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NCIA/ACQ/2016/1406
28 July 2016

To : Distribution List

Subject : **Amendment 2 to IFB-CO-13859-TRITON**
Answers to Clarification Requests and Changes to IFB Documentation

Provision of Functional Services for Command and Control of Maritime Operations (TRITON), Increment 1

Reference(s) :
A. AC/4-D/2261 (1996 Edition)
B. AC/4-D(2008)0002-REV1 and AC/4-D(2009)0002
C. NSIP Project Serial 2011/0IS03081
D. AC/4(PP)D/26970-ADD3
E. AC/4-DS(2016)0005
F. NCI Agency NOI NCIA/ACQ/ASG/2014/6288, dated 24 Sep 2014
G. NCI Agency NOI AMD 1 NCIA/ACQ/ASG/2015/1499, dated 29 Sep 2015
H. Issuance of IFB-CO-13859-TRITON dated 17 May 2016
I. Issuance of IFB-CO-13859-TRITONm Amd. 1, dated 8 Jul 2016

Dear Sir, Madam,

1. The purpose of this Amendment to IFB-CO-13859-TRITON is to provide all prospective bidders with the NCI Agency answers to additional Clarification Requests received for subject IFB. The Purchaser provided clarifications are issued as Annex A to this letter and will also be made available for download via the TRITON IFB Portal.

2. As a result of the clarifications provided herein, the following IFB documents have been revised. By virtue of this Amendment they replace and supersede any previous version issued in the context of IFB-CO-13859-TRITON:

   a. 03-IFB-CO-13859-TRITON-Book I-Annex A-Bidding_Sheets_v1.2.xlsx

   b. 04-IFB-CO-13859-TRITON-Book II-Parts I_and_II_Prospective Contract_v1.2.pdf

   c. 06-IFB-CO-13859-TRITON-Book II-Part IV-SOW_v1.2.pdf

   d. 07-IFB-CO-13859-TRITON-Book II-Part IV-SOW-Annex A-SRS_1.2.pdf

   e. 08-IFB-CO-13859-TRITON-Book II-Part IV-SOW-Annex B-Work_Packages_v1.2.pdf

   f. 09-IFB-CO-13859-TRITON-Book II-Part IV-SOW-Annex C-Requirements Implementation Schedule_v1.2.xlsx

NATO Communications and Information Agency
Agence OTAN d'information et de communication
Avenue du Bourget 140
1110 Brussels, Belgium
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3. Except for changes made to the Bidding Sheets and Requirements Implementation Schedule, all modifications to the documents have been highlighted. For ease of reference, both marked and unmarked files are provided in PDF.
4. All amended documents are available for download via the TRITON IFB Portal at: https://ifb.ncia.nato.int
5. Following receipt of a request by a NATO Delegation, the Bid Closing date of IFB-CO-13859-TRITON is extended in accordance with reference A to:

Friday, 23 September 2016, 12:00 Hours (Brussels Time).

6. Except as provided herein, all other documents of IFB-CO-13859-TRITON remain unchanged from their original version as issued on 17 May 2016.
7. The Purchaser Point of Contact for this IFB is

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FOR THE GENERAL MANAGER

P. Scaruffy

Peter Scaruppe
Director of Acquisition

Attachments:

A) Questions and Answers to IFB-CO-13859-TRITON, Amendment 2
B) Revised Bidding Documentation as per para 2

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NATEXs

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Index No.	IFB Source Document	IFB Paragraph Reference	Bidder's Question	Purchaser's Answer	IFB Package Amended	CR Released in AMD #
CR#3	Book I - Bidding Instructions	Book I, Part I, 2.6.2	Para 2.6.2 of the Bidding Instructions indicate that questions and clarification requests to the Purchaser be made by using ANNEX E to Book I, Bidding Instructions. The reference to ANNEX E seems to be incorrect and should read ANNEX F instead. Can you please confirm.	The Purchaser confirms that the reference is incorrect and that the correct reference is ANNEX F.	Yes	**AMD2**
CR#4	Book I - Bidding Instructions	Book I, Part I, 4.5.2.11.2	Para 4.5.2.11.2 of the Bidding Instructions instruct Bidders to submit a detailed specification sheet for each COTS Hardware equipment proposed. Please send us the structure of this "detailed specification sheet" you require bidders to provide as part of their bid.	The Purchaser has no specific request for the hardware specifications other than the commercial specification attributes.	No	**AMD2**
CR#5	Book I - Bidding Instructions	Book I, Part I, 3.6.3.6.3 Book II, Part TBD	Para 3.6.3.6.3 of the Bidding Instructions requests Bidders to provide a Requirements Traceability Matrix as part of their Bid. It is our understanding that you are using DOORS for this purpose. Could you please make the DOORS Module available or export the DOORS content in the Requirements Interchange Format?	The DOORS module for SRS will be provided to the Contractor after the Contract Award. RIS has been generated from DOORS. Please also see Technical CR#80.	No	**AMD2**
CR#6	Book II - Contract Special Provisions	Book II, Part II, Article 23	We assume that the Liquidated Damages stated in clause 23 are the sole and exclusive remedy? Please confirm that our understanding is correct?	This assumption is not correct. The Prospective Contract (Contract Special Provisions and Contract General Provisions) provides the Purchaser with remedies other than Liquidated Damages, such as Termination for Default.	No	**AMD2**
CR#7	Book II - Contract General Provisions	Book II, Part III, Article 6.2, 8., 9. and 10	Can we consider that bidder's affiliates within the NATO Participating countries will not be classified as Sub-Contractors and insofar it is not necessary to name the legal entities.	The Bidder does not provide any definition of what constitutes a "bidder's affiliate" or in what terms the definition of a bidder's affiliate is different from that of a sub-contractor. In absence of any formal definition, the Purchaser must assume that Bidders affiliates are to be considered sub-contractors in accordance with the terms and conditions of the prospective contract as they are different legal persons than the prime contractor.	No	**AMD2**
CR#8	Book II - Contract Special Provisions	Book II, Part II, Article 28	The bidder carefully restricts the access to Confidential information. Can we consider that bidder's affiliates will not be classified as a third party and therewith a transfer of confidential information is permitted?	Clause 28 does not forbid transfer of confidential information but specifies restrictions to be observed by the Contractor with regards to the handling and distribution of confidential information, including compliance with security regulations. It is understood that subcontractors, including affiliates, working on the contract will need to have access to information for carrying out the work. The Contractor is responsible for meeting all contractual requirements regarding security and use of confidential information.	No	**AMD2**
CR#9	Book II - Contract Special Provisions	Book II, Part II, Article 23	It is a legitimate interest of the Contractor to limit its liability for slight negligence. We suggest that the liability for slight negligence will be limited to 50% of the TCV and the liability for indirect damages will be excluded.	The proposed change is not acceptable to the Purchaser. Bidders are invited to review the limitations existing in Belgian law regarding limitation of liability.	No	**AMD2**
CR#10	Book II - Contract General Provisions	Book II, Part III, Article 6.2, 8., 9. and 10	We see no need to disclose prices we have agreed with our Sub-Contractors (comp. clause 10.5 CGPs). Please confirm our understanding that prices have to be only disclosed if there is any need therefore.	Bidders are required to provide sub-contractor costs for labour and material as part of their bid submission (Bidding Sheets, CLIN Break-Down sheets).	No	**AMD2**
CR#11	Book II - Contract General Provisions	Book II, Part III, Article 6.2, 8., 9. and 10	We see no possibility to disclose prices with our SubCo, if the SubCo is an affiliate (comp. clause 10.5 CGPs). Please confirm our understanding that there is no need to disclosed our internal pricing	Please see answers to CR#7 and CR#8.	No	**AMD2**
CR#12	Book II - Contract Special Provisions	Book II, Part II, Article 27.5	The Contractor notes that this Special Condition is largely unchanged from General Condition 30. Accordingly, the terms do not contemplate solutions that include the Contractor's commercial off the shelf or other pre-existing products (which would be treated as Contractor Background IPR) which may be subject to standard commercial license terms and fees. The Contractor notes that Clause 27.5 allows for the costs in respect of any third party licensed IPR to be chargeable but does not allow the Contractor to recover any of its own product investment: it's Background IPR which "shall be free of any charge to the Purchaser". This would appear to disadvantage those Contractors that might have existing developed products to offer as a solution, even though such a proven product would significantly de-risk the development of that part of the solution for the Purchaser. We also note however A.4.3.2 Section 1 – CLIN Summary Pricing Requirements states that: "All costs associated with the performance of the CLINs including but not limited to those associated to COTS, Third Party or Background Intellectual Property Software (including license acquisition costs and recurrent fees) necessary to successfully perform the scope of the CLIN in accordance with the technical proposal shall be included in the bid prices quoted." a) The Contractor requests that the Purchaser modify Special Provision Clause 27.5 to remove "free of any charge" wording and enable the Contractor to licence its Background IPR to the Purchaser on a chargeable basis. b) We seek further information from the Purchaser regarding the wording relating to distribution of the Contractor's Background IPR including for the nature of "exploitation" contemplated and the meaning of "for national purposes".	Clause 27.5 of the Contract Special Provisons and Clause 30 of the Contract General Provisions of the prospective contract define the scope of the license the Purchaser requests for Background IPR. The Purchaser does not expect to receive this license to Background IPR at no cost and expects the Contractor to price this cost as part of his Price Bid in accordance with the pricing instructions detailed in Annex A-2 of the Bidding Instructions. However, the Purchaser will not accept to pay any additional costs for the use of Background IPR. The Purchaser thus rejects the proposed rewording of Clause 27.5. With regards to the request for clarification on use of Background IPR for national purposes: TRITON as a software solution is procured by NCI Agency on behalf of NATO and its NATO Member Nations and should thus be free of charge to use for all NATO Member Nations for any defence purpose. Considering that the software to be developed will be fully owned by NATO, the point is to ensure that NATO and the NATO Nations will also be able to use any background needed to use the foreground with no additional costs and/or limitations.	No	**AMD2**
CR#13	Book II - Contract Special Provisions Book II - Contract General Provisions	Book II, Part II, Article 27.5, 27.6, and 27.8 Book II, Part III, Article 6.2, 31.6, and 32.11	Elements of the Contractor's Triton solution are governed by certain applicable export control regulations. While there are no export control restrictions anticipated for the NATO Nations and many of the Purchaser's existing suppliers; ensuring the proposed re-transferees of Contractor's export controlled data are authorized under those regulations is not currently provided for in the Special Conditions. a) In order that the Contractor can comply with its obligations to secure the appropriate export licenses for all proposed recipients of the export controlled elements of the Triton solution, can the Purchaser please confirm that the Contract will be modified to include provisions whereby the Contractor is given due notice of any proposed re-transferees so that the necessary licenses can be applied for? b) For those elements of the Contractor's existing product that are subject to certain international export regulations, the provision of Source Code is strictly prohibited. Therefore any Foreground IPR created by modification of these products could only be provided to the Purchaser as Object Code. Please can the Purchaser confirm that it understands this restriction and accepts that the delivery of Foreground Data relating to such controlled product in this manner would be considered contractually compliant? c) Please can the Purchaser also confirm that should the Export authorities refuse to grant export approval for any Party (nation or supplier), any resulting failure to deliver would be considered an event of Force Majeure under Clause 39.6.1 and not a contractual breach by the Contractor?	The Purchaser recognizes that the Bidder's solution might be governed by supplemental agreements such as export control regulations and recognizes the restrictions associated with them. The Purchaser agrees to add the following clauses 27.9 and 27.10 to the Contract Special Provisions: *27.9 The Purchaser will inform the Contractor of any transfer of Contractor Background IPR in accordance with Clause 27.5 and 27.6 of this Article 27, in order for the Contractor to obtain all necessary export licenses.* *27.10 The Contractor shall promptly notify the Purchaser of any refusal or rejection by national authorities for transfer of Contractor Background IPR in accordance with Clause 27.5 and 27.6 of this Article 27. In the case of such rejection or refusal, the Contractor shall not be held accountable for any failure to perform if the refusal is solely due to restrictions imposed by supplemental agreements and not due to negligence on the side of the Contractor.*	Yes	**AMD2**

CR#14	Book II - Contract Special Provisions	Book II, Part II, Article 8.5.2	The Contractor has a developed solution that it would wish to offer in partial satisfaction of the requirement for the Visualisation Component. It is recognised that under Clause 8 the Purchaser wishes to be free to both adapt and modify the component itself and also allow its other suppliers to utilize and make changes to the component. The current drafting provides for the component to be treated as Foreground IPR which is effectively requiring the Contractor to assign the rights and ownership in the Contractor's existing product to the Purchaser. This would also preclude the Contractor from continuing to develop and exploit its existing product for its own purposes outside of the NATO customer group without the Purchaser's prior approval. However there is also drafting at clause 8.5.5 suggesting the Contractor is licencing the Foreground IPR. a) Please can the Purchaser clarify its intentions in this regard, noting that the Contractor would wish to retain sufficient rights to continue to develop and exploit its Background IPR without requiring the consent of the Purchaser? b) Would the Purchaser consider an alternative approach which recognizes and respects the intentions of the Purchaser, but allows the Contractor to retain ownership of its Background IPR? This could be achieved by the Contractor offering the Purchaser (and allowing the Purchaser to sub-licence to other suppliers) a wide license on a perpetual, irrevocable and royalty free basis to use, adapt and modify the Visualisation Component for NATO end use? c) Should this not be acceptable to the Purchaser, please can the Purchaser confirm that it is willing to modify clause 8.5.6 at Contract award so that the Contractor is granted such required Purchaser permission and sufficient licence rights at the effective date of the Contract, so that the Contractor may thereafter use the Visualisation Component without requiring further consent? d) Where the Contractor retains ownership, this model would enable NATO to benefit from enhancements and updates made in the Contractor's Visualisation Component. However, it is also noted that by virtue of the proposed Contract conditions, the Visualisation Component would not be covered by the Support model. Can the Purchaser please confirm its intent in this regard should the proposed alteration of the licencing model be acceptable and attractive to NATO?	Due to the Purchaser's needs regarding the development, maintenance and use of the C4ISR Visualization Component, the Purchaser rejects the license-based approach described. The Purchaser needs to be freely able to use and continue to develop the Viz Component without any limitations. This also includes access and provision of the source code. The Purchaser will not oppose Contractor to continue developing this tool as a separate version outside of the prospective contract.	Yes	**AMD2**
CR#15	Book II - Contract Special Provisions	Book II, Part II, Article 27.6	Clause 27.6 provides NATO with the ability to further distribute the Contractor's Background IPR to third parties eligible to take part in NATO procurements. As this is in advance of any contract for development, such release is not tied to a NATO end use. a) The Contractor would propose that only sufficient information to enable development of incremental capabilities using the published interfaces extracted from the Contractor's Background IPR should be released. Please can the Purchaser modify clause 27.6 to ensure the Contractor's Background IPR is protected? b) Please can the Purchaser confirm the intention of such wider distribution in relation to future increments of the Triton system is to address additional requirements and to make use of published programming interfaces solely for NATO use and not for the nations to use for national purposes?	The licence is aimed at allowing third parties to further develop TRITON and to allow this third party to access the Background IPR if this is required to further develop TRITON. The Background IPR would in this case be provided by NATO under the limitation that the Background IPR would only be used for the purpose of further developing TRITON.	No	**AMD2**
CR#16	Book II - Contract Special Provisions	Book II, Part II, Article 27.3	Please can the Purchaser clarify that the wording "any derivative product" shall only refer to the newly developed IP (Foreground IPR) and not the overall package of Background and Foreground IPR?	A derivative product would also cover new modules added to the Contractor Background IPR for the purpose of developing TRITON as well as any element added to the source code having the Background IPR as part of the work to be carried out under the Prospective Contract.	No	**AMD2**
CR#17	Book I - Bidding Instructions	Book I, Part I, 3.6.4.4	The Instructions for Bidders ask for a Draft Project Management Plan as part of the Management Proposal Package. Statement of Work requirement 3.13.2.1 asks for a Quality Plan to be delivered with the PMP. Can the Purchaser please clarify that a Draft Quality Plan is only required to be delivered under contract and not as part of the IFB response submission?	PMP may include some principles regarding the Quality Management System. Depending on the Bidder's own quality system, a separate QP may be prepared. QP needs to be delivered at PMR.	No	**AMD2**
CR#18	Industry Day Slides		Will NCI Agency contract IV&V independently or shall it be included as part of the TRITON bid response?	Bidders shall only include the specified requirements related to IV&V testing activities in their Bids. IV&V Support, which is a separate Project Work Package as stated in TBCE, is not requested in this IFB.	No	**AMD2**
CR#19	Book I - Bidding Instructions	Book I, Part I, 4.5.3.2.3	Regarding 4.5.3.2.3., is it acceptable that some of the evidences of relevant and recent experience is presented by one of the major sub-Contractors, not only in regard of the 4th bullet (specific corporate experience of the major sub-Contractors) but in other items as well?	Paragraph 4.5.3.2.3 specifically addresses relevant and recent experiences of the Prime Bidder. The Purchaser would also like to draw attention to the fact that the Prime Bidder Qualifications based on corporate experience, corporate structure and capabilities are included in the evaluation criteria as listed in Paragraph 4.2.7.6.1, bullet 4, of the Bidding Instructions. While the Bidder may satisfy this requirement by listing relevant experience of sub-contractors, this will have an influence on the Bidder's Technical Score.	No	**AMD2**
CR#20	Book I - Bidding Instructions	Book I, Part I, 4.5.3.2.3	Please detail what is considered as "Relevant and successful experience and expertise in export control".	Bidders should demonstrate that they have a clear understanding of applicable national export control regulations or other technology transfer restrictions and should provide evidence of pertinent recent experience with government authorities regarding export control issues handled or resolved during delivery or implementation of military-based systems, and/or the existence of a company export control expert or office to deal with such issues.	No	**AMD2**
CR#21	Book II - Contract Special Provisions	Book II, Part II, Annex F	Shall the information to be included in the list of purchaser provided items contain all the servers and other hardware components required for the proposed architecture of the environments of the TRITON project?	Annex F, List of Purchaser Provided Items, will be completed by the Purchaser and the Winning Bidder during Pre-Award discussions. It will contain all identified items furnished by the Purchaser and given to the Contractor and required for the execution of the Prospective Contract. The Purchaser confirms that the hardware infrastructure required for TRITON at all installation sites (with the exception of the TRITON Deployable Kits) will be provided as Purchaser Furnished Property.	No	**AMD2**

CR#22	Book II - SOW	Book II, Part IV, 3.3.7	It is mentioned that project work shall be carried out in the Contractor's premises. Assuming the need for remote access to the NCI Agency network for interfaces development purposes (among others), will the Purchaser provide the physical conditions and supported VPN remote access tools to connect to this infrastructure?	The Purchaser will provide remote access to the Test Systems in PMIC.	No	**AMD2**
CR#23	Book I - Bidding Instructions	Book I, Part I, 2.1.1.1	In the case of the Bidder being a consortium, a principal contractor shall be vested with a full power of authority to act on behalf of all members of the consortium. Please, clarify what kind of document will be recognized by NCIA. Please, confirm that such document should be submitted in the administrative package.	The Purchaser confirms that this proof of power of attorney shall be submitted as part of the administrative bid package, in conjunction with a completed and signed Annex B.1, Certificate of Legal Name of Bidder in the name of the consortium. This confirmation can be submitted as a standard power of attorney granted by all members of the consortium to the principal contractor for all decisions governing the contract.	No	**AMD2**
CR#24	Book I - Bidding Instructions	Book I, Part I, 3.6.3.3	It is requested a System Requirements Specifications (SRD)	Incomplete CR. Bidder has been requested to provide completed CR.	TBD	**TBD**
CR#25	Book I - Bidding Instructions	Book I, Part I, 3.6.3.11.2	It is requested that the SIP should include a draft of generic site survey workbook. Please, confirm that SIP is the "Service Interface Profiles" as per 4.9.2.17.2. Please, confirm that the SIP should include the a draft of "site survey workbook" as per 4.13.2.7 . Please, confirm if any of those documents should be included by the Bidder in its Bid.	The editorial error for the acronym is corrected in Paragraph 3.6.3.11.2 as "STrP".	Yes	**AMD2**
CR#26	Book I - Bidding Instructions	Book I, Part I, 4.1.7	Please provide procedures AC/4-D(2008)002	Document: AC/4-D(2008)0002 Procedures and Practices for Conducting NSIP International Competitive Bidding Using Best Value Methodology Bidders should get access to this document through their national sources.	No	**AMD2**
CR#27	Book I - Bidding Instructions	Book I, Part I, 4.2.7.5.1	Concerning to the evaluation of technical sub-criteria in engineering. Please, describe how is going to be qualified items like "effectiveness and robustness of the proposed system design" or "flexibility of data and object models"	*Effectiveness and robustness of the proposed system design:* This criterion refers to the level of product maturity perspective, for instance whether the solution is based primarily on software developed "green field" or based on existing, tried and tested capabilities and components and/or COTS products. A design based on mature and existing capabilities will be preferred. The robustness of the design will be evaluated according to the framework used, SOA perspective and compliance to non-functional requirements and design constraints. *Flexibility of data and object models:* Initial high-level Data Model and compliance to the requirements regarding the Information Objects such as Maritime Operational Objects, will be examined to see if they consider basic software quality factors such as data management efficiency, storage efficiency, commonality across multiple TRITON instances, future expendability, efficient adaptation of existing models to the requirements.	No	**AMD2**

Index No.	IFB Source Document	IFB Paragraph Reference	Bidder's Question	Purchaser's Answer	IFB Package Amendment Required	CR Released in AMD #
CR#3	Book I - Bidding Sheets	Bidding Sheets, CLINs 5.10.2, 5.10.3 and 5.10.1, 5.10.2, 5.10.3 Book II, Part IV, 4.13.6.7	CLIN items 5.10.2 and 5.10.3 imply SiAT being performed as part of Organizational Node Activation. This appears to be at odds with the SOW 4.13.6.7, which makes no mention of SiAT, but does require On-site UAT, which is not mentioned under CLIN 5.10. Please can the Purchaser provide clarification as to what is required for these CLIN items? Note also that the SOW and WP references for these CLIN items appear to be incorrect: CLIN 5.10.1 refers to SOW 4.13.6.9, which is Software Distribution List CLIN 5.10.2 refers to SOW 4.13.6.8, which is KPIs CLIN 5.10.3 refers to SOW 4.13.6.8.4 , which does not exist Note also that a number of SOW and WP references under CLINs 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9 are also incorrect - it would seem that the SOW and WP documents may have been changed after these CLIN references were recorded. (For example, CLIN 5.3.2 refers to SOW 4.13.6.3.1/WP 9.3.4.3, but it should probably refer to SOW 4.13.6.1/WP 9.3.3.1; CLIN 5.3.2 refers to SOW 4.13.6.8.2/WP 9.3.8.2 but it should probably refer to SOW 4.13.6.6.2). Can the Purchaser please re-validate the cross-references for CLIN 5?	CLIN 5.10 items and references have been corrected according to SOW and WP. SOW and WP references for CLINs 5.3 through 5.9 have been corrected.	Yes	**AMD2**
CR#4	Book I - Bidding Sheets	Bidding Sheets, Schedule of Forward Labour Rates	The bidding sheets include Forward Labour rates for the various Labour Categories defined in the IFB. Where sub-contractors are also involved, can the Purchaser please advise if additional sheets or additional rows can be included to allow the Forward Labour rates for each party to be included?	The Schedule of Forward Labour Rates should list all labour resources (prime and sub-contractors) required for the execution of Work under the prospective contract. For this purpose, Bidders may add additional lines in Section 2, or add additional sheets in Section 2, i.e. 2b, 2c, etc.	No	**AMD2**
CR#5	Book I - Bidding Sheets	Bidding Sheets	There are a number of CLINs that are "NSP" - not separately priced, but it's not clear where the NCI Agency expect this activity to be priced. For example, there are a number of management processes (Project Management Process, Risk Management Process, Quality Management Process, etc.) that are to be delivered "Until FSA", but there are no other "Until FSA" deliveries in Work Package 1 that can be used for pricing. Can the NCI Agency please advise how to price each of the "NSP" CLINs?	The NSP CLINs in the bidding sheets represent overarching processes for which the Contractor shall be responsible as part of the execution of the work under the prospective Contract. All deliverables that are part of this process are listed as separate CLINs within the same high level CLIN and the Purchaser expects the costs for the overarching process to be included in the CLINs of the actual process deliverables.	No	**AMD2**
CR#6	Book I - Contract Special Provisions	Book II, Part II, 13.7	The clause for escalation of Labour Rates is based on either the Labour Cost Index for Belgium or the Bidder's national Labour Cost Index. Where a Contractor has Sub-Contractors in different countries, can the different Contract and Sub-Contractor Labour Rates use their appropriate national Labour Cost Index rather than being based on a single rate?	Depending on the extent of sub-contractor involvement in the resulting contract, the Purchaser is willing to consider the use of the respective national labour cost index of the sub-contractor. If applicable, changes to Article 13.7 to this effect will be made during pre-award discussions.	No	**AMD2**

CR#7	Book I - Bidding Sheets	Bidding Sheets	The Bidding Sheets appear to contain the following reference errors: CLIN 2.2.4 appears to be a duplicate of CLIN 2.2.5 (both ICD). The SOW and WP references are identical. CLIN 3.4.2 appears as Software Architectural and Detailed Design and then again as Hardware Requirements Analysis and Design (i.e. the same CLIN number is used for two distinct CLINs and sub-CLINs). Can this be resolved (it will also impact other CLINs within Build Process 4) CLIN 6.3.3. The WP reference should be 10.1, not 9.1 CLIN 11.1.1: The WP reference should be 15.3.1, not 13.3.1 CLIN 11.5.2: The Description should read "High-level System Requirements Review Report (HL-SRR-R)", not "High-level System Design Review Report (HL-SDR-R)" CLIN 5.13.3 references Work Package 9.4.5. The correct reference is 9.4.6 CLIN 5.13.4 references Work Package 9.4.5.1 The correct reference is 9.4.6.2 CLIN 5.13.5: The WP reference (9.13.15) does not exist. Please provide a valid reference (e.g. 9.3.15) CLIN 5.14.1: The WP reference (9.13.14) does not exist. Please provide a valid reference (e.g. 9.3.14) Can the Purchaser please revalidate the above references?	The Bidding Sheets have been corrected.	Yes	**AMD2**
CR#8	Book II - SRS	Book II, Part IV, Annex A, T1-R11956	Requirement T1-R1956 states: “TRITON shall be equipped with security software that can detect malicious software contained in files of TRITON-delivered workstations and servers. The software shall have the ability to scan any file or directory to detect any malicious software. The supplied software shall be compatible with the NATO Anti-Virus management centre and approved by the Purchaser”. It’s our assumption that this shall be provided by the Purchaser as GFE. If that’s not the case not: • Should this be quoted in the Work Package 9? • How many servers and workstations should be supported?	Security software will be provided by the Purchaser for the static sites. The Contractor will provide the security software for TDKs and Test Systems. They will be quoted in Section 3 of the Bidding Sheets. License Costs for security software for the static systems must also be quoted as part of optional Work Package 9 (CLIN 9.4.1 - COTS Products List) for 2 installations with the requirements stipulated in para 13.3.1.3 of Book II, Part IV, Annex B (Work Packages).	No	**AMD2**
CR#9	Book II - Work Packages	Book II, Part IV, Annex B, 7.3.2.4	It’s our understanding that COTS licenses for TDK servers shall be provided by the contractor according to what is stated in paragraph 7.3.2.4. Please confirm that this assumption is correct and that it should be quoted under CLIN 3.4	That is correct.	No	**AMD2**
CR#11	Book II - Work Packages	Book II, Part IV, Annex B, 7.3.2.4	Please confirm that no client COTS should be quoted client workstations for TDKs.	Work Packages, Paragraph 7.3.2.5 is modified as follows: *"The Purchaser will provide MS Office applications for TDK Client Laptops and Workstations."*	Yes	**AMD2**

CR#12	Book II - Work Packages	Book II, Part IV, Annex B, WP 9	It's our understanding that all COTS products to support TRITON Operational Software (Databases, backup, Virtualization, OS, etc.) will be purchased by NATO (except for the TDK servers). WP9 only covers the contractor's support to NCIA to purchase those licenses. That is, COTS licenses acquisition costs shall not be quoted in WP9. Please confirm if this assumption is correct.	This assumption is incorrect. The Purchaser intends to provide the COTS software to support the TRITON Operational software at all installation sites but reserves the right to exercise optional Work Package 9 either fully or partially in case the Purchaser is unable to provide certain COTS software or requires additional quantities not initially foreseen. Thus, as part of Optional Work Package 9, bidders are required to price the deliverables specified in para 13 of Book II, Part IV, Annex B (Work Packages) which includes a COTS products list (clin 9.4.1). Bidders are further required to complete Section 3 of the Bidding Sheets by listing the COTS software priced in CLIN 9.4.1 in accordance with Para A.4.7.2 of Annex -2 to the Bidding Instructions.	No	**AMD2**
CR#13	Book II - SOW	Book II, Part IV, 2.4	Please confirm that SRS is the "System Requirements Specifications" in the whole bidding document, except in SOW 2.4, where SRS is defined as "Security Requirements Statement".	SRS stands for System Requirements Specification in the IFB context. Please see Technical - CR#2. Only the referenced document uses the acronym "SRS" for Security Requirements Statement.	No	**AMD2**

Index No.	IFB Source Document	IFB Paragraph Reference	Bidder's Question	Purchaser's Answer	IFB Package Amendment Required	CR Released in AMD #
CR#17	Book II - SRS	Book II, Part IV, Annex A, 4.3.2.1 T1-R890	With regards to the Portrayal Catalogue, ISO 19117 defines an abstract model not an ICD. Can the Purchaser please provide clarification as to what ICD (or implementation profile) is being requested here, specifically to include what protocols and bindings are being requested?	ISO 19117 is not a firm requirement and may be considered one potential solution. The specific model for the catalogue and the ICD are not defined and left to the Bidder to define. This catalogue and ICD are expected to be utilized by thick and thin applications and must provide value in this context. A sample interface and model could be derived from NATO's existing Symbology Server. Specifically the Symbology Server Hierarchy Interface best correlates to the Portrayal Catalogue concept.	No	**AMD2**
CR#18	Book II - SRS	Book II, Part IV, Annex A, 4.3.2.1 T1-R898	Can the Purchaser please specify the format required for the "tile map"? For example, this could be an HTML image map, a CSS, etc. It would be useful if the Purchaser could also provide a use case to explain the intended use.	The Bidder can specify the model and encoding of the "tile map" taking into consideration that the "tile map" should be easily processable by various thin and thick applications and sufficient to identify all constituent parts (main, echelon, mobility, flag, etc.) of a point symbol from in the sprite sheet. Previous works have encoded such a tile map in JSON and XML, but this is not mandated.	No	**AMD2**
CR#19	Book II - SOW	Book II, Part IV, 7.1.3	The SOW states that documents shall not be marked with corporate logos or contain warnings limiting the rights to use or reproduction. Documentation for COTS software is likely to include logos and/or warning limits to the rights of use or reproduction. Can the Purchaser please confirm that providing such documentation is exempt from this restriction? Documentation for military software may be required to be marked with warnings limiting the rights of use or reproduction in order to conform with national legislation or export controls or in accordance with supplemental agreements that will be documented in response B.7 of the bid response. Can the Purchaser please confirm that providing such documentation is exempt from this restriction?	Paragraph 7.1.3 is modified as follows to clarify such an exemption: *"Documents shall not be marked with corporate logos or contain warnings limiting the rights to use or reproduction. Documentation for COTS software or military software whose distribution is governed by national legislation or export control restrictions are exempt from this restriction."* Additionally, an editorial correction is made on Paragraph 7.1.7.	Yes	**AMD2**
CR#20	Book II - SOW	Book II, Part IV, 3.5.6.4 and 6.8.1	Book II, Part IV, SOW Para 3.5.6.4 states that the ILS Engineer shall meet the qualifications of the Senior ILS Engineer as specified in 6.8.1. Please provide the qualifications requirements for the Senior ILS Engineer since they do not exist in Para 6.8.1 or in any other place within the IFB documents.	The reference in SOW 3.5.6.4 is corrected as follows: "*The ILS Engineer shall meet the qualifications of the Logistics Management Specialist as specified in 6.5.1."*	Yes	**AMD2**
CR#21	Book II - SRS	Book II, Part IV, Annex A, Various	A significant number of requirements are tagged “finalise at design review”. Many of these requirements have significant price implications and are not appropriate to a firm price proposal, please can the Purchaser advise how the Contractor should bound their scope of supply and price for such requirements?	The system-level requirements are defined at SRS as part of the SOW. There is a System Requirements Analysis Phase and a System Architectural Desing Phase, followed by five separate Software Requirements Analysis and Design phases. These standard development phases will enable both the Purchaser and the Contractor to determine the detailed software requirements and ultimate capabilities of the delivered product. The system-level specification given in the SRS does not provide all details such as data models, processing algorithms, lower level performance criteria, user data entry options, user interface design, system configuration parameters, detailed mode change rules, warning events, detailed hardware specifications, operation under low bandwidth and software quality factors. These subjects can be addressed during the formal analysis and design phases based on the maturity of the proposed solution. Implementaion-specific details will be finalised at the relevant analysis and design reviews of each Build Process. The Purchaser expects to acquire a product compliant to the minimum specifications given in the IFB. However, the Purchaser may also consider and propose any improvements or adaptations on the requirements during the software requirements analysis for each Build Process. The Purchaser provided Comments for some of the requirements in the SRS with the intention to inform the Bidders that a more detailed analysis on the subject will be required for the actual implementation. However, the scope and the system-level requirement will not be changed.	No	**AMD2**
CR#22	Book II - SOW	Book II, Part IV, Table 7-1	Can the Purchaser please confirm that the quality standard for 4.6.3 in Table 7-1 of the SOW should read 'SOW', and for 4.6.4 should read 'ISO 9241:2010'. (note ISO 13407:1999 is obsolete).	Reference correction: In Table 7-1, the Quality Standards for RIS and UEP are changed to "SOW" and "ISO 9241:2010" respectively.	Yes	**AMD2**

CR#23	Book II - SOW	Book II, Part IV, 4.15.3.2	Can the Purchaser confirm that On-the-job (OTJ) Training is only required for Exercises?	Paragraph 4.13.6.7.14 states that OJT shall be provided on the selected locations during Organizational Node Activation. Work Packages, Paragraph 9.3.9.2 lists the Authorised Locations at which Organizational Node Activation will be performed. For further clarification, Paragraph 4.13.6.7.14 is modified as follows: *"The Contractor shall provide On-the-Job Training (OJT) to the operational users at the Authorised Locations as described in Paragraph 5.8.9. OJT shall be provided on the following conditions:* *- During the Organizational Node Activation for the first delivery* *- During the Organizational Node Activation for the subsequent deliveries and maintenance releases.* *- Before participating the three (3) exercises during the OT&E Period."*	Yes	**AMD2**
CR#24	Book II - SOW	Book II, Part IV, 5.2.7	Can the Purchaser provide a copy of the "NCI Agency SLA Template"?	The requested template was provided with IFB-CO-13859-TRITON, Amendment 1.	No	**AMD2**
CR#25	Book II - SOW	Book II, Part IV, 3.13.1.2	This SOW clause states "The Quality Management System shall be based on AQAP-2110 and AQAP-2310 which incorporates by reference ISO 9001:2008, and on AQAP-160. " Please can the Purchaser confirm that this should read AQAP-2210 (as referenced by 3.13.2.4, 3.13.3.1, 3.13.3.2) rather than AQAP-2310? (AQAP-2210 defines supplementary requirements for software development.)	AQAP-2210 is intended for use with AQAP-2110 as a software specific and project oriented supplement. For software development activities, AQAP-2210 will be applicable. Since this acquisition project defines a system perspective which includes hardware development as well as software development, and anlso includes services to be delivered, a Quality Management System based on only AQAP-2210 will not be sufficient. For clarification purposes, Paragraph 3.13.1.2 is modified to include AQAP-2210 as a reference to be used during the preparation of Quality Management Process: *"The Quality Management System shall be based on AQAP-2110, AQAP-2210 and AQAP-2310 which incorporates by reference ISO 9001:2008, and on AQAP-160."*	Yes	**AMD2**
CR#26	Book II - SOW	Book II, Part IV, 5.7.2.3.9	Please define “The NCI Agency The Hague” business hours for: a) Days per week b) Non-working days such as Public Holidays	Paragraph 5.7.2.3.9 is modified as follows: *"The Service Desk shall operate eight (8) hours per day during the NCI Agency The Hague business hours (Monday to Friday, 09:00 to 17:00, except non-working days such as Public Holidays)."*	Yes	**AMD2**
CR#27	Book II - RIS Book II - SOW	Book II, Part IV, Annex C, Instructions, Worksheet Row 17 Book II, Part IV, 1.6.10	The RIS (Reference 1) suggests that “Not Implemented" is an acceptable response to a system requirement. However the SOW (Reference 2) states "The Contractor shall implement all TRITON system requirements stated in Annex- A, System Requirements Specification (SRS)." Please can the Purchaser confirm that "Not Implemented" is an acceptable response to a system requirement and that an “X” in the column "Not Implemented" when referring to a “shall” requirement (indicating that the Bidder is declaring that the proposed solution will not cover this requirement) will not result in the exclusion of the bidder from the competition?	Explanation in RIS, Instructions, Line 17 is valid. It doesn't imply that the response to a system requirement is acceptable. A Bidder should provide a Change Proposal to a system requirement that is marked as "Not Implemented". The Change Proposal will be considered during the Technical Evaluation (as described in Bidding Instructions). In principle, all system requirements must be implemented; partial scope coverage is not acceptable. Therefore, marking a system requirement as "Not Implemented" without a proposed change will result in a lower technical score or may render the bidder non-compliant with the technical requirements of the IFB.	No	**AMD2**
CR#28	Book II - SRS	Book II, Part IV, Annex A, 5.1.3.5.1	SRS 5.1.3.5.1 references the withdrawn ISO 9241 parts 10-17. Can the Purchaser please confirm that ISO 9241-210 is the recommended standard?	Paragraph 5.1.3.5.1 of the SRS is modified as follows to indicate the reference: *"These principles are mainly the ones standardised in [ISO 9241-210]".*	Yes	**AMD2**
CR#29	Book II - SOW	Book II, Part IV, 4.12.12.5.3	SOW 4.12.12.5.3 states that "The UAT shall be based on the requirements defined in the Stakeholder Requirements Specification (StRS) document provided by the Purchaser." Can the Purchaser please provide the StRS to bidders in order that the scope and costs associated with the UAT may be accurately assessed?	The StRS document will be made available to the Contractor after the Contract Award. It contains high level user requirements which the System Requirements Specification has been derived. The Acceptance Criteria based on the proposed solution for UAT will be finalised at SRR. UAT Procedure preparation is explained in SOW, Paragraph 4.12.12.5.5. The SRS contained in the IFB is deemed to be sufficient to estimate the effort for preparing the draft UAT Procedure. The Purchaser will finalise it with the User Community.	No	**AMD2**
CR#30	Book II - SRS	Book II, Part IV, Annex A, [T1-R626] and [T1-R628]	Can the Purchaser please explain the difference in intent between the similarly worded requirements [T1-R626] and [T1-R628]?	These two requirements are modified as follows: *[T1-R626] TRITON shall display only the information allowed for a particular user to view according to the viewing permissions assigned to that user.* *[T1-R628] TRITON shall display only those functions enabled for a particular user according to the execution permissions assigned to that user and provide access to them.* RIS is also modified accordingly.	Yes	**AMD2**

CR#31	Book II - SRS	Book II, Part IV, Annex A, [T1-R1798]	The coding standard specified in [T1-R1798] appears to be completely Microsoft .NET specific. Can the Purchaser please modify this requirement to be applicable to best practice in other environments such as Java and ECMAScript / java script?	The source code comments are applicable to all components of the application and not specific to the client or server components. For clarification purposes, the requirement T1-R1798 is modified as follows: *"Comments in TRITON source code shall be formatted according with best practices applicable to the specific programming language and allow for the automated extraction and formatting for augmenting technical documentation. In order to reduce the code size the source code comments of the client applications shall be removed by an automated process before entering into production in order to improve the transfer time."* RIS is also modified accordingly.	Yes	**AMD2**
CR#32	Book II - SRS	Book II, Part IV, Annex A, [T1-R1591]	This requirements states that 'TRITON shall not bear additional licences and charges for deployment of TRITON if used in a NATO context (exercise, mission, static and deployable commands, NRF).'. Where a solution uses COTS products that require a licence for each deployment or CPU, can the Purchaser please advise how these costs should be captured in the TRITON pricing information? Can the Purchaser please also define the number of additional deployments that should be accommodated in the overall price?	COTS Software Licenses are excluded from this context. The Bidder should calculate the necessary COTS licenses according to the specifications, solution design, and propose them in the Bidding Sheets. The Authorised Locations for deployment are already specified in the IFB. The Purchaser currently does not have any additional deployment plan. In case additional COTS Software Licenses are required for use of TRITON in NATO exercises and missions, the Purchaser will procure the additional quantities required.	No	**AMD2**
CR#33	Book II - SRS	Book II, Part IV, Annex A, [T1-R1361] and [T1-R1364]	The requirements for the TDK Workstation and Laptops refer to being similar to the corresponding NATO Workstation/Laptop Hardware Configuration (CPU, RAM GB, HDD GB?). Can the Purchaser please provide details of the configurations for NATO workstations and laptops?	A minimum configuration is now provided in Paragraph 4.4.1.7.5 of the SRS. More detailed configuration will be determined according to the proposed design, technical availability and NATO Standard Workstation definition at time of TDK HwRR.	Yes	**AMD2**
CR#34	Book II - SOW	Book II, Part IV, 2.3	Can the Purchaser please provide a copy of the NATO Bi-SC 75-7 Education & Individual Training Directive (E&TD), 10 September 2015 (NU) inclusive of annexes A – I? The publicly available version is a 2013 draft version that does not include annexes.	Bidders should get access to this document through their national sources.	No	**AMD2**
CR#35	Book II - Work Packages	Book II, Part IV, Annex B, Table 9-4	Table 9-4, SOW Annex B, details: • the courses to be delivered • the audience • the locations but does not give the number of students as either a max. or min. for any course except for the Software maintenance course (At least 4 individuals). Can the Purchaser please give an indication, by course, of audience size (max/min)?	The estimated number of trainees for each course will be determined during the TNA. As an initial estimation, the number of users given in Table 1-1 of the SOW may be taken into consideration for each Node Activation for static sites. The Contractor will provide the initial training to MARCOM users for each delivery. Depending on the level of training, the number of students may vary.	No	**AMD2**
CR#36	Book II - SRS	Book II, Part IV, Annex A, 4.3.5.1.1	Can the Purchaser please provide clarification (with a visual sample) of what is meant by "orbit", please give examples with reference to use cases.	Visualization of an Orbit can be seen in the [NVG]. An Orbit is defined by two or more points along a centerline and an associated width. When rendering the Orbit, the edges of the width are drawn along with circular end caps connecting the geometry into a closed shape. The Orbit is typically used to render a continuous aircraft movement over a fixed position. It can also be used as a reference geometry for military control feature, events or tasks. A sample view of an Orbit is added to the figure showing sample Drawing Primitives in the SRS Paragraph 4.3.5.1.	Yes	**AMD2**
CR#37	Book II - SRS	Book II, Part IV, Annex A, 4.3.7.3	Can the Purchaser please provide an ICD for the Line of Sight Analysis Service that is provided by the GIS Server?	The Line of Sight Analysis Service will be provided by the NATO CoreGIS using the ArcGIS Server technology. To consume the WPS hosted by ArcGIS Server, the Client must support the WPS specification. The following descriptive statement is added to Paragraph 4.3.7.3: *"Currently, NATO Core GIS provides the LOS and Elevation Service using the ArcGIS Server technology. The Client can consume the WPS hosted by ArcGIS Server."*	Yes	**AMD2**
CR#38	Book II - SRS	Book II, Part IV, Annex A, 4.3.7.4	Can the Purchaser please provide an ICD for the Depth Analysis Service that is provided by the GIS Server?	The Depth Analysis Service will be provided by the NATO CoreGIS using the ArcGIS Server technology. To consume the WPS hosted by ArcGIS Server, the Client must support the WPS specification. The following descriptive statement is added to Paragraph 4.3.7.4: *"Currently, NATO Core GIS provides a Depth/Elevation Service using the ArcGIS Server technology. The Client can consume the OGC-compliant WPS hosted by ArcGIS Server."*	Yes	**AMD2**

CR#39	Book II - SRS	Book II, Part IV, Annex A, 4.3.7.5	Can the Purchaser please provide an ICD for the Height Analysis Service that is provided by the GIS Server?	The Height Analysis Service will be provided by the NATO CoreGIS using the ArcGIS Server technology. To consume the WPS hosted by ArcGIS Server, the Client must support the WPS specification. The following descriptive statement is added to Paragraph 4.3.7.5: *"Currently, NATO Core GIS provides a Depth/Elevation Service using the ArcGIS Server technology. The Client can consume the OGC-compliant WPS hosted by ArcGIS Server."*	Yes	**AMD2**
CR#40	Book II - SRS	Book II, Part IV, Annex A, 4.2.3.5.5	Can the Purchaser please provide the schema, WSDL and sample data for the "Intel-FS" ICD as there are broken links to these artefacts embedded in the ICD PDF documents?	The implementation details of the interface will be provided after the Contract Award.	No	**AMD2**
CR#41	Book II - SRS	Book II, Part IV, Annex A, 4.2.5.4.3	Can the Purchaser please provide the standards listed in the requirement narrative: AHP-7, MTP-06,ATP-06,AHP-11?	AHP-7 and ATP-06 are classified documents. Bidders should get access to them through their national sources. MTP-06 contains the unclassified portions of ATP-06. The detailed information regarding the Q-Routes will be required during software requirements analysis which will be finalised at SwRR-3. The data model will be finalised at SwDR-3. Reference to [AHP-11] is corrected as [AHP-1].	Yes	**AMD2**
CR#42	Book II - SRS	Book II, Part IV, Annex A, 4.2.7.2.7	Section 4.2.7.2.7.1 of the SRS states that 'Only one instance of TRITON, as the master, is active at a Data Centre as a static site. The data is mirrored to the other instances by the Data Centre infrastructure in real time…' and in 4.2.7.2.7.2 states 'TRITON will use the Data Centre Infrastructure to replicate its operational data over its instances at static sites'. Can the Purchaser please provide details of the capabilities of the Data Centre Infrastructure? In particular: • Is storage and VM Clustering replicated by the ITM Infrastructure • Are failover mechanisms provided between data centres • Will the replication services provided by the ITM Infrastructure provide the configuration required by [T1-R677] and filtering requirements of [T1-R679] • Will ITM provide IP Address virtualisation to allow external connections to failover (e.g. National connections, ACPs) to another data centre when it becomes active • Are data centres on which TRITON will be hosted on autonomous networks with point to point networks between them or are they truly part of a cluster? If the latter, are the requirements in section 4.7.2.7 applicable to the data centres or are they only intended for the ACPs and DCISs? • Can confirmation be provided that the ITM replication services will meet the latency requirements of [T1-R678] and [T1-R680]?	The Data Centre capabilities are in the acquisition phase. When their detailed is completed, it will be made available to the Contractor after the Contract Award. The system-level design of TRITON Multi-Site Operation Management will be made during the System Architectural Design, and they will be refined during the Software Detailed Design. Some preliminary responses to the questions are given below: - Storage will be replicated among the Data Centres by the infrastructure according to the selected level of support. - Applications must handle the fail over conditions. - Replication services will provide replication of TRITON databases indicated by the user. Application must configure the data to be replicated and must be able to synchronise the new data during retrieval without corrupting internal data and business logic (e.g. correlated track information). - IP address virtualisation will be provided at the Data Centres. - Data Centres will be on the same network with point-to-point connections. The Multi-Site Operation Management requirements will be applicable to Data Centres and ACP instances of TRITON. DCIS instances can also use the same management within the DCIS network. - Data Centre replication services will be able to meet these requirements. However, the amount of data must be managed by the authorised user of the apllications (e.g. reducing the amount of data in case bandwidth becomes an issue).	No	**AMD2**
CR#43	Book II - SRS	Book II, Part IV, Annex A, 4.2.5.5.1 and 4.2.5.5.2	Can the Purchaser please provide referenced document ATP-18 so that the management of WSM/PMI Areas and Moving Havens can be better understood as well as the details of the vertical separation referred to in requirement [T1-R531].	ATP-18 is a classified document. Bidders should get access to it through their national sources.	No	**AMD2**
CR#44	Book II - SOW	Book II, Part IV, 5.6.4.3	Under the heading of "Incident Management Process", the reference states that "The Contractor shall comply with the existing NCI Agency business practices which are based on ITIL v3 and will be provided after signing the Contract." Can the Purchaser please advise how the Contractor should bound its price and compliance commitments at Bid stage, in the absence of the full requirement details being available to the Contractor?	In order to achieve a service-based ICT environment, NATO adopted ITIL as a service management framework, complemented by other industry best practices. The NATO ITM project will provide a baseline set of service lifecycle processes that will need to be aligned with the specific operational requirements of NATO. The Contractor will implement the specific process during the OT&E period. The Contractor will use procedures tailored according to the operation of TRITON until FSA. When required the Contractor will propose the necessary changes to the specific processes, to be evaluated and agreed by the Purchaser before implementation. The Purchaser assumes that the requirements given in 5.6.4 are sufficient for bidding.	No	**AMD2**
CR#45	Book II - SOW	Book II, Part IV, 4.13.1.8	The Contractor cannot be responsible for solving interfacing issues with external systems or NATO infrastructure where issues reside with those elements. Can the Purchaser please clarify the scope of Para 4.13.1.8.	Paragraph 4.13.1.8 requires solving integration and interfacing problems regarding TRITON, not the other systems/services. For clarification, the paragraph is modified as follows: "*The Contractor shall solve all integration and interface problems within TRITON that may occur during the installation. The responsibility for the system's operation, support, and performance rests solely with the Contractor until reaching FSA* "	Yes	**AMD2**
CR#46	Book II - SOW	Book II, Part IV, 4.13.6.2.15-17	Please can the Purchaser clarify the meaning of 'Operational Baseline' in SOW para 4.13.6.2.15. Does this refer to the software build provided by the Contractor into IV&V for addition to the AFPL?	Operational Baseline is defined in Paragraph 4.7.3.7. As interpreted, OBL is the software build that passes IV&V successfully and added in AFPL, provided that Site Acceptance is achieved.	No	**AMD2**

CR#47	Book II - SRS	Book II, Part IV, Annex A 4.2.7.2.7	Can the Purchaser please clarify how it is intended for the capabilities described in section 4.2.7.2.7 to be incorporated and tested in the NU deployment, as these requirements are predominantly assigned to BL-3, which is deployed to NS systems? If through an upgrade, then new testing would be required that was not originally performed in the BL-2 test suite, which would seem to be beyond the normal scope of an upgrade.	BL-2 will be installed at one site at its first delivery. Therefore these tests will not be executed. To give more time for implementation and take advantage of the lessons learned from the first formal delivery on NU, these requirements are allocated to BL-3. After PSA, new development for BL-3, including these requirements, will be applied to BL-2 and other sites will be isntalled. Multi-site Operation Management can then be tested separately on both NS and NU Domains. That is also one of the reasons having one common source code configuration but two deployments on two domains.	No	**AMD2**
CR#48	Book II - Work Packages	Book II, Part IV, Annex B, 9.3.9.2	Can the Purchaser please clarify the scope of the Organization Node activations? Section 9.3.9.2 in the WP document identifies four additional Organization Nodes other than MARCOM. Do each of the ONs comprise an NS and NU community and so is there a requirement for a total of 10 Organizational Node Activation activities?	The Authorised Location given in Paragraph 9.3.9.2 will be activated in addition to MARCOM for NS. NU will only be activated at MARCOM. A clarification is added to 9.3.9.1 and 9.3.9.2.	Yes	**AMD2**
CR#49	Book II - SOW	Book II, Part IV, 5.8.2.10.1	States The contractor shall complete Part 1 and Part 2 of the NATO POI Document II in accordance with [Bi-SC DIR 75-7] Can the Purchaser please provide the NATO POI Document II to the Contractor?	Bidders should get access to the reference document, which contains the forms regarding to course proposals, through their national sources.	No	**AMD2**
CR#50	Book II - SRS	Book II, Part IV, Annex A, 4.3.5.1.1. C2	Can the Purchaser please provide clarification (with a visual sample) of what is meant by "point cluster"? Please give examples with reference to use cases. Is this expecting to apply clustering to the drawings (i.a.w. 4.3.4.1.4) or to enable the user to place objects that look like clustered objects? If the former, please provide an illustrative example of how editing a clustered object is expected to behave.	“Point cluster” refers to the resulting symbol after the application of the Cluster operation described in Paragraph 4.3.4.1.4. Visualisation samples and use cases are given there. A “point cluster” cannot be edited. Instead, the point cluster will expose the actual points (on mouse roll over, or other user action) allowing the user to select a specific point for editing. The method used to expose these actual points is left to the Bidder to determine. Possible means to expose actual points could include a list, context menu, dialog window, graphical distribution around the cursor, or decluttering of the actual points within the GeoView. To prevent confusion, Point Cluster is removed from the list of Drawing Primitives.	Yes	**AMD2**
CR#51	Book II - SRS	Book II, Part IV, Annex A, 4.3.5.1.1. C2	Can the Purchaser please provide clarification (with a visual sample) of what is meant by “Optimized rectangle", please give examples with reference to use cases. For example is this two points (bottom/left, top/right) or one point and height and width, etc.	An “optimized rectangle” refers to a rectangle defined by two points (bottom/left, top/right). A visual sample is given in Paragraph 4.3.5.1.1 (the figure indicating the rectangle with two corners).	No	**AMD2**
CR#52	Book II - Work Packages	Book II, Part IV, Annex B, WP11	Can the Purchaser please clarify the schedule for WP 11? Figure 2 indicates HL-SRR at WP PSD+4 and HL-SDR at WP PSD+8 15.4.2.3 requires HL-SDR at WP PSD+6, The table at 15.5.1 requires HL-SRR at WP PSD+0 and HL-SDR at WP PSD+4.	The milestone dates are aligned in Work Packages Paragraph 15.2.2, 15.4.2.3 and 15.5.1 as illustrated in Figure 2. Some of the table cell formating are changed for left alignment.	Yes	**AMD2**
CR#53	Book II - SOW	Book II, Part IV, 3.5	The Key Personnel include an Integrated Logistics Support Engineer (section 3.5.6) that makes reference to the "Senior ILS Engineer as specified in 6.8.1". However, 6.8.1 describes a "Senior Maritime C2 Functional Specialist" role. Can the Purchaser please confirm whether Senior ILS Engineer is a Key Personnel role, and resolve the inconsistency described above?	The reference error has been corrected in CR#20.	No	**AMD2**
CR#54	Book II - SRS	Book II, Part IV, Annex A, [T1-R404]	The requirement refers to the EVENTEXPLOITREP XML schema, but the “JOCWatch OIR Web Services Specification” document doesn’t mention EVENTEXPLOITRE. Can the Purchaser please provide details of the EVENTEXPLOITREP XML schema?	More clarification is provided in the Description part of Paragraph 4.2.4.3.2 of SRS and Requirements [T1-R404], [T1-R406], [T1-R407] are modified, RIS is updated. One specific instance of JOCWatch will be used together with TRITON. Therefore all instances can be assumed to be maritime-related. A standard operating procedure for JOCWatch will be developed for using it in maritime domain. During the requirements analysis and design phase a suitable field to store Vessel Name will be selected, and used thereafter.	Yes	**AMD2**
CR#55	Book II - SRS	Book II, Part IV, Annex A, [T1-R407]	If the association between Maritime Incident and Vessels is to be automatic, Can the Purchaser please clarify where the Vessel Identifier is located in the incident message?	Please see CR#54.	No	**AMD2**
CR#56	Book II - SRS	Book II, Part IV, Annex A, 4.2.4.3.2	The JOCWatch OIR Web Services Specification document v.1.0 Section 3 specifies that the Jocwatch interface is read only. The SRS requirement R405 requires a 'Read' and 'Write' JOCWatch interface. Can the Purchaser please clarify how the 'Write' interface to JOCWatch is to be provided by the Purchaser?	Please see CR#54.	No	**AMD2**
CR#57	Book II - SRS	Book II, Part IV, Annex A, 4.2.4.3.2	The requirements mention only Maritime Incidents. Can the Purchaser please confirm that (a) only Maritime Incidents shall be imported from JOCWatch into Triton and (b) what attribute and value in the JOCWatch ICD allows the Contractor to filter only Maritime Incidents?	Please see CR#54.	No	**AMD2**
CR#58	Book II - SRS	Book II, Part IV, Annex A, 6.2.2.1	The AIS messages include Special Points, Emergencies and Voyages which are not referenced in the SRS. If Triton is expected to manage these entities, can the Purchaser please specify these requirements?	Currently TRITON is expected to process AIS Message Type 1 and Type 5.	No	**AMD2**

CR#59	Book II - SRS	Book II, Part IV, Annex A, 4.2.3.4 and 4.2.3.5.1.2	In the figure included in Para. 4.2.3.4 the Person of Interest List function is allocated to the NU domain, whilst in Para. 4.2.3.5.1.2 the requirements are allocated to NS. Can the Purchaser please clarify?	The conceptual figure in Paragraph 4.2.3.4, indicating the flow of information from external sources, including Person of Interest, is modified to reflect the storage location of the Person of Interest List to be on NS.	Yes	**AMD2**
CR#60	Book II - SRS	Book II, Part IV, Annex A, [T1-R316]	States “TRITON shall be able to use a World Port Data Service if a the available GIS Server can provide.” Can the Purchaser please provide an ICD for the World Port Data Service provided by the GIS Server?	TRITON is expected to be able to consume WFS and Gazetteer Service which can provide the World Port data. The Bidders may propose implementing a WFS within the Interim Local Geospatial Service using the WFS standards and data schema. The details can be defined during the requirements analysis and design phase. Following explanation is provided in Paragraph 4.2.3.5.1.6 and the requirement T1-R316 is modified as follows: *TRITON can also consume a WFS or Gazetteer Service for handling the World Port Database if is incorporated in the available GIS Server.* *[T1-R316] TRITON shall be able to use a World Port Data Service if the available GIS Server can provide (e.g. WFS, Gazetteer Service).*	Yes	**AMD2**
CR#61	Notification of Intent		Server components will be deployed in NATO Data Centres provided by NATO ITM project. Is this project completed and the environments ready to use? Will NATO provide Production (including Disaster Recovery), Pre-Production, Quality and other environments for the project? Will these environments be accessible from the supplier site?	The NATO ITM Project will be implemented in multiple waves and is expected to be completed before the scheduled TRITON deployment. In case a specific TRITON site is not migrated to the ITM platform, the migration to new environment will be conducted by the ITM Project. NATO ITM Project will deliver multiple Data Centres which will provide the required redundancy for the Disaster Recovery for the TRITON instances hosted on the Data Centres. A reference and integration environment at PMIC will be provided by the Purchaser. The access to the reference sites will be evaluated on a case by case basis based on the specific requirements and after an analysis of the risks. Operational environment is not accessible from outside.	No	**AMD2**
CR#62	Book II - SOW	Book II, Part IV, 4.8.2.4	In paragraph 4.8.2.4. reverse engineering is indicated as a technique for requirements elicitation to be used for legacy products. Could NCIA specify the amount of products to which this technique must be applied and in which technologies are they implemented?	The stated techniques will be used if they are applicable. In case examples to some MSA-White Picture functionality (e.g. anomaly detection, AIS simulator) are needed by the Contractor, the source code of the current MSA/BRITE Operational Protoype, which has been developed using C++ programming language or its user interface design can be used to better identify the detailed TRITON software requirements. The Contractor is not expected to perform reverse engineering at source code level to implement TRITON.	No	**AMD2**
CR#63	Book II - SOW	Book II, Part IV, 4.10.2.2	It is mentioned that the Contractor shall establish a software development environment at his own premises. Can we assume that there is no need for external access by NATO to this infrastructure?	External access to the Contractor's Software Development Environment (SDE) is not required. However, the required products need to be provided through the Collaborative Working Environment (CWE). The Purchaser has the right to examine the SDE at the Contractor's premises during the development life cycle as stated in SOW Paragraph 4.10.4. For allowing the Purchaser to remotely examine and monitor the software construction as stated in SOW Paragraph 4.10.2.6.6.6, 4.10.2.7.3.3, 4.10.2.8.5, 4.10.4.1, and to enable collaboration, the Contractor must provide sufficient access rights to the services used in SDE. The findings will be discussed during SEWG and SIWG meetings.	No	**AMD2**
CR#64	Book II - SOW	Book II, Part IV, 4.13	In the transition process, is it necessary to ensure the replication of data sent to the legacy systems after the initial data migration, during the period of operation in parallel with the TRITON? Or can the contractor assume that all operations during parallel will be replicated by the users in both legacy systems and TRITON?	System Transition activities will be performed together with the operational user. As TRITON is delivered incrementally, it will be operationally used first at MARCOM, and the existing Standard Operating Procedures will be modified to incorporate TRITON capabilities. Until TRITON becomes fully operational at all authorised locations and tested during exercises, the legacy systems will be used in parallel.	No	**AMD2**
CR#65	Book II - SRS	Book II, Part IV, Annex A 3.2.2.4	TRITON will have interfaces to other Bi-SC AIS Functional Services such as NCOP and others. If there is need to change the interfaces provided by these services to meet the TRITON's project requirements, will those changes be ensured by the NCI Agency?	TRITON will implement the interfaces currently provided by the existing Bi-SC AIS Functional Services. TRITON project requirements have already been specified using the available interfaces. The Purchaser currently doesn't foresee any changes on these requirements.	No	**AMD2**
CR#66	Book II - SRS	Book II, Part IV, Annex A, 1.5	TRITON will be able to export and import data using files with recognised formats, which include Portable Document Format (PDF). Does NATO already have third-party licensed software for handling documents in PDF format that may be reused in this project? If so, with which development frameworks is it compatible?	NATO does not provide a third party component to enable exporting to PDF at servers. Bidders may propose a COTS product or an open source software package which provides a common service to all TRITON modules. License Costs for this software must also be included in Bidding Sheets and also quoted as part of the optional Work Package 9 (CLIN 9.4.1 - COTS Products List) for two installations with the requirements stipulated in para 13.3.1.3 of Book II, Part IV, Annex B (Work Packages).	No	**AMD2**
CR#67	Book II - SRS	Book II, Part IV, Annex A, 3.2.2.7	It is mentioned that TRITON is expected to be compatible with the infrastructure services planned to be provided by the IT Modernization Project. What are the main features of this infrastructure to be considered for compatibility purposes?	ITM will provide Virtualised Computing Environment. The Contractor will specify computing requirements in terms of service parameters. The details of these parameters will be determined after the implementation of the Data Centres under the ITM Project.	No	**AMD2**

CR#68	Book II - SRS	Book II, Part IV, Annex A, 4.1.2	In T1-R007 requirement of paragraph 4.1.2.1.2 it is mentioned that the authorised user can change the Operational State manually with a notification to all users. Could NCIA specify which will be the channels provided for the TRITON system notifications: e-mail, text message (SMS), instant messaging, others?	TRITON is expected to inform its users by means of the User Notification Management (SRS Para. 4.2.9.6).	No	**AMD2**
CR#69	Book II - SRS	Book II, Part IV, Annex A, 4.2.2	In T1-R026 requirement it is mentioned that the user shall be able to import whole or part of exported Maritime Operational Object Databases into the internal databases of a Maritime Operation. Will this import only be used for maritime operations in off-line use, with full replacement of existing data?	Requirement [T1-R026] specifies a capability for the authorised user. Importing external data into a Maritime Operation is an operational use case. When a new Maritime Operation is created, its internal databases can also be populated by importing part or whole of the data from an already exported database. Full import is expected to replace the existing data.	No	**AMD2**
CR#70	Book II - SRS	Book II, Part IV, Annex A, 4.2.7.3	In T1-R701 requirement of paragraph 4.2.7.3.2.2 it is mentioned the need for migration of legacy systems data (MCCIS and /or MSA / BRITE). Could NCIA detail the approximate number of items involved and their corresponding volume of information? In which repositories are they stored (e.g. Oracle, SQL Server, Filesystem)?	Current systems use Postgres to store data. The size of the accumulated data is about 13GB plus an optional image data of 26GB per six months. MCCIS track data will not be migrated. Some of the operational data such as overlays, WSM/PMI areas may need to be transferred if applicable. MSA/BRITE AIS track database will be imported in case a commercial service is not used at the time of transition. The import size is expected to be 1TB. Details will be determined within the context of WP8 Transition from Legacy Systems.	No	**AMD2**
CR#71	Reference Documentation	PMIC HMI Style Guide 1.1., Section 10	According to the guideline [1015] in paragraph 10.1.1., should we assume that the TRITON system interface must have multi-language support?	The language requirements are given in SRS Paragraph 5.1.3.7.	No	**AMD2**
CR#72	Reference Documentation	NCOP-2014-10-06 Thales ICD 1.4, Chapter 3.3	Some embedded documents referenced in this document are not available, particularly in the following chapters: - 3.3.9: I_NCOP_ WS: NCOP Web Services - 3.3.14: I_NCOP_NFFI_SIP3: NFFI SIP-3 Interface - 3.3.18: I_NCOP_LC2IS: LC2IS Interface - 3.3.21: I_NCOP_NVG_STREAMING: NVG Streaming Protocol Interface - 3.3.22: I_NCOP_TOPFAS: TOPFAS native XML Interface - 3.3.49: I_NCOP_GENERIC_XML: Generic XML Interface - 3.3.50: I_NCOP_GENERIC_TEXT: Generic Text Interface Could NCIA provide the missing files referenced above?	The interface implementation details will be provided to the Contractor after the Contract Award.	No	**AMD2**
CR#73	Reference Documentation	INTEL-FS ICD v1.1	Some embedded documents referenced in this document are not available, particularly in the following chapters: - 4.3.2: Intelligence Information Entities export format - 4.4.1: Raw objects import formats - 5.1: List of Web Services - 7: Migration "Interface" Could NCIA provide the missing files referenced above?	The interface implementation details will be provided to the Contractor after the Contract Award.	No	**AMD2**
CR#74	Book II - SRS	Book II, Part IV, Annex A, 4.3	In this chapter the generalized C4ISR architecture is described as a mandatory requirement. Are there any frameworks to support building application with that architecture?	The high level design described in SRS Subsection 4.3 is a generic overview of the main components of the C4ISR systems used by NATO, and should be used as a reference by the Bidders. A detailed design of TRITON, its integration with the C4ISR Visualisation Component, interfaces to other systems/services are expected to be proposed by the Bidders.	No	**AMD2**
CR#75	Book II - SRS	Book II, Part IV, Annex A, 5.4	This chapter describes the Computer Resources Requirements and that TRITON should utilize the virtualized environment. Regarding the databases planned for TRITON, are there any existing Database Cluster in the NATO DATA Centre or in Bi-SC AIS which can be used for TRITON?	No database cluster is currently available in NATO server sites. Nevertheless the Bidders may propose such a solution for the TRITON relational database storage services, if identified as required.	No	**AMD2**
CR#76	Book II - SRS	Book II, Part IV, Annex A, 5.5.2	In this chapter a “Maritime Reference Architecture” is mentioned. As described this architecture has to be used together with the NAF for generating the architecture views. We weren't able to find the Maritime Reference Architecture or information about it. Can NCIA provide this "Reference Architecture"?	The Maritime Reference Architecture (2011) is currently being updated by the NCI Agency. It will be made available to the Contractor after the Contract Award. The current SRS structure basically defines the Application, Services, Information Products and related requirements. It should be sufficient for the initial architectural design for bidding purposes.	No	**AMD2**
CR#77	Book II - SOW	Book II, Part IV, 3.5.6.4	The referenced paragraph 6.8.1 is for a "Senior Maritime C2 Functional Specialist", not a Senior ILS Engineer. This labor category description does not match Annex B.14 of the Bidding Instructions which identifies the position as a Logistics Management Specialist and refers to SOW 6.5.1 for the requirements. What is the correct job description for the Position of Integrated Logistics Support Engineer?	Please see CR#20.	No	**AMD2**
CR#78	Book II - SOW	Book II, Part IV, 4.12.2.2, Table 4-10	Test Strategy, “The PTP shall…” Please define the acronym “PTP”.	The acronym in is corrected as "TMP".	Yes	**AMD2**
CR#79	Book II - SRS	Book II Part IV, Annex A, [T1-R1358]	IFB-CO-13859-TRITON, Amendment 1 provided further information regarding CR#13, but did not specify the requirements for the IEG Data Diode. Will a specification be provided or are Bidders free to bid any Data Diode that is cleared to EAI-7 by a NATO member country?	Bidders must propose a NATO-approved commercial Data Diode product. The list of the approved products can be found in NATO Information Assurance Product Catalogue (NIAPC) at http://www.ia.nato.int. Please also see CR#13.	No	**AMD2**

CR#80	Book II - SOW	Book II, Part IV, 4.8.1.5	The Contractor shall use the DOORS (IBM) Requirements Management tool for management of the system and project requirements given in SOW and SRS. IBM no longer supports DOORS (April 2016) and licences can no longer be purchased. Can the Purchaser provide new Tool reference (eg. DOORS NG) or will the Purchaser allow use of other tools which export to DOORS (including DOORS version number)?	The Purchaser currently uses IBM Rational DOORS 9.6. Assessment of DOORS Next Generation is in process. Paragraph 4.8.1.5 is modified as follows, also aiming to be more precise: "*The Contractor shall use a Requirements Management Tool for managing the system-level requirements (SyRS) and software requirements (SRS). The Contractor shall deliver the updated requirements repository to the Purchaser in modules compliant to IBM Rational DOORS v9.6 or the version used by the Purchaser at the time of delivery. The Contractor shall deliver the requirements repository to the Purchaser as defined in Paragraph 4.8.9".* In relation to deliveries, Paragraph 4.8.9.5 is modified as follows: *"The Contractor shall provide the initial version of the system-level RMD Baseline at least two (2) weeks prior to the System Requirements Review (SRR), then at each Software Requirements Review (SwRR), and as updated or as requested by the Purchaser."*	Yes	**AMD2**
CR#81	Book II - SOW Book I - Bidding Sheets	Book II, Part IV, Table 7-1 Book I - Bidding Sheets	Their appears to be a conflict between the SOW and Bidding Sheets with respect to what Annexes are assigned to the ISP and ISSP documents: The SOW Table 7-1 identifies the following: 1. Integrated Support Plan (ISP) Annex – Transportation Plan (TransP) 2. In-Service Support Plan (ISSP) Annex – Obsolescence Management Plan (OMP) The Bidding Sheet: Section 1 CLIN Summary sheet CLIN 1.2.17 identifies the following: 1. In-Service Support Plan (ISSP) Annex - System Maintenance Plan (SMP) Annex - Obsolescence Management Plan (OMP) Annex - Transportation Plan (TransP) Please clarify which reference is to be used for the correct assignment of Annexes to the respective Parent Plans?	Bidding Sheets CLIN 1.2.17 is modified and "Annex - TransP" is removed. CLIN 1.2.14 is modified and Annex - Transportation Plan (TransP) is added to ISP. For clarifying the content of ISP, Paragraph 5.2.8 is added to SOW: *"ISP shall include, as an Annex, Transportation Plan (TransP). The details of TransP are given in Paragraph 5.9.2."*	Yes	**AMD2**
CR#82	Book II - SRS	Book II Part IV, Annex A, 5.2.2.2.1, [T1-R1634]	Confidentiality Labels. References ADaTP-4774 and ADatP-4778 have not been officially published and exist only in draft form. Can the Purchaser provide the version to be used for the purposes of the Proposal?	At the moment the confidentiality labels standards are under distinct phases of the ratification process by NATO. STANAG 4774 – Label Syntax, is submitted to NSO and undergoing internal audit. STANAG 4778 – Metadata Binding, has been developed in the international community and validated by NATO Nations in several venues. It is mature and ready for adoption. The current NCI Agency assessment is that the technical content is sound and mature with a corresponding low technical risk regarding to this approach which might diverge from the current draft. However, the format may change (i.e. core document and binding mechanism published separately from the binding profiles). The last available version of the referenced documents at CDR time will be used during development. If the standard is not approved by then, the Purchaser will decide which version to be used.	No	**AMD2**
CR#83	Book II - SRS	Book II Part IV, Annex A, 5.2.2.21 [T1-R1633]	This requirement refers to NCIRC Configuration Guides. Can the Purchaser clarify which Configuration Guides and where these guides might be found?	NCIRC security configuration guides provide the best practices regarding the configuration of COTS products. These configuration guides can be provided after the Contract Award. Implementing of hardening in accordance with industry best practices can be taken into consideration at bidding.	No	**AMD2**
CR#84	Book II - SRS	Book II Part IV, Annex A, 4.4.1.7.5, [T1-R1361]	[T1-R1361] TDK Client Workstation shall have a similar configuration to the NATO Workstation Hardware Configuration as a Thin Client. The Server Unit shall provide the computing platform for the Thin Clients. Can the Purchaser please clarify what is meant by “NATO Workstation Hardware Configuration”? The term is not defined by any referenced specifications’	Please see CR#33.	No	**AMD2**
CR#85	Book II - SRS	Book II Part IV, Annex A, [T1-R2069]	SRS [T1-R2069] TRITON shall make the requested data available within one second via the ICI Service. Since TRITON does not cover the IT Infrastructure, what are the timing reference points for meeting this requirement?	The timing reference points are the acceptance of the request by the server and making the data available at the server. For clarification purposes Requirement [T1-R2069] is modified as follows: *"TRITON shall make the requested data available in the ICI Service not more than one second after the request has been received by the ICI Service at the server side."*	Yes	**AMD2**

CR#86	Book II - Work Packages	Book II, Part IV, Annex B, 2.4.4.1	"… the Contractor shall establish and maintain a Project Master Schedule (PMS) that contains all Contract." Sentence appears to be missing something after the word "Contract". Can Purchaser please clarify?	Paragraph 2.4.4.1 is modified to complete the sentence as follows: *"As specified in SOW, Subsection 3.10, the Contractor shall establish and maintain a Project Master Schedule (PMS) that contains all Contract. events and milestones, including contract-related Purchaser activities and events (e.g. Purchaser reviews, IV&V testing, participating meetings and conferences). The PMS shall correlate with the PWBS and also be traceable to performance and delivery requirements of this SOW."*	Yes	**AMD2**
CR#87	Book II - SRS	Book II, Part IV, Annex A, diagram page 104	In Amendment 1, an interface to "NCOP" was added to the diagram (NS side) on page 104 in the SOW. Can the Purchaser provide further clarification as to the intent of this change as it was not described in the CR. (CR #13 only mentions the Nations interface).	Since NCOP is not a Functional Service, it is separately indicated in the conceptual diagram on page 104. There is already an interface defined for NCOP.	No	**AMD2**
CR#88	Book II - SRS	Book II, Part IV, Annex A, 5.5.6	Section 5.5.6 (Programming Languages) lists the preferred Languages including Java. For that language it specifies Java SE Version 6 [JSR 270]. Java SE Version 6 has ended the publications of public updates. A more recent version should be used.	Java SE Version is modified as "Java SE Version 8 or newer" in the Description part of SRS Paragraph 5.5.6. The Reference [JSR 270] is removed.	Yes	**AMD2**
CR#89	Book II - SRS	Book II, Part IV, Annex A, T1-R1789	Requirement T1-R1789 states that TRITON "will" be developed using the latest version of Microsoft Visual Studio .NET. Our understanding is that this requirement only applies if C# is used as a language. Please clarify if our assumption is correct.	Yes. For clarification, Requirement [T1-R1789] is modified as follows: *"TRITON "will" be developed using the latest version of Microsoft Visual Studio .NET if C# is used as the programming language."*	Yes	**AMD2**
CR#90	Book II - SRS	Book II, Part IV, Annex A, T1-R1790	Requirement T1-R1790 TRITON shall be compatible with the .NET Framework version 4.5 or newer. If contractor is able to choose a language from the list of preferred languages, and the exchange of information should be done in XML format, Could you clarify the this requirement?	Requirement [T1-R1790] is modified as follows: *"TRITON shall be compatible with the .NET Framework version 4.5 or newer if .NET Framework is utilised for development."*	Yes	**AMD2**
CR#91	Book II - SOW	Book II, Part IV, 5.4.3.1	Requirement 5.4.3.1 states that "The Contractor shall perform following types of Software Maintenance in the context of Third Level Maintenance". In section 5.7 (Provision of Support), requirements 5.7.1.2 states: "The Contractor shall provide First, Second and Third Level Support in accordance with the Purchaser's Support Concept". Please clarify the level of support required.	Purchaser's Support Concept is defined in SOW Paragraph 5.6.2. Work Packages Paragraph 10.3.3 describes what support and maintenance must be provided by the Contractor until FSA.	No	**AMD2**
CR#92	Book II - SRS	Book II, Part IV, Annex A, TBD	In SRS page 32, it's stated: "These ACPs are expected to have the minimum CIS capabilities as defined in [MC0195/9]. The minimum level of C2 capabilities are currently described in [MC0593]. The communication methods applicable for ACPs are described in [ACP-200].". Could you please summarize those capabilities?	These capabilities cannot be summarised at this time. The TDK requirement have been specified in SRS. Paragraph 5.1.1.2 describes the expected performance by bandwidth efficiency.	No	**AMD2**
CR#93	Book II - SRS	Book II, Part IV, Annex A, TBD	When defining TRITON modes, page 46, the Standalone Mode is defined like this: "TRITON is used for operational purpose on an afloat site. The Server does not have any connection to other TRITON Servers or other Functional Services. Some functions of TRITON use internal core services with limited capabilities". This seems to be contradictory with what's stated in other parts of the SRS. ACPs shall have connection to other TRITON Servers as described in section 6.3.2 and Figure of page 35. Please clarify this.	TRITON modes are defined considering any possible tactical conditions at sea. TDKs may operate in either Normal Mode or Standalone Mode. If a connection to WAN (NSWAN for TDK-NS and Internet for TDK-NU) exists, it will operate in Normal Mode, and establish connection to other TRITON Servers as defined in 6.3.2. If the WAN connectivity is lost due to local conditions (e.g. sea state, coverage, tactical restrictions), it will switch to Standalone Mode, and operate locally without any connection to other TRITON Servers.	No	**AMD2**
CR#94	Book II - SRS	Book II, Part IV, Annex A, TBD	In page 56 it's stated the following: "In order to preserve the data integrity, only the authorised Maritime Operation can manage the Vessel Database in the Global Operational Store when the local one is updated". Could you clarify this paragraph? What's the "local one"?	The local database is the Operation-Specific Store. For clarification, the sentence is modified as follows: *"In order to preserve the data integrity, only the authorised Maritime Operation can manage the Vessel Database in the Global Operational Store when the local one (Operation-Specific Store) is updated."*	Yes	**AMD2**
CR#95	Book II - SRS	Book II, Part IV, Annex A, T1-R235	T1-R235 states: "TRITON shall automatically designate the Vessel Lists according to the default Picture of the global RMP". Could you clarify the relation between Vessel Lists and the RMP, what information elements / conditions in the RMP should trigger the designation of a Vessel List?	When a Maritime Operation is created the context of global RMP will be created. Vessel List attributes are defined in Paragraph 4.2.3.1.6. When an RMP Region is defined, the RMP filter will be applied to this Vessel List as described in [T1-R233], and the Vessels identified by the Vessel List will be included in the RMP. Manual designation of a Vessel List is decribed in [T1-R237].	No	**AMD2**
CR#96	Book II - SRS	Book II, Part IV, Annex A, T1-R278	T1-R278 states: "TRITON shall allow the authorised user to combine information received from external sources with the existing ones in the Person of Maritime List if the user-selected attributes of Person Data match". It's our assumption that the format of Person of Maritime interest Lists will be the same as the one used when TRITON exports that information. It's also our assumption that this format will be defined by TRITON. Please confirm if these assumptions are correct.	Person Data is defined in 4.2.3.5.1.2. The format will be defined by TRITON. For clarification, the requirement [T1-R278] is modified as follows: *"TRITON shall allow the authorised user to manually combine the information received from external sources with the existing ones in the Person of Maritime List if the user-selected attributes of Person Data match."*	Yes	**AMD2**
CR#97	Book II - SRS	Book II, Part IV, Annex A, T1-R403	T1-R403 states: "TRITON shall be capable of exchanging information with JOCWatch using JOCWatch OIR Service as defined in [JOCWatch ICD". Could you please provide the reference to this ICD?	The reference name is changed to "[JOCWatch WSS]" in the entirety of the SRS and RIS. The document has already been provided on the IFB Web Site.	Yes	**AMD2**

CR#98	Book II - SRS	Book II, Part IV, Annex A, T1-R618	T1-R618 states: “If an enterprise-level authentication is not available, TRITON shall implement an authentication service that requires the user to provide a valid User ID and password”, T1-R619 states: “For users accessing TRITON from networks which would not allow an instance of TRITON to authenticate the user, TRITON shall use the internal authentication service that requires the user to provide a valid User ID and password” but T1-R620 states: “TRITON shall not store login and password details for users that cannot be authenticated through Windows Active Directory”. Does T1-R620 contradict T1-618 and RT-619 requirements? Could you please clarify how authentication is expected to work in this case?	There will be two means to authenticate users: First, authentication at the enterprise-level using Enterprise Services. Second, authentication service provided by TRITON. These two means of authentication are mutually exclusive and should not be used simultaneously. This approach is applicable to TRITON where it is configured to support Standalone Mode of operation. Requirement [T1-R620] is modified in SRS and RIS, as follows: *"TRITON shall not store login and password details for users when configured for using only Normal Mode of operation. TRITON authentication process shall be configurable to use either the enterprise-level authentication services or the TRITON authentication service (allowing to store the user information in Standalone Mode), but not both simultaneously."*	Yes	**AMD2**
CR#99	Book II - SRS	Book II, Part IV, Annex A, 4.4.1.7.4	Section 4.4.1.7.4 describes the IEG-Data Diode that will be used at TDKs. In latest clarifications it’s assumed that IED-Data Diodes shall be provided by the Contractor for Deployable Kits. Although it’s our understanding that installation and integration shall be done by the Contractor, can we consider these elements as GFE?	Data Diodes for TDKs will be provided by the Contractor as COTS products. For static sites, Purchaser-provided Data Diodes that exist on the site will be used.	No	**AMD2**
CR#100	Book II - SRS	Book II, Part IV, Annex A, TBD	In the case that data Diodes for Deployable Kits shall be purchased by the Contractor, according to the supplied list of providers one of them is the NC3A. Can you provide a point of contact to request quotation?	The Data Diode model produced by NCI Agency is not available for industry. The Bidders are requested to select another model. More options will be made available by the IT Modernisation Project in future.	No	**AMD2**
CR#101	Book II - SRS	Book II, Part IV, Annex A, T1-R1508	Requirement T1-R1508 states: “TRITON GUI shall comply with the Web Content Accessibility Guidelines as defined by the W3C (see [WCAG]).” Which level of compliance is required: A, AA or AAA?	Requirement [T1-R1508] is modified as follows to indicate the required level: *"TRITON GUI shall comply with “Level A” of the Web Content Accessibility Guidelines as defined by the W3C (see [WCAG])."*	Yes	**AMD2**
CR#102	Book II - SRS	Book II, Part IV, Annex A, T1-R1522	Requirement T1-R1522, “TRITON, including hardware, infrastructure and Operational Software, shall be available for use at static sites (via Data Centres) twenty-four (24) hours per day, three-hundred and sixty-five (365) days per year with an availability of ninety-nine point zero percent (99.0%) (Level 3 of Operational Continuity).”. It’s our assumption that no hardware should be provided for static sites. Could you please clarify this?	No hardware will be provided by the Contractor.	No	**AMD2**
CR#103	Book II - SRS	Book II, Part IV, Annex A, T1-R1529	Requirement T1-R1529 states: “TRITON shall ensure system availability to users so that they do not experience interruption of services as a result of high latency. High latency is defined as latency exceeding one-thousand-and-one-hundred (1100) milliseconds”. What’s the upper bound for latency to ensure System availability?	This is left to the system design. It is expected to have a configuration parameter to set a timeout for requests and connectivity.	No	**AMD2**
CR#104	Book II - SRS	Book II, Part IV, Annex A, T1-R1748	Requirement T1-R1748 states: “TRITON shall be able to execute in MS Hyper-V Server 12 virtualisation surrounding”. Could you clarify this requirement? Is Hyper-V Server 2012 the preferred choice? Could you please clarify this?	For clarification, Requirement [T1-R1748] is modified as follows: "*TRITON shall be able to execute in the virtualisation hypervisor environments supported by NATO, namely "MS Hyper-V Server 12 or later" and "VMWare 5.5 or later.”* Editorial corrections in Requirement [T1-R1749]: *"The Server deployment package (virtual appliance or installation package) shall be tested against the used hypervisors, configured in accordance with NATO Security Settings “VMWare ESXi 5.5 or later” and “Microsoft Hyper-V 2012 or later”.*	Yes	**AMD2**
CR#105	Book II - SRS	Book II, Part IV, Annex A, T1-R1750	Requirement T1-R1750 states: “TRITON shall use a COTS Operating System on a Virtualised Environment. If the proposed solution does not use MS Windows, it shall be specified, documented, justified and the necessary licenses shall be provided”. Does this mean that provision of MS Windows Licenses should not be quoted in Work Package 9?	If MS Windows is proposed to be used as the operating system, no license is required except for the Deployable Kits and the Test Systems (as described in SRS). These licenses can be acquired through the NCI Agency MS Enterprise license agreement in ortder to preserve the consistency for future maintenance and support.	No	**AMD2**

CR#106	Book II - SRS	Book II, Part IV, Annex A, 5.4.5	Section 5.4.5 specifies the infrastructure software. For Web Server software TOMCAT or JETTY can be evaluated upon request. These products seem to fit more into Application Servers category which is not specified. Are there any restrictions or recommendations about the software to be used for Application servers? Are JETTY and TOMCAT considered here just for serving static content?	Currently there are no restrictions regarding Application Servers. In the foreseeable future, NATO will consolidate existing Application Servers. TRITON should be designed in such a way as to not impede such a consolidation. The final decision regarding the Application Server will be made by the Purchaser at the CDR. For clarification, the Description part of Paragraph 5.4.5 is modified as follows: *Infrastructure Software:* *The minimum specifications for such software, if used for infrastructure, are given below:* *- Operating System: Microsoft Windows Server 2016 (or later)* *- Database Management System/Server: Microsoft SQL Server 2014 (or higher) or Oracle 11g (or higher) or PostgreSQL Version 9 (or higher)* *- Web Server Software: Microsoft Internet Information Services (IIS) Version 6 (or higher) or Apache HTTP Server Version 2.0 (or higher) or Eclipse Jetty Version 9 (or higher)* *- Virus Scan Software (Server): McAfee Total Virus Defence Suite (for TDKs)* *- Backup Software: Veritas Backup Exec Advanced Server (for TDKs)* *- Compression Software: Operating system feature or Winzip or equivalent*	Yes	**AMD2**
CR#107	Book II - SRS	Book II, Part IV, Annex A, 5.5.2	Section 5.5.2 states that “TRITON will use the NATO Architecture Framework, Version 3.0”, but in the Statement of Work document (BOOK II, Part IV, SOW), requirement 4.9.2.9, page 84, it’s stated: “The SDS shall include the information as required in the architectural views based on the NATO Architectural Framework (NAF) (currently Version 3.1).”. Could you please clarify which NAF version is to be used?	NAF v3 is the latest version. V3.1 has not been endorsed yet. TOGAF is included in the reference lists of SOW and SRS and referenced in the text and requirements. The description in paragraph 5.5.2 of SRS is modified, as follows, to clarify how the architecture should be developed: *"TRITON will use the NATO Architecture Framework (NAF), Version 3.0 [AC/322-D(2007)0048] as the reference for generating architectural views together with the NATO Maritime Reference Architecture which defines the exchange of Information Products between Functional Services. The services to be delivered under Project TRITON will develop the Information Products and facilitate the information exchange as defined in that model and [C3TAXO]. The architecture will be developed based on the Architecture Development Method described by The Open Group Architecture Framework (TOGAF) [TOGAF] version 9 or higher."* Paragraph 4.9.2.9 of SOW is modified as follows: *"The SDS shall include the information as required in the architectural views and meta-models based on the NATO Architectural Framework (NAF) in accordance with the latest approved version (currently Version 3.0 is available with Version 3.1 for Chapter 5 only). The architecture shall be developed based on the Architecture Development Method described by the Open Group Architecture Framework (TOGAF) [TOGAF] version 9 or higher."*	Yes	**AMD2**
CR#108	Book II - SRS	Book II, Part IV, Annex A, 6.2.1.1.4	Section 6.2.1.1.4 specifies that TRITON shall report its internal performance metrics to the Bi-SC AIS Enterprise Management System (EMS). Could you please provide more information about the interface characteristics (protocols, etc.)?	The definition of Service Management and Control (SMC) Services in Enterprise Management System (EMS) is in process. The interface definition for SMC Services will be provided at a future date.	No	**AMD2**
CR#109	Book II - SRS	Book II, Part IV, Annex A, 6.2.1.1.6	Section 6.2.1.1.6 specifies that TRITON shall exchange information with NATO Information Portal (NIP), which is based on SharePoint 2013. Could you please provide more detail about the integration mechanisms desired (information types and protocols to be used)?	It is expected that TRITON will support the information exchange standards used in NIP, currently provided by MS SharePoint 2013. A dedicated interface to NIP is not required for Increment 1. However, the support is subject to inspection for qualification.	No	**AMD2**
CR#110	Book II - SRS	Book II, Part IV, Annex A, T1.R1985	Requirement T1.R1985 states: “TRITON shall have a dedicated interface for each AIS Data Source specified on either NS or NU Domain”. Which protocol should be used (only TCP/IP is specified)? Shall we expect NMEA messages?	Only TCP/IP will be used to transfer AIS NMEA messages from a designated AIS Data Source. TRITON will not have a direct connection to an AIS device having a serial interface.	No	**AMD2**
CR#111	Book II - SRS	Book II, Part IV, Annex A, 6.2.2.2	As specified in section 6.2.2.2 specifies how MSSIS System shall be integrated. TRITON will interface with the TC32 software. Could you please confirm if these assumptions are correct? • TV32 Software will not be managed by TRITON. • TRITON will be connected to a network port to a specified IP address through TCP/IP Protocol. • Once the connection has been established NMEA messages will be received, without applying encryption.	TV32 will not be managed by TRITON. TRITON will be connected to TV32 via TCP/UDP IP. NMEA messages will be received without encryption.	No	**AMD2**
CR#112	Book II - SRS	Book II, Part IV, Annex A, TBD	Bi-SC AIS Directory Services are only available on NS Domain. For the NU Domain it’s our assumption that a similar solution shall be provided by the Contractor in the scope of this project. Please confirm if this assumption is correct.	NU Domain will have its own Directory Services, as described in SRS.	No	**AMD2**

CR#113	Book II - Work Packages	Book II, Part IV, Annex B, WP 12	Work Package 12, Warranty, is described in the Book I-Annex A, but it's not included in the Work Packages description. Please include what should be covered in the WP definition.	The Purchaser believes that the Warranty requirements are sufficiently addressed in SOW, Subsection 5.10 and the Contract Terms and Conditions. As the Warranty activities are not explicitly executed and monitored under the Contract, a separate definition in Part IV, Annex B, Work Packages is not required.	No	**AMD2**
CR#114	Book II - SRS	Book II, Part IV, Annex A, 6.2.3	Section 6.2.3 describes Nation Interfaces. It's our understanding that TRITON will define a single interface common to all nations (one for NU and another one for NS domain). TRITON shall be able to exchange information with Nations simultaneously and shall be able to control each interface per-nation. However, the protocol to be used will be the same for all Nations. Please confirm if this assumption is correct.	As stated in Requirement [T1-R2006], TRITON will have a dedicated, separate interface for each Nation. The Nation Interface SIS may be implemented once, with the same protocol, but it will be instantiated and configured for each Nation, allowing the authorised user to manage them individually at run-time.	No	**AMD2**
CR#115	Book II - SRS	Book II, Part IV, Annex A, TBD	Please clarify what type of information should be stored / exchanged with NATO-wide Enterprise Directory Services (NEDS).	NEDS provides services for filtering and synchronization of information between various NATO directories. NEDS is based on Microsoft Active Directory services and is the authoritative data source for the enterprised directory services and information. TRITON will rely on this source at static sites and only store the minimum required data to operate TRITON.	No	**AMD2**
CR#116	Book II - SRS	Book II, Part IV, Annex A, T1-R1940	Requirement T1-R1940 states that "TRITON shall be compatible with the Enterprise Directory Services SIP (to be provided by the Purchaser). Please provide this specification	For clarification, the reference is added to Requirement [T1-R1940] as follows: *"TRITON shall be compatible with the Enterprise Directory Services SIP [NCIA-06.02.05]."* The document is already provided on the IFB Web Site.	Yes	**AMD2**
CR#117	Book II - SRS	Book II, Part IV, Annex A, 6.2.1.1.4	Section 6.2.1.1.4 describes how TRITON shall interface with Bi-SC AIS Enterprise Management System (EMS). Please provide interface details.	Please see CR#108.	No	**AMD2**
CR#118	Book II - SRS	Book II, Part IV, Annex A, 4.2.3	Section 4.2.3 describes Maritime Operational Support. In this section, several alert types are described. It's our understanding that alerts could be sent to: - The authorised user that created the alert condition. - A group of users defined by the authorised user that created the alert conditions. - All the users within an operation. - All active users. Could you please specify the notification targets that shall be supported by each type of alert?	Requirement [T1-R368] states that the user can define an alert with the User Group to be notified. In principle, Operational and Manual Alerts are bounded by the Maritime Operation. As described in SRS Paragraph 4.2.9.6, User Notification Management will provide a capability to manage system warnings at user level and user group level. Maskable and non-maskable notifications as Warnings or Alerts can be defined by the creator. Critical warnings are non-maskable warnings to be sent to all active users.	No	**AMD2**
CR#119	Book II - SRS	Book II, Part IV, Annex A, 4.2.4.1.2	Section 4.2.4.1.2 specifies Manual Alerts It's our understanding that this functionally shall allow operators to manually raise an alert based on existing Maritime Operational Objects. Users will be notified including the reference of those Maritime Operational Alerts.	That is correct. The requirements are defined in SRS.	No	**AMD2**
CR#120	Book II - SRS	Book II, Part IV, Annex A, T1-R370	Requirement T1-R370 states: "TRITON shall allow the user to issue a Manual Alert by using Alert Templates". Are these alerts just plain text that will be pre-generated with a template definition? May they be associated also to a Maritime Operational Object? Please clarify.	For clarification, a description for Alert Templates is added to SRS Paragraph 4.2.4.1.2. A reference to this is added in the Requirement [T1-R370] and RIS is updated.	Yes	**AMD2**
CR#121	Book II - SRS	Book II, Part IV, Annex A, 4.2.4.3.1.3	Section 4.2.4.3.1.3 specifies Vessel Identity Validation. TRITON shall be able to access HIS Fairplay and Lloyds MIU Detention List to complement identity validation process. Please confirm that subscription to those services will be provided by the Purchaser, enabling the Contractor to access them during development (even from Contractor's premises).	Subscription to these data services will be provided by MARCOM for operational use only. SOW Paragraph 4.13.10.1.6 describes that the Contractor must provide the necessary licenses or service fee for the commercial data services to be used during the development. The Purchaser will inform the Contractor which service provider is used. The Contractor may use test data for identity validation process.	No	**AMD2**

CR#122	Book II - SRS	Book II, Part IV, Annex A, 4.2.4.3.1.3	Section 4.2.4.3.1.3 specifies Vessel Identity Validation and states that “Other accessible databases providing Web services over the NU Domain” can be used. This requirement is not bounded. Could you please specify the desired databases to be integrated? If that’s not possible at present time, could you please limit the number of databases to be integrated?	SRS Paragraph 4.2.4.3.1.3 is modified as follows to indicate the minimum number: *"• At least three (3) other accessible databases providing Web services over the NU Domain"*	Yes	**AMD2**
CR#123	Book II - SRS	Book II, Part IV, Annex A, T1-R405	Requirement “T1-R405” states that “TRITON shall allow the authorised user to manage (create, modify, import, export, delete) the Maritime Incidents (given in the Description) via JOCWatch. It’s assumed that these operations can be performed over an interface provided by JOCWatch. Please conform if this assumption is correct Besides that, Maritime Incidents created via JOCWatch should be also created in TRITON?	Please see CR#54.	No	**AMD2**
CR#124	Book II - SRS	Book II, Part IV, Annex A, 4.2	Section 4.2. TRITON Functional Service Requirements includes a diagram showing the high-level breakdown of TRITON. That diagram shows “Maritime Operation Management” as a component of the “Maritime Situational Awareness” functional group. But the Maritime Situational Awareness in section 4.2.3. does not include the “Maritime Operation Management” as part of its functionality. Can you clarify this?	The figure is replaced to better illustrate the high-level breakdown.	Yes	**AMD2**
CR#125	Book II - SRS	Book II, Part IV, Annex A, T1-R732	Requirement T1-R732 states: “TRITON shall allow the authorised manage (define, configure, start, stop) the Training Environment”. Should this be read like this ? “TRITON shall allow the authorised <user?> manage (define, configure, start, stop) the Training Environment”	Requirement [T1-R732] is corrected in SRS and RIS.	Yes	**AMD2**
CR#126	Book II - Work Packages	Book II, Part IV, Annex B, WP 2, 3.3.5	WP 2: System Engineering Services 3.3.5 System Validation It is supposed that 3.3.5.3 activity (System Validation Test (SVT) execution) is part of the scope of Work Package 7 (Support to Operational Testing and Evaluation) instead of part of Work Package 2 (Engineering Services). Please, to confirm the work package that includes SVT execution activity.	System Validation is an activity under WP2 whereas the test is an activity under WP7. For clarification, following modifications are made: Paragraph 3.3.5.3: *"The Contractor shall plan the System Validation Test (SVT), execute as defined in WP7 (Paragraph 11.3.4), and conduct the System Validation Review using the Sytem Validation Test Report."* Paragraph 11.3.4.1: "*The Contractor shall execute the System Validation Test (SVT) as defined in SOW, Paragraph 4.14.4, and provide the SVT Report."*	Yes	**AMD2**
CR#127	Book II - Work Packages	Book II, Part IV, Annex B, WP 2, 3.4.5.1	3.4.5.1 Reference to paragraph 4.13.7 seems to be erroneous. Please, could you confirm reference?.	The paragraph reference is corrected as 4.14.6.	Yes	**AMD2**
CR#128	Book II - Work Packages	Book II, Part IV, Annex B, 9.3.11.2	9.3.11.2 The Contractor shall provide the Training Courses listed in Table 9-4 as a minimum. Please, confirm the maximum estimated number of courses that the Contractor shall provide under the scope of this contract.	The type and content of the Training Courses will be determined at the TNA. If major changes are made on the software during the OT&E Period, some of the courses may be repeated. The Purchaser has already identified the minimum courses to be provided. A maximum number cannot be stated at this time.	No	**AMD2**
CR#129	Book II - Work Packages	Book II, Part IV, Annex B, WP 2, 9.3.11.3	9.3.11.3 The Contractor shall support the NCI Agency Trainers for providing the Training Courses listed in Table 9-5 as a minimum. Please, to confirm the maximum estimated number of courses that the Contractor shall support the NCI Agency Trainers under the scope of this contract.	The Purchaser has already identified the minimum courses to be supported. A maximum number cannot be stated at this time.	No	**AMD2**
CR#130	Book II - SOW	Book II, Part IV, 5.10.3.	Please can the Purchaser confirm that the “Warranty Period” referenced throughout the Statement of Work is the period beginning at FSA and ending 12 months thereafter (as set forth in Clause 32.1.1 of the Prospective Contract)?	SOW Paragraph 5.10.2.1 and 5.10.2.2 define the Warranty Period for hardware elements, and 5.10.2.3 defines the Warranty Period of the software as Operational Baseline.	No	**AMD2**
CR#131	Book II - SOW	Book II, Part IV, 5.6.7.3.	The transfer of warranty rights to other NATO entities would require those entities to be identified to the Contractor so that the Contractor could comply with its export compliance obligations and ensure its support department was sure of those parties authorized to exercise the warranty. Can the Purchaser please confirm that this condition will only become effective as and when the entities have been identified to the Contractor and the relevant required export approvals have been secured?	Currently identified NATO entities are the NATO Commands specified as "Authorised Locations" on which TRITON will be deployed and used.	No	**AMD2**

CR#132	Book II - SOW	Book II, Part IV, 5.9.9.4.1.	This clause is essentially a duplicate of 5.6.7.2. Can the Purchaser please remove clause 5.9.9.4.1 to avoid potential confusion?	Paragraph 5.9.9.4.1 is modified as follows: "*The Contractor shall provide the software warranty and licensing documentation related to any software subject to licensing and handover them to the Purchaser as described in Paragraph 5.6.7."*	Yes	**AMD2**
CR#133	Book II - SOW	Book II, Part IV, 5.9.9.4.2.	This clause is essentially a duplicate of 5.6.7.3. Can the Purchaser please remove clause 5.9.9.4.2 to avoid potential confusion?	As redundant, Paragraphs 5.6.7.3, 5.9.9.4.2, 5.9.9.4.3 are removed.	Yes	**AMD2**
CR#134	Book II - SOW	Book II, Part IV, 5.10.1.3.	Can the Purchaser please confirm that as well as having no warranty liability in respect of the Purchaser amended code, the Contractor also has no warranty responsibility in respect of any impact to the TRITON system resulting from the Purchaser's amended code?	For clarification, Paragraph 5.10.1.3 is modified as follows: *The Warranty for TRITON PBL is limited to the scope provided by the Contractor to the Purchaser. The Purchaser, in consultation with the Contractor, may apply changes to the TRITON PBL. The scope of the Purchaser's changes and its impact on the delivered TRITON PBL will be excluded from the Warranty.*	Yes	**AMD2**
CR#135	Book II - SOW	Book II, Part IV, 5.10.2.4.	Please can the Purchaser clarify this provision by replacing the terminology "fit for purpose" with "shall comply with the purposes made known to the Contractor through the Purchaser's requirements and SOW"?	For clarification, Paragraph 5.10.2.4 is modified as follows: *"For developed software components, the Contractor shall provide the Purchaser with a Warranty that the software component developed to satisfy the Purchaser's requirements shall comply with the purposes described in this SOW and SRS. Re-using the C4ISR Visualisation Component in other applications beyond the Warranty Period of this Contract shall be excluded from the Warranty obligations."*	Yes	**AMD2**
CR#136	Book II - SOW	Book II, Part IV, 5.10.2.4.	In that the intended purpose of the Visualisation Component (particularly in regard to future applications) is unknown, can the Purchaser please confirm any future applications of the Visualisation Component beyond the Triton Project are excluded from the warranty obligations.	Please see CR#135	No	**AMD2**
CR#137	Book II - SOW	Book II, Part IV, 5.10.3.4.1.	Can the Purchaser please confirm that that the requirement for "reactive modification of the software to correct discovered problems" shall be read to mean that any discovered software defect will be categorized against its impact and severity under the defect sentencing procedures and addressed in accordance with those procedures.	Corrective maintenance is carried out when a defect is detected. It aims at restoring the item/component to a condition in which it can perform its intended function. Once a software defect is detected Problem Management Process is initiated. For clarification, Paragraph 5.10.3.4.1 is modified as follows: "*The Contractor shall provide reactive modification (take action when reported) of the software to correct discovered problems."*	Yes	**AMD2**
CR#138	Book II - SOW	Book II, Part IV, 5.10.5.2.	Can the Purchaser confirm that Warranty Support of COTS Software relates only to COTS software provided by the Contractor under the TRITON contract?	For clarification Paragraph 5.10.5.2 is modified as follows: "*The Warranty Support shall include maintenance of any COTS software (e.g. operating system, support software that are supplied by the Contractor under the TRITON Contract) as provided by its vendor."*	Yes	**AMD2**
CR#139	Book II - SOW	Book II, Part IV, 5.10.6.2.	Can the Purchaser please explain its meaning of "Non-repeatable action" in the context of a warranty claim? The Contractor suggests that "Non-repeatable action" is reworded on the basis that the Contractor cannot guarantee a fix for a fault that cannot be repeated.	For clarification, the bullet in Paragraph 5.10.6.2 is modified as follows: *Non-repeatable actions that give symptoms of error (not identifiable without special tests)*	Yes	**AMD2**
CR#140	Book II - SOW	Book II, Part IV, 5.10.6.3.2.	In regard to the wording "….or of the integration of NATO-furnished property into any system delivered under this Contract if the installation, modification or integration of the NATO-furnished property voids or renders unenforceable any warranties otherwise applicable to the NATO-furnished property." Please can the Purchaser insert "by the Contractor" after the word "property"?	Paragraph 5.10.6.3.2 is modified as follows: *"The Warranty shall not apply to alleged defects that the Contractor demonstrates to be in or otherwise attributable to NATO-furnished property as determined, tested, and verified by the tests and procedures set forth in Paragraph 4.12 of this SOW. Notwithstanding this Warranty Case, a defect is not attributable to NATO-furnished property if it is the result of installation or modification of NATO-furnished property by the Contractor or of the integration of NATO-furnished property into any system delivered under this Contract if the installation, modification or integration of the NATO-furnished property by the Contractor voids or renders unenforceable any warranties otherwise applicable to the NATO-furnished property."*	Yes	**AMD2**
CR#141	Book II - SOW	Book II, Part IV, 5.10.8.2.	This Clause states "The Contractor shall ensure availability and readiness for installation of replaceable hardware items within ten (10) days of fault notification". Clause 5.10.4.3 calls for providing a remedy "such as an immediate correction or replacement". Please can the Purchaser confirm that 10 (working) days meets the expectation for response to a hardware replacement provided in Clause 5.10.4.3?	Finding a remedy for a hardware problem may or may not include replacement. For further clarification, Paragraph 5.10.4.3 is modified as follows: "*The Contractor shall provide for a specific remedy in the event a hardware item fails to meet the warranty conditions. This remedy may include an immediate correction/repair at the site, a replacement of the item/component with an available spare, or a replacement process as a Warranty Service."*	Yes	**AMD2**
CR#142	Book II - Work Packages	Book II, Part IV, Annex B, Work Package 4	With regards to the C4ISR Visualization Component, if a respondent proposes a different architecture than prescribed in the RFP that provides better value through greater use of COTS and reduced customization, while still meeting NATO's business and architectural needs, will the respondent be eligible to receive full scoring and consideration in the selection process?	The architectural requirements of the C4ISR Visualization Component are described in detail in paragraph 4.3 of Book II, Part IV, Annex A, SRS. The Purchaser has defined the architecture of the visualisation capability by separating the server and client parts. The scope of the C4ISR Visualisation Component does not include GIS Server capabilities. Bidders may propose changes to the SRS requirements, as described in the RIS, which the Purchaser will evaluate as part of the Technical Proposal. See CR#27 for further details. Bidders should note that significant changes to this architecture may not be accepted.	No	**AMD2**

IFB-CO-13859-TRITON BIDDING SHEETS

Contract Bidding Documentation
ANNEX 1 to General Provisions - Bidding Sheets
IFB-CO-13859-TRITON
Ammendment 1

The tabs contained in this workbook are the Basis of Estimate (BOE) for the proposal.

Legend

	Headings / Background
	Bidder Input Cell
	To be Completed by the NCI Agency Contracting
	Background / Information Only

Summary Bidders Input Cells	Description
UNIT PRICE	*Provide the unit price for the item in your selected currency*
TOTAL PRICE	*Provide the total price of all items in your selected currency*

CLIN Bidding Sheets Instructions

INTRODUCTION
All bidders are required to submit pricing details to demonstrate the Purchaser's Pricing Principles are being applied as part of their bids (in the absence of a pre-approved National Format). All data completed in these sheets shall be complete, verifiable and factual and include the required details. Any exclusions may render your bid as non compliant thus removing yourself from the bidding process. Input cells are colour coded **YELLOW**. Modify other cells as required and in accordance with the instructions below. Please use the **CLIN PRICING** sheets to provide the required pricing details **FOR EACH CLIN.** However replicate sheets as required. Please see Bidding Instructions for further details.

FORM INPUTS

PRICING SUMMARY ASSUMPTIONS	
Currency:	*Select currency of input values from drop down list.*
Calendar Year:	*Select Year 1 of the spread profile from the drop down list.*
Quantity	*Enter quantities of proposed item(s) in the time profiling inputs to the right.*
Unit Cost	*Enter the unit cost of the proposed item(s) for each year.*
Total Estimated Cost	*This is a calculated value (Quantity x Unit Price) and should not be altered.*

CATEGORY	DESCRIPTION	APPLICATION
1. DIRECT MATERIAL	*A. Purchased Equipment - Items purchased as part of the proposed solution. Please provide vendor quotes and/or invoices along with quantity and prices.* *B. Subcontracted Item - Items procured through sub contracts as part of the proposed solution. Please provide subcontractor quotes and/or invoices along with quantity and prices. Prices must be traceable to the Subcontract & Material BOE tab* *C. Other Equipment/Materials - Items procured as part of the proposed solution. Please provide vendor quotes and/or invoices along with quantity and prices.*	*1. Insert the Equipment Item Name(s).* *2. Provide a time phased (monthly) breakdown of quantities.* *3. Provide unit prices against each equipment item for each year.* *4. Insert comments/descriptions/references/explanation of calculation method under the 'Notes' column*
2. DIRECT LABOUR	*Direct labour is all effort directly expended by the bidder for the proposed solution*	*1. Insert the direct labour title(s).* *2. Provide a time phased (monthly) breakdown of labour hours.* *3. Provide hourly rates against each labour title for each year.* *4. Insert comments/descriptions/references/explanation of calculation method under the 'Notes' column.*
3. SUBCONTRACT LABOUR	*Indirect labour is all effort expended by the sub-contractor for the proposed solution. Prices must be traceable to the Subcontract & Material BOE tab*	*1. Insert the subcontract labour title(s).* *2. Provide a time phased (monthly) breakdown of labour hours.* *3. Provide hourly rates against each labour title for each year.* *4. Insert comments/descriptions/references/explanation of calculation method under the 'Notes' column*
4. TRAVEL	*Includes all travel associated with the procurement and delivery of the proposed solution.*	*1. Insert the Trip Name(s).* *2. Provide number of trips being made.* *3. Provide number of people travelling.* *4. Provide number of days per trip.* *5. Provide cost of round trip flight.* *6. Provide daily per diem rate.* *7. Insert comments/descriptions/references/explanation of calculation method under the 'Notes' column including the location & reference to SOW.*
5. OTHER DIRECT COSTS	*Additional direct costs directly expended by the bidder for the proposed solution that do not fit in any of the above categories.*	*1. Insert the Other Direct Cost title(s).* *2. Provide a time phased (monthly) breakdown of unit quantities.* *3. Provide unit costs against each title.* *4. Insert comments/descriptions/references/explanation of calculation method under the 'Notes' column.*
6. TOTAL FEE / PROFIT %	*Provide all FEE/PROFIT percentage applied to costs in accordance with your approved national accounting standards.*	*Provide calculation used in application of FEE/PROFIT into the price.*
7. OTHER FACTORS	*Provide any OTHER FACTOR percentage applied to costs in accordance with your approved national accounting standards. Insert comments/descriptions/references/explanation of calculation method under the 'Notes' column.*	*Provide calculation used in application of FACTORS into the price.*
GRAND TOTAL	*The total shall feed into the SSS.*	*Total Price including direct cost, indirect cost, rates and factors as applied above. Please do not forget to amend the title to reflect the appropriate CLIN number.*

IFB-CO-13859-TRITON											
CLIN SUMMARY											
BASIC CONTRACT CLIN SUMMARY											
CLIN	**DESCRIPTION**	**SOW REFERENCE**	**WP REFERENCE**	**DELIVERY DATE**	**DELIVERY DESTINATION**	**DELIVERY FORM**	**UNIT**	**QTY**	**UNIT PRICE**	**PRICE (Currency)**	**Comments**
1	**PROJECT MANAGEMENT**										
1.1	**Project Resources**									**€ -**	
1.1.1	Project Management Office	3.5	2.3.1	PMR	Contractor's Premises	As Required	Lot	1	€ -	€ -	
1.1.2	Project Website and Collaborative Working Environment (CWE)	3.6	2.3.2	PMR; 4 wks after WP1 PSD	Online	Online	Each	1	€ -	€ -	
1.1.3	Perform Project Management Process	3	2.1	Until FSA	Contractor's Premises	As Required	Lot	1			NSP
1.2	**Project Planning**									**€ -**	
1.2.1	Project Management Plan (PMP)	3.7	2.4.1	PMR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
1.2.2	Project Product Breakdown Structure (PPBS) (Breakdown Structure, Product Descriptions, Product Flow Diagram)	3.8	2.4.2	PMR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
1.2.3	Project Work Breakdown Structure (PWBS)	3.9	2.4.3	PMR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
1.2.4	Project Master Schedule (PMS)	3.10	2.4.4	PMR	CWE	Electronic	Each	1	€ -	€ -	
1.2.5	Work Package Management	3.11	2.4.5	PMR	NCIA-TH, CWE	Paper, Electronic	Lot	1	€ -	€ -	
1.2.6	Perform Risk Management Process	3.12	2.5	Until FSA	Contractor's Premises	As Required	Lot	1			NSP
1.2.7	Risk Management Plan (RMP)	3.12.4	2.5.2	PMR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
1.2.8	Perform Quality Management Process	3.13	2.6	Until FSA	Contractor's Premises	As Required	Lot	1			NSP
1.2.9	Quality Plan (QP)	3.13.2	2.6.2	PMR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
1.2.10	System Development Plan (SDP) Annex - Requirements Implementation Schedule (RIS) Annex - Usability Engineering Plan (UEP) Annex - Security Accreditation Plan (SAP)	4.6	2.9.1	PMR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
1.2.11	Perform Configuration Management Process	4.7	2.7	Until FSA	Contractor's Premises	As Required	Lot	1			NSP
1.2.12	Configuration Management Plan (CMP)	4.7.5	2.7.2	PMR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
1.2.13	Perform Integrated Logistic Support Process	5	2.8	Until FSA	Contractor's Premises	As Required	Lot	1			NSP
1.2.14	Integrated Support Plan (ISP) (draft) Annex - Transportation Plan (TransP)	5.2	2.8.2	PMR	CWE	Electronic	Each	1	€ -	€ -	
1.2.15	Integrated Support Plan (ISP) (initial)	5.2	2.8.2	CDR	CWE	Electronic	Each	1	€ -	€ -	
1.2.16	Integrated Support Plan (ISP) (final)	5.2	2.8.2	SQR-2 Updated at SQR-3, 4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
1.2.17	In-Service Support Plan (ISSP) Annex - System Maintenance Plan (SMP) Annex - Obsolescence Management Plan (OMP)	5.3	2.8.3	SQR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
1.2.18	Test Management Plan (TMP) (initial) Annex - Security Test and Verification Plan (STVP) Annex - System Validation Plan (SVP) (draft)	4.12.2	2.9.2	CDR	CWE	Electronic	Each	1	€ -	€ -	
1.2.19	Test Management Plan (TMP) (updated, with STVP and SVP)	4.12.2	2.9.2	TRR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
1.2.20	Test Management Tool Demonstration	4.12.3	2.9.3	PMR	CWE	Electronic	Each	1	€ -	€ -	
1.3	**Monitoring and Control**									**€ -**	
1.3.1	Risk Register and Issue Register	3.12	2.5.2	PMR	CWE	Electronic	Each	1	€ -	€ -	
1.3.2	Quality Register	3.13	2.6.2	PMR	CWE	Electronic	Each	1	€ -	€ -	
1.3.3	Lessons Log and Lessons Learned Report	3.3.8	2.10.3	PMR, each PCR	CWE	Electronic	Lot	1	€ -	€ -	
1.3.4	Perform Change Management Process	4.7.7	2.7.7	Until FSA	Contractor's Premises	As Required	Lot	1			NSP
1.3.5	Change Requests, Deficiency Reports	4.7.8, 4.7.9	2.7.3	As required	CWE	Electronic	Lot	1	€ -	€ -	
1.3.6	Configuration Status Accounting Database (CSAD)	4.7.10.5	2.7.8	PMR; as changes occur	CWE	Electronic	Each	1	€ -	€ -	
1.3.7	Project Highlight Reports (PHR)	3.17	2.10.1	Monthly	NCIA-TH, CWE	Paper, Electronic	Each	36	€ -	€ -	
1.3.8	Final System Acceptance Report (FSA-R)	4.14.8.3	2.10.5	CCM	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
1.4	**Project Meetings and Reviews**									**€ -**	
1.4.1	Minutes of Meetings			After each meeting	CWE	Electronic	Lot	1	€ -	€ -	
1.4.2	Conduct Project Kick-off Meeting	3.15.2	2.11.2	2 wks after EDC	NCIA-TH	Meeting	Each	1	€ -	€ -	
1.4.3	Project Kick-off Meeting Report	3.15.2.5	2.11.2	After the meeting	CWE	Electronic	Each	1	€ -	€ -	
1.4.4	Attending Integrated Project Management Team (IPMT) Meetings	3.15.3	2.11.3	Quarterly or as required	To be Defined	Meeting	Lot	1	€ -	€ -	
1.4.5	Configuration Control Board (CCB) Meetings	3.15.3	2.11.3	As required	NCIA-TH	Meeting	Lot	1	€ -	€ -	
1.4.6	Configuration Audit Report (CAuR)	4.7.11	2.7.6	After each BL TRR	NCIA-TH, CWE	Paper, Electronic	Each	4	€ -	€ -	
1.4.7	Conduct Project Management Review (PMR) Meeting	3.16.2.2	2.14.1	PMR	Contractor's Premises	Meeting	Lot	1	€ -	€ -	
1.4.8	Project Management Review Report (PMR-R)	3.16.2.2	2.14.1	After PMR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
1.4.9	Conduct Project Checkpoint Review (PCR) Meetings	3.16.2.2	2.14.1	PCR	NCIA-TH	Meeting	Lot	1	€ -	€ -	
1.4.10	Project Checkpoint Review Reports (PCR-R)	3.16.3	2.14.2	at CP Reviews	NCIA-TH, CWE	Paper, Electronic	Lot	1	€ -	€ -	
1.4.11	Conduct Provisional System Acceptance (PSA) Process	4.14.7	2.10.4.2	PSAR	NCIA-TH	As Required	Lot	1			NSP
1.4.12	Provisional System Acceptance Review Report (PSAR-R)	3.19	2.12.1.2	After PSAR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
1.4.13	Conduct Final System Acceptance (FSA) Process	4.14.8	2.10.5	Prior to CCM	NCIA-TH	As Required	Lot	1			NSP
1.4.14	Final System Acceptance Report (FSA-R)	3.19	2.12.1.2	After PSAR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
1.4.15	Conduct Contract Close-out Meeting (CCM)	3.19.1.4	2.12.1	CCM	NCIA-TH	Meeting	Lot	1	€ -	€ -	
1.4.16	Contract Close-out Meeting Report (CCM-R)	3.19.1.5	2.12.1.2	After CCM	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
1.5	**Other Project Management Work**									**€ -**	
1.5.1	Other Project-related Work	3.20	2.13	As required	NCIA-TH, CWE	As Required	Lot	1	€ -	€ -	
1.5.2	Project Information Materials	3.20.1.4	2.13.2	As required	NCIA-TH, CWE	As Required	Lot	1	€ -	€ -	
1.5.3	Attendance to Meetings and Conferences	3.20.1.4	2.13.2	On Purchaser Request	As needed	Meeting	Lot	1	€ -	€ -	
TOTAL PRICE CLIN 1										**€ -**	
2	**SYSTEMS ENGINEERING SERVICES**										
2.1	**System Requirements Analysis**									**€ -**	
2.1.1	Perform System Requirements Analysis Process	4.8	3.3.1	PMR to SRR	Contractor's Premises	As Required	Lot	1			NSP
2.1.2	Requirements Management Database (RMD)	4.8.9	3.3.1.2	PMR	CWE	Electronic	Each	1	€ -	€ -	
2.1.3	System Requirements Specification (SyRS)	4.8.3	3.3.1.3	SRR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	

2.1.4	User Interface Specification (UIS) (draft)	4.8.4	3.3.1.4	PDR	CWE	Electronic	Lot	1	€ -	€ -	
2.1.5	User Interface Specification (UIS) (preliminary)	4.8.4	3.3.1.4	CDR updated at each SwDR	CWE	Electronic	Each	1	€ -	€ -	
2.1.6	Security Risk Assessment Report (SRA-R)	4.8.5	3.3.1.5	SRR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
2.1.7	System-Specific Security Requirements Statement (SSRS)-Draft	4.8.6	3.3.1.6	SRR	CWE	Electronic	Each	1	€ -	€ -	
2.1.8	Community Security Requirements Statement (CSRS)-Draft	4.8.6	3.3.1.6	SRR	CWE	Electronic	Each	1	€ -	€ -	
2.1.9	System Interconnection Security Requirements Statements (SISRS)-Draft	4.8.6	3.3.1.6	SRR	CWE	Electronic	Each	1	€ -	€ -	
2.2	**System Architectural Design**									€ -	
2.2.1	Perform System Architectural Design Process	4.9	3.3.2	SRR to CDR	Contractor's Premises	As Required	Lot	1			NSP
2.2.2	System Design Specification (SDS) Annex - Requirements Traceability Matrix (RTM) Annex - System Security Design Specification (SSDS)	4.9.2	3.3.2.2	PDR	CWE	Electronic	Each	1	€ -	€ -	
2.2.3	User Interface Mock-Up or Low Fidelity Prototype	4.9.1.8	3.3.1.4.2	CDR	CWE	Electronic	Each	1	€ -	€ -	
2.2.4	Interface Control Descriptions (ICDs) (for external systems)	4.9.2.17	3.3.2.3	CDR	CWE	Electronic	Each	1	€ -	€ -	
2.2.5	TRITON Interface Control Description (ICD) (v1)	4.9.2.17	3.3.2.3	CDR	CWE	Electronic	Each	1	€ -	€ -	
2.2.6	System Validation Test (SVT) Procedure (preliminary)	4.14.3	3.3.2	CDR	CWE	Electronic	Lot	1	€ -	€ -	
2.3	**System Validation**									€ -	
2.3.1	Conduct System Validation Process	4.14	3.3.5	Between PSA and FSA	Selected Site	As Required	Lot	1			NSP
2.3.2	System Validation Test (SVT) Procedure (final)	4.14.3	3.3.5.2	PSA	CWE	Electronic	Each	1	€ -	€ -	
2.4	**Meetings and Reviews**									€ -	
2.4.1	Conduct System Requirements Review (SRR)	4.8.8	3.4.1	SRR	NCIA-TH	Meeting	Lot	1	€ -	€ -	
2.4.2	System Requirements Review Report (SRR-R)	4.8.8	3.4.1.1	After SRR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
2.4.3	Conduct Preliminary Design Review (PDR)	4.9.3	3.4.2	PDR	NCIA-TH	Meeting	Lot	1	€ -	€ -	
2.4.4	Preliminary Design Review Report (PDR-R)	4.9.3	3.4.2.1	After PDR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
2.4.5	Conduct Critical Design Review (CDR)	4.9.4	3.4.3	CDR	NCIA-TH	Meeting	Lot	1	€ -	€ -	
2.4.6	Critical Design Review Report (CDR-R)	4.9.4	3.4.3.1	After CDR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
2.4.7	Joint Technical Reviews (JTR)	4.5.1	3.4.4	As needed	NCIA-TH or On-line	Meeting	Lot	1	€ -	€ -	
2.4.8	Working Group (WG) Meetings - Minutes	4.4	3.4.4	After JTR	CWE	Electronic	Lot	1	€ -	€ -	
2.4.9	Conduct System Validation Review (SVR)	4.14.6	3.4.5	SVR	NCIA-TH	Meeting	Lot	1	€ -	€ -	
2.4.10	System Validation Review Report (SVR-R)	4.14.6	3.4.5.1	After SVR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
TOTAL PRICE CLIN 2										€ -	
3.1	**BUILD PROCESS 1**										
3.1.1	**Software Requirements Analysis**									€ -	
3.1.1.1	Perform Software Requirements Analysis Process	4.10.2.4	4.3.2	PSD to SwRR-1	Contractor's Premises	As Required	Lot	1			NSP
3.1.1.2	Software Requirements Specification (SRS) (v1)	4.10.2.4.4	4.3.2.2	SwRR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.1.1.3	Preliminary User Interface Specification (UIS) (v1)	4.10.2.6.7	4.3.2.3	SwRR-1	CWE	Electronic	Each	1	€ -	€ -	
3.1.2	**Software Architectural and Detailed Design**									€ -	
3.1.2.1	Perform Software Architectural and Detailed Design Process	4.10.2.5/6	4.3.3	SwRR-1 to SwDR-1	Contractor's Premises	Electronic	Lot	1			NSP
3.1.2.2	Preliminary Software Architecture Description (SAD)	4.9.1.7	3.3.2	PDR	CWE	Electronic	Each	1	€ -	€ -	
3.1.2.3	Preliminary Database Design Description (DDD)	4.9.1.7	3.3.2	PDR	CWE	Electronic	Each	1	€ -	€ -	
3.1.2.4	Software Architecture Description (SAD) (v1)	4.10.2.5.5	4.3.3.2	SwDR-1 (CDR)	CWE	Electronic	Each	1	€ -	€ -	
3.1.2.5	Database Design Description (DDD) (v1)	4.10.2.5.6	4.3.3.3	SwDR-1 (CDR)	CWE	Electronic	Each	1	€ -	€ -	
3.1.2.6	Software Design Description (SDD) (CI-level set, for information)	4.10.2.6.6	4.3.3.4	SwDR-1 (CDR)	CWE	Electronic	Lot	1	€ -	€ -	
3.1.2.7	User Interface Specification (UIS) (v1)	4.10.2.6.7	4.3.3.5	SwDR-1 (CDR)	CWE	Electronic	Each	1	€ -	€ -	
3.1.2.8	TRITON Interface Control Description (ICD) (v2)	4.9.2.17	4.3.3.6	SwDR-1 (CDR)	CWE	Electronic	Each	1	€ -	€ -	
3.1.3	**Software Construction, Testing and Integration**									€ -	
3.1.3.1	Perform Software Construction Process	4.10.2.7	4.3.4	SwDR-1 to FAT-1	Contractor's Premises	SW/Labour	Lot	1			NSP
3.1.3.2	Concept Demonstration System (CDS) installation and activation in PMIC	4.13.10.1	4.3.5	SwDR-1 to TRR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.1.3.3	Perform Software Integration and Testing Process	4.10.2.8-9	4.3.6	Before FAT-1	Contractor's Premises	N/A	Lot	1			NSP
3.1.3.4	Software Test Description (STD) (CI-level set, for information)	4.10.2.9.2	4.3.6.1	TRR-1	CWE	Electronic	Each	1	€ -	€ -	
3.1.3.5	Test Management Tool (with actual data)	4.12.3	4.4.3.2	TRR-1	CWE	Electronic	Each	1	€ -	€ -	
3.1.3.6	Factory Acceptance Test (FAT) Procedure	4.12.12.1.4	4.3.6.2	TRR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.1.3.7	System Integration Test (SIT) Procedure	4.12.12.3.4	4.3.6.2	TRR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.1.3.8	System Support and Maintenance Acceptance Test (SSMAT) Procedure	4.12.12.4.6	4.3.6.2	TRR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.1.3.9	User Assessment Test (UAT) Procedure	4.12.12.5.5	4.3.6.2	TRR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.1.3.10	Security Operating Procedures (SecOps)	4.12.12.2.5	4.3.6.2	TRR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.1.3.11	Security Implementation Verification Procedures (SIVP)	4.12.12.2.6	4.3.6.2	TRR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.1.3.12	Perform Internal System Tests	4.10.2.9.3	4.3.6.5	Before TRR-1	Contractor's Premises	As Required	Lot	1	€ -	€ -	
3.1.3.13	Internal System Test Report (IST-R)	4.10.2.9.3	4.3.6.5	TRR-1	CWE	Electronic	Lot	1	€ -	€ -	
3.1.3.14	Source Code Review Report (SCR-R)	4.10.2.7.5	4.3.6.6	TRR-1	CWE	Electronic	Each	1	€ -	€ -	
3.1.3.15	Conduct Security Test and Evaluation (ST&E)	4.12.12.2	4.3.6.7	Before TRR-1	Contractor's Premises	As Required	Lot	1	€ -	€ -	
3.1.3.16	Security Test and Evaluation Report (ST&E-R)	4.12.12.2.7	4.3.6.7	TRR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.1.3.17	Conduct Factory Acceptance Test (FAT)	4.12.12.1	4.3.9.2	FAT-1	Contractor's Premises	As Required	Lot	1	€ -	€ -	
3.1.3.18	Factory Acceptance Test Report (FAT-R)	4.12.12.1.8	4.3.9.3	After FAT-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.1.3.19	Perform System Integration Activity	4.11.2	4.3.8	Before SIT-1	NCIA-TH	As Required	Lot	1	€ -	€ -	
3.1.3.20	Conduct System Integration Test (SIT)	4.12.12.3	4.3.9.2	SIT-1	NCIA-TH	As Required	Lot	1	€ -	€ -	
3.1.3.21	System Integration Test Report (SIT-R)	4.12.12.3.10	4.3.9.3	After SIT-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.1.3.22	Software Installation Guide (SIG)	4.12.12.4.3	4.3.6.2	Prior to SSMAT-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.1.3.23	Conduct System Support and Maintenance Acceptance Test (SSMAT)	4.12.12.4	4.3.9.2	SSMAT-1	NCIA-TH	As Required	Lot	1	€ -	€ -	
3.1.3.24	System Support and Maintenance Acceptance Test Report (SSMAT-R)	4.12.12.4	4.3.9.3	After SSMAT-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.1.3.25	Conduct User Assessment Test (UAT)	4.12.12.5	4.3.9.2	UAT-1	NCIA-TH	As Required	Lot	1	€ -	€ -	
3.1.3.26	User Assessment Test Report (UAT-R)	4.12.12.5	4.3.9.3	After UAT-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.1.3.27	Perform Regression Tests (RegT)	4.12.12.6	4.3.9.2	When necessary	Contractor's Premises	As Required	Lot	1	€ -	€ -	
3.1.3.28	Regression Test Reports (RegT-R)	4.12.12.6	4.3.9.3	After Reg.Tests	NCIA-TH, CWE	Paper, Electronic	Lot	1	€ -	€ -	
3.1.3.29	Software Version Description (SVD) (BL1)	4.10.2.11	4.3.7	IPC-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	

3.1.3.30	Support to IV&V Testing	4.12.12.7	4.3.9.2	IV&V Testing	NCIA-Casteau	As Required	Lot	1	€ -	€ -	
3.1.3.31	TRITON-NS Operational Software - BL1 (in AFPL)	4.7.3	4.1.1	PED	CWE	SW	Each	1	€ -	€ -	
3.1.4	**Meetings and Reviews**									€ -	
3.1.4.1	Conduct Software Requirements Review (SwRR)	4.10.2.4.6	4.4.1	SwRR-1	NCIA-TH	Meeting	Lot	1	€ -	€ -	
3.1.4.2	Software Requirements Review Report (SwRR-R)	4.10.2.4.6	4.4.1.1	After SwRR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.1.4.3	Conduct Software Design Review Report (SwDR-R)	4.10.2.6.8	4.4.2	SwDR-1	NCIA-TH	Paper, Electronic	Lot	1	€ -	€ -	
3.1.4.4	Software Design Review Report (SwDR-R)	4.10.2.6.8	4.4.2.1	After SwDR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.1.4.5	Conduct Test Readiness Review (TRR)	4.12.5	4.4.3	TRR-1	Contractor's Premises	Meeting	Lot	1	€ -	€ -	
3.1.4.6	Test Readiness Review Report (TRR-R)	4.12.5.6	4.4.3.1	After TRR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.1.4.7	Attend IV&V Initial and Final Planning Conferences (IPC and FPC)	4.12.12.7.18	4.4.4	IPC-1	NCIA-Casteau	Meeting	Lot	1	€ -	€ -	
3.1.4.8	Conduct System Verification Review (SVerR)	4.12.13	4.4.5	SVR-1	NCIA-TH	Meeting	Lot	1	€ -	€ -	
3.1.4.9	System Verification Review Report (SVerR-R)	4.12.13.4	4.4.5.1	After SVR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.1.4.10	Support User Assessment Reviews (UAR)	3.16.5	4.4.6	UARs	NCIA-TH	Meeting	Lot	1	€ -	€ -	
3.1.4.11	Working Group (WG) Meetings - Minutes	4.4	4.3.1	After Meetings	CWE	Electronic	Lot	1	€ -	€ -	
TOTAL PRICE CLIN 3.1										€ -	
3.2	**BUILD PROCESS 2**										
3.2.1	**Software Requirements Analysis**									€ -	
3.2.1.1	Perform Software Requirements Analysis Process	4.10.2.4	5.3.2	PSD to SwRR-2	Contractor's Premises	As Required	Lot	1			NSP
3.2.1.2	Software Requirements Specification (SRS) (v2)	4.10.2.4.4	5.3.2.2	SwRR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.2.1.3	Preliminary User Interface Specification (UIS) (v2)	4.10.2.6.7	5.3.2.3	SwRR-2	CWE	Electronic	Each	1	€ -	€ -	
3.2.2	**Software Architectural and Detailed Design**									€ -	
3.2.2.1	Perform Software Architectural and Detailed Design Process	4.10.2.5/6	5.3.3	SwRR-2 to SwDR-2	Contractor's Premises	As Required	Lot	1			NSP
3.2.2.2	Software Architecture Description (SAD) (v2)	4.10.2.5.5	5.3.3.2	SwDR-2	CWE	Electronic	Each	1	€ -	€ -	
3.2.2.3	Database Design Description (DDD) (v2)	4.10.2.5.6	5.3.3.3	SwDR-2	CWE	Electronic	Each	1	€ -	€ -	
3.2.2.4	Software Design Description (SDD) (CI-level set, for information)	4.10.2.6.6	5.3.3.4	SwDR-2	CWE	Electronic	Lot	1	€ -	€ -	
3.2.2.5	User Interface Specification (UIS) (v2)	4.10.2.6.7	5.3.3.5	SwDR-2	CWE	Electronic	Each	1	€ -	€ -	
3.2.2.6	TRITON Interface Control Description (ICD) (v3)	4.9.2.17	5.3.3.6	SwDR-2	CWE	Electronic	Each	1	€ -	€ -	
3.2.3	**Software Construction, Testing and Integration**									€ -	
3.2.3.1	Perform Software Construction Process	4.10.2.7	5.3.4	SwDR-2 to FAT-2	Contractor's Premises	SW/Labour	Lot	1			NSP
3.2.3.2	Perform Software Integration and Testing Process	4.10.2.8-9	5.3.5	Before FAT-2	Contractor's Premises	As Required	Lot	1			NSP
3.2.3.3	Software Test Description (STD) (CI-level set, for information)	4.10.2.9.2	5.3.5.1	TRR-2	CWE	Electronic	Each	1	€ -	€ -	
3.2.3.4	Factory Acceptance Test (FAT) Procedure	4.12.12.1.4	5.3.5.2	TRR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.2.3.5	System Integration Test (SIT) Procedure	4.12.12.3.4	5.3.5.2	TRR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.2.3.6	System Support and Maintenance Acceptance Test (SSMAT) Procedure	4.12.12.4.6	5.3.5.2	TRR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.2.3.7	User Assessment Test (UAT) Procedure	4.12.12.5.5	5.3.5.2	TRR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.2.3.8	Security Operating Procedures (SecOps)	4.12.12.2.5	5.3.5.2	TRR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.2.3.9	Security Implementation Verification Procedures (SIVP)	4.12.12.2.6	5.3.5.2	TRR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.2.3.10	Perform Internal System Tests	4.10.2.9.3	5.3.5.5	Before TRR-2	Contractor's Premises	As Required	Lot	1	€ -	€ -	
3.2.3.11	Internal System Test Report (IST-R)	4.10.2.9.3	5.3.5.5	TRR-2	CWE	Electronic	Lot	1	€ -	€ -	
3.2.3.12	Source Code Review Report (SCR-R)	4.10.2.7.5	5.3.5.6	TRR-2	CWE	Electronic	Each	1	€ -	€ -	
3.2.3.13	Conduct Security Test and Evaluation (ST&E)	4.12.12.2	5.3.5.7	Before TRR-2	Contractor's Premises	As Required	Lot	1	€ -	€ -	
3.2.3.14	Security Test and Evaluation Report (ST&E-R)	4.12.12.2.7	5.3.5.7	TRR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.2.3.15	Conduct Factory Acceptance Test (FAT)	4.12.12.1	5.3.8.2	FAT-2	Contractor's Premises	As Required	Lot	1	€ -	€ -	
3.2.3.16	Factory Acceptance Test Report (FAT-R)	4.12.12.1	5.3.8.3	After FAT-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.2.3.17	Perform System Integration Activity	4.11.2	5.3.7	Before SIT-2	NCIA-TH	As Required	Lot	1	€ -	€ -	
3.2.3.18	Conduct System Integration Test (SIT)	4.12.12.3	5.3.8.2	SIT-2	NCIA-TH	As Required	Lot	1	€ -	€ -	
3.2.3.19	System Integration Test Report (SIT-R)	4.12.12.3.10	5.3.8.3	After SIT-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.2.3.20	Software Installation Guide (SIG)	4.12.12.4.3	5.3.5.2	Prior to SSMAT-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.2.3.21	Conduct System Support and Maintenance Acceptance Test (SSMAT)	4.12.12.4	5.3.8.2	SSMAT-2	NCIA-TH	As Required	Lot	1	€ -	€ -	
3.2.3.22	System Support and Maintenance Acceptance Test Report (SSMAT-R)	4.12.12.4	5.3.8.3	After SSMAT-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.2.3.23	Conduct User Assessment Test (UAT)	4.12.12.5	5.3.8.2	UAT-2	NCIA-TH	As Required	Lot	1	€ -	€ -	
3.2.3.24	User Assessment Test Report (UAT-R)	4.12.12.13	5.3.8.3	After UAT-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.2.3.25	Perform Regression Tests (RegT)	4.12.12.6	5.3.8.2	When necessary	Contractor's Premises	As Required	Lot	1	€ -	€ -	
3.2.3.26	Regression Test Reports (RegT-R)	4.12.12.6	5.3.8.3	After Reg.Tests	NCIA-TH, CWE	Paper, Electronic	Lot	1	€ -	€ -	
3.2.3.27	Software Version Description (SVD) (BL2)	4.10.2.11	5.3.6	IPC-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.2.3.28	Support to IV&V Testing	4.12.12.7	5.3.8.2	IV&V Testing	NCIA-Casteau	As Required	Lot	1	€ -	€ -	
3.2.3.29	TRITON-NS Operational Software - BL2 (in AFPL)	4.7.3	5.1.1	PED	CWE	SW/Labour	Each	1	€ -	€ -	
3.2.4	**Meetings and Reviews**									€ -	
3.2.4.1	Conduct Software Requirements Review (SwRR)	4.10.2.4.6	5.4.1	SwRR-2	NCIA-TH	Meeting	Lot	1	€ -	€ -	
3.2.4.2	Software Requirements Review Report (SwRR-R)	4.10.2.4.6	5.4.1.1	After SwRR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.2.4.3	Conduct Software Design Review (SwDR)	4.10.2.6.8	5.4.2	SwDR-2	NCIA-TH	Meeting	Lot	1	€ -	€ -	
3.2.4.4	Software Design Review Report (SwDR-R)	4.10.2.6.8	5.4.2.1	After SwDR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.2.4.5	Conduct Test Readiness Review (TRR)	4.12.5	5.4.3	TRR-2	Contractor's Premises	Meeting	Lot	1	€ -	€ -	
3.2.4.6	Test Readiness Review Report (TRR-R)	4.12.5.6	5.4.3.1	After TRR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.2.4.7	Attend IV&V Initial and Final Planning Conferences (IPC and FPC)	4.12.12.7.18	5.4.4	IPC-2	NCIA-Casteau	Meeting	Lot	1	€ -	€ -	
3.2.4.8	Conduct System Verification Review (SVerR)	4.12.13	5.4.5	SVR-2	NCIA-TH	Meeting	Lot	1	€ -	€ -	
3.2.4.9	System Verification Review Report (SVerR-R)	4.12.13.4	5.4.5.1	After SVR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.2.4.10	Conduct Operational Test Readiness Review (OTRR)	4.13.9	5.4.6	OTRR-2	NCIA-TH	Meeting	Lot	1	€ -	€ -	
3.2.4.11	Operational Test Readiness Review Report (OTRR-R)	4.13.9.6	5.4.6.1	After OTRR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.2.4.12	Support User Assessment Reviews (UAR)	3.16.15	5.4.7	UARs	NCIA-TH	Meeting	Lot	1	€ -	€ -	
3.2.4.13	Working Group (WG) Meetings - Minutes	4.4	5.3.1	After Meetings	CWE	Electronic	Lot	1	€ -	€ -	
TOTAL PRICE CLIN 3.2										€ -	
3.3	**BUILD PROCESS 3**										
3.3.1	**Software Requirements Analysis**									€ -	
3.3.1.1	Perform Software Requirements Analysis Process	4.10.2.4	6.3.2	PSD to SwRR-3	Contractor's Premises	As Required	Lot	1			NSP
3.3.1.2	Software Requirements Specification (SRS) (v3)	4.10.2.4.4	6.3.2.2	SwRR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.3.1.3	Preliminary User Interface Specification (UIS) (v3)	4.10.2.6.7	6.3.2.3	SwRR-3	CWE	Electronic	Each	1	€ -	€ -	

3.3.2	**Software Architectural and Detailed Design**										€ -	
3.3.2.1	Perform Software Architectural and Detailed Design Process	4.10.2.5/6	6.3.3	SwRR-3 to SwDR-3	Contractor's Premises	As Required	Lot	1				NSP
3.3.2.2	Software Architecture Description (SAD) (v3)	4.10.2.5.5	6.3.3.2	SwDR-3	CWE	Electronic	Each	1	€ -	€ -		
3.3.2.3	Database Design Description (DDD) (v3)	4.10.2.5.6	6.3.3.3	SwDR-3	CWE	Electronic	Each	1	€ -	€ -		
3.3.2.4	Software Design Description (SDD) (CI-level set, for information)	4.10.2.6.6	6.3.3.4	SwDR-3	CWE	Electronic	Lot	1	€ -	€ -		
3.3.2.5	User Interface Specification (UIS) (v3)	4.10.2.6.7	6.3.3.5	SwDR-3	CWE	Electronic	Each	1	€ -	€ -		
3.3.2.6	TRITON Interface Control Description (ICD) (v4)	4.9.2.17	6.3.3.6	SwDR-3	CWE	Electronic	Each	1	€ -	€ -		
3.3.3	**Software Construction, Testing and Integration**										€ -	
3.3.3.1	Perform Software Construction Process	4.10.2.7	6.3.4	SwDR-3 to FAT-3	Contractor's Premises	SW/Labour	Lot	1				NSP
3.3.3.2	Perform Software Integration and Testing Process	4.10.2.8-9	6.3.5	SwDR-3 to FAT-3	Contractor's Premises	As Required	Lot	1				NSP
3.3.3.3	Software Test Description (STD) (CI-level set, for information)	4.10.2.9.2	6.3.5.1	TRR-3	CWE	Electronic	Each	1	€ -	€ -		
3.3.3.4	Factory Acceptance Test (FAT) Procedure	4.12.12.1.4	6.3.5.2	TRR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.3.3.5	System Integration Test (SIT) Procedure	4.12.12.3.4	6.3.5.2	TRR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.3.3.6	System Support and Maintenance Acceptance Test (SSMAT) Procedure	4.12.12.4.6	6.3.5.2	TRR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.3.3.7	User Assessment Test (UAT) Procedure	4.12.12.5.5	6.3.5.2	TRR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.3.3.8	Security Operating Procedures (SecOps)	4.12.12.2.5	6.3.5.2	TRR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.3.3.9	Security Implementation Verification Procedures (SIVP)	4.12.12.2.6	6.3.5.2	TRR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.3.3.10	Perform Internal System Tests	4.10.2.9.3	6.3.5.5	Before TRR-3	Contractor's Premises	As Required	Lot	1	€ -	€ -		
3.3.3.11	Internal System Test Report (IST-R)	4.10.2.9.3	6.3.5.5	TRR-3	CWE	Electronic	Lot	1	€ -	€ -		
3.3.3.12	Source Code Review Report (SCR-R)	4.10.2.7.5	6.3.5.6	TRR-3	CWE	Electronic	Each	1	€ -	€ -		
3.3.3.13	Conduct Security Test and Evaluation (ST&E)	4.12.12.2	6.3.5.7	Before TRR-3	Contractor's Premises	As Required	Lot	1	€ -	€ -		
3.3.3.14	Security Test and Evaluation Report (ST&E-R)	4.12.12.2.7	6.3.5.7	TRR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.3.3.15	Conduct Factory Acceptance Test (FAT)	4.12.12.1	6.3.8.2	FAT-3	Contractor's Premises	As Required	Lot	1	€ -	€ -		
3.3.3.16	Factory Acceptance Test Report (FAT-R)	4.12.12.1	6.3.8.2	After FAT-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.3.3.17	Perform System Integration Activity	4.11.2	6.3.7	Before SIT-3	NCIA-TH	As Required	Lot	1	€ -	€ -		
3.3.3.18	Conduct System Integration Test (SIT)	4.12.12.3	6.3.8.2	SIT-3	NCIA-TH	As Required	Lot	1	€ -	€ -		
3.3.3.19	System Integration Test Report (SIT-R)	4.12.12.3	6.3.8.3	After SIT-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.3.3.20	Software Installation Guide (SIG)	4.12.12.4.3	6.3.5.2	Prior to SSMAT-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.3.3.21	Conduct System Support and Maintenance Acceptance Test (SSMAT)	4.12.12.4	6.3.8.2	SSMAT-3	NCIA-TH	As Required	Lot	1	€ -	€ -		
3.3.3.22	System Support and Maintenance Acceptance Test Report (SSMAT-R)	4.12.12.4	6.3.8.3	After SSMAT-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.3.3.23	Conduct User Assessment Test (UAT)	4.12.12.5	6.3.8.2	UAT-3	NCIA-TH	As Required	Lot	1	€ -	€ -		
3.3.3.24	User Assessment Test Report (UAT-R)	4.12.12.5.13	6.3.8.3	After UAT-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.3.3.25	Perform Regression Tests (RegT)	4.12.12.6	6.3.8.2	When necessary	Contractor's Premises	As Required	Lot	1	€ -	€ -		
3.3.3.26	Regression Test Reports (RegT-R)	4.12.12.6	6.3.8.3	After Reg.Tests	NCIA-TH, CWE	Paper, Electronic	Lot	1	€ -	€ -		
3.3.3.27	Software Version Description (SVD) (BL3)	4.10.2.11	6.3.6	IPC-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.3.3.28	Support to IV&V Testing	4.12.12.7	6.3.8.2	IV&V Testing	NCIA-Casteau	As Required	Lot	1	€ -	€ -		
3.3.3.29	TRITON-NS Operational Software - BL3 (in AFPL)	4.7.3	6.1.1	PED	CWE	SW	Each	1	€ -	€ -		
3.3.4	**Meetings and Reviews**										€ -	
3.3.4.1	Conduct Software Requirements Review (SwRR)	4.10.2.4.6	6.4.1	SwRR-3	NCIA-TH	Meeting	Lot	1	€ -	€ -		
3.3.4.2	Software Requirements Review Report (SwRR-R)	4.10.2.4.6	6.4.1.1	After SwRR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.3.4.3	Conduct Software Design Review (SwDR)	4.10.2.6.8	6.4.2	SwDR-3	NCIA-TH	Meeting	Lot	1	€ -	€ -		
3.3.4.4	Software Design Review Report (SwDR-R)	4.10.2.6.8	6.4.2.1	After SwDR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.3.4.5	Conduct Test Readiness Review (TRR)	4.12.5	6.4.3	TRR-3	Contractor's Premises	Meeting	Lot	1	€ -	€ -		
3.3.4.6	Test Readiness Review Report (TRR-R)	4.12.5.6	6.4.3.1	After TRR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.3.4.7	Attend IV&V Initial and Final Planning Conferences (IPC and FPC)	4.12.12.7.18	6.4.4	IPC-3	NCIA-Casteau	Meeting	Lot	1	€ -	€ -		
3.3.4.8	Conduct System Verification Review (SVerR)	4.12.13	6.4.5	SVR-3	NCIA-TH	Meeting	Lot	1	€ -	€ -		
3.3.4.9	System Verification Review Report (SVerR-R)	4.12.13.4	6.4.5.1	After SVR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.3.4.10	Conduct Operational Test Readiness Review (OTRR)	4.13.9	6.4.6	OTRR-3	NCIA-TH	Meeting	Lot	1	€ -	€ -		
3.3.4.11	Operational Test Readiness Review Report (OTRR-R)	4.13.9.6	6.4.6.1	After OTRR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.3.4.12	Support User Assessment Reviews (UAR)	3.16.15	6.4.7	UARs	NCIA-TH	Meeting	Lot	1	€ -	€ -		
3.3.4.13	Working Group (WG) Meetings - Minutes	4.4	6.3.1	After Meetings	CWE	Electronic	Lot	1	€ -	€ -		
TOTAL PRICE CLIN 3.3											€ -	
3.4	**BUILD PROCESS 4**											
3.4.1	**Software Requirements Analysis**										€ -	
3.4.1.1	Perform Software Requirements Analysis Process	4.10.2.4	7.3.2	PSD to SwRR-4	Contractor's Premises	As Required	Lot	1				NSP
3.4.1.2	Software Requirements Specification (SRS) (v1)	4.10.2.4.4	7.3.2.2	SwRR-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.4.1.3	Preliminary User Interface Specification (UIS)	4.10.2.6.7	7.3.2.3	SwRR-4	CWE	Electronic	Each	1	€ -	€ -		
3.4.2	**Software Architectural and Detailed Design**										€ -	
3.4.2.1	Perform Software Architectural and Detailed Design Process	4.10.2.5/6	7.3.4	SwRR-4 to SwDR-4	Contractor's Premises	As Required	Lot	1				NSP
3.4.2.2	Software Architecture Description (SAD) (v4)	4.10.2.5.5	7.3.4.2	SwDR-4	CWE	Electronic	Each	1	€ -	€ -		
3.4.2.3	Database Design Description (DDD) (v4)	4.10.2.5.6	7.3.4.3	SwDR-4	CWE	Electronic	Each	1	€ -	€ -		
3.4.2.4	Software Design Description (SDD) (CI-level set, for information)	4.10.2.6.6	7.3.4.4	SwDR-4	CWE	Electronic	Lot	1	€ -	€ -		
3.4.2.5	User Interface Specification (UIS) (v4)	4.10.2.6.7	7.3.4.5	SwDR-4	CWE	Electronic	Each	1	€ -	€ -		
3.4.2.6	TRITON Interface Control Description (ICD) (v5)	4.9.2.17	7.3.4.6	SwDR-4	CWE	Electronic	Each	1	€ -	€ -		
3.4.3	**Hardware Requirements Analysis and Design**										€ -	
3.4.3.1	Perform Hardware Requirements Analysis Process	4.10.3.2	7.3.3	PSD to HwRR	Contractor's Premises	As Required	Lot	1				NSP
3.4.3.2	Hardware Requirements Specification (HRS)	4.10.3.2.2	7.3.3.2	HwRR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.4.3.3	Perform Hardware Design Process	4.10.3.3	7.3.5	HwRR to HwDR	Contractor's Premises	As Required	Lot	1				NSP
3.4.3.4	Hardware Design Description (HDD)	4.10.3.3.2	7.3.5.1	HwDR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.4.4	**Software Construction, Hardware Production, Testing and Integration**										€ -	
3.4.4.1	Perform Software Construction Process	4.10.2.7	7.3.6	SwDR-4 to IST	Contractor's Premises	SW/Labour	Lot	1				NSP
3.4.4.2	Perform Hardware Production Process	4.10.3.4	7.3.7	SwDR-4 to IST	Contractor's Premises	HW/Labour	Lot	1				NSP
3.4.4.3	Perform Software Integration and Testing Process	4.10.2.8-9	7.3.8	Before FAT-4	Contractor's Premises	As Required	Lot	1				NSP
3.4.4.4	Software Test Description (STD) (CI-level set, for information)	4.10.2.9.2	7.3.8.1	TRR-4	CWE	Electronic	Each	1	€ -	€ -		
3.4.4.5	First Article Acceptance Test (FAAT) Procedure	4.10.3.6.2.4	7.3.8.2	TRR-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.4.4.6	Factory Acceptance Test (FAT) Procedure (including nominal tests)	4.10.3.8.2.5	7.3.11	TRR-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.4.4.7	System Integration Test (SIT) Procedure	4.10.3.8.3.3	7.3.8.2	TRR-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.4.4.8	System Support and Maintenance Acceptance Test (SSMAT) Procedure	4.12.12.4.6	7.3.8.2	TRR-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		
3.4.4.9	User Assessment Test (UAT) Procedure	4.12.12.5.5	7.3.8.2	TRR-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -		

3.4.4.10	Sea Acceptance Test (SeAT) Procedure	4.10.3.8.3.3	7.3.8.2	TRR-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.4.11	Security Operating Procedures (SecOps)	4.12.12.2.5	7.3.8.2	TRR-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.4.12	Security Implementation Verification Procedures (SIVP)	4.12.12.2.6	7.3.8.2	TRR-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.4.13	Perform Internal System Tests	4.10.2.9.3	7.3.8.5	Before TRR-4	Contractor's Premises	As Required	Lot	1	€ -	€ -	
3.4.4.14	Internal System Test Report (IST-R)	4.10.2.9.3	7.3.8.5	TRR-4	CWE	Electronic	Lot	1	€ -	€ -	
3.4.4.15	Source Code Review Report (SCR-R)	4.10.2.7.5	7.3.8.6	TRR-4	CWE	Electronic	Each	1	€ -	€ -	
3.4.4.16	Conduct Security Test and Evaluation (ST&E)	4.12.12.2	7.3.8.7	Before TRR-4	Contractor's Premises	As Required	Lot		€ -	€ -	
3.4.4.17	Security Test and Evaluation Report (ST&E-R)	4.12.12.2.7	7.3.8.7	TRR-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.4.18	Conduct First Article Acceptance Test (FAAT)	4.10.3.6.2	7.3.10.1	FAAT	Contractor's Premises	As Required	Lot		€ -	€ -	
3.4.4.19	First Article Acceptance Test Report (FAAT-R)	4.10.3.6.2.9	7.3.10.1	After FAAT	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.4.20	Conduct TDK Factory Acceptance Test (FAT) (for one TDK)	4.10.3.8.2	7.3.13.2	FAT-4	Contractor's Premises	As Required	Lot	1	€ -	€ -	
3.4.4.21	Factory Acceptance Test Report (FAT-R) (for one TDK)	4.10.3.8.2.8	7.3.13.2	After FAT-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.4.22	Serial Hardware Production	4.10.3.7	7.3.11	Before Hw-FAT	Contractor's Premises	As Required	Lot	1	€ -	€ -	
3.4.4.23	Perform System Integration Activity	4.11.2	7.3.12	Before SIT-4	NCIA-TH	As Required	Lot	1	€ -	€ -	
3.4.4.24	Conduct System Integration Test (SIT)	4.12.12.3	7.3.11.5	SIT-4	NCIA-TH	As Required	Lot	1	€ -	€ -	
3.4.4.25	System Integration Test Report (SIT-R)	4.12.12.3.10	7.3.11.5	After SIT-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.4.26	Software Installation Guide (SIG)	4.12.12.4.3	7.3.8.2	Prior to SSMAT-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.4.27	Conduct System Support and Maintenance Acceptance Test (SSMAT)	4.12.12.4	7.3.13.3	SSMAT-4	NCIA-TH	As Required	Lot	1	€ -	€ -	
3.4.4.28	System Support and Maintenance Acceptance Test Report (SSMAT-R)	4.12.12.4	7.3.13.4	After SSMAT-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.4.29	Conduct User Assessment Test (UAT)	4.12.12.5	7.3.13.3	UAT-4	NCIA-TH	As Required	Lot	1	€ -	€ -	
3.4.4.30	User Assessment Test Report (UAT-R)	4.12.12.5.13	7.3.13.4	After UAT-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.4.31	Perform Regression Tests (RegT)	4.12.12.6	7.3.13.3	When necessary	Contractor's Premises	As Required	Lot	1	€ -	€ -	
3.4.4.32	Regression Test Reports (RegT-R)	4.12.12.6	7.3.13.4	After Reg.Tests	NCIA-TH, CWE	Paper, Electronic	Lot	1	€ -	€ -	
3.4.4.33	Attend IV&V Initial and Final Planning Conferences (IPC and FPC)	4.12.12.7.18	7.4.4	IPC-4	NCIA-Casteau	Meeting	Lot	1	€ -	€ -	
3.4.4.34	Software Version Description (SVD) (BL4)	4.10.2.11	7.3.9	IPC-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.4.35	Support to IV&V Testing	4.12.12.7.26	7.3.13.5	IV&V Testing	NCIA-Casteau	Meeting	Lot	1	€ -	€ -	
3.4.4.36	Conduct Sea Acceptance Test (SeAT)	4.10.3.8.3	7.3.11.6	SeAT	On board a ship at port in Europe	As Required	Lot	1	€ -	€ -	
3.4.4.37	Sea Acceptance Test Report (SeAT-R)	4.10.3.8.3.5	7.3.11.6	After SeAT	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.4.38	Conduct TDK Factory Acceptance Tests (FAT) (for seven TDKs)	4.10.3.8.2	7.3.13.7	Hw-FAT	Contractor's Premises	As Required	Lot	1	€ -	€ -	
3.4.4.39	Factory Acceptance Test Report (FAT-R) (for seven TDKs)	4.10.3.8.2.8	7.3.13.7	After Hw-FAT	NCIA-TH, CWE	Paper, Electronic	Each	7	€ -	€ -	
3.4.4.40	TRITON-NS Operational Software - BL4 (in AFPL)	4.7.3	7.1.1	PED	CWE	As Required	Each	1	€ -	€ -	
3.4.4.41	TRITON-NU Operational Software - BL4 (in AFPL)	4.7.3	7.1.1	PED	CWE	As Required	Each	1	€ -	€ -	
3.4.5	**Meetings and Reviews**									€ -	
3.4.5.1	Conduct Software Requirements Review (SwRR)	4.10.2.4.6	7.4.1.1	SwRR-4	NCIA-TH	Meeting	Lot	1	€ -	€ -	
3.4.5.2	Software Requirements Review Report (SwRR-R)	4.10.2.4.6	7.4.1.1	After SwRR-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.5.3	Conduct Hardware Requirements Review (HwRR)	4.10.3.2.3	7.4.1.2	HwRR	NCIA-TH	Meeting	Lot	1	€ -	€ -	
3.4.5.4	Hardware Requirements Review Report (HwRR-R)	4.10.3.2.3	7.4.1.2	After HwRR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.5.5	Conduct Software Design Review (SwDR)	4.10.2.6.8	7.4.2.1	SwDR-4	NCIA-TH	Meeting	Lot	1	€ -	€ -	
3.4.5.6	Software Design Review Report (SwDR-R)	4.10.2.6.8	7.4.2.1	After SwDR-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.5.7	Conduct Hardware Design Review (HwDR)	4.10.3.3.3	7.4.2.2	SwDR-4	NCIA-TH	Meeting	Lot	1	€ -	€ -	
3.4.5.8	Hardware Design Review Report (HwDR-R)	4.10.3.3.3	7.4.2.2	After SwDR-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.5.9	Conduct Test Readiness Review (TRR)	4.12.5	7.4.3.1	TRR-4	Contractor's Premises	Meeting	Lot	1	€ -	€ -	
3.4.5.10	Test Readiness Review Report (TRR-R)	4.12.5.6	7.4.3.2	After TRR-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.5.11	Conduct Hardware Test Readiness Review (HwTRR)	4.12.5	7.4.3	Hw-TRR	Contractor's Premises	Meeting	Lot	1	€ -	€ -	
3.4.5.12	Hardware Test Readiness Review Report (HwTRR-R)	4.12.5.6	7.4.3.1	After Hw-TRR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.5.13	Conduct Production Readiness Review (PRR)	4.10.3.7.1	7.4.5	PRR	Contractor's Premises	Meeting	Lot	1	€ -	€ -	
3.4.5.14	Production Readiness Review Report (PRR-R)	4.10.3.7.1	7.4.5.1	After PRR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.5.15	Conduct System Verification Review (SVerR)	4.12.13	7.4.6	SVR-4	NCIA-TH	Meeting	Lot	1	€ -	€ -	
3.4.5.16	System Verification Review Report (SVerR-R)	4.12.13.4	7.4.6.1	After SVR-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.5.17	Conduct Operational Test Readiness Review (OTRR)	4.13.9	7.4.7	OTRR-4	NCIA-TH	Meeting	Lot	1	€ -	€ -	
3.4.5.18	Operational Test Readiness Review Report (OTRR-R)	4.13.9.6	7.4.7.1	After OTRR-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
3.4.5.19	Working Group (WG) Meetings - Minutes	4.4	7.3.1	After Meetings	CWE	Electronic	Lot	1	€ -	€ -	
3.4.6	**Equipment**									€ -	
3.4.6.1	Delivery of Eight (8) sets of TRITON Deployable Kits - Each including one NS and one NU Unit - Carrying Cases - Workstations - Installation Kit	4.10.2.4.6	7.3.12	PED	To be defined by the Purchaser.	HW	Each	8	€ -	€ -	
TOTAL PRICE CLIN 3.4										€ -	
4	**VISUALISATION COMPONENT PROVISION**										
4.1	**Software Requirements Analysis**									€ -	
4.1.1	Perform Software Requirements Analysis Process	4.10.2.4	8.3.3	PSD to VC-SwRR-3	Contractor's Premises	As Required	Lot	1			NSP
4.1.2	VC Software Requirements Specification (SRS) (for VC-BL1)	4.10.2.4.4	8.3.3.2	VC-SwRR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.1.3	VC Software Requirements Specification (SRS) (for VC-BL2)	4.10.2.4.4	8.3.3.2	VC-SwRR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.1.4	VC Software Requirements Specification (SRS) (for VC-BL3)	4.10.2.4.4	8.3.3.2	VC-SwRR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.1.5	VC Factory Acceptance Test (FAT) Procedures (VC-BL1) (preliminary)	4.10.2.9.2	8.3.3.3	VC-SwRR-1	CWE	As Required	Each	1	€ -	€ -	
4.1.6	VC Factory Acceptance Test (FAT) Procedures (VC-BL2) (preliminary)	4.10.2.9.2	8.3.3.3	VC-SwRR-2	CWE	As Required	Each	1	€ -	€ -	
4.1.7	VC Factory Acceptance Test (FAT) Procedures (VC-BL3) (preliminary)	4.10.2.9.2	8.3.3.3	VC-SwRR-3	CWE	As Required	Each	1	€ -	€ -	
4.1.8	Component Acceptance Test (CAT) Procedure	4.10.2.9.2	8.3.3.5	VC-SwRR-3	CWE	As Required	Each	1	€ -	€ -	
4.2	**Software Architectural and Detailed Design**									€ -	
4.2.1	Perform Software Architectural and Detailed Design Process	4.10.2.5/6	8.3.4	VC-SwRR to VC-SwDR	Contractor's Premises	As Required	Lot	1			NSP
4.2.2	Software Architecture Description (SAD) (for VC-BL1)	4.10.2.5.5	8.3.4.2	VC-SwDR-1	CWE	Electronic	Each	1	€ -	€ -	
4.2.3	Software Architecture Description (SAD) (for VC-BL2)	4.10.2.5.5	8.3.4.2	VC-SwDR-2	CWE	Electronic	Each	1	€ -	€ -	
4.2.4	Software Architecture Description (SAD) (for VC-BL3)	4.10.2.5.5	8.3.4.2	VC-SwDR-3	CWE	Electronic	Each	1	€ -	€ -	
4.2.5	Software Design Description (SDD) (CI-level set, for information)	4.10.2.6.6	8.3.43	VC-SwDR-3	CWE	Electronic	Lot	1	€ -	€ -	
4.2.6	User Interface Specification (UIS) (for VC-BL1)	4.10.2.6.7	8.3.4.4	VC-SwDR-1	CWE	Electronic	Each	1	€ -	€ -	
4.2.7	User Interface Specification (UIS) (for VC-BL2)	4.10.2.6.7	8.3.4.5	VC-SwDR-2	CWE	Electronic	Each	1	€ -	€ -	
4.2.8	User Interface Specification (UIS) (for VC-BL3)	4.10.2.6.7	8.3.4.6	VC-SwDR-3	CWE	Electronic	Each	1	€ -	€ -	
4.2.9	VC Interface Control Description (ICD) (v1)	4.9.2.17	8.3.4.6	VC-SwDR-1	CWE	Electronic	Each	1	€ -	€ -	

4.2.10	VC Interface Control Description (ICD) (v2)	4.9.2.17	8.3.4.6	VC-SwDR-2	CWE	Electronic	Each	1	€ -	€ -	
4.2.11	VC Interface Control Description (ICD) (v3)	4.9.2.17	8.3.4.6	VC-SwDR-3	CWE	Electronic	Each	1	€ -	€ -	
4.3	**Software Construction, Testing and Integration**									€ -	
4.3.1	Perform Software Construction Process	4.10.2.7	8.3.5	VC-SwDR to VC-FAT	Contractor's Premises	SW/Labour	Lot	1			NSP
4.3.2	VC Software Test Description (STD) (VC-BL 1, 2, 3)	4.10.2.9.2	8.3.6.1	VC-TRR	CWE	Electronic	Lot	1	€ -	€ -	
4.3.3	Source Code Review Report (SCR-R)	4.10.2.7.5	8.3.6.2	VC-TRR-2	CWE	Electronic	Each	1	€ -	€ -	
4.3.4	Factory Acceptance Test (FAT) Procedure (for VC-BL1)	4.12.12.1.6	8.3.6.4	VC-TRR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.3.5	Conduct Factory Acceptance Test (FAT) (for VC-BL1)	4.12.12.1	8.3.6.4	VC-FAT-3	Contractor's Premises	As Required	Lot	1	€ -	€ -	
4.3.6	Factory Acceptance Test Report (FAT-R) (for VC-BL1)	4.12.12.1	8.3.6.4	After VC-FAT-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.3.7	Factory Acceptance Test (FAT) Procedure (for VC-BL2)	4.12.12.1.6	8.3.6.4	VC-TRR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.3.8	Conduct Factory Acceptance Test (FAT) (for VC-BL2)	4.12.12.1	8.3.6.4	VC-FAT-3	Contractor's Premises	As Required	Lot	1	€ -	€ -	
4.3.9	Factory Acceptance Test Report (FAT-R) (for VC-BL2)	4.12.12.1	8.3.6.4	After VC-FAT-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.3.10	Factory Acceptance Test (FAT) Procedure (for VC-BL3)	4.12.12.1.6	8.3.6.4	VC-TRR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.3.11	Conduct Factory Acceptance Test (FAT) (for VC-BL3)	4.12.12.1	8.3.6.4	VC-FAT-3	Contractor's Premises	As Required	Lot	1	€ -	€ -	
4.3.12	Factory Acceptance Test Report (FAT-R) (for VC-BL3)	4.12.12.1	8.3.6.4	After VC-FAT-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.3.13	VC Software Installation Guide (SIG)	4.12.12.5.3	8.3.8.3	Prior to CAT	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.3.14	Conduct Component Acceptance Test (CAT)	4.12.12.5	8.3.8	CAT	NCIA-TH	As Required	Lot	1	€ -	€ -	
4.3.15	Component Acceptance Test Report (CAT-R)	4.12.12.5	8.3.8.4	After CAT	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.3.16	VC Software Version Description (SVD) (VC-BL1, 2, 3)	4.10.2.11	8.3.7.1	At each VC-TRR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.3.17	C4ISR Visualisation Component - VC-BL1	4.7.3	8.3.1.7	VC-FAT-1	CWE	As Required	Each	1	€ -	€ -	
4.3.18	C4ISR Visualisation Component - VC-BL2	4.7.3	8.3.1.7	VC-FAT-2	CWE	As Required	Each	1	€ -	€ -	
4.3.19	C4ISR Visualisation Component - VC-BL3	4.7.3	8.3.1.7	VC-FAT-3	CWE	As Required	Each	1	€ -	€ -	
4.3.20	Reusable User Interface Component Set	4.7.3	8.3.1.8	CAR	CWE	As Required	Each	1	€ -	€ -	
4.3.21	Symbology Service Software	4.7.3	8.3.1.9	CAR	CWE	SW	Each	1	€ -	€ -	
4.3.22	Perform Software Maintenance until FSA	5.4.3	8.3.9.1	FSA	Contractor's Premises	As Required	Lot	1	€ -	€ -	
4.4	**Meetings and Reviews**									€ -	
4.4.1	Conduct VC Software Requirements Review (VC-SwRR) (VC-BL1, 2, 3)	4.10.2.4.6	8.4.1	VC-SwRR-1,2,3	NCIA-TH	Meeting	Lot	1	€ -	€ -	
4.4.2	VC Software Requirements Review Report (VC-SwRR-R) (VC-BL1)	4.10.2.4.6	8.4.1.1	After VC-SwRR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.4.3	VC Software Requirements Review Report (VC-SwRR-R) (VC-BL2)	4.10.2.4.6	8.4.1.1	After VC-SwRR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.4.4	VC Software Requirements Review Report (VC-SwRR-R) (VC-BL3)	4.10.2.4.6	8.4.1.1	After VC-SwRR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.4.5	Conduct VC Software Design Review (VC-SwDR) (VC-BL1, 2, 3)	4.10.2.6.8	8.4.2	VC-SwDR-1,2,3	NCIA-TH	Meeting	Lot	1	€ -	€ -	
4.4.6	VC Software Design Review Report (VC-SwDR-R) (VC-BL1)	4.10.2.6.8	8.4.2.1	After VC-SwDR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.4.7	VC Software Design Review Report (VC-SwDR-R) (VC-BL2)	4.10.2.6.8	8.4.2.1	After VC-SwDR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.4.8	VC Software Design Review Report (VC-SwDR-R) (VC-BL3)	4.10.2.6.8	8.4.2.1	After VC-SwDR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.4.9	Conduct VC Test Readiness Review (TRR) (VC-BL1, 2, 3)	4.12.5	8.4.3	VC-TRR-1,2,3	Contractor's Premises	Meeting	Lot	1	€ -	€ -	
4.4.10	VC Test Readiness Review Report (TRR-R) (VC-BL1)	4.12.5.6	8.4.3.1	After VC TRR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.4.11	VC Test Readiness Review Report (TRR-R) (VC-BL2)	4.12.5.6	8.4.3.1	After VC TRR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.4.12	VC Test Readiness Review Report (TRR-R) (VC-BL3)	4.12.5.6	8.4.3.1	After VC TRR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.4.13	Conduct Component Acceptance Review (CAR)	4.12.13	8.4.4	CAR	NCIA-TH	Meeting	Lot	1	€ -	€ -	
4.4.14	Component Acceptance Review Report (CAR-R)	4.12.13.4	8.4.4.1	After CAR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
4.4.15	Working Group (WG) Meetings - Minutes	4.4	8.1	After Meetings	CWE	Electronic	Lot	1	€ -	€ -	
TOTAL PRICE CLIN 4										€ -	
5	**SYSTEM TRANSITION**										
5.1	**Planning**									€ -	
5.1.1	System Transition Plan (STrP)	4.13.2	9.1.3	CDR	CWE	Electronic	Each	1	€ -	€ -	
5.1.2	System Transition Plan (STrP) (update)	4.13.2	9.1.3	TRRs	CWE	Electronic	Lot	1	€ -	€ -	
5.1.3	Release and Deployment Plan (RDP)	5.6.6.3	9.3.14	SQR-2	CWE	Electronic	Each	1	€ -	€ -	
5.1.4	Training Plan (TrP)	5.8.3	9.3.10	CDR	CWE	Electronic	Each	1	€ -	€ -	
5.1.5	Software Transition Plan (SwTrP)	4.17.2	9.13.15.2	SwTrRR	CWE	Electronic	Each	1	€ -	€ -	
5.2	**Site Surveys**									€ -	
5.2.1	Perform Site Survey at DC-1	4.13.3	9.3.1	After CDR	DC-1	As Required	Lot	1	€ -	€ -	
5.2.2	Site Survey Report for DC-1	4.13.3.8	9.3.2	After Site Survey	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.2.3	Perform Site Survey at MARCOM	4.13.3	9.3.1	After CDR	MARCOM	As Required	Lot	1	€ -	€ -	
5.2.4	Site Survey Report for MARCOM	4.13.3.8	9.3.2	After Site Survey	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.2.5	Perform Site Surveys at DC-2 and DC-3	4.13.3	9.3.1	After PSA	DC-2 and DC-3	As Required	Lot	1	€ -	€ -	
5.2.6	Site Survey Reports for DC-2 and DC-3	4.13.3.8	9.3.2	After Site Survey	NCIA-TH, CWE	Paper, Electronic	Lot	1	€ -	€ -	
5.2.7	Perform Site Surveys at DCIS Location	4.13.3	9.3.1	After PSA	To be defined	As Required	Lot	1	€ -	€ -	
5.2.8	Site Survey Reports for DCIS	4.13.3.8	9.3.2	After Site Survey	NCIA-TH, CWE	Paper, Electronic	Lot	1	€ -	€ -	
5.3	**System Transition for BL1**									€ -	
5.3.1	Establishing TRITON Support Systems for BL1	4.13.10	9.3.4.7	TRR-1	NCIA-TH (PMIC)	As Required	Lot	1	€ -	€ -	
5.3.2	Pre-Installation Check (PIC) Procedure	4.13.6.1	9.3.4.2	SQR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.3.3	Site Activation Test (SiAT) Procedure	4.13.6.6	9.3.8.2	SQR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.3.4	On-site User Assessment Test (UAT) Procedure	4.13.6.7.8	9.3.9.1	SQR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.3.5	Software Distribution List (SWDL)	4.13.6.9	9.4.2.2	SQR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.3.6	Conduct Sustainment Qualification Review (SQR)	4.13.4	9.4.2	SQR-1	DC-1 or MARCOM	Meeting	Lot	1	€ -	€ -	
5.3.7	Sustainment Qualification Review Report (SQR-R)	4.13.4.4	9.4.2	After SQR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.3.8	Perform Site Preparation	4.13.5	9.3.3	After SQR-1	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.3.9	Perform Pre-Installation Check	4.13.6.1	9.3.4.2	After IV&V-1	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.3.10	Perform Static Site Software Installation	4.13.6.2	9.3.4	After IV&V-1	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.3.11	Perform Physical Configuration Audit (PCA)	4.7.11.2	9.4.3	PCA-1	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.3.12	Configuration Audit Report (CAuR)	4.7.11.4	9.4.3.1	After PCA-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.3.13	Perform Static Site Activation	4.13.6.5	9.3.8.1	After PCA-1	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.3.14	Perform Site Activation Test (SiAT)	4.13.6.6	9.3.8.2	SiAT-1	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.3.15	Site Activation Test Report (SiAT-R)	4.13.6.6.4	9.3.8.2	After SiAT-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.3.16	Training Materials (Student and Instructor Manuals for BL1)	5.8.4.7	9.3.11.4	TrRR-1	Training Location, CWE	Electronic, Paper	Lot	1	€ -	€ -	
5.3.17	Conduct Training Readiness Review (TrRR)	5.8.5	9.4.1	TrRR-1	NCIA-TH	Meeting	Lot	1	€ -	€ -	
5.3.18	Training Readiness Review Report (TrRR-R)	5.8.5	9.4.1.1	After TrRR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.3.19	Training Courses	5.8.10	9.3.11	As in TP	DC-1 and/or MARCOM	Course	Lot	1	€ -	€ -	
5.3.20	Training Course Evaluation Report (TCER) (for each training)	5.8.12	9.3.11.6	After each Course	CWE	Electronic	Lot	1	€ -	€ -	

5.3.21	Perform On-Site User Assessment Test (UAT) (Organizational Node)	4.13.6.7	9.3.9.1	On-Site UAT-1	MARCOM	As Required	Lot	1	€ -	€ -	
5.3.22	On-Site User Assessment Test Report (UAT-R)	4.13.6.7.15	9.3.9.1	After On-Site UAT-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.3.23	Perform Site Acceptance Activities	4.13.8	9.3.12	Prior to SiAR-1	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.3.24	Conduct Site Acceptance Review (SiAR)	4.13.8.2	9.4.4	SiAR-1	DC-1 or MARCOM	Meeting	Lot	1	€ -	€ -	
5.3.25	Site Acceptance Review Report (SiAR-R)	4.13.8.2.4	9.4.4.1	After SiAR-1	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.4	**System Transition for BL2**									€ -	
5.4.1	Establishing TRITON Support Systems for BL2	4.13.10	9.3.4.7	TRR-2	NCIA-TH (PMIC)	As Required	Lot	1	€ -	€ -	
5.4.2	Pre-Installation Check (PIC) Procedure	4.13.6.1	9.3.4.2	SQR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.4.3	Site Activation Test (SiAT) Procedure	4.13.6.6	9.3.8.2	SQR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.4.4	On-site User Assessment Test (UAT) Procedure	4.13.6.7.8	9.3.9.1	SQR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.4.5	Software Distribution List (SWDL)	4.13.6.9	9.4.2.2	SQR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.4.6	Conduct Sustainment Qualification Review (SQR)	4.13.4	9.4.2	SQR-2	DC-1 or MARCOM	Meeting	Lot	1	€ -	€ -	
5.4.7	Sustainment Qualification Review Report (SQR-R)	4.13.4.4	9.4.2	After SQR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.4.8	Perform Site Preparation	4.13.5	9.3.3	After SQR-2	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.4.9	Perform Pre-Installation Check	4.13.6.1	9.3.4.2	After IV&V-2	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.4.10	Perform Static Site Software Installation	4.13.6.2	9.3.4	After IV&V-2	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.4.11	Perform Physical Configuration Audit (PCA)	4.7.11.2	9.4.3	PCA-2	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.4.12	Configuration Audit Report (CAuR)	4.7.11.4	9.4.3.1	After PCA-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.4.13	Perform Static Site Activation	4.13.6.5	9.3.8.1	After PCA-2	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.4.14	Perform Site Activation Test (SiAT)	4.13.6.6	9.3.8.2	SiAT-2	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.4.15	Site Activation Test Report (SiAT-R)	4.13.6.6.4	9.3.8.2	After SiAT-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.4.16	Training Materials (Student and Instructor Manuals for BL2)	5.8.4.7	9.3.11.4	TrRR-2	Training Location, CWE	Paper, Electronic	Lot	1	€ -	€ -	
5.4.17	Computer-Based Training (CBT) (software)	5.8.7	9.3.11.4	TrRR-2	CWE	SW, Electronic	Each	1	€ -	€ -	
5.4.18	Conduct Training Readiness Review (TrRR)	5.8.5	9.4.1	TrRR-2	NCIA-TH	Meeting	Lot	1	€ -	€ -	
5.4.19	Training Readiness Review Report (TrRR-R)	5.8.5	9.4.1.1	After TrRR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.4.20	Training Courses	5.8.10	9.3.11	As in TP	DC-1 and/or MARCOM	Course	Lot	1	€ -	€ -	
5.4.21	Training Course Evaluation Report (TCER) (for each training)	5.8.12	9.3.11.6	After each Course	CWE	Electronic	Lot	1	€ -	€ -	
5.4.22	Perform On-Site User Assessment Test (UAT) (Organizational Node)	4.13.6.7	9.3.9.1	On-Site UAT-2	MARCOM	As Required	Lot	1	€ -	€ -	
5.4.23	On-Site User Assessment Test Report (UAT-R)	4.13.6.7.15	9.3.9.1	After On-Site UAT-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.4.24	Perform Site Acceptance Activities	4.13.8	9.3.12	Prior to SiAR-2	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.4.25	Conduct Site Acceptance Review (SiAR)	4.13.8.2	9.4.4	SiAR-2	DC-1 or MARCOM	Meeting	Lot	1	€ -	€ -	
5.4.26	Site Acceptance Review Report (SiAR-R)	4.13.8.2.4	9.4.4.1	After SiAR-2	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.5	**System Transition for BL3**									€ -	
5.5.1	Establishing TRITON Support Systems for BL3	4.13.10	9.3.4.7	TRR-3	NCIA-TH (PMIC)	As Required	Lot	1	€ -	€ -	
5.5.2	Pre-Installation Check (PIC) Procedure	4.13.6.1	9.3.4.2	SQR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.5.3	Site Activation Test (SiAT) Procedure	4.13.6.6	9.3.8.2	SQR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.5.4	On-site User Assessment Test (UAT) Procedure	4.13.6.7.8	9.3.9.1	SQR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.5.5	Software Distribution List (SWDL)	4.13.6.9	9.4.2.2	SQR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.5.6	Conduct Sustainment Qualification Review (SQR)	4.13.4	9.4.2	SQR-3	DC-1 or MARCOM	Meeting	Lot	1	€ -	€ -	
5.5.7	Sustainment Qualification Review Report (SQR-R)	4.13.4.4	9.4.2	After SQR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.5.8	Perform Site Preparation	4.13.5	9.3.3	After SQR-3	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.5.9	Perform Pre-Installation Check	4.13.6.1	9.3.4.2	After IV&V-3	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.5.10	Perform Static Site Software Installation	4.13.6.2	9.3.4	After IV&V-3	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.5.11	Perform Physical Configuration Audit (PCA)	4.7.11.2	9.4.3	PCA-3	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.5.12	Configuration Audit Report (CAuR)	4.7.11.4	9.4.3.1	After PCA-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.5.13	Perform Static Site Activation	4.13.6.5	9.3.8.1	After PCA-3	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.5.14	Perform Site Activation Test (SiAT)	4.13.6.6	9.3.8.2	SiAT-3	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.5.15	Site Activation Test Report (SiAT-R)	4.13.6.6.4	9.3.8.2	After SiAT-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.5.16	Training Materials (Student and Instructor Manuals for BL3)	5.8.4.7	9.3.11.4	TrRR-3	Training Location, CWE	Paper, Electronic	Lot	1	€ -	€ -	
5.5.17	Computer-Based Training (CBT) (software)	5.8.7	9.3.11.4	TrRR-3	CWE	SW, Electronic	Each	1	€ -	€ -	
5.5.18	Conduct Training Readiness Review (TrRR)	5.8.5	9.4.1	TrRR-3	NCIA-TH	Meeting	Lot	1	€ -	€ -	
5.5.19	Training Readiness Review Report (TrRR-R)	5.8.5	9.4.1.1	After TrRR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.5.20	Training Courses	5.8.10	9.3.11	As in TP	DC-1 and/or MARCOM	Course	Lot	1	€ -	€ -	
5.5.21	Training Course Evaluation Report (TCER) (for each training)	5.8.12	9.3.11.6	After each Course	CWE	Electronic	Lot	1	€ -	€ -	
5.5.22	Perform On-Site User Assessment Test (UAT) (Organizational Node)	4.13.6.7	9.3.9.1	On-Site UAT-3	MARCOM	As Required	Lot		€ -	€ -	
5.5.23	On-Site User Assessment Test Report (UAT-R)	4.13.6.7.15	9.3.9.1	After On-Site UAT-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.5.24	Perform Site Acceptance Activities	4.13.8	9.3.12	Prior to SiAR-3	DC-1 or MARCOM	As Required	Lot	1	€ -	€ -	
5.5.25	Conduct Site Acceptance Review (SiAR)	4.13.8.2	9.4.4	SiAR-3	DC-1 or MARCOM	Meeting	Lot	1	€ -	€ -	
5.5.26	Site Acceptance Review Report (SiAR-R)	4.13.8.2.4	9.4.4.1	After SiAR-3	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.6	**System Transition for BL4**									€ -	
5.6.1	Training Materials (Student and Instructor Manuals for BL4)	5.8.4.7	9.3.11.4	TrRR-4	Training Location, CWE	Paper, Electronic	Lot	1	€ -	€ -	
5.6.2	Conduct Training Readiness Review (TrRR)	5.8.5	9.4.1	TrRR-4	NCIA-TH	As Required	Lot	1	€ -	€ -	
5.6.3	Training Readiness Review Report (TrRR-R)	5.8.5	9.4.1.1	After TrRR-4	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.6.4	Training Courses	5.8.10	9.3.11.	As in TP	NCIA-TH	Course	Lot	1	€ -	€ -	
5.6.5	Training Course Evaluation Report (TCER) (for each training)	5.8.12	9.3.11.6	After each Course	CWE	Electronic	Lot	1	€ -	€ -	
5.6.6	Ship installation (for SeAT)	4.13.6.3	9.3.6	Prior to SeAT	On board a ship at port in Europe	As Required	Each	1	€ -	€ -	
5.7	**System Roll-out DC-2**									€ -	
5.7.1	Conduct Sustainment Qualification Review (SQR)	4.13.4	9.4.2	SQR for DC-2	DC-2	Meeting	Lot	1	€ -	€ -	
5.7.2	Sustainment Qualification Review Report (SQR-R)	4.13.4.4	9.4.2	After SQR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.7.3	Perform Site Preparation	4.13.5	9.3.3	After SQR	DC-2	As Required	Lot	1	€ -	€ -	
5.7.4	Perform Pre-Installation Check	4.13.6.1	9.3.4.2	After SQR	DC-2	As Required	Lot	1	€ -	€ -	
5.7.5	Perform Static Site Software Installation	4.13.6.2	9.3.4	After SQR	DC-2	As Required	Lot	1	€ -	€ -	
5.7.6	Perform Physical Configuration Audit (PCA)	4.7.11.2	9.4.3	PCA for site	DC-2	As Required	Lot	1	€ -	€ -	
5.7.7	Configuration Audit Report (CAuR)	4.7.11.4	9.4.3.1	After PCA	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.7.8	Perform Static Site Activation	4.13.6.5	9.3.8.1	After PCA	DC-2	As Required	Lot	1	€ -	€ -	
5.7.9	Perform Site Activation Test (SiAT)	4.13.6.6	9.3.8.2	SiAT	DC-2	As Required	Lot	1	€ -	€ -	
5.7.10	Site Activation Test Report (SiAT-R)	4.13.6.6.4	9.3.8.2	After SiAT	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.7.11	Perform Site Acceptance Activities	4.13.8	9.3.12	Prior to SiAR	DC-2	As Required	Lot	1	€ -	€ -	
5.7.12	Conduct Site Acceptance Review (SiAR)	4.13.8.2	9.4.4	SiAR	DC-2	Meeting	Lot	1	€ -	€ -	

5.7.13	Site Acceptance Review Report (SiAR-R)	4.13.8.2.4	9.4.4.1	After SiAR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.8	**System Roll-out DC-3**									€ -	
5.8.1	Conduct Sustainment Qualification Review (SQR)	4.13.4	9.4.2	SQR for DC-3	DC-3	Meeting	Lot	1	€ -	€ -	
5.8.2	Sustainment Qualification Review Report (SQR-R)	4.13.4.4	9.4.2	After SQR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.8.3	Perform Site Preparation	4.13.5	9.3.3	After SQR	DC-3	As Required	Lot	1	€ -	€ -	
5.8.4	Perform Pre-Installation Check	4.13.6.1	9.3.4.2	After SQR	DC-3	As Required	Lot	1	€ -	€ -	
5.8.5	Perform Static Site Software Installation	4.13.6.2	9.3.4	After SQR	DC-3	As Required	Lot	1	€ -	€ -	
5.8.6	Perform Physical Configuration Audit (PCA)	4.7.11.2	9.4.3	PCA for site	DC-3	As Required	Lot	1	€ -	€ -	
5.8.7	Configuration Audit Report (CAuR)	4.7.11.4	9.4.3.1	After PCA	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.8.8	Perform Static Site Activation	4.13.6.5	9.3.8.1	After PCA	DC-3	As Required	Lot	1	€ -	€ -	
5.8.9	Perform Site Activation Test (SiAT)	4.13.6.6	9.3.8.2	SiAT	DC-3	As Required	Lot	1	€ -	€ -	
5.8.10	Site Activation Test Report (SiAT-R)	4.13.6.6.4	9.3.8.2	After SiAT	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.8.11	Perform Site Acceptance Activities	4.13.8	9.3.12	Prior to SiAR	DC-3	As Required	Lot	1	€ -	€ -	
5.8.12	Conduct Site Acceptance Review (SiAR)	4.13.8.2	9.4.4	SiAR	DC-3	Meeting	Lot	1	€ -	€ -	
5.8.13	Site Acceptance Review Report (SiAR-R)	4.13.8.2.4	9.4.4.1	After SiAR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.9	**System Roll-out DCIS**									€ -	
5.9.1	Conduct Sustainment Qualification Review (SQR)	4.13.4	9.4.2	SQR for DC-3	DCIS	Meeting	Lot	1	€ -	€ -	
5.9.2	Sustainment Qualification Review Report (SQR-R)	4.13.4.4	9.4.2	After SQR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.9.3	Perform Site Preparation	4.13.5	9.3.3	After SQR	DCIS	As Required	Lot	1	€ -	€ -	
5.9.4	Perform Pre-Installation Check	4.13.6.1	9.3.4.2	After SQR	DCIS	As Required	Lot	1	€ -	€ -	
5.9.5	Perform Software Installation	4.13.6.2	9.3.4	After SQR	DCIS	As Required	Lot	1	€ -	€ -	
5.9.6	Perform Physical Configuration Audit (PCA)	4.7.11.2	9.4.3	PCA for site	DCIS	As Required	Lot	1	€ -	€ -	
5.9.7	Configuration Audit Report (CAuR)	4.7.11.4	9.4.3.1	After PCA	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.9.8	Perform Site Activation	4.13.6.5	9.3.8.1	After PCA	DCIS	As Required	Lot	1	€ -	€ -	
5.9.9	Perform Site Activation Test (SiAT)	4.13.6.6	9.3.8.2	SiAT	DCIS	As Required	Lot	1	€ -	€ -	
5.9.10	Site Activation Test Report (SiAT-R)	4.13.6.6.4	9.3.8.2	After SiAT	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.9.11	Perform Site Acceptance Activities	4.13.8	9.3.12	Prior to SiAR	DCIS	As Required	Lot	1	€ -	€ -	
5.9.12	Conduct Site Acceptance Review (SiAR)	4.13.8.2	9.4.4	SiAR	DCIS	Meeting	Lot	1	€ -	€ -	
5.9.13	Site Acceptance Review Report (SiAR-R)	4.13.8.2.4	9.4.4.1	After SiAR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.10	**Organizational Node Activation**									**#REF!**	
5.10.1	Perform Organisational Node Activation at Authorised Locations	4.13.6.7	9.3.9	Prior to FSA	Organizational Nodes	As Required	Lot	1	€ -	€ -	
5.10.2	Perform On-Site User Assessment Test (on-site UAT) (for each Org.Node)	4.13.6.7.8	9.3.9.1	UAT	Organizational Nodes	As Required	Lot	1	€ -	€ -	
5.10.3	On-Site User Assessment Test Report (UAT-R)	4.13.6.7.15	9.3.9.1	After UAT	NCIA-TH, CWE	Paper, Electronic	Lot	1	€ -	€ -	
5.10.4	On-the-Job Training (for each Org.Node)	4.13.6.7.14	9.3.9.3	Prior to ONAR	Organizational Nodes	Training	Lot	1	€ -	€ -	
5.10.5	Organizational Node Activation Review (ONAR) (for each Org.Node)	4.13.6.7.6	9.4.5	ONAR	Organizational Nodes	Meeting	Lot	1	€ -	€ -	
5.10.6	Organizational Node Activation Review Report (ONAR-R)	4.13.7.7	9.4.5	After ONAR	NCIA-TH, CWE	Paper, Electronic	Lot	1	€ -	€ -	
5.11	**Training**									€ -	
5.11.1	Support to Training Needs Analysis (TNA)	5.8.2	9.3.10	As in PMS	NCIA-TH	As Required	Lot	1	€ -	€ -	
5.11.2	Training Needs Analysis Report (TNA-R)	5.8.3	9.3.10	As in PMS	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.11.3	Conduct Training Readiness Reviews (TrRR) (as per TP)	5.8.5	9.4.1	TrRR	NCIA-TH	Meeting	Lot	1	€ -	€ -	
5.11.4	Training Readiness Review Reports (TrRR-R)	5.8.5	9.4.1.1	After TrRR	NCIA-TH, CWE	Paper, Electronic	Lot	1	€ -	€ -	
5.11.5	Training Courses (as per TP)	5.8.10	9.3.11.2/3	As in TP	Training Location	Course	Lot	1	€ -	€ -	
5.11.6	Training Course Evaluation Reports (TCER) (for each training)	5.8.12	9.3.11.6	After each Course	CWE	Electronic	Lot	1	€ -	€ -	
5.11.7	Update Training Materials (if necessary)	5.8	9.3.11.7	As necessary	NCIA-TH, CWE	Paper, Electronic	Lot	1	€ -	€ -	
5.12	**Testing**									€ -	
5.12.1	Perform Multi-Site Operation Test (MSOT)	4.13.11	9.3.13	MSOT	NCIA-Casteau	As Required	Lot	1			NSP
5.12.2	Multi-Site Operation Test Report (MSOT-R)	4.13.11.7	9.3.13.3	After MSOT	NCIA-TH	Paper, Electronic	Each	1	€ -	€ -	
5.12.3	Support to FMN Initial Testing (engineering)	4.13.12	9.3.14	As in PMS	NCIA-Casteau	As Required	MxD	20	€ -	€ -	
5.12.4	Support to FMN Final Testing (engineering)	4.13.12	9.3.14	As in PMS	NCIA-Casteau	As Required	MxD	20	€ -	€ -	
5.13	**Software Transition**									€ -	
5.13.1	Software Source Code and Documentation (an initial copy at SwTrRR)	4.17.3.6	9.13.15.4	FSA	CWE	As Required	Lot	1	€ -	€ -	
5.13.2	Computer Programming Manual (CPM)	4.17.3.7	9.13.15.4	SwTrRR	CWE	Electronic	Each	1	€ -	€ -	
5.13.3	Conduct Software Transition Readiness Review (SwTrRR)	4.17.4	9.4.6	SwTrRR	NCIA-TH	As Required	Lot	1	€ -	€ -	
5.13.4	Software Transition Readiness Review Report (SwTrRR-R)	4.17.4	9.4.6.2	After SwTRR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.13.5	Perform Software Transition	4.17	9.13.15	As in PMS	NCIA-TH	As Required	Lot	1	€ -	€ -	
5.13.6	Software Maintenance Training	5.8.14	9.3.15.4	As in SwTrP	NCIA-TH	As Required	Each	1	€ -	€ -	
5.13.7	Perform Software Transition Validation Test (SwTrVT)	4.17.6	9.3.16.5	SwTrVT	NCIA-TH	As Required	Lot	1	€ -	€ -	
5.13.8	Software Transition Validation Test Report (SwTrVT-R)	4.17.6.4	9.3.16.5	After SwTrVT	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.13.9	Software Transition Validation Review (SwTVR)	4.17.7	9.4.6	SwTVR	NCIA-TH	Meeting	Lot	1	€ -	€ -	
5.13.10	Software Transition Validation Review Report (SwTVR-R)	4.17.7	9.4.6.1	After SwTVR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
5.14	**Other Activities**									€ -	
5.14.1	Perform Release Management	5.6.6	9.3.14	As in PMS	NCIA-TH	As Required	Lot	1	€ -		
5.14.2	Update TRITON Support Systems (if needed)	4.13.10	9.3.4.8	Prior to FSA	NCIA-TH (PMIC)	As Required	Lot	1	€ -	€ -	
5.15	**Meetings and Reviews**									€ -	
5.15.1	Working Group (WG) Meetings - Minutes	4.4	9.1	After Meetings	CWE	Electronic	Lot	1	€ -	€ -	
TOTAL PRICE CLIN 5										**#REF!**	
6	**SYSTEM SUPPORT AND MAINTENANCE**										
6.1	**Support**									€ -	
6.1.1	On-Site support (engineering)	4.15.4	10.3.1	PSD to FSA	NCIA-TH	Labour	MxD	150	€ -	€ -	
6.1.2	Experimentation, Exercise and Prototyping Support (engineering)	4.16.4	10.3.2	PSD to FSA	NCIA-TH	Labour	MxD	50	€ -	€ -	
6.2	**System Support and Maintenance**									€ -	
6.2.1	System Support	5.7	10.3.3	PSD to FSA	NCIA-TH	As Required	Lot	1	€ -	€ -	
6.2.2	Software Distribution List (SWDL) (updates)	4.13.6.12	10.3.3.4	Prior to each SQR	CWE	Electronic	Lot	1	€ -	€ -	
6.2.3	Perform Release Management	5.6.6.2.2	10.3.3.4	PSD to FSA	Contractor's Premises	As Required	Lot	1	€ -	€ -	
6.2.4	System Maintenance Documentation	4.16.2	10.3.3.4	FSA	CWE	Electronic	Lot	1	€ -	€ -	
6.2.5	Software Maintenance (engineering)	5.4.3	10.3.5.4	PSD to FSA	Contractor's Premises	Labour	MxD	100	€ -	€ -	
6.3	**Meetings and Reviews**									€ -	
6.3.1	Conduct Monthly Maintenance Review (MMR)	4.16.3	10.4.1	MMR	NCIA-TH	Meeting	Lot	1	€ -	€ -	
6.3.2	Monthly Maintenance Review Report (MMR-R)	4.16.3	10.4.1.1	After MRRs	NCIA-TH, CWE	Paper, Electronic	Lot	1	€ -	€ -	

6.3.3	Working Group (WG) Meetings - Minutes	4.4	10.1	After Meetings	CWE	Electronic	Lot	1	€ -	€ -	
TOTAL PRICE CLIN 6										€ -	
7	**SUPPORT TO OPERATIONAL TESTING & EVALUATION (OT&E)**										
7.1	**Operating and Exercise Support**									€ -	
7.1.1	Support to development of Standard Operating Procedures (SOP) (engineering)	4.15.2	11.3.2	As in PMS	NCIA-TH	Labour	MxD	40	€ -	€ -	
7.1.2	Support to MARCOM users during Exercise-1	4.15.3	11.3.3	OTRR to FSA	MARCOM	Labour	MxD	20	€ -	€ -	
7.1.3	Support to MARCOM users during Exercise-2	4.15.3	11.3.3	OTRR to FSA	MARCOM	Labour	MxD	20	€ -	€ -	
7.1.4	Support to MARCOM users during Exercise-3	4.15.3	11.3.3	OTRR to FSA	MARCOM	Labour	MxD	20	€ -	€ -	
7.2	**System Validation Test**									€ -	
7.2.1	Perform System Validation Test (SVT)	4.14.4	11.3.4	SVT	MARCOM	As Required	Lot	1	€ -	€ -	
7.2.2	System Validation Test Report (SVT-R)	4.14.4.5	11.3.4.1	SVR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
7.3	**Meetings and Reviews**									€ -	
7.3.1	Conduct In-Service Reviews (ISR)	4.15.5	11.4.1	ISR	NCIA-TH	Meeting	Lot	1	€ -	€ -	
7.3.2	In-Service Review Report (ISR-R)	4.15.5.6	11.4.1.1	After ISRs	NCIA-TH, CWE	Paper, Electronic	Lot	1	€ -	€ -	
7.3.3	Working Group (WG) Meetings - Minutes	4.4	11.1	After Meetings	CWE	Electronic	Lot	1	€ -	€ -	
TOTAL PRICE CLIN 7										€ -	
8	**SUPPORT TO TRANSITION FROM LEGACY SYSTEMS**										
8.1	**Support to Transition**									€ -	
8.1.1	Technical and CIS support for transition (1) (engineering)	4.15.6	12.3.1	PSD and FAT-2	NCIA-TH and MARCOM	Labour	MxD	60	€ -	€ -	
8.1.2	Technical and CIS support for transition (2) (engineering)	4.15.6	12.3.1	FAT-2 and TrRR-2	NCIA-TH and MARCOM	Labour	MxD	60	€ -	€ -	
8.1.2	Technical and CIS support for transition (3) (engineering)	4.15.6	12.3.1	FAT-3 and TrRR-3	NCIA-TH and MARCOM	Labour	MxD	60	€ -	€ -	
8.2	**Data Migration**									€ -	
8.2.1	Support to Data Migration	4.15.6.1	12.3.2	SVR	NCIA-TH and MARCOM	As Required	Lot	1	€ -	€ -	
8.2.2	Data Migration Tools (including procedures) for MSA/BRITE	4.15.6.2	12.3.2.3	TRR-2	CWE	As Required	Each	1	€ -	€ -	
8.2.3	Data Migration Tools (including procedures) for MCCIS	4.15.6.2	12.3.2.4	TRR-3	CWE	As Required	Each	1	€ -	€ -	
8.3	**Nations Interoperability Testing**									€ -	
8.3.1	TRITON Simulator (software) - NS (for Nations)	4.15.6.1	12.3.3.1	TRR-1	CWE	SW	Each	1	€ -	€ -	
8.3.2	TRITON Simulator (software) - NU (for Nations)	4.15.6.1	12.3.3.1	TRR-2	CWE	SW	Each	1	€ -	€ -	
8.3.3	TRITON Simulator (software) - NS (for Nations) (updated)	4.15.6.1	12.3.3.1	TRR-3	CWE	SW	Each	1	€ -	€ -	
8.3.4	Support to Nations Interoperability Testing	4.15.6.2	12.3.3.3	SIT-1, 2, 3	NCIA-TH	As Required	Lot	1	€ -	€ -	
8.4	**Meetings and Reviews**									€ -	
8.4.1	Conduct System Transition Readiness Review (STRR) for TRITON-NU	4.15.6.3	12.4.1.1	STRR-NU	NCIA-TH	Meeting	Lot	1	€ -	€ -	
8.4.2	System Transition Readiness Review Report (STRR-R) for TRITON-NU	4.15.6.4	12.4.1.3	After STRR-NU	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
8.4.3	Conduct System Transition Readiness Review (STRR) for TRITON-NS	4.15.6.3	12.4.1.2	STRR-NS	NCIA-TH	Meeting	Lot	1	€ -	€ -	
8.4.4	System Transition Readiness Review Report (STRR-R) for TRITON-NS	4.15.6.4	12.4.1.3	After STRR-NS	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
8.4.5	Working Group (WG) Meetings - Minutes	4.4	12.1	After Meetings	CWE	Electronic	Lot	1	€ -	€ -	
TOTAL PRICE CLIN 8										€ -	
12	**WARRANTY**										
12.1	**Management**									€ -	
12.1.1	Warranty Management for Hardware	5.10.7	-	TDK Acceptance	Contractor's Premises	As Required	Lot	1	€ -	€ -	
12.1.2	Warranty Management for Software	5.10.7	-	FSA	Contractor's Premises	As Required	Lot	1	€ -	€ -	
12.1.3	Establishing Warranty Service Access Point	5.10.7.4	-	TDK Acceptance	Contractor's Premises	As Required	Each	1	€ -	€ -	
12.2	**Warranty for Developed Software**									€ -	
12.2.1	OBL Warranty Report for Software	5.10.1.5	-	FSA	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
12.2.2	Third Level Support for Operational Software (starting from FSA)	5.10.1.4	-	Warranty Period	Contractor's Premises	As Required	Lot	1			NSP
12.2.3	Third Level Maintenance - Software Maintenance	5.10.3	-	Warranty Period	Contractor's Premises	As Required	Lot	1			NSP
12.2.4	Providing Service for Software	5.10.8	-	Warranty Period	Contractor's Premises	As Required	Lot	1			NSP
12.3	**Warranty for Developed Hardware**									€ -	
12.3.1	OBL Warranty Report for Hardware (TDKs)	5.10.1.5	-	TDK Acceptance	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
12.3.2	Third Level Support for TDK Hardware (starting from TDK Acceptance)	5.10.1.4	-	Warranty Period	Contractor's Premises	As Required	Lot	1			NSP
12.3.3	Third Level Maintenance - Hardware Maintenance (for TDKs)	5.10.4	-	Warranty Period	Contractor's Premises	As Required	Lot	1			NSP
12.3.4	Providing Service for Hardware	5.10.8	-	Warranty Period	Contractor's Premises	As Required	Lot	1			NSP
12.4	**Recording**									€ -	
12.4.1	Establishing Trouble-Ticketing System and Problem Log	5.10.9	-	TDK Acceptance	Contractor's Premises	As Required	Each	1	€ -	€ -	
12.4.2	Recording	5.10.9	-	Warranty Period	Contractor's Premises	As Required	Lot	1			NSP
TOTAL PRICE CLIN 12										€ -	
TOTAL BID PRICE (BASIC CONTRACT) - GRAND TOTAL										**#REF!**	
OPTIONAL CLINS											
9	**COTS SOFTWARE PROVISION (EVALUATED OPTION)**										
9.1	**COTS Products Requirements Analysis**									€ -	
9.1.1	Requirements Analysis	-	13.3.1	PSD and COTSPR	Contractor's Premises	As Required	Lot	1	€ -	€ -	
9.1.2	COTS Products List	-	13.3.1.3	COTSPR	CWE	Electronic	Each	1	€ -	€ -	
9.2	**Procurement and Delivery of COTS Software Products**									€ -	
9.2.1	Support for the Procurement and Delivery of COTS Products	-	13.3.2	SQR	Installation Sites	As Required	Lot	1	€ -	€ -	
9.3	**Meetings and Reviews**									€ -	
9.3.1	Conduct COTS Products Review (COTSPR)	3.16.4	13.4.1	COTSPR	NCIA-TH	Meeting	Lot	1	€ -	€ -	
9.3.2	COTS Products Review Report (COTSPR-R)	3.16.4	13.4.1.1	After COTSPR	NCIA-TH, CWE	Paper, Electronic	Each	1	€ -	€ -	
9.4	**Software**									€ -	
9.4.1	COTS Products as defined in the COTS Product List	-	13.3.1.3	SQR	Installation Sites	SW	Each	1	€ -	€ -	
TOTAL PRICE CLIN 9										€ -	
10	**5-YEAR MAINTENANCE AND SUPPORT (EVALUATED OPTION)**										
10.1	**Maintenance and Support - Year 1**									€ -	
10.1.1	Project Management (for one year)	3	14.3.1	PSD to PED	Contractor's Premises	N/A	Lot	1	€ -	€ -	
10.1.2	Project Highlight Report (PHR)	3	14.3.1	Monthly	NCIA-TH, CWE	Paper, Electronic	Each	12	€ -	€ -	
10.1.3	In-Service Support Plan (updates)	5.11.2	14.3.4	As necessary	NCIA-TH, CWE	Paper, Electronic	Lot	1	€ -	€ -	
10.1.4	Conduct Quarterly Maintenance Review (QMR)	3.16.4	14.4.1.1	QMR	NCIA-TH	Meeting	Lot	1	€ -	€ -	

10.1.5	Quarterly Maintenance Review Report (QMR-R)	5.2	14.4.1.2	After QMR	NCIA-TH, CWE	Paper, Electronic	Each	4	€ -	€ -
10.1.6	Corrective and Preventive Software Maintenance for TRITON Operational Software (except C4ISR Visualisation Component)	5.4.3	14.3.2.1	As planned	Contractor's Premises	As Required	Lot	1	€ -	€ -
10.1.7	Corrective and Preventive Software Maintenance for C4ISR Visualisation Component	5.4.3	14.3.2.1	As planned	Contractor's Premises	As Required	Lot	1	€ -	€ -
10.1.8	Adaptive and Perfective Software Maintenance for TRITON Operational Software (except C4ISR Visualisation Component)	5.4.3	14.3.2.2	As planned	Contractor's Premises	As Required	MxD	300	€ -	€ -
10.1.9	Adaptive and Perfective Software Maintenance for C4ISR Visualisation Component	5.4.3	14.3.2.3	As planned	Contractor's Premises	As Required	MxD	150	€ -	€ -
10.1.10	Third Level Support	5.7.4	14.3.2.3	As necessary	Contractor's Premises	As Required	Lot	1	€ -	€ -
10.1.11	Support to IV&V Testing	3.3.3	14.3.3	At new releases	NCIA-Casteau	Labour	Lot	1	€ -	€ -
10.1.12	Maintenance Records (updates)	5.4.4	14.3.5	As necessary	CWE	Electronic	Lot	1	€ -	€ -
10.1.13	Provide User and Support Training with updated material	5.2	14.3.4	At new releases	One (1) site in Europe	Paper, Electronic	Lot	1	€ -	€ -
10.2	**Maintenance and Support - Year 2**									€ -
10.2.1	Project Management (for one year)	3	14.3.1	PSD to PED	Contractor's Premises	As Required	Lot	1	€ -	€ -
10.2.2	Project Highlight Report (PHR)	3	14.3.1	Monthly	NCIA-TH, CWE	Paper, Electronic	Each	12	€ -	€ -
10.2.3	In-Service Support Plan (updates)	5.11.2	14.3.4	TBD	NCIA-TH, CWE	Paper, Electronic	Lot	1	€ -	€ -
10.2.4	Conduct Quarterly Maintenance Review (QMR)	3.16.4	14.4.1.1	QMR	NCIA-TH	Electronic	Lot	1	€ -	€ -
10.2.5	Quarterly Maintenance Review Report (QMR-R)	5.2	14.4.1.2	After QMR	NCIA-TH, CWE	Paper, Electronic	Each	4	€ -	€ -
10.2.6	Corrective and Preventive Software Maintenance for TRITON Operational Software (except C4ISR Visualisation Component)	5.4.3	14.3.2.1	As planned	Contractor's Premises	As Required	Lot	1	€ -	€ -
10.2.7	Corrective and Preventive Software Maintenance for C4ISR Visualisation Component	5.4.3	14.3.2.1	As planned	Contractor's Premises	As Required	Lot	1	€ -	€ -
10.2.8	Adaptive and Perfective Software Maintenance for TRITON Operational Software (except C4ISR Visualisation Component)	5.4.3	14.3.2.2	As planned	Contractor's Premises	As Required	MxD	300	€ -	€ -
10.2.9	Adaptive and Perfective Software Maintenance for C4ISR Visualisation Component	5.4.3	14.3.2.3	As planned	Contractor's Premises	As Required	MxD	150	€ -	€ -
10.2.10	Third Level Support	5.7.4	14.3.2.3	As necessary	Contractor's Premises	As Required	Lot	1	€ -	€ -
10.2.11	Support to IV&V Testing	3.3.3	14.3.3	At new releases	NCIA-Casteau	Labour	Lot	1	€ -	€ -
10.2.12	Maintenance Records (updates)	5.4.4	14.3.5	As necessary	CWE	Electronic	Lot	1	€ -	€ -
10.2.13	Provide User and Support Training with updated material	5.2	14.3.4	At new releases	One (1) site in Europe	Paper, Electronic	Lot	1	€ -	€ -
10.3	**Maintenance and Support - Year 3**									€ -
10.3.1	Project Management (for one year)	3	14.3.1	PSD to PED	Contractor's Premises	As Required	Lot	1	€ -	€ -
10.3.2	Project Highlight Report (PHR)	3	14.3.1	Monthly	NCIA-TH, CWE	Paper, Electronic	Each	12	€ -	€ -
10.3.3	In-Service Support Plan (updates)	5.11.2	14.3.4	TBD	NCIA-TH, CWE	Paper, Electronic	Lot	1	€ -	€ -
10.3.4	Conduct Quarterly Maintenance Review (QMR)	3.16.4	14.4.1.1	QMR	NCIA-TH	Meeting	Lot	1	€ -	€ -
10.3.5	Quarterly Maintenance Review Report (QMR-R)	5.2	14.4.1.2	After QMR	NCIA-TH, CWE	Paper, Electronic	Each	4	€ -	€ -
10.3.6	Corrective and Preventive Software Maintenance for TRITON Operational Software (except C4ISR Visualisation Component)	5.4.3	14.3.2.1	As planned	Contractor's Premises	As Required	Lot	1	€ -	€ -
10.3.7	Corrective and Preventive Software Maintenance for C4ISR Visualisation Component	5.4.3	14.3.2.1	As planned	Contractor's Premises	As Required	Lot	1	€ -	€ -
10.3.8	Adaptive and Perfective Software Maintenance for TRITON Operational Software (except C4ISR Visualisation Component)	5.4.3	14.3.2.2	As planned	Contractor's Premises	As Required	MxD	300	€ -	€ -
10.3.9	Adaptive and Perfective Software Maintenance for C4ISR Visualisation Component	5.4.3	14.3.2.3	As planned	Contractor's Premises	As Required	MxD	150	€ -	€ -
10.3.10	Third Level Support	5.7.4	14.3.2.3	As necessary	Contractor's Premises	As Required	Lot	1	€ -	€ -
10.3.11	Support to IV&V Testing	3.3.3	14.3.3	At new releases	NCIA-Casteau	Labour	Lot	1	€ -	€ -
10.3.12	Maintenance Records (updates)	5.4.4	14.3.5	As necessary	CWE	Electronic	Lot	1	€ -	€ -
10.3.13	Provide User and Support Training with updated material	5.2	14.3.4	At new releases	One (1) site in Europe	Paper, Electronic	Lot	1	€ -	€ -
10.4	**Maintenance and Support - Year 4**									€ -
10.4.1	Project Management (for one year)	3	14.3.1	PSD to PED	Contractor's Premises	As Required	Lot	1	€ -	€ -
10.4.2	Project Highlight Report (PHR)	3	14.3.1	Monthly	NCIA-TH, CWE	Paper, Electronic	Each	12	€ -	€ -
10.4.3	In-Service Support Plan (updates)	5.11.2	14.3.4	TBD	NCIA-TH, CWE	Paper, Electronic	Lot	1	€ -	€ -
10.4.4	Conduct Quarterly Maintenance Review (QMR)	3.16.4	14.4.1.1	QMR	NCIA-TH	Meeting	Lot	1	€ -	€ -
10.4.5	Quarterly Maintenance Review Report (QMR-R)	5.2	14.4.1.2	After QMR	NCIA-TH, CWE	Paper, Electronic	Each	4	€ -	€ -
10.4.6	Corrective and Preventive Software Maintenance for TRITON Operational Software (except C4ISR Visualisation Component)	5.4.3	14.3.2.1	As planned	Contractor's Premises	As Required	Lot	1	€ -	€ -
10.4.7	Corrective and Preventive Software Maintenance for C4ISR Visualisation Component	5.4.3	14.3.2.1	As planned	Contractor's Premises	As Required	Lot	1	€ -	€ -
10.4.8	Adaptive and Perfective Software Maintenance for TRITON Operational Software (except C4ISR Visualisation Component)	5.4.3	14.3.2.2	As planned	Contractor's Premises	As Required	MxD	300	€ -	€ -
10.4.9	Adaptive and Perfective Software Maintenance for C4ISR Visualisation Component	5.4.3	14.3.2.3	As planned	Contractor's Premises	As Required	MxD	150	€ -	€ -
10.4.10	Third Level Support	5.7.4	14.3.2.4	As necessary	Contractor's Premises	As Required	Lot	1	€ -	€ -
10.4.11	Support to IV&V Testing	3.3.3	14.3.3	At new releases	NCIA-Casteau	Labour	Lot	1	€ -	€ -
10.4.12	Maintenance Records (updates)	5.4.4	14.3.5	As necessary	CWE	Electronic	Lot	1	€ -	€ -
10.4.13	Provide User and Support Training with updated material	5.2	14.3.4	At new releases	One (1) site in Europe	Paper, Electronic	Lot	1	€ -	€ -
10.5	**Maintenance and Support - Year 5**									€ -
10.5.1	Project Management (for one year)	3	14.3.1	PSD to PED	Contractor's Premises	As Required	Lot	1	€ -	€ -
10.5.2	Project Highlight Report (PHR)	3	14.3.1	Monthly	NCIA-TH, CWE	Paper, Electronic	Each	12	€ -	€ -
10.5.3	In-Service Support Plan (updates)	5.11.2	14.3.4	TBD	NCIA-TH, CWE	Paper, Electronic	Lot	1	€ -	€ -
10.5.4	Conduct Quarterly Maintenance Review (QMR)	3.16.4	14.4.1.1	QMR	NCIA-TH	Meeting	Lot	1	€ -	€ -
10.5.5	Quarterly Maintenance Review Report (QMR-R)	5.2	14.4.1.2	After QMR	NCIA-TH, CWE	Paper, Electronic	Each	4	€ -	€ -
10.5.6	Corrective and Preventive Software Maintenance for TRITON Operational Software (except C4ISR Visualisation Component)	5.4.3	14.3.2.1	As planned	Contractor's Premises	As Required	Lot	1	€ -	€ -
10.5.7	Corrective and Preventive Software Maintenance for C4ISR Visualisation Component	5.4.3	14.3.2.1	As planned	Contractor's Premises	As Required	Lot	1	€ -	€ -
10.5.8	Adaptive and Perfective Software Maintenance for TRITON Operational Software (except C4ISR Visualisation Component)	5.4.3	14.3.2.2	As planned	Contractor's Premises	As Required	MxD	300	€ -	€ -

10.5.9	Adaptive and Perfective Software Maintenance for C4ISR Visualisation Component	5.4.3	14.3.2.3	As planned	Contractor's Premises	As Required	MxD	150	€ -	€ -	
10.5.10	Third Level Support	5.7.4	14.3.2.3	As necessary	Contractor's Premises	As Required	Lot	1	€ -	€ -	
10.5.11	Support to IV&V Testing	3.3.3	14.3.3	At new releases	NCIA-Casteau	Labour	Lot	1	€ -	€ -	
10.5.12	Maintenance Records (updates)	5.4.4	14.3.5	As necessary	CWE	Electronic	Lot	1	€ -	€ -	
10.5.13	Provide User and Support Training with updated material	5.2	14.3.4	At new releases	One (1) site in Europe	Paper, Electronic	Lot	1	€ -	€ -	
TOTAL PRICE CLIN 10										€ -	
TOTAL BID PRICE (EVALUATED OPTION CLINS) - GRAND TOTAL										€ -	
11	**SUPPORT TO PREPARATIONS FOR THE NEXT INCREMENT (NON-EVALUATED OPTION)**										
11.1	**System Requirements Analysis**									€ -	
11.1.1	Perform High-level System Requirements Analysis Process	-	15.3.1	PSD to HL-SRR	Contractor's Premises	As Required	Lot	1	€ -	€ -	
11.1.2	Draft System Requirements Specification (SyRS) (extended for Increment 2)	-	15.3.1	HL-SRR	CWE	Electronic	Each	1	€ -	€ -	
11.1.3	Security Risk Assessment Report (SRA-R)	-	15.3.1.6	HL-SRR	CWE	Electronic	Each	1	€ -	€ -	
11.2	**System Design**									€ -	
11.2.1	Perform High-level System Design Process	-	15.3.2	HL-SDR	Contractor's Premises	As Required	Lot	1	€ -	€ -	
11.2.2	Draft System Design Specification (SDS) (extended for Increment 2)	-	15.3.2.1.3	HL-SDR	CWE	Electronic	Each	1	€ -	€ -	
11.3	**Planning**									€ -	
11.3.1	Planning and Engineering	-	15.3.4	PSD to PED	Contractor's Premises	As Required	Lot	1		€ -	NSP
11.3.2	Draft Project Product Breakdown Structure	-	15.3.3.2	FAR	CWE	Electronic	Each	1	€ -	€ -	
11.3.3	Draft Project Work Breakdown Structure	-	15.3.3.3	FAR	CWE	Electronic	Each	1	€ -	€ -	
11.3.4	Draft Work Packages with Cost Estimates	-	15.3.3.4	FAR	CWE	Electronic	Each	1	€ -	€ -	
11.3.5	Draft Project Master Schedule (PMS)	-	15.3.3.5	FAR	CWE	Electronic	Each	1	€ -	€ -	
11.4	**Engineering Support**									€ -	
11.4.1	Engineering Support	-	15.3.4.3	PSD to PED	Contractor's Premises	Labour	MxD	100	€ -	€ -	
11.5	**Meetings and Reviews**									€ -	
11.5.1	Conduct High-level System Requirements Review (HL-SRR)	-	15.4.1	HL-SRR	NCIA-TH	Meeting	Lot	1	€ -	€ -	
11.5.2	High-level System Requirements Review Report (HL-SDR-R)	-	15.4.1.2	After HL-SRR	CWE	Electronic	Each	1	€ -	€ -	
11.5.3	Conduct High-level System Design Review (HL-SDR)	-	15.4.2	HL-SDR	NCIA-TH	Meeting	Lot	1	€ -	€ -	
11.5.4	High-level System Design Review Report (HL-SDR-R)	-	15.4.2.2	After HL-SDR	CWE	Electronic	Each	1	€ -	€ -	
11.5.5	Conduct Final Assessment Review (FAR)	-	15.4.3	FAR	NCIA-TH	Meeting	Lot	1	€ -	€ -	
11.5.6	Final Assessment Review Report (FAR-R)	-	15.4.3.5	After FAR	CWE	Electronic	Each	1	€ -	€ -	
TOTAL PRICE CLIN 11										€ -	
TOTAL BID PRICE (NON-EVALUATED OPTION CLINS) - GRAND TOTAL										€ -	

SUMMARY		
TOTAL BID PRICE (BASIC CONTRACT CLINS) - GRAND TOTAL	**CLINs 1 to 8 + 12**	**#REF!**
TOTAL BID PRICE (BASIC CONTRACT CLINS + EVALUATED OPTION CLINS) - GRAND TOTAL	**CLINs 1 to 10 + 12**	**#REF!**
TOTAL BID PRICE (BASIC CONTRACT CLINS + EVALUATED OPTION CLINS + NON-EVALUATED OPTION CLINS) - GRAND TOTAL	**CLINs 1 to 12**	**#REF!**

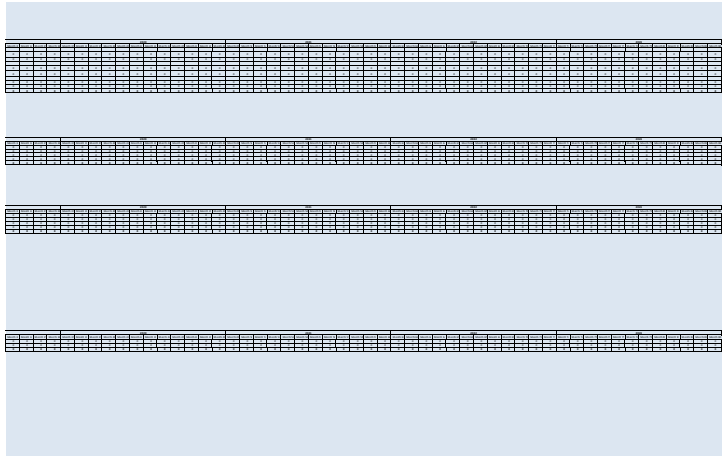
CLIN 1 Price Breakdown

Contract Line Item Number	
Contract Line Item Name	

Contract Line Item Number	
Contract Line Item Name	

Contract Line Item Number	
Contract Line Item Name	

Contract Line Item Number	
Contract Line Item Name	



CLIN 2 Price Breakdown

		NOTES
Currency	[illegible]	
Calendar Year (Year 1):	[illegible]	

	Quantity	Unit Cost 2017	Unit Cost 2018	Unit Cost 2019	Unit Cost 2020	Unit Cost 2021	Unit Cost 2022	Unit Cost 2023	TOTAL COST	NOTES
1. MATERIALS										
A. PURCHASED EQUIPMENT										[illegible]
Purchased	0								0.00	
Purchased	[illegible]								[illegible]	
B. SUBCONTRACTED EQUIPMENT/MATERIALS										
Subcontracted	0								0.00	
Subcontracted	0								0.00	
C. OTHER										
Other	[illegible]								[illegible]	
Other	[illegible]								[illegible]	
1. TOTAL DIRECT MATERIAL	[illegible]								[illegible]	

	OH RATE (%)	TOTAL COST	NOTES
2. MATERIAL OVERHEAD (OH)			
A. OH Rate (%) X TOTAL Material			
B. (Expand as needed)			
2. Total MATERIAL OVERHEAD (OH)		[illegible]	

	HOURS	RATE/HOUR 2017	RATE/HOUR 2018	RATE/HOUR 2019	RATE/HOUR 2020	RATE/HOUR 2021	RATE/HOUR 2022	RATE/HOUR 2023	TOTAL COST	NOTES
3. LABOUR										[illegible]
Labour Category Name	0								0.00	
[illegible]	[illegible]								[illegible]	
Labour Category Name	0								0.00	
[illegible]	[illegible]								[illegible]	
3. TOTAL DIRECT LABOUR	[illegible]								[illegible]	

	OH RATE (%)	TOTAL COST	NOTES
4. LABOUR OVERHEAD			
A. OH Rate (%) X TOTAL LABOUR			
B. (Expand as needed)			
4. Total LABOUR OVERHEAD		[illegible]	

	HOURS	RATE/HOUR 2017	RATE/HOUR 2018	RATE/HOUR 2019	RATE/HOUR 2020	RATE/HOUR 2021	RATE/HOUR 2022	RATE/HOUR 2023	TOTAL COST	NOTES
5. SUBCONTRACT LABOUR										[illegible]
[illegible]	[illegible]								[illegible]	
Labour Category Name	0								0.00	
[illegible]	[illegible]								[illegible]	
Labour Category Name	0								0.00	
5. TOTAL SUBCONTRACT LABOUR	[illegible]								[illegible]	

	OH RATE (%)	TOTAL COST	NOTES
6. SUBCONTRACT LABOUR O/H			
A. OH Rate (%) X TOTAL SUBCONTRACT LABOUR			
B. (Expand as needed)			
6. Total SUBCONTRACT LABOUR O/H		[illegible]	

7. TRAVEL UNIT TRIP COST	Number of [illegible]	Number of [illegible]	Number of [illegible]	Unit Cost Cost per [illegible]	Unit Cost Per Diem	TOTAL COST	NOTES
							Please Describe the reason for the trip.
Trip Name A (Please update trip name)						[illegible]	
Trip Name B (Please update trip name)						0.00	
7. TOTAL TRAVEL						[illegible]	

	OH RATE (%)	TOTAL COST	NOTES
8.TRAVEL OVERHEAD			
A. OH Rate (%) X TOTAL TRAVEL			
B. (Expand as needed)			
8.TRAVEL OVERHEAD		[illegible]	

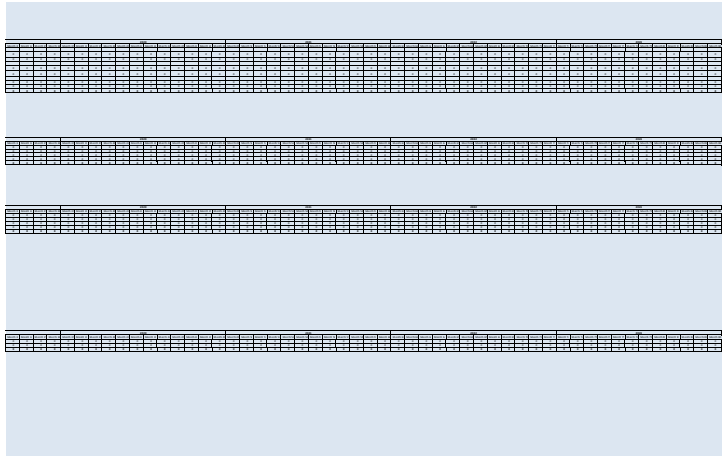
	Quantity	Unit Cost 2017	Unit Cost 2018	Unit Cost 2019	Unit Cost 2020	Unit Cost 2021	Unit Cost 2022	Unit Cost 2023	TOTAL COST	NOTES
9. OTHER DIRECT COSTS										
Other Direct Cost	0.00								0.00	
Other Direct Cost	0.00								0.00	
9. TOTAL OTHER DIRECT COST									[illegible]	

	OH RATE (%)	TOTAL COST	NOTES
10. OTHER DIRECT COSTS O/H			
A. OH Rate (%) X TOTAL ODCs			
B. (Expand as needed)			
10. OTHER DIRECT COST O/H		0.00	

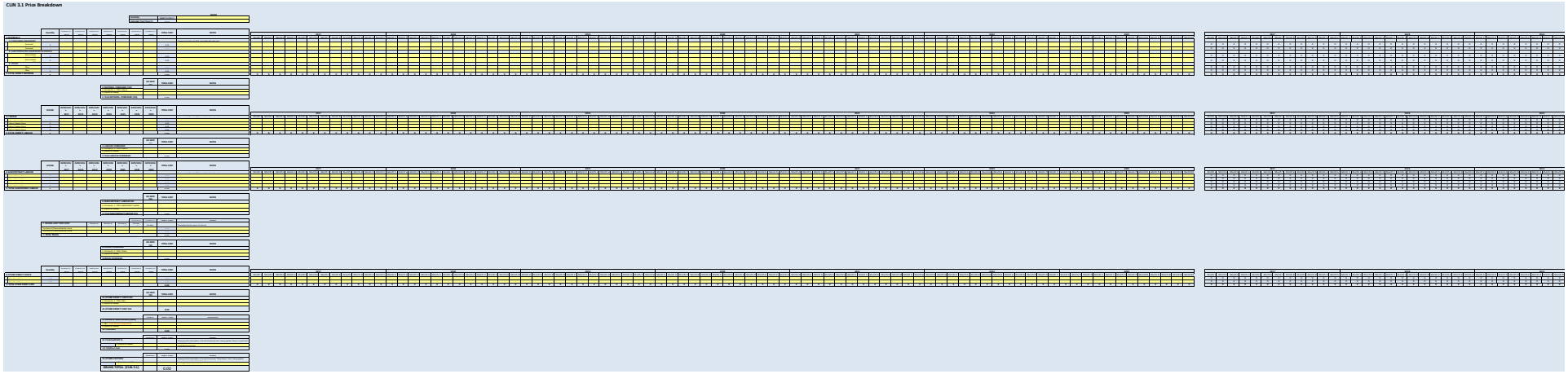
	RATE %	TOTAL COST	REFERENCE
11. General & Administrative (G&A)			
A. G&A (Insert Business Application)			
B. (Expand as needed)			
11. Total G&A		[illegible]	

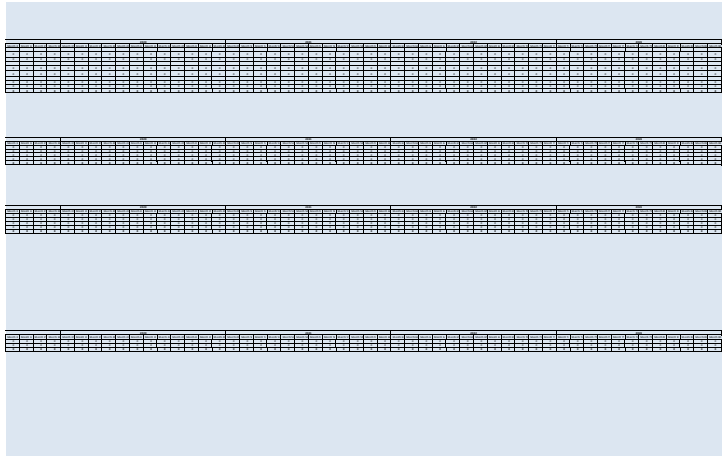
	RATE (%)	TOTAL COST	NOTES
12. Total Fee/Profit %			Please provide a description of to which elements fee is being applied. Ensure a correct and [illegible]
A. (Expand as needed)			Insert Fee Formula Here
12. Total Fee Cost		[illegible]	

	RATE (%)	TOTAL COST	NOTES
13. OTHER FACTORS			Please provide a description of to which elements "Other factors" rate is being applied.
A. (Expand as needed)			Insert Other Factors Formula Here
GRAND TOTAL (CLIN 2)		0.00	

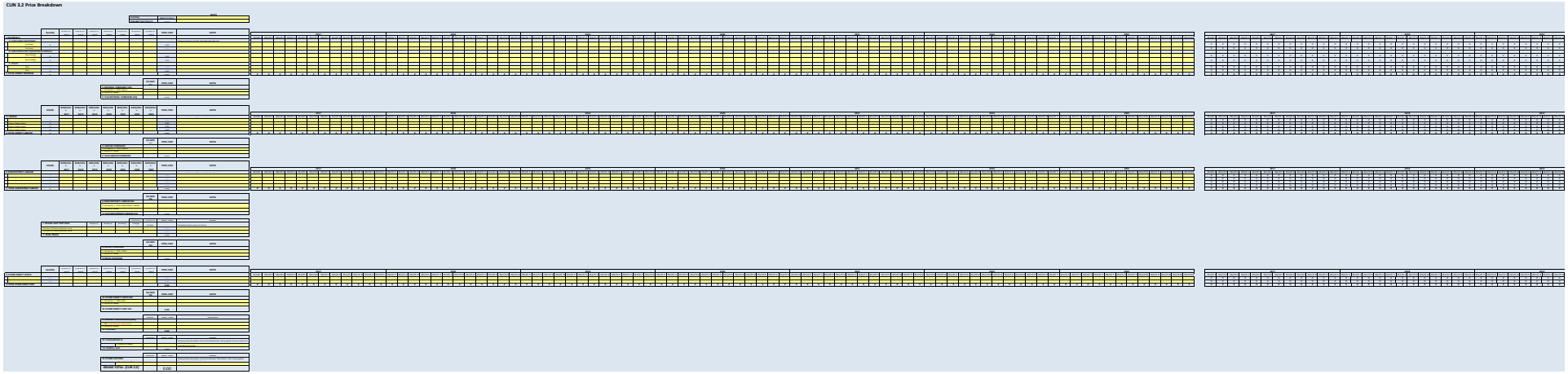


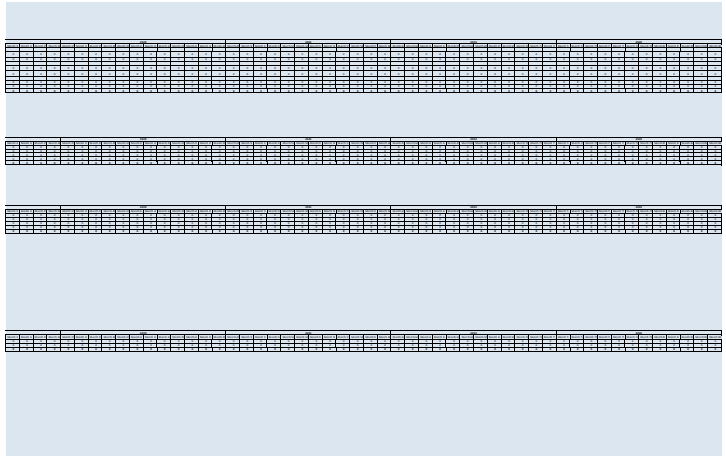
CUN 3.1 Price Breakdown



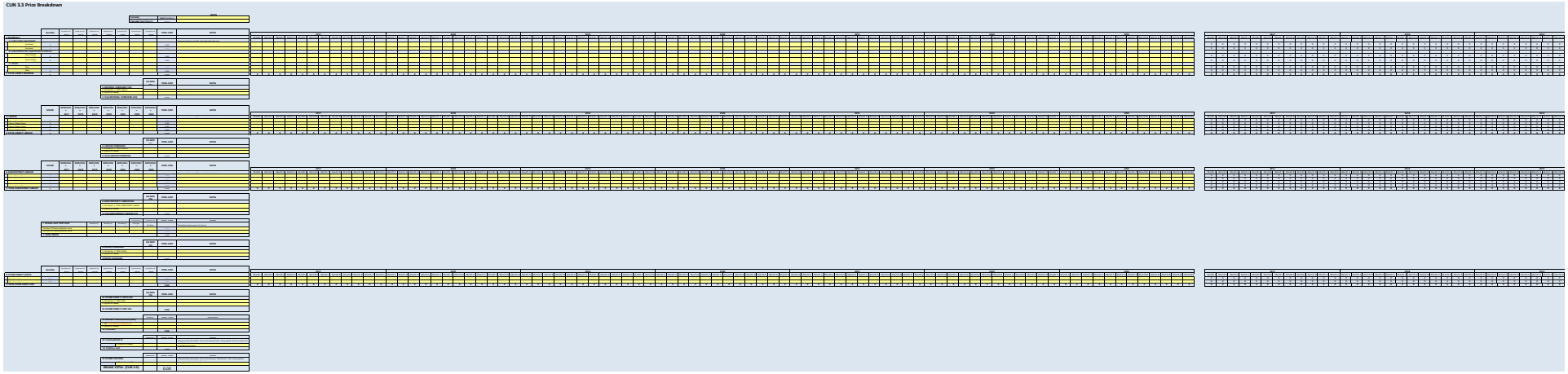


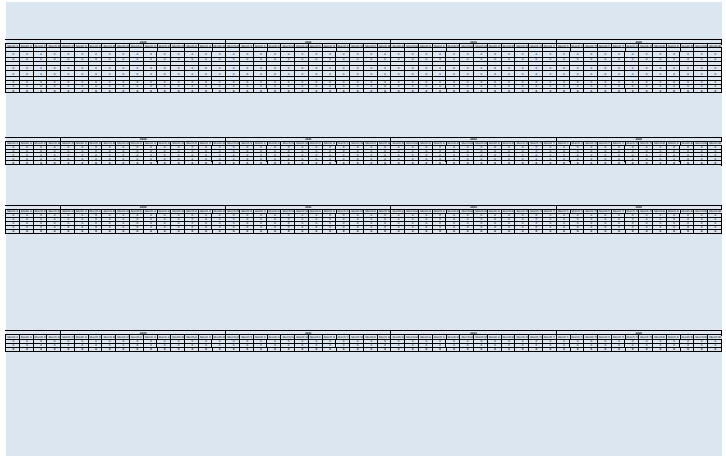
CUN 3.2 Price Breakdown



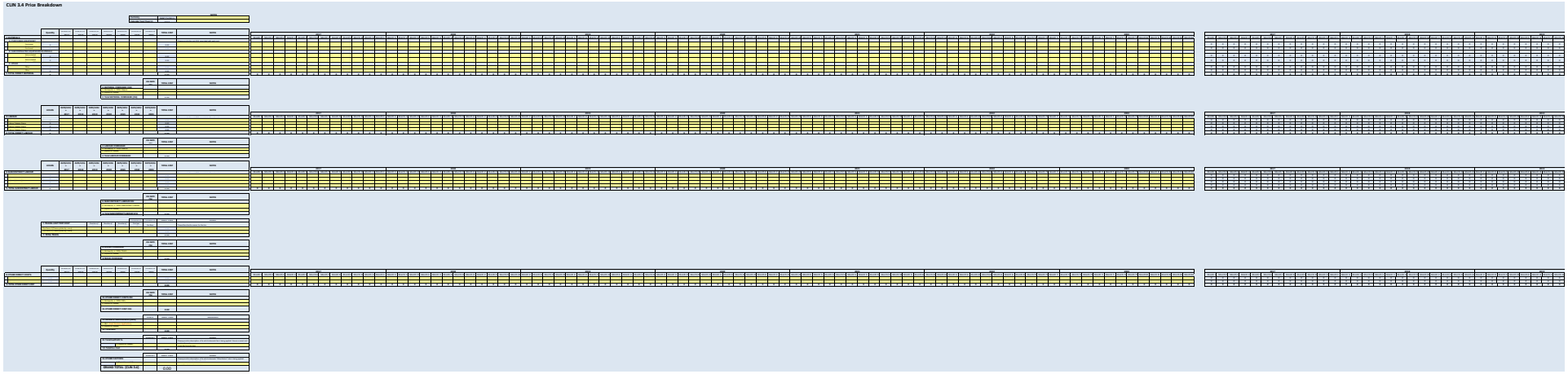


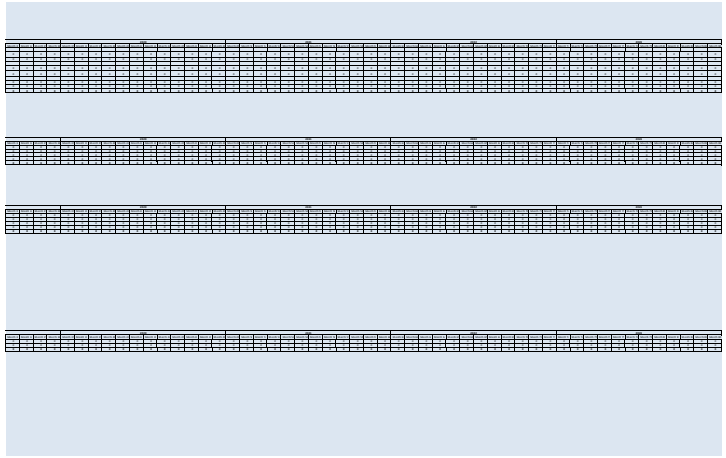
CUN 3.3 Price Breakdown





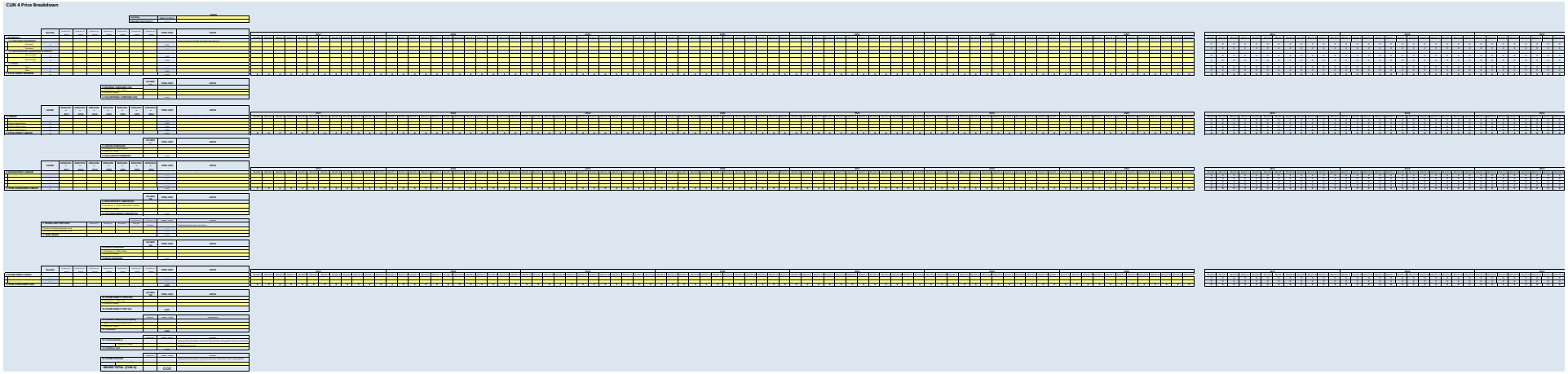
CUN 3.4 Price Breakdown

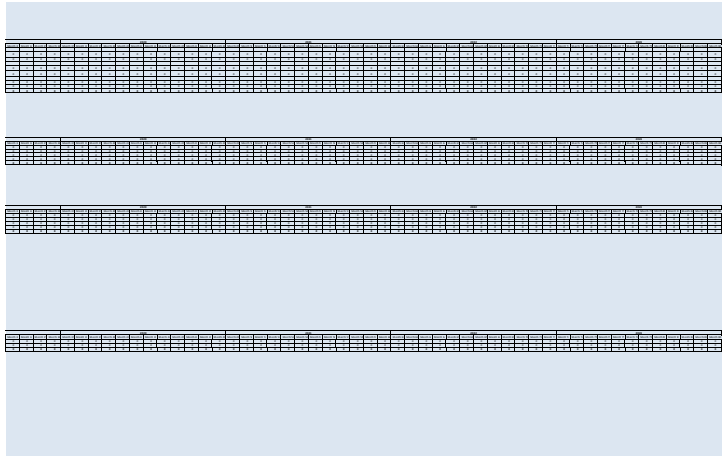




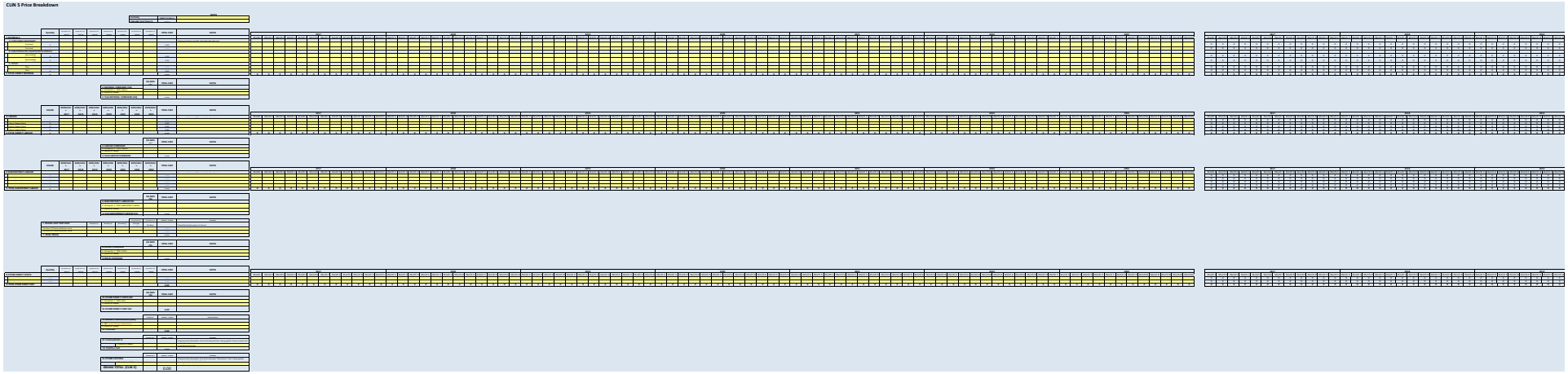
Machine Learning Applications

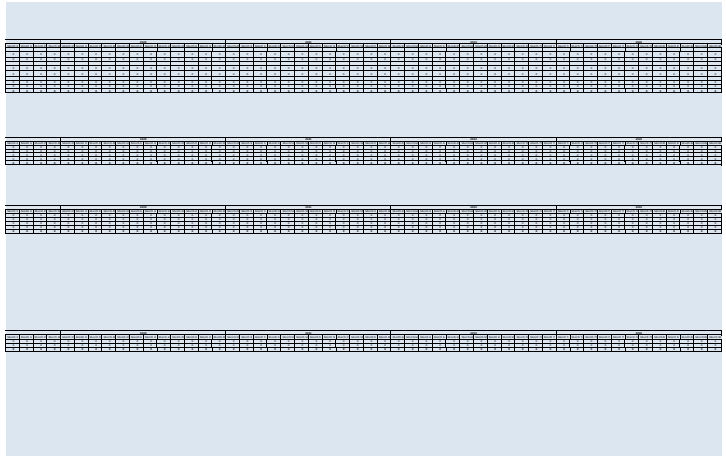
CLIN 4 Price Breakdown



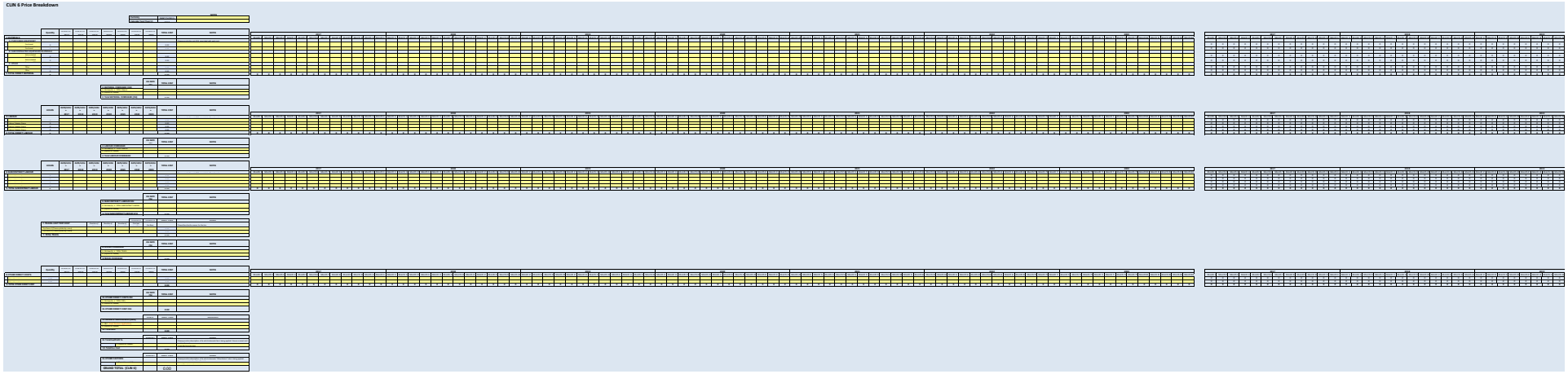


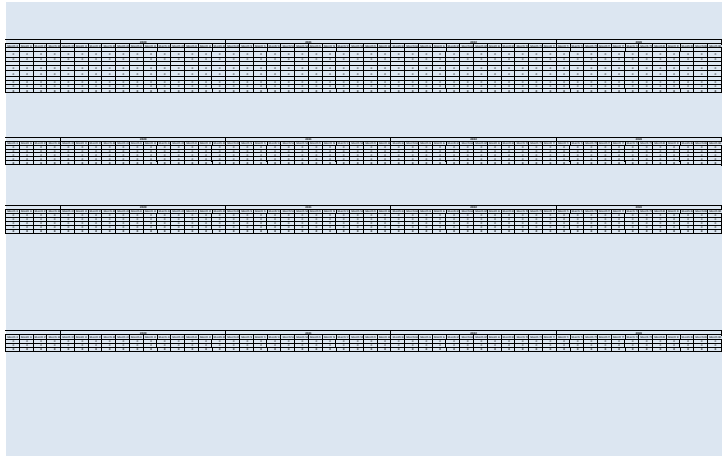
CUS 5 Price Breakdown





CUN 6 Price Breakdown





CLIN 7 Price Breakdown

		NOTES
Currency	Select Currency	
Calendar Year (Year 1):	2017	

	Quantity	Unit Cost 2017	Unit Cost 2018	Unit Cost 2019	Unit Cost 2020	Unit Cost 2021	Unit Cost 2022	Unit Cost 2023	TOTAL COST	NOTES
1. MATERIALS										
A. PURCHASED EQUIPMENT										Please provide the sub-CLIN associated with each cost.
Purchased	0								0.00	
Purchased	0								0.00	
B. SUBCONTRACTED EQUIPMENT/MATERIALS										
Subcontracted	0								0.00	
Subcontracted	0								0.00	
C. OTHER										
Other	0								0.00	
Other	0								0.00	
1. TOTAL DIRECT MATERIAL	0								0.00	

	OH RATE (%)	TOTAL COST	NOTES
2. MATERIAL OVERHEAD (OH)			
A. OH Rate (%) X TOTAL Material			
B. (Expand as needed)			
2. Total MATERIAL OVERHEAD (OH)		0.00	

	HOURS	RATE/HOUR 2017	RATE/HOUR 2018	RATE/HOUR 2019	RATE/HOUR 2020	RATE/HOUR 2021	RATE/HOUR 2022	RATE/HOUR 2023	TOTAL COST	NOTES
3. LABOUR										Please provide the sub-CLIN associated with each cost.
Labour Category Name	0								0.00	
Labour Category Name	0								0.00	
Labour Category Name	0								0.00	
Labour Category Name	0								0.00	
3. TOTAL DIRECT LABOUR	0								0.00	

	OH RATE (%)	TOTAL COST	NOTES
4. LABOUR OVERHEAD			
A. OH Rate (%) X TOTAL LABOUR			
B. (Expand as needed)			
4. Total LABOUR OVERHEAD		0.00	

	HOURS	RATE/HOUR 2017	RATE/HOUR 2018	RATE/HOUR 2019	RATE/HOUR 2020	RATE/HOUR 2021	RATE/HOUR 2022	RATE/HOUR 2023	TOTAL COST	NOTES
5. SUBCONTRACT LABOUR										Please provide the sub-CLIN associated with each cost.
Labour Category Name	0								0.00	
Labour Category Name	0								0.00	
Labour Category Name	0								0.00	
Labour Category Name	0								0.00	
5. TOTAL SUBCONTRACT LABOUR	0								0.00	

	OH RATE (%)	TOTAL COST	NOTES
6. SUBCONTRACT LABOUR O/H			
A. OH Rate (%) X TOTAL SUBCONTRACT LABOUR			
B. (Expand as needed)			
6. Total SUBCONTRACT LABOUR O/H		0.00	

7. TRAVEL UNIT TRIP COST	Number of	Number of	Number of	Unit Cost / Cost per	Unit Cost / Per Diem	TOTAL COST	NOTES
							Please Describe the reason for the trip.
Trip Name A (Please update trip name)						0.00	
Trip Name B (Please update trip name)						0.00	
7. TOTAL TRAVEL						0.00	

	OH RATE (%)	TOTAL COST	NOTES
8.TRAVEL OVERHEAD			
A. OH Rate (%) X TOTAL TRAVEL			
B. (Expand as needed)			
8.TRAVEL OVERHEAD		0.00	

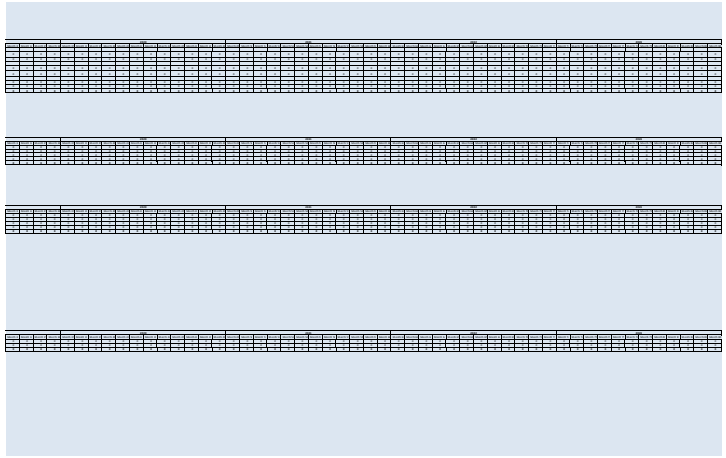
	Quantity	Unit Cost 2017	Unit Cost 2018	Unit Cost 2019	Unit Cost 2020	Unit Cost 2021	Unit Cost 2022	Unit Cost 2023	TOTAL COST	NOTES
9. OTHER DIRECT COSTS										
Other Direct Cost	0.00								0.00	
Other Direct Cost	0.00								0.00	
9. TOTAL OTHER DIRECT COST									0.00	

	OH RATE (%)	TOTAL COST	NOTES
10. OTHER DIRECT COSTS O/H			
A. OH Rate (%) X TOTAL ODCs			
B. (Expand as needed)			
10. OTHER DIRECT COST O/H		0.00	

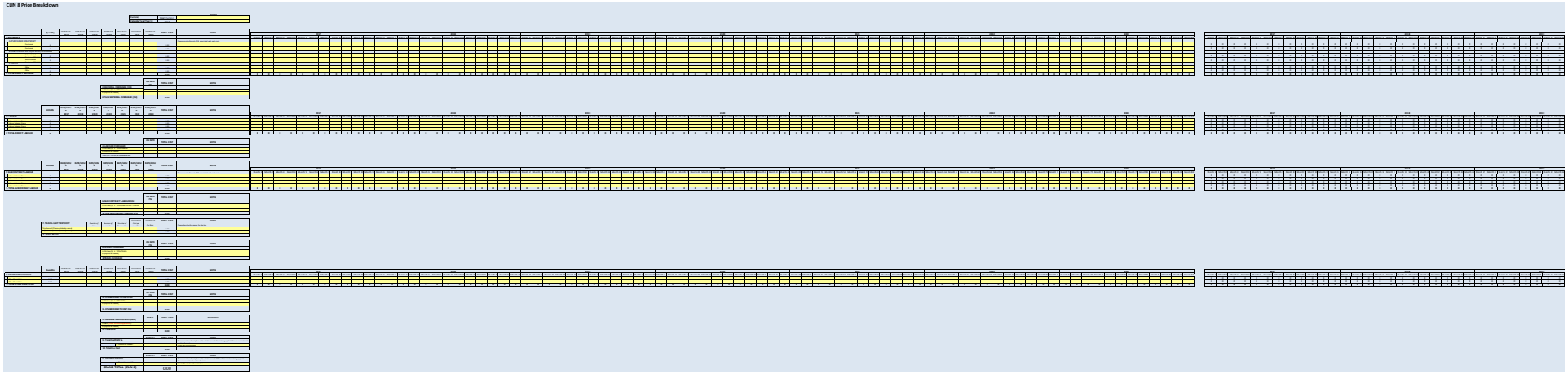
	RATE %	TOTAL COST	REFERENCE
11. General & Administrative (G&A)			
A. G&A (Insert Business Application)			
B. (Expand as needed)			
11. Total G&A		0.00	

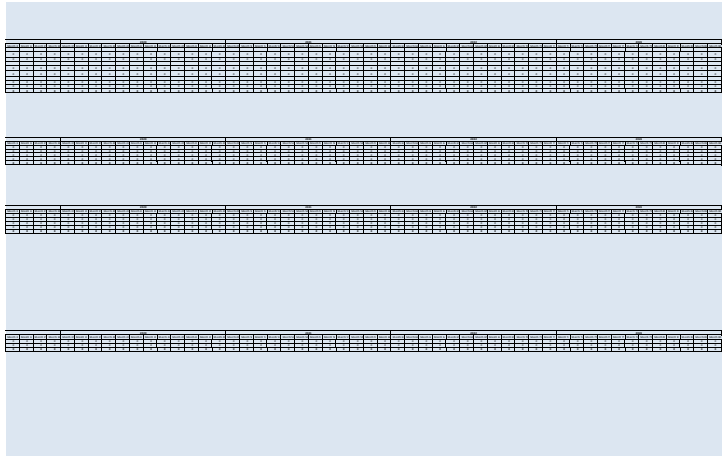
	RATE (%)	TOTAL COST	NOTES
12. Total Fee/Profit %			Please provide a description of to which elements fee is being applied. Ensure a correct and
A. (Expand as needed)			Insert Fee Formula Here
12. Total Fee Cost		0.00	

	RATE (%)	TOTAL COST	NOTES
13. OTHER FACTORS			Please provide a description of to which elements "Other factors" rate is being applied.
A. (Expand as needed)			Insert Other Factors Formula Here
GRAND TOTAL (CLIN 7)		0.00	



CLIN II Price Breakdown





Machine Learning Applications

CLIN 9 Price Breakdown

Contract Year 1 Start Date:	[redacted]
Contract Year 1 End Date:	[redacted]

Contract Year 1

	Quantity	Unit of Measure	Unit Price	Extended Price	Currency	Notes
Fixed Monthly Charges						
Fixed Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Fixed Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Fixed Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Fixed Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Fixed Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Fixed Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Total Fixed Charges - Contract Year 1	[redacted]			[redacted]	CAD	

	Price	Currency	Notes
Additional Implementation Costs			
Additional Implementation Costs	[redacted]	CAD	
Total Additional Implementation Costs	[redacted]	CAD	

	Quantity	Unit of Measure	Unit Price	Extended Price	Currency	Notes
Variable Charges						
Variable Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Variable Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Variable Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Total Variable Charges - Contract Year 1	[redacted]			[redacted]	CAD	

	Price	Currency	Notes
Total Contract Year 1 Charges			
Total Contract Year 1 Charges	[redacted]	CAD	

	Price	Currency	Notes
Optional Additional Implementation Costs			
Optional Additional Implementation Costs	[redacted]	CAD	
Total Optional Additional Implementation Costs	[redacted]	CAD	

	Quantity	Unit of Measure	Unit Price	Extended Price	Currency	Notes
Optional Additional Charges						
Optional Additional Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Optional Additional Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Optional Additional Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Total Optional Additional Charges	[redacted]			[redacted]	CAD	

	Price	Currency	Notes
Total Optional Charges			
Total Optional Charges	[redacted]	CAD	

	Price	Currency	Notes
Total Contract Year 1 Charges			
Total Contract Year 1 Charges	[redacted]	CAD	

Contract Year 2

	Quantity	Unit of Measure	Unit Price	Extended Price	Currency	Notes
Fixed Monthly Charges						
Fixed Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Fixed Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Fixed Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Total Fixed Charges - Contract Year 2	[redacted]			[redacted]	CAD	

	Price	Currency	Notes
Additional Implementation Costs			
Additional Implementation Costs	[redacted]	CAD	
Total Additional Implementation Costs	[redacted]	CAD	

	Quantity	Unit of Measure	Unit Price	Extended Price	Currency	Notes
Variable Charges						
Variable Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Variable Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Variable Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Total Variable Charges - Contract Year 2	[redacted]			[redacted]	CAD	

	Price	Currency	Notes
Total Contract Year 2 Charges			
Total Contract Year 2 Charges	[redacted]	CAD	

	Price	Currency	Notes
Optional Additional Implementation Costs			
Optional Additional Implementation Costs	[redacted]	CAD	
Total Optional Additional Implementation Costs	[redacted]	CAD	

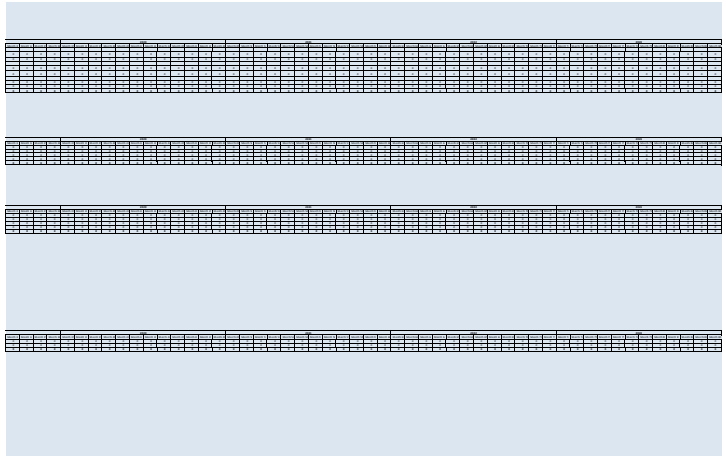
	Quantity	Unit of Measure	Unit Price	Extended Price	Currency	Notes
Optional Additional Charges						
Optional Additional Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Optional Additional Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Optional Additional Charge	[redacted]	Month	[redacted]	[redacted]	CAD	
Total Optional Additional Charges	[redacted]			[redacted]	CAD	

	Price	Currency	Notes
Total Optional Charges			
Total Optional Charges	[redacted]	CAD	

	Price	Currency	Notes
Total Contract Year 2 Charges			
Total Contract Year 2 Charges	[redacted]	CAD	

	Price	Currency	Notes
Total Contract Value - 2 Years			
Total Contract Value - 2 Years	[redacted]	CAD	

	Price	Currency	Notes
Total Contract Value - 10 Years			
Total Contract Value - 10 Years	[redacted]	CAD	



CLIN 10 Price Breakdown

		NOTES
Currency	Select Currency	
Calendar Year (Year 1):	2017	

	Quantity	Unit Cost 2017	Unit Cost 2018	Unit Cost 2019	Unit Cost 2020	Unit Cost 2021	Unit Cost 2022	Unit Cost 2023	TOTAL COST	NOTES
1. MATERIALS										
A. PURCHASED EQUIPMENT										Please provide the sub-CLIN associated with each cost
Purchased	0								0.00	
Purchased	0								0.00	
B. SUBCONTRACTED EQUIPMENT/MATERIALS										
Subcontracted	0								0.00	
Subcontracted	0								0.00	
C. OTHER										
Other	0								0.00	
Other	0								0.00	
1. TOTAL DIRECT MATERIAL	0								0.00	

	OH RATE (%)	TOTAL COST	NOTES
2. MATERIAL OVERHEAD (OH)			
A. OH Rate (%) X TOTAL Material			
B. (Expand as needed)			
2. Total MATERIAL OVERHEAD (OH)		0.00	

	HOURS	RATE/HOUR 2017	RATE/HOUR 2018	RATE/HOUR 2019	RATE/HOUR 2020	RATE/HOUR 2021	RATE/HOUR 2022	RATE/HOUR 2023	TOTAL COST	NOTES
3. LABOUR										Please provide the sub-CLIN associated with each cost
Labour Category Name	0								0.00	
Labour Category Name	0								0.00	
Labour Category Name	0								0.00	
Labour Category Name	0								0.00	
3. TOTAL DIRECT LABOUR	0								0.00	

	OH RATE (%)	TOTAL COST	NOTES
4. LABOUR OVERHEAD			
A. OH Rate (%) X TOTAL LABOUR			
B. (Expand as needed)			
4. Total LABOUR OVERHEAD		0.00	

	HOURS	RATE/HOUR 2017	RATE/HOUR 2018	RATE/HOUR 2019	RATE/HOUR 2020	RATE/HOUR 2021	RATE/HOUR 2022	RATE/HOUR 2023	TOTAL COST	NOTES
5. SUBCONTRACT LABOUR										Please provide the sub-CLIN associated with each cost
Labour Category Name	0								0.00	
Labour Category Name	0								0.00	
Labour Category Name	0								0.00	
Labour Category Name	0								0.00	
5. TOTAL SUBCONTRACT LABOUR	0								0.00	

	OH RATE (%)	TOTAL COST	NOTES
6. SUBCONTRACT LABOUR O/H			
A. OH Rate (%) X TOTAL SUBCONTRACT LABOUR			
B. (Expand as needed)			
6. Total SUBCONTRACT LABOUR O/H		0.00	

7. TRAVEL UNIT TRIP COST	Number of Trips	Number of Persons	Number of Days per Trip	Unit Cost: Cost per Trip	Unit Cost: Per Diem	TOTAL COST	NOTES
							Please Describe the reason for the trip.
Trip Name A (Please update trip name)						0.00	
Trip Name B (Please update trip name)						0.00	
7. TOTAL TRAVEL						0.00	

	OH RATE (%)	TOTAL COST	NOTES
8.TRAVEL OVERHEAD			
A. OH Rate (%) X TOTAL TRAVEL			
B. (Expand as needed)			
8.TRAVEL OVERHEAD		0.00	

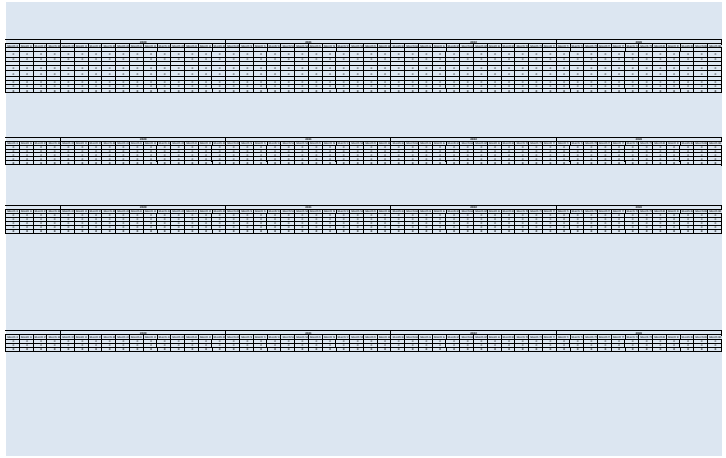
	Quantity	Unit Cost 2017	Unit Cost 2018	Unit Cost 2019	Unit Cost 2020	Unit Cost 2021	Unit Cost 2022	Unit Cost 2023	TOTAL COST	NOTES
9. OTHER DIRECT COSTS										
Other Direct Cost	0.00								0.00	
Other Direct Cost	0.00								0.00	
9. TOTAL OTHER DIRECT COST									0.00	

	OH RATE (%)	TOTAL COST	NOTES
10. OTHER DIRECT COSTS O/H			
A. OH Rate (%) X TOTAL ODCs			
B. (Expand as needed)			
10. OTHER DIRECT COST O/H		0.00	

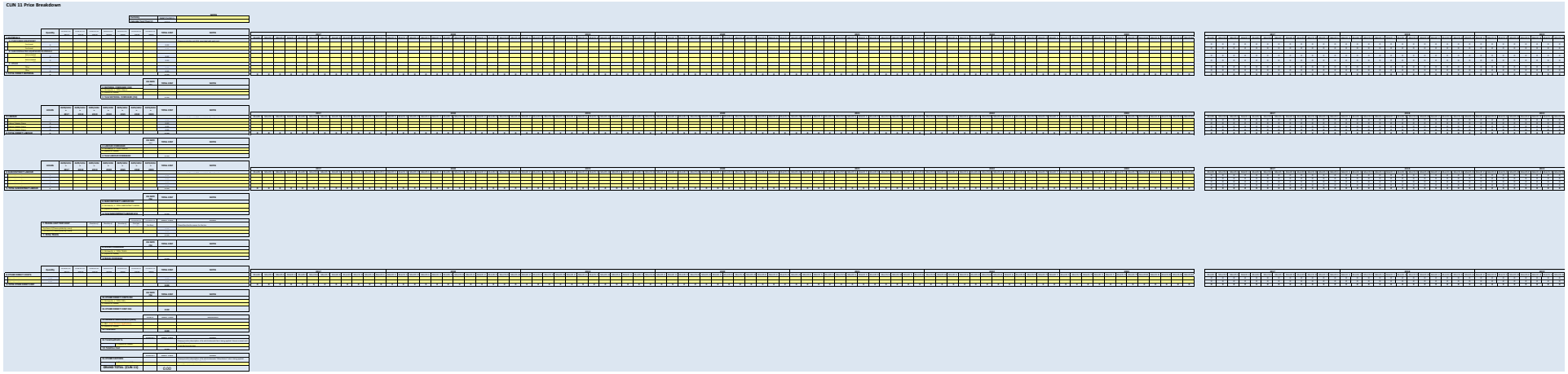
	RATE %	TOTAL COST	REFERENCE
11. General & Administrative (G&A)			
A. G&A (Insert Business Application)			
B. (Expand as needed)			
11. Total G&A		0.00	

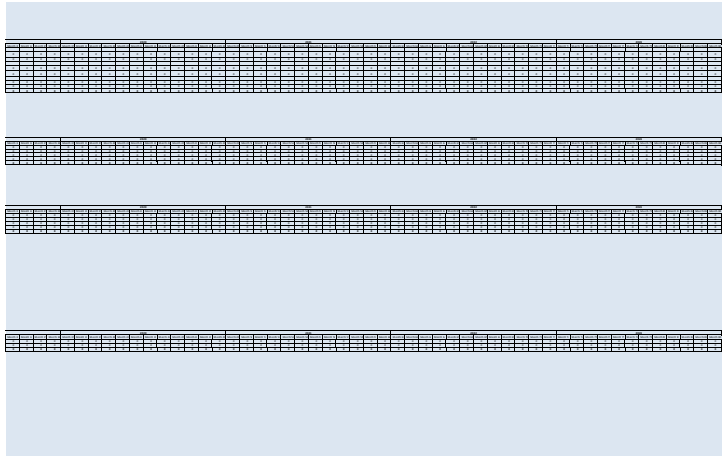
	RATE (%)	TOTAL COST	NOTES
12. Total Fee/Profit %			Please provide a description of to which elements fee is being applied. Ensure a consist and
A. (Expand as needed)			Insert Fee Formula Here
12. Total Fee Cost		0.00	

	RATE (%)	TOTAL COST	NOTES
13. OTHER FACTORS			Please provide a description of to which elements "Other Factors" rate is being applied.
A. (Expand as needed)			Insert Other Factors Formula Here
GRAND TOTAL (CLIN 10)		0.00	



CLIN 11 Price Breakdown





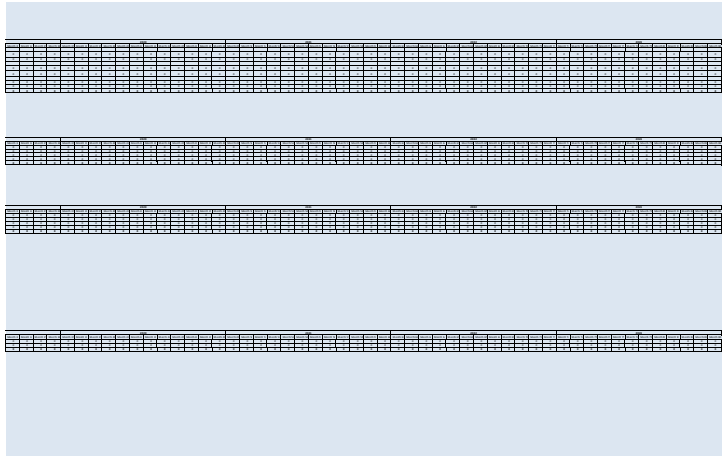
CLIN 12 Price Breakdown

Contract Line Item Number	
Contract Line Item Name	

Contract Line Item Number	
Contract Line Item Name	

Contract Line Item Number	
Contract Line Item Name	

Contract Line Item Number	
Contract Line Item Name	



SCHEDULE OF FORWARD LABOUR RATES

Firm Fixed Price Daily Rates for Work performed at Location and Year specified below

Currency:

		Year 2017		Year 2018		Year 2019		Year 2020		Year 2021	
ITEM	Labour Category (See description in Section 6 of the SOW)	Contractor Facilities	NATO Europe	Contractor Facilities	NATO Europe	Contractor Facilities	NATO Europe	Contractor Facilities	NATO Europe	Contractor Facilities	NATO Europe
1.1	Project Manager										
1.2	Project Control Analyst										
1.3	Webmaster										
1.4	Contract Security Specialist										
1.5	Senior Engineer										
1.6	Intermediate Engineer										
1.7	Junior Engineer										
1.8	Senior Systems Engineer										
1.9	Intermediate Systems Engineer										
1.10	Junior Systems Engineer										
1.11	Senior Communications Engineer										
1.12	Intermediate Communications Engineer										
1.13	Junior Communications Engineer										
1.14	Senior Network Engineer										
1.15	Intermediate Network Engineer										
1.16	Junior Network Engineer										
1.17	Systems Integration Analyst										
1.18	Senior Software Programmer										
1.19	Intermediate Software Programmer										
1.20	Junior Software Programmer										
1.21	System Support Engineer										
1.22	Senior Test Engineer										
1.23	Intermediate Test Engineer										
1.24	Junior Test Engineer										
1.25	Test Technician										
1.26	Information Systems Security Engineer										
1.27	Information Systems Security Specialist										
1.28	Field Engineer										
1.29	Senior Technician										
1.30	Intermediate Technician										
1.31	Junior Technician										
1.32	System Management Specialist										
1.33	Logistics Management Specialist										
1.34	Logistics Analyst										
1.35	Inventory Specialist										
1.36	Shipping and Receiving Clerk										
1.37	Technical Writer										
1.38	Senior Configuration Manager										
1.39	Intermediate Configuration Manager										
1.40	Junior Configuration Manager										
1.41	Data Control Specialist										
1.42	Qualiy Assurance Manager										
1.43	Quality Assurance Specialist										
1.44	Instructional Systems Designer										

1.45	Senior Training Materials Developer										
1.46	Training Materials Developer										
1.47	CBT Developer										
1.48	Senior Instructor										
1.49	Junior Instructor										
1.50	System Administrator										
1.51	Network Manager										
1.52	Database Administrator										
1.53	Operational Support Manager										
1.54	Senior Maritime C2 Functional Specialist										
1.55	Intermediate Maritime C2 Functional Specialist										
1.56	Senior Graphical User Interface Designer										
1.57	Senior Geo-Specialist										
1.58	Intermediate Geo-Specialist										
1.59	Other (TBD by Bidder)										
1.60											
1.61											
1.62											
1.63											
1.64											
1.65											
1.66											
1.67											
1.68											
1.69											
1.70											
1.71											
1.72											
1.73											
1.74											
1.75											

SCHEDULE OF UNIT PRICES FOR COTS SOFTWARE LICENSES (for all CLINs)

		Firm Fixed-Price Unit Prices for COTS Software Licenses and order quantities stated below. Quantity refers to number of licenses. Currency:														
		Year 2017			Year 2018			Year 2019			Year 2020			Year 2021		
Item	Item Description	Less than 20	20 to 59	60 or more	Less than 20	20 to 59	60 or more	Less than 20	20 to 59	60 or more	Less than 20	20 to 59	60 or more	Less than 20	20 to 59	60 or more
1.1	To be filled by Bidders based on the proposed COTS products															
1.2																
1.3																
1.4																
1.5																
1.6																
1.7																
1.8																
1.9																
1.10																
1.11																
1.12																
1.13																
1.14																
1.15																
1.16																
1.17																
1.18																
1.19																
1.20																
1.21																
1.22																
1.23																
1.24																
1.25																

IFB-CO-13859-TRITON

PROVISION OF FUNCTIONAL SERVICES FOR COMMAND AND CONTROL OF MARITIME OPERATIONS (TRITON)

INCREMENT 1

PROJECT SERIAL 2011/0IS03081

BOOK II – PART I

PROSPECTIVE CONTRACT

NCI AGENCY CONTRACT	
1. Original Number __ of	2. PO Number:
3. Contract Number: CO-13859-TRITON	4. Effective Date:
5. Contractor:	6. Purchaser: NCIO represented by: The General Manager NCI Agency Avenue du Bourget 140 B-1140 Bruxelles Tel: +32 (0)2 707 8591 Fax: +32 (0)2 707 8770
7. CONTRACT SCOPE/SCHEDULE OF SUPPLIES/SERVICES This is a Firm Fixed Price Contract for the implementation and transitioning of Increment 1 of the Functional Services Command and Control of Maritime Operations (short name: TRITON) to be developed and delivered in accordance with the terms and conditions specified herein. The overall performance to be rendered by the Contractor under this Contract is divided into distinguished Work Packages. The obligation of the parties is limited to performance of work under Work Packages authorized in accordance with the terms of this Contract and up to the total amount specified in Block 8 of this Contract Signature Page.	
8. TOTAL AMOUNT OF CONTRACT : Firm Fixed Price (Cumulative Total CLINs 1 to 8 and 12)	
9. PERIOD OF PERFORMANCE EDC + 36 months	10. LOCATION OF WORK As specified in the Statement of Work and Contractor's proposal
11. CONTRACT AGREEMENT: Subject to the prescriptions of Clause 3 ("Order of Precedence") of the Special Provisions, this document (hereinafter referred to as the "Signature Page") including all of its Annexes and the below named documents, where indicated incorporated by reference, constitute the entire Agreement between the Parties (hereinafter referred to as the "Contract" or the "Agreement"): (a) Part 1. Schedule of Supplies and Services (b) Part 2. Special Contract Provisions and Annexes (c) Part 3. NCIO General Provisions and Annexes (d) Part 4. Statement of Work and Annexes (e) Other documents indicated under Clause 2 "Order of Precedence" In the event of any conflict or inconsistencies between or among any of the documents comprising this Agreement, the order of priority specified in clause 2 "Order of Precedence" of the Contract Special Provisions shall apply.	
12. Signature of Contractor	13. Signature of Purchaser
14. Name and Title of Signer	15. Name and Title of Signer
16. Date signed by the Contractor	17. Date signed by the Purchaser

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IFB-CO-13859-TRITON

PROVISION OF FUNCTIONAL SERVICES FOR COMMAND AND CONTROL OF MARITIME OPERATIONS (TRITON)

INCREMENT 1

PROJECT SERIAL 2011/0IS03081

BOOK II – PART I

CONTRACT SCHEDULES

To be extracted from the Bidding Sheets

IFB-CO-13859-TRITON

PROVISION OF FUNCTIONAL SERVICES FOR COMMAND AND CONTROL OF MARITIME OPERATIONS (TRITON)

INCREMENT 1

PROJECT SERIAL 2011/0IS03081

BOOK II – PART II

SPECIAL CONTRACT PROVISIONS

1. INTERPRETATION, DEFINITIONS, AND ACRONYMS

1.1. As used throughout this Contract, the following terms shall have the meanings specified below unless otherwise specified in the Contract:

1.1.1. "Installation Sites": the NATO premises as set out in Contract Schedules and the Statement of Work (SOW) and or such other sites as the Purchaser shall from time to time notify to the Contractor through a Contract Amendment;

1.1.2. "NATO Participating Country": any NATO nation that has undertaken to share the cost of the project, namely, (in alphabetical order): ALBANIA, BELGIUM, BULGARIA, CANADA, CROATIA, CZECH REPUBLIC, DENMARK, ESTONIA, FRANCE, GERMANY, GREECE, HUNGARY, ICELAND, ITALY, LATVIA, LITHUANIA, LUXEMBOURG, THE NETHERLANDS, NORWAY, POLAND, PORTUGAL, ROMANIA, SLOVAKIA, SLOVENIA, SPAIN, TURKEY, THE UNITED KINGDOM and THE UNITED STATES OF AMERICA.

1.1.3. "Work Packages": Divisions of the total Contract work effort into a grouping of tasks/products that the Contractor shall deliver and/or perform as a bundle under the terms of this contract. A description of all Contract Work Packages is provided in Annex B to Part IV, Statement of Work.

1.1.4. "Technical Solution": the Contractor's specification for project TRITON provided as part of his bid and included in this Contract by reference.

1.1.5. "Service": A non-material equivalent of a good that is part of the activity performed under the Contract.

2. DISPOSITION OF NCIO CONTRACT GENERAL PROVISIONS

2.1. For the purposes of this Contract, the NCIO Contract General Provisions are modified, supplemented, or deleted as follows.

2.1.1. Clause 1 (Order of Precedence) is replaced by Clause 3 (Order of Precedence) of the Contract Special Provisions.

2.1.2. Clause 2 (Definitions) is supplemented by Clause 1 (Interpretation, Definition, and Acronyms) of the Contract Special Provisions.

2.1.3. Clause 7 (Firm Fixed Price Contract) is replaced by Clause 6 (Contract Type) of the Contract Special Provisions.

2.1.4. Clause 8 (Performance Guarantee) is supplemented by Clause 33 (Performance Guarantee) of the Contract Special Provisions.

2.1.5. Clause 11 (Security) is supplemented by Clause 34 (Security) of the Contract Special Provisions.

2.1.6. Clause 19 (Pricing of Changes, Amendments and Claims) is supplemented by Clause 13 (Pricing of Changes Amendment and Claims) of the Contract Special Provisions.

2.1.7. Clauses 21 (Inspection and Acceptance of Work) and 22 (Inspection and Acceptance of Documentation) are supplemented by Clause 17 (Acceptance Procedures) of the Contract Special Provisions.

2.1.8. Clause 24 (Ownership and Title) is supplemented by Clause 18 (Risk of Loss or Damage) of the Contract Special Provisions.

2.1.9. Clause 25 (Invoices and Payment) is supplemented by Clause 7 (Invoices and Payment Terms) of the Contract Special Provisions.

2.1.10. Clause 27 (Warranty of Work (Exclusive of Software)) is supplemented by Clause 31 (Warranty Period (Exclusive of Software)) of the Contract Special Provisions.

2.1.11. Clause 31 (Software Warranty) is supplemented by Clause 32 (Software Warranty) of the Contract Special Provisions.

2.1.12. Clause 38 Liquidated Damages is replaced by Clause 23 (Liquidated Damages) of the Contract Special Provisions.

3. ORDER OF PRECEDENCE

3.1. This Clause supersedes Clause 1 of the NCIO Contract General Provisions.

3.2. In case of conflict between the clauses and the schedules and/or any annexes to the schedules and/or any other documents referred to in this Contract, the conflict shall be resolved in accordance with the following order of precedence:

1. The Signature Page
2. Part I (Contract Schedule of Supplies and Services)
3. Part II (Special Contract Provisions) and Annexes
4. Part III (NCIO Contract General Provisions) and Annexes
5. Project Management and Engineering documentation as listed and approved in accordance with Clause 36.
6. Annex B to Part IV – Statement of Work, Work Packages
7. Part IV – Statement of Work
8. Annex A to Part IV – Statement of Work, System Requirements Specification
9. The Purchaser's provided clarifications, issued throughout the bidding period relevant to IFB-CO-13859-TRITON.
10. The Contractor's proposal (Technical Proposal and Price Quotation) in response to IFB-CO-13859-TRITON dated [date] and any clarifications thereto, incorporated herein by reference.

4. SCOPE OF WORK

4.1. This Contract is for the provision of the implementation and transitioning of Increment 1 of the Functional Services for Command and Control of Maritime Operations, short name "TRITON".

4.2. TRITON Increment 1 will deliver services to provide the users with Maritime Situational Awareness (MSA) and C2 capabilities by replacing the operational-level functionality of the existing Maritime Command and Control Information System (MCCIS) and MSA/BRITE Demonstrator Prototype.

4.3. The purpose of Project TRITON is to provide Functional Services for Command and Control of Maritime Operations, which will allow NATO and its Alliance members to conduct maritime operations. The services to be delivered for the entire capabilities of TRITON will provide the tools for the NATO operational user to plan and execute the full spectrum of maritime missions in a joint environment. They enable the operators to share and leverage the services provided by Core Services implementation, as well as tools and capabilities offered through the other NATO Functional Services in order to facilitate a seamless operating environment for the users.

4.4. TRITON will provide the NATO community with an integrated, robust and flexible C2 capability supported by the Core Services available through the Bi-Strategic Command Automated Information System (Bi-SC AIS).

4.5. The services delivered by TRITON Increment 1 will cover a subset of overall capabilities and provide a foundation to build on for future Increments.

4.6. TRITON will enable the users to collect, process, present and distribute information that supports the major functions of Maritime C2. These services will support NATO Headquarters and Centres at both static and afloat locations. TRITON Functional Services will be operational at deployed sites, Afloat Command Platforms (ACP) in NATO-led task forces/groups, basically Standing NATO Maritime Group (SNMG) and Standing NATO Mine Counter Measures Group (SNMCMG).

4.7. The project will also provide a C4ISR Visualisation Component as a re-usable software package. This component will be used by other Bi-SC AIS systems to provide a standardised map and object visualisation capability.

4.8. The full scope of work to be delivered under this Contract is set up in eleven (11) individual Work Packages, of which three are Contract Options. The Work Packages are described in detail in Annex B to Part IV, Statement of Work (SOW).

5. TOTAL SYSTEM PERFORMANCE RESPONSIBILITY AND COMPREHENSION

5.1. The Contractor warrants that he has read, understood and agreed to implement each and all terms, clauses, specifications (including interfaces), conditions and requirements specified in this Contract and that his signature of the Contract is an acceptance, without reservations, of the said Contract terms within their normal and common meaning.

5.2. The Statement of Work (SOW) and its Annex System Requirements Specification (SRS) of Part IV of this Contract set forth the performance requirements for the Contractor's proposed work as called for under this Contract. Accordingly, notwithstanding any conflict or inconsistency which hereafter may be found

between achievement of the aforesaid performance requirements and adherence to the Contractor's proposed design for the work, the Contractor hereby warrants that the Deliverables will meet the performance requirements of the said SOW and SRS.

5.3. The Contractor shall be fully responsible for the integration of all its sub-systems and components, and hereby agrees to make certain that any or all required inspection and Acceptance test procedures are accomplished and are sufficient to meet the specifications. Further, the Contractor agrees that all subsystems and components will be installed and integrated into the systems to be delivered under this Contract.

6. CONTRACT TYPE

6.1. This Clause supersedes Clause 7 of the NCIO Contract General Provisions.

6.2. This is a Firm Fixed Price Contract.

6.3. The total Firm Fixed Price of this Contract is stated on the Signature page of the Contract and is based on the price of CLINs 1 through 8 and 12, unless revised by the Purchaser through formal Amendment to the Contract.

6.4. The Purchaser assumes no liability for costs incurred by the Contractor in excess of the stated Total Price.

7. INVOICES AND PAYMENT TERMS

7.1. This Clause supplements Clause 25 of the NCIO Contract General Provisions.

7.2. Payment for supplies and services furnished under this Contract shall be made in the currency quoted by the Contractor for the relevant portion of the Contract.

7.3. Payments will be made to the Contractor on achievement/delivery and prior written acceptance by the Purchaser of the progress milestones defined at ANNEX J of the Contract Special Provisions.

7.4. Where Optional Work Packages are exercised, payments shall be made in accordance with the stipulations of the relevant amendment providing for the exercise of such Options.

7.5. No payment shall be made with respect to undelivered supplies, works not performed, services not rendered and/or incorrectly submitted invoices.

7.6. The Purchaser shall not be liable for any amount resulting from the performance of services or the delivery of equipment outside the scope of this Contract.

7.7. Payment to the Contractor will be made within 60 days of receipt of properly supported and documented invoices and upon acceptance in writing by the Purchaser.

7.8. All invoices shall refer to CO-13859-TRITON Purchase Order Number [*NCIA PO REF*].

8. C4ISR VISUALISATION COMPONENT

8.1. This Clause 8 only applies to Contract deliverables of Work Package 4 (Visualisation Component Provision).

8.2. The technical scope of this Contract includes the design and implementation of a "C4ISR Visualisation Component" which the Purchaser intends to re-use and incorporate into current and future NCI Agency projects and Bi-SC AIS Functional Services for use by NATO and NATO Nations.

8.3. The C4ISR Visualisation Component constitutes a stand-alone, self-sufficient, and independently installable software package to be developed in accordance with the technical specifications set forth in Annex A (SRS) and Annex B (Work Packages) to Part IV, Statement of Work (SOW).

8.4. The design and development of the C4ISR Visualisation Component under this Contract is set up as an independent Work Package (Work Package 4). Due to the Purchaser's intent to re-use the C4ISR Visualisation Component, both as a completed object and as initial releases or prototypes thereof, all deliverables of Work Package 4, i.e. CLIN 4, shall be governed by distinct Intellectual Property and Ownership provisions listed in Clauses 8.5 through 8.7 herewith.

8.5. **Intellectual Property**

8.5.1. This Clause supplements Clause 30 (Intellectual Property) of the NCIO Contract General Provisions and covers the C4ISR Visualisation Component.

8.5.2. As the Purchaser intends to reuse the C4ISR Visualisation Component as detailed in Section 8.2 above, it is anticipated that all Intellectual Property of the C4ISR Visualisation Component, both object and source code, shall be considered Foreground Intellectual Property Rights (IPR) in accordance with Clause 2.19 and 30.3 of the NCIO Contract General Provisions. As a consequence, all IPR of the C4ISR Visualisation Component shall be the property of the Purchaser on behalf of NATO.

8.5.3. Notwithstanding Clause 8.5.2 above, the Purchaser recognizes that the Contractor may require the use of Third Party Commercial of the Shelf (COTS) products for the purpose of developing the C4ISR Visualisation Component pursuant to this Contract. In such case, the Contractor shall state the proposed COTS products in ANNEX E hereto. For such COTS items, the Contractor shall be responsible for obtaining licenses in line with the requirements of the Statement of Work and its annexes (including numbers and locations of licenses). No IPR other than Foreground and Third Party COTS shall govern the deliverables of this Work Package 4 and the delivery of the C4ISR Visualisation Component. With the exception of licencing terms for COTS to be provided, if any, no statement limiting the use of the Visualisation Component shall be accepted.

8.5.4. The Contractor shall ensure that suitable arrangements are in place between its employees, agents, consultants and itself regarding the IPR of the C4ISR Visualisation Component generated by said employees, agents, Subcontractors and consultants to allow the Contractor to fulfil its obligations under Clause 8.5 above.

8.5.5. The Contractor shall be entitled to use the Foreground IPR of the visualization component on a non-exclusive, royalty free basis solely for the purpose of carrying out the Work.

8.5.6. The Contractor shall not use any Foreground IPR of the C4ISR Visualisation Component (other than for the purpose of carrying out the Work) without the Purchaser's prior written agreement. Any such agreement shall include terms relating to such use.

8.5.7. The Contractor shall provide the Purchaser, at the latest upon delivery of the C4ISR Visualisation Component and thereafter for the duration of the warranty and any purchased CLS (Contractor Logistics Support) agreement period, with full documented records of information in relation to the C4ISR Visualisation Component, including but not limited to, all drawings, specifications and other data that is necessary or useful to further develop, maintain and operate the C4ISR Visualisation Component.

8.5.8. The Contractor shall take all necessary actions and sign all necessary documents to;

8.5.8.1. Enable the Purchaser to obtain the registration, if applicable, of the C4ISR Visualisation Component IPR as the Purchaser may require and select; and

8.5.8.2. Execute any formal assignment or prepare other documents as may be necessary or useful to vest title to any C4ISR Visualisation Component IPR in the Purchaser.

8.5.9. The Contractor undertakes;

8.5.9.1. To notify the Purchaser promptly of any invention or improvement to an invention or any design conceived or made by the Contractor; and

8.5.9.2. To provide the Purchaser with such information as the Purchaser may reasonably request in order to:

8.5.9.2.1 Determine the patentability of such invention or improvement,

8.5.9.2.2 Assess the need for registering such invention or improvement;

8.5.9.3. If the Purchaser determines that it wishes to apply for one or more patents for the disclosed invention or improvement or for a registration for the disclosed design, it will prosecute such application(s) at its own expense. The Contractor undertakes to provide the Purchaser, at the Purchaser's expense, with such information and assistance as the Purchaser shall reasonably require to prosecute such application(s).

8.5.9.4. In accordance with the Purchaser’s intent to re-use the C4ISR Visualisation Component in current and future projects, the Purchaser reserves the right to transfer IPR of the C4ISR Visualisation Component to third parties for implementation under separate Purchaser contracts.

8.6. **Ownership and Title**

8.6.1. This Clause supersedes Clause 24 (Ownership and Title) of the NCIO Contract General Provisions.

8.6.2. All IPR of the C4ISR Visualisation Component is immediately and exclusively

transferred and assigned to the Purchaser as from their coming into existence upon which point in time the Purchaser assumes ownership and title to such IPR.

8.7. **Warranty**

8.7.1. Notwithstanding the ownership and title provisions of Clause 8.6, the warranty period for the visualisation component shall start upon Purchaser acceptance of the FSA milestone in accordance with the SOW paragraph 5.10.

9. PURCHASER RIGHT TO CONTRACT WITH THIRD PARTIES IN CASE OF CONTRACTOR DEFAULT

9.1. This Clause supplements Clause 39 (Termination for Default) of the NCIO Contract General Provisions.

9.2. In the event that the Contractor fails to deliver or make progress on the provision of TRITON Increment 1 in accordance with the activity milestones and delivery dates stipulated in the Schedule of Supplies and Services and Statement of Work, and is notified by the Purchaser in writing that the Contractor is in a state of default in accordance with Clause 39 of the NCIO Contract General Provisions (Termination for Default), the Purchaser reserves the right to enter directly into contracts with any third party, including commercial entities, and Contractor's Subcontractors for provision of the C4ISR Visualisation Component or any other Contract Work Package.

9.3. The provisions of this Article are in addition to and in no way limit the rights of the Purchaser contained in other applicable clauses of this Contract, including but not limited to, Clause 21 (Inspection and Acceptance of Work) and Clause 39 (Termination for Default) of the NCIO Contract General Provisions.

10. TASK ORDERS

10.1. The Purchaser intends to reuse and incorporate the C4ISR Visualisation Component into current and future NCI Agency projects and functional services and may select the Contractor to perform additional work related to component customization, installation and implementation, maintenance and support activities or any other Work Package of this Contract.

10.2. The Purchaser anticipates both projected and incidental needs of these services, but cannot provide the exact details on the dates, specific deliverables, and quantities to satisfy those needs.

10.3. If the Purchaser requires these additional services, the Purchaser may contract such additional Work with the Contractor through issuance of Task Orders under this Contract. A Task Order's scope, price, and period of performance will be mutually agreed with the Contractor prior to its issuance.

10.4. The following prescriptions shall apply regarding the pricing of work under Task Orders:

10.4.1. Prices offered by the Contractor for specific deliverables and performances shall be

in accordance with those stipulated in the Schedule of Supplies and Services for similar activities and deliverables.

10.4.2. Labour prices shall strictly adhere with the Schedule of Forward Labour Rates of the Schedule of Supplies and Services.

10.4.3. Costs for travel, per-diem and associated charges shall not exceed that applicable to NATO Staff as indicated in Annex L, subject to annual revision.

10.5. Task Orders will be issued in writing by the Purchaser's Contracting Authority in the format specified at Annex K.

10.6. Task Orders may be issued in two types, Level of Effort (LOE) and Completion. Regardless of the type, an issued Task Order will include the following information:

10.6.1. Task Order reference and effective date;

10.6.2. Schedule of Supplies and Services specifying the performance period, deliverables, and the amount of authorized expenses, and

10.6.3. Statement of Work (SOW).

10.7. Task Orders may only be issued within the duration of this Contract.

11. CONTRACT STATUS REVIEW AND DECISION GATES

11.1. The Contract schedule is divided into the following four sequential Contract Execution Phases which are described in Annex B to Part IV, SOW:

- Contract Phase 1: System Analysis and Design (EDC until CDR)
- Contract Phase 2: First Implementation (CDR until FAT-1)
- Contract Phase 3: Implementation and Verification (FAT-1 until OTRR-2)
- Contract Phase 4: Validation and Operation (OTRR-2 until end of Contract)

11.2. Each Contract execution phase contains individual Milestones and Checkpoints to enable the Purchaser to assess the status of the project. Contract Phases 1 through 3 end in a so-called "Decision Gate".

11.3. Decision Gates are the stepping stones from one Contract Phase into the next and their purpose is to validate the deliverables of the individual Contract Phase, to ascertain that the project schedule is on track and to assess Contractor performance under the Contract. As such, Decision Gates are considered "Critical Progress Markers" upon which successful completion of the contracted effort depends.

11.4. All three Decision Gates have success and fail criteria pre-defined by the Purchaser against which the Purchaser will measure Contractor's performance. The default success and fail criteria for all three Decision Gates are listed in paragraph 2.17 of Annex B to Part IV, SOW. Should the default criteria change or have to be adjusted during execution of the Contract, the Purchaser will make the new Success and Fail Criteria available to the Purchaser at the last Project Checkpoint Review, or at the latest four (4) weeks prior to the Decision Gate review by the Purchaser.

11.5. At each Decision Gate, the Purchaser will review the overall Contract status and

progress and Contractor performance in order to determine if continuation of the overall Contract remains in the best interest of NATO.

11.6. The Purchaser will take into account in his decision the following considerations which include, but are not limited to:

- The number and types of changes made to the Contractor's technical solution, or expected to be made and their impact on project cost and schedule of the present contract,
- Operational, environmental, or technological changes in the requirements for TRITON,
- Level of satisfaction with the product(s) delivered by the Contractor up to the Decision Gate.

11.7. Notwithstanding Purchaser's right to terminate the Contract for Default in accordance with Clause 39 of the NCIO Contract General Provisions in case the Contractor is not performing, if the Purchaser determines that continuation of the Contract after a Decision Gate is not in the best interest of NATO, the Contractor shall be notified that no further Work Packages will be activated and the Contract will be terminated pursuant to Clause 40 of the NCIO Contract General Provisions entitled "Termination For The Convenience Of The Purchaser".

11.8. Under such a termination, the Purchaser will follow the procedures set forth in Clause 40 of the NCIO Contract General Provisions except that the cost incurred by the Contractor for which the Purchaser may be liable are limited to costs incurred in relation to Work Packages that have been activated in accordance with Clause 12, "Activation of Work Packages", of the Contract Special Provisions. In such a case, the Purchaser will not be liable for any costs associated with Work Packages not activated, even if the Contractor had commenced work within these Work Packages at his own risk.

11.9. Nothing in this Clause 11 shall be construed as or interpreted to limit the rights and obligations of the parties with respect to those established by virtue of Clauses 39 ("Termination for Default") and 40 ("Termination for the Convenience of the Purchaser") of the NCIO Contract General Provisions.

12. ACTIVATION OF WORK PACKAGES

12.1. In accordance with the Contract execution phases described in Clause 11 above, this Contract will be executed through a staged approach with the scope of work structured into a series of Work Packages each associated with a set of project milestones and checkpoints.

12.2. Project milestones are specific events held over the course of the Contract and provide reference points to the Purchaser during the execution of the Contract. Project milestones are linked to the Contract's progress payment milestones defined at Annex J of the Contract Special Provisions. A list of all major project milestones of this Contract and their mapping to Contract Work Packages, Decision Gates and checkpoints is provided in Table 2 of Annex B to Part IV, SOW.

12.3. Checkpoints are selected events identified in the Project Master Schedule that are

used by the Purchaser as formal review points in the course of the execution of this Contract to ensure that the project is on schedule. There are a total of twelve (12) Checkpoints. During the Checkpoint Review, the Purchaser will assess the status of all Project Milestones associated with the respective Checkpoint, and will assign Status Indicators to each Project Milestone in accordance with Paragraph 3.18.4 of the SOW.

12.4. Based on the indicators, the Purchaser will assess the overall status of the Checkpoint as one of the following:

- Success: All associated milestones are on schedule.
- Provisional Success: One or more milestones are not fully achieved, but the Purchaser recognises them to be in good progress and to be completed within a mutually agreed schedule. These pending milestones will be reassessed during subsequent Checkpoint reviews.
- Fail: One or more milestones have not been achieved, and the Purchaser does not recognise them to be in good progress. The assessment of the checkpoint will be repeated on a mutually agreed date and the Purchaser reserves the right to take remedial action.

12.5. Contractor performance as measured and assessed at Checkpoint Reviews and Decision Gates will contribute to Purchaser's recommendation to the respective funding committees on whether to retain the Contractor for future follow-on Increments of Project TRITON.

12.6. The Effective Date of Contract activates Work Packages 1, 2, 3.1, and 4. The activation of the remaining Work Packages shall automatically occur in conjunction with Checkpoint Reviews that are assessed by the Purchaser with results "Success" or "Provisional Success" as follows:

- Checkpoint Review 2 activates Work Packages 5 and 8.
- Checkpoint Review 3 activates Work Package 3.2.
- Checkpoint Review 4 activates Work Package 3.3.
- Checkpoint Review 7 activates Work Package 3.4.
- Checkpoint Review 10 activates Work Packages 6 and 7.

12.7. Optional Work Packages 9, 10, and 11, may only be activated upon formal amendment to the Contract.

12.8. Activation of Optional Work Package 9 will depend upon the results of the Site Surveys, CLIN 5, which the Purchaser intends to conclude before Checkpoint Review 5.

12.9. The Purchaser intends to activate Optional Work Package 11 after Checkpoint Review 10.

12.10. The Purchaser intends to activate Optional Work Package 10 after the Final System Acceptance at a date defined by the Purchaser and provided the respective authorisation has been received by the funding committees.

12.11. If the Contractor fails to meet a critical progress milestone on which activation of one or more succeeding Work Packages depend, the Purchaser is not obligated to

extend the dates of these milestones in order to accommodate the Contractor delay, if the failure to meet the critical progress milestone is attributable solely to the Contractor.

12.12. The Contractor is advised that if the Contractor elects to begin work on a Work Package prior to its activation, the Purchaser bears no liability for costs incurred by the Contractor for work conducted prior to activation in the case that the Contract is terminated.

13. PRICING OF CHANGES, AMENDMENTS AND CLAIMS

13.1. This Clause supplements Clause 19 of the NCIO General Contract Provisions.

13.2. The Purchaser may at any time, by written order designated or indicated to be a change order, and without notice to the sureties, if any, make changes within the scope of any Contract or Task Order, in accordance with Clause 16 (Changes) of the NCIO Contract General Provisions.

13.3. Changes, modifications, or follow-on Contracts of any nature, and claims shall be priced in accordance with Clause 19 (Pricing of Changes, Amendments, and Claims) of the NCIO Contract General Provisions, and with the "Purchaser's Pricing Principles" as set out in Annex 1 to the NCIO Contract General Provisions.

13.4. Contractor's pricing proposals for Changes, Amendments and Claims shall be priced in accordance with the Schedule of Forward Labour Rates and Schedule of COTS Software and Licenses established in the Contract Schedule of Supplies and Services, or, if not defined in the latter, which were submitted in the Contractor's bid incorporated in the Contract by reference.

13.5. If new labour categories, not previously specified in section 6 of the SOW are deemed necessary by the Purchaser during the course of this Contract; the prices for the new labour categories shall be within the range of 10% of rates listed for comparable labour services and skills in the Contract Schedules at Part I.

13.6. The Contractor shall be bound by the stated labour rates and COTS components prices till 31 December [*year EDC + 4 years*]. At the beginning of each following calendar year that the Contract is effective, the labour rates of the Schedule of Forward Labour Rates in Section 2 of the Schedule of Supplies and Services will be subject to an annual revision.

13.7. The stated revision shall be based on the evolution of the Labour Cost Index in Belgium for NACE section C – Index (2000=100) (LCI), as published by the Belgian Ministry of Economy (http://statbel.fgov.be/en/statistics/figures/) or shall be based on the evolution of the Bidder's national Labour Cost Index.

13.8. The revised rates shall be obtained through the following formula:

$P = Po * (0.2 + 0.8 L/Lo)$.

where:

P : Revised daily labour rate applicable to the considered labour category during the following 12 months.

Po : Effective rate applicable to the same labour category in year 2021 according to the SSS, Section 2.

L : LCI value registered in 4th quarter of the year prior to the revision.

Lo : LCI value registered in 4th quarter of 2020.

14. OPTIONS

14.1. The Purchaser's liabilities and obligations under this Contract at the time of its signature, and unless a formal Contract Amendment is issued in accordance with the terms of this Clause and Clause 16 (Changes) of the NCIO General Contract Provisions, are limited in scope and amount to performance and deliverables associated to TRITON Increment 1, Work Packages 1 through 8, CLINs 1 through 8 and 12, as described in Annex B Work Packages to Part IV, Statement of Work.

14.2. CLINs 9, 10, and 11 are optional and are available for unilateral exercise by the Purchaser at any time and in any combination from Effective Date of Contract until the period of validity indicated in 14.3 through 14.5 below.

14.3. CLIN 9 may be exercised 12 months after EDC until 36 months after EDC after which the option will be deemed to have expired.

14.4. CLIN 10 may be exercised as annual options within a period of five (5) years following EDC + 36 months after which the option will be deemed to have expired.

14.5. CLIN 11 may be exercised 25 months after EDC until 36 months after EDC after which the option will be deemed to have expired.

14.6. If the Purchaser exercises such options, the Contractor shall deliver such specified quantities of additional or alternative supplies and services at the times and to the destinations as specified in the Contract.

14.7. The Contractor understands that there is no obligation under this Contract for the Purchaser to exercise any of the optional line items and that the Purchaser bears no liability should he decide not to exercise the options either totally or partially. Further, the Purchaser reserves the right to request another Contractor (or the same) to perform the tasks described in the optional Contract line items of the current Contract with other conditions.

14.8. Any Contract option shall be exercised by written amendment to the Contract.

14.9. Any options for additional equipment and services may be exercised multiple times within the stated time period.

14.10. If an option is exercised, the Contractor will have a minimum period of forty-five (45) days between notification and the required Performance Start Date (PSD).

15. COMMERCIAL OF THE SHELF (COTS) SOFTWARE

15.1. The Purchaser reserves the right to exclude from the awarded Contract the purchase of software licenses for which NATO has established centralized Contracts. The

Contractor will be notified by the Purchaser in writing as to which software licenses will be removed from the contract scope to be provided to the Contractor in the form of "Purchaser Furnished Property" in accordance with Clause 13 (Purchaser Furnished Property) of the NCIO Contract General Provisions. The Contract terms, schedule, and prices will subsequently be modified accordingly through an amendment to the Contract.

16. SCHEDULE OF SITE INSTALLATIONS

16.1. The sequential order of any performance to be rendered at any NATO sites may be changed by the Purchaser on the basis of sites availability at no cost to the Purchaser provided that the notification of change is provided to the Contractor thirty (30) days prior to the scheduled date of site activity as illustrated in the most current Purchaser Approved Project Master Schedule.

17. ACCEPTANCE PROCEDURES

17.1. This Clause supplements Clauses 21 and 22 of the NCIO General Contract Provisions.

17.2. Acceptance is the action by which the Purchaser formally acknowledges that the Contractor has fully demonstrated that Contract Deliverables are complete or have been performed according to the requirements set in the Contract.

17.3. Acceptance procedures are described in Sections 3 and 4 of the SOW and Clauses 21 (Inspection and Acceptance of Work) and 22 (Inspection and Acceptance of Documentation) of the NCIO General Contract Provisions.

17.4. In accordance with the implementation procedures stated in Section 4 of the SOW, any hardware, software, documentation, or any other Deliverables provided as part of a site installation shall not be subject to Acceptance until Site Activation is satisfactorily completed.

17.4.1. Where a delivered or performed Contract Line Item Number (CLIN) fails to meet all Contract requirements but such a failure is not material or fundamental, the Purchaser may, at its sole discretion, declare the Acceptance provisional. In this case, the Purchaser will make an assessment of the nature of the deficiencies and may pay the Contractor an amount commensurate with the importance of the stated deficiencies. This amount shall be between 50% and 90% of the total price of the CLIN that covers the deficient services or deliverables and will be deducted from the payment during the next due progress milestone specified in ANNEX J of these Contract Special Provisions. Full payment will not be made until all deficiencies have been cleared at which point in time the Acceptance shall become final.

18. RISK OF LOSS OR DAMAGE

18.1. This Clause supplements Clause 24 of the NCIO Contract General Provisions.

18.2. Risk of loss or damage to Deliverables covered by this Contract shall remain with the Contractor until, and shall pass to the Purchaser upon Acceptance by the

Purchaser or receipt of the supplies by the Purchaser at the destination specified in the Contract, whichever is the later.

18.3. Notwithstanding paragraph 18.2 above, the risk of loss or damage to supplies which fail to conform to the requirements of the Contract shall remain with the Contractor until cure and Acceptance, at which time 18.2 above shall apply.

18.4. Notwithstanding paragraph 18.2 above the Contractor shall not be liable for the loss of or damage to supplies caused by the negligence of officers, agents or employees of the Purchaser acting within the scope of their employment.

19. COTS PRODUCTS REPLACEMENT

19.1. If any COTS products specified in the Contract are upgraded or discontinued by their original providers for commercial or technological reasons, the Contractor shall propose their substitution by the new versions that are intended as market replacement of the original products. The proposed items shall provide an equivalent or enhanced performance without a price or life-cycle support cost increase.

19.2. The Contractor shall provide price and performance data to support an improvement in performance and/or a reduction in price and/or life-cycle support costs. If necessary for evaluation by the Purchaser, the Contractor shall provide a demonstration of the proposed items. Should the Purchaser decide that the proposed item(s) should be included in the Contract, an equitable price adjustment will be negotiated and the proposed item(s) shall be added to the Contract by bilateral modification under the authority of this Clause.

20. LOCAL STANDARDISATION

20.1. For reasons of efficiency, some Purchaser sites have standardised some or their entire computer baseline on a specific suite of hardware from one or more particular vendors. As the process of site standardisation will continue as the prospective Contract is being executed, the Purchaser reserves the right to require the Contractor to substitute, for one or more system components, an equivalent item compatible with a site-specified standard.

20.2. The requirement for local standardisation shall be addressed during site surveys and shall be reflected by the Contractor in the corresponding site survey report as specified in Section 4 of the SOW.

20.3. Pricing proposed for the substituted equipment shall be fair and reasonable and consistent with the market prices reserved for large buyers and/or Governmental Institutions.

20.4. In the event that the Purchaser chooses to exercise this right, the required substitutions will be negotiated through a bilateral Contract amendment issued under the authority of this clause.

21. CONTRACT ADMINISTRATION

21.1. The Purchaser reserves the right to re-assign this Contract to a representative(s) for administrative purposes, in whole or in part, provided that the Purchaser shall always be responsible for his obligations under the Contract and for actions or lack of actions of its assigned administrator. The Purchaser undertakes to advise the Contractor in writing whenever this right is to be exercised.

21.2. The Contractor shall accept Contract modifications only in writing from NCI Agency Contracting Authority.

21.3. All notices and communications between the Contractor and the Purchaser shall be written in English and may be personally delivered, mailed, or faxed at the following address:

Contractor:

Attn:
Tel:
Fax:
e-mail:

NCI Agency:
Avenue du Bourget 140
1110 Brussels, Belgium
Acquisition
Attn: Ms. Katharina Schwarz (Senior Contracting Officer)

Tel: +32 (2) 707 8591
Fax: +32 (2) 707 8770
e-mail: katharina.schwarz@ncia.nato.int

or to such address as the Purchaser may from time to time designate in writing.

22. TECHNICAL DIRECTION

22.1. For its direct official control and coordination requirements, the Purchaser designates the Project Manager specified below as the staff element that has the authority to coordinate, monitor and control Contractor's performance under this Contract:

NCI Agency
C2 Service Line
Oude Waalsdorperweg 61
2597 AK The Hague
The Netherlands

Attn: Dr. Erhan Saridogan
Principal Scientist and TRITON Project Manager
Tel : +31 (70) 374 3611
Fax: +31 (70) 374 3239

22.2. The Purchaser may designate other staff elements as technical focal points for the execution of specific tasks.

22.3. Notwithstanding the prescriptions of this Clause, neither the Purchaser's Project Manager, nor any Technical Representative has the authority to change the terms and conditions of the Contract. If the Contractor has reason to believe that the Project Manager/Technical Representative is requesting work inconsistent with that in the scope of the Contract, the Contractor shall immediately inform the Purchaser's contracting Authority for confirmation of the actions. Failure to obtain confirmation that the action of the Project Manager is under the authority of the Contract shall render any subsequent claim null and void.

23. LIQUIDATED DAMAGES

23.1. This Clause replaces Clause 38.1 (Liquidated Damages) of the NCIO Contract General Provisions.

23.2. If the Contractor;

23.2.1. Fails to meet the delivery schedule of the Work or any performance milestones specified in the Schedule of Work to this Contract, or any extension thereof, or

23.2.2. Fails to obtain acceptance of the delivered Work as specified in the Contract, or, if no time for acceptance is specified in the contract within a reasonable time after work is delivered,

the actual damage to the Purchaser for the delay will be difficult or impossible to determine. Therefore, in lieu of actual damages the Contractor shall pay to the Purchaser, for each day of delinquency in achieving the deadline or milestone, fixed and agreed liquidated damages of 0.5% (zero point five percent) per day of the associated payment set forth in the Schedule of Payments provided in ANNEX J.

23.3. In addition to the liquidated damages referred to above, the Purchaser shall have the possibility of terminating this Contract in whole or in part, as provided in Clause 39 of the NCIO Contract General Provisions (Termination for Default). In the event of such termination, the Contractor shall be liable to pay the excess costs provided in Clause 39.5 of the NCIO Contract General Provisions.

23.4. The Contractor shall not be charged with liquidated damages when the delay arises out of causes beyond the control and without the fault or negligence of the Contractor as defined in Clause 39.6 of the NCIO Contract General Provisions (Termination for Default). In such event, subject to the provisions of Clause 41 of the NCIO Contract General Provisions (Disputes), the Purchaser shall extend the time for performance of the Contract when in his judgement the findings of the fact justify an extension.

23.5. Liquidated damages shall be payable from the first day of delinquency and shall accrue at the rate specified in Clause 23.2.2 above to 15% (fifteen percent) of the value of each payment milestone individually, not to exceed 10% (ten percent) of the total value of the Contract. These liquidated damages shall accrue automatically and without any further notice being required.

23.6. The rights and remedies of the Purchaser under this Clause are in addition to any other rights and remedies provided by law or under this Contract.

23.7. The Contractor acknowledges that any sums payable under this clause are in the nature of liquidated damages and not penalties, and represent a reasonable estimate of fair compensation for the losses that may be reasonably anticipated from such failure to perform obligations.

23.8. The amount of Liquidated Damages due by the Contractor shall be recovered by the Purchaser in the following order of priority:

- By deducting such damages from the amounts due to the Contractor against the Contractor's invoices.
- By drawing from the performance guarantee.
- By reclaiming such damages through appropriate legal remedies.

24. CONTRACTOR'S EMPLOYEES

24.1. The Contractor shall provide and pay, as required, qualified personnel as needed for the proper performance of the services required under this Contract; it shall strictly comply with all Host Nation Labour Laws, tariffs and social security and other regulations applicable to the employment of its personnel.

24.2. The Purchaser shall not be responsible for securing work permits, lodging, leases nor tax declarations, driving permits, etc., with national or local authorities. Contractor's employees, agents, or representatives are not eligible for any diplomatic privileges nor NATO employee benefits.

24.3. The Contractor shall inform his employees, agents, and representatives under this Contract of the terms of the Contract and the conditions of the working environment.

25. KEY PERSONNEL

25.1. Contractor's employees or agents specifically identified in ANNEX B shall be considered as key personnel for the performance of the Contract. Without prejudice to other applicable stipulations of the contract, key personnel shall be subject to the terms and conditions specified below.

25.2. A key personnel assigned to this Contract shall remain working on the Contract for as long as required by the terms of the present Contract unless the Purchaser agrees to a replacement who is equal or better qualified. Such a replacement will be in accordance with article 25.5 and is without extra cost to the Purchaser.

25.3. The Contractor shall guarantee that suitable backup personnel will be available to promptly remedy situations of key personnel non-availability that may endanger the

performance of services or deliverables set in the contract.

25.4. The Purchaser reserves the right to reject a Contractor's staff member after prior acceptance if the Purchaser determines during Contract performance that the individual is not providing the required level of support. The Purchaser will inform the Contractor in writing in case such a decision is taken, and the Contractor shall propose a replacement within fifteen (15) days after the Purchaser's written notification.

25.5. The Purchaser shall approve any replacement or additional key personnel according to the following procedure:

25.5.1. The Contractor shall provide the name(s) and qualifications statement(s) of a nominee(s) for review by the Purchaser a least twenty (20) days before the intended date of replacement or the date when the nominee(s) is/are required to start work under the contract. If the Purchaser accepts the nominations, this acceptance will be notified in writing to the Contractor, who will be authorized to assign the nominated personnel to the Contract on the date(s) established in the stated notification.

25.5.2. If the Purchaser considers a nominee or nominees to be inappropriate for the required services, the Contractor will be so notified and shall have not more than ten (10) days to submit alternate nominees.

25.6. If the Contractor fails to provide in due time a compliant candidate, the Purchaser may terminate this Contract in whole or in part as provided in the first paragraph of the clause 39 entitled "Termination For Default" of the NCIO General Contract Provisions, and in that event the Contractor shall be liable, in addition to the excess costs provided in second paragraph of the "Termination For Default" clause, for such liquidated damages accruing until such time as the Purchaser may reasonably obtain delivery or performance of similar services.

25.7. The delay stated above shall be counted from the day the Purchaser notifies the Contractor, in accordance with paragraph 25.5.2 above, that the alternate nominees are considered to be non-compliant or inappropriate for the required services according to the requirements of the Contract.

26. INDEPENDENT CONTRACTOR

26.1. The Contractor's status shall be that of an independent Contractor and it is expressly understood that neither the Contractor and its personnel nor Sub-Contractors shall be considered in any respect as being employees, servants or agents of the Purchaser.

27. CONTRACTOR BACKGROUND IPR

27.1. This Clause supplements Clause 30 of the NCIO Contract General Provisions and does not apply to Contract deliverables under Work Package 4 (C4ISR Visualisation Component).

27.2. The Contractor intends to use the Contractor and Third Party Background IPR listed in ANNEX D and ANNEX E hereto for the purpose of carrying out work pursuant

to this Contract.

27.3. The Contractor warrants, undertakes, and represents that any derivative product created under this Contract from the stated Background IPR shall be considered as Foreground IPR and, therefore, shall be governed by the terms and conditions specified in Clause 30.3 (Foreground IPR) of the NCIO General Contract Provisions.

27.4. The Purchaser shall consider open source solutions alongside proprietary ones in developments provided that such solutions are fully compliant with the requirements of this Contract and, particularly, Clauses 9 (Participating Countries) and 30 (Intellectual Property) of the NCIO Contract General Provisions. The Contractor shall disclose in advance the open source licence associated with the contemplated open source solution. The Purchaser reserves the right to refuse the incorporation of open source solutions that are deemed inadequate for incorporation in a NATO application.

27.5. Any use of Background IPR for the purpose of carrying out work pursuant to the Contract shall, subject to any obligation on the part of the Contractor to make payments to any third party in respect of IPR which is licensed from such third party, be free of any charge to Purchaser. The Contractor hereby grants to NATO a perpetual, non-exclusive, royalty-free and irrevocable licence to use and authorise others to use any Background IPR for the purpose of exploiting or otherwise using the Foreground IPR, including national purposes by NATO member nations.

27.6. In addition, this license shall allow the Purchaser to further re-transfer this Background IPR free of charge to companies eligible for NATO procurements to further develop the Foreground IPR, including without limitation, developing, maintaining and operating future iterations of TRITON.

27.7. Any use of Contractor and Third Party Background IPR as stated in ANNEX D and ANNEX E, and unless specifically applicable to COTS items, is not limited to the number of users or the number of licenses required by the Contract for use of the system. With the exception of COTS items, the Purchaser reserves the right to use or authorise NATO members to use the Background IPR as stated in ANNEX D and ANNEX E for any number of users and number of licenses as required, at no additional cost to the Purchaser.

27.8. All Software, except COTS, delivered under this Contract shall not be marked with corporate logos, proprietary information or contain warnings limiting the rights to use or reproduction nor shall those markings be included in the operating and/or maintenance manuals or instructions accompanying such software.

27.9. The Purchaser will inform the Contractor of any transfer of Contractor Background IPR in accordance with Clause 27.5 and 27.6 of this Article 27, in order for the Contractor to obtain all necessary export licenses.

~~27.8.~~27.10. The Contractor shall promptly notify the Purchaser of any refusal or rejection by national authorities for transfer of Contractor Background IPR in accordance with Clause 27.5 and 27.6 of this Article 27. In the case of such rejection or refusal, the Contractor shall not be held accountable for any failure to perform if the refusal is

solely due to restrictions imposed by supplemental agreements and not due to negligence on the side of the Contractor.

28. CONFIDENTIALITY AND NON-DISCLOSURE

28.1. For purposes of this clause, "Confidential Information" shall include all information pertaining to any part of this Contract or any program related to this Contract that is not marked "Non-Confidential".

28.2. Confidential Information does not include information that is: (a) publicly known at the time of disclosure or subsequently becomes publicly known through no fault of the Contractor; (b) discovered or created by the Contractor before disclosure by the Purchaser; (c) learned by the Contractor through legitimate means other than from the Purchaser or its representatives; or (d) is disclosed by the Contractor with the Purchaser's prior written approval.

28.3. Without prejudice to other obligations imposed by NATO Security regulations, the Contractor shall hold and maintain the Confidential Information in strictest confidence for the sole and exclusive benefit of the Purchaser. The Contractor shall carefully restrict access to Confidential Information to employees, sub-contractors and third parties as is reasonably required and shall require those persons to sign nondisclosure restrictions at least as protective as those in this contract. The Contractor shall not, without prior written approval of the Purchaser, use for the Contractor's own benefit, publish, copy, or otherwise disclose to others, or permit the use by others for their benefit or to the detriment of the Purchaser, any Confidential Information. The Contractor shall return to the Purchaser any and all records, notes, and other written, printed, or tangible materials in its possession pertaining to Confidential Information immediately if the Purchaser requests it in writing.

28.4. The provisions of this clause and the associated Contractor's duties shall survive the termination of this Contract and remain in effect until the Purchaser sends the Contractor written notice releasing the Contractor from the obligations imposed by this clause, or for a further period of three (3) years after Contract close-out, whichever occurs first, and without prejudice to other obligations imposed by applicable NATO Security regulations.

28.5. The Contractor shall include the substance of the language of this clause in any subcontract/Contract issued for the purpose of the fulfilment of the obligations contracted under this Contract regardless of the legal nature of the entity subscribing such subcontract. Additionally, Contractor's key personnel mentioned in clause 25 (Key Personnel) above shall be required to sign the Non-Disclosure Certificate at ANNEX A.

28.6. The Contractor agrees that compliance with the obligations imposed by the terms of this clause is of the essence and that failure to abide to these terms shall constitute sufficient grounds for the termination of the Contract for default.

29. CONFLICT OF INTEREST

29.1. A conflict of interest means that because of other activities or relationships with other persons or entities, a Contractor is unable, or potentially unable to render impartial assistance or advice to the Purchaser, or the Contractor's objectivity in performing the Contract work is, or might be otherwise impaired, or the Contractor has an unfair competitive advantage. Conflict of interest includes situations where the capacity of a Contractor (including the Contractor's executives, directors, consultants, subsidiaries, parent companies or subcontractors) to give impartial, technically sound advice or objective performance is or may be impaired or may otherwise result in a biased work product or performance because of any past, present or planned interest, financial or otherwise in organizations whose interest may substantially affected or be substantially affected by the Contractor's performance under the Contract.

29.2. The Contractor is responsible for maintaining and providing up-to-date conflict of interest information to the Contracting Officer. If, after award of this Contract or Task Order herein, the Contractor discovers a conflict of interest with respect to this Contract which could not reasonably have been known prior to award, or if any additional conflicts or potential conflicts arise after award, the Contractor shall give written notice to the Contracting Officer as set forth below.

29.3. If, after award of this Contract herein, the Purchaser discovers a conflict of interest with respect to this Contract or Task Order, which has not been disclosed by the Contractor, the Purchaser may at its sole discretion request additional information to the Contractor, impose mitigation measures or terminate the Contract for default in accordance with Clause 39 (Termination for Default).

29.4. The Contractor's notice called for in paragraph 29.2 above shall describe the actual, apparent, or potential conflict of interest, the action(s) the Contractor has taken or proposes to take to avoid or mitigate any conflict, and shall set forth any other information which the Contractor believes would be helpful to the Contracting Officer in analysing the situation. Any changes to the Contractor's Conflict of Interest Mitigation Plan, if any is incorporated in the contract, should be also detailed.

29.5. The Contractor has the responsibility of formulating and forwarding a proposed mitigation plan to the Contracting Officer, for review and consideration. This responsibility arises when the Contractor first learns of an actual, apparent, or potential conflict of interest.

29.6. If the Contracting Officer in his/her discretion determines that the Contractor's actual, apparent, or potential conflict of interest remains, or the measures proposed are insufficient to avoid or mitigate the conflict, the Contracting Officer will direct a course of action to the Contractor designed to avoid, neutralize, or mitigate the conflict of interest. If the parties fail to reach agreement on a course of action, or if having reached such agreement the Contractor fails to strictly adhere to such agreement during the remaining period of Contract performance, the Contracting Officer has the discretion to terminate the Contract for default or alternatively refrain from exercising any further Option or Work Package under the contract.

29.7. The Contractor's misrepresentation of facts in connection with a conflict of interest reported or a Contractor's failure to disclose a conflict of interest as required shall be a basis for default termination of this contract.

30. PURCHASER FURNISHED PROPERTY AND SERVICES

30.1. This Clause hereby supplements Clause 13 of the NCIO General contract Provisions.

30.2. The Purchaser shall provide the Contractor with the following property and services for the performance of the contract:

30.2.1. Items and Services as specified in Paragraph 3.3.4 of the SOW.

30.2.2. Access to laboratories at its premises in The Hague, Netherlands.

30.2.3. Hardware Infrastructure at Installation Sites.

31. WARRANTY PERIOD (EXCLUSIVE OF SOFTWARE)

31.1. This Clause hereby supplements Clause 27 of the NCIO General Contract Provisions.

31.2. The Warranty Period for any Hardware deliverables under this Contract shall be the longer of:

(a) the specific warranty periods established in the SOW for individual deliverables;

(b) the applicable Original Equipment Manufacturer's warranty; or

(c) two (2) years for any Hardware items.

The Warranty Period shall start from the time of their formal acceptance after delivery.

31.3. Throughout the Warranty Period the Contractor shall make good any:

- Defects in the deliverables;
- Breach of warranties specified in Clause 27 (Warranty of Work) of the General Contract Provisions; and
- Breach of any other express or implied warranties that may be applicable;

arising out of or in connection with the Contractor's failure to perform its obligations under this Contract (herein after collectively referred to as "Warranty Period Incidents") in accordance with this Clause 31, and Clause 27 (Warranty of Work) of the General Contract Provisions.

31.4. The Contractor shall correct all Warranty Period Incidents arising during the Warranty Period without any cost to the Purchaser.

31.5. If the Contractor fails to correct any Warranty Period Incidents within the timeframe specified in Clause 27 (Warranty of Work) of the General Contract Provisions or Section 5 of the SOW for the type of incident concerned, or if no specific timeframe

has been established in the referred Clause or in the SOW for the type of incident concerned, within 30 working days of notification, the Purchaser may on ten (10) working days written notice:

- correct the Warranty Period Incident or employ a third party to correct it; and
- deduct from the prices to be paid, draw from the performance guarantee, or recover as a debt due from the Contractor, all reasonable costs in so doing.

31.6. The Contractor shall deploy all such additional resources as are reasonably required to remedy any Warranty Period Incident as efficiently and quickly as possible.

31.7. If replacement parts are fitted by the Contractor as part of the warranty the parts removed shall become the Contractor's property unless required by the Purchaser at the Purchaser's discretion. Notwithstanding that, faulty hard disks removed from NATO SECRET equipment shall not be returned to the Contractor but destroyed by the NATO site personnel in accordance with applicable NATO security regulations.

31.8. Notwithstanding Clause 27.6 of the General Contract Provisions, if prior agreed upon by the Purchaser, the Contractor has the possibility to repair the failed component instead of providing a new replacement.

32. SOFTWARE WARRANTY

32.1. The following Clause 32.1.1 supersedes Clause 31.3.1 of the NCIO Contract General Provisions:

32.1.1. For each Software delivered under this Contract, the Contractor Warranties stated in paragraph 31.1 of the NCIO General Provisions shall extend to all defects discovered within twelve (12) months from Final System Acceptance (FSA) declared in writing by the Purchaser’s Contracting Authority.

33. PERFORMANCE GUARANTEE

33.1. This Clause hereby supplements Clause 8 of the NCIO General Contract Provisions.

33.2. The Purchaser may allow reductions in the amount of the Performance Guarantee in accordance with the Purchaser’s cost estimate of the work remaining to be completed under the Contract. In order to benefit from such reductions, the Contractor must provide the Purchaser with an updated copy of the Project Master Schedule for completion of the remaining work, and detailed cost breakdowns, prepared in accordance with the pricing principles and standards established in the Contract, which indicate the percentage of work completed for each Contract line item. These requests for reduction shall be submitted in writing to the point of contact established in paragraph 21.3 above.

33.3. The reductions specified in paragraph 33.2 above shall be treated as a concession to the Contractor and, therefore, shall be supported by sufficient consideration. Further, the decision to accept or reject an application for reduction of Performance Guarantee shall be a unilateral decision made solely at the discretion of the Purchaser.

34. SECURITY

34.1. This Clause hereby supplements Clause 11 of the NCIO General Contract Provisions.

34.2. Contractor's personnel working at the Purchaser's facilities shall possess a valid security clearance up to the level of "NATO SECRET" so as to be able to have unescorted access to classified security areas where work will be performed. Also, the Contractor must fulfil the reporting requirements set in Section 3 of the SOW regarding the submission of personal details security clearance data of Contractor's personnel.

34.3. Without prejudice to other Purchaser's rights, failure to comply with the requirements stated in 34.2 above shall constitute grounds for Contract termination under the clause 39 "Termination For Default" of the NCIO General Contract Provisions and entitle the Purchaser to collect liquidated damages in case of delay as specified in Clause 23 above and Clause 8 of the NCIO General Contract Provisions.

34.4. Notwithstanding paragraph 34.3 above, if the Contractor fails to comply with the requirement stated in paragraph 34.2 of this Clause, the Purchaser may opt for providing escorts to allow Contractor's personnel to perform work in a classified area without being in possession of the prerequisite security clearance. In such cases, the Contractor agrees that the Purchaser shall be entitled to collect an amount equivalent to € 800 per escort assigned to supervise Contractor's personnel and per day of escorting. This compensation shall be collected through the same mechanisms established in Clause 23 above for the case of liquidated damages.

34.5. Contractor's staff members shall hold a valid passport and are required to maintain its validity for the duration of the contract.

34.6. The Contractor shall note that there are restrictions regarding the carriage and use of electronic devices (e.g. laptops) in NATO designated Security Areas. The Contractor shall be responsible for satisfying and obtaining from the appropriate NCI Agency Authorities the necessary clearance to introduce and utilize any such equipment into the facility.

35. SUPPLEMENTAL AGREEMENTS

35.1. The Contractor has submitted all relevant draft supplemental agreement(s), documents and permissions prior to Contract award, the execution of which by the Purchaser is/are required by National Law or regulation. If any supplemental agreements, documents and permissions are introduced after Contract award, and it is determined that the Contractor failed to disclose the requirement for the execution of such agreement from the Purchaser prior to Contract signature, the Purchaser may terminate this Contract for Default, in accordance with the Clause 39 (Termination For Default) of the NCIO Contract General Contract Provisions.

35.2. Supplemental agreement(s), documents and permissions, the execution of which by the Purchaser is/are required by National Law or regulation and that have been identified by the Contractor prior to the signature of this contract, but have not yet

been finalised and issued by the appropriate governmental authority, are subject to review by the Purchaser. If such supplemental agreement(s), documents and permissions are contrary to cardinal conditions of the signed Contract between the Parties, and the Parties and the appropriate governmental authority cannot reach a mutual satisfactory resolution of the contradictions, the Purchaser reserves the right to terminate this Contract and the Parties agree that in such case the Parties mutually release each other from claim for damages and costs of any kind, and any payments received by the Contractor from the Purchaser will be refunded to the Purchaser by the Contractor.

36. INCORPORATION OF REVISED PROJECT MANAGEMENT AND ENGINEERING DOCUMENTATION DELIVERABLES

36.1. The following set of documentation is part of the Contract:

- Project Management Plan (PMP)
- Project Product Breakdown Structure (PPBS)
- Project Work Breakdown Structure (PWBS)
- Project Master Schedule (PMS)
- Quality Plan (QP)
- Configuration Management Plan (CMP)
- System Development Plan (SDP)
- Test Management Plan (TMP)
- Training Plan (TrP)
- System Transition Plan (STrP)
- System Maintenance Plan (SMP)
- Integrated Support Plan (ISP)
- In-Service Support Plan (ISSP)
- System Validation Plan (SVP)
- Software Transition Plan (SwTP)

36.2. This documentation because of the nature of the performance under the contract will be subject to changes and revisions. The frequency and dynamics of these changes and revisions would make it unfeasible to ratify a new version of the documentation via a formal Contract amendment at the time it is produced and approved by the Purchaser. Consequently during the course of formal reviews the Purchaser Contracting Authority will evaluate any changed documentation and subject to the terms of the contract validate its adequacy and, at its sole discretion provide for its approval in writing indicating which updated documentation is approved.

36.3. Subject to the exception noted in paragraph 36.4 below, any formally Purchaser approved documentation shall be deemed as made part of the contract and shall replace any existing previous version.

36.4. The Purchaser is under no obligation to approve any proposed revised document except as in accordance with the terms of the present Contract. Rejection of any proposed changes shall not discharge the Contractor, in whole or in part, of its responsibility for the performance under the Contract.

36.5. Nothing in this Clause is to be construed as a waiver to any other obligation of the Contractor under the contract.

ANNEX A. NCI AGENCY DECLARATION

To be signed by the Contractor's key personnel designated under CO-13859-TRITON

I UNDERSTAND:

That I must preserve the security of all information (including but not limited to classified/commercial-in-confidence information) which comes to my knowledge as a result of the Contract with the NCI Agency stated above and that I undertake to comply with all relevant security regulations.

That I must not divulge to any unauthorised person even within my own company, any classified/commercial-in confidence information gained by me as a result of my Contract with the NCI Agency, unless prior permission for such disclosure has been granted by the General Manager of the NCI Agency.

That I must not, without the approval of the General Manager of the NCI Agency, publish (in any document, article, book, CD, video, film, play, or other form) any classified /commercial-in-confidence information which I have acquired in the course of my official duties for the NCI Agency.

That, at the end of Contract and after performance of all required tasks, I must surrender any official document or material made or acquired by me in the course of my official duties, save such as I have been duly authorised to retain.

That if I violate prescribed security practices either intentionally or accidentally, my Contract shall be immediately terminated.

That the provisions of the above Declaration apply not only during the period of the referred Contract with the NCI Agency, but also after the stated Contract has ceased and that I am liable to prosecution if either by intent or negligence I allow classified/commercial-in-confidence information to pass into unauthorised hands.

That I will be considered as a key personnel as specified in Clause 25 of the Special Provisions of Contract CO-13859-TRITON, and therefore, shall comply with all regulations and restrictions applicable to key personnel.

That I commit to fulfil my obligations for the period of performance mentioned in the Contract Schedules and the Special Provisions of the Contract referred above (including the optional periods) unless major events beyond my reasonable control happen.

That should I decide for personal interest to leave the position, I will do my best effort to fulfil my obligations until the Company that is currently employing me has provided NATO with an acceptable suitable substitute in accordance with Clause 25 of the Special Provisions of the aforementioned Contract.

_____ _____

Full name (in block capitals) Date

_____

Signature

ANNEX B. KEY PERSONNEL

The following Key Personnel shall be subject to the stipulations contained in Clause 2525 (Key Personnel) of the Contract Special Provisions for the period of designation indicated below:

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Position	SOW/WP Reference	Labour Category	Name	Designation Period
Project Manager	3.5.2, 6.2.1	Project Manager		EDC thru Contract expiration date
Technical Lead (Overall TRITON)	3.5.3, 6.4.1	Senior Engineer		EDC thru Contract expiration date
Technical Lead (Visualisation Component)	3.5.3, 6.4.1	Senior Engineer		thru WP4
Test Director	3.5.4, 6.4.18	Senior Test Engineer		EDC thru Contract expiration date
Quality Assurance Manager	3.5.5, 6.5.10	Quality Assurance Manager		EDC thru Contract expiration date
Integrated Logistics Support Engineer	3.5.6, 6.5.1	Logistics Management Specialist		EDC thru Contract expiration date

ANNEX C. LIST OF SUBCONTRACTORS

Name and Address of Sub-Contractor	DUNS Number[1]	Primary Location of Work	Items/Services to be Provided	Estimated Value of Sub-Contract

[1] Data Universal Numbering System (DUNS). Contractor is requested to provide this data in order to help the NCI Agency to correctly identify Subcontractors. If a Subcontractor's DUNS is not known this field may be left blank.

ANNEX D. CONTRACTOR AND SUBCONTRACTOR BACKGROUND IPR

a. The Contractor Background IPR specified in the table below will be used for the purpose of carrying out work pursuant to Work Packages 1 through 3 and 5 through 8 of the prospective Contract.

IPR Description	IPR Owner	Remarks / Restrictions[2]

b. The Contractor represents that it has and will continue to have, for the duration of this Contract, all necessary rights in and to the IPR specified above necessary to meet the Contractor's obligations under the Contract.

c. The Contractor Background IPR stated above complies with the terms specified in Clause 27 of the Special Contract Provisions and shall be licensed to the Purchaser according to the terms and conditions specified in the Contract.

[2] Indicate whether the IPR is applicable to a COTS product

ANNEX E. THIRD PARTY IPR

a. The Subcontractor and Third Party Background IPR specified in the table below will be used for the purpose of carrying out work pursuant to the prospective Contract.

Table E.1 – Deliverables of Work Package 4 (C4ISR Visualisation Component)

IPR Description	IPR Owner	Remarks / Restrictions[3]

Table E.2 – Deliverables of Work Packages 1 through 3 and 5 through 8

IPR Description	IPR Owner	Remarks / Restrictions[4]

b. The Contractor represents that it has and will continue to have, for the duration of this Contract, all necessary rights in and to the IPR specified above necessary to meet the Contractor's obligations under the Contract.

c. The Subcontractor and Third Party Background IPR stated above complies with the terms specified in Clause 8.5 and 27 of the Special Contract Provisions and shall be licensed to the Purchaser according to the terms and conditions specified in the Contract.

[3] May only be COTS in accordance with Clause 8.5 of the Contract Special Provisions
[4] Indicate whether the IPR is applicable to a COTS

ANNEX F. LIST OF PURCHASER PROVIDED ITEMS

To be defined at Pre-Award stage in line with Clause 30 of the Special Contract Provisions.

a. Purchaser Furnished Equipment (PFE)

Equipment title	Equipment description	Number required (exclusive options)	Date required

b. Purchaser Furnished Documentation (PFD):

Title	Date required	Provided during IFB	Version

ANNEX G. USE AND NON DISCLOSURE UNDERTAKING

To be included from NDU in Book I

ANNEX H. INSTRUCTIONS FOR COMPLETING A CONTRACTOR PRICING SUMMARY

This annex contains instructions on how to fill out the Pricing Summary form (ANNEX I), which must be sent by the Contractor, in addition to relevant pricing and non-pricing data, to properly document a request for price adjustment under applicable clauses of the Contract.

H.1. DIRECT MATERIAL

Purchased Parts: Provide a consolidated priced summary of individual material quantities included in the various tasks, orders, or Contract line items being proposed and the basis for pricing (vendor quotes, invoice prices, etc.). Give details on an attached schedule.

Sub-contracted Items: Show the total cost of sub-contract effort.

Other:

(i) Raw Material: Consists of material in a form or state that requires further processing. Provide priced quantities of items required for the proposal. Show total cost and give details on an attached schedule.

(ii) Standard Commercial Items: Consists of items that the Contractor normally fabricates, in whole or in part, and that are generally stocked in inventory. Provide an appropriate explanation of the basis for pricing on attached schedule.

H.2. MATERIAL OVERHEAD

This is the overhead charged to prices for material handling and/or other overhead associated with material costs. This may or may not apply to your prices.

H.3. DIRECT LABOUR

Show the hourly rate and the total hours for each individual (if known) and discipline of direct labour proposed. Indicate whether actual rates or escalated rates are used. If escalation is included, state the degree (percent) and rationale used.

H.4. LABOUR OVERHEAD

This is labour overhead.

H.5. OTHER DIRECT COSTS

Special Tooling/Equipment: Identify and support specific equipment and unit prices. Use a separate schedule if necessary.

Travel: Identify and support each trip proposed and the persons (or disciplines) designated to make each trip. Identify and support transportation and per diem rates.

Individual Consultant Services: Identify and support the proposed contemplated consulting. State the amount of services estimated to be required and the consultant's quoted daily or hourly rate.

Other Costs: List all other direct charge costs not otherwise included in the categories described above (e.g., services of specialized trades, computer services, preservation, packaging and packing, travel costs, leasing of equipment) and provide bases for pricing.

H.6. GENERAL AND ADMINISTRATIVE EXPENSE

This is the overhead charged for SG&A or G&A.

H.7. FEE OR PROFIT

Enter this total of all proposed Fee or Profit.

H.8. OTHER FACTORS

This would be any other overhead factors applied to Contractor prices.

H.9. GRAND TOTAL

This is the Contractor final FFP total and should in essence match the total price claimed in the proposal for adjustment.

ANNEX I. CONTRACTOR PRICING SUMMARY

CONTRACTOR PRICING SUMMARY DETAILED DESCRIPTION OF COST ELEMENTS					
1. DIRECT MATERIAL	QUANTITY	UNIT COST	UNIT COST €	TOTAL EST COST €	REFERENCE
A. PURCHASED PARTS					
B. SUBCONTRACTED ITEMS					
C. OTHER- (1)Raw Material					
(2) Standard Commercial Items (COTS)					
TOTAL DIRECT MATERIAL					
2. MATERIAL OVERHEAD (RATE % X TOTAL EST COST € BASE)					
3. DIRECT LABOR (INDICATE LABOR CATEGORIES)	EST HRS	RATE/HR	RATE €	TOTAL EST COST €	REFERENCE (CLIN)
TOTAL DIRECT LABOR					
4. LABOR OVERHEAD	O.H. RATE	(X) BASE			
TOTAL LABOR OVERHEAD					
5. OTHER DIRECT COSTS	QUANTITY	UNIT COST	UNIT COST €	TOTAL EST COST €	REFERENCE
A. SPECIAL EQUIPMENT/CFE/NFE					
TOTAL SPECIAL EQUIPMENT					
B. TRAVEL					
(1) TRANSPORTATION					
(2) PER DIEM					
TOTAL TRAVEL					
C. CONSULTANTS OTHER SERVICES					
TOTAL INDIVIDUAL CONSULTANT SERVICES					
D. OTHER					
TOTAL OTHER					
SUBTOTAL DIRECT COST & OVERHEAD					
6. GENERAL & ADMINISTRATIVE (G&A) (RATE % X TOTAL EST COST € BASE)					
7. TOTAL ESTIMATED FEE/ PROFIT %					
8. OTHER FACTORS					
9. GRAND TOTAL					

NOTES:
Please indicate pricing details for those categories specified as "Other" including "Other Factors."
If currency is not Euro, please indicate currency of the bid.

ANNEX J. PROGRESS PAYMENT SCHEDULE (CLAUSE 7 SPECIAL PROVISIONS)

a. Firm Requirements:

Months	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
Milestones			**CP1**	**CP2**	**CP3**	**CP4**	**CP5**	**CP6**	**CP7**		**CP8**	**CP9**		**CP10**		**CP11**		**CP12**	**EOC**
WP 1	PMR				DG1				DG2					DG3		PSA			FSA
	20%		5%	5%	10%	5%	5%	5%	10%		5%	5%		10%		5%		5%	5%
WP 2	PSD		SRR	PDR	CDR				JTR					JTR				SVR	PED
	10%		15%	15%	15%				20%					10%				10%	5%
WP 3.1	PSD			SwRR-1	SwDR-1			UAR	FAT-1		PED								
	10%			15%	15%			10%	30%		20%								
WP 3.2					PSD	SwRR-2	SwDR-2		UAR			FAT-2		PED					
					10%	15%	15%		10%			30%		20%					
WP 3.3						PSD	SwRR-3	SwDR-3			UAR			FAT-3		PED			
						10%	15%	15%			10%			30%		20%			
WP 3.4									PSD		Hw/SwRR-4	Hw/SwDR-4		FAAT		PED			
									10%		15%	15%		10%		50%			
WP 4	PSD		VC-SwRR-1	VC-SwDR-1			VC-FAT-1	BL1			VC-SwDR-3	BL2		BL3				CAT	PED
	10%		15%	15%				20%			10%	10%		10%				5%	5%
WP 5				PSD		Survey			FAT-1		FSiA-1			FSiA-2		FSiA-3		MSOT	PED
				10%		10%			10%		10%			10%		20%		10%	20%
WP 6														PSD		MMR		MMR	PED
														10%		40%		40%	10%
WP 7														PSD		ISR-1		SVT	PED
														10%		40%		40%	10%
WP 8				PSD					FAT-1			FAT-2		FAT-3		TrRR-NU		TrRR-NS	
				10%					10%			10%		10%		30%		30%	
Warranty																FAT			FSA
																10%			90%

b. Optional Requirements (notional only, depending on the scope and exercise date of the options)

Months	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
Milestones	EDC		CP1	CP2	CP3	CP4	CP5	CP6	CP7		CP8	CP9		CP10		CP11		CP12	EOC
WP 9							PSD	COTSPR			Delivery-NS			Delivery-NU				PED	
							5%	5%			30%			30%				30%	
WP 11														PSD		HL-SRR		HL-SDR	PED
														10%		40%		30%	20%

c. Optional Requirements – WP 10

At each Quarterly Maintenance Review.

ANNEX K. TASK ORDER FORM

CONTRACT CO-13859-TRITON			
1. Task Order Number:		**2. Amendment**	
3. Issuing Office:	NATO Communications and Information Agency, HQ Brussels		
4. Project Manager:			
7. Tasks			
8. Delivery Time and Period of Performance:			
9. Total Value of the Order: DDP Destination		**10. Travel**	
11. Total Cumulative Value of Task Orders Issued under the contract.			
12. Commitment No.:			
13. Project No.:			
14. Effective Date of Order:			
15. For The Contractor:		**16. For the Purchaser:**	
17. Signature:		18. Signature:	
19. Printed Name and Title		20. Printed Name and Title	
21. Date		22. Date	

ANNEX L. NCI AGENCY PER DIEM RATES AND KILOMETRIC ALLOWANCE 2016

KILOMETRIC ALLOWANCE:

- Belgium: EUR 0.50
- The Netherlands: EUR 0.57

PER DIEM RATES

EURO Countries (Full Daily Rates)

COUNTRY	EUR	COUNTRY	EUR	COUNTRY	EUR
Afghanistan	184.00	France, Paris	234.00	Netherlands	209.00
Albania	181.00	Georgia	180.00	Poland	186.00
Andorra	134.00	Germany	210.00	Portugal	179.00
Armenia	149.00	Greece	185.00	Romania	177.00
Austria	184.00	Hungary	181.00	Russian Federation	293.00
Azerbaijan	223.00	Iceland	182.00	San Marino	169.00
Belgium	228.00	Ireland	193.00	Serbia	198.00
Bosnia and Herzegovina	140.00	Italy	240.00	Slovakia	166.00
Bulgaria	166.00	Latvia	159.00	Slovenia	186.00
Croatia	180.00	Lithuania	158.00	Spain	184.00
Cyprus	185.00	Luxembourg	210.00	The former Yugoslav Republic of Macedonia	149.00
Czech Republic	180.00	Malta	150.00		
Estonia	162.00	Moldova	156.00	Turkey	157.00
Finland	224.00	Monaco	220.00	Ukraine	210.00
France, elsewhere	212.00	Montenegro	158.00	United Arab Emirates	252.00

NON - EURO Countries (Full Daily Rates)

COUNTRY	CURRENCY	AMOUNT
UK, London	GBP	216.00
UK, Elsewhere	GBP	186.00
Norway	NOK	1,949.00
Denmark	DKK	1,782.00
Canada	CAD	304.00
USA, Washington	USD	361.00
USA, New York City	USD	409.00
USA, Elsewhere	USD	337.00
Sweden	SEK	2,477.00
Switzerland	CHF	322.00

IFB-CO-13859-TRITON

PROVISION OF FUNCTIONAL SERVICES FOR COMMAND AND CONTROL OF MARITIME OPERATIONS (TRITON)

INCREMENT 1

PROJECT SERIAL 2011/0IS03081

BOOK II – PART IV

STATEMENT OF WORK (SOW)



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SECTION 1: INTRODUCTION

1.1. Purpose

1.1.1. The purpose of this Contract is to implement and support the Functional Services for Command and Control of Maritime Operations (Short Title: TRITON) – Increment 1 Project. This is a Contract for services and supplies to design, develop, test, deploy, and provide life-cycle support for TRITON capability including the production of Deployable Kits for NATO Command Ships (Afloat Command Platforms).

1.2. Background

1.2.1. Project **TRITON** is the name given to all implementation activities associated with the delivery of services in support of Maritime Command and Control contained within the Bilateral Strategic Command (Bi-SC) Capability Package **9C0107** "Functional Services for Command & Control of Operations" and is authorised as the NSIP project **2011/0IS03081**.

1.2.2. The purpose of TRITON is to provide the NATO community with an integrated, robust and flexible capability supporting a set of services available throughout the Bi-SC Automated Information System (AIS) and NATO operational theatres to enable NATO and National forces to establish and share a common view of the battle space thereby improving their situational awareness and decision-making processes.

1.2.3. The capabilities delivered under Project TRITON will be the primary source of the NATO Recognised Maritime Picture (RMP). TRITON as a system consisting of a set of services will be required for use in peacetime, exercises, and time of crisis (operations) throughout the static and deployed environments in the NATO Command Structure (NCS) to provide commanders with the required level of maritime information in order to make informed operational decisions.

1.2.4. TRITON will enable maritime situational awareness based on received information from NATO and National systems, collating the information into RMP and making the RMP available to the NATO forces in a timely and responsive manner in accordance with NATO policy, doctrine and guidance.

1.2.5. To enable this capability, TRITON will provide an integrated and supported suite of services supporting the Maritime C2 Information Services functions that complement and build upon the Bi-SC AIS Core Services. These TRITON services are required to facilitate the work of relevant staff at all static and deployable Command Facilities of the NATO Command Structure to provide the RMP for the full spectrum of NATO operations.

1.2.6. TRITON Increment 1 includes provision of services to provide the users with Maritime Situational Awareness (MSA) to replace the existing MSA Demonstrator Prototype as well as to provide for a replacement of the legacy Maritime Command and Control Information System (MCCIS) functionality at the NATO operational headquarters. It will also provide a foundation to build on for future increments.

1.2.7. At the moment, the MSA and maritime C2 requirements are supported by MCCIS and an Operational Prototype MSA/BRITE). TRITON is intended to replace MCCIS functionality for operational-level C2 and MSA/BRITE by implementing

a full Bi-SC AIS Functional Service, configured to run on two NATO network domains (NS and NU) for both static and deployed headquarters.

1.2.8. In addition to C2 of maritime operations, TRITON will support the NATO Shipping Centre (NSC) at MARCOM, by means of TRITON-NU, for contributing to Maritime security and freedom of navigation, and for aiding commercial shipping and military operations.

1.2.9. TRITON will be executed and managed within the Bi-SC AIS Programme. Its scope, schedule, technical roadmap and dependencies will be aligned with the programme.

1.3. TRITON Implementation

1.3.1. All Maritime C2 and Information Services under Project TRITON will be implemented as "Increments" where each Increment to be procured as separate NSIP projects. The scope of this Statement of Work (SOW) covers only the Increment 1 of Project TRITON, 2011/0IS03081. Other Project Increments will be programmed in future. Figure 1~~Figure 1~~ shows the possible scope allocation for future Increments as well as the scope of Increment 1.

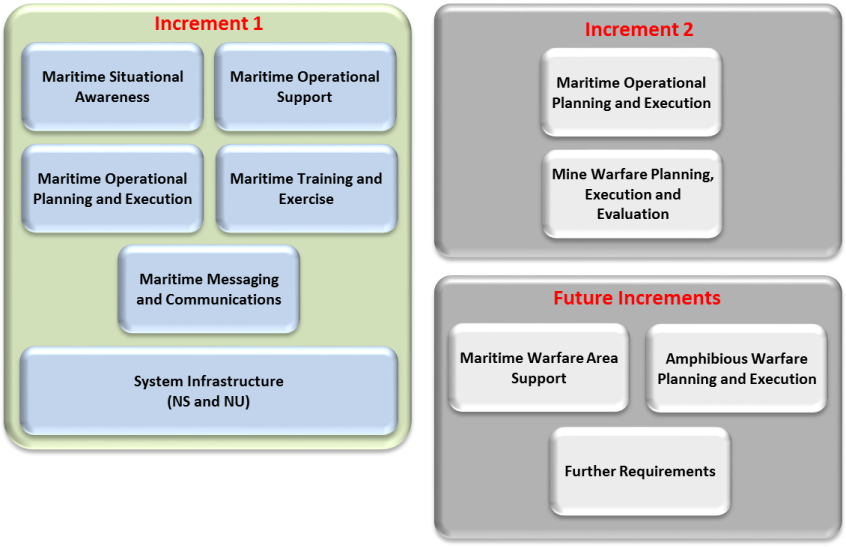


Figure 1 – Project Scope

1.3.2. As a system development methodology, "Incremental Development with Multiple Deliveries Approach" will be used to meet all requirements of TRITON Increment 1. This approach will also be used to balance operational user priorities with technical risks, implementation costs, and development schedules in determining the scope of each increment. During the Incremental Development, parallel Build Phases will be followed and a Baseline will be created with a given set of implemented requirements and the product will be delivered after official testing. Further Baselines will follow the same method while applying enhancements to the previous Baselines. Ultimately, full product will be achieved when the last Baseline is officially accepted. There will also be some infrastructural preparations and analysis for the next Increment to be planned according to the acquisition status. Figure 2~~Figure 2~~ illustrates the Incremental Development Approach:

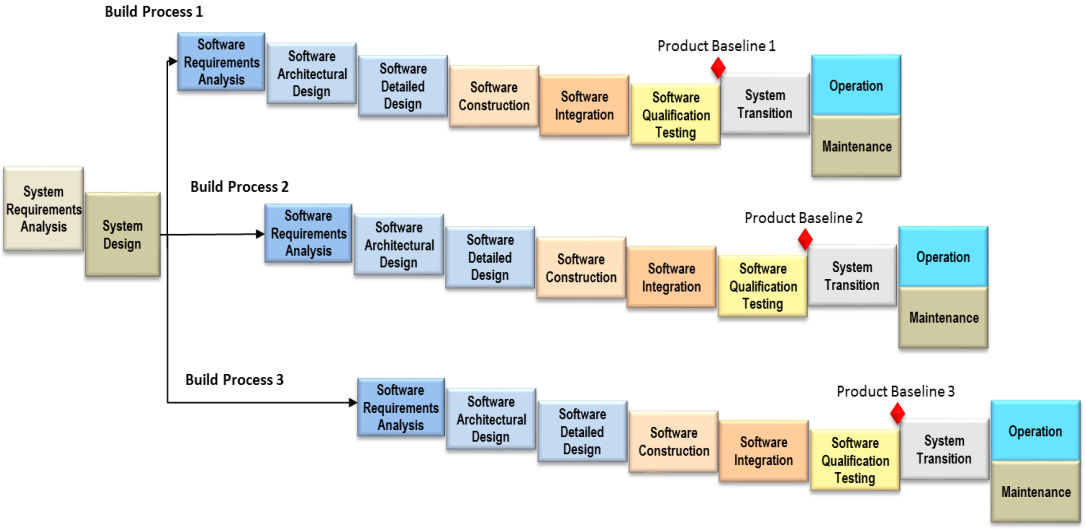


Figure 2 - TRITON Incremental Development Approach

1.3.3. The initial contracted effort is intended to address the TRITON Increment 1 capability as defined in this SOW and the supporting Work Packages.

1.3.4. The TRITON technical solution will be based on a Service-Oriented Approach in order to meet the required flexibility and adaptability for the NATO environment and to prepare for the future NATO Federated Mission Network (FMN). This includes:

1.3.4.1. A set of Business Services to deliver the functionalities,

1.3.4.2. A set of Enabler Services to deliver functionalities in support of Business Services, and perform actions that could be combined with or migrated towards NATO Core Enterprise Services as required,

1.3.4.3. An architectural construct to provide sets of services to internal and external partners and to provide dedicated means of communications to Information Providers, and other methods enabling adequate transformations, also ensuring policy enforcement and governance within TRITON scope[1],

1.3.4.4. An Orchestration Engine[2] to allow for flexibility in designing sequences of services interaction in support of evolving business processes definition.

1.3.5. TRITON will be integrated with the existing BI-SC AIS infrastructure and comply with the planned infrastructure to be provided by CP 9C0150. Optionally, additional COTS software can be procured and delivered.

1.3.6. The TRITON capability will exchange information with various Communities of Interest such as Bi-SC AIS Functional Services, Core Services and Nations. To that extent the TRITON capability needs to support current standards of information exchange, data replication and mechanisms derived from its SOA environment (e.g. Web-services). It will also support the existing interfaces and data formats that are being used by MCCIS and MSA/BRITE.

---

[1] Such an architecture construct may be called in the literature an “Enterprise Service Bus”

[2] Such engine may be also called “business process manager”

1.4. Locations

1.4.1. Purchaser Facility

1.4.1.1. Unless otherwise specified in the text, the definition of the Purchaser's Facility defines the following locations:

- NCI Agency in Brussels, Belgium (referred to as NCI Agency Brussels);
- NCI Agency in Casteau, Belgium (referred to as NCI Agency Mons)
- NCI Agency in The Hague, The Netherlands (referred to as NCI Agency The Hague).

1.4.2. Operational Sites

1.4.2.1. The TRITON capability will be accessible across the NATO Command Structure (NCS), Afloat Command Platforms (ACP), NATO Agencies, and Nations. The locations that are originally authorised and confirmed by the operational community – hereafter referred as "Authorised Locations" – and able to access TRITON Services, are listed in Table 1-1~~Table 1-1~~. The list also provides the estimated number of users at each location. The number of users will be confirmed during the Site Surveys. As future Increments will require more users, these numbers will not be taken as a limitation factor for the system design.

Table 1-1 - TRITON Authorised Locations and Estimated Number of Users

Serial	Site	Location	Installation	Number Of Users
TRITON-NS Static Site				
1	SHAPE	Mons	DC	20
2	ACT (NCI Agency Sector)	Norfolk	DC	10
3	JFC	Brunssum	DC	20
4	JFC	Naples	DC	20
5	Land Command	Izmir	DC	10
6	Maritime Command	Northwood	DC or MARCOM	50
7	Air Command	Ramstein	DC	20
8	STRIKFORNATO	Lisbon	DC	20
9	JFTC	Bydgoszcz	DC	20
10	JWC	Stavanger	DC	20
11	CAOC	Uedem	DC	15
12	CAOC	Torrejon	DC	15
13	DACCC	Poggio Renatico	DC	15
14	Battle Laboratory	NCI Agency	DC	10
15	National HQs (10 users each)	20 Nations	DC	200
	TOTAL (for one instance)			**465**
TRITON-NU Static Site				
1	NATO Shipping Centre	Northwood	DC or MARCOM	20
2	Maritime Operations Centre	Northwood	DC	20

3	SHAPE	Mons	DC	10
4	National HQs (10 users each)	20 Nations	DC	200
	TOTAL (total for one instance)			**250**
DCIS				
1	Mission Anchor Point	Deployed	DCIS	50
2	MCC	Deployed	DCIS	50
3	Mission Anchor Point	Deployed	DCIS	50
4	MCC	Deployed	DCIS	50
	TOTAL (for 4 instances)			**200**
Deployable Kit				
1	CTF/CTG	Command Ship	Deployable Kit Unit	5
2	CTU (2 users on each)	4 Other Ships		8
	TOTAL (for each unit of one TDK)			**13**
Support Systems				
1	Maintenance and Support	NCI Agency	NS Reference System	10
	Virtual Test Users	NCI Agency	NS Reference System	100
	TOTAL (for one instance)			**110**
2	Maintenance and Support	NCI Agency	NU Reference System	10
	Virtual Test Users	NCI Agency	NU Reference System	100
	TOTAL (for one instance)			**110**
3	Development and Test	NCI Agency	NS Test System	50
	Virtual Test Users	NCI Agency	NS Test System	100
	TOTAL (for one instance)			**150**
4	Development and Test	NCI Agency	NU Test System	50
	Virtual Test Users	NCI Agency	NU Test System	100
	TOTAL (for one instance)			**150**
5	Individual Training	Training Node	NS Training System-1	**50**
6	Collective Training	Training Node	NS Training System-2	**100**
7	Individual Training	Training Node	NU Training System-1	**50**
8	Collective Training	Training Node	NU Training System-2	**50**
	TOTAL (for eight instances)			**~~1290~~770**

1.4.2.2. In the coming years, NATO will rationalise and centralise its IT infrastructure, reducing the footprint down to only three Data Centres. There are several projects in CP 9C0150 related to the implementation of this new IT architecture in the Bi-SC AIS. Two of these projects within the IT Modernisation Programme are given below:

- "0IS03091: Exploit New Technology", which is implementing the basic Data Centre concept and the future "NATO Cloud"
- "0IS03092: Extend, Upgrade and Adapt Fielded Baseline", which is helping upgrade existing infrastructure at sites.

1.4.2.3. Figure 3~~Figure 3~~ shows the "To-Be Architecture" of the IT Modernisation Programme.

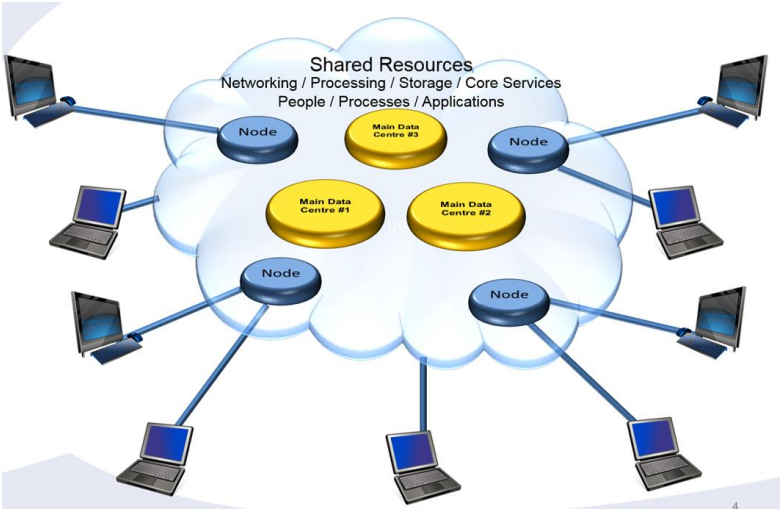


Figure 3 – IT Modernisation "To-Be" Architecture

1.4.3. Authorised Locations

1.4.3.1. The Authorised Locations are classified into the following categories:

- Data Centre Locations
- Enhanced Node Locations
- Standard Node Locations
- Remote Node Locations
- Deployable Nodes
- Support Systems Locations
- User Node Locations
- Organizational Node Locations

1.4.3.2. Data Centre Locations

1.4.3.2.1. Data Centre Locations will have TRITON Servers and infrastructure (if required) and can provide access to the TRITON Services for local and remote users. These sites will be equipped with equipment necessary to support a large number of users. These sites will have TRITON System Administrators and may also have local TRITON users.

1.4.3.2.2. Although the locations of the Data Centres will be finalised later, the current thinking is to place them all in Europe, with a Main Data Centre (DC-1), a Secondary Data Centre (DC-2) and a third Data Centre (DC-3). The design will be based on two full Data Centres (DC-1 and DC-2) having asynchronous replication and a third, smaller Data Centre (DC-3) supporting asynchronous replication with DC-1 for mission-critical data.

1.4.3.2.3. The initially planned Data Centre Locations are given below:

- NATO HQ, Brussels, Belgium
- SHAPE, Mons, Belgium
- JFC Naples, Lago Patria, Italy

1.4.3.2.4. Two of the Data Centres will be sufficiently close to each other to permit asynchronous replication of mission critical data, but sufficiently separated to prevent outage of both due to a common cause. Each Data Centre will provide processing, storage and networking capabilities both at NS and NU Domains.

1.4.3.2.5. The availability of each Data Centre will be 99% in order to achieve an overall 99.999% availability across the three Data Centres for mission-critical services and data.

1.4.3.2.6. The design of TRITON for these nodes should take into account the existing equipment and in a fully virtualised environment.

1.4.3.2.7. Users at the same location as the Data Centres can access TRITON Functional Services (NS and NU) using standard workstations on the appropriate networks.

1.4.3.3. Enhanced Node Locations

1.4.3.3.1. Enhanced Nodes will be equipped with a Local Computing Facility for services that cannot be provided from the Data Centres. These are services with special service level requirements (e regarding latency or availability). It is anticipated that even for Enhanced Node Locations, the majority of services will be provided from Data Centres.

1.4.3.3.2. These Local Computing Facilities will be equipped with the same physical and virtualisation environment as the Data Centres, just at a smaller scale commensurate with the service level requirements.

1.4.3.3.3. Enhanced Node Locations will have TRITON Users and System Administrators.

1.4.3.3.4. Users at Enhanced Node Locations can access TRITON-NS or NU Functional Services using standard workstations on the appropriate networks.

1.4.3.4. Standard Node Locations

1.4.3.4.1. Standard Nodes will have minimum footprint to provide access to the enterprise. They will provide:

- Core network infrastructure services
- Remote management capabilities
- Enterprise network access enhancement
- Information assurance and cyber defence components

1.4.3.4.2. These locations do not have any TRITON System Administrators. The management is centralised.

1.4.3.4.3. Users at Standard Node Locations can access TRITON NS or NU Functional Services using standard workstations on the appropriate networks.

1.4.3.5. Remote Node Locations

1.4.3.5.1. Nations and ships that do not have Deployable Kits are considered as Remote Nodes.

1.4.3.5.2. These locations do not have any TRITON System Administrators. The management is local.

1.4.3.5.3. Users at Remote Node Locations can access TRITON NS or NU Functional Services using standard workstations on the appropriate networks.

1.4.3.6. Deployable Nodes

1.4.3.6.1. Deployable Nodes are those nodes whose locations may be changed according to the needs. Current Deployable Node Locations are as follows:

- Afloat Command Platforms (NATO Command Ships)
- Deployable CIS (DCIS)

1.4.3.6.2. Afloat Command Platforms

1.4.3.6.2.1 The NATO Command Ships assigned to NATO Task Force/Group are named as Afloat Command Platform (ACP).

1.4.3.6.2.2 There will be two (2) Standing NATO Maritime Groups (SNMG-1 and 2) and two (2) Standing NATO Mine Counter-Measures Groups (SNMCMG-1 and 2). In addition to these four Groups in operation, another four Groups may be required for mission hand-over. TRITON will therefore provide eight (8) Deployable Kits in total.

1.4.3.6.2.3 TRITON Deployable Kits will be provided to only the ACPs. They will correspond to standard Data Centre functionality deployed on semi-ruggedized equipment boxes and other mobile equipment to support deployed Headquarters. They will provide server-based capabilities for integration into a deployable network. They will have standalone capabilities, but are intended to rely on available deployable infrastructure (e networking, workstations, domain services etc.) on board the ship.

1.4.3.6.3. Deployable CIS Locations

1.4.3.6.3.1 TRITON shall be accessible across the NATO Command Structure (NCS) and on the deployed commands through the Deployable Communication and Information Services (DCIS), including the NATO Response Force (NRF).

1.4.3.6.3.2 Separate instances of TRITON will be installed on the DCIS infrastructure provided by the Purchaser (named as DragonFly). These instances will be able to run on the Mission Network (MS).

1.4.3.6.3.3 Due to the rotational nature of the NRF, the deployment location is presently unknown. The Contractor shall perform the installation upon confirmation of the locations.

1.4.3.7. Support Systems Locations

1.4.3.7.1. Test Node Location

1.4.3.7.1.1 The Test Node will host the TRITON Test Systems, for both NS and NU Functional Services. These systems will not be operationally used.

1.4.3.7.1.2 The Purchaser will use the Test Systems to conduct system test and integration activities.

1.4.3.7.1.3 All Test Systems will be established on the NU Domain.

1.4.3.7.1.4 The Test Node Location will be the NCI Agency The Hague, PMIC, facilities on the NU Domain.

1.4.3.7.2. Reference Node Location

1.4.3.7.2.1 The Reference Node Location will host the TRITON Reference Systems, for both NS and NU Functional Services. These systems will not be operationally used.

1.4.3.7.2.2 The Purchaser will use the Reference Systems to conduct maintenance and system integration activities.

1.4.3.7.2.3 All Reference Systems will be established on the NU Domain.

1.4.3.7.2.4 The Reference Node Locations will be one of the following NCI Agency premises:

- Testbed in Mons
- PMIC, The Hague

1.4.3.7.2.5 The Purchaser will decide on the Reference Node Locations according to the status of internal organisational needs at the time of deployment. The Contractor shall perform the installation at the designated site.

1.4.3.7.3. Training Node Location

1.4.3.7.3.1 The Training Node Location will host the TRITON Training Systems, both NS and NU Functional Services. They will be used during Individual or Collective Training by remotely accessing the services via browsers.

1.4.3.7.3.2 All Training Systems will be established on the NU Domain.

1.4.3.7.3.3 The Individual Training Node Location will be one of the following:

- Data Center-1
- NCI Academy, Lisbon

1.4.3.7.3.4 The Collective Training Node will be one of the following:

- JFTC, Bydgoszcz (Enhanced Node)
- JWC, Stavanger (Enhanced Node)

1.4.3.7.3.5 The Purchaser will decide on the Training Node Locations according to the status of the CIS infrastructure and operational needs at the time of deployment. The Contractor shall perform the installation at the designated sites.

1.4.3.8. User Node Locations

1.4.3.8.1. User Node is a generic name for a location serving general TRITON users. A User Node may be a Data Centre, an Enhanced Node or a Remote Node, without any geographical restriction. It may also be an ACP with or without the Deployable Kit. Nations are also considered as a User Node.

1.4.3.8.2. User Nodes will host the user workstations which allow individual users to access TRITON functions via Web-based applications.

1.4.3.9. Organizational Nodes

1.4.3.9.1. An Organizational Node provides an integrated set of TRITON functionality and a virtual repository for NATO Headquarters or Centres like a User Node. SHAPE, MARCOM, JFCs are examples to Organizational Nodes.

1.4.3.9.2. An Organizational Node provides a logical structuring of users, functionality and information, and may be independent of the physical node structure (e.g. a physical node may support more than one Organizational Node).

1.4.3.9.3. Organizational Nodes will host the user workstations which allow local users to access TRITON functions via Web-based applications.

1.4.4. Deployment

1.4.4.1. Figure 4~~Figure 4~~ shows a notional diagram of the TRITON operational architecture showing Data Centres, Organizational and User Nodes, and Afloat Command Platforms.

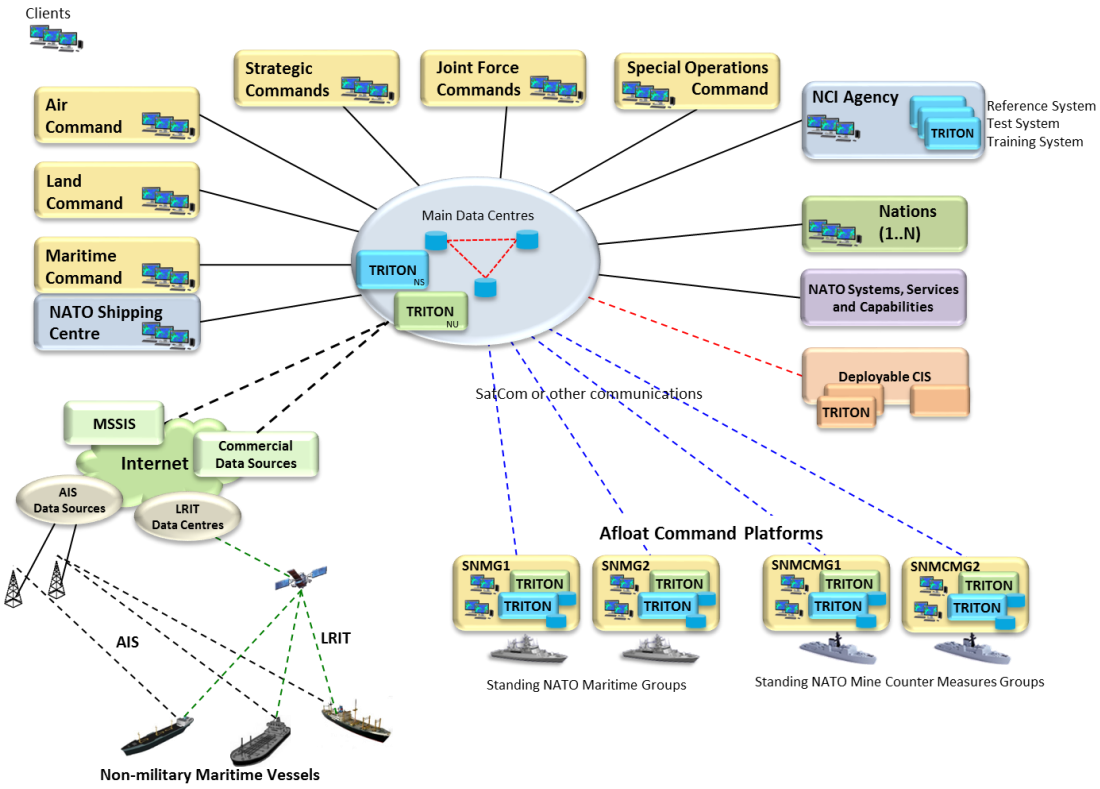


Figure 4 - TRITON Operational Architecture

1.4.4.2. The TRITON installation locations including the Data Centres and other types of Nodes within the architecture illustrated in Figure 4~~Figure 4~~ are given in Annex-B, WP5 System Transition.

1.5. Key Operational Requirements

1.5.1. TRITON, as a system provided by the Contractor, shall meet the key operational requirements stated below:

1.5.1.1. Replacement of MCCIS functionality that supports operational-level Maritime C2, MSA, and RMP.

1.5.1.2. Replacement of MSA functionality for White Shipping currently supported by MSA/BRITE.

1.5.1.3. Building and dissemination of White Picture (WP) on the NU Domain.

1.5.1.4. Building and dissemination of RMP on the NS Domain.

1.5.1.5. Utilising information received from National maritime C2 systems and commercial maritime services to build the WP and RMP.

1.5.1.6. The Water Space Management and Prevention of Mutual Interference (WSM/PMI) segment of Maritime Operational Planning.

1.5.1.7. Interoperability with other NATO systems and Functional Services.

1.5.1.8. Providing Deployable Kits for Afloat Command Platforms to operate TRITON in standalone mode for both domains.

1.5.2. The TRITON capability shall utilise the use of existing Bi-SC AIS Core and Functional Services and comply with the Bi-SC AIS Reference Architecture as specified in the SRS.

1.5.3. The TRITON capability shall be made available to its users as a set of services running on the existing NATO WANs. A degree of information flow shall occur between different security domains.

1.5.4. The TRITON capability shall provide a system which is accreditable at the required security level and mode of operation as defined in the SRS.

1.6. Scope of Work

1.6.1. This Statement of Work (SOW) describes the Contractor's responsibilities and tasks to satisfy the NATO requirements of TRITON Increment 1.

1.6.2. The Contractor shall provide all necessary resources including services, personnel, material, components, equipment and documentation needed to accomplish the tasks described in the SOW and the Work Packages, to meet the requirements of the SOW and Work Packages, and to fulfil Contract Provisions.

1.6.3. TRITON is expected to be implemented using Incremental Development with Multiple Deliveries Approach where each development activity is called “Build Process” which ends with an official product delivery called “Baseline”.

1.6.4. The defined Build Processes are given in Table 1-2~~Table 1-2~~:

Table 1-2 – Build Processes

Build Process	Name	Product	Capabilities
1	TRITON-NS (Partial) as Pilot	BL1	• System infrastructure on NS Domain • Core functions • Object handling • Picture display capability • Concept Demonstration System
2	TRITON-NU (Full)	BL2	• System infrastructure on NU Domain • White Picture management • MSA functions
3	TRITON-NS (Full)	BL3	• C2 capabilities • RMP management • Operational planning (WSM/PMI)
4	TRITON ACP Capability	BL4	• Deployable Kit production • System infrastructure on NS/NU • ACP handling
	C4ISR Visualisation Component	VC BL1,2,3	• Map and object display capability • Isolated component

1.6.5. Each Build Process is expected to follow the standard Waterfall Development life cycle enabling updates to previous Baselines. Agile management and development practices for individual functions and requirements within a Build Process can be applied. A notional overview of Build Process Realisation Plan, including the system-level analysis and design is given in Figure 5~~Figure 5~~.

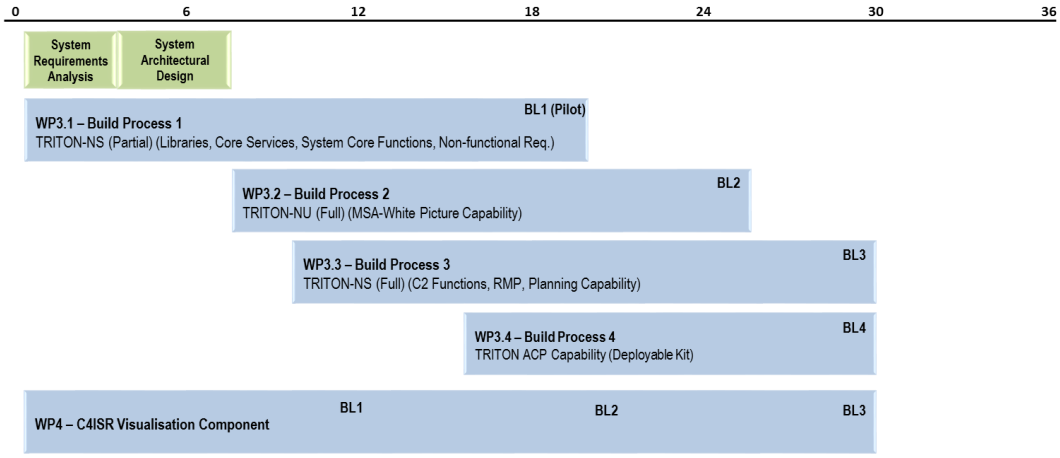


Figure 5 – Build Process Realisation Plan (Notional)

1.6.6. A sequence of software requirements analysis, software design, software construction, software integration, software verification and installation activities will be conducted in each Build Process to deliver a Baseline with a software version. Hardware implementation will be conducted similarly.

1.6.7. The overall TRITON capability for Increment 1 will be realised via a series of Work Packages (WP). The details of the Contractual Work Packages are described in Annex B to this SOW. The list of the Work Packages is given in Table 1-3~~Table 1-3~~:

Table 1-3 – Work Packages

Number	Work Package
WP1	Project Management
WP2	Systems Engineering Services
WP3.1	Build Process 1 (TRITON-NS Partial)
WP3.2	Build Process 2 (TRITON-NU Full Capability)
WP3.3	Build Process 3 (TRITON-NS Full Capability)
WP3.4	Build Process 4 (TRITON ACP Capability)
WP4	C4ISR Visualisation Component Provision
WP5	System Transition
WP6	System Support and Maintenance
WP7	Support to Operational Testing and Evaluation
WP8	Support to Transition from Legacy Systems
WP9	COTS Software Provision (option)
WP10	5-Year Maintenance and Support (option)
WP11	Support to Preparations for the Next Increment (option)

1.6.8. Note that the following packages are contract options that can be exercised during the performance of the main contract, and therefore shall be included in the overall project schedule:

- WP9 : COTS Software Provision (option)
- WP10 : 5-Year Maintenance and Support (option)
- WP11 : Support to Preparations for the Next Increment (option)

1.6.9. Exercising the optional Work Packages shall have no impact on the overall timeline, especially on the date of Final System Acceptance (FSA). Thus the Bidder shall already work these options into the Master Schedule as if they are going to be exercised.

1.6.10. The Contractor shall implement all TRITON system requirements stated in Annex-A, System Requirements Specification (SRS).

1.6.11. The Contractor shall:

1.6.11.1. Design the system and maximise the use of commercially-available products to meet the Contractual System Requirements Specification (SRS) given in Annex B.

1.6.11.2. Use a component-based, loosely-coupled architecture to support maximum reusability.

1.6.11.3. Organise, manage and report on the contracted work as directed by the Work Packages placed under this Contract.

1.6.11.4. Plan and execute developments and/or procurements required in order to ensure that the TRITON Product Baseline will at all times meet the SRS and other Contract requirements.

1.6.11.5. Plan and execute the required tests to certify the TRITON Product Baseline as meeting its functionality, performance, security, interoperability and O&M requirements.

1.6.11.6. Provide expertise to participate in additional Purchaser-led test activities as required.

1.6.11.7. Develop/procure and prepare the necessary TRITON elements for delivery to the specified sites as directed by the Work Packages placed under this Contract.

1.6.11.8. Prepare, install and configure the TRITON in the Purchaser-identified Test and Reference Environment in order to conduct system verification and validation. The Contractor shall coordinate with the Purchaser to arrange access to the NCI Agency TRITON Test Systems and Reference Systems in order to conduct verification or further testing to support follow-on development.

1.6.11.9. Deliver the required software to the prepared site, and execute installation, testing, training and activation of the system, according to the agreed Project Management Plan and Project Master Schedule.

1.6.11.10. Install and configure the Training Systems to be used for TRITON-NS and NU.

1.6.11.11. Develop TRITON Deployable Kits, install and configure software for TRITON ACP Capability.

1.6.11.12. Coordinate with the Purchaser to ensure that the site preparation activities are completed on or ahead of the date site implementation begins.

1.6.11.13. Deliver the required software to all Authorised Locations, and execute installation, testing, training and activation of the system, according to the agreed Project Management Plan and Project Master Schedule.

1.6.11.14. Plan and implement cut-over and initial operation of the new system to ensure transition from the existing to the new operational capabilities without loss of essential mission functions (e.g. building RMP) or data (e.g. existing AIS recordings).

1.6.11.15. Support development of Standard Operating Procedures (SOP) for operational use and maintenance of TRITON (for static and afloat sites and for both NS and NU Domains).

1.6.11.16. Develop and deliver Training Courses, including Training Materials, Student Manuals, Computer-Based Training, and course assessment after each course.

1.6.11.17. Fully document the design, operation, and maintenance of the delivered operational and Support Systems by providing the required manuals, operational procedures, supporting technical data, computer software and drawings required by the Contract.

1.6.11.18. Provide initial service support for the TRITON Product Baseline and transition service provisioning responsibility to the Purchaser.

1.7. Statement of Work Organization

1.7.1. This SOW defines the general requirements for services and supplies provided under Work Packages under this Contract. Specific performance requirements will be defined as part of each Work Package given in Annex B.

1.7.2. Section 1 provides an introduction to the SOW.

1.7.3. Section 2 identifies applicable documents.

1.7.4. Section 3 defines the management requirements of this Contract.

1.7.5. Section 4 defines the requirements for technical tasks under this Contract.

1.7.6. Section 5 defines the support requirements under this Contract.

1.7.7. Section 6 identifies the responsibilities and experience and education requirements for the labour categories to be used in support of this Contract.

1.7.8. Section 7 lists requirements for documentation to be delivered with this Contract.

1.8. Standards for Interpretation of the Statement of Work

1.8.1. This SOW invokes a variety of NATO Standardisation Agreements (STANAGs), Allied Publications (AQAP, ACMP, etc.) and International Standards (e.g. ISO/IEC). While these are NATO reference documents, there are national and international standards that are considered to be equivalent and are cited as such within these documents.

1.8.2. Where a national or international standard exists that is not specifically referenced in the STANAGs, Allied Publications, ISOs as being equivalent, the Contractor may propose to utilise such a standard if it can demonstrate to the satisfaction of the

Purchaser that such a standard is equivalent to the STANAG, Allied Publications or ISOs in question. The Purchaser, however, reserves the right to deny such a request and demand performance in accordance with the standard cited in the SOW.

SECTION 2: APPLICABLE DOCUMENTS

2.1. STANAGS

- STANAG 2290, Ed. 2, 2010, NATO Unique Identification of Items
- STANAG 4107, Ed. 8, 2007, Mutual Acceptance of Government Quality Assurance and Usage of the Allied Assurance Publications (AQAP)
- STANAG 4427, Ed.3, 2014, Configuration Management in System Life Cycle Management
- STANAG 4728, Ed. 2, 2015, System Life Cycle Management
- STANAG 6001, Ed. 5, 2014, Language Proficiency Levels
- STANREC 4174, Ed.4, 2014, Guidance for Dependability Management
- STANREC 4753, Ed. 1, 2015, Project Managers' Guide to Quality Assurance Insight, Oversight and Intervention in the Acquisition Process

2.2. Allied Publications

- AAP-20 Ed. C, Ver.1, 2015, NATO Programme Management Framework (NATO System Life Cycle Model)
- AAP-48 Ed. B, Ver.1, 2013, NATO System Life Cycle Processes
- ACMP-2000, Ed. A, Ver.1, 2014, Policy on Configuration Management
- ACMP-2009, Ed. A, Ver.1, 2014, Guidance on Configuration Management
- ACMP-2100, Ed. A, Ver.1, 2014, Configuration Management Contractual Requirements
- ALP-10 Guidance on Integrated Logistics Support for Multinational Equipment Projects (ILS)
- AQAP-160, Ed. 1, 2001. NATO Integrated Quality Requirements for Software through the Life Cycle
- AQAP-169, Ed. 1, 2001, NATO Guidance on the Use of AQAP-160
- AQAP-2000, Ed. 3, 2000, NATO Policy on an Integrated Systems Approach to Quality through the Life Cycle
- AQAP-2009, Ed. 3, 2010, NATO guidance on the Use of the AQAP-2000 Series
- AQAP-2020, Ed. A, Ver. 1, 2015, Project Managers' Guide to Quality Assurance Insight, Oversight and Intervention in the Acquisition Process
- AQAP-2050, Ed. 1, 2003, NATO Project Assessment Model
- AQAP-2070, Ed. 2, Ver. 2, 2012, NATO Mutual Government Quality Assurance (GQA) Process
- AQAP-2105, Ed. 2, 2009, NATO Requirements for Deliverable Quality Plans

- AQAP-2110, Ed. 3, 2009, NATO Quality Requirements for Design, Development and Production
- AQAP-2210, Ed. 1, 2006, NATO Supplementary Software Quality Assurance Requirements to AQAP-2110
- AQAP-2310, Ed. A, Ver. 1, 2013, NATO Quality Management System Requirements for Aviation, Space and Defence Suppliers
- ATrainP-5, Ed. A, Ver. 1, 2014, Language Proficiency Levels

2.3. Bi-SC Documents

- Bi-SC DIR 75-2, "Education, Training, Exercise and Evaluation Directive (ETEED)", 2 October 2013 (NU)
- Bi-SC DIR 75-7, "Education & Individual Training (E&IT)", 10 September 2015 (NU)
- Bi-SC Capability Package 9C0107, Functional Services for Command and Control of Operations (OPS FS) (NU)
- Bi-SC Capability Package 9C0150, Core Information Services for Command and Control (NU)

2.4. Other NATO Documents

- AC/35-D/2005-REV3, Management Directive on CIS Security, 12 October 2015 (NU)
- AC/35-D/1014-REV2, Guidelines for the Structure and Content of Security Operating Procedures (SecOps) for Communication and Information Systems (CIS), 19 October 2006 (NU)
- AC/35-D/1015-REV3, Guidelines for the Development of Security Requirement Statements (SRS), 31 January 2012 (NR)
- AC/35-D-1021-REV3, Guidelines for the Security Approval or Security Accreditation of Communication and Information Systems (CIS), 31 January 2012 (NR)
- AC/322(SC/5)L(2006)0001, Ver. 2.2, 2006, NATO Communication and Information Systems Configuration Management Policy (NU)
- AC/322(SC/5)L(2006)0001, Ver. 1.0, 2006, Enclosure 2 NATO Communication and Information Systems Configuration Management Directive (NU)
- AC/322-D(2009)0006-(INV), 2009, Guidelines for the Implementation of Configuration Management for NATO CIS (NU)
- AC/322-D(2006)0052 “NATO Consultation, Command and Control Board (NC3B) NATO CIS Configuration Management Policy and Directive (NU)
- AC/322-D(2007)0048 NATO Architecture Framework (NAF) Ver.3, 23 November 2007 (NU)

- ~~AC/322(SC/1-WG/1)N(2009)0005-ADD2, NATO Architecture Framework (NAF) Ver. 3.1 (NU)~~
- NCSA OSI ~~L~~A-14-02, Preparation of NATO CIS Integrated Logistics Support Plans (ILSP), 2nd Revision (NU)
- Approved Fielded Product List (AFPL) (as updated) (NU)
- Material Data Sheet Template (for inventories and CMDBs) (NU)

2.5. Non-NATO Standards

- ISO 9241-210:2010: Ergonomics of Human-System Interaction - Part 210: Human-centred design for interactive systems
- ISO 60300-1:2014: Dependability management - Part 1: Guidance for management and application
- ISO/IEC 10007:2003: Quality management systems - Guidelines for Configuration Management;
- ISO/IEC 20000-1:2005: Information Technology - Service Management, Part1: Specification; Part2: Code of Practice
- ISO/IEC 15288:2008: Systems and Software Engineering - System Life cycle processes
- ISO/IEC/IEEE 15289:2008: Systems and Software Engineering – Content of life-cycle information products (documentation)
- ISO/IEC 12207:2008: Systems and Software Engineering - Software life cycle processes
- ISO/IEC TR 24748-2:2011: Systems and Software Engineering, Life Cycle Management, Guide to the Application of ISO/IEC 15288 (System Life Cycle Processes)
- ISO/IEC/IEEE 29119:2013 Software and systems engineering -- Software testing
- ISO/IEC/IEEE 29148:2011: Systems and Software Engineering - Life cycle processes – Requirements engineering
- ISO/IEC 25000:2005: Software Engineering - Software product Quality Requirements and Evaluation (SQuaRE) - Guide to SQuaRE
- ISO/IEC FDIS 25010:2011: Systems and software engineering - Systems and software Quality Requirements and Evaluation (SQuaRE) - System and software quality models
- ISO/IEC 14764:2006: Software Engineering - Software life cycle processes - Maintenance
- IEEE Standard 1058-1998, IEEE Standard for software project management plans
- IEEE Standard 1016-2009, IEEE Standard for information technology - systems design - software design descriptions

- IEEE Standard 829-2008: IEEE Standard for software and system test documentation
- International Chamber of Commerce Incoterms® 2010, 2010
- ITIL v3 Service Transition (Best Management Practices); 29 July 2011
- Unified Modelling Language (UML) 2.1, Object Management Group
- Project Management Institute, A Guide to the Project Management Body of Knowledge (PMBOK Guide), Fifth Edition
- Project Management Institute, Practice Standard for Work Breakdown Structures, Second Edition

SECTION 3: MANAGEMENT

3.1. General

3.1.1. This section outlines the Project Management Task Area for the TRITON Contract.

3.1.2. The goal of the Contractor's Project Management shall be to guide the project through a controlled, well-managed, visible set of activities to achieve the desired results and, wherever possible, to eliminate problems and to ensure that those problems that do occur are identified early, assessed accurately, and resolved quickly in partnership with the Purchaser.

3.2. Project Management Methodology

3.2.1. By default, the Contractor shall apply the PRINCE2 project management methodology to the planning, delivery and control of services under this Contract. Subject to approval of the Purchaser, the Contractor may propose his own project management methodology.

3.3. General Requirements

3.3.1. This sub-section outlines the general requirements for the TRITON Contract. The requirements of this Subsection (3.3) shall apply to all Work Packages issued under the TRITON Contract.

3.3.2. Personnel Security

3.3.2.1. Unescorted access to a NATO site or unescorted work at NATO facilities can only be possible if the Contractor or Subcontractor personnel have, at a minimum, NS Security Clearance as required by NATO policy.

3.3.2.2. The Contractor shall provide proof that each team member has a valid NS Security Clearance or its application is in process when it is required to work on a NATO site or facility.

3.3.2.3. The Contractor shall process all Contractor and Subcontractor personnel through the NATO Security Office at each site, adhering to their procedures for clearances, to obtain security badges for the duration of the on-site activities.

3.3.3. Independent Verification and Validation

3.3.3.1. The main objective of the Independent Verification and Validation (IV&V) activity will be the evaluation of the performance of the TRITON Contractor and the verification and validation of the work being performed under the related effort, in particular evaluation of Contractor deliverables.

3.3.3.2. The Purchaser will engage an IV&V Contractor to provide support for the TRITON Project. The IV&V Contractor will monitor, assess, and report on the TRITON Contract in order to identify, as early as possible, perceived problem areas.

3.3.3.3. The IV&V Contractor will execute a non-disclosure agreement with the TRITON Implementation Contractor.

3.3.3.4. The IV&V Contractor may be requested by the Purchaser to monitor Contractor activities at Contractor's facilities or other sites related to the development, testing and implementation of the TRITON capability. The Contractor shall fully support such activities and in particular:

3.3.3.4.1. Host inspection visits by IV&V Contractor,

3.3.3.4.2. Make himself available for answering questions and furnishing information related to the project,

3.3.3.4.3. Allow the IV&V Contractor to inspect and monitor testing activities, and

3.3.3.4.4. Allow the IV&V Contractor to inspect and monitor the Contractor's processes applicable to this project.

3.3.3.5. The Contractor shall transfer to the IV&V Contractor all information deemed necessary to perform the IV&V activities, on his own initiative or on request by the IV&V Contractor or the Purchaser.

3.3.3.6. The Contractor shall transfer to the IV&V Contractor at the least the following information:

- Plans
- Reports
- Requirements specifications and RMD~~B~~,
- Design, test, and other technical documentation
- Minutes of CCB meetings
- Software source code.

3.3.3.7. The Purchaser may engage the IV&V Contractor to review any Contract deliverables on behalf of the Purchaser.

3.3.4. Purchaser Responsibilities

3.3.4.1. The Purchaser's Project Manager will act as the Purchaser's representative and will be the primary interface between the Contractor and Purchaser after the Effective Date of Contract (EDC).

3.3.4.2. The Purchaser's Project Manager will be supported by specialists in certain areas who may, from time to time, be delegated to act on the Project Manager's behalf in their area of expertise.

3.3.4.3. The Project Manager, the Integrated Project Management Team (IPMT), Project Board or any other NATO personnel cannot make changes to the terms and conditions of the Contract but may only provide the Purchaser's interpretation of technical matters. All changes to the Contract will be made through the Purchaser's contracting authority only.

3.3.4.4. The Purchaser will provide the Contractor with technical descriptions of existing NATO systems as required for the purpose of determining specific interface requirements between the TRITON capability and these systems.

3.3.4.5. Purchaser Furnished Items and Services

3.3.4.5.1. The Purchaser will make available to the Contractor the facilities necessary to test and demonstrate TRITON compliance with required interfaces to existing NATO systems.

3.3.4.5.2. The Purchaser will provide access to sample existing databases and other data export formats to support the development of representative data for purposes of development, testing, and training. The intent is to provide this through remote access to the Programme Management and Integration Capability (PMIC) facility mentioned below. The sample databases for MCCIS, MSA/BRITE and NIRIS will be made available.

3.3.4.5.3. The Contractor shall identify requirements for PMIC test support in the System Development Plan and the Test Management Plan.

3.3.4.5.4. The Purchaser will provide the (security) settings and related testing documentation for servers, workstations, and Wide Area Network connections.

3.3.4.6. The Purchaser will provide access to PMIC at its premises in The Hague, Netherlands.

3.3.4.6.1. The facility, currently known as the Programme Management and Integration Capability (PMIC), provides Test Systems, Training Systems, Reference Systems and related networks having NATO security settings and also information products applicable to TRITON.

3.3.4.6.2. At the PMIC Test System, the Purchaser will provide access to those Bi-SC AIS Core Services on which the TRITON capability is to depend.

3.3.4.6.3. Upon a request, the Contractor will receive remote access via internet VPN to PMIC sub-network, as required to conduct development and testing.

3.3.4.7. The Purchaser will provide the facilities, operational links, and interfaces required for Installation Tests, Integration Tests, Regression Tests, Verification and Validation Tests.

3.3.4.8. The Purchaser will make available to the Contractor a baseline version of the software source code and any available documents for the following operational prototype:

- MSA Demonstrator Prototype (MSA/BRITE)

3.3.4.9. The Purchaser will maintain Configuration Control for Purchaser-provided prototype software baseline. The Contractor shall identify to the designated Purchaser contact any deficiencies in this baseline it encounters during the course of software implementation activities.

3.3.5. Coordination with Other NATO Projects

3.3.5.1. The NATO CIS environment will be under continual development by other NATO projects and programmes that are being implemented in parallel with TRITON.

3.3.5.2. The Purchaser will inform the Contractor and provide more detailed information concerning the changes in the operational or technical environment that may emerge as a result of these projects and programmes.

3.3.5.3. The Contractor shall advise the Purchaser on the cost, schedule, and performance impacts of such changes on the project.

3.3.6. Operational User Involvement

3.3.6.1. The Contractor shall involve (e.g. through participation in Working Groups reviews, workshops, Joint Technical Reviews, Formal Reviews, User Assessment Reviews, user interface design, test events) appropriate operational users for input to, review of and testing of the project deliverables throughout the life span of the Contract work (i.e. requirements refinement for system activation).

3.3.6.2. The operational user is expected to participate in the following activities:

- Validation of system requirements
- SME support for software analysis and design
- Human-Computer Interaction design
- SME support for implementation details
- User Assessment Reviews (UAR)
- User Assessment Tests (UAT)
- On-site UAT
- System Validation Test (SVT)
- User feedback during Operational Test and Evaluation (OT&E)
- In-Service Reviews (ISR)
- Initial Operational Capability (IOC) declaration

3.3.6.3. The Contractor shall arrange operational user participation through the Purchaser Project Manager or Purchaser Technical Lead.

3.3.7. Location of Work

3.3.7.1. Unless otherwise specified by the Work Package or approved by the Purchaser, the main effort for this Project shall be carried out in the Contractor's premises.

3.3.7.2. Work at Purchaser Sites

3.3.7.2.1. To support extended collaborative efforts, the Contractor may request to locate personnel at the Purchaser’s facilities.

3.3.7.2.2. If the request is approved by the Purchaser, the Contractor shall be responsible for costs associated with working at the Purchaser’s facilities.

3.3.7.2.3. The Purchaser will provide the Contractor personnel working at Purchaser locations as part of Work Packages under this Contract with the services given in Table 3-1~~Table 3-1~~.

Table 3-1 – Services provided by the Purchaser to the Contractor

Serial	Requirement
1	A desk, cubicle, workstation, or workbench, as appropriate
2	Standard office furniture
3	Common expendable office supplies
4	Access to local telephone service

5	Access to the Purchaser's intranet (NR), NS network, Internet site and selected applications
6	Access to utilities within the work area and storage space for project support data

3.3.8. Lessons Report and Lessons Log

3.3.8.1. The Contractor shall establish and maintain a project Lessons Log (LLog).

3.3.8.2. The Lessons Log shall include major problems encountered during the project implementation and identify improvements for the future projects.

3.3.8.3. The Contractor shall make the Lessons Log available on the Project Website.

3.3.8.4. The Lessons Log shall include any learned during the execution and the information captured in the Issue Register and the Risk Register.

3.3.8.5. The Contractor shall prepare a Lessons Report after each major milestone as part of the report of that event.

3.4. Project Management Teams

3.4.1. Integrated Project Management Team

3.4.1.1. The TRITON Integrated Project Management Team (IPMT) comprises the key stakeholders in Maritime Community and serves as a mechanism for monitoring the project status, aligning activities with the other Maritime activities, resolving issues or conflicts within the project, and advising the Purchaser's TRITON Project Manager.

3.4.1.2. The Purchaser's representative chairs the IPMT. The other members are the designated representatives of the NATO Strategic Commands (ACT, ACO). Technical experts within the NCI Agency and other bodies also serve as advisory members of the IPMT.

3.4.1.3. Upon award of this Contract, the Contractor shall become an advisory member of the IPMT, which also serves as the TRITON Configuration Control Board (CCB). The Contractor shall participate the IPMT Meeting as invited.

3.4.1.4. The Contractor shall provide his inputs to the IPMT via the Purchaser's Project Manager.

3.4.2. Project Board

3.4.2.1. The TRITON Project Board is formed by the Purchaser according to PRINCE2 and serves as the primary mechanism for monitoring project status, resolving issues or conflicts within the project, and advising the Purchaser's TRITON Project Manager.

3.4.2.2. The Purchaser's Chief C2 Service Line chairs the TRITON Project Board as the "Executive" role.

3.4.2.3. Depending on the context of the meeting, the Contractor will become a member of the TRITON Project Board as the "Senior Supplier" role. The Contractor shall participate the Project Board Meeting as invited.

3.4.2.4. Depending on the context of the meeting, the user community is represented by the "Senior User" role.

3.4.2.5. The other members (e.g. Assurance) are the designated representatives of the NCI Agency.

3.5. Contractor Project Management Office

3.5.1. The Contractor shall establish and maintain a Project Management Office (PMO) to perform and manage all efforts necessary to discharge all his responsibilities under this Contract.

3.5.1.1. The Contractor shall also provide all necessary manpower and resources to conduct and support the management and administration of operations in order to meet the objectives of the project, including taking all reasonable steps to ensure continuity of personnel assigned to work on this project. The personnel identified below shall be considered as "Key Personnel" in accordance with the Special Provisions of this Contract.

3.5.2. Project Manager

3.5.2.1. The Contractor shall designate a Project Manager (PM), who will direct and coordinate the activities of the Contractor's project team.

3.5.2.2. The Project Manager shall be the Contractor's primary contact for the Purchaser's TRITON Project Manager and shall conduct all major project design, test, and status reviews.

3.5.2.3. The Project Manager shall be prepared at all times to present and discuss the status of Contract activities with the Purchaser's Project Manager, Contracting Officer, or Technical Lead.

3.5.2.4. The Project Manager shall assist the Purchaser's Project Manager in assessing of cost, schedule, and performance trade-offs within the scope of this Contract.

3.5.2.5. The Project Manager shall serve as point of contact for the IV&V Contractor.

3.5.2.6. The Project Manager shall meet the qualifications of Project Manager as specified in 6.2.1.

3.5.3. Technical Lead

3.5.3.1. The Contractor shall designate a Technical Lead for the project.

3.5.3.2. The Technical Lead shall lead the analysis, design, implementation, integration, and follow-on enhancement efforts of the Contractor.

3.5.3.3. The Technical Lead shall be accountable for Configuration Management activities and maintaining the Configuration Control of all Configuration Items.

3.5.3.4. The Technical Lead shall meet the qualifications of a Senior Engineer and Senior Systems Engineer as specified in Senior Engineer 6.4.1 and 6.4.4, respectively.

3.5.3.5. A Technical Manager for the Provision of C4ISR Visualisation Component may be designated.

3.5.4. Test Director

3.5.4.1. The Contractor shall designate a Test Director for all test activities conducted under this Contract.

3.5.4.2. The Test Director shall meet the qualifications of Senior Test Engineer as specified in 6.4.18.

3.5.5. Quality Assurance Manager

3.5.5.1. The Contractor shall designate a qualified individual to serve as the Quality Assurance Manager for activities under this Contract.

3.5.5.2. The Quality Assurance Manager shall be able to work independently from the Project Manager and report to a separate manager within the Contractor's organization at a level equivalent to or higher than the Project Manager.

3.5.5.3. The Quality Assurance Manager shall meet the qualifications of Quality Assurance Manager as specified in 6.5.10.

3.5.5.4. The Contractor should designate Quality Engineers to work under the supervision of the Quality Assurance Manager for all Quality actions to be taken during the lifetime of the project.

3.5.6. Integrated Logistics Support Engineer

3.5.6.1. The Contractor shall designate a qualified individual to serve as the Integrated Logistics Support (ILS) Engineer for activities under this Contract.

3.5.6.2. The ILS Engineer shall report to a separate manager within the Contractor's organization at a level equivalent to the Purchaser ILS Officer.

3.5.6.3. The ILS Engineer shall also be responsible for all training-related activities.

3.5.6.4. The ILS Engineer shall meet the qualifications of the ~~Senior ILS Engineer~~Logistics Management Specialist as specified in 6.5.1~~6.8.1~~.

3.6. Project Website and Collaborative Working Environment

3.6.1. The Contractor shall establish an unclassified Project Website and Collaborative Working Environment (CWE) on which all relevant unclassified TRITON project documentation and datasets shall be maintained.

3.6.1.1. The Project Website shall allow the Purchaser, the Contractor, TRITON Project Team, and the IV&V Contractor to share the CWE content, collaborate and work efficiently online with managed privilege and access to all relevant project information.

3.6.1.2. CWE shall provide tools for co-development of project documents, storing them and supporting communication between the team members.

3.6.2. The Purchaser will provide t~~T~~he unclassified hosting environment for the Project Website and CWE ~~will be provided to the Contractor~~ through the Bi-SC AIS PMIC facility at the NCI Agency The Hague location and ~~will~~ make it~~be~~ available ~~remotely~~ for all relevant stakeholders.

3.6.3. The Project Website and CWE shall identify all relevant classified documents by title, unless a title is itself classified.

3.6.4. The Project Website and CWE shall allow the Purchaser to access to the Issue Register, Risk Register, Quality Register, Project Master Schedule, and other datasets and tools required by this SOW.

3.6.5. The Project Website and CWE shall allow the Purchaser to access to the finished and in-progress items, including design specifications, documentation, source code, installers and executables.

3.6.6. The Project Website and CWE shall contain links to the latest baseline of the software package during all phases of project.

3.6.7. The Contractor shall update the CWE with the development artefacts on at least weekly basis.

3.6.8. The Contractor shall implement an access control mechanism to restrict viewing of any document on the Project Website and CWE to a list of users approved by the Purchaser and administered by the Contractor.

3.6.9. The Contractor shall establish a NATO UNCLASSIFIED link between the NCI Agency The Hague, the IV&V Contractor premises, and the Contractor's premises to establish the Collaborative Working Environment for Project TRITON.

3.6.10. Video Tele-Conferencing Facilities

3.6.10.1. It is envisioned that there will be frequent Video Tele-Conferences (VTC) between the Contractor team and the Purchaser Project Team and as such the Contractor shall have facilities to carry out VTC sessions with the Purchaser's facility locations. These VTC sessions will cover only the UNCLASSIFIED discussions.

3.7. Project Management Plan

3.7.1. The Contractor shall establish, provide and maintain a Project Management Plan (PMP) which describes how the Contractor will implement the totality of the project, including details of the project control that will be applied.

3.7.2. The PMP shall identify all major Contractor operating units and any subcontractors involved in the development of the TRITON capability and a description of the portion of the overall effort or deliverable item for which they are responsible.

3.7.3. The PMP shall cover all aspects of the project implementation, including the Contractor's project management structure and project control processes, personnel assignments, and external relationships necessary to provide the capability as required by this Contract.

3.7.4. The PMP shall be sufficiently detailed to ensure that the Purchaser is able to assess the Contractor plans with insight into the Contractor's plans, capabilities, and ability to satisfactorily implement the entire project in conformance with the requirements as specified in this SOW.

3.7.5. The PMP shall describe, or refer to, how the various project management processes (quality management, configuration management, risk management etc.) are integrated, either via a tool set and/or internal project management practices.

3.7.6. The PMP shall describe how the Project Website and Collaborative Working Environment will be used to maintain communication between the Purchaser and the Contractor.

3.7.7. The PMP shall cover at least the following areas:

3.7.7.1. Project Scope:

- Major deliverables
- Assumptions
- Constraints

3.7.7.2. Project Organization:

- Internal structure, including a project organizational diagram
- Roles and responsibilities of each organizational unit
- Key personnel, their qualifications, and their responsibilities
- Organizational boundaries between the project organization and the parent and subcontracted organizations
- Governance structure

3.7.7.3. Project Management Processes:

- Project start-up, including staffing, basis of cost and schedule estimates, and project infrastructure
- Project control, including monitoring, reporting, and change management of Work Packages
- Responsibility assignment matrix (Responsible, Accountable, Consulted, Informed – RACI)
- Issue management, including the identification, reporting, assessment, and logging of project issues
- Communications management including communication strategy
- Communications including the Project's Website, its establishment, maintenance and use, Project Highlight Reports, Project Checkpoint Reviews, and all other communications with the Purchaser
- Risk management, including the Contractor’s process for risk identification, assessment, mitigation, monitoring, and reporting
- Security management, including personnel and facility security and system security accreditation
- Purchaser involvement via Formal Reviews, Joint Technical Reviews, Working Group Reviews , (in)formal meetings, reporting, modification and change, implementation, verification, approval, acceptance and access to facilities.

3.7.7.4. Software Project Management

3.7.7.4.1. The PMP shall cover software project management aspects including managerial, technical and supporting process plans in accordance with IEEE Std 1058-1998 and ISO/IEC 12207.

3.7.7.5. Hardware Production

3.7.7.5.1. The PMP shall cover hardware production aspects including managerial, technical and supporting process plans in accordance with ISO/IEC 15288 and ISO 9001:2008.

3.7.7.6. Quality Management

3.7.7.6.1. The PMP shall describe how Contractor will establish and use quality management programme, refer to the Quality Plan described in Subsection 3.13 for the following:

- Quality management, including quality assurance of work processes,

- Internal verification and validation,
- Joint Technical Reviews, Working Group Reviews, Formal Reviews and audits.

3.7.7.6.2. The PMP shall cite any references used in the quality management, such as methodologies, tools or best practice material.

3.7.7.6.3. The PMP shall identify the organization and responsibilities of the quality assurance team and its relation to the project team.

3.7.7.6.4. If sub-contracted quality resources are used, the PMP shall describe the controls and processes in place for monitoring the sub-Contractor's work against agreed timelines and levels of quality.

3.7.8. The approval of the PMP by the Purchaser signifies only that the Purchaser agrees to the Contractor's approach in meeting the requirements. This approval in no way relieves the Contractor from its responsibilities to meet the requirements stated in this Contract. The requirements of the Contract supersede any statement in the PMP in case of any conflict, ambiguity or omission.

3.7.9. The PMP shall describe the relationship between the PMP and subordinate plans:

- Quality Plan (QP)
- Configuration Management Plan (CMP)
- Risk Management Plan (RMP)
- System Development Plan (SDP)
- Test Management Plan (TMP)
- System Transition Plan (STrP)
- Integrated Support Plan (ISP)
- In-Service Support Plan (ISSP)
- System Maintenance Plan (SMP)
- Training Plan (TrP)

3.7.10. The Contractor shall ensure that the PMP remains current throughout the duration of the Project to reflect the actual state of the Contractor's organization and efforts, and maintain a current copy on the Project Website.

3.8. Project Product Breakdown Structure

3.8.1. The Contractor shall establish and maintain Project Product Breakdown Structure (PPBS). PBS is a hierarchical list of all the products to be produced during the project where PRINCE2 guidance may be used.

3.8.2. The PPBS shall be used to identify the Work Packages in the Project Work Breakdown Structure.

3.8.3. PPBS shall include the following to enable product-based planning:

- Breakdown Structure
- Product Descriptions of the final products,
- Product Descriptions of each deliverable or sub-product
- Product Flow Diagram.

3.8.4. The PPBS shall describe the hierarchical structure that breaks down a final product into its constituent sub-products.

3.8.5. Product Description

3.8.5.1. The PPBS shall describe the products in Product Description to a level of detail to understand what is needed to build the final product and to clarify and identify all necessary work for the creation of the final product.

3.8.5.2. The Product Description shall be sufficient to understand the purpose and function of the product and the level of quality required of the product.

3.8.6. The Product Flow Diagram shall show the sequence of delivery of products and identify dependencies between those products, including external products.

3.8.7. The Contractor shall not change the PPBS without the approval of the Purchaser.

3.9. Project Work Breakdown Structure

3.9.1. The Contractor shall establish and maintain a Project Work Breakdown Structure (PWBS).

3.9.2. The PWBS shall define the major Work Packages and the relationship between the Work Packages and the end product.

3.9.3. The PWBS shall describe the Work Packages to a level that exposes all project risk factors and allows accurate estimate of each work item's duration, resource requirements, inputs and outputs, and predecessors and successors.

3.9.4. The PWBS shall include a PWBS Dictionary that identifies for each work item its duration, resource requirements, inputs and outputs, predecessors and successors, assumptions, constraints, dependencies, and requirements for Purchaser support. In order to perform Earned Value Management, the PWBS shall identify for each work item both the budgeted and actual cost of work.

3.9.5. The Contractor shall plan the work contained within the lowest-level PWBS components in the Work Packages.

3.9.6. The PWBS shall be used as the primary framework for Contract planning and reporting to the Purchaser.

3.9.7. The Contractor shall not change the PWBS or PWBS Dictionary, without the approval of the Purchaser.

3.10. Project Master Schedule

3.10.1. The Contractor shall establish and maintain a Project Master Schedule (PMS) that contains all Contract events such as Milestones, Checkpoints, Decision Gates and Contract-related Purchaser activities and events (e.g. Purchaser reviews, IV&V tests, provision of specific Purchaser-furnished items). The PMS shall correlate with the PWBS and also be traceable to performance and delivery requirements of this SOW.

3.10.2. The PMS shall depict the sequence, duration, and relationship among PWBS, Task Orders, Work Packages and work items, including internal QA events.

3.10.3. The PMS shall identify the start and finish dates, duration, predecessors, successors, and resource requirements for each work item.

3.10.4. The PMS shall include the delivery dates for all management products (e.g. project plans, Project Highlight Reports), including at least the initial version and the final one.

3.10.5. The PMS shall include activity network, activity Gantt, milestone, and critical path views of the project schedule.

3.10.6. The PMS shall be provided in a format fully compatible with the latest commercial version of the MS Project or other Project Management Software as proposed by the Contractor and authorised by the Purchaser. The PMS shall be made available on the Project Website.

3.10.7. The initial version of the PMS shall, upon Purchaser Acceptance, be placed under the TRITON Configuration Control System.

3.10.7.1. Thereafter, the Contractor shall maintain the baseline version of the PMS on the Project Website.

3.10.7.2. The Purchaser's TRITON Project Manager, without consulting the other TRITON CCB members, can approve changes to the PMS that do not affect other baseline documents or incur additional costs.

3.11. Work Package Management

3.11.1. The Contractor shall prepare draft Work Package Descriptions as requested by the Purchaser.

3.11.2. The Contractor shall ensure that all confirmed Work Packages are reflected in the PMP, PWBS and PMS.

3.11.3. The Contractor-defined Work Packages shall be at least at the level of the Work Packages provided in Annex B to this SOW.

3.11.4. The Contractor-defined Work Packages shall describe schedule, and cost and resources of the work to be done.

3.11.5. The Contractor shall provide link between Work Packages, the scope defined in the PPBS and PMS.

3.12. Risk Management

3.12.1. The Contractor shall establish a risk management strategy and perform risk management throughout the period of performance of this Contract.

3.12.2. The Contractor should use the Risk Management approach as defined in PRINCE2.

3.12.3. The Contractor shall identify threats and opportunities, assess them, establish a plan to implement the responses and follow-up actions, and report the risks as part of the project management reports.

3.12.4. Risk Management Plan

3.12.4.1. The Contractor shall prepare a Risk Management Plan (RMP) and deliver it together with the PMP.

3.12.4.2. The RMP shall describe how the risk management will be performed.

3.12.5. Risk Register

3.12.5.1. Risk Register (RReg) is a record of identified risks relating to an initiative, including their status and history (PRINCE2).

3.12.5.2. The Contractor shall establish and maintain a Risk Register for the project.

3.12.5.3. The Contractor shall identify management, technical, schedule, and cost risks and record them in the Risk Register.

3.12.5.4. The Contractor shall rate each risk as "High", "Medium", or "Low", based on its probability of occurrence and its impact on cost, schedule, and quality.

3.12.5.5. The Contractor shall identify for each risk the measures being taken to mitigate any risk rated as High on any factor and make an assessment of the risk rate in case of implementation of the mitigation measures.

3.12.5.6. The Contractor shall provide the initial baseline version of the Risk Register at the PMR and maintain it throughout the period of the Contract.

3.12.5.7. The Contractor shall make the Risk Register available on the Project Website.

3.12.6. Issue Register

3.12.6.1. Issue Register (IReg) is a register used to capture and maintain information on all of the issues that are being managed formally (PRINCE2).

3.12.6.2. The Contractor shall establish and maintain an Issue Register for the project.

3.12.6.3. The Contractor shall capture and manage all issues raised during reviews in the project Issue Register.

3.12.6.4. The Contractor shall make the Issue Register available on the Project Website.

3.12.7. Assessment

3.12.7.1. The Contractor shall include in the Project Highlight Report a chart that lists all active risks rated High on any factor and note any significant forecasted changes in these risks.

3.12.7.2. The Contractor shall update and brief the Risk Register and update the Issue Register at all Project Checkpoint Reviews and Formal Reviews.

3.13. Quality Management

3.13.1. General

3.13.1.1. The Contractor shall establish, execute, and maintain a Quality Management System throughout the Contract lifetime.

3.13.1.2. The Quality Management System shall be based on AQAP-2110, AQAP-2210 and AQAP-2310 which incorporates by reference ISO 9001:2008, and on AQAP-160.

3.13.1.3. The Quality Management System shall ensure that procedures are developed, implemented and maintained to adequately control the design, development, production, testing, configuration management, and support of all deliverables.

3.13.1.4. The Contractor shall establish, document, implement, assess and improve an effective and economical system in accordance with this document, which includes the requirements of ISO 9001:2008 as necessary to satisfy the contract requirements.

3.13.2. Quality Plan

3.13.2.1. The Contractor shall describe the Quality Management System in a Quality Plan (QP) and deliver it together with the PMP.

3.13.2.2. The QP shall cover quality planning, quality control, quality assurance and quality improvement issues and refer to other management plans.

3.13.2.3. The QP shall be prepared in accordance with AQAP-2110 as detailed in AQAP-2009, Annex C, and Subsection 5.4. The QP shall include at least the following:

- Organizational structure including the assignment of responsibilities and authorities and the organizational units of the Contractor and sub-contractors.
- The specific operational functions of the Contractor's Quality Manual.
- The application of contract related procedures, processes and instructions for activities.
- Introduction and qualification of new methods, processes and procedures for the life cycle processes.
- Analysis, evaluation and correction of problems/non-conformities.
- Fulfilment of specific requirements (e.g. reliability/maintainability/ interoperability/serviceability/safety etc.)
- Preparation of inspection and test specifications for acceptance tests and for their approval as necessary.
- The design, implementation and verification programme for the complete product including theoretical/analytical demonstration, formal reviews, functional and acceptance tests.
- Methods for notification and submittal of documents required by the contract to the Purchaser.

3.13.2.4. The QP shall also incorporate the following:

- Deliverable Quality Plan (DQP) in accordance with AQAP-2105, further details in AQAP-2009, Annex D, Section 3.
- Software Project Quality Plan (SPQP) in accordance with AQAP-2210, further details in AQAP-2009, Annex E, Part 2.

3.13.3. Quality Management Process

3.13.3.1. The Contractor shall conduct the activities for system level quality management as defined in AQAP-2210 and ISO/IEC 15288 Quality Management Process (Paragraph 6.2.5).

3.13.3.2. The Contractor shall conduct the activities for software quality as defined in AQAP-2210 and ISO/IEC 12207, Quality Management Process (Paragraph 6.2.5).

3.13.3.3. The Contractor shall conduct the activities for hardware quality as defined in AQAP-2120 and ISO 9001:2008.

3.13.4. Purchaser Quality Assurance Process

3.13.4.1. The Government Quality Assurance (GQA) multilateral agreement, existing between NATO countries and NATO organizations, is laid down in STANAG 4107.

3.13.4.2. The Contractor shall recognise and accept the application of STANAG 4107 for this Contract and sub-contracts thereof.

3.13.4.3. The Contractor shall comply with the requirements of STANAG 4107. In addition, the Contractor shall use AQAP-2070 as guidance to the delegation of GQA.

3.13.4.4. The Contractor shall provide all necessary assistance to the Purchaser QA Representative (QAR), or his delegated National Quality Assurance Representative (NQAR), if and when Quality Assurance (QA) activities are delegated in accordance with STANAG 4107 in the Contractor's and Sub-Contractors' facilities.

3.13.5. Quality Register

3.13.5.1. Quality Register (QReg) is a register containing summary details of all planned and completed quality activities. The Quality Register is used by the Project Managers and Project Assurance of both Contractor and Purchaser as part of the reviewing progress (PRINCE2).

3.13.5.2. The Contractor shall establish and maintain a project Quality Register which lists all planned and performed quality checks on Contractor deliverables.

3.13.5.3. The Contractor shall make the Quality Register available on the Project Website.

3.14. Communication Management

3.14.1. Communication Management Strategy

3.14.1.1. A Communication Management Strategy (CMS) contains a description of the means and frequency of communication to parties both internal and external to the project. It facilitates engagement with stakeholders through the establishment of a controlled and bi-directional flow of information (PRINCE2).

3.14.1.2. The Contractor shall prepare a CMS.

3.14.2. Electronic Media

3.14.2.1. Non-repudiation of any electronic information exchange will be provided by The Purchaser’s Electronic Mail System.

3.14.2.2. The Contractor’s all official deliveries will be accepted by the Purchaser’s Contracting Officer. The acceptance will be made by e-mail.

3.14.2.3. Electronically scanned copies of signed documents can be exchanged via e-mail where applicable.

3.14.3. Information Sharing

3.14.3.1. All e-mails or any other communication mechanism shall be limited with “need-to-know” principle. “Reply all” function should be refrained.

3.14.3.2. Level of recipients’ positions and relevance of information shall be considered for each e-mail.

3.14.3.3. Only professional e-mail addresses shall be used for official communication.

3.14.3.4. Official English language shall be used in all e-mails.

3.14.4. Postal Services

3.14.4.1. Information exchange through postal services can be used when necessary.

3.14.5. Delivery

3.14.5.1. All hard copies shall be delivered to the Purchaser by either postal services or by a representative of the Contractor.

3.14.5.2. Receipts will be signed by the Purchaser's representative.

3.15. Meetings

3.15.1. General

3.15.1.1. Unless otherwise specified, at least one week before all meetings required under this Contract, the Contractor shall send an invitation, including the following:

- Purpose
- Agenda
- List of participants
- Date, time, place, duration

3.15.1.2. The Contractor shall record meeting minutes and post them on the Project Website within three (3) working days after the meeting.

3.15.1.3. The meeting minutes shall include:

- Date, time and location of the event
- List of participants
- Meeting Agenda
- Input documents
- Discussion
- Comments raised
- Decisions taken
- Action Items
- Attachments

3.15.1.4. The minutes shall not be used as a mechanism to change the terms, conditions or specifications of the Contract, nor as a vehicle to alter the design or configuration of equipment or systems. Such changes shall only be made by agreement, amendment or by authorised mechanisms as set forth in the Contract.

3.15.2. Project Kick-Off Meeting

3.15.2.1. The Contractor's Project Manager or designated representative shall participate in the Project Kick-off Meeting with the Purchaser's Project Manager and members of the TRITON Integrated Project Management Team (IPMT).

3.15.2.2. The Project Kick-off Meeting will be held at the Purchaser's facility within two (2) weeks after the Effective Date of Contract (EDC).

3.15.2.3. Contractor's attendance in person is necessary.

3.15.2.4. The Contractor shall be at least prepared to present a draft Project Management Plan and review the organization of the Project Website.

3.15.2.5. The Contractor shall prepare and submit a Project Kick-off Meeting Report within three (3) business days after the meeting.

3.15.3. Integrated Project Management Team/Configuration Control Board Meetings

3.15.3.1. The Contractor's Project Manager or designated representative shall participate in TRITON IPMT and CCB meetings as requested by the Purchaser's TRITON Project Manager. These meetings will be held at the Purchaser's location, the NCI Agency The Hague.

3.15.3.2. For each CCB meeting the Contractor shall provide the status of all active Change Requests.

3.15.3.3. The Purchaser may combine a CCB meeting with an IPMT meeting. Such a meeting will be counted as one item.

3.15.3.4. Attendance in person is preferred but via video or telephone conferences may be accepted by the Purchaser if meeting agendas are too short to justify travel.

3.15.4. Working Group Meetings

3.15.4.1. In support of incremental development, the Contractor shall establish task-oriented Working Groups with NATO Subject Matter Experts (SMEs).

3.15.4.2. The Contractor shall organise Working Group meetings to conduct reviews with NATO SMEs as specified in Subsection 4.4.

3.15.4.3. The technical reviews supporting Working Groups shall be carried out in the formula of the Joint Technical Reviews and Working Group Reviews.

3.15.5. Additional Meetings

3.15.5.1. The Contractor shall identify to the Purchaser's Project Manager any other meetings with NATO personnel required to support this Contract.

3.15.5.2. Upon approval by the Purchaser's Project Manager, the Contractor shall schedule and conduct such meetings, which shall be mentioned in that month's Project Highlight Report.

3.16. Reviews

3.16.1. Entry and Exit Criteria

3.16.1.1. In general, "Entry and Exit Criteria" support the decision management process prior to and after an identified formal event. They can be used as check lists to decide whether or not to continue with the event or postpone it until the necessary prerequisites are met. They can also be used control the transition from one phase to the next.

3.16.1.2. The Contractor shall define the Entry and Exit Criteria in the related plan of the event and state the satisfactory start and finish points for each formal event.

3.16.1.3. The Purchaser will have right to redefine the Entry Criteria until two (2) weeks prior to the event.

3.16.1.4. Entry Criteria

3.16.1.4.1. Entry Criteria includes affirmative statements regarding the following:

- Status of previous phase

- Status of documents to be used
- Availability of resources to execute the work.

3.16.1.4.2. All items of the defined Entry Criteria shall be checked. The event will start only if the Purchaser agrees the status of the Entry Criteria.

3.16.1.5. Exit Criteria

3.16.1.5.1. Exit Criteria may have two types: "Success Criteria" and "Fail Criteria".

3.16.1.5.2. Success Criteria includes affirmative statements regarding the status of the event after the assessment and the required outputs.

3.16.1.5.3. Success Criteria will be used to identify the condition of any formal event such as Formal Reviews (e.g. SRR, PDR, CDR, TRR, OTRR). The result of the assessment shall be one of the following:

- Passed: All items of the defined Success Criteria are satisfied.
- Conditionally Passed: One or more of the criteria are not fully met. They are identified, recorded and included in the resolution plan.
- Failed: The status is not acceptable for the Purchaser. The event and the assessment have to be repeated according to a revised plan.

3.16.1.5.4. Fail Criteria includes affirmative statements regarding the definitions of unacceptable status.

3.16.1.5.5. Fail Criteria will be used to identify an explicit fail condition for formal events requiring a decision which cannot be recovered (i.e. Decision Gates). If one or more items of the Fail Criteria are satisfied, then the Purchaser will declare the event as "Failed". This event cannot be repeated. Contractual leverages shall apply.

3.16.1.5.6. All items of the defined Success of Fail Criteria shall be checked. The status of the criteria will be determined by the Purchaser.

3.16.2. Project Management Review

3.16.2.1. The Contractor shall execute the Project Management Review (PMR) with the purpose of approving the scope and the plan for the Contractor activities provided within this Contract.

3.16.2.1.1. The PMR meeting shall be hosted by the Contractor.

3.16.2.1.2. The PMR meeting shall be within thirty (30) days after the Effective Date of Contract (EDC).

3.16.2.1.3. The Contractor shall provide the documents given in Table 3-2~~Table 3-2~~ for the PMR.

Table 3-2 –Documents for PMR

Serial	Requirement
1	Project Management Plan (PMP)
2	Project Product Breakdown Structure (PPBS)
3	Project Work Breakdown Structure (PWBS)
4	Project Master Schedule (PMS)
5	Work Package Management

6	Configuration Management Plan (CMP)
7	Quality Plan (QP)
8	Risk Management Plan (RMP)
9	Risk Register
10	Issue Register
11	Quality Register
12	Lessons Log
13	Project Website and Collaborative Working Environment
14	System Development Plan (SDP)
15	Requirements Implementation Schedule (RIS) (Annex to SDP)
16	Usability Engineering Plan (draft) (Annex to SDP)
17	Security Accreditation Plan (draft) (Annex to SDP)
18	Integrated Support Plan (ISP)

3.16.2.2. The Contractor shall prepare PMR Report and submit it to the Purchaser within three (3) working days after the PMR.

3.16.3. Project Checkpoint Reviews

3.16.3.1. The Contractor shall conduct Project Checkpoint Reviews (PCR) at least once a month throughout the Contract period of performance. By default, the PCRs shall take place in the week after the delivery of the PHR. However, the date and time of PCRs may vary and, where possible, be scheduled with other project meetings.

3.16.3.2. The Contractor shall identify and discuss problems with the Purchaser's TRITON Project Manager promptly, however, and not delay this until the next PCR.

3.16.3.3. The PCR shall be conducted in one of the Purchaser's sites or the Contractor's site and the location shall be subject to the Purchaser's Project Manager's approval. By default, the NCI Agency The Hague shall be considered as the location to conduct PCR. However; the location of PCRs may vary and, where possible, be scheduled with other project meetings.

3.16.3.4. Attendance in person is preferred but video or telephone conferences may be accepted by the Purchaser if meeting agendas are too short to justify travel.

3.16.3.5. The Contractor shall organize the first PCR no later than thirty (30) days after the EDC. The first PCR may be combined with PMR.

3.16.3.6. The Contractor shall prepare PCR Report (PCR-R) and submit it to the Purchaser within three (3) days after the PCR.

3.16.4. Formal Reviews

3.16.4.1. The Contractor shall plan and conduct the Formal Reviews (in the form of meeting) with the Purchaser. The initial list of Formal Reviews is given in Table 3-3~~Table 3-3~~.

Table 3-3 – Formal Reviews

Serial	Requirement	Scope
1	Project Management Review (PMR)	Project (initial)
2	Project Checkpoint Review (PCR)	Project (monthly)
3	System Requirements Review (SRR)	System level
4	Preliminary Design Review (PDR)	System level
5	Critical Design Review (CDR)	System level
6	Software Requirements Review (SwRR)	Each SW Build Process
7	Software Design Review (SwDR)	Each SW Build Process
8	Hardware Requirements Review (HwRR)	HW Build Process
9	Hardware Design Review (HwDR)	HW Build Process
10	Hardware Production Readiness Review (PRR)	HW Build Process
11	Test Readiness Review (TRR)	Prior to each test event
12	Sustainment Qualification Review (SQR)	For each Build Process
13	Training Readiness Review (TrRR)	Prior to each training course
14	Site Acceptance Review (SiAR)	At each Site Installation
15	Organizational Node Activation Review (ONAR)	At each Node Activation
16	Provisional System Acceptance Review (PSAR)	After BL3 and 4 delivery.
17	Operational Test Readiness Review (OTRR)	Build Process 2, 3, 4
18	Transition Readiness Review (TrRR)	Build Process 2 and 3
19	In-Service Review (ISR)	During OT&E, system level
20	Monthly Maintenance Review (MMR)	During OT&E
21	Component Acceptance Review (CAR)	At the end of WP4
22	System Verification Review (SVerR)	For each Build Process
23	System Validation Review (SVR)	During OT&E, system level
24	COTS Products Review (COTSPR)	Optional WP

3.16.4.2. The Contractor shall define the Entry and Exit Criteria (see Paragraph 3.3.8) in the related plans in which the reviews are defined. The Purchaser has the right to redefine the proposed criteria.

3.16.4.3. At least two (2) weeks before each Formal Review, the Contractor shall send an invitation to the participants and an organization paper, including as a minimum the following:

- Purpose
- Agenda
- List of participants
- Date, time, location of the Formal Review

3.16.4.4. Upon Purchaser's approval, Formal Reviews can be combined with other meetings or reviews to increase time efficiency. The Contractor may propose optimal dates and schedule considering official holidays and availability of staff.

3.16.4.5. Attendance in person is preferred but video or telephone conferences may be accepted by the Purchaser if a review meeting is deemed to be too short to justify travel.

3.16.5. User Assessment Reviews

3.16.5.1. User involvement in early stages of the development is highly beneficial to correctly understand the user needs and design the software accordingly, especially the user interface. User reviews play a crucial role in providing feedback to designers. The Purchaser will therefore organise User Assessment Reviews (UAR) during each phase of software implementation to assess an implementation product or part of the system under development.

3.16.5.2. During the UAR, participants will review a specification document or a mock-up, or work on a pilot system to provide initial feedback.

3.16.5.3. The Contractor shall support UARs by:

- Preparing a demonstration using the available system capabilities,
- Preparing a scenario to demonstrate the system functions,
- Preparing document reviews,
- Collecting feedback and user comments on the assessed parts of the system or the reviewed product.

3.16.5.4. UAR will be conducted at the Purchaser's PMIC facilities for a duration of three (3) days.

3.17. Project Highlight Report

3.17.1. The Contractor shall provide, no later than the third working day of each month, a Project Highlight Report (PHR). This report shall summarise the activities stated in Table 3-4~~Table 3-4~~.

Table 3-4 – PHR Content

Serial	Requirement
1	Summary of contract activities during the preceding month, including the status of current and pending Work Packages
2	Progress of work and schedule status, highlighting any changes since the preceding report
3	Status of action items and decisions
4	Description of any identified problems, anomalies and high risk areas with proposed solutions and corrective actions
5	Test(s) conducted and their results
6	Provisional financial status and predicted invoices
7	Changes in key Contractor personnel, as approved by the Purchaser
8	Summary of Change Requests requested, recommended or approved
9	Summary of any Site Surveys or other analysis conducted
10	Report on maintenance calls by number, type, and actions taken
11	Plans for activities during the following reporting period

3.17.2. Progress of work and schedule status shall include application of Earned Value Management and provide information to measure progress and performance, including the actual cost incurred by the Contractor under this Contract. Following elements shall be provided based on the data delivered in the WBS:

- Budgeted Cost of Work Scheduled (BCWS)

- Budgeted Cost of Work Performed (BCWP)
- Actual Cost of Work Performed (ACWP)
- Forecast of Remaining Work (FCST)
- Budget at Completion (BAC)
- Estimate to Complete (ETC)
- Schedule Variance (SV)
- Cost Variance (CV)
- Schedule Performance Index (SPI)
- Cost Performance Index (CPI)

3.17.3. The Contractor shall prepare the PHRs as documents and maintain an archive of PHRs on the Project Website.

3.18. Project Status Assessment

3.18.1. The project will be continuously assessed by the Purchaser through a series of control points. These control points are certain events like Milestones in addition to monthly Project Checkpoint Reviews.

3.18.2. Milestones

3.18.2.1. Milestones are the certain events that are held at the end of each development phase to provide visibility to system-wide issues, synchronise the management and engineering perspectives and verify that the goals of the phases have been achieved. SRR, PDR, CDR, TRR, FAT, OTRR, SVT are examples to Milestones. Some Milestones are system-wide (SRR, PDR, CDR, SVR) while some are at Work Package level.

3.18.2.2. Build Process Milestones such as SwRR, SwDR, FAT, SiAR focus the detailed content for a defined scope.

3.18.2.3. The Contractor shall clearly identify in the Project Master Schedule all Milestones identified in this SOW and the Work Packages.

3.18.3. Checkpoints

3.18.3.1. Checkpoints are the selected Milestones or events in the Project Master Schedule used to ensure that the project status is on agreed track. They have clear expectations and tangible results.

3.18.3.2. The Contractor shall clearly identify the Checkpoints and the associated Milestones stated in this SOW in the Project Master Schedule.

3.18.4. Checkpoint Assessment

3.18.4.1. The project will be assessed at each Checkpoint by the Purchaser based on the associated Milestones.

3.18.4.2. “Status Indicators” as traffic lights, Red-Amber-Green colours, will be used to visually indicate the status of the associated Milestones at the time of assessment. A Status Indicator will be assigned to each Milestone according to the amount of schedule deviation as defined in Table 3-5~~Table 3-5~~:

Table 3-5 – Status Indicators for Milestones

Milestone Deviation	Description	Status
0 - 15 days	The Milestone is achieved earlier than the scheduled date or within fifteen (15) days behind the schedule.	Green
15 - 30 days	The Milestone is achieved between fifteen (15) and thirty (30) days behind the schedule.	Yellow
More than 30 days	The Milestone has not been achieved yet although it is more than thirty (30) days behind the schedule.	Red

3.18.4.3. The Purchaser will decide which Status Indicator will be assigned to the Milestones at the time of the Checkpoint assessment.

3.18.4.4. A Checkpoint will be assessed by the Purchaser. The result of the assessment shall be one of the following:

- Success: All associated Milestones are achieved on time.
- Provisional Success: One or more Milestones are not fully achieved. They are recognised as in progress and will be completed within an agreed schedule. The pending items will be reassessed during other PCRs and the status of the Checkpoint can be set to Success.
- Fail: The status of one or more Milestones are not acceptable for the Purchaser. The assessment have to be repeated according to a revised plan. Contractual leverages shall apply.

3.18.4.5. A Checkpoint Assessment may also include warnings to the Contractor, describing the risk areas and subjects to be improved. Warnings can be issued by the Purchaser within a Formal Notification (see Paragraph 3.18.7).

3.18.4.6. Checkpoint Assessments will be in the form a review meeting of the Purchaser and the Contractor. The first PCR after the associated Milestone can be used for Checkpoint Assessment.

3.18.4.7. The Purchaser will use the result of the Checkpoint Assessment to activate other Work Packages.

3.18.5. Contract Phases

3.18.5.1. The Contract Schedule is divided into logical phases called “Contract Phases” in order to assess the performance of the Contract.

3.18.5.2. The Contract Phases are identified in Work Package 1, Project Management.

3.18.5.3. The Purchaser will commit the Contract phase by phase (not as a whole). As such, each Contract Phase is bound to certain Milestones, a Checkpoint and a payment plan.

3.18.5.4. The transition between the Contract Phases are achieved by means of “Decision Gates”.

3.18.6. Decision Gates

3.18.6.1. Decision Gates are used to transition between stages of a project as defined in AAP-20, Section 3. The decisions made at each of the gates may be to (see Figure 6~~Figure 6~~):

- execute the next stage,

- continue this stage,
- go to a preceding stage,
- terminate the programme/project (life cycle),
- hold programme/project (life cycle) activity.

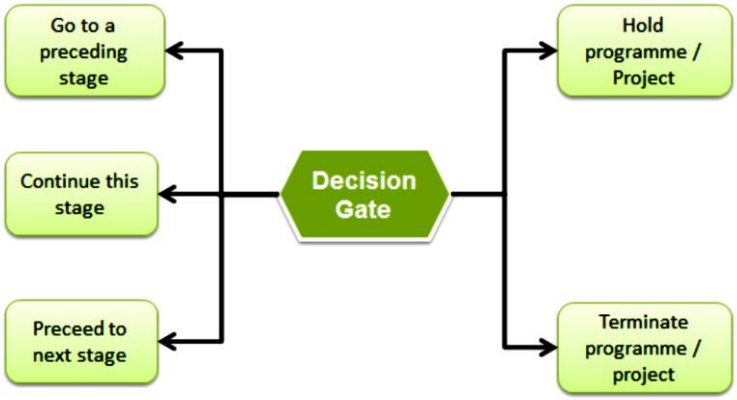


Figure 6 – Decision Gate (AAP-20)

3.18.6.2. Decision Gates mark the milestones and the steps from one Contract Phase into the next. They are mapped to Checkpoints where past work is mature and validated, future work is agreed upon and lessons learned are captured in the Lessons Log and Lessons Report is prepared.

3.18.6.3. Decision Gates may be in the form of review meeting of the Purchaser and the Contractor. The first PCR after the associated Milestone can be used for Decision Gate assessment.

3.18.6.4. The Decision Gates for the TRITON Contract are identified in Work Package 1, Project Management.

3.18.6.5. The Purchaser will define the Entry, Success and Fail Criteria for each Decision Gate and provide them to the Contractor at the last PCR prior to the Decision Gate. The default criteria are defined in the Work Package 1.

3.18.6.6. The Purchaser can use the Decision Gates as break-points at which there will be administrative decision about whether or not continuing the project by executing the next phase. The Purchaser has the right to re-assess if the Contract and the capability it implements is still in NATO's best interest. If not, the Contract will be terminated and Premature Close-out procedure (see 3.19.2) will be activated.

3.18.6.7. A Decision Gate will be assessed by the Purchaser using the Success and Fail Criteria. The result of the assessment shall be one of the following:

- Success: All items in the Success Criteria are met. The Purchaser will commit for the next Contract Phase.
- Provisional Success: One or more items of the Success Criteria are not fully achieved. They are recognised as in progress and will be completed within an agreed schedule. The Purchaser will commit for the next Contract Phase or wait until completion of all identified items. The pending items will be reassessed during other Checkpoints and the status of the Decision Gate can be set to Success.

- Fail: One or more items of the Fail Criteria are met. This Decision Gate can be a break-point for the Contract. The Purchaser may choose not to commit the next Contract Phase. A Cure Plan may be applicable, or the Contract may be terminated.

3.18.6.8. The result of the Decision gate assessment will be a written document signed by the Purchaser formalising the decisions made, or any other form that is deemed appropriate for the project.

3.18.7. Formal Notification

3.18.7.1. The Purchaser may inform the Contractor about certain subjects which are deemed to be not compliant to the contractual requirements and cannot be acceptable. Continuous delays, inefficient plans, unacceptable quality of services, inappropriate project organization are examples to reasons that lead to Formal Notification.

3.18.7.2. A Formal Notification may include one or more warnings to the Contractor, which may have indication levels as “Minor”, “Medium” or “Major”.

3.18.7.3. The Purchaser may use the “Formal Notification” to inform the Contractor in writing about the unacceptable conditions of the Contract based on the status assessment at Checkpoints prior to a Decision Gate.

3.18.7.4. Formal Notifications may have impact on the decision taken by the Purchaser at the Decision Gate.

3.19. Contract Close-out

3.19.1. Planned Closure

3.19.1.1. Planned Contract Close-out occurs after all products and services provided by the Contractor have been accepted by the Purchaser.

3.19.1.2. The Contractor shall finalise all plans such as PMP, CMP, QP, STrP, ISP and ISSP, and all records such as Risk, Issue Register and Lessons Log.

3.19.1.3. The Contractor shall apply the project closure practices as defined in PRINCE2.

3.19.1.4. The Contractor shall plan a Contract Close-out Meeting (CCM) to review all products and services are delivered, and all activities are successfully completed.

3.19.1.5. Contract Close-out Meeting (CCM) and its report shall mark the End of Contract.

3.19.2. Premature Closure

3.19.2.1. Premature Close-out occurs when the Purchaser decides to close the Contract at an earlier phase than the FSA. It does not mean that the work in progress is not simply abandoned, but that the project salvages anything of value created to date and checks that any gaps left by the cancellation of the project are clearly defined.

3.19.2.2. Upon the decision on premature close-out, the Contractor shall:

- Update the Project Plan with actuals from the final phase.
- Identify the status of the Developmental Items under development.
- Identify the work that has not started yet.
- Identify the products already developed.

- Agree the means for recovering products that have been completed or are in progress (if appropriate).
- Develop an Exception Plan to include additional work to create, make safe or complete products that needs to be delivered to the Purchaser.

3.20. Other Project Management Work

3.20.1. Other work that the Contractor shall perform as specified under appropriate Work Packages under the Project Management Task Area includes:

3.20.1.1. Project and security risk analysis.

3.20.1.2. Adapting the Requirements Management.

3.20.1.3. Attending to Purchaser meetings or conferences and giving briefs.

3.20.1.4. Preparation of Project Information Materials such as brochures, white papers, posters and a video presentation.

3.20.1.5. Preparation and maintenance, in coordination with the Purchaser, of a project Lessons Log, project Risk Register and Issue Register.

SECTION 4: TECHNICAL

4.1. General

4.1.1. This section outlines the Technical Task Area of the TRITON Contract.

4.1.2. The Contractor shall design, implement, integrate, test, and deliver the TRITON capability including software and hardware. Furthermore, the Contractor shall provide engineering and operational support for the TRITON capability.

4.1.2.1. The Contractor shall refine the system requirements based on an analysis and a fine-tuning of the Purchaser's functional and non-functional requirements provided in the Contractual SRS; design and develop system elements, adapt and integrate the system elements and components to establish the TRITON Product Baseline; and plan and execute a series of tests to confirm that this baseline meets the functional and non-functional requirements.

4.1.2.2. The Contractor shall provide continuing engineering for the TRITON capability, which shall include analysing the cost and performance impacts on the TRITON Product Baseline of changes in OTS components or system requirements, integrating approved changes, and planning and conducting follow-on tests.

4.1.2.3. The Contractor shall integrate the TRITON capability with existing NATO systems and interfaces, deploy and prepare it for operation as part of the NATO Communications and Information Systems (CIS).

4.1.2.4. The Contractor shall install the TRITON software to Purchaser-designated facilities in close coordination with the Purchaser’s staff.

4.1.2.5. The Contractor shall install a Deployable Kit on board a selected ship in close coordination with the Purchaser’s staff.

4.1.2.6. The TRITON capability shall be made available to its users as a Web-based application running on the existing NATO SECRT Wide Area Network and (NSWAN) and NATO UNCLASSIFIED Network. Stand-alone operation with limited capabilities shall be provided to support Afloat Command Platforms (ACP) in case network connectivity fails during operation at sea.

4.1.2.7. TRITON shall consist of a combination of custom-developed, off-the-shelf (whether commercially available or developed for other customers), and potentially, adaptations of Purchaser-provided prototypes and systems.

4.1.2.8. TRITON shall be built following a Component-Based Framework (CBF) approach for reusability of components and a Service Oriented Architecture (SOA) to provide for flexibility, scalability and agility, to minimise the impacts of future modifications to accommodate changes in other NATO systems and interfaces, as well as changes in the products and technologies employed in the TRITON capability.

4.1.3. As authorised by the Work Packages, the Contractor shall be responsible for the overall design, implementation, integration, and system engineering of the TRITON capability throughout all Product Baselines delivered under this Contract.

4.1.4. The Contractor shall be responsible for delivering the items and services described in this SOW and its Annexes. Any conflict shall be resolved with the Order of Precedence defined below:

4.1.4.1. Precedence 1 - SOW Work Package Requirements: Describe what the deliverables are, when they will be delivered.

4.1.4.2. Precedence 2 - SOW Requirements: Describe how the deliverable item will be prepared and delivered.

4.1.4.3. Precedence 3 - SRS Requirements: Describe the system element functions.

4.1.4.4. Precedence 4 - SRS Descriptions: Define and clarify the system element functions.

4.1.5. The Final System Acceptance (FSA) shall be achieved when all system and project requirements are met, all services are delivered.

4.2. System Life Cycle Processes

4.2.1. The Contractor shall apply the system life cycle processes as defined in AAP-48 referencing to ISO/IEC 15288 under [STANAG 4728].

4.2.2. The AAP-20 defines, based on the ISO/IEC 15288 system definition and its general life cycle model, the customer (NATO, Agencies, Nation or Groups of Nations) system concept and the necessary skeleton (stages) for the life cycle. The appropriate Decision Gates mark milestones and the steps from one stage into the next. The big picture given in Figure 7~~Figure 7~~ shows the relationship and dependencies between the documents and major elements of the system life cycle concept.

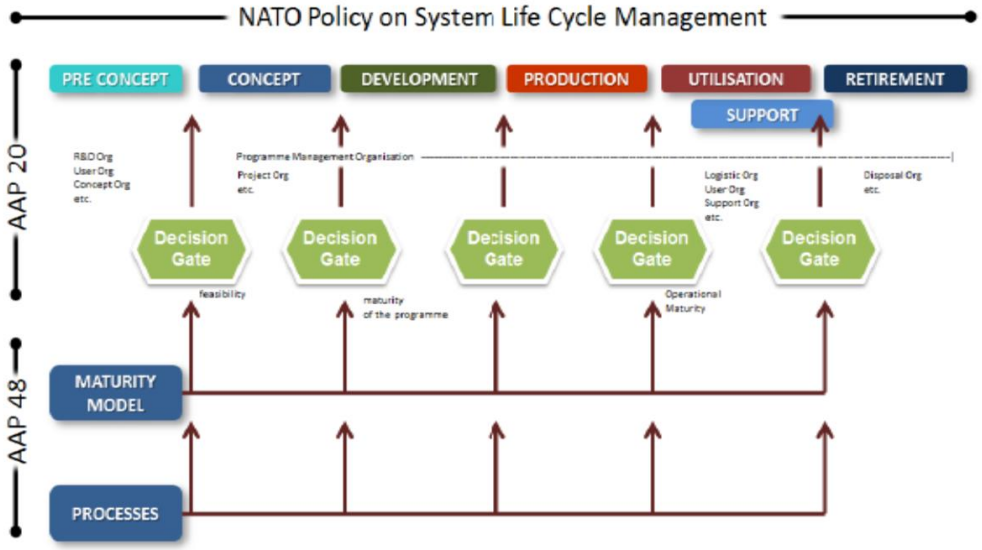


Figure 7 – NATO Policy on System Life Cycle (AAP-20)

4.2.3. The NATO Policy on Life Cycle Management provides the frame for all system life cycle elements and linked these with the industrial life cycle framework described in ISO/IEC 15288. The Development Stage and Production Stage are covered within this Contract with overlaps on Utilisation Stage. The mapping of overall life cycle of AAP-20 onto the TRITON life cycle is depicted in Figure 8~~Figure 8~~.

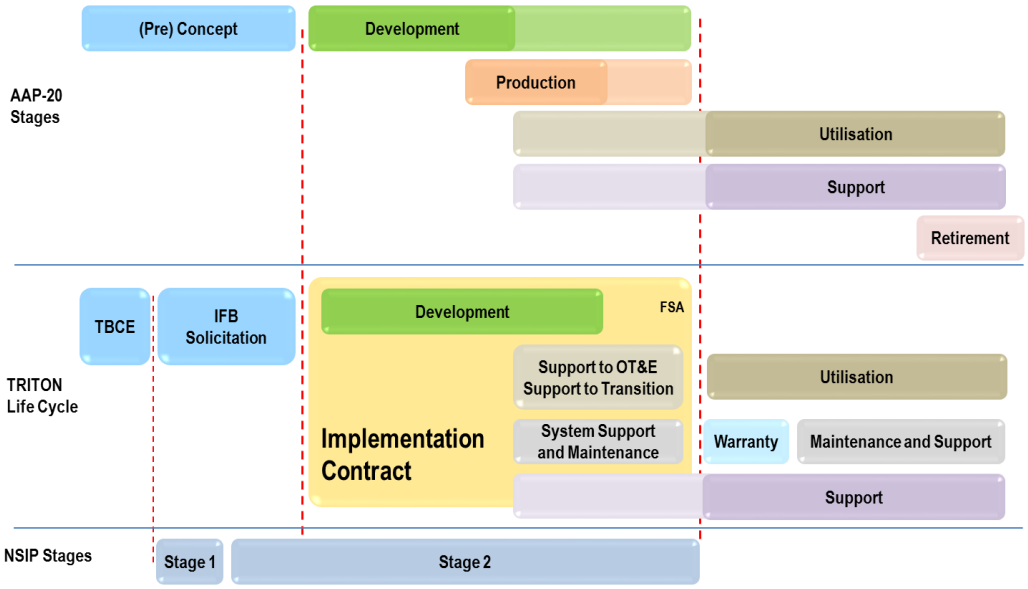


Figure 8 - Life Cycle Mapping

4.2.4. The Contractor shall apply the system life cycle activities defined in this Contract.

4.2.5. The Contractor shall construct software (and produce hardware) at his own or his sub-contractor's premises. After the internal software construction is completed with internal unit tests, the System Verification and Transition Process will start. This process is defined in this SOW and also depicted in Figure 9~~Figure 9~~.

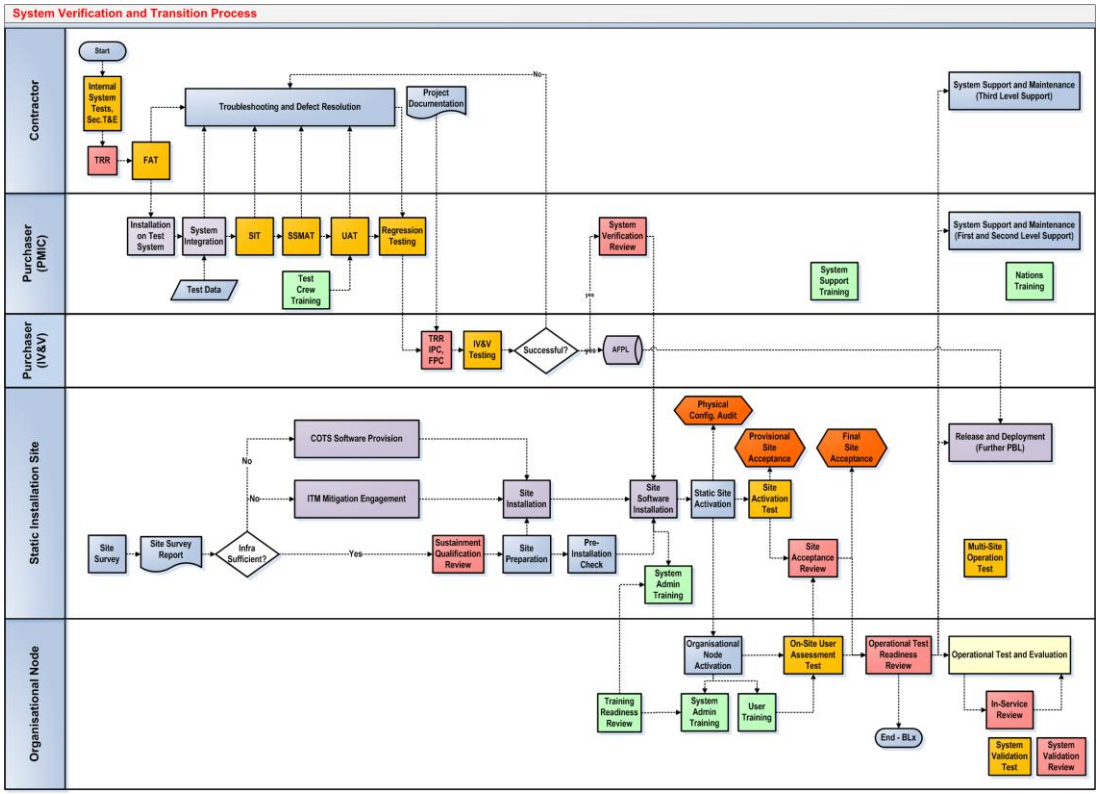


Figure 9 – System Verification and Transition Process

4.3. Incremental Development Methodology

4.3.1. General system life cycle approach and terminology as defined in AAP-48 (referring to ISO/IEC 15288) shall be used during the realisation of TRITON. A summary of the general system life cycle processes to implement TRITON capability is given in Figure 10~~Figure 10~~.

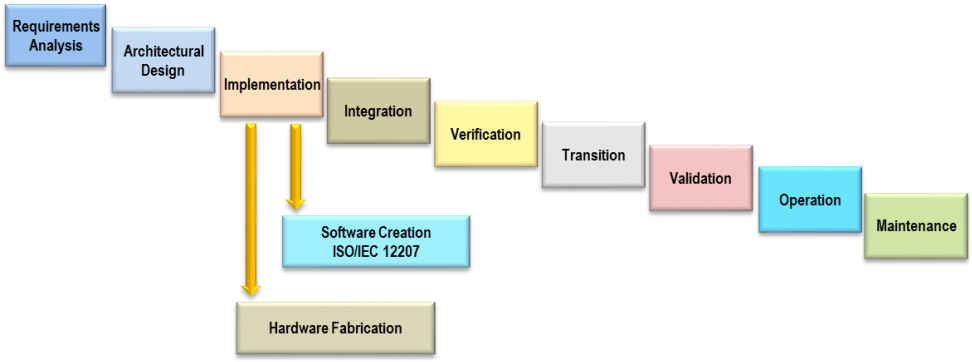


Figure 10 – System Life Cycle Processes

4.3.2. The Contractor shall deliver TRITON using an Incremental Development Methodology. Each increment shall be identified as a "Build Process" which shall be realised using Waterfall Methodology. Software shall be developed using the software life cycle processes as defined in ISO/IEC 12207. A summary of the general software life cycle processes to be used for each Build Process are given in Figure 11~~Figure 11~~.

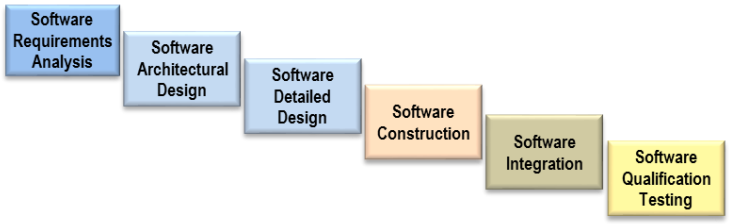


Figure 11 - Software Life Cycle Processes

4.3.3. The Contractor shall group the system requirements and assign the groups to a Baseline to be developed in a Build Process. After developing software through each Build Process, a software product with a baselined version will be delivered and set to operation. There may be parallel or overlapping Build Processes for Baselines, which can reuse previously developed software elements to deliver a new version of the overall system. The overall TRITON System Life Cycle, notionally depicting the Incremental Development with Multiple Deliveries is given in Figure 12~~Figure 12~~.

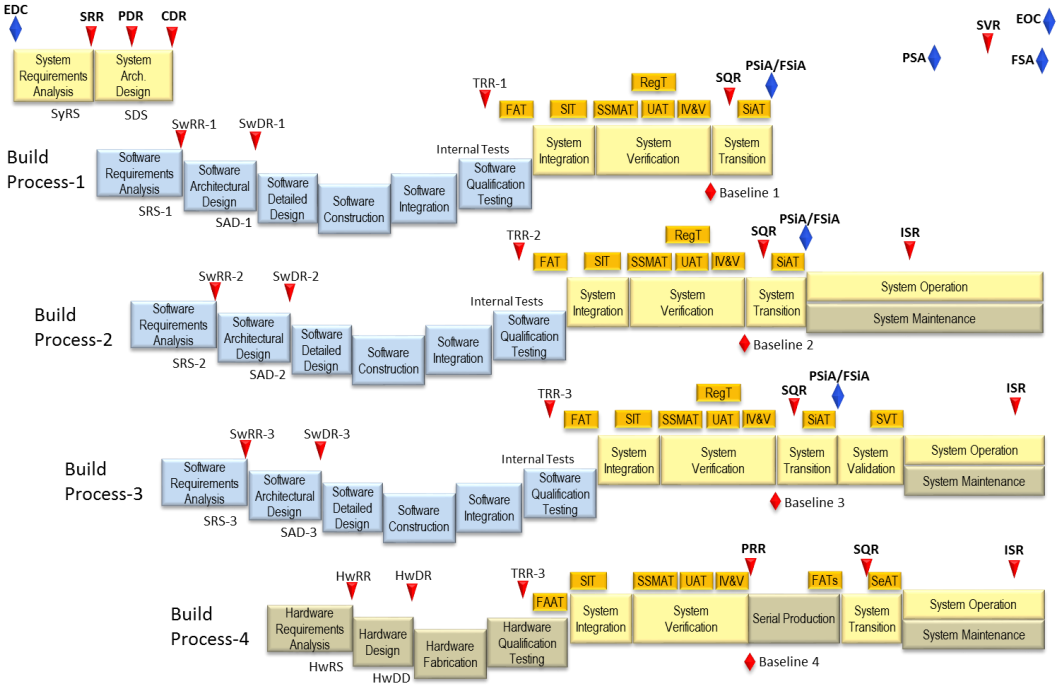


Figure 12 – TRITON System Life Cycle

4.3.4. During the System Requirements Analysis and System Architectural Design, all requirements defined in the SRS shall be allocated to Baselines according to the proposed solution and the RIS shall be updated. Within each Build Process, the functions and requirements shall be prioritised for applying agile management and development approaches (see Requirements Prioritisation).

4.3.5. The Contractor shall apply the software life cycle processes defined in [ISO/IEC 12207] to build a product in each Build Process, to deliver it and set it to operation.

4.3.6. Within each Build Process, the Contractor shall conduct software requirements analysis, software architectural and detailed design following a Waterfall Methodology; and then construct the software, integrate it with hardware, interface it with external systems, test and create a product as a "Baseline". The Contractor may apply iterative or agile techniques for detailed software design and construction within a Build Process, but must follow the milestone schedule. Smaller deliveries can be made at the Test System at the Purchaser's site.

4.3.7. The Contractor shall use Software CM Process to manage CIs and to combine the products of each Build Process into one general built.

4.3.8. The Contractor shall fabricate TRITON Deployable Kits conducted as a Build Process.

4.3.9. At the end of each Build Process, the Contractor shall deliver a PBL and install the PBL at the TRITON Test System and Reference System, and the selected NATO sites.

4.3.10. Within each Build Process life cycle, the Contractor shall organise the following types of meetings using the recent version of the developed products relevant to the aim of the meeting:

- Joint Technical Reviews (JTR)

- Working Group Reviews (WGR)
- Formal Reviews

4.3.11. The formal acceptance of the deliverables from the current stage shall be done using the formula of Formal Review, as described in Paragraph 3.16.4.

4.4. Working Groups

4.4.1. The Contractor shall organise activities involving the Purchaser and the Users (excluding the Contractor internal engineering activities and Formal Reviews with the Purchaser) under a Working Group structure.

4.4.2. The Contractor shall ensure that each Working Group addresses requirements, planned or on-going activities, issues and deliverables in its respective scope by collaboration between Users, Purchaser and the Contractor.

4.4.3. The Working Groups shall meet under formula of JTR and WGR.

4.4.4. The Contractor shall seek approval from the Purchaser to decide in which Working Group a subject (activity or deliverable) should be discussed in case the subject belongs to different groups.

4.4.5. In case a subject is not within the scope of a Working Group, the Contractor shall seek approval from the Purchaser to decide in which Working Group the subject will be refined further.

4.4.6. The Contractor shall support the following Working Groups defined within the TRITON Project:

- Systems Engineering Working Group (SEWG)
- Implementation Working Group (IWG)
- Visualisation Component Working Group (VCWG)
- Verification and Validation Working Group (VVWG)
- System Transition Working Group (STWG)
- Operation and Support Working Group (OSWG)

4.4.7. Systems Engineering Working Group

4.4.7.1. The scope of SEWG is the overall requirements analysis, specification, design, technical architecture, integration and interface aspects of TRITON.

4.4.7.2. SEWG will focus on the architectural-driving requirements and the design of TRITON.

4.4.7.3. SEWG will work on the interoperability aspects, interfaces (ICDs) and information exchange standards as well as adapting to changing environment (e.g. changes in Formatted Messages).

4.4.7.4. The SEWG shall include the following representation:

- User SMEs on Maritime domain
- Purchaser Project Manager, Technical Lead, System Manager, Group Leads and selected SMEs
- Contractor’s Project Manager, Technical Lead, Group Leads and selected experts

- Any other staff required for a particular subject.

4.4.7.5. SEWG will coordinate the security aspects of the capability, preparation of the security and INFOSEC documentation.

4.4.8. Implementation Working Group

4.4.8.1. The Contractor shall organise software and hardware implementation activities involving the Purchaser and the operational users (excluding the Contractor internal engineering activities and Formal Reviews with the Purchaser) under the IWG structure.

4.4.8.2. The IWG shall include the following representation:

- User SMEs on Maritime domain
- Purchaser Project Manager, Technical Lead, System Manager, Group Leads and selected SMEs
- Contractor's Project Manager, Technical Lead, Group Leads and selected experts
- Any other staff required for a particular subject.

4.4.8.3. The composition of the IWG shall be adjusted before each IWG Workshop to meet the goals of the review (e.g. software or hardware).

4.4.8.4. The IWG Meetings/Workshops will be held at the Purchaser's location, the NCI Agency The Hague.

4.4.8.5. The Contractor shall use the IWG Meetings/Workshops to discuss all the engineering deliverables.

4.4.8.6. At the IWG Meeting/Workshops the Contractor shall present to the Purchaser the documentation before sending them for the formal approval of the Purchaser. The quality of the provided documents shall reduce the risk that the documents will be rejected during the Formal Review.

4.4.8.7. At the IWG Meeting/Workshop the Contractor shall discuss users' feedback on the TRITON Operational Software deployed to the TRITON Test System.

4.4.8.8. The Contractor shall send the documentation to be discussed at the IWG Meeting/Workshop and deploy, if necessary, any software to the TRITON Test System at least two (2) weeks prior to the IWG Meeting/Workshop.

4.4.9. Visualisation Component Working Group

4.4.9.1. The scope of VCWG is the overall requirements analysis, specification, design, technical architecture, integration and interface aspects of the C4ISR Visualisation Component.

4.4.9.2. VCWG will focus on the architectural-driving requirements and the design of the Component.

4.4.9.3. VCWG will work on the interoperability aspects, interfaces (ICDs) and information exchange standards as well as adapting the Component to TRITON visualisation requirements.

4.4.9.4. The Contractor shall organise the development activities for the C4ISR Visualisation Component under the VCWG structure.

4.4.9.5. The VCWG shall include the following representation:

- User SMEs on geospatial domain
- Purchaser's Group Lead and selected experts
- Contractor's Group Lead and selected experts.

4.4.9.6. The VCWG will meet at mutually-agreed locations or using VTC facilities.

4.4.9.7. The Contractor shall send the documentation to be discussed at the VCWG Meeting/Workshop and deploy, if necessary, any software to the TRITON Test System at least two (2) weeks prior to the VCWG Meeting/Workshop.

4.4.10. Verification and Validation Working Group

4.4.10.1. The scope of VVWG is the support for qualification testing and acceptance of the capability including both functional and non-functional aspects.

4.4.10.2. VVWG will also support preparation of test procedures, test scenarios and test data.

4.4.10.3. The Purchaser will provide test data related to the NATO systems and services. The Contractor shall prepare the test data necessary for executing the testing other systems or services. The Contractor shall make use of the test data provided by the Purchaser.

4.4.10.4. The Contractor shall organise the testing activities under the VVWG structure.

4.4.10.5. The VVWG shall include the following representation:

- Purchaser's Test Manager responsible for the V&V process
- Purchaser's IV&V staff, TV&V staff and selected experts
- Contractor's Test Manager and selected experts
- Contractor's developers when necessary.

4.4.10.6. The Contractor shall send the documentation to be discussed at the VVWG Meeting/Workshop at least two (2) weeks prior to the VVWG Meeting/Workshop.

4.4.11. System Transition Working Group

4.4.11.1. The scope of STWG is the support for installation of the capability, site-specific aspects, training and transition from legacy systems.

4.4.11.2. STWG will provide support for the following:

- Deployment of the capability on the authorised sites
- Training and mentoring aspects for the end-users
  - Training Need Analysis
  - Preparation of Training Materials (including CBT)
  - Providing training courses and computer-based training.
- Software transition from the Contractor to the Purchaser.

4.4.11.3. The STWG shall include the following representation:

- Purchaser's Transition Manager responsible for the transition process
- Purchaser's Training Group Lead

- Purchaser's support staff
- Contractor's Training Group Lead
- Contractor's support staff and developers.

4.4.12. Operation and Support Working Group

4.4.12.1. The scope of OSWG is to provide support during the operation of TRITON OBL and the final deliverables during the OT&E period.

4.4.12.2. The OSWG will also provide support to the acquisition, development and implementation of the physical support capability (e.g. organise the supply chain, set up logistics data, organise warranty and in-service support, organise CM, codification and labelling, etc.).

4.4.12.3. The OSWG shall include the following representation:

- Purchaser's Test Manager responsible for the OT&E process
- Purchaser's support staff
- Contractor's support staff and experts.

4.5. Technical Reviews

4.5.1. Joint Technical Reviews

4.5.1.1. The aim of the Joint Technical Reviews (JTR) shall be to address issues prior to formal coordination of issues within the current Build Process life cycle.

4.5.1.2. The Contractor shall plan and take part in JTRs at locations and dates proposed by the Contractor and approved by the Purchaser. These reviews shall be attended by persons with technical knowledge of the software products to be reviewed. The reviews shall focus on in-process and final software products, rather than materials generated especially for the review. The reviews shall have the following objectives:

4.5.1.2.1. Review evolving software products, using the software product evaluation criteria in listed below:

- Accurately describes (an item)
- Adequate test cases, procedures, data, results
- Consistent with indicated product(s)
- Contains all applicable information in the related description document
- Covers all requirements
- Feasible
- Follows the development plans
- Internally consistent
- Meets contractual requirements
- Presents a sound approach
- Testable
- Understandable.

4.5.1.2.2. Review and demonstrate proposed technical solutions; provide insight and obtain feedback on the technical effort; surface and resolve technical issues.

4.5.1.2.3. Review project status; surface near- and long-term risks regarding technical, cost, and schedule issues.

4.5.1.2.4. Arrive at agreed-upon mitigation strategies for identified risks, within the authority of those present.

4.5.1.2.5. Identify risks and issues to be raised at joint management reviews.

4.5.1.2.6. Ensure on-going communication between acquirer and developer technical personnel

4.5.1.3. Attendance in the JTR is solely at the discretion of the Purchaser and shall not be limited by the Contractor.

4.5.1.4. The Contractor shall capture and manage all issues raised during JTRs in the project Issue Register with a category corresponding to the Working Group handling the issue.

4.5.1.5. The Contractor shall organize and conduct JTR to address and resolve critical technical issues in advance of the Working Group Reviews, supporting incremental development.

4.5.1.6. The Contractor shall propose the subject and the timing of the JTRs to ensure the most critical technical risks are raised and mitigated as early as possible. The JTRs shall be planned as early as possible but as a minimum four weeks prior to the review to provide sufficient time for the identification of appropriate operational users and arrangements for their participation.

4.5.1.7. The Contractor shall deliver, at least one (1) week prior to each JTR, a meeting agenda and a list of issues to be reviewed with an impact assessment, root cause of the issue (evidence) and possible solutions per issue.

4.5.1.8. Unless agreed by the Purchaser or organised in accordance with 4.5.1.14, all JTRs shall be conducted at a Purchaser Facility (either the NCI Agency Brussels or The Hague). The specific date and location must be agreed between the Contractor and the Purchaser's Project Manager.

4.5.1.9. The Contractor shall provide all relevant resources including personnel, hardware, software, and tools at each review.

4.5.1.10. The Contractor shall propose the detailed scope of the JTRs executed within the Build Process. The JTR’s shall be based on deliverables reviewed at SRR, PDR and CDR, following the Incremental Development approach.

4.5.1.11. The Contractor shall provide, at each review, presentation and discussion of each issue, including relevant technical material such as requirements references, design specifications, views, use cases, mock-ups, screenshots, or prototypes.

4.5.1.12. The Contractor shall deliver, within one week after each JTR, the Minutes of Meeting, updated Issue Register, and any resulting proposed Change Requests.

4.5.1.13. In addition to the JTRs, the Contractor may call additional Working Group meetings, when deemed necessary, to ensure that critical project risks are raised, discussed, and resolved as early as possible throughout the course of the project.

4.5.1.14. The Contractor may organise JTRs using remote meeting technologies (online conferencing tool) over the NATO Unclassified network after approval by the Purchaser.

4.5.1.14.1. The online review meeting shall take place in regular Central European Time (CET) business hours (i.e. 09:00 to 17:00).

4.5.1.14.2. The online review may be planned on a shorter notice than a regular review, but not shorter than a week.

4.5.1.14.3. The Contractor shall ensure that participating in an online review is at no-cost for the participants. Any licences for the online meeting shall be arranged at the beginning of the Contract by the Contractor.

4.5.1.14.4. The Contractor shall allow the online review of material with classification up to NATO Unclassified using appropriate security means.

4.5.2. Working Group Reviews

4.5.2.1. The aim of the Working Group Reviews (WGR) shall be verification of the deliverables produced during the current Build Process and providing recommendation for the next Build Process. The verification shall be carried out using the scope defined for SRR, PDR and CDR, as planned by the Contractor.

4.5.2.2. Attendance in the WGR is solely at the discretion of the Purchaser and shall not be limited by the Contractor.

4.5.2.3. The Contractor shall capture and manage all issues raised during WGRs in the project Issue Register with a category corresponding to the Working Group handling the issue.

4.5.2.4. The Contractor shall organise a WGR at the end of each Build Process.

4.5.2.5. The Contractor shall organise a single WGR not to last more than two hours for a remote meeting. In case the agenda requires more time, more sessions shall be organised in coordination with the Purchaser.

4.5.2.6. The WGRs shall follow the requirements as specified for the JTRs, with the exception that WGRs shall keep the scope separately for each Working Group and shall not join their meetings, unless otherwise agreed by the Purchaser.

4.5.2.7. The Contractor may organise WGRs using remote meeting technologies (online conferencing tool) over the NATO Unclassified network after approval by the Purchaser.

4.5.2.7.1. The online review meeting shall take place in regular CET business hours.

4.5.2.7.2. The online review may be planned on a shorter notice than a regular review, but not shorter than one (1) week.

4.5.2.7.3. The Contractor shall ensure that participation to an online review is at no-cost for the participants. Any licences for the online meeting shall be arranged at the beginning of the Contract by the Contractor.

4.5.2.7.4. The Contractor shall allow the online review of material with classification up to NATO Unclassified using appropriate security means.

4.5.3. IWG Workshops

4.5.3.1. The IWG shall meet under the formula of IWG Workshop.

4.5.3.2. The aim of the IWG Workshop shall be to address issues prior to formal coordination within the current Build Process.

4.5.3.3. Attendance in the IWG Workshop is solely at the discretion of the Purchaser and shall not be limited by the Contractor.

4.5.3.4. The contractor shall organize an IWG Workshop either in a form of a standard meeting on a location selected by the Purchaser, or via a remote meeting. The selection is to be approved by the Purchaser.

4.5.3.5. Remote meeting can be used to increase efficiency for the User Community to participate in the IWG Workshop session.

4.5.3.6. In case of a remote meeting, the Contractor shall make sure the duration of the session not to last more than two hours. In case the agenda requires more time, several sessions shall be organised in coordination with the Purchaser.

4.5.3.7. The Contractor shall capture and manage all issues raised at IWG Workshop in the project Issue Register.

4.5.3.8. The Contractor shall organize IWG Workshop at least twice per Build Process, before the planned Formal Reviews.

4.5.3.9. The IWG Workshop shall aim into recommendation for approval of the deliverables produced during the Build Process. The verification shall be carried out using the scope defined for the related Formal Review.

4.6. System Development Plan

4.6.1. The Contractor shall provide and maintain a System Development Plan (SDP). The SDP shall include all necessary activities for planning, managing and controlling the engineering efforts for specifying, designing, implementing, integrating, testing, installing and supporting TRITON capability.

4.6.2. The SDP shall describe the following:

4.6.2.1. Engineering Work Packages and Work Items defined in the PWBS Dictionary.

4.6.2.2. The system development strategy including the organization, tasks, resources, and methodologies.

4.6.2.3. The technical approach, including the relationship between bespoke (i.e. software specially written to specification) and off-the-shelf (OTS) products (i.e. existing products that can be integrated with little or no customization).

4.6.2.4. The engineering processes (e.g. development technologies, development practices, design methodologies, unit testing and system integration procedures, risks analysis, control and monitoring mechanisms).

4.6.2.5. The computing environment including COTS hardware, operating system and other infrastructure software.

4.6.2.6. The development and test methodologies, standards, tools (including OTS products and programming or scripting languages), engineering environment, equipment, facilities, libraries, interfaces, plug-ins/add-ins, glue code and data.

4.6.2.7. Change Management and Configuration Management of the TRITON SyRS, SDS, and TMP, which shall be described in line with the Incremental Development methodology (described in 4.2).

4.6.2.8. System development schedule, which shall be prepared in line with the Incremental Delivery methodology (described in 4.2).

4.6.2.9. Purchaser/user participation, which shall be achieved using a Working Group structure (described in 4.4).

4.6.2.10. Requirements management, which shall be performed to ensure traceability and alignment with requirements from other NCI Agency projects, and to Baseline requirements within the Work Packages (described in 4.8.2).

4.6.2.11. Following annexes:

- Requirements Implementation Schedule (RIS)
- Usability Engineering Plan (UEP)
- Security Accreditation Plan (SAP)

4.6.3. Requirements Implementation Schedule

4.6.3.1. The Contractor shall provide (in the Bid) a Requirements Implementation Schedule (RIS), which lists groups of TRITON requirements from the Contractual SRS and assigns in which Baseline the requirement will be implemented (Available at Bidding Time, Available at Baseline 1, 2, 3, 4 or PSA). The requirements for the C4ISR Visualisation Component shall also be allocated to its own Baselines, 1, 2 or 3.

4.6.3.2. The Contractor shall provide, in the RIS, the roadmap for any COTS components used in the technical solution in the Bid. The Roadmap should contain the list of planned updates to the COTS product and the new functionality that will be included in each Baseline.

4.6.3.3. The Contractor will suggest, in the RIS, what will be implemented in each Build Process based on the proposed concept, technical solution envisioned, availability of COTS components and other factors relevant for the Bid.

4.6.3.4. The RIS shall have tabular form as specified in the template given Annex C with at least the following columns:

- Requirement identification
- Requirement short description
- Implementation Baseline and Milestone:
  - Available at EDC
  - Baseline (1, 2, 3, 4)
  - PSA
  - Not implemented (requirements will not or cannot be implemented)

4.6.3.5. Each requirement shall have only one Baseline or Milestone selected.

4.6.4. Usability Engineering Plan

4.6.4.1. Usability Engineering Plan (UEP) which defines how the human-centred activities fit into the overall system development process shall be prepared as an annex to the SDP, in accordance with ISO 9241-210:2010.

4.6.4.2. The UEP shall identify:

4.6.4.2.1. The human-centred design process activities such as:

- Understanding and identifying context of use and supported user tasks,
- Considering recent military and industry Human-Computer Interaction (HCI) innovations,
- Surveying academic usability research,
- Producing prototypes for user assessment and Graphical User Interface (GUI) design refinement,
- Evaluating GUI designs with users including usability testing and HCI evaluation,
- Procedures for integrating these activities with other system development activities (e.g. analysis, design, implementation, testing).

4.6.4.2.2. The individuals and the organization(s) responsible for the human-centred design activities and the range of skills and viewpoints they provide;

4.6.4.2.3. Effective procedures for establishing feedback and communication from users and other Purchaser representatives on human-centred design activities as they affect other design activities, and methods for documenting these activities;

4.6.4.2.4. Appropriate milestones for human-centred activities integrated into the overall design and development process, including events with the users prior to the SRR, PDR, CDR, TRR, FAT, SIT, SiAT, SiAR, SQR and OTRR.

4.6.4.2.5. Suitable timescales to allow feedback and possible design changes to be incorporated into the project schedule.

4.6.5. Security Accreditation Plan

4.6.5.1. The Security Accreditation Plan (SAP) describes the Contractor deliverables and the interaction with the Purchaser in order to achieve timely system INFOSEC accreditation.

4.6.5.2. The Contractor shall prepare the SAP compliant to [AC/35-D/2005-REV3].

4.7. Configuration Management Process

4.7.1. General

4.7.1.1. Configuration Management (CM) is the technical and administrative activity concerned with the creation, maintenance and controlled change of configuration throughout the life of System Elements.

4.7.1.2. The Contractor shall perform CM in accordance with the NATO CM Contractual Requirement document and the applicable additional requirements as selected on NATO Form ACMP-2009. STANAG-4427 which covers [ACMP-2000], [ACMP-2009] and [ACMP-2100] shall be used as the main reference. The industry standard [ISO 10007] shall be used for further guidance.

4.7.1.3. The system is decomposed into building blocks. System Elements are the main building blocks and also considered as a System Component.

4.7.1.4. A Component is a general term that is used to mean one part of something more complex. For example, a computer system may be a component of an IT Service, an Application may be a Component of a Release Unit. Components that need to be managed should be Configuration Items (ITILv3).

4.7.1.5. A Configuration Item (CI) is any Component that needs to be managed in order to deliver a Service. Information about each CI is recorded in a Configuration Record within the Configuration Management System and is maintained throughout its life cycle by CM. CIs are under the control of Change Management. CIs typically include IT Services, hardware, software, and formal documentation such as Process documentation and Service Level Agreements (ref. ITIL v3).

4.7.1.6. The Contractor shall use a structural decomposition of system into System Elements, Components, CIs and further. A notional decomposition is given in Figure 13~~Figure 13~~ (the type of each element/component to be identified as software or hardware).

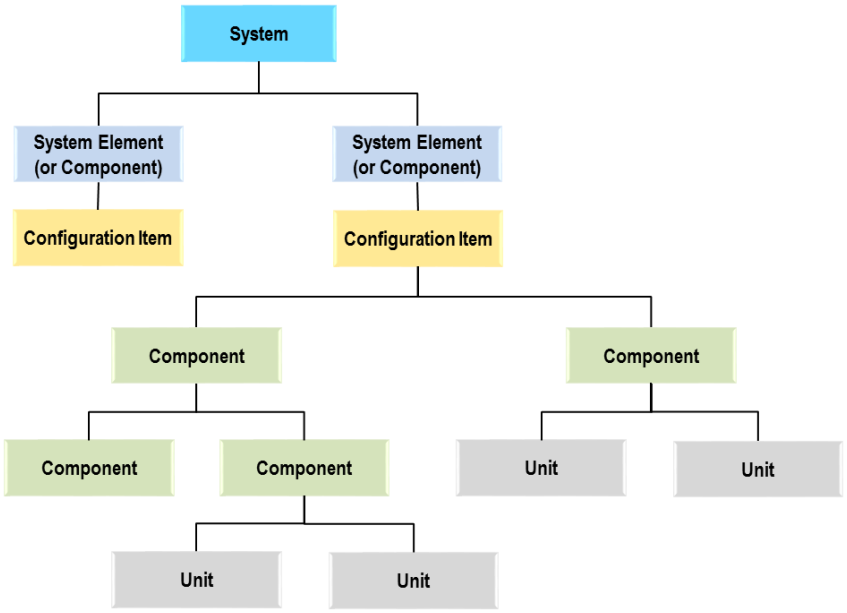


Figure 13 – System Decomposition

4.7.1.7. The Contractor shall implement a CM program in accordance with [STANAG-4427], which covers [ACMP-2000], [ACMP-2009] and [ACMP-2100], to carry out the CM functions as described in this SOW (configuration item identification, configuration control, configuration status accounting, and configuration verification).

4.7.1.8. The CM program shall enable the baselining of CIs into the FBL, ABL and PBL and the maintenance of these baselines throughout the duration of the contract.

4.7.1.9. The Contractor shall ensure that an effective CM organization is established and maintained to implement the CM program and apply all necessary CM procedures, in accordance with the requirements and guidance applicable for this contract throughout the duration of the contract.

4.7.1.10. Under the CM program the Contractor shall maintain and update all project CIs as requested by changes within the project or external to the project throughout the duration of the contract.

4.7.1.11. The Contractor shall establish and maintain a Configuration Management System (CMS) to store all CIs.

4.7.1.12. The Contractor shall describe the CM program and the CM organization in a CMP.

4.7.2. Configuration Item Identification and Documentation

4.7.2.1. A CI is an aggregation of hardware, software, or both that satisfies an end-use function and is designated for separate configuration management.

4.7.2.1.1. Computer Software Configuration Items (CSCI) is an aggregation of software that satisfies an end use function and is designated for separate configuration management. CSCIs are selected based on trade-offs among software function, size, host or target computers, developer, support concept, plans for reuse, criticality, interface considerations, need to be separately documented and controlled, and other factors.

4.7.2.1.2. Hardware Configuration Item (HWCI) is an aggregation of hardware parts that satisfies an end use function and is designated for separate configuration management.

4.7.2.2. The Contractor shall establish, document and maintain a configuration identification system in accordance with [ACMP-2009].

4.7.2.3. The Contractor shall use configuration identification to divide the system into CIs (HWCI and CSCI) for ease of management. Configuration identification shall identify the documents that establish each baseline. The identification process will continue as long as the system is undergoing change.

4.7.2.4. The Contractor shall identify, for each CSCI, its Computer Software Components (CSC) and Computer Software Units (CSU), if any. For each CSCI, CSC and CSU, the Contractor shall issue/obtain a Software Identifier, which shall consist of a name or number, and a version identifier, and shall relate the software to its associated software design documentation, revision, and release date.

4.7.2.5. The Contractor shall identify, for each HWCI, its assembly and parts. For each part the Contractor shall issue/obtain a Hardware Identifier, which shall consist of a name, CAGE number, part number and serial number, and shall relate the hardware part to its associated hardware design documentation, revision, and date of production.

4.7.2.6. An explanation of the rationale and criteria used in the process of selecting CIs shall be provided and be based on the criteria for selection of CIs as detailed in [ACMP-2009].

4.7.2.7. The CIs shall be chosen in accordance with [ACMP-2009] and in a way to assure visibility throughout the development effort and easy support to the operational system after acceptance.

4.7.2.8. All COTS, adapted and developed software shall be designated as CIs.

4.7.2.9. Where COTS can be installed in a modular fashion, the description of the CI shall unambiguously identify the complete list of installed components.

4.7.2.10. The Contractor shall ensure that the configuration baselines and configuration items are persistently stored in a COTS Configuration Management Database (CMDB) and that it shall be kept consistent and updated.

4.7.2.11. The CMDB shall provide the ability to easily trace higher and subordinate CIs using CI identifiers or other CI attributes.

4.7.2.12. The CMDB shall include the Data Information Packets (DIP) specified in [ACMP-2009].

4.7.2.13. The CI identification system shall provide the ability to easily trace higher and subordinate CIs.

4.7.2.14. Each commercial/government/NATO/modified-off-the-shelf (OTS), adapted, and developed software application or module shall be designated as a CI.

4.7.2.15. Each complete hardware element shall be designated as a CI and shall be marked in accordance with [STANAG 2290].

4.7.2.16. The CI structure shall be a tree structure with TRITON being the top level CI and shall show the relationships between the lower level CIs. The Purchaser reserves the right to modify the CI structure prior to its baselining.

4.7.2.17. The level of granularity for the CI selection shall reach at minimum:

- Line Replaceable Units (LRUs) - Hardware CIs,
- Software Assets and/or Firmware - Software CIs,

4.7.2.18. The Hardware CI attributes shall include, but is not limited to, the MDS.

4.7.2.19. Any Documentation CI shall include, but is not limited to, the Contract Schedule of Supplies and Services (SSS) attributes.

4.7.2.20. Each physical deliverable software shall be marked with the Contract number, its associated CI identifier, name, version number, release date, and media copy number.

4.7.2.21. Non-Developmental Items identified as CI, when modified to satisfy project requirements, shall be re-identified as a project modified CI, and documented accordingly.

4.7.3. Configuration Baselines

4.7.3.1. The Contractor shall establish the following Configuration Baselines for each CI:

- Functional Baseline (FBL)
- Allocated Baseline (ABL)
- Development Baseline (DBL)
- Product Baseline (PBL)
- Operational Baseline (OBL)

4.7.3.2. The Contractor shall ensure that the configuration documentation defining the Configuration Baselines is mutually consistent and mutually compatible. Each succeeding level of configuration documentation from the FBL to the ABL to the PBL and OBL shall be traceable to, and be a detailed extension of, its predecessor(s).

4.7.3.3. Functional Baseline

4.7.3.3.1. The Functional Baseline (FBL) is the initial approved functional configuration identification (documentation) for each system element which describes the system functional characteristics.

4.7.3.3.2. The system level FBL shall be derived from the TRITON Contractual SRS and shall be established at the successful completion of the SRR with the approved SyRS.

4.7.3.3.3. Since Incremental Development with Multiple Deliveries Approach is used, there will be separate FBLs for each Build Process during the Contract execution, which are subsets of the system-level FBL.

4.7.3.4. Allocated Baseline

4.7.3.4.1. The Allocated Baseline (ABL) is the allocation of the FBL to (physical) system elements. It is the initial approved allocated configuration identification (documentation) for each system element functional and interface characteristics allocated from those of a higher level CI, and interface requirements with interfacing CIs, additional design constraints and the verification required to demonstrate the achievement of those specified functional and interface characteristics.

4.7.3.4.2. The ABL shall be a product of the Preliminary Design stage (approved at CDR) and provides architecture of the system at the element level.

4.7.3.5. Developmental Baseline

4.7.3.5.1. The Developmental Baseline (DBL) is the status of the TRITON capability during development by the Contractor.

4.7.3.5.2. The system level DBL shall be established after successful completion of the PDR and shall be finally approved at the CDR. Each Build Process shall have its own Design Review to set the DBL for that Build Process.

4.7.3.5.3. The Contractor shall include the TRITON System Design Specification (SDS) (including the Requirements Traceability Matrix), the TMP, and any other documentation deemed appropriate by the Contractor, in accordance with provisions of ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 12207, to ensure TRITON requirements are reflected in the system during development and integration, can be demonstrated through a comprehensive set of tests, and can be delivered in the form of the Product Baseline.

4.7.3.6. Product Baseline

4.7.3.6.1. The Product Baseline (PBL) is the initial approved product configuration identification (documentation) for each CSCI and HWCI. It reflects the “as-built” configuration of the system.

4.7.3.6.2. The PBL documentation shall describe all of the necessary functional and physical characteristics of the CI, any required joint and combined operations, interoperability characteristics of a CI and the selected functional and physical characteristics designated for production acceptance testing and tests necessary for support of the CI.

4.7.3.6.3. The PBL shall be established after successful completion of the CDR.

4.7.3.6.4. The PBL shall contain all delivered HWCI, CSCI and documentation that comprise the TRITON Increment 1 (for both NS and NU) system and any subsequent releases.

4.7.3.6.5. The Contractor shall include in the PBL release package the elements listed in Table 4-1~~Table 4-1~~, as a minimum.

Table 4-1 – Product Baseline Contents

Serial	Requirement
1	All required CSCIs and HWCIs.
2	The source code of elements categorised as foreground knowledge, script, and configuration setting baseline, including the documentation for these items.
3	The script and configuration setting baseline, including documentation for these items, for non-development software items (e Microsoft Office).
4	Release notes, which include a description of what is new or changed in each software module.
5	List of open known problems and faults.
6	The SyRS and SDS versions against which the PBL has been developed.
7	ICD for TRITON external interfaces
8	All design artefacts provided as part of the SDS, updated to reflect the Product Baseline.
9	Conversion programs and instructions
10	Plug-ins/add-ins, glue-code and interfaces.
11	Parameter definitions.
12	Initial data sets.
13	Online help files.
14	Test procedures and test cases for any automated tests, along with all source data for the manual and automated tests and including the documentation for these items.
15	Copyright and license information.
16	Instructions for system administration staff to follow to save the previously installed system baseline, to install the new baseline, and to recover the old baseline if the new baseline installation must be interrupted or aborted.
17	Installation scripts.
18	Instructions on how to identify and report problems after acceptance.
19	Instructions for the generation of new Product baselines, distribution and installation of new software versions, and any test procedures and test cases necessary to verify the generated baseline before distribution.
20	Additional documentation artefacts identified in the SyRS.

4.7.3.7. Operational Baseline

4.7.3.7.1. The Operational Baseline (OBL) is the "approved" product configuration identification (documentation) for all delivered CSCI and HWCI and other documentation that comprise the TRITON systems (NS, NU, Deployable Kit) and any subsequent releases. It reflects the "as-deployed" configuration of the system.

4.7.3.7.2. Since Incremental Development with Multiple Deliveries Approach is used, there will be multiple OBLs during the Contract execution until FSA. Each OBL shall be identified with a unique number.

4.7.3.7.3. The final OBL shall be established after successful completion of Validation Process and approved at the FSA.

4.7.4. Versioning and Baselines

4.7.4.1. The Contractor shall apply the guidance provided by the Purchaser for versioning and baselines.

4.7.4.2. Baselines will be given a major release number and a minor release number comprising an "X.X.X" notation. Once a system is approved for Approved Final Product List (AFPL), which is maintained by the NCI Agency, it is given a version number 1.0.

4.7.4.3. TRITON Baselines shall be given version numbers starting with 1.X and followed by a release number (e.g. 1.2.1).

4.7.4.4. Long term Operational Baseline shall be identified as 2.0.

4.7.4.5. Similar numbering scheme shall be used for the C4ISR Visualisation Component.

4.7.4.6. An example list of versions and releases of TRITON Operational Software and C4ISR Visualisation Component is given in Table 4-2:

Table 4-2 – Release Numbers

Build	Name	Baseline	Release Number
Build Process 1	BL1 – TRITON-NS (Pilot)	BL 1	1.1.0
Build Process 2	BL2 – TRITON-NU (full)	BL 2	1.2.0
Build Process 3	BL3 – TRITON-NS (full)	BL 3	1.3.0
Build Process 4	BL4 – TRITON-ACP NS (full)	BL 4	1.4.0
FSA	TRITON Increment 1	OBL	2.0
C4ISR Visualisation Component	Visualisation Component – BL1	VC-BL1	1.1.0
	Visualisation Component – BL2	VC-BL2	1.2.0
	Visualisation Component – BL3	VC-BL3	1.3.0
CAR	C4ISR Visualisation Component	OBL	2.0

4.7.4.7. Intermediate baselines, whether they are Functional or Developmental baselines, shall be labelled logically within this scheme. For example, 1.2.1 is an interim release within Build Process 2.

4.7.4.8. The Contractor shall develop Configuration Control mechanisms to keep one single source tree and generate multiple OBLs out of this tree. The concept is presented in Figure 14~~Figure 14~~.

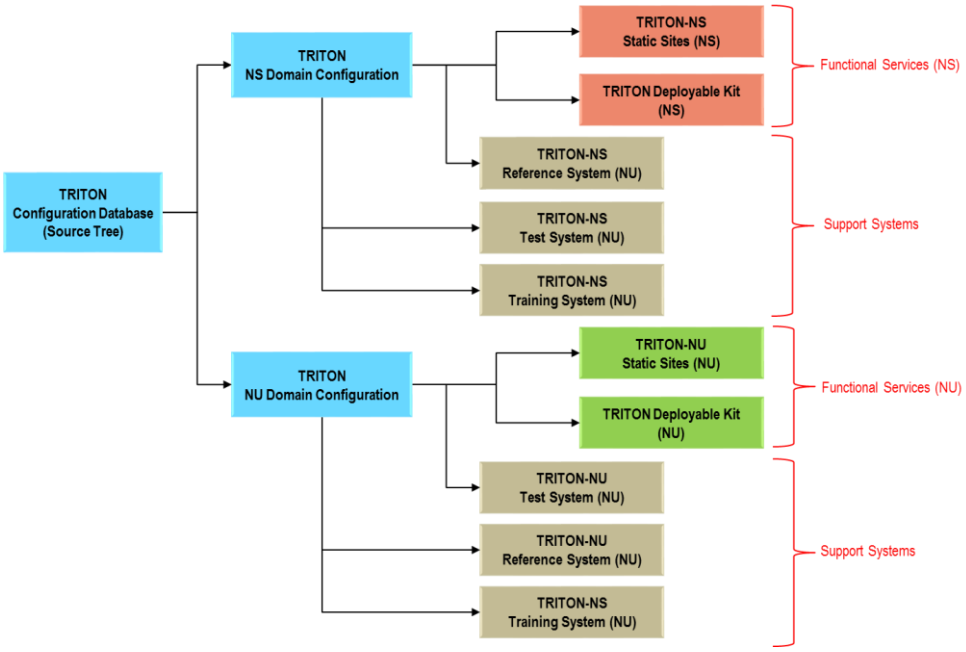


Figure 14 – Configuration Control for OBLs

4.7.4.9. TRITON Deployable Kits shall be identified with Model Numbers like “TDK Model 1”.

4.7.5. Configuration Management Plan

4.7.5.1. The Contractor shall prepare a Configuration Management Plan (CMP) in accordance with [STANAG 4427] and deliver it together with the PMP.

4.7.5.2. The Contractor shall define in the CMP the CM organization and the relation to the overall organization.

4.7.5.3. The Contractor shall identify the means by which continuity of effort and understanding is achieved between his subcontractors and himself, and between the PM and himself and internally within his organization, for the allocated CI, integrating, interfacing or otherwise related CI, contractor organizations, test and evaluation activities, and managers.

4.7.5.4. The CMP shall describe the relationship with the SSS.

4.7.5.5. The Contractor shall define CM organization and procedures in place to implement the CM program and manage the CM functions and the role of the CCB.

4.7.5.6. The CMP shall describe relation between the CMS at the Contractor’s site and the CMS to be deployed at the Purchaser’s site.

4.7.5.7. The CMP shall describe how the CM data will be handed-over to the Purchaser to be further supported as described in Section 5.

4.7.5.8. Procedures and the schedule for updating the CMP shall be included in the CMP itself. The CMP, when approved, shall serve as a working document to plan, guide, and measure the CM process. CM shall be implemented in accordance with the approved CMP.

4.7.6. Configuration Control

4.7.6.1. The Contractor shall apply configuration control measures to each Baseline and CI in accordance with [ACMP-2009].

4.7.6.2. The Contractor shall define the responsibilities and procedures used within the Contractor's organization for configuration control of established CI, and for processing changes to these CI.

4.7.6.3. The Contractor shall define the Configuration Baseline Change Procedures and shall submit Notice of Revision or Request for Deviations and Wavers when required and approved by the Purchaser.

4.7.7. Change Management Process

4.7.7.1. The Contractor shall implement a central Change Management Process that addresses the approval and controls the implementation of changes to the TRITON infrastructure in accordance with [ACMP-2009].

4.7.7.2. The Contractor shall implement the Change Management Process to:

- Assess changes.
- Minimize the impact of changes on the TRITON Baselines.
- Ensure the traceability of changes.

4.7.7.3. The Contractor shall implement a Change Management Process to ensure that standard methods [ACMP-2009] and procedures are used, that changes can be dealt with quickly, with the lowest possible impact on service quality. All changes must be traceable.

4.7.7.4. The Contractor shall organise the Change Management Process such that the following objectives are successfully met:

4.7.7.4.1. Reduced adverse impact of changes on the quality of TRITON Baselines.

4.7.7.4.2. Better estimates of the costs of proposed changes.

4.7.7.4.3. Fewer changes are reversed, and any back-outs that are implemented proceed more smoothly.

4.7.7.4.4. Enhanced management information is obtained about changes, which enables a better diagnosis of problem areas.

4.7.7.4.5. Improved user productivity through more stable and better TRITON Baselines.

4.7.7.4.6. Increased ability to accommodate frequent changes without creating an unstable TRITON operational environment.

4.7.8. Change Requests

4.7.8.1. The Contractor shall establish and maintain a process for identifying, reviewing, approving, and tracking all requests for changes to FBL, ABL and PBL in accordance with [ACMP-2009].

4.7.8.2. Change Requests (CR) identify proposed changes to the FBL, ABL or PBL.

4.7.8.3. The Contractor shall prepare and submit Engineering Change Proposals (ECP), Requests for Deviations (RFD), Requests for Waivers (RFW), and Notices of Revision (NOR) in accordance with [ACMP-2009].

4.7.8.4. Any CR shall contain, at a minimum:

- Identification number per request
- Requestor's identity
- Date of request
- Type of change (e delete, add etc.)
- Requested change description
- Status of request (how it was addressed – e, completed, not addressed etc.)
- Comment/Resolution of the request
- If the requested change impacts the cost, design, implementation, licensing scheme, or any other contractual documentation, then two other areas shall be addressed:
  - Impact on schedule, cost, performance, or any other contractual requirements (based on an analysis)
  - Priority for handling (high/critical/urgent, medium/sensitive/important, low)
- Consequences if the change is not implemented.

4.7.8.5. The Contractor shall foresee a change approval mechanism that consists of the three aspects given below:

- Financial approval - cost/benefit analysis and budget.
- Technical approval - impact, necessity and feasibility.
- Business approval - approval by the customers requiring the change and those functions impacted by the change.

4.7.8.6. The Contractor shall apply internal configuration control measures to the configuration documentation of each CI, prior to the time that each CI is baselined.

4.7.8.7. The Contractor shall prepare and process an ECP for engineering, design, development changes, and shall classify and submit to the Purchaser. The process and classification is defined in [ACMP-2009].

4.7.9. Deficiency Reports

4.7.9.1. The Contractor shall establish and maintain a process for reporting, tracking, and resolving deficiencies in the Developmental and Product Baselines.

4.7.9.2. Deficiency Reports (DRs) are used to document the problems encountered during the design, configuration, implementation and operation of the TRITON capability.

4.7.9.3. DRs shall be closed when the identified problem is resolved through procedure or other action that does not affect the system baselines, or when a corresponding CR is opened to correct the deficiency through a change to a baseline.

4.7.10. Configuration Status Accounting

4.7.10.1. The Contractor shall be fully responsible for the Configuration Status Accounting (CSA) for all CIs in accordance with [ACMP-2009].

4.7.10.2. Under the CSA function the Contractor shall prepare CSA reports in a manner, and format which shall be proposed by the Contractor in his CMP and approved by the Purchaser.

4.7.10.3. The Contractor shall deliver CSA reports to the Purchaser both as part of management and specialist products in this Contract and also as standalone documents at the Purchaser's request.

4.7.10.4. At the end of the Contract, the Contractor shall deliver a set of final CSA reports for each CI or set of CI's in both hard copy and in electronic media.

4.7.10.5. Configuration Status Accounting System

4.7.10.5.1. The Contractor shall maintain a CSA System (CSAS) for all CIs. The CSAS shall be capable of recording and reporting on the status of the configuration baselines and maintaining traceability of all configuration changes to the current baselines.

4.7.10.5.2. The CSAS shall be maintained and provided as a database, spreadsheet, or version control system. It shall provide the following data for each CI:

- Associated baseline
- CI identifier
- CI name
- Version number
- Release date
- Audit date

4.7.10.5.3. The CSAS shall provide the following data for each CR:

- Unique CR identifier
- CR title
- Description
- Justification
- Category
- POC identifying CR
- Priority
- Criticality (high, medium, low)
- Impact on schedule, cost and performance
- Baseline(s) affected
- CIs affected
- Date opened
- Date approved or rejected
- Date closed
- Status

4.7.10.5.4. The CSAS shall provide the following data for each DR:

- Unique DR identifier

- DR title
- Description
- Category
- POC identifying DR
- Priority
- Severity (high, medium, low)
- Impact on schedule, cost and performance
- Baseline(s) affected
- CIs affected
- Date opened
- Date approved or rejected
- Date closed
- Status

4.7.10.5.5. The CSAS shall be maintained in such a manner that it can readily be copied in part or in total.

4.7.10.5.6. The CSAS shall provide a complete historical record of all CIs, CRs, and DRs.

4.7.10.5.7. The CSAS shall be capable of providing the following reports:

- List of CIs associated with a baseline
- List of all CRs and DRs associated with a CI
- List of all audits
- Log of all changes to a baseline

4.7.11. Configuration Verification

4.7.11.1. Upon request from the Purchaser, the Contractor shall support Configuration Audits to demonstrate that the actual status of all CIs matches the authorised state of CIs as registered in the Configuration Status Accounting reports according to [ACMP-2009].

4.7.11.2. The Contractor shall support the Functional Configuration Audit (FCA) and Physical Configuration Audit (PCA) as defined in [ACMP-2009], by providing the required Baseline Documentation and answering questions from the Purchaser's Auditor. The Contractor shall schedule the FCA and PCA in the CMP.

4.7.11.3. The Contractor shall plan the FCA during the TRR, and the PCA during the SiAR of each Build Process.

4.7.11.4. The Contractor shall draft a Configuration Audit Report (CAuR) for the FCA and PCA that summarises the results for the Purchaser's approval.

4.7.11.5. The Contractor shall solve any deficiencies found during the Configuration Management Audits within the agreed timeframe and update the Baseline accordingly.

4.7.11.6. The initial version of the ABL, and PBL shall be provided to the Purchaser for acceptance. Upon Purchaser Acceptance, ABL and PBL shall be placed under the control of the CCB.

4.7.11.7. The Contractor shall be responsible for ensuring that Subcontractors, Vendors, and Suppliers participate in audits, as appropriate.

4.7.11.8. The acceptance of the ABL and PBL by the Purchaser signifies only that the Purchaser agrees to the Contractor's approach in meeting the requirements. This acceptance in no way relieves the Contractor from its responsibilities to meet the requirements stated in this Contract.

4.7.11.9. The Contractor shall keep the contents of the ABL and PBL under Configuration Control and shall keep it current to reflect the progress of the project activities.

4.7.12. Configuration Management and Software Versioning Tool

4.7.12.1. The Contractor shall create and maintain a COTS-based Configuration Management System (CMS), including the CMDB, which persists the CIs attributes, (inter-) relationships.

4.7.12.2. A software source code version control tool shall be used for any custom software development.

4.7.12.3. The version control/configuration management automation tool shall include the capabilities for baseline management, source control versioning (including source code), configuration item identification, change request management, deficiency reporting management, and configuration status accounting.

4.7.12.4. The Contractor shall provide the Purchaser read-only access to the version control/configuration management automated tool via the project Web-site.

4.7.12.5. The Contractor shall provide the ability for the Purchaser to access (read-only) the source code of the baseline via the version control/configuration management automation tool.

4.7.12.6. The Contractor shall provide the information about the COTS tools to the Purchaser. If it is proprietary solution, the Contractor shall provide the necessary licenses to enable life-cycle configuration management.

4.7.12.7. The Contractor shall enable the Purchaser to be able to download the baseline on a weekly basis, including components required to perform a build.

4.8. System Requirements Analysis Process

4.8.1. General

4.8.1.1. The Contractor shall perform system requirements analysis activities in compliance with the processes defined in ISO/IEC 15288, Paragraph 6.4.2 as referred by AAP-48, Paragraph 6.4.2.

4.8.1.2. The Contractor will use ISO/IEC 29148 as a basis for Requirements Engineering.

4.8.1.3. The Contractor shall review the Contractual SRS and all other applicable documents; liaise with NATO subject matter experts as necessary; and prepare its recommendations in terms of proposed changes to the SRS. The Contractor may propose changes to the SRS, in order to resolve inconsistencies and/or make improvements. Such proposals will be considered by the Purchaser through the CCB approval process after the Systems Requirements Review (SRR) Meeting.

4.8.1.4. The Contractor shall conduct an initial System Requirement Analysis phase at system level to support the Incremental Development methodology (described in Subsection 4.2).

4.8.1.5. The Contractor shall use ~~the DOORS (IBM)~~a Requirements Management Ttool for managing~~ement of~~ the system-level ~~and project~~ requirements ~~given in SOW and~~ (SyRS) and software requirements (SRS). The Contractor shall deliver the updated requirements repository to the Purchaser in modules compliant to IBM Rational DOORS v9.6 or the version used by the Purchaser at the time of delivery. The Contractor shall deliver the requirements repository to the Purchaser as defined in Paragraph 4.8.9.

4.8.1.6. The Purchaser will provide the TRITON Requirements Management Database (RMD) to the Contractor.

4.8.1.7. The Contractor shall update the RIS, as Annex to the SDP, to reflect the requirements to be implemented as a Baseline as agreed during the SRR (described in Paragraph 4.8.7).

4.8.1.8. The Contractor shall justify any proposed changes to the requirements by the expected system cost, schedule, performance, and supportability impacts.

4.8.1.9. The Contractor shall also identify any requirements that seem to be in conflict (e.g. with design constraints).

4.8.1.10. The Contractor shall identify the requirements initially satisfied by the proposed solution.

4.8.2. Requirements Identification, Elaboration and Validation

4.8.2.1. The focus and effort for TRITON Increment 1 Project is on analysing and consolidating the TRITON requirements provided as part of this Contract as the basis for establishment of TRITON Increment 1 for both NS and NU Domains.

4.8.2.2. The Contractor shall provide additional support for requirements identification, elaboration and validation as stated below:

4.8.2.2.1. Elicit, analyse, and support validation of stakeholder needs, expectations, constraints, and interfaces to specify requirements that constitute an understanding of what will satisfy stakeholders.

4.8.2.2.2. Develop the lifecycle requirements of the product (e.g. development, transition to operations, maintenance).

4.8.2.2.3. Review operational concepts and scenarios to refine and discover detailed requirements.

4.8.2.2.4. Analyse needs and requirements (for each product lifecycle phase), the operational environment, and factors that reflect overall customer and end-

user needs and expectations for attributes such as safety, security, portability, maintainability, performance, interoperability and affordability.

4.8.2.2.5. Define the environment in which the product will operate, including boundaries and constraints.

4.8.2.2.6. Analyse stakeholder needs, expectations, constraints, and external interfaces to remove conflicts and to organize into related subjects.

4.8.2.2.7. Analyse requirements to determine whether they satisfy higher level requirements.

4.8.2.2.8. Analyse requirements to ensure that they are complete, feasible, realizable, and verifiable.

4.8.2.2.9. Identify key requirements that have a strong influence on cost, schedule, functionality, risk, quality, or acceptance.

4.8.2.2.10. Identify technical performance measures to be tracked during the implementation.

4.8.2.2.11. Derive new system-level requirements from the existing ones if further clarification is needed according to the proposed solution.

4.8.2.2.12. Explore the adequacy and completeness of requirements by developing product representations (e.g. prototypes, simulations, models, scenarios, and storyboards) and by obtaining feedback about them from relevant stakeholders.

4.8.2.2.13. Analyse the requirements to determine the risk that the resulting product will not perform appropriately in its intended-use environment.

4.8.2.2.14. Define constraints for verification and validation.

4.8.2.2.15. Establish and maintain relationships among the requirements under consideration during change management and requirements allocation.

4.8.2.2.16. Apply requirements elicitation, documentation, and verification and validation methods based on sound engineering principles.

4.8.2.2.17. Provide impact assessment of new project issues, risks, and changes.

4.8.2.3. Requirements Prioritisation

4.8.2.3.1. The Contractor shall prioritise capabilities, functions and requirements using MoSCoW (Must have, Should have, Could have, Would like but won't get) method, initially trying to deliver all the "Must have", "Should have" and "Could have" requirements, but the "Should" and "Could" requirements will be the first to be deferred if the delivery timescale looks threatened.

4.8.2.3.2. Minimum Usable SubseT (MUST) of functions shall be completely implemented, thoroughly tested and delivered. The functions and requirements defined in SRS are all in MUST status within the Contract duration. Prioritisation is therefore only applicable within the Build Processes and any approved maintenance work.

4.8.2.3.3. The Contractor shall apply at least three-level prioritisation as given below and depicted in Figure 15:

- Level 1: Capability allocation to Baselines (as described in SRS and RIS)

- Level 2: Function allocation within a capability
- Level 3: Requirement allocation within a function (e.g. into sprints).

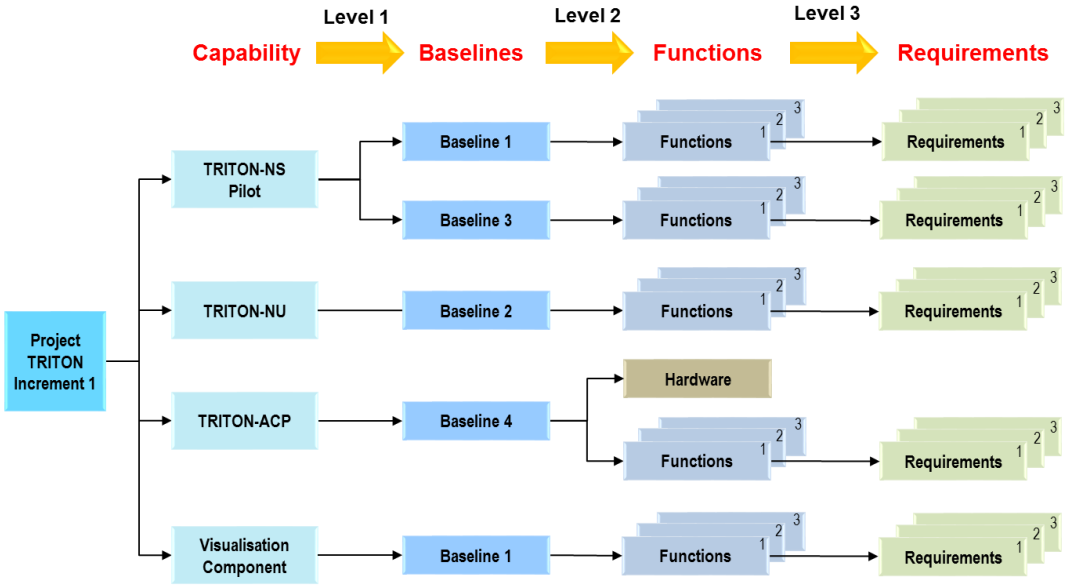


Figure 15 – Requirements Prioritisation

4.8.2.3.4. Within each Build Process, prioritised requirements can be implemented in small increments and interim baselines can be deployed on the Test System at PMIC to allow continuous development, testing and integration process.

4.8.2.3.5. The Contractor shall propose a prioritisation approach such as prioritising functions and requirements as 1, 2, 3, and develop a plan.

4.8.2.3.6. Upon Purchaser's approval, the Contractor shall conduct the development plan supported by an agile management and development practice, and update continuously.

4.8.2.4. The Contractor shall employ the following techniques to elicit system requirements as applicable:

- Questionnaires and interviews with staff officers
- Business Process Analysis
- Operational scenarios obtained from end users
- Operational walkthroughs and end-user task analyses
- Prototypes, storyboards and models
- Observation of existing products, environments, and workflow patterns
- Participation in NATO exercises
- Structured workshops with brainstorming
- Working Group studies
- Market surveys (for any COTS product)
- Extraction from sources such as business process documents, standards, or specifications
- Use Cases and User Stories
- Technical documentation review

- Reverse engineering (for legacy products).

4.8.2.5. The Contractor shall employ the following techniques to elicit project requirements as applicable:

- Organise, facilitate, and document the results of Joint Technical Reviews and other stakeholder workshops (such as the Working Groups) in an agreed requirements database, and architecture product deliverables.
- Develop Use Cases to identify in details, the required functions, supported processes, information exchanges, and operational modes of the system.
- Develop proposed changes to the system requirements, justified and documented by the products mentioned above.
- Re-prioritise functions and requirements according to the progress and test results.

4.8.3. System Requirements Specification

4.8.3.1. The Contractor shall prepare the System Requirements Specification (SyRS) by using the Contractual SRS with approved changes and, as required, extended with additional details supporting the approved scope including the identification of COTS products to be used.

4.8.3.2. The Contractor shall use ISO/IEC 15289, ISO/IEC 29148 as a basis for developing the SyRS.

4.8.3.3. The Contractor shall propose changes to the Contractual SRS during the Incremental Development in order to take into account outcomes of the Working Group reviews or to mitigate identified issues.

4.8.3.4. The Purchaser will propose changes to the contractual SRS during the Incremental Development to take into account outcomes of the Working Group reviews or to mitigate identified issues.

4.8.3.5. The Purchaser will propose a prioritised requirements list to insure that proposed changes can be considered by the TRITON CCB within the same Build Process scope or within another.

4.8.3.6. The Purchaser will propose elaborated contractual requirements consistent with user requirements to a level of detail that is sufficient to be included in the Contract.

4.8.4. User Interface Specification

4.8.4.1. The Contractor shall prepare User Interface Specification (UIS) to capture the details of the Human Machine Interface (HMI) including Graphical User Interface (GUI) and covering all possible actions that an end user may perform.

4.8.4.2. The Contractor shall ensure that the GUI design is compliant to the NCI Agency Style Guide.

4.8.4.3. The UIS shall include the following:

- All user interaction through HMI
- Main Application View design
- Structure and navigation of Web pages
- Individual Application GUI

- Dialog boxes
- Notification windows
- Tooltips
- Description and navigation for each window
- All elements in a window (including the menu/list items)
- Behaviour of control widgets

4.8.4.4. The UIS shall include all use cases for logical flow, description of displays, windows and dialog boxes, full range of information displayed in GUI elements (e.g. items for a pull-down list).

4.8.4.5. The Contractor shall deliver the first UIS with high-level requirements at PDR, a more detailed, preliminary version at CDR. The actual details for individual software elements shall be added during related Build Processes and evaluated at related Software Requirements Reviews and Software Design Reviews.

4.8.4.6. The UIS will be updated during detailed software design and reviewed by operational users as planned during the Build Processes.

4.8.4.7. The Contractor shall provide user interface mock-ups supporting the descriptions included in the UIS better understanding and more effective assessment.

4.8.5. Security Risk Assessment and Requirements Analysis

4.8.5.1. The Contractor shall conduct a Security Risk Assessment (SRA) which identifies all threats, vulnerabilities, and resulting risks to TRITON using the NATO version of the PILAR methodology.

4.8.5.1.1. The SRA shall identify any changes to the contractual SRS required to achieve the desired system accreditation.

4.8.5.1.2. The Contractor shall provide a report documenting the findings of its SRA.

4.8.5.1.3. The SRA Report shall be discussed at the TRITON IWG Workshop and agreed with the Purchaser.

4.8.5.1.4. The SRA Report will be subject to the approval by the respective NATO Security Authority. The Contractor is requested to update the document as requested to obtain security approval.

4.8.6. System-Specific Security Requirement Statement

4.8.6.1. The Contractor shall prepare the System-specific Security Requirement Statement (SSRS) and the Community Security Requirement Statement (CSRS) defining all security measures required to counter the risks identified in the SRA, as a change to the Contractual SRS.

4.8.6.2. The Contractor shall prepare a System Interconnection Security Requirement Statement (SISRS) for each interface between TRITON and any other Purchaser system on NS Domain.

4.8.6.3. The SSRS, CSRS and SISRS shall be based on the documents provided by the Purchaser and shall be discussed at TRITON IWG Workshop

4.8.6.4. The Contractor shall develop and provide system documentation before the IV&V Testing as required by the NCI Agency in order to support the Security Penetration Test and screening activities and to include TRITON in the NATO AFPL. The security settings and related testing documentation will be provided as part of PFE.

4.8.7. Reliability Engineering

4.8.7.1. The Contractor shall perform Reliability Engineering to meet the related non-functional requirements specified in the SyRS. The Reliability Engineering shall include the following:

- System availability and operational readiness analysis and related reliability and maintenance requirement allocation
- System failure analysis
- Design reliability analysis
- System error handling and diagnostic design
- Failure and recovery analysis

4.8.7.2. The Contractor shall document the results of Reliability Engineering in the SyRS, derive requirements for software development, review the system-level and component design and perform specific tests to make sure the product can meet the specifications.

4.8.7.3. The Contractor shall also consider Availability and Maintainability aspects of the product and review the design according to the specification.

4.8.8. System Requirements Review

4.8.8.1. System Requirements Review (SRR) is a multi-disciplined review to ensure that the system under review can proceed into initial systems development, and that all system requirements and performance requirements derived from the SyRS are defined and testable, and are consistent with cost, schedule, risk, technology readiness, and other system constraints.

4.8.8.2. The Contractor shall organise and conduct the SRR at the Purchaser's facility to present the updated SyRS as the Functional Baseline (FBL) for TRITON.

4.8.8.3. Entry Criteria

4.8.8.3.1. The Contractor shall include in planning the SRR Entry Criteria given in Table 4-3~~Table 4-3~~ and make them available to the Purchaser at least two (2) weeks prior to the SRR:

Table 4-3 – SRR Entry Criteria

Serial	Activities / Documents
1	A preliminary SRR agenda
2	Success Criteria (enhanced or adapted)
3	System Requirements Specification (SyRS)
4	Traceability of requirements from SyRS to SRS
5	Security Risk Assessment Report (SRA-R)
6	System-Specific Security Requirements Statement (SSRS)
7	Community Security Requirements Statement (CSRS)

8	System Interconnection Security Requirements Statements (SISRS)
9	Preliminary system requirements allocation to the next lower levels.
10	Updated schedule
11	Preliminary software development plan
12	Preliminary verification and validation approach
13	Updated risk assessment and mitigations in the Risk Register
14	Active Change Requests

4.8.8.4. Success Criteria

4.8.8.4.1. The Purchaser concludes that the SRR Success Criteria in Table 4-4~~Table 4-4~~ accomplished to complete the objectives of the SRR.

Table 4-4 – SRR Success Criteria

Serial	Requirement
1	The resulting overall concept is reasonable, feasible, complete, responsive to the operational requirements, and is consistent with system requirements and available resources (cost, schedule, staff, etc.).
2	The project utilizes a sound process for the allocation and control of requirements throughout all levels, and a plan has been defined to complete the definition activity within schedule constraints. Preliminary software development plan exists.
3	Requirements definition, SyRS, is complete with respect to the Contractual SRS requirements, and interfaces with external entities and between major internal elements have been defined.
4	Requirements allocation and traceability of key driving requirements have been defined from Contractual SRS, down to SyRS and lower level system elements.
5	System and element design approaches and operational concepts exist and are consistent with the SyRS.
6	The requirements, design approaches, and conceptual design will fulfil the mission needs within the estimated costs.
7	Preliminary approaches have been determined for how requirements will be verified and validated down to the system element level.
8	Requirements Implementation Schedule (Annex to SDP) is updated to reflect the requirements to be implemented at each Build Process.
9	All changes to SyRS, SSRS, CSRS, SISRS are agreed, they are accepted to have sufficient detail to begin or continue with the system design and implementation work.
10	Major risks have been identified, and viable mitigation strategies have been defined. Steps to mitigate risks are identified in the Risk Register.

4.8.8.5. The Contractor shall prepare a SRR Report and deliver within one week after the completion of the SRR.

4.8.9. Requirements Management Database

4.8.9.1. The Contractor shall establish and maintain an effective Requirements Management Database (RMD).

4.8.9.2. A copy of the Purchaser's Preliminary System Requirements will be handed over to the Contractor during the TRITON Project Kick-Off Meeting. The Contractor shall take over the requirements that the Purchaser's RMD contains and maintain it throughout the Contract.

4.8.9.3. The RMD shall indicate for each requirement in which iteration it will be implemented. The RMD should also indicate requirements which are covered by COTS components (by definition these should exist at the time of bidding).

4.8.9.4. The Contractor shall provide Internet access for the Purchaser to this RM tool via the Project Website.

4.8.9.5. The Contractor shall provide the initial version of the system-level RMD Baseline at least two (2) weeks prior to the System Requirements Review (SRR), then at each Software Requirements Review (SwRR), and as updated or as requested by the Purchaser.

4.8.9.6. The Contractor shall deliver the final version of the RMD at FSA.

4.8.10. Requirements Change Requests

4.8.10.1. The Contractor shall identify all proposed changes to the Contractual SRS in the form of one or more Change Requests (CR).

4.8.10.2. The Contractor shall prepare CRs following the guidelines of the Contract Configuration Management requirements stated in Paragraph 4.7.10.

4.8.10.3. The CR impact description shall include a statement of compliance with the authorised scope of the project and any trade-offs that shall be considered.

4.8.10.4. Provided approval of the Purchaser's Contracting Authority, the Contractor shall update the Contractual SRS to reflect the decision of the TRITON CCB on these CRs and also apply the changes to SyRS.

4.8.10.5. The Contractor shall use the approved SyRS as the basis for the TRITON system design and subsequent design changes.

4.9. System Architectural Design Process

4.9.1. General

4.9.1.1. System Architectural Design includes an identification of the hardware items, software items and manual operation items included in the system and an allocation of system requirements to those items. The Contractor shall perform System Architectural Design activities in compliance with the processes defined in ISO/IEC 15288 Paragraph 6.4.3 (s referred by AAP-48) and using the guidance of ISO/IEC 42010 and ISO/IEC 15289.

4.9.1.2. The Contractor shall conduct the System Architectural Design phase in accordance with the Incremental Development approach (described in 4.2).

4.9.1.3. The Contractor shall provide system architecture design to be used by the Build Processes. The design shall describe the structure of the final system as described in the SyRS.

4.9.1.4. The Contractor shall decompose the system into System Elements, allocate the requirements to the elements and verify that all requirements are allocated to elements.

4.9.1.5. The Contractor shall use one of the following requirement assignment types:

- Direct assignment: The requirement from SyRS is directly assigned to a System Element.
- Indirect assignment: The requirement from SyRS is analysed, and the derived parameters are assigned to the appropriate System Elements.
- Derived requirement: The requirements produced as a result of design activities (e use of COTS items, reuse, and adaptation).

4.9.1.6. The Contractor shall specify the selected physical design solution as an architectural design baseline in terms of its functions, performance, behaviour, interfaces and unavoidable implementation constraints.

4.9.1.7. The Contractor shall start software architectural design after system-level requirements are finalised and provide the preliminary versions of Software Architecture Description (SAD) and Database Design Description (DDD) during PDR, and finalise them during CDR. These documents can be updated in Build Processes as necessary.

4.9.1.8. The Contractor shall develop and provide a mock-up or low fidelity prototype of the major user interface features and include the user interface concept in the User Interface Specification (UIS). The UIS shall be updated during the Build Processes.

4.9.1.9. The Contractor shall perform Reliability, Availability, Maintainability and Testability (RAMT) engineering, model the system reliability using Reliability Block Diagrams (RBD) and Failure Modes and Effect Analysis (FMEA) as defined in STANREC 4174.

4.9.1.10. The Contractor shall organize and conduct system-level design reviews to present its design of the TRITON capability and any subsequent maintenance and major releases.

4.9.1.11. The Contractor shall deliver the draft documents prior to the design reviews as agreed with the Purchaser. Informal design reviews using the draft documents may be held at times agreed to by the Purchaser and the Contractor.

4.9.2. System Design Specification

4.9.2.1. The Contractor shall establish, provide, and maintain the System Design Specification (SDS) based on the approved SyRS specifying the FBL.

4.9.2.2. The SDS shall describe the TRITON capability to a level of detail that is sufficient for the Purchaser to be able to understand how the TRITON capability will be implemented and verified.

4.9.2.3. The Contractor shall develop the SDS in accordance with ISO/IEC 12207, ISO/IEC 15289, IEEE 1016 and the specifications given in this SOW.

4.9.2.4. After having an approved initial SDS at PDR, the Contractor shall develop the final SDS in accordance with the processes defined in Paragraph 7.1.4 through 7.1.7 of ISO/IEC 12207 and submit it at CDR.

4.9.2.5. The Contractor shall include in the SDS the ABL which includes all documentation related to verification (i.e. test procedures per CI as defined in ACMP-2009) of requirements per CI identified in the FBL.

4.9.2.6. The SDS shall identify the proposed CIs and their design, functionality, interfaces, and data structures. For each CI, the SDS shall identify the following:

- The functional requirements that are realized by a CI
- Any constraints imposed upon it
- Any COTS and NATO OTS components necessary to build, deploy or execute this CI
- The value of the Adjusted Function Points Count, as the measure of CI's complexity
- Test Procedures (preliminary) to be used for verification and validation

4.9.2.7. The SDS shall identify the Interface Control Descriptions (ICD) required to define the interface between TRITON and external systems, services, or capabilities.

4.9.2.8. The SDS shall identify all necessary customisation (by parameterisation or new software development) of the COTS packages that will be used.

4.9.2.9. The SDS shall include the information as required in the architectural views and meta-models based on the NATO Architectural Framework (NAF) in accordance with the latest approved version (currently Version 3~~.1~~). The architecture shall be developed based on the Architecture Development Method described by the Open Group Architecture Framework (TOGAF) [TOGAF] version 9 or higher.

4.9.2.10. The SDS shall provide both the high-level and detailed design information as an integrated set of model files using structured dataset format containing all the required data and relationships according to the SyRS specifications. The Contractor shall propose the most appropriate notation and representation to represent the underlying data in the SDS to be validated by the Purchaser at PDR.

4.9.2.11. TRITON Architecture Models

4.9.2.11.1. The Contractor shall provide the high-level design information in the form of a TRITON Logical Model.

4.9.2.11.2. The TRITON Logical Model shall include the following:

- Use Case Diagrams
- Activity Diagram
- State Machine Diagram
- Sequence Diagram.

4.9.2.11.3. UML or SysML may be used to develop the Logical Model.

4.9.2.11.4. The Contractor shall develop and maintain TRITON System Architecture Model in an architecture repository~~ using Purchaser-approved format (ARIS or System Architect).~~ The Model shall be delivered to the Purchaser at CDR and updated at each SwDR using Purchaser-approved format (ARIS or System Architect)~~.~~. The Purchaser will provide guidance on preparing the model.

4.9.2.12. System Security Design Specification

4.9.2.12.1. The SDS shall include a System Security Design Specification (SSDS) as an Annex to support accreditation of the TRITON capability for use in NSWAN.

4.9.2.12.2. SSDS shall include at least the following:

- System access control, data protection, and information exchange requirements and design features
- Backup, recovery, availability, and security requirements and design features
- System configuration and administration requirements and design features
- Security impacts, including any required adjustments and configuration changes to workstation baselines and network elements such as firewalls and routers
- The security features of any off-the-shelf products included in the system
- For each security measure included in the SRS, the SDS shall either identify the matching security design feature or operational procedure.

4.9.2.13. The SDS shall identify the minimum hardware and software specifications required to support the proposed system baseline, including the baseline design, maintenance, and test elements to be installed. The required computation resources shall be identified in terms of Service Parameters for static sites.

4.9.2.14. The SDS shall provide a detailed list of the COTS components (hardware and software) proposed to be supplied as part of the Contract. The product name, manufacturer name, and manufacturer's part number, version, or release number shall be stated, as appropriate.

4.9.2.15. The SDS shall provide a detailed specification sheet for each item of COTS equipment and software proposed to be supplied as part of the Contract.

4.9.2.16. Requirements Traceability Matrix

4.9.2.16.1. As an annex to the SDS, the Contractor shall provide and maintain a Requirements Traceability Matrix (RTM) that guarantees the two-way link between requirements (SyRS), technical specifications (SDS), test procedures and tests.

4.9.2.16.2. The Contractor shall extend the RTM to the Developmental Baseline, Product Baseline, and the TMP to ensure the Purchaser can verify compliance throughout the project.

4.9.2.16.3. The Contractor shall update the RTM during the System Architectural Design Process if any Change Proposal is accepted by the CCB.

4.9.2.17. Interface Control Description

4.9.2.17.1. The Contractor shall produce TRITON Interface Control Description (ICD), describing all external TRITON interfaces (for external systems, services, Nations and ACPs) to be developed or updated within this Contract. The ICD shall refer to other ICDs where applicable.

4.9.2.17.2. The TRITON ICD shall include all types of interfaces including the Web-services (e.g. RMP Service) and their Service Interface Profiles (SIP).

4.9.2.17.3. The Contractor shall made the initial TRITON ICD available at CDR. This ICD shall include Nations' interface options as well as known interfaces.

4.9.2.17.4. The Purchaser will release the TRITON ICD to Nations and other Functional Services.

4.9.2.17.5. The Contractor shall update the TRITON ICD for the NS Domain and NU Domain at during the Software Design Reviews for each Build Process.

4.9.2.18. The Contractor shall include an updated set of all the above design artefacts as part of the delivered Product Baseline.

4.9.2.19. Review and acceptance of design documentation provided by the Contractor to the Purchaser shall not imply Purchaser acceptance of the TRITON design. It remains the sole responsibility of the Contractor to prove the design through the regime of testing set forth in the Contract and it shall be the sole responsibility of the Contractor in the event that the system proves deficient in meeting the SRS.

4.9.3. Preliminary Design Review

4.9.3.1. The Preliminary Design Review (PDR) demonstrates that the preliminary design meets all system requirements with acceptable risk and within the cost and schedule constraints and establishes the basis for proceeding with detailed design. It will show that the correct design option has been selected, interfaces have been identified, and verification methods have been described.

4.9.3.2. The Contractor shall plan the PDR near the completion of the preliminary design phase and conduct the PDR at the Purchaser's facility.

4.9.3.3. Entry Criteria

4.9.3.3.1. The Contractor shall include in planning the PDR Entry Criteria given in Table 4-5~~Table 4-5~~ and make them available to the Purchaser at least two (2) weeks prior to the PDR:

Table 4-5 – PDR Entry Criteria

Serial	Activities / Documents
1	A preliminary PDR agenda
2	Success Criteria (enhanced or adapted)
3	System Design Specification (SDS) (preliminary)
4	Software Architecture Description (SAD) (preliminary)
5	Database Design Description (DDD) (preliminary)
6	User Interface Specification (UIS) (preliminary)
7	System Security Design Specification (SSDS) (preliminary)
8	Requirements Traceability Matrix (RTM)
9	TRITON Interface Control Description (ICD) (draft)
10	Integrated Support Plan (ISP) (draft)
11	Updated Risk Register
12	Active Change Requests

4.9.3.3.2. The scope of the SDS to be provided for PDR may be limited to high-level design information, and is not required to present implementation details.

4.9.3.4. Success Criteria

4.9.3.4.1. The Purchaser concludes that the PDR Success Criteria in Table 4-6~~Table 4-6~~ accomplished to complete the objectives of the PDR.

Table 4-6 – PDR Success Criteria

Serial	Status / Documents
1	Agreement exists for the top-level requirements, including their verification and validation criteria, technical performance measures and any implementation constraints, and that these are finalised, stated clearly, and are consistent with the preliminary design.
2	The traceability of verifiable requirements is complete and proper or, if not, an adequate plan exists for timely resolution of open items. Requirements are traceable to the Contractual SRS.
3	The preliminary design is expected to meet the requirements at an acceptable level of risk.
4	Definition of the technical interfaces is consistent with the overall technical maturity and proves an acceptable level of risk.
5	Adequate technical interfaces are consistent with the overall technical maturity and provide an acceptable level of risk.
6	Adequate technical margins exist with respect to technical performance measures.
7	The project risks are understood; plans, process and resources exist to effectively manage them. Steps to mitigate risks are identified in the Risk Register.
8	Major user interface features are reviewed and concept of interfaces are agreed.
9	Non-functional requirements have been adequately addressed in preliminary designs.
10	The operational concept is technically sound, that it includes (where appropriate) human factors that apply, and that requirements for its execution are traceable.

4.9.3.5. The Purchaser concludes that the Success Criteria was accomplished to complete the objectives of the PDR.

4.9.3.6. The Contractor shall incorporate all design changes approved during the PDR.

4.9.3.7. The Contractor shall prepare PDR Report and submit it within one week after the completion of PDR.

4.9.4. Critical Design Review

4.9.4.1. The purpose of the Critical Design Review (CDR) is to demonstrate that the maturity of the design is appropriate to support proceeding with full scale software and hardware implementation, integration, verification, validation and operation and that the technical effort is on track to complete system development in order to meet the SyRS requirements within the identified cost and schedule constraints.

4.9.4.2. The Contractor shall plan the CDR at the completion of the system design phase and conduct the CDR at the Purchaser's facility.

4.9.4.3. Entry Criteria

4.9.4.3.1. The Contractor shall include in planning the CDR Entry Criteria given in Table 4-7~~Table 4-7~~ and make them available to the Purchaser at least two (2) weeks prior to the CDR:

Table 4-7 – CDR Entry Criteria

Serial	Activities / Documents
1	A preliminary CDR agenda
2	Success Criteria (enhanced or adapted)
3	Successful completion of the PDR and responses has been made to all PDR open issues, or a timely closure plan exists for those remaining open.
4	Test Management Plan (TMP) (final)
5	Test Procedures (preliminary)
6	Training Plan (TrP) (initial release)
7	System Validation Plan (draft)
8	System Design Specification (SDS) (final)
9	User Interface Specification (UIS) (initial version)
10	System Security Design Specification (SSDS) (final)
11	Software Architecture Description (SAD) (final)
12	Database Design Description (DDD) (final)
13	Requirements Traceability Matrix (RTM)
14	TRITON Interface Control Description (ICD) (initial version)
15	Integrated Support Plan (ISP) (initial version)
16	Updated Risk Register
17	Active Change Requests

4.9.4.4. Success Criteria

4.9.4.4.1. The Purchaser concludes that the CDR Success Criteria in Table 4-8~~Table 4-8~~ accomplished to complete the objectives of the CDR.

Table 4-8 – CDR Success Criteria

Serial	Status / Documents
1	The detailed design is expected to meet the requirements with adequate margins at an acceptable level of risk. System Element-level functionality, design and interfaces are defined.
2	Core Services integration (at Service-level and host environment-level) is defined.
3	System security, including Technical Services access-control mechanisms, data protection, backup and recovery, audit, interconnection, and information exchange security in context of the Services breakdown are defined.
4	High-level design of Maritime Information Entities is completed.

5	ICDs are appropriately matured to proceed with implementation, integration and test, and plans are in place to manage any open items. System-level and Service-level interfaces, including external Services interfaces are defined.
6	High confidence exists in the PDR, and adequate documentation exists and/or will exist in a timely manner to allow proceeding with implementation, integration, and test. For any elements that require development, the development methodology and documentation approach are defined.
7	Overall system design and its interactions, Services, components and Human-Machine Interface and Human Factors justifications are defined.
8	For COTS products, the intended product and version, and note if any modifications, adaptations, or additional elements (such as macros or plug-ins) are required. Open Source Software (OSS) are to be disclosed (for review of OSS conditions by the Purchaser).
9	The verification and validation requirements and plans are complete.
10	The testing approach is comprehensive, and the planning for system integration, test, and operation is sufficient to progress into the next phase. Sequence and scope of system tests of each Baseline and any requirements for Purchaser support and participation are defined.
11	Adequate technical and programmatic margins and resources exist to complete the development within budget, schedule, and risk constraints.
12	Risks are understood, and plans and resources exist to effectively manage them. Steps to mitigate risks are identified in the Risk Register.
13	Non-functional requirements have been adequately addressed in system and operational designs.

4.9.4.5. The Purchaser concludes that the CDR Success Criteria was accomplished to complete the objectives of the CDR.

4.9.4.6. As required, the Contractor shall organise subsequent Design Reviews and shall deliver updated design documents as minor revisions that replaces earlier versions of the documents of the Functional Baseline. The reviews shall be carried out within the framework of the Working Group Reviews.

4.9.4.7. The Contractor shall incorporate all design changes approved during the CDR.

4.9.4.8. The Contractor shall prepare CDR Report and submit it within one week after the completion of CDR.

4.10. System Implementation Process

4.10.1. General

4.10.1.1. The Contractor shall implement the System Elements (hardware and software items) identified in the SDS.

4.10.1.2. The Contractor shall perform system implementation activities in compliance with the processes defined in ISO/IEC 15288, Paragraph 6.4.4 as referred by AAP-48, Paragraph 6.4.4.

4.10.1.3. The Contractor shall conduct Software and Hardware Implementation Processes separately.

4.10.2. Software Implementation Processes

4.10.2.1. General

4.10.2.1.1. The Contractor shall perform Software Implementation Process to produce a specified system element implemented as a software product or service according to ISO/IEC 12207, Paragraph 7.1.

4.10.2.1.2. The Contractor shall apply a formally defined and documented software development methodology.

4.10.2.1.3. The Contractor shall use a Component-Based Architecture for developing the TRITON capability as it is expected that it will be a combination of custom-developed and off-the-shelf (whether commercially available or developed for other customers).

4.10.2.1.4. The Contractor shall design and implement identified components supporting well-defined interfaces and supporting reuse, encapsulation and independent deployment together with its own documentation

4.10.2.1.5. The Contractor shall develop the TRITON capability as a Service-Oriented Architecture (SOA). The Contractor shall identify, document and implement services (primarily as Web services) that can be accessed within TRITON and by other authorised systems or services.

4.10.2.1.6. The Contractor shall utilise the available Bi-SC AIS Core Services which will be provided either as components of the target operating environment or by the other NATO systems/services with which TRITON must co-operate and communicate.

4.10.2.1.7. The Contractor shall provide integration with available Bi-SC AIS Functional Services which will be provided either as components of the target operating environment or by the development of other NATO systems with which TRITON must cooperate and communicate.

4.10.2.1.8. The Purchase will have the right to observe the process.

4.10.2.2. Software Development Environment

4.10.2.2.1. The Contractor shall establish a software development environment at his own premises in accordance with the following requirements:

4.10.2.2.1.1 The Contractor shall establish, control, and maintain a “software engineering environment”, which consists of the facilities, hardware, software, firmware, procedures, and documentation needed to perform software engineering effort. Elements may include but are not limited to computer-aided software engineering tools, compilers, linkers/loaders, operating systems, debuggers, simulators, documentation tools, and database management systems. The Contractor shall ensure that each element of the environment performs its intended functions.

4.10.2.2.1.2 The Contractor shall establish, control, and maintain a “software test environment”, which consists of the facilities, hardware, software, firmware, procedures, and documentation needed to perform qualification,

and possibly other, testing of software. Elements may include but are not limited to simulators, code analysers, test case generators, and path analysers, and may also include elements used in the software engineering environment. The Contractor shall ensure that each element of the environment performs its intended functions.

4.10.2.2.1.3 The Contractor shall establish, control, and maintain a Software Development Library (SDL) [ACMP-2009], which is a controlled collection of software, documentation, other intermediate and final software products, and associated tools and procedures used to facilitate the orderly development and subsequent support of software. The SDL, having procedures for controlling the software residing within the SDL, may be an integral part of the software engineering and test environments.

4.10.2.2.2. The Contractor may use non-deliverable software, which are software products that are not required by the Contract to be delivered to the Purchaser, in the development of deliverable software as long as the operation and support of the deliverable software after delivery to the Purchaser do not depend on the non-deliverable software or provision is made to ensure that the Purchaser has or can obtain the same software. The Contractor shall ensure that all non-deliverable software used on the project performs its intended functions.

4.10.2.3. Incremental Development

4.10.2.3.1. The Contractor shall apply Incremental Development with Multiple Deliveries approach for implementing the TRITON Functional Services in Build Processes. The Contractor shall develop a deliverable product within a Build Process.

4.10.2.3.2. The Contractor shall apply all software implementation processes separately for each Build Process.

4.10.2.3.3. The Contractor shall provide a Product Baseline at the end of each Build Process.

4.10.2.4. Software Requirements Analysis Process

4.10.2.4.1. The Contractor shall conduct Software Requirements Analysis Process to establish the requirements of the software elements of the system allocated to the Build Process.

4.10.2.4.2. The Contractor shall perform the software requirements analysis activities described in ISO/IEC 12207, Paragraph 7.1.2.3.

4.10.2.4.3. The Contractor shall generate requirements for software from the SyRS.

4.10.2.4.4. Software Requirements Specification

4.10.2.4.4.1 The Contractor shall produce and maintain the Software Requirements Specification (SRS) based on the approved SyRS for each Build Process and specify the FBL.

4.10.2.4.4.2 The Contractor shall develop the SRS in accordance with ISO/IEC 12207, ISO/IEC 15289, and the specifications given in this SOW.

4.10.2.4.4.3 The SRS shall include the following:

- Requirements allocated to the software elements which are to be implemented in a Build Process.
- Derived software requirements (functional and non-functional)
- Database requirements

4.10.2.4.5. The Contractor shall perform lower-level software requirements analysis for each defined software item in order to specify construction-level requirements and produce item-level specification documents (e.g. SRS-CI).

4.10.2.4.6. Software Requirements Review

4.10.2.4.6.1 Software Requirements Review (SwRR) is a review to ensure that the software under review can proceed into initial development, and that all software requirements and performance requirements derived from the SyRS are defined and testable, and are consistent with cost, schedule, risk, technology readiness, and other system-level constraints.

4.10.2.4.6.2 The Contractor shall organise and conduct the SwRR at the Purchaser's facility to present the SRS for each Build Process.

4.10.2.4.6.3 The SRS containing the software requirements allocated to that Build Process shall be evaluated, reviewed, approved and baselined during the SwRR. The Contractor shall deliver the RMD.

4.10.2.4.6.4 The Contractor shall prepare a SwRR Report and deliver within one week after the completion of the SwRR.

4.10.2.5. Software Architectural Design Process

4.10.2.5.1. The Contractor shall conduct a Software Architectural Design Process in order to define an architectural solution for all TRITON Software. As a minimum, the architectural solution shall consist of both a functional/logical architecture (expressed as a set of functions, scenarios, and/or operational models) and a physical architecture (expressed as a set of system elements physically connected between them) associated to a set of design properties.

4.10.2.5.2. The Contractor shall perform the software architectural design activities described in ISO/IEC 12207, Paragraph 7.1.3.3 in each Build Process.

4.10.2.5.3. The Contractor shall decompose the TRITON software, for both NS and NU Domains, into components, and then into lower level elements.

4.10.2.5.4. The Contractor shall transform the requirements for the software into an architecture that describes its top-level structure and identifies the software components. It shall be ensured that all the requirements are allocated to software components and lower level elements.

4.10.2.5.5. Software Architecture Description

4.10.2.5.5.1 The purpose of the Software Architecture Description (SAD) is to describe the system-wide design decisions related to software architectural design, including the concept of execution and resource limitations.

4.10.2.5.5.2 The SAD shall include:

- System-wide software design
- Infrastructure software and SOA

- Software Components and their interfaces
- High-level design for the databases (input to Database Design Description)
- Dynamic behaviour of modules, components and services
- Provision of data integrity (synchronisation and replication)
- Recovery from failure.

4.10.2.5.5.3 The SAD shall include architecture drawings compliant with the NATO Architecture Framework (v3) views.

4.10.2.5.5.4 The SAD shall be produced in the first Build Process and updated during other Build Processes.

4.10.2.5.5.5 One system-wide SAD may be used for all Build Processes with indications of classification domains (NS and NU) and installation sites (Static and Afloat).

4.10.2.5.5.6 The SAD shall be evaluated, reviewed, approved and baselined during a Software Design Review (SwDR) for each Build Process.

4.10.2.5.5.7 The Contractor shall provide the detailed GUI information in the UIS at each SwDR and then update during the construction of each software item.

4.10.2.5.6. Database Design Description

4.10.2.5.6.1 The Contractor shall design the databases used in TRITON and prepare a Database Design Description (DDD) as an annex to the SAD.

4.10.2.5.6.2 DDD shall describe database-wide design decisions, that is, decisions about the database's behavioural design (how it will behave, from a user's point of view, in meeting its requirements, ignoring internal implementation) and other decisions affecting further design of the database.

4.10.2.5.6.3 DDD shall describe the detailed design of the database (Data Model). The number of levels of design and the names of those levels shall be based on the design methodology used.

4.10.2.5.6.4 DDD shall identify a database design level and shall describe the data elements and data element assemblies of the database in the terminology of the selected design method.

4.10.2.5.6.5 DDD shall define other database-related functions, management, accessibility and security issues.

4.10.2.6. Software Detailed Design Process

4.10.2.6.1. The Contractor shall perform the software detailed design activities described in ISO/IEC 12207, Paragraph 7.1.4.3 in each Build Process.

4.10.2.6.2. The Contractor shall develop a detailed design for each software item or component. The software components shall be refined into lower levels containing software units that can be coded, compiled, and tested. It shall be ensured that all the software requirements are allocated from the software items to components and to software units.

4.10.2.6.3. The Contractor shall follow the following process as a general design approach for managing the identified information objects:

- Determine information to be managed
- Define a data structure to store the data
- Design the data model
- Provide standard management functions on the stored data (create, modify, delete, export, import etc.)
- Assign access privileges
- Provide a user interface to manage the data
- Provide a user interface to enter data
- Provide a user interface to view data (read-only)
- Provide user interface to link data to other data structures.

4.10.2.6.4. The documents produced during the Software Detailed Design Process shall be discussed during IWG Workshops.

4.10.2.6.5. The Contractor shall provide the detailed design information in the form of a TRITON implementation model.

4.10.2.6.5.1 The TRITON implementation model shall include the following diagrams:

- Activity diagram
- Class diagram
- Object Diagram
- Component diagram
- Deployment diagram
- Sequence diagram
- State Machine diagram
- Communication diagram.

4.10.2.6.5.2 UML class diagrams shall be used to identify and describe the computer software units and their interdependencies. Class diagrams shall portray attributes (data), methods (functions, interface), and dependency relationships (e inheritance, dependencies, associations).

4.10.2.6.6. Software Design Description

4.10.2.6.6.1 The Contractor shall document the detailed design in Software Design Description (SDD) in accordance with ISO/IEC 12207, ISO/IEC 15289, IEEE 1016 and specifications given in this SOW.

4.10.2.6.6.2 The SDD shall include the database schema represented using UML data modelling standards. The SDD shall include Logical and Physical Data Models.

4.10.2.6.6.3 The SDD shall provide a data dictionary describing all data elements within the database, with views and outputs consistent with UML modelling standards. The information in the data dictionary shall be captured in the database design tool.

4.10.2.6.6.4 The Contractor shall perform lower-level Software Design for each defined software item in order to code it efficiently and produce item-level design documents (e.g. SDD-CI).

4.10.2.6.6.5 There may be more than one SDD depending on the level of components and units. The SDD documents will have informative purposes and not subject to Purchaser approval.

4.10.2.6.6.6 The Purchaser shall have the right to ask for the SDD during the development and examine to ensure that the software construction is carried out according to the architecture, detailed design and selected methodology.

4.10.2.6.6.7 The Contractor shall deliver the SDD(s) to the Purchaser for information purposes.

4.10.2.6.7. User Interface Design

4.10.2.6.7.1 The Contractor shall design the GUI for each software item before the construction and update the UIS during the Build Process.

4.10.2.6.7.2 The detailed GUI design shall be discussed during IWG Workshops/Meetings, the UIS shall be reviewed. User Community will also be involved in the GUI design process to the extent possible.

4.10.2.6.7.3 The Contractor shall update the GUI design for each software item in the UIS. The Purchaser will approve the GUI design for each item before its construction.

4.10.2.6.7.4 Both the Contractor and Purchaser can propose changes to the GUI design following the Change Management process. Any change to any part of the UIS will be subjected to the Purchaser's approval.

4.10.2.6.8. Software Design Review

4.10.2.6.8.1 Software Design Review (SwDR) is a review to ensure that the software design is sufficient to proceed into construction, and that all software requirements and performance requirements can be met.

4.10.2.6.8.2 The Contractor shall organise and conduct a SwDR for each Build Process at the Purchaser's facility to present the design documents.

4.10.2.6.8.3 The Purchaser will review, evaluate and approve the design documents to be used in that Build Process during its SwDR, and the Contractor shall baseline them.

4.10.2.6.8.4 The Contractor shall prepare a SwDR Report and deliver within one week after the completion of the SwDR.

4.10.2.7. Software Construction Process

4.10.2.7.1. The Contractor shall perform the software construction activities described in ISO/IEC 12207, Paragraph 7.1.5.3 in each Build Process.

4.10.2.7.2. The Contractor shall apply best practices for software development and documentation, including lower level design documents, development tools, test environment and internal test procedures.

4.10.2.7.3. Coding

4.10.2.7.3.1 The Contractor shall develop the source code together with source code documentation (commenting).

4.10.2.7.3.2 The Contractor shall ensure that the construction follows the design given in related documents. Any diversion shall be justified, and updated design documents shall be presented to the Purchaser for assessment.

4.10.2.7.3.3 The Purchaser has the right to closely monitor the software construction activities at the Contractor premises and examine the source code to ensure that the software construction is carried out according to the design descriptions following the methodology and coding standards defined in the SDP.

4.10.2.7.3.4 The Contractor shall produce executable software units that properly reflect the software design.

4.10.2.7.4. Unit Testing

4.10.2.7.4.1 The Contractor shall perform unit-level internal testing at his own premises, units using internal development and test environment.

4.10.2.7.4.2 The Contractor shall develop the software unit test procedures in accordance with ISO/IEC 12207, ISO/IEC 15289, and IEEE Std 829.

4.10.2.7.4.3 The Contractor shall perform unit testing for any identified software components using applicable test methods (e.g. black-box, white-box).

4.10.2.7.5. Source Code Review

4.10.2.7.5.1 The Contractor shall perform Source Code Review (SCR) during Unit Testing using COTS tools.

4.10.2.7.5.2 The objective of the SCR shall be to demonstrate that the code is maintainable, well-documented and follows sound coding practises.

4.10.2.7.5.3 The Contractor shall prepare a Source Code Review Report (SCR-R) which describes the methodology used, the acceptance criteria, the list of findings, explanations and a resolution plan.

4.10.2.7.5.4 The Contractor shall deliver the SCR-R at the TRR. The SCR-R shall be one of the Entry Criteria for the TRR.

4.10.2.7.5.5 The Contractor shall submit the final (if modified) SCR-R at the SSMAT and the Purchaser will review the Report as part of the SSMAT.

4.10.2.7.5.6 The Purchaser may conduct another Source Code Review, through IV&V Support as part of the SSMAT, using automated tools. The results/findings will be presented. The Contractor shall include the deficiencies found during this process into his resolution plan.

4.10.2.7.5.7 The Contractor shall correct all deficiencies in the resolution plan prepared and updated according to the Source Code Review Reports.

4.10.2.7.6. The documents produced during the Software Construction Process (e.g. SRS-CI, SDD-CI, STD-CI) shall be discussed during IWG Workshops.

4.10.2.8. Software Integration Process

4.10.2.8.1. The Contractor shall perform the Software Integration activities described in ISO/IEC 12207 Paragraph 7.1.6.3, in each Build Process.

4.10.2.8.2. The Contractor shall combine the software units and software components, producing integrated software items, consistent with the software design, and demonstrate that the functional and non-functional software requirements are satisfied on an equivalent or complete operational platform.

4.10.2.8.3. The Contractor shall be responsible for system integration of the TRITON capability. This integration shall include both the integration of the various hardware and software elements that constitute the TRITON capability and the integration of the TRITON capability with the existing NATO systems, capabilities and Core Services specified in the SyRS.

4.10.2.8.4. The Contractor shall perform software integration in its own premises using the Software Development Environment. The Contractor can also use the TRITON Test System at the Purchaser's PMIC facilities for conducting developmental tests and integration.

4.10.2.8.5. The Purchaser will have the right to examine the integration and internal test documents and process to ensure that the software integration is carried out according to the plans and selected methodology.

4.10.2.8.6. The Contractor shall deliver any prepared integration and test document to the Purchaser for information purposes.

4.10.2.9. Software Qualification Testing Process

4.10.2.9.1. The Contractor shall perform the software qualification testing activities described in ISO/IEC 12207, Paragraph 7.1.7.3 within the System Verification Process for each Build Process.

4.10.2.9.2. Software Test Description

4.10.2.9.2.1 The Contractor shall produce Software Test Description (STD) in accordance with ISO/IEC 12207, ISO/IEC 15289, and IEEE Std 829 for each software element.

4.10.2.9.2.2 The STD shall describe the Test Environment, prerequisite conditions that must be established prior to performing the test case.

4.10.2.9.2.3 The STD shall include at least one test case per requirement, per use case and per main flow/extension.

4.10.2.9.2.4 The STD shall describe test inputs, expected results and criteria for evaluating results.

4.10.2.9.2.5 The STD shall describe test procedures for each software element to be tested internally.

4.10.2.9.2.6 The Contractor shall deliver the STD(s) to the Purchaser for information purposes.

4.10.2.9.3. Internal System Test

4.10.2.9.3.1 The Contractor shall perform Internal System Test (IST) as software qualification testing to confirm that the integrated software product meets its defined requirements.

4.10.2.9.3.2 The Contractor shall use the STDs for IST.

4.10.2.9.3.3 The Purchaser shall have the right to witness the internal system integration and testing activities to ensure that the software qualification testing is carried out according to the TMP by following the indicated quality system.

4.10.2.9.3.4 The Contractor shall cover, in IST, all code logic and branches, including the rationale behind the selected test coverage and the accepted risk level. The IST shall include boundary value testing (maximum-minimum values, error values), wild key testing of user interfaces (an extensive error checking testing executed by having a user hit any combination of keys, and trapping errors to redirect he user to correct the entries or key combinations without crashing the software or losing previous work), state transition testing (rules and conditions to cause state transition), and black-box testing.

4.10.2.9.3.5 The Contractor shall deliver the IST-Report (IST-R) within one week after the IST.

4.10.2.9.3.6 The IST-R shall be one of the Entry Criteria for TRR and contain any defects found during the IST and a Resolution Plan.

4.10.2.9.4. Qualification Methods

4.10.2.9.4.1 The Contractor shall use the software qualification methods defined in Table 4-9~~Table 4-9~~ for each requirement in the specification document to ensure that the requirement has been met:

Table 4-9 – Software Qualification Methods

Method	Description
Analysis	The processing of accumulated data obtained from other qualification methods. Examples are reduction, interpretation, or extrapolation of test results; analysing the performance of design by running simulations. This method can be used if a test scenario cannot be created at the Test Environment.
Test	The operation of the software element or component, using instrumentation or other special test equipment to collect data for later analysis. Controlled condition, configurations, and inputs are used in order to observe the response. Results are quantified and analysed. This method can be used where user interaction is involved and when computations with input data are necessary.
Demonstration	The operation of the software element or component, that relies on observable functional operation not requiring the use of instrumentation, special test equipment, or subsequent analysis. This method is used to demonstrate a capability to be provided by the requirement.
Inspection	The visual examination of software code, documentation, etc. This method can be used where testing is not possible (e.g. the maximum number of items used as a limitation inside the code).

Special Case	Any special qualification methods for the software element, such as special tools, techniques, procedures, facilities, and acceptance limits.

4.10.2.10. Software Verification and Validation Processes

4.10.2.10.1. The Contractor shall perform the software verification activities described in ISO/IEC 12207, Paragraph 7.2.4 and 7.2.5 within the System Verification Process and System Validation Process applicable to each Build Process.

4.10.2.10.2. The Contractor shall perform software verification to confirm that each software element properly reflects the specified requirements, design, code, integration and documentation.

4.10.2.10.3. Further software verification and validation shall be performed according to the System Verification Process (Paragraph 4.12) and System Validation Process (Paragraph 4.14).

4.10.2.11. Software Version Description

4.10.2.11.1. The Contractor shall produce a Software Version Description (SVD) for each Baseline and for each new release thereafter.

4.10.2.11.2. The SVD shall list by identifying numbers, titles, abbreviations, dates, version numbers, and release numbers, as applicable, all physical media (for example, listings, disks) and associated documentation that make up the software version being released.

4.10.2.11.3. The SVD shall include applicable security and privacy considerations for the release.

4.10.2.11.4. The SVD shall contain a list of all changes incorporated into the software version since the previous version.

4.10.2.11.5. The SVD shall identify or reference all unique-to-site data contained in the software version.

4.10.2.11.6. The SVD shall identify any possible problems or known errors with the software version at the time of release, any steps being taken to resolve the problems or errors, and instructions (either directly or by reference) for recognizing, avoiding, correcting, or otherwise handling each one. The information presented shall be appropriate for the user who may need advice on avoiding errors.

4.10.3. Hardware Implementation Processes

4.10.3.1. General

4.10.3.1.1. The Contractor shall perform Hardware Implementation Process to produce TRITON Deployable Kits (TDK).

4.10.3.1.2. The Contractor may use ISO 9001:2008 to produce the Hardware Developmental Items (HDI) or use a subcontractor.

4.10.3.1.3. The Contractor shall manufacture the TDKs, install the software and test them as a complete system.

4.10.3.2. Hardware Requirements Analysis Process

4.10.3.2.1. The Contractor shall perform hardware requirements analysis in order to determine detailed requirements for the production.

4.10.3.2.2. The Contractor shall prepare Hardware Requirements Specification (HRS) which maps the system-level requirements to the hardware with additional derived requirements.

4.10.3.2.3. Hardware Requirements Review

4.10.3.2.3.1 The Contractor shall conduct Hardware Requirements Review (HwRR) and prepare HwRR Report.

4.10.3.3. Hardware Design Process

4.10.3.3.1. The Contractor shall design the TDKs, prepare the interface, layout and integration diagrams, cable diagrams, power circuits used in the server and.

4.10.3.3.2. The Contractor shall prepare Hardware Design Description (HDD) to clearly describe what COTS products are used, how they are assembled to build the desired hardware unit, and how they are integrated.

4.10.3.3.3. If any component is manufactured, its design shall also be included.

4.10.3.3.4. Hardware Design Review

4.10.3.3.4.1 The Contractor shall conduct Hardware Design Review (HwDR) and prepare HwDR Report.

4.10.3.4. Hardware Production Process

4.10.3.4.1. The Contractor shall procure the COTS hardware needed for TDKs, as agreed with the Purchaser.

4.10.3.4.2. The Contractor shall integrate the COTS equipment to build one HDI as the First Article.

4.10.3.4.3. The Contractor shall fully document the cabling design to allow the maintenance staff to trace the source and destination of cables and their path. The cable marking shall be by one of the following methods:

- Moulded on the cable or cord
- Stamped on the cable, cord or wire
- Bands securely attached or captivated.

4.10.3.4.4. All cabling shall be installed in a neat and workmanlike manner. It shall allow for easy access to the label, have sufficient slack to prevent undue stress, and provide sufficient access for maintenance. The cables shall be properly supported and secured to avoid undue stress on the connectors.

4.10.3.5. Software Installation

4.10.3.5.1. The Contractor shall install the TRITON Operational Baseline (BL4), specifically developed for ACPs, on each TDK, along with the supporting software and documentation associated with the Baseline.

4.10.3.5.2. The Contractor shall obtain server address and other configuration details from the Purchaser and activate the installed servers, workstations, and ancillary equipment on the TDK.

4.10.3.5.3. The Contractor shall install and configure OTS software applications included as part of the TRITON Baseline for the TDK.

4.10.3.5.4. The Contractor shall configure all software settings to match the Product Baseline and TDK-specific requirements, and load any initial data included with the baseline.

4.10.3.5.5. The Contractor shall import and/or load any specific data.

4.10.3.5.6. The Contractor shall demonstrate to the local Security Accreditation Authority (SAA) that the equipment complies with the SyRS and SOW requirements, and Security Operating Procedures (SecOps).

4.10.3.5.7. The Contractor shall execute the SIVPs for the TDK for verification by the SAA. The Contractor shall obtain a System Statement of Conformance from the SAA.

4.10.3.5.8. Upon completion of TDK software installation, the Contractor shall provide the Purchaser with a copy of the TDK installation and activation checklist. The Contractor shall resolve any discrepancies identified.

4.10.3.5.9. The Contractor shall provide operation of the TRITON software on the TDK as listed in the AFPL.

4.10.3.5.10. The Purchaser will provide the Contractor the images of the latest version of the supported software configuration (Operational Baseline) for TDKs and clients as defined in the AFPL.

4.10.3.5.11. The Purchaser will provide the Contractor the licenses for the activation of the COTS software indicated in the Software Baseline maintained by the NCI Agency unless otherwise specified (e.g. the Contractor purchases the software licenses on behalf of the Purchaser).

4.10.3.6. Hardware Verification Process

4.10.3.6.1. Hardware Test Description

4.10.3.6.1.1 Hardware verification shall be conducted on the basis of test cases. These test cases shall be developed by the Contractor and documented in the Hardware Test Description (HTD).

4.10.3.6.1.2 The Contractor shall deliver the HTD to the Purchaser for information prior to HW-TRR.

4.10.3.6.1.3 The Contractor shall perform internal hardware testing according to the HTD.

4.10.3.6.2. First Article Acceptance Test

4.10.3.6.2.1 The Contractor shall plan the First Article Acceptance Test (FAAT) for the first HDI produced before the serial production.

4.10.3.6.2.2 The Contractor shall conduct the PCA for a new production item on the first article of its kind of the production line [ACMP-2009].

4.10.3.6.2.3 The Contractor's conduct of the PCA shall include a detailed audit of; engineering drawings, specifications, technical data and tests utilized in production of hardware CI. The PCA shall also include an audit of the released engineering documentation and quality control records to make

sure the as-built or as-coded configuration is reflected by this documentation [ACMP-2009].

4.10.3.6.2.4 The Contractor shall prepare the FAAT Procedure which includes test cases for the hardware components of the HDI. The FAAT Procedure shall include test cases related to overall HDI functionality as well as the hardware components.

4.10.3.6.2.5 FAAT shall cover at least the following tests:

- Demonstration of components
- Mantling and dismantling
- Power and network cabling
- Operating all components
- Hardware maintainability (such as accessibility and replaceability of components).

4.10.3.6.2.6 The Contractor shall deliver the FAAT Procedure two (2) weeks prior to the Hw-TRR.

4.10.3.6.2.7 The FAAT is not complete until all non-conformances affecting the part are closed and corrective action is implemented. After corrective action is implemented a FAAT for the failed characteristic shall be re-performed and the results recorded that include the details of the corrective action taken.

4.10.3.6.2.8 The Contractor shall perform serial production for the TDKs as an HDI after the successful completion of FAAT.

4.10.3.6.2.9 The Contractor shall prepare FAAT Report for the status of the First Product.

4.10.3.6.3. IV&V Testing

4.10.3.6.3.1 The hardware of the TDK is subject to security screening and approval by the NCI Agency. In particular, the software used in the TDK must be included in the NATO Operational Baseline as described in the AFPL.

4.10.3.6.3.2 The Purchaser will execute Security Test for one produced TDK with its NS and NU Units as a single, stand-alone “system”.

4.10.3.6.3.3 The Contractor shall transfer one TDK to the test location indicated by the Purchaser, set to operation, and after the test, the Contractor shall transfer the TDK to its own premises.

4.10.3.6.3.4 The IV&V Testing for TDK is described in Paragraph 4.12.12.7.26.

4.10.3.7. Serial Hardware Production

4.10.3.7.1. Production Readiness Review

4.10.3.7.1.1 Production Readiness Review (PRR) is planned to determine if the hardware design is ready for serial production and if the Contractor (and subcontractors) have accomplished adequate production planning without incurring unacceptable risks that will breach thresholds of schedule, performance, cost, or other established criteria.

4.10.3.7.1.2 The Contractor shall plan and execute a PRR prior to the serial production of the HDIs.

4.10.3.7.1.3 The Contractor shall prepare PRR Report.

4.10.3.7.2. The Contractor shall perform serial production of HDIs according to the authorisation given by the Purchaser.

4.10.3.8. Hardware Acceptance

4.10.3.8.1. Hardware Test Readiness Review

4.10.3.8.1.1 Before scheduling the individual FATs, the Contractor shall host a Hardware Test Readiness Review (Hw-TRR) to review preparations and readiness for testing of HDIs, including adequate version identification of hardware, software and test procedures.

4.10.3.8.2. Factory Acceptance Test (Hardware)

4.10.3.8.2.1 The Contractor shall plan a Factory Acceptance Test (FAT) for each of the produced HDI. One TDK shall be tested with full test cases, and the others shall be tested using the nominal test cases.

4.10.3.8.2.2 The Contractor shall inform the Purchaser about the date and time of the FATs for each TDK at least thirty (30) days prior the FAT.

4.10.3.8.2.3 The Contractor shall prepare the FAT Procedure which includes test cases for the hardware components of the HDI and TRITON Operational Software Baseline 4.

4.10.3.8.2.4 FAT Procedure shall cover the following tests in addition to the functional tests:

- Mode changes
- Lost and recovered network connectivity
- Lost and regained power
- Bandwidth utilisation under simulated environment
- Performance under simulated environment
- Hardware maintainability (such as accessibility and replaceability of components).
- Nominal test cases (for the remaining HDIs).

4.10.3.8.2.5 The Contractor shall deliver the TDK FAT Procedure two (2) weeks prior to the Hw-TRR.

4.10.3.8.2.6 The Contractor shall prepare each TDK for FAT including the COTS software and TRITON Operational Software installation. TDK Test Environment shall have the simulation capability for the external interfaces (e.g. ship side for the ACP Interface).

4.10.3.8.2.7 The Purchaser has the right to participate in the selected or all FAT activities of TDKs.

4.10.3.8.2.8 The Contractor shall prepare FAT Report for the status of each TDK.

4.10.3.8.3. Sea Acceptance Test

4.10.3.8.3.1 The objective of the Sea Acceptance Test (SeAT) is to ensure that the TDK can be transferred on board a ship, carried to the indicated compartment, fixed on the deck, powered on, set to operation and get connected to the selected static TRITON Server. ACP simulator can be used to simulate the data exchange with ship systems.

4.10.3.8.3.2 SeAT shall cover the following tests in addition to the functional tests:

- Mode changes
- Lost and recovered network connectivity
- Lost and regained power
- Bandwidth utilisation under available ship capabilities
- Performance under ship conditions
- Hardware maintainability.

4.10.3.8.3.3 The Contractor shall prepare SeAT Procedure and deliver it at least two (2) weeks prior to the Hw-TRR.

4.10.3.8.3.4 The Contractor shall transport one TDK to the port where SeAT will be executed, perform the tests and transport the TDK back to its own premises if not any other destination is agreed.

4.10.3.8.3.5 The Contractor shall conduct the SeAT and prepare the SeAT Report.

4.10.3.9. Delivery

4.10.3.9.1. The Contractor shall pack, preserve, ship, transport, document, deliver and handover HDIs (TDK) to the Purchaser after the shipment authorisation is given for an indicated location in Europe.

4.10.3.9.2. The Contractor shall apply the procedure defined in Subsection 5.9 of the SOW.

4.10.3.9.3. The Purchaser will have the right to reject any TDK determined to be defective due to transportation. In this case, the Contractor shall replace any defective unit of the TDKs and demonstrate at the Purchaser’s location that the entire TDK is functioning properly.

4.10.3.10. Hardware Maintenance Process

4.10.3.10.1. The Contractor shall provide software and hardware maintenance for TDK until FSA.

4.10.4. Purchaser Access during Implementation

4.10.4.1. The Purchaser, case-by-case represented by the IV&V team, reserves the right to monitor the Contractor's activities, including code inspections, to ensure that sound engineering practices are followed and that the requirements of the SRS are met.

4.10.4.2. During the process of development, the Contractor shall provide the Purchaser with Internet access to a version of the Developmental Baseline. This online accessible version of the application shall be updated to reflect the weekly build.

4.10.4.2.1. The Contractor shall implement an access control mechanism to restrict viewing of the version of the Developmental Baseline to a list of users approved by the Purchaser and administered by the Contractor.

4.10.4.3. The Contractor shall permit Purchaser personnel or designees to inspect the Developmental Baseline.

4.10.4.4. The Purchaser will notify the Contractor at least three (3) working days before an inspection visit.

4.11. System Integration Process

4.11.1. General

4.11.1.1. The Contractor shall perform the System Integration Process to assemble the TRITON capability that is consistent with the architectural design.

4.11.1.2. The Contractor shall perform system integration activities in compliance with the processes defined in ISO/IEC 15288, Paragraph 6.4.5 as referred by AAP-48, Paragraph 6.4.5.

4.11.1.3. The purpose of System Integration shall be:

4.11.1.3.1. Completely assemble the implemented system elements to make sure that the implemented elements are compatible with each other.

4.11.1.3.2. Demonstrate that the aggregates of implemented elements perform the expected functions and performance/effectiveness.

4.11.1.3.3. Detect defects/faults related to design and assembly activities by submitting the aggregates to focused verification and validation actions.

4.11.1.3.4. Demonstrate that the implemented elements form the entire Functional Service.

4.11.1.3.5. Demonstrate that the Functional Service can interact with external systems/services.

4.11.2. System Integration Activity

4.11.2.1. The Contractor shall perform System Integration Activity with the support of SEWG and VVWG at the NCI Agency PMIC facilities using the actual external systems with the test data necessary for each Build Process.

4.11.2.2. The Purchaser will provide working environment for the System Integration Activity and provide support for the external systems.

4.11.2.3. The Contractor shall install the PBL on the TRITON Test System at the PMIC facilities. The Contractor shall work in close coordination with the Purchaser's staff members.

4.11.2.4. The Purchaser will establish TRITON Interoperability Test Centre (TRITON-ITC) at PMIC using the TRITON Test Systems (NS and NU). The ITC will be used during integration and test activities for Nation Interfaces.

4.11.2.5. The Contractor shall perform system integration by checking all interfaces, adapting the software as necessary and performing dry-run of the System Integration Test (SIT).

4.11.2.6. System Integration Activity can last up to two (2) weeks, between the FAT and the SIT.

4.11.2.7. The Contractor shall determine any deficiencies and correct them before the actual SIT.

4.11.2.8. The Contractor shall provide technical support to integration and testing of Nation Interfaces using the TRITON Test Systems.

4.11.3. System Integration Test

4.11.3.1. The Contractor shall perform the System Integration Test (SIT) at the NCI Agency PMIC using the actual external systems with test data for each Build Process. The details of the SIT are given in Paragraph 4.12.12.3.

4.11.3.2. As the prerequisite to start the SIT, the Contractor must pass the FAT.

4.11.3.3. The Contractor shall perform the SIT prior to other acceptance tests.

4.12. System Verification Process

4.12.1. General

4.12.1.1. Verification is the process of providing objective evidence that the system, software, or hardware and its associated products conform to requirements (e.g. for correctness, completeness, consistency, and accuracy) for all life cycle activities during each life cycle process (acquisition, supply, development, operation, and maintenance); satisfy standards, practices, and conventions during life cycle processes; and successfully complete each life cycle activity and satisfy all the criteria for initiating succeeding life cycle activities. Verification of interim work products is essential for proper understanding and assessment of the life cycle phase product(s).

4.12.1.2. The Contractor shall perform system verification activities in compliance with the processes defined in ISO/IEC 15288, Paragraph 6.4.6 as referred by AAP-48, Paragraph 6.4.6.

4.12.1.3. Testing is a set of activities conducted to facilitate discovery and/or evaluation of properties of one or more test items. It is the primary technique intended to evaluate the fulfilment of specifications and requirements to reduce risk and improve quality/user satisfaction. Testing activities could include planning, preparation, execution, reporting, and management activities, insofar as they are directed towards testing.

4.12.1.4. The Contractor shall define and develop test programs, plans, and procedures, conduct testing, and evaluate and document results.

4.12.1.5. The Contractor shall perform sequence of testing on a TRITON Baseline in order to verify its quality and receive necessary approvals required to deploy the system in NATO operational environment.

4.12.1.6. Test Levels

4.12.1.6.1. The Contractor shall include the following types of tests during the Verification Process [IEEE 29119]:

- Smoke Tests (surface level testing to ensure further tests can be performed)
- Functional Tests

  - Positive (verifying outputs with valid inputs)
  - Negative (invalid inputs, unexpected operating conditions, other out-of-bound scenarios)
- Compatibility Tests
- Usability Tests
  - User friendliness tests
  - User interface tests (including wild key testing)
  - Navigation tests
  - Look-and-feel tests
  - Accessibility tests (limited to military users)
- Performance Tests
  - Timing and limitations
- Scalability Tests
  - Load test
  - Volume test
  - Data flow test
  - Storage test
- Reliability Tests
  - Stress tests (for hardware and software)
  - Spike tests (sudden increase in number of users)
- Destructive Tests (attempting to cause the system/component to fail)
- Recovery Tests
  - Exception handling
  - Error recovery
  - Failover
- Security Tests
- Safety Tests
- Exploratory Testing (testers learn the system before testing)
- Ad-hoc Testing (testers already know the system)
- Installation Tests
- Maintenance Tests

4.12.1.6.2. The Contractor shall explain the objectives of these tests in the TMP and allocate them onto each formal Test Activity in the Verification Process.

4.12.1.7. The Contractor shall have the overall responsibility for meeting TRITON testing requirements, and shall provide the man-power required to install the TRITON Baseline under test onto the Purchaser's Test Systems and to perform all tests.

4.12.1.8. The Contractor shall ensure that its hardware, software, test equipment, instrumentation, supplies, facilities, and personnel are available and in place to conduct or support each scheduled test.

4.12.1.9. Test Data and Test Environment

4.12.1.9.1. The Contractor shall establish a Test Environment in its premises using simulators for external data sources. This environment shall be used during Internal System Tests and FAT.

4.12.1.9.2. The Contractor shall establish a Test Environment at the Purchaser's premises using the TRITON Test Systems (see 4.13.10.1). This environment shall be used during SIT, SSMAT and UAT.

4.12.1.9.3. The Test Environment shall include a scenario-based data input capability for the TRITON function under test. The concept of Training Environment described in SRS can be used for test purposes.

4.12.1.9.4. The Contractor shall provide Test Data to support developmental, acceptance, and operational testing activities.

4.12.1.9.5. The Test Data shall provide:

- The quantities,
- The varieties of object types, object sizes and attribute values,
- The exceptional values,
- The update frequency appropriate to the type of testing and sufficient to verify that all system requirements are met.

4.12.1.9.6. For acceptance and operational testing, the Test Data shall also include, as a minimum, the anticipated operational quantities and sizes of Maritime Information Entities identified in the SyRS.

4.12.1.9.7. The Contractor shall also use live data sources to test the system behaviour under real conditions. The necessary live data sources shall be made available by the Contractor during the tests. If commercial sources require licenses or service fees, the Contractor shall provide the appropriate licenses for test purposes (e.g. AIS Data Source license).

4.12.1.9.8. The Contractor shall be able to use recorded data for test purposes.

4.12.1.9.9. The Contractor shall develop tools to capture, store or replay Test Data to perform functional tests without the real systems or services.

4.12.1.9.10. The Contractor shall identify which parts of Test Data will be used as Reference Data to test the correctness of processes.

4.12.1.9.11. The Purchaser will provide Test Data, when feasible, for those NATO Systems and Services that TRITON will have interface with.

4.12.1.10. The Contractor shall perform follow-on Operational Testing activities during the OT&E period in order to evaluate the TRITON capability performance and establish benchmarks for future enhancements, including the changes which are made to meet the requirements.

4.12.1.11. The Contractor shall perform developmental, acceptance, and operational testing for future TRITON enhancements and modifications undertaken as part of this Contract, including the changes which are made to meet the requirements.

4.12.2. Test Management Plan

4.12.2.1. The Contractor shall provide and maintain a Test Management Plan (TMP) outlining the tests and supporting tasks to meet the requirements of this SOW and the Contractual SRS.

4.12.2.2. The Contractor shall use ISO/IEC/IEEE 29119 as a guidance for Test Management and include the sections given in Table 4-10 as a minimum:

Table 4-10 – TMP Content

Section	Description
Test Objectives	The tangible goals of testing. At the TMP level, the test objectives are driven by the solution objectives and describe the overall objectives for testing. These include high level objectives that address the business functions, the technical requirements and those that reduce the risks and costs of failure.
Test Scope	The boundaries of testing. It describes or lists applications and systems within scope of the TMP. The TMP also covers static testing of the development and testing work products or references to document covering this. If any of the applications or systems is known to be out-of-scope for testing, the exclusions are mentioned here.
Assumptions	Any underlying assumptions on which this TMP is based. This is very important and key to successful testing because, if any of the assumptions turn out to be untrue, then this TMP and the detailed test plans it drives will require to be adjusted.
Test Strategy	The Functions - this includes functions or use cases from the use case model. The ~~PTP~~TMP shall identify the relation of all Functions to the [Project Name] Configuration Items (CIs) and shall indicate by which method the items will be evaluated. The Requirements - this lists, refers to, the requirements that are within scope for testing. The Risk Assessment - this comprises a detailed risk assessment, driven by the functions and requirements of the project under development. Set the level of risk for each function. Use a simple rating scale such as (H, M, L): High, Medium and Low.
Planning	The Roles and responsibilities - this describes in generic terms the handoffs and handovers that occur at various points in the test lifecycle as the project evolves from specification to design to implementation. Test Schedule - this defines the overall schedule of, and relationships between the various levels of testing. Major testing milestones - this defines the major milestones at each level of testing. Resource requirements - this provides an overview of the human and infrastructure resources required for each level of testing. Contingencies - this describes any actions taken to minimize the impact, should the testing not proceed as planned. It is based on the Risk Assessment above.
Test Environment Build Strategy	Test Environment Test Data Strategy - this identifies the approach to test data creation and set-up, and describes how test data is shared amongst the different levels of testing.

Requirements Traceability Matrix	Description of terms.
Test Reporting	The status and other periodic test reports for ongoing progress tracking as well as hand off from one level of testing to another. Descriptions of the frequency, format, and distribution of test reports.

4.12.2.3. The TMP shall describe at a high level, the overall plans for test, verification and validation at all stages of the project lifecycle including the following:

- Applicability of the quality characteristics
- Standards to be used
- Risk
- Project activities and IV&V activities at each stage
- Test stages (e.g. unit, system, integration, change evaluation, acceptance)
- Test Environments (including Test/Reference Data) to be used at each stage
- Resource requirements and schedule.

4.12.2.4. The TMP shall describe how the Contractor intends to meet the following objectives:

- How testing deficiencies will be categorized, addressed, rectified and retested;
- Verification that the design produces the required capability;
- Confidence that system defects are detected early and tracked through to correction by using a test management tool and logged in a file;
- Compliance with the requirements of the SRS, including quality attributes and their test case coverage and with external system interfaces as defined in the ICDs, including any plug-ins/add-ins and glue code;
- Compatibility among internal system components (with reference to the TRITON SDS implementation model);
- Regression testing;
- Operational readiness and suitability of all configurations;
- Verification by the operational users that the system is usable and acceptable;
- Verification that the system can be efficiently supported and maintained;
- System characterisation to establish the system's performance benchmarks;
- Documentation and code verification;
- Establishment of the Test and Reference Systems.

4.12.2.5. The TMP shall describe the Contractor's test organization and its relationship with the Contractor's Project Management Office and QA functions.

4.12.2.6. The TMP shall provide a flow diagram that identifies the overall sequence of tests, the location, and Contractor and Purchaser equipment and personnel involved in each test, and the relationship of test events to project milestones.

4.12.2.7. The TMP shall identify the test documentation associated with each test, including the scenario, procedures, test data, test results, and test reports.

4.12.2.8. The TMP shall identify how defects are tracked through to correction by using a Test Management Tool or defect management tool respectively.

4.12.2.9. The TMP shall identify the support to be provided by the Purchaser in terms of manpower, services and material, including Purchaser witnessing and approval activities.

4.12.2.10. The TMP shall identify any specialised or long-lead items required for testing.

4.12.2.11. The TMP shall identify all TRITON system elements and CIs that are subject to test and shall indicate by which method the items will be evaluated.

4.12.2.12. The TMP shall include a description of how the Requirements Traceability Matrix (RTM) shows how test tasks demonstrate that the tested system fulfils specific SRS requirements and implements specific SDS features.

4.12.2.13. The TMP shall provide the allocation of test procedure to each test task supporting the tests.

4.12.2.14. The TMP shall include the following plans as appendices:

- Security Test and Verification Plan (STVP)
- System Validation Plan (SVP)

4.12.2.15. Security Test and Verification Plan

4.12.2.15.1. The Contractor shall provide and maintain, as an annex to the TMP, which can be addressed as a separate document, a Security Test and Verification Plan (STVP) that details the tests by which it will demonstrate compliance with the security requirements of the SyRS. This test should demonstrate that the Contractor has mitigated the security risks that are identified in the Security Risk Assessment. The report of this test shall be delivered to the INFOSEC accreditation authority as a step to achieve INFOSEC accreditation.

4.12.2.15.2. The Contractor shall derive a generic STVP, compliant to [AC/35-D/2005-REV3], from the original STVP which can be used by Organizational Nodes to produce their specific STVP.

4.12.2.15.3. The Contractor shall deliver the draft STVP at the CDR.

4.12.2.16. System Validation Plan

4.12.2.16.1. The Contractor shall prepare a System Validation Plan (SVP), as an annex to the TMP, which describes the detailed activities needed for the validation process.

4.12.2.16.2. The SVP shall include the following:

- Evaluate the stakeholders' requirements
- Determine the proper validation method (i.e. demonstration, inspection, test) and level (i.e. system, component)
- Develop the requirements verification matrix

- Define the approach for validating the system services in a representative operational environment
- Identify resources necessary to perform validation
- Identify and plan for enabling systems
- Define the roles and responsibilities
- Define validation criteria for stakeholders' requirements

4.12.2.16.3. The Contractor shall deliver the draft SVP at the CDR.

4.12.2.16.4. The Purchaser will obtain operational user community's concurrency/ approval on the SVP and approve it.

4.12.3. Test Management Tool

4.12.3.1. The Contractor shall perform Test Quality Management by introducing a Test Management Tool including a Test Automation Tool.

4.12.3.2. The Test Management Tool shall:

4.12.3.2.1. Link requirements in the SyRS to test cases, procedures, and results.

4.12.3.2.2. Support Test Preparation, Test execution, Test evaluation and Test optimisation, as well as the logging of errors.

4.12.3.2.3. Support the establishment of version-controlled test baselines associated with the Functional, Development and Product Baselines.

4.12.3.2.4. Provide all Test Case references to the associated SOW and SyRS requirement(s).

4.12.3.2.5. Provide all Test Case references to the associated functional area(s) in the logical model of TRITON SDS.

4.12.3.2.6. Provide detailed Test Case description, including the following fields:

- Test Case title / Unique identifier
- Test priority (low/medium/high/critical)
- Function to be tested (names of components, modules and sub-modules)
- Objective
- Acceptance criteria
- Input data
- Preconditions
- Execution procedures (test scripts, execution steps)
- Output data
- Expected result
- Post conditions
- Exception handling, including test break-off criteria.

4.12.3.2.7. Provide overall and individual Test Case dependencies.

4.12.3.2.8. Provide overall procedures for sequences of tests, such as those for the Factory Acceptance Test.

4.12.3.2.9. Provide individual and summary test results.

4.12.3.2.10. Provide a Test Log of all tests run, including:

- Test Log Identification (number/name)
- Test Case reference and/or attachment
- Test Level
- Test Environment
- Test Execution Date
- Tester
- Test Witness (the Purchaser or its designee)
- System elements under test
- Software Build Version and Release Number
- Test Inputs (test data, configuration parameters)
- Remarks (steps taken to achieve the test outcome if different than test case)
- Test Outputs (actual results per test step, description of system behaviour after test execution if actual result differs from expected result a test defect)
- Test Result (pass/conditionally pass/fail)

4.12.3.3. Support Change Management, including data on test errors, affected Test Cases, associated Deficiency Reports, and change history.

4.12.3.4. The Contractor shall make the contents of the Test Management Tool information accessible on a read-only basis via the Project Website.

4.12.3.5. Test Automation Tool

4.12.3.5.1. The Contractor shall use a Test Automation Tool which is part of the Test Management Tool to allow automation on repeatable test cases.

4.12.3.5.2. The Contractor shall define automated test cases with automated verification conditions.

4.12.4. Test Procedures

4.12.4.1. The Contractor shall develop and maintain Test Procedures (or test cases) for each formal test activity (as defined in the TMP) according to ISO/IEC/IEEE 29119.

4.12.4.2. The Contractor shall identify any conditions which shall be satisfied prior to application of the test with, if applicable, a block diagram showing the proposed method of meeting the test requirements.

4.12.4.3. The Contractor shall state for each test the following items:

- Test objective
- System elements and facilities and test equipment involved
- Configuration parameter resets (i.e. to allow recording of relevant initial parameter settings)
- Steps to be taken to achieve the test outcome
- Data to be collected
- Expected outcome.

4.12.4.4. The Contractor shall include, in each Test Procedure, the Nominal Test Cases, which can be used to demonstrate that the system elements continue functioning properly after applying maintenance to some elements. The Nominal Test Cases shall cover the basic flows of the system elements and can be used to verify that a selected system element is functioning as specified and tested before.

4.12.4.5. The Contractor shall include a subset of the RTM relevant to the test item to show how test tasks are linked to and demonstrate specific SOW and SyRS requirements.

4.12.4.6. The Contractor shall identify the means of measurement or assessment for each test in the Test Procedure.

4.12.4.7. The Contractor shall forward the Test Procedures for Purchaser review and acceptance at least three (3) weeks prior to test execution, unless specified differently in the Work Package.

4.12.4.8. The Contractor shall generate and deliver automated Test Procedures compatible with the Test Management and Test Automation Tools for all test procedures.

4.12.4.9. The Test Procedures shall also be provided in a structured format (XML) to allow exporting to the Purchaser's Test Management Tool.

4.12.5. Test Readiness Review

4.12.5.1. A Test Readiness Review (TRR) ensures that the test article (hardware/ software), test facility, support personnel, and test procedures are ready for testing and data acquisition, reduction, and control.

4.12.5.2. Before scheduling the Verification Tests (see 4.12.12), the Contractor shall organise and host a TRR to review preparations and readiness for testing of system elements, including adequate version identification of CIs and test procedures.

4.12.5.3. The Contractor shall plan and conduct Physical Configuration Audit (PCA) as defined in [ACMP-2009] in order to clearly identify the PBL as the items to be tested, with their configuration control and version numbers. Each Baseline shall have its own PBL to be considered as the Test Baseline.

4.12.5.4. Entry Criteria

4.12.5.4.1. The Contractor shall include in planning the TRR Entry Criteria given in Table 4-11~~Table 4-11~~ and make them available to the Purchaser at least two (2) weeks prior to the TRR:

Table 4-11 – TRR Entry Criteria

Serial	Activities / Documents
1	A preliminary TRR agenda
2	Success Criteria (enhanced or adapted)
3	The objectives of the testing have been clearly defined and documented, and all of the test plans, procedures, environment, and configuration of the test item(s) support those objectives.
4	TRITON Test System is available.

5	Configuration of the system under test has been defined and agreed to. All interfaces have been placed under configuration management or have been defined in accordance with an agreed to plan, and a version description document has been made available to TRR participants prior to the review.
6	All applicable functional, unit-level, element, system, and qualification testing has been conducted successfully; reports are available.
7	All previous design review success criteria and key issues have been satisfied in accordance with an agreed-upon plan.
8	All required test resources people (including a designated test director), facilities, test articles, test instrumentation, and other test enabling products have been identified and are available to support required tests.
9	Roles and responsibilities of all test participants are defined and agreed to.
10	Test contingency planning has been accomplished, and all personnel have been trained.

4.12.5.5. Success Criteria

4.12.5.5.1. The Purchaser concludes that the TRR Success Criteria in Table 4-12~~Table 4-12~~ accomplished to complete the objectives of the TRR.

Table 4-12 – TRR Success Criteria

Serial	Requirement
1	Test Management Plan (TMP), Security Test and Verification Plan (STVP) (an Annex in TMP), System Validation Plan (an Annex in TMP) and System Transition Plan (STrP) are completed and approved for the system under test.
2	Adequate identification and coordination of required test resources are completed; the test environment is adequate to execute the test according to its objective.
3	Previous component, element, and system test results form a satisfactory basis for proceeding into planned tests.
4	The objectives of the testing have been clearly defined and documented, and the review of all the test plans, as well as the procedures, environment, and configuration of the test item, provide a reasonable expectation that the objectives will be met.
5	The test procedures and test cases (including Security Implementation Verification Procedures (SIVP) and Security Operating Procedures (SecOps)) have been reviewed and analysed for expected results, and the results are consistent with the test plans and objectives.
6	Operational software (baselined version to be tested) (PBL) is available on the TRITON Test System.
7	Test personnel have received appropriate training in test operation and safety procedures.
8	Test Report form (empty) is available.
9	Test Automation Tool is available.

10	Plans to capture any lessons learned from the test program are documented in the Lessons Log.
11	Major risks have been identified, and viable mitigation strategies have been defined. Steps to mitigate risks are identified in the Risk Register.

4.12.5.6. The Contractor shall prepare a TRR Report and submit it within one week after the completion of the TRR.

4.12.6. Test Crew Training

4.12.6.1. The Contractor shall provide Test Crew Training for the following tests in accordance with the requirements given in Paragraph 5.8.8:

- FAT for each Baseline
- UAT for each Baseline
- SSMAT for each Baseline.

4.12.7. Test Reports

4.12.7.1. The Contractor shall record the results for each testing activity (test levels) in a Test Report, using the test result sheets incorporated in the relevant test procedure and the information collected in the Test Log.

4.12.7.2. The Contractor shall include at least the following items in the Test Report:

- Test Report Identification (level/name of the test activity)
- References (Test Procedures, Test Logs)
- Metrics (number of planned and executed Test Cases, status of Test Cases)
- Test Environment
- Types of tests performed
- Lessons Learned
- Recommendations
- Exit Criteria
- Conclusion

4.12.7.3. Where the Purchaser has witnessed the testing, the witness will annotate each page of the test results. Such annotation will only confirm the accuracy of the test results and shall not be considered as an acceptance of the testing.

4.12.7.4. Any failure to complete a test successfully shall be recorded by the Contractor, logged as a Deficiency Report, and noted in the Test Report.

4.12.7.5. The original Deficiency Report (electronic and hard-copy) shall be delivered to the Purchaser for acceptance within two (2) weeks after the completion of the test, unless specified differently in the Work Package.

4.12.8. Test Failures

4.12.8.1. Classification of Failures

4.12.8.1.1. Should a failure occur during testing, the Contractor shall submit a failure report (individually identified to ensure traceability) and carry out a preliminary investigation to classify the failure as one of the following:

4.12.8.1.1.1 Class “A”: there is evidence that the cause was an external or transient condition;

4.12.8.1.1.2 Class “B”: there is mutual agreement between the Contractor and Purchaser that the cause was an inherent design or manufacturing deficiency in the unit under test; or

4.12.8.1.1.3 Class “C”: When the specific nature of the cause cannot be immediately determined and a more detailed investigation is required before a conclusion can be drawn.

4.12.8.2. Class “A” Failures

4.12.8.2.1. In the event that a preliminary investigation results in the classification of a failure as described above, the Contractor shall repeat the test at least three successive times in order to confirm the failure.

4.12.8.2.2. If the re-test is successful, the Purchaser will close the observation and testing shall be resumed from the point immediately after that where the failure occurred.

4.12.8.2.3. If the re-test fails, the Contractor shall change the failure category to class “B” or “C”, as described above.

4.12.8.3. Class “B” Failures

4.12.8.3.1. If a failure is classified as a Class "B" from above, the Contractor shall suspend all testing until the Contractor determines the specific cause of the failure and proposes appropriate remedial action acceptable to the Purchaser.

4.12.8.3.2. If the Contractor determines that the cause of the failure or the effect of the proposed remedial action will have no influence whatsoever on other areas of scheduled testing, it may propose to the Purchaser to continue testing in the other areas prior to the rectification of the cause of the failure.

4.12.8.3.3. The Purchaser shall have the right to require repetition of any or all tests performed in these circumstances after the rectification of the cause of the failure and the subsequent re-tests, to prove they have been successfully completed.

4.12.8.3.4. The Contractor shall be responsible for all costs related to the rectification of deficiencies or failures and subsequent re-testing caused by the design or production of the deliverables identified during the verification and/or testing cycles.

4.12.8.3.5. The Contractor shall be responsible for any travel, subsistence and other incidental expenses incurred by the Purchaser as a result of the requirement for the re-performance of tests necessitated by test failures.

4.12.8.3.6. The Contractor shall provide full details describing the cause of the failure and the recommended remedial actions to be taken by the Contractor.

4.12.8.3.7. After the Contractor has taken remedial action, the test may be resumed at the step during which the deficiency or failure was identified; however, the Purchaser shall have the right to require that re-testing includes all of the tests related to the verification of that particular specification requirement.

4.12.8.4. Class “C” Failures

4.12.8.4.1. If a failure is classified as a Class "C" from above, the Contractor shall immediately suspend testing and conduct a detailed investigation into its causes.

4.12.8.4.2. The Contractor shall report its findings and recommendations on the cause and remedial action required and advise if the failure should be re-classified as either a Class “A” or “B.” The actions previously described relating to these classifications shall then be commenced.

4.12.8.4.3. If the Contractor determines that the test failure was due to a component failure and not attributable to a deficiency in design, then the defective component may be replaced and the failure re-classified as a Class "A" failure.

4.12.8.5. Tracking of Failures

4.12.8.5.1. If a failure occurs during testing, the Contractor shall record the event and log the subsequent actions taken to resolve the failure.

4.12.8.5.2. The Contractor shall indicate in the Problem Resolution Plan, how these recorded failures will be solved.

4.12.9. Test Waivers

4.12.9.1. If the Contractor has previously successfully completed qualification testing to national or international standards for assemblies, subassemblies, components or parts, the Contractor may submit documentation that substantiates the particular test requirement.

4.12.9.2. The Purchaser reserves the right to review and approve the test documentation for acceptance and waiver of any test requirement.

4.12.9.3. The Contractor shall produce the following to justify a test waiver:

4.12.9.3.1. The nationally or internationally certified test results;

4.12.9.3.2. The test standards, procedures and methods employed on the testing; and

4.12.9.3.3. The Test Environment specifications that show that the previous testing matches the requirements of this Contract.

4.12.9.3.3.1 The Contractor shall certify that the environment to be implemented is identical to that which was originally tested and certified, or advise the Purchaser of design/construction changes which affect form, fit or function.

4.12.9.3.3.2 The Purchaser, after review of such changes and their impact, reserves the right to require test and certification of the modified equipment at no cost.

4.12.9.4. The Contractor shall record and log all waiver requests along with their resolution.

4.12.10. Test Results

4.12.10.1. The result of a Verification Test shall be assigned as one of the results defined in Table 4-13:

Table 4-13 – Verification Test Results

Result	Description
Passed	The results of all test cases are successful.
Conditionally Passed	Some test cases have deficiencies. They are identified, recorded and included in the Problem Resolution Plan.
Failed	The test is not successful due to too many deficiencies. The test has to be repeated.

4.12.10.2. The Contractor shall propose the result of a test event in the relevant Test Report.

4.12.10.3. The final decision about the result of the test will be given by the Purchaser and the decision shall be recorded in the Test Report.

4.12.11. Problem Resolution Plan

4.12.11.1. The Contractor shall prepare a Problem Resolution Plan (PRP) after each test. One PRP may be used for all tests and updated accordingly.

4.12.11.2. The PRP shall include how all the findings, deficiencies and failures will be resolved.

4.12.12. Verification Tests

4.12.12.1. Factory Acceptance Test

4.12.12.1.1. The purpose of the Factory Acceptance Test (FAT) is to demonstrate that the Product Baseline complies with the FBL (as set during the FCA for each Baseline) and that the off-the-shelf and uniquely developed elements of the TRITON capability have been integrated to meet the requirements of the SOW and the SyRS.

4.12.12.1.2. The testing environment for FAT at the Contractor premises shall reflect the target implementation environment including configuration and security settings. The tests shall cover both functional testing and security testing.

4.12.12.1.3. The FAT shall be conducted by the Contractor at the Contractor's premises and observed by the Purchaser. The Contractor shall allow the Purchaser to perform specific tests after demonstration of that test by the Contractor.

4.12.12.1.4. Factory Acceptance Test Procedure

4.12.12.1.4.1 The FAT shall be conducted on the basis of test cases. These test cases shall be developed by the Contractor and documented in the FAT Procedure. The Purchaser will review, amend and approve the FAT Procedure prior to execution.

4.12.12.1.4.2 The Contractor shall prepare the final FAT Procedure and deliver it at the TRR of each Build Process.

4.12.12.1.4.3 The FAT Procedure shall include the GUI test cases according to the UIS.

4.12.12.1.5. The Contractor shall facilitate and support (Test Crew Training) at least five (5) days of ad hoc testing by the Purchaser's staff. The Contractor shall support the ad hoc testing and shall provide space and at least five (5) TRITON capability-enabled workstations for the Purchaser's staff. The Contractor shall record and assess for contract relevance any discrepancies identified during the ad hoc testing.

4.12.12.1.6. The Contractor shall inform the Purchaser about the date and time of the FAT at least thirty (30) days prior the FAT.

4.12.12.1.7. The Purchaser will declare the status of the FAT (Passed / Conditionally Passed / Failed) at the end of the test event.

4.12.12.1.8. The Contractor shall prepare the FAT Report (FAT-R) submit it to the Purchaser within (1) one week after the test event.

4.12.12.2. Security Test and Evaluation

4.12.12.2.1. The purpose of Security Test and Evaluation (ST&E) is to demonstrate that the TRITON capability meets its security requirements and can be accredited for use on the NATO SECRE_T network, MISSION SECRE_T, NATO RESTRICTE_D NATO UNCLASSIFIED network.

4.12.12.2.2. The Contractor shall provide the initial version of the Security Operating Procedures (SecOps) in accordance with [AC/35-D/1014-REV2] and the Security Implementation Verification Procedures (SIVP) no later than the TRR for the FAT.

4.12.12.2.3. The Contractor shall perform an internal ST&E prior to a TRR for Baseline. The results of this test shall be used to contribute to the development of the initial version of the TRITON SecOps.

4.12.12.2.4. The Contractor shall demonstrate compliance of the TRITON capability with security requirements of the SRS, the draft SecOps and the SIVP, including compliance with operating system and security configuration settings.

4.12.12.2.5. Security Operating Procedures

4.12.12.2.5.1 The Security Operating Procedures (SecOps) shall be based on a Purchaser-furnished template in accordance with [AC/35-D/1014-REV2] and cover the following:

- Administration and Organization of Security
- Physical Security
- Personnel Security
- Data Protection
- Information Security (INFOSEC)
- Emergency and Contingency Measures
- Configuration Management
- General Security Guidance to Users.

4.12.12.2.5.2 After approval by the Purchaser, the SecOps shall be provided as part of Product Baseline.

4.12.12.2.6. Security Implementation Verification Procedures

4.12.12.2.6.1 The Contractor shall develop, provide and maintain the initial and any updated Security Implementation Verification Procedures (SIVP) for each TRITON element as part of Security Tests. These procedures shall consist of a set of software scripts and inspection procedures that shall allow a System Security Officer to verify that the installed systems at a site comply with the SRS and SecOps.

4.12.12.2.6.2 After approval by the Purchaser, the SIVP shall be provided as part of Product Baseline.

4.12.12.2.7. The Contractor shall prepare the ST&E Report (ST&E-R) which will be required as part of the submissions for INFOSEC accreditation and submit it at the TRR of each Baseline.

4.12.12.3. System Integration Test

4.12.12.3.1. The purpose of System Integration Test (SIT) is to demonstrate that the Product Baseline complies with the FBL concerning the integration with the Bi-SC AIS Hardware Baseline and the Bi-SC AIS Core Services and other Bi-SC AIS Functional Services.

4.12.12.3.2. The purpose of the SIT is also to demonstrate that the Product Baseline complies with the Interoperability Requirements such as information exchange and interfaces to other systems, standards and protocols.

4.12.12.3.3. The Contractor shall perform SIT by installing the PBL on the TRITON Test System at the PMIC facilities.

4.12.12.3.4. System Integration Test Procedure

4.12.12.3.4.1 The SIT shall be conducted on the basis of test cases. The Contractor shall develop the initial version of the test cases and document them in the SIT Procedure.

4.12.12.3.4.2 The Purchaser will review, amend and approve the SIT Procedure prior to execution.

4.12.12.3.4.3 The Contractor shall prepare the final SIT Procedure and deliver it at the TRR of each Build Process.

4.12.12.3.5. The SIT shall include testing of all supporting capabilities, including:

- Data migration capabilities
- Data migration verification and validation
- Collaboration capabilities
- Data display and validation.

4.12.12.3.6. The SIT shall be executed using Test Data that is realistic in terms of structure, content and size.

4.12.12.3.7. The Purchaser reserves the right to observe the tests and to have the Contractor perform selected testing tasks on the TRITON Reference System to confirm compliance.

4.12.12.3.8. The Purchaser reserves the right to perform ten (10) days of ad hoc testing by the Purchaser personnel with support from the Contractor personnel. The Contractor shall record and assess for Contract relevance any discrepancies identified during the ad hoc testing.

4.12.12.3.9. The Purchaser will declare the status of the SIT (Passed / Conditionally Passed / Failed) at the end of the test event.

4.12.12.3.10. The Contractor shall prepare the SIT Report and submit it to the Purchaser within one (1) week after the test event.

4.12.12.4. System Support and Maintenance Acceptance Test

4.12.12.4.1. The purpose of System Support and Maintenance Acceptance Test (SSMAT) is to demonstrate that the PBL complies with the FBL with respect to support and maintenance, and provides Purchaser support staff with the capability to support, test and maintain after handover to the Purchaser.

4.12.12.4.2. The Contractor shall perform SSMAT by installing the PBL using the Software Installation Guide on the TRITON Test System at the PMIC facilities.

4.12.12.4.3. Software Installation Guide

4.12.12.4.3.1 Software Installation Guide (SIG) provides information about all actions to take in order to install and configure the TRITON Operational Software, including COTS components.

4.12.12.4.3.2 The SIG shall include the following:

- Prerequisites for installing TRITON (e.g. the necessary operating system access right to perform installation)
- The necessary supplementary software, drivers, etc. to install TRITON
- The required disk space
- Configuration file information (location, content, available settings of the items and their meaning)
- How to modify the configuration file
- How to configure the database management systems (including both the data model and access mechanisms)
- How to modify the system backbone to run TRITON
- Any additional information specific to the system.
- Text and/or screenshots of the system feedback which will be displayed after each action
- Detailed installation procedures for all services installed or migrated on new or existing platforms, allowing system administrators to rebuild services from scratch.

4.12.12.4.3.3 The Contractor shall deliver the SIG at least three (3) weeks prior to the SSMAT.

4.12.12.4.4. “Read Me” Files

4.12.12.4.4.1 There may be additional “Read Me” files to explain specific information related to installation and configuration of certain components.

4.12.12.4.4.2 The TRITON “Read Me” files shall have at least the following information:

- The version number of the component to which the “Read Me” file applies
- Minimal system requirements necessary to run the specific component
- The functional changes since the latest release
- The solved problems

- Known errors
- Contact information for problem reporting.

4.12.12.4.4.3 The Contractor shall provide "Read Me" files in the installation package.

4.12.12.4.5. The SSMAT shall include at least the following:

- COTS software installation
- Application software installation
- Configuration
- Running and setting to operation with appropriate mode changes
- Operation monitoring
- Error detection and fault isolation (System Technical Status Management and Error Reporting functions)
- De-installation
- Back-up and restore
- Data migration (with realistic structure, content and size)
- Maintainability (including replaceability, quick releases, direct accessibility, no obstruction by other items, no harm or disturbance during maintenance)
- Source code quality (submission and review of the Source Code Review Report – SCR-R)

4.12.12.4.6. SSMAT Procedure

4.12.12.4.6.1 The SSMAT shall be conducted on the basis of test cases for software elements.

4.12.12.4.6.2 The Contractor shall develop the test cases and document them in the SSMAT Procedure.

4.12.12.4.6.3 The SSMAT Procedure shall refer to the Software Installation Guide.

4.12.12.4.6.4 The Purchaser will review, amend and approve the SSMAT Procedure prior to execution.

4.12.12.4.7. The Purchaser reserves the right to observe the tests and to have the Contractor perform selected testing tasks on the TRITON Test System to confirm compliance.

4.12.12.4.8. The Purchaser reserves the right to perform five (5) days of ad hoc testing by Purchaser personnel with support from the Contractor personnel (Test Crew Training). The Contractor shall record and assess for Contract relevance any discrepancies identified during the ad hoc testing.

4.12.12.4.9. The Purchaser will evaluate the source code quality using the SCR-R as part of the SSMAT. The Purchaser has right to conduct another Source Code Review through IV&V Support.

4.12.12.4.10. The Purchaser will declare the status of the SSMAT (Passed / Conditionally Passed / Failed) at the end of the test event.

4.12.12.4.11. The Contractor shall prepare the SSMAT Report and submit it within one (1) week after the SSMAT.

4.12.12.5. User Assessment Test

4.12.12.5.1. The Contractor shall perform functional testing for the TRITON capability to demonstrate that user requirements are met. As representatives of operational users participates this activity, it shall be referred to as User Assessment Test (UAT).

4.12.12.5.2. The UAT will be conducted by the representatives of the User Community (Maritime Community of Interest) at the Purchaser's PMIC facility using the TRITON Test Systems. The Contractor shall provide support to the activity.

4.12.12.5.3. The Operational Users from the User Community will assess and identify that the product is available for testing, and meets the operational needs ("fit for purpose"). The UAT shall be based on the requirements defined in the Stakeholder Requirements Specification (StRS) document provided by the Purchaser.

4.12.12.5.4. UAT is a key event that must be passed for the Baseline to go to IV&V Testing and AFPL posting.

4.12.12.5.5. UAT Procedure

4.12.12.5.5.1 UAT shall be conducted on the basis of tests cases (scenarios or vignettes).

4.12.12.5.5.2 The Contractor shall develop an initial version of the UAT Procedure using the User Requirements provided by the Purchaser, test scenario, test data, the Acceptance Criteria and description of tests already developed or produced by the Operational Users if available.

4.12.12.5.5.3 The Purchaser will review, amend with the Operational Users and approve the UAT Procedure and the Acceptance Criteria prior to execution.

4.12.12.5.5.4 The UAT shall also be conducted on the basis of an operational context (vignettes) in addition to the UAT execution plan. The Purchaser and the User Community will determine which events will provide the context for the additional UAT scope.

4.12.12.5.5.5 The UAT Acceptance Criteria shall describe the conditions that a particular test case/vignette is considered as Passed or Failed according the associated User Requirement in the StRS.

4.12.12.5.6. The Contractor shall provide Test Crew Training (as defined in Paragraph 5.8.8) to the representatives of the User Community at the beginning of the UAT.

4.12.12.5.7. The Contractor shall record any recommendations or comments related to Training Material (including the CBT) by the participants of the UAT.

4.12.12.5.8. The Purchaser reserves the right to observe the UAT and to have the Contractor perform selected testing tasks to confirm compliance.

4.12.12.5.9. The Purchaser reserves the right to perform two (2) days of ad hoc testing by the Purchaser's staff and the User Community with support from the Contractor personnel.

4.12.12.5.10. The duration of the UAT shall be no less than three (3) working days for a Baseline.

4.12.12.5.11. The Contractor shall record and assess for contract relevance any discrepancies identified during testing.

4.12.12.5.12. The Contractor shall identify any discrepancies and provide a schedule for resolving.

4.12.12.5.13. The Contractor shall prepare the UAT Report which includes the deficiencies found during the test. The participating Operational Users will provide their own report to the Purchaser.

4.12.12.5.14. The Purchaser will declare the status of the UAT (Passed / Conditionally Passed / Failed) at the end of the test event.

4.12.12.6. Regression Test

4.12.12.6.1. Regression Test (RegT) is a quality control measure to ensure that the newly modified code still complies with its specified requirements and that unmodified code has not been affected by the maintenance activity. The intent of regression testing is to provide confidence that corrective actions have not introduced or exposed anomalies in unchanged parts of the test item.

4.12.12.6.2. The Contractor shall plan and execute RegT to uncover new software problems or regressions in the system after changes or bug fixes are applied.

4.12.12.6.3. The Contractor shall demonstrate in the RegT that the defects found in the previous test events are solved and the rest of the system is not affected.

4.12.12.6.4. The Contractor shall perform a RegT on the whole system (or some components) if a formal test activity is deemed to be "Conditionally Passed". The test status shall be changed to "Passed" if the RegT is agreed to be successful.

4.12.12.6.5. The Contractor shall provide Regression Test Procedure to the Purchaser prior to the test, execute the test, update the Test Log and provide the Regression Test Report (RegT-R) within two (2) weeks after the test.

4.12.12.7. Independent Verification and Validation Testing

4.12.12.7.1. The Contractor shall provide support to the Purchaser to conduct Independent Verification and Validation (IV&V) Testing including the Independent Security Testing (IST).

4.12.12.7.2. The Contractor is responsible for successfully obtaining security accreditations of TRITON Operational Software for both NS and NU Domains.

4.12.12.7.3. The purpose of Software Accreditation is to demonstrate that TRITON meets its security requirements and can be accredited for use on NATO networks within the NCI Agency jurisdiction.

4.12.12.7.4. Any software to be used in NATO networks and operational environments is subject to security screening and approval by the NCI Agency. In particular, this software must be included in the NATO Operational Baseline as described in the AFPL. The process of software accreditation is divided in two phases:

- Configuration Change Proposal – the software to be accredited is presented to a Configuration Control Board;

- Software Accreditation Test – the Software itself and the software documentation are subjected to in-deep technical assessment by the NCI Agency.

4.12.12.7.5. The Contractor-provided software shall operate within the environment of NATO Operational Baseline (defining software deployed at NATO computers) as listed in the AFPL.

4.12.12.7.6. The Purchaser will provide the Contractor the images of the latest version of the supported software configuration (Operational Baseline) for servers and clients as defined in the AFPL.

4.12.12.7.7. The Purchaser will provide the Contractor with the licenses for the activation of the COTS software indicated in the software that is covered by Enterprise Agreements the Purchaser has signed, unless otherwise specified (e.g. the Contractor purchases the software licenses on behalf of the Purchaser).

4.12.12.7.8. In case third party software is used, the Contractor shall provide the software warranty and licensing documentation to the Purchaser at least three (3) weeks before the IV&V Security Testing or when otherwise specified to ensure that Security Test planning can be carried out at the Purchaser's facility.

4.12.12.7.9. The Contractor shall develop and provide system documentation as required by the IV&V and NCI Agency CCB in order to support the security penetration test and screening activities (to be conducted using the NCI Agency IV&V Testbed) and to include TRITON in the AFPL. The list of documents required to conduct such activities will be provided as part of PFE on Contract Award.

4.12.12.7.10. The Contractor shall deliver the IV&V test documentation for reviewing at least thirty (30) days prior to the IV&V testing activity. This delivery shall be indicated in the TMP.

4.12.12.7.11. The Contractor is responsible for successfully obtaining listing on the necessary AFPL. This includes the provision of the required product documentation and actively supporting the product testing.

4.12.12.7.12. Two test sessions for software accreditation are foreseen, whose duration is five (5) working days each. Test session schedule will be planned in advance by the NCI Agency and in coordination with the Purchaser. The Contractor will be communicated in due time the test schedule.

4.12.12.7.13. IV&V Test sessions will be repeated until completion with a Pass or Conditional Pass.

4.12.12.7.14. Upon successful completion of the test, the software product is added to the AFPL and then it can be installed on a NATO site.

4.12.12.7.15. The NCI Agency will provide the Contractor with a Test Report at the end of each test session, where the reason for failure and remedial actions will be indicated.

4.12.12.7.16. The Purchaser will perform IV&V Testing in support of the approval process for changes to the operational Bi-SC AIS configuration. The IV&V Testing will be performed at the Purchaser's IV&V Test Facility at Casteau, unless

mutually agreed by the Contractor and the Purchaser. Standard Bi-SC AIS components (e.g. operating systems, e-mail servers) will be provided at the IV&V Test Facility.

4.12.12.7.17. The Contractor shall develop and provide system documentation as required by the IV&V and the NCI Agency CCB in order to support the security penetration test and screening activities. The list of documents required to conduct such activities will be provided as part of PFE on Contract Award.

4.12.12.7.18. The Contractor shall support the Purchaser for Initial Planning Conference (IPC) and Final Planning Conference (FPC) prior to the IV&V Testing.

4.12.12.7.19. The Contractor shall support the installation and configuration of the TRITON capability (as delivered in the Product Baseline) in support of IV&V Testing. The Contractor shall install all required elements of the TRITON PBL including Purchaser- and Contractor-provided COTS components on the equipment in the IV&V Test Facility using the Site Installation and Activation Procedures. The Contractor shall install test databases to support Acceptance Testing.

4.12.12.7.20. The Contractor shall provide support to the IV&V Testing activity performed by the Purchaser. The Contractor shall provide on-site support for the testing, including supporting the identification and resolution of issues, performance of test procedures to demonstrate system functionality, and participation in pre- and post-test reviews. The Contractor shall record and assess for Contract relevance any discrepancies identified during IV&V Testing.

4.12.12.7.21. The Contractor shall support interoperability testing performed between TRITON and ~~other applications~~ external systems/services as defined in SRS~~requested by the user~~. These applications will be defined in correspondence of the Contractor's submission of the Test Management Plan.

4.12.12.7.22. The Contractor shall resolve any discrepancies relevant under the Contract and support additional IV&V Testing required to verify these fixes. If the resolution of discrepancies requires changes to the PBL, the Contractor shall deliver a revised version of the PBL prior to site installation and additional testing.

4.12.12.7.23. The IV&V Testing will be repeated for those Baselines indicated in the relevant Work Package and major release thereafter.

4.12.12.7.24. The Purchaser reserves the right to perform the user-produced test scenarios during this test.

4.12.12.7.25. The Purchaser's test authority will prepare the IV&V Report.

4.12.12.7.26. TDK IV&V Testing

4.12.12.7.26.1 The TDK IV&V Testing covers System Security Test for one TDK.

4.12.12.7.26.2 The Purchaser or its designees (e.g. IV&V Contractor) will review/approve the Contractor's TMP and procedures for correctness and completeness for the TDK IV&V Testing, and will monitor and inspect the Contractor's test activities to ensure compliance.

4.12.12.7.26.3 The TDK IV&V Testing for one TDK is similar to the system IV&V Tests for Baselines and expected to last 5 (five) days.

4.12.12.7.26.4 The Contractor shall provide technical support to the TDK IV&V testing activity.

4.12.12.7.26.5 The Purchaser's test authority will prepare the TDK IV&V Report.

4.12.12.7.26.6 The Contractor shall resolve any discrepancies relevant under the Contract and support additional IV&V Testing required to verify these fixes. If the resolution of discrepancies requires changes to the PBL, the Contractor shall deliver a revised version of the PBL prior to serial production or fix apply the changes after the production.

4.12.13. System Verification Review

4.12.13.1. The Contractor shall execute a System Verification Review (SVerR) after each IV&V Testing as indicated in AAP-20 Development Stage.

4.12.13.2. The SVerR shall include reviewing at least the following:

- IV&V Test reports
- Problem Resolution Plan

4.12.13.3. The Contractor shall prepare a SVerR Report and submit it after the SVerR.

4.12.13.4. The Contractor shall perform the system deployment and installation activities after the successful verification of the software by IV&V.

4.12.14. Key Performance Indicators

4.12.14.1. The Contractor, in conjunction with the Purchaser, shall measure the success of each Verification Test by measuring and monitoring the following KPIs:

- Total number of critical defects and non-conformities found during verification activities
- Number of defects (according to their severity)
- Number of emergency changes reported by the user community following deployment
- Number of customer waivers required to field the product, service or system.
- Labour spent for verification activities.

4.12.14.2. The Contractor shall provide KPI and any other statistical data in the result report.

4.12.14.3. The Contractor shall use the KPIs to identify opportunities for quality improvement, provide solutions and update the plans.

4.13. System Transition Process

4.13.1. General

4.13.1.1. The Contractor shall perform system transition activities in compliance with the processes defined in ISO/IEC 15288, Paragraph 6.4.7 as referred by AAP-48, Paragraph 6.4.7 and AAP-20.

4.13.1.2. The Contractor shall conduct a System Transition Process in order to facilitate the transfer, as appropriate, of the responsibility for the system and system support to the Purchaser.

4.13.1.3. The Contractor shall install and activate the verified TRITON capability, together with the Support Systems (Reference Systems, Test Systems, and Training Systems) and provide the related Initial Operational Support.

4.13.1.4. The Contractor shall coordinate the deployment activities with the Purchaser's site CIS Support Units (CSUs).

4.13.1.5. Since the TRITON Infrastructure will be based on deployment on Data Centres, not all sites will be having or updating infrastructure to host TRITON Servers and Storage. Therefore, the Transition Process will be conducted in two parallel activities:

- Static Site Installation and Activation (Data Centre or Enhanced Node)
- Organizational Node Activation

4.13.1.6. The Transition Process shall cover the following activities:

- Surveying the installation site
- Preparations at the installation
- Software installation
- Activation on operational sites
- Training.

4.13.1.7. Although the Purchaser will provide the facilities in which the TRITON capability will be installed and the external systems to which it will be interfaced, the Contractor shall be responsible for timely and complete delivery and installation of all relevant supplies provided under this Contract.

4.13.1.8. The Contractor shall solve all integration and interface problems within TRITON that may occur during the installation. The responsibility for the system's operation, support, and performance rests solely with the Contractor until reaching FSA.

4.13.1.9. The Purchaser reserves the right to suspend the Contractor's installation or activation work for up to two (2) working days to avoid interfering with or disrupting a critical operational event. If this suspension exceeds two (2) working days, an adjustment of the Work Package price can be submitted for consideration in connection with rescheduling efforts required. During the installation activities, if the Contractor receives any indication of a possible requirement for a suspension, this shall be made known immediately to the Purchaser's Project Manager.

4.13.1.10. System Transition for a site shall be completed with a Site Acceptance Process as defined in STrP. Each Site Acceptance shall be conducted in two phases. Provisional Site Acceptance (PSiA) and Final Site Acceptance (FSiA).

4.13.1.11. The overall transition process is given in Figure 9~~Figure 9~~.

4.13.2. System Transition Plan

4.13.2.1. The Contractor shall prepare a System Transition Plan (STrP) as defined in AAP-48 (para. 6.4.7.2).

4.13.2.2. The STR shall define the hand-over of TRITON Product Baseline hardware (for TDKs), software and documentation from the Contractor to the Purchaser Implementation Authority (IA), the Service Provision Authority (SPA) and the Operation Authority (OA).

4.13.2.3. The STrP shall detail the overall schedule for transition activities, including site preparation, site activation, data migration, initial on-site training, the Contractor's approach to all transition tasks, the Contractor organization and Key Personnel involved in transition, a sample of its Site Survey checklist, initial site inventory, site engineering drawing(s), installation and activation checklist(s).

4.13.2.4. The specific procedures to be executed at each site shall be described in Site Installation and Activation Procedures, being a part of the STrP.

4.13.2.5. The STrP shall include an agreed process for site transition from the use of MCCIS and MSA/BRITE to the use of the TRITON capability. This may require running the capabilities in parallel for a period of time.

4.13.2.6. The STrP shall contain a list of Site Points of Contact (POCs) and their associated contact data.

4.13.2.7. Site Survey Workbook

4.13.2.7.1. The STrP shall include a generic Site Survey Workbook and checklists, fill-in forms, installation sketches, contact information, installation specifications, and any other documentation required to perform the Site Survey.

4.13.2.7.2. The Site Survey Workbook shall be available for Purchaser review and shall be maintained and updated as necessary to support site surveys throughout the period of performance of this Contract.

4.13.2.8. The STrP shall include transition planning, describing the procedures, mechanisms and responsibilities to be used in transitioning the TRITON capability into operation. These transition plans and procedures shall be of sufficient quality and detail to enable the successful transition of the TRITON capability at a particular site without adverse impact on the operational mission, but also the continued maritime operations of those sites not yet transitioned. The transition plans and procedures shall include:

4.13.2.8.1. Technical transition (e.g. parallel operation with the legacy systems, phased transition, timing of transition to lower risk periods)

4.13.2.8.2. Organizational transition (e.g. communication planning, just-in-time training, issue reporting)

4.13.2.8.3. Site Acceptance Process (Provisional and Final Site Acceptance)

4.13.2.9. The STrP shall include “back-out” procedures for deactivating and removing installed TRITON components and restoring existing services if any part of the TRITON capability is found to be interfering with the operation of other Purchaser systems.

4.13.2.10. The STrP shall be structured so that general implementation information is maintained in the body of the plan and site-specific details are kept as annexes.

4.13.2.11. The Contractor shall maintain the STrP on the Project Website and update it to reflect changes in the SRS and SOW.

4.13.2.12. The site installation sequence and installation dates shall be coordinated with the Site POCs to accommodate site-specific requirements, exercises, holiday periods, and other considerations and shall be approved by the Purchaser.

4.13.2.13. The Contractor shall be able to conduct parallel installations in different locations at the same time, as required to meet the project milestones.

4.13.2.14. The Contractor shall deliver the STR for Purchaser approval not later than the CDR milestone. It shall be updated at each TRR if necessary.

4.13.3. Site Survey

4.13.3.1. The Contractor shall visit the Purchaser facilities, according to the agreed STrP, at which it is required to install elements of the TRITON Baseline; survey physical, logistical, and system configuration requirements to support TRITON installation; and interview site personnel involved in TRITON installation, training, activation, and use.

4.13.3.2. The Contractor shall use the Site Survey Workbook from the STrP to conduct the Site Survey.

4.13.3.3. Site Survey will be used to determine the site's infrastructural capabilities including the status of the NATO Communication Infrastructure at the time of deployment.

4.13.3.4. The Site Survey shall verify the provided Detailed Design and identify if there are any design or implementation issues which have not been documented or described.

4.13.3.5. The Site Survey may be conducted with the NCI Agency representatives, and the duration is estimated at two (2) calendar days (without travel time) for each of the sites.

4.13.3.6. Site Survey Preparation

4.13.3.6.1. The Contractor shall give notice in well in advance to coordinate with the Purchaser access to any classified spaces which require an escort.

4.13.3.6.2. The Contractor shall convey initial information about the site configuration from Purchaser's representation at the Implementation Working Group.

4.13.3.7. Site Survey Execution

4.13.3.7.1. As a minimum the Site Survey shall be conducted to resolve the following issues:

- Coordination of site installation periods
- Survey of the physical infrastructure (server rooms, site layout etc.) and identification of missing infrastructure elements.
- Coordination of the installation with the Installation Site, identifying all responsibilities, tasks, their sequence and required resources (e.g. space, personnel, and data).
- Identification of the exact shipment addresses and NATO Points of Contact (POCs) for subsequent equipment delivery.

- Identification and documentation of any minor elements not addressed in other project documentation.
- Coordination of a proposed work schedule and migration strategy with the site, including identification of unique technical and design issues to be considered during implementation.
- Identification of availability of hardware / software capacity (meeting the TRITON requirements) to be used for TRITON and determination of whether additional server capacity for TRITON is needed.
- Identification of site specific policies for requirements to server hardware that apply to the TRITON installation.
- Identification of data provider systems that need to exchange information with the TRITON services.

4.13.3.8. Site Survey Report

4.13.3.8.1. The Contractor shall provide a Site Survey Report (SS-R), separately for each site, detailing its findings from the Site Survey, identifying all required Purchaser and Contractor actions to prepare for, conduct, or support TRITON installation and activation, and identifying the type of training courses required and the number of Purchaser staff to be trained for each course.

4.13.3.8.2. At minimum, the SS-R shall include the following subjects:

- Infrastructure
  - Available computing environment (physical and virtualised)
  - Network infrastructure
  - NATO Communication Infrastructure
  - System location, space and ventilation
  - Details for possible delivery
- Installation and activation
  - Stakeholders communication
  - System installation requirements
  - Schedule of installation activities
- Training requirements (initial and follow-on)
- Local Security Accreditation Authority documentation
  - Contact details of security responsibilities
  - Interconnection details
  - Network diagrams

4.13.3.8.3. The SS-R shall include a site diagram that shall be used as the basis for the As-Built Documentation and used in the installation of the site.

4.13.3.8.4. The SS-R shall register all findings that require modification of the site infrastructure or change of the agreed implementation scope. For each of the changes the Contractor shall produce a formal change proposal.

4.13.3.8.5. In SS-R the Contractor shall include a proposal for the infrastructure to be deployed at the site, to comply with the existing site’s infrastructure. The

Contractor's solution shall strive to achieve required performance by upgrading the existing hardware rather than deploying new components.

4.13.3.8.6. The SS-R shall provide an annex with a list of all preparations required to support the installation and activation of the TRITON capability at the site, as specified in Section 4 of the SOW.

4.13.4. Sustainment Qualification Review

4.13.4.1. Sustainment Qualification Review (SQR) is used to check if the Installation Site resources including facilities and support personnel are sufficient for system sustainment.

4.13.4.2. The Contractor shall provide the documents given in Table 4-14~~Table 4-14~~ for the SQR:

Table 4-14 – Input for the SQR

Serial	Requirement
1	Integrated Support Plan (ISP)
2	Software Distribution List (SWDL)
3	Pre-Installation Check Procedure (PIC-P)
4	Site Activation Test Procedure (SiAT-P)

4.13.4.3. The Contractor shall plan and conduct a SQR at each Installation Site.

4.13.4.4. The Contractor shall prepare the SQR Report (SQR-R) and submit it to the Purchaser within three (3) days after the review.

4.13.5. Site Preparation

4.13.5.1. The Contractor shall identify all facilities support issues, including modifications or additions required, within one (1) week after the Site Survey.

4.13.5.1.1. This notification shall be in the form of an attachment to the Site Survey Report, accompanied by engineering drawings, checklists, or any other supporting information.

4.13.5.1.2. Facilities support issues that represent Medium or High risk items shall be highlighted in the Project Highlight Report for the month in which they are identified.

4.13.5.2. In case the Site Infrastructure has to be augmented instead of TRITON equipment acquired, the Contractor shall inform the Purchaser of the necessary changes and the Purchaser will make necessary arrangements with the Site POC to reflect the infrastructure upgrade.

4.13.5.3. For each out-of-scope item that requires either technical support or procurement activity, the Contractor shall offer a proposal to the Purchaser with his recommended solution.

4.13.5.4. The Contractor shall provide the Purchaser and each respective Site POC with a list of software to be shipped (if necessary) and a list of Contractor personnel who will be involved in site installation and activation at least two (2) weeks prior to the installation date.

4.13.5.5. The Contractor shall monitor the progress of any required Purchaser facilities preparations and ensure that anything that may delay installation is brought to the attention of the Purchaser promptly.

4.13.6. Site Installation

4.13.6.1. Pre-Installation Check

4.13.6.1.1. The Contractor shall check the site infrastructure using the Pre-Installation Check Procedure (PIC-P) in order to make sure all the necessary infrastructure is ready to perform the installation.

4.13.6.1.2. The Contractor shall prepare and submit the PIC-P at least two (2) weeks prior to the SQR.

4.13.6.2. Site Software Installation

4.13.6.2.1. The Contractor shall apply the Roll-Back Plan (e.g. taking snapshots of the Virtual Machines of the affected servers) to restore the previous service in case the new deployment causes serious business impact.

4.13.6.2.2. The Contractor shall provide support to the Purchaser to ensure the integrity of the installed baseline is maintained and be prepared to execute the Roll-Back/Contingency Plan in the event of a major incident or problem.

4.13.6.2.3. The Contractor shall install the baselined TRITON operational software, along with any supporting/COTS software and documentation associated with the baseline, on the designated Purchaser environment.

4.13.6.2.4. During installation and migration, the service interruption shall be kept to minimum. Precautions shall be taken for not losing any data, as any loss of data is unacceptable. Any system downtime occurring during normal business hours shall be coordinated and agreed with the Site POC. Using details provided by the Site, the Contractor shall prepare a migration plan to achieve this. This plan shall be included in the STrP.

4.13.6.2.5. The Contractor shall obtain server address and other site configuration details from the Site POC and activate all installed servers, workstation, and ancillary equipment on the Site's Local Area Network.

4.13.6.2.6. The Contractor shall install and configure COTS software applications included as part of the TRITON PBL for the site.

4.13.6.2.7. The Contractor shall configure all software settings to match the Product Baseline and site-specific requirements, and load any initial data included with the PBL.

4.13.6.2.8. The Contractor shall import and/or load any site-specific data (e.g. Group Policy Objects).

4.13.6.2.9. The Contractor shall demonstrate that the TRITON capability is accessible by the authorised users at the Authorised Locations.

4.13.6.2.10. The Contractor shall demonstrate that:

- The installed TRITON capability is integrated with the Bi-SC AIS Core Enterprise Services;

- The installed TRITON capability is correctly interfaced with the required Bi-SC AIS Functional Services;
- The installed TRITON capability has correctly-configured interfaces with Nations;
- The installed TRITON capability has correctly-configured interfaces with external systems and services (e.g. Commercial Data Services over Internet).

4.13.6.2.11. The Contractor shall demonstrate to the local Security Accreditation Authority (SAA) that the equipment complies with the SRS and SOW requirements, and Security Operating Procedures (SecOps).

4.13.6.2.12. The Contractor shall execute the Security Implementation Verification Procedures (SIVP) for the TRITON elements installed for verification by the local SAA. The Contractor shall obtain a System Statement of Conformance from the local SAA prior to proceeding with site activation.

4.13.6.2.13. Upon completion of site installation work, the Contractor shall provide the Purchaser Site POC with a copy of the site installation and activation checklist. The Contractor shall resolve any discrepancies identified.

4.13.6.2.14. The Contractor shall provide operation of the TRITON software within the environment of NATO Operational Baseline (defining software deployed at NATO computers) as listed in the AFPL.

4.13.6.2.15. The Purchaser will provide the Contractor the images of the latest version of the supported software configuration (Operational Baseline) for servers and clients as defined in the AFPL.

4.13.6.2.16. The Purchaser will provide the Contractor with the licenses for the activation of the COTS software indicated in the software baseline maintained by the NCI Agency unless otherwise specified (e.g. the Contractor purchases the software licenses on behalf of the Purchaser).

4.13.6.2.17. If a site has already been installed, further installations can be performed remotely.

4.13.6.2.18. All required System Maintenance Documentation (SMD) and training aids shall be delivered.

4.13.6.3. Ship Installation

4.13.6.3.1. The Contractor shall perform one installation on board a selected NATO Command Ship for Sea Acceptance Test of the TRITON Deployable Kit (TDK).

4.13.6.3.2. The Contractor shall transfer one set of TDK to the port indicated by the Purchaser. The port will be assumed to be in Europe.

4.13.6.3.3. The Purchaser will provide access to a NATO Command Ship to install the TDK.

4.13.6.3.4. The Contractor shall install one set of TDK on board the ship, at the designated compartment, connect it to the networks on board, integrate with the allowed ship systems (e.g. AIS Data Source) and operate it.

4.13.6.3.5. The Contractor shall perform the installation and testing together with the NCI Agency Support Personnel and ship crew.

4.13.6.3.6. The Contractor shall perform the Sea Acceptance Test (SeAT) as described in Paragraph 4.10.3.8 after the installation.

4.13.6.3.7. The Contractor shall de-install the TDK and transfer it to his own premises.

4.13.6.4. Physical Configuration Audit

4.13.6.4.1. The Contractor shall plan and conduct the Physical Configuration Audit (PCA) for each TRITON Installation Site as described in Paragraph 4.7.11. The objective of the PCA is to verify that the delivered CIs correspond with the TRITON PBL documentation.

4.13.6.4.2. The PCA shall include visual inspection of all physical CIs (if delivered) and visual verification of the presence and correct configuration of all software CIs.

4.13.6.4.3. Successful completion of PCA establishes the Site Baseline.

4.13.6.4.4. The Contractor shall document the PCA in Configuration Audit Report (CAuR) that shall be provided to the Purchaser no later than two (2) weeks after the PCA.

4.13.6.5. Static Site Activation

4.13.6.5.1. Static Site Activation includes checking the accessibility of Organizational Nodes to the just-installed TRITON Instance, configuring the system to adapt the TRITON capability according to organizational needs.

4.13.6.5.2. Organizational adaptation is not intended to include changes to the Product Baseline, but shall include, as necessary:

- Establishment of local system interfaces
- Creation of initial user accounts and privileges
- Adaptation of workflows
- Changes to mapping values to support data migration.

4.13.6.5.3. Upon authorisation by the Purchaser's Installation Site POC, the Contractor shall establish live connections with other TRITON Instances and perform synchronisation tests.

4.13.6.6. Site Activation Test

4.13.6.6.1. The Contractor shall perform Site Activation Test (SiAT) at the Installation Site to demonstrate that:

- The software installed for an individual site is ready for operational use.
- All supporting capabilities (e.g. configuration, operational data, user management) for operation have been successfully performed.
- The Site Activation is verified.

4.13.6.6.2. The Contractor shall execute SiAT using the Site Activation Test Procedures (SiAT-P) that the software installed and configured for an individual site is ready for operational use.

4.13.6.6.3. The SiAT shall demonstrate that:

4.13.6.6.3.1 All supplied equipment (if there is any) meets, or exceeds, the Purchaser's stated specifications.

4.13.6.6.3.2 All supplied equipment is in full working order.

4.13.6.6.3.3 All supplied equipment has been configured by the Contractor and is fully integrated within the existing site Bi-SC AIS infrastructure and has been implemented to meet:

- Information exchange
- Software configuration
- Security configuration
- Network and communications configuration
- Systems and services configuration
- System administration and management

4.13.6.6.3.4 All user data and accounts have been successfully migrated to the new environment.

4.13.6.6.3.5 All legacy server equipment has been migrated to the new environment using the new software baseline configuration (if necessary).

4.13.6.6.3.6 All interfaces with relevant other systems within the site has been established.

4.13.6.6.3.7 All interfaces with Nations and external systems have been established.

4.13.6.6.3.8 All training pertaining to deployment, configuration and operation of TRITON has been completed.

4.13.6.6.4. The Contractor shall prepare SiAT Report and submit it within three (3) days after the test.

4.13.6.7. Organizational Node Activation

4.13.6.7.1. Organizational Node Activation includes checking the accessibility of Organizational Node to the TRITON Instances and configuring the system according to the Standard Operating Procedures (SOP) of the Maritime Community.

4.13.6.7.2. The Contractor shall execute selected test cases (nominal tests) from On-site User Assessment Test Procedure to ensure that the Organizational Node is activated successfully.

4.13.6.7.3. The Contractor shall provide support to the Organizational Node to configure TRITON, including functional and technical user account settings.

4.13.6.7.4. The Contractor shall provide support to migrate local data and configuration data from the legacy systems (MCCIS and MSA/BRITE configuration data will be made available by the Purchaser).

4.13.6.7.5. The Contractor shall establish data import and export mechanisms, establish information exchange with information sources, adapt business rules to the local environment, prepare automated supervision reports, workflows, and defined roles as required and assign TRITON Users to Roles.

4.13.6.7.6. The Contractor shall plan and conduct Organizational Node Activation Review (ONAR) for each Organizational Node at which activation is performed.

4.13.6.7.7. The Contractor shall prepare ONAR Report and submit it within three (3) days after the review.

4.13.6.7.8. On-Site User Assessment Test

4.13.6.7.8.1 The objective of the On-Site User Assessment Test (UAT) is to establish that the system is fit-for-purpose for the end-users and the support staff, to establish benchmarks on the capabilities of TRITON on the Organizational Node and to establish that the operational staff can conduct their tasks with no disruption of loss of productivity than any previous system that TRITON is replacing.

4.13.6.7.8.2 The Contractor will plan an On-Site UAT at each activated Organizational Node and provide support to the user to execute the test. MARCOM On-site UAT shall be conducted for each delivered Baseline.

4.13.6.7.9. On-Site UAT Procedure

4.13.6.7.9.1 The On-site UAT shall be conducted on the basis of On-Site UAT Procedure.

4.13.6.7.9.2 The Contractor shall develop an initial version of the On-site UAT Procedure using test data and description of test already developed/produced by the Operational Users if available.

4.13.6.7.9.3 The On-site UAT shall include nominal test cases to cover technical issues and used during Organizational Node Activation.

4.13.6.7.9.4 The Contractor shall deliver the On-site UAT Procedure at SQR.

4.13.6.7.9.5 The Purchaser will review, amend with the Operational Users and approve the On-site UAT Procedure prior to execution.

4.13.6.7.10. The Contractor shall configure TRITON and enable the required functionalities as required by the On-site UAT Procedure and as requested by the On-site UAT audience while performing the tests and ad-hoc testing.

4.13.6.7.11. The On-site UAT shall be conducted by the representatives of the Operational Community, with support from the Contractor personnel. The representatives will perform procure-driven and ad-hoc testing during this On-Site UAT.

4.13.6.7.12. The Purchaser's on-site representative will declare the result of the On-site UAT.

4.13.6.7.13. The Contractor shall record and assess for Contract relevance any discrepancies identified during testing.

4.13.6.7.14. The Contractor shall provide On-the-Job Training (OJT) to the operational users ~~on~~ at the ~~selected~~ Authorised L~~l~~ocations as described in Paragraph 5.8.9. OJT shall be provided on the following conditions:

- During the Organizational Node Activation for the first delivery
- During the Organizational Node Activation for the subsequent deliveries and maintenance releases.

- Before participating the three (3) exercises during the OT&E Period.

4.13.6.7.15. The Contractor shall prepare On-Site UAT Report and submit it within three (3) days after the test.

4.13.6.8. Key Performance Indicators

4.13.6.8.1. The Contractor, in conjunction with the Purchaser, shall measure the success of each deployment by measuring and monitoring the following KPIs:

- Number of emergency releases or deployments in response to problems with each respective deployment
- Number of operational user complaints related this each respective deployment
- Amount of deployment delays (measured in days)
- Cost over-runs related to each respective deployment
- Complaints received from Purchaser's support staff regarding their ability to support the deployment.

4.13.6.9. Software Distribution List

4.13.6.9.1. The Contractor shall provide and maintain a Software Distribution List (SWDL) for each site.

4.13.6.9.2. The SWDL shall contain all applications that are comprised in the system's package and thus including COTS, glue-code and software developed for exclusive use of the Purchaser.

4.13.6.9.3. The SWDL shall contain the following information:

- Site (location and server ID where the CI is installed)
- Software Application
- Version
- Release
- Manufacturer
- License Code and Expiry Date
- NATO Ownership (i.e. COTS or PFE).

4.13.6.9.4. The Contractor shall provide the SWDL at least two (2) weeks prior to SQR for each Baseline.

4.13.7. Training

4.13.7.1. The Contractor shall perform the training activities as defined in Subsection 5.7 and provide the initial training for users and the system support staff as defined in the Training Plan.

4.13.8. Site Acceptance

4.13.8.1. Provisional Site Acceptance

4.13.8.1.1. Provisional Site Acceptance (PSiA) will take place on completion and Purchaser's acceptance of all work at the site. The PSiA should last no longer than three (3) calendar days per site.

4.13.8.1.2. As part of the PSiA, the Contractor shall present the Purchaser with witnessed and approved Site Activation Test (SiAT) and On-Site User Assessment Test (UAT) Reports and all documentation including verified inventory, Software Distribution List (SWDL), and site delivery to the Purchaser or his representative. The deliverables include all software configurations, any software licences supplied plus all documentation, maintenance, training, and support included in this Contract. The Purchaser reserves the right to request draft configuration details prior to PSiA.

4.13.8.1.3. Any discrepancies discovered during the PSiA shall be recorded on Observation Sheet(s) with a statement on their required resolution. Depending on the severity and priority of the discrepancy discovered, PSiA may be withheld until satisfactory resolution.

4.13.8.1.4. The Contractor shall plan a formal Technical Transfer Meeting to record formal acceptance of the deliverables, including training, as meeting the contractual requirements for PSiA.

4.13.8.2. Site Acceptance Review

4.13.8.2.1. After successful resolution of any discrepancies and completion of the PSiA, the Purchaser, together with the Contractor, will organise a Site Acceptance Review (SiAR) meeting to record formal acceptance of the deliverables as meeting the contractual requirements.

4.13.8.2.2. The Contractor shall conduct SiAR for each site installation and site updates.

4.13.8.2.3. The Contractor shall update the Software Installation Guide and Site Activation Test Procedures based on the lessons learned and provide the updated documents not later than two (2) weeks after the SiAR.

4.13.8.2.4. The Contractor shall prepare a SiAR Report (SiAR-R) within one (1) week after the SiAR.

4.13.8.3. Final Site Acceptance

4.13.8.3.1. The Contractor shall perform an analysis of the Site Installation and present the Entry-Exit Criteria with all the achievements performed, their results and remaining items if there are any.

4.13.8.3.2. If all the site acceptance criteria are deemed to be met during the SiAR, the Final Site Acceptance (FSiA) will be achieved and both Contractor and Purchaser will sign the Site Acceptance documentation.

4.13.8.3.3. A copy of the System Statement of Conformance (SSC) signed by the local SAA, separately for each installation site.

4.13.8.3.4. FSiA shall be repeated for each site installation and major upgrade (e.g. Baseline-3 installation).

4.13.8.3.5. After the FSiA, the Contractor shall start performing the activities of the Operational Testing and Evaluation and System Support and Maintenance for the installed Baseline at the installed site.

4.13.9. Operational Test Readiness Review

4.13.9.1. Operational Test Readiness Review (OTRR) is a multi-disciplined product and process assessment to ensure that the system can proceed into OT&E with a high probability of success, and that the delivered Baseline is effective and suitable for service introduction. The OTRR examines the actual system characteristics and the procedures used in the system's operation and ensures that all system software, personnel, procedures, and user documentation accurately reflect the deployed state of the system.

4.13.9.2. The Contractor shall plan OTRR at the location where the Purchaser will indicate.

4.13.9.3. Entry Criteria

4.13.9.3.1. The Contractor shall include in planning the OTRR Entry Criteria given in Table 4-15~~Table 4-15~~ and make them available to the Purchaser at least two (2) weeks prior to the OTRR:

Table 4-15 – OTRR Entry Criteria

Serial	Activities / Documents
1	A preliminary OTRR agenda
2	Success Criteria (enhanced or adapted)
3	All verification tests are completed.
4	Test failures and anomalies from verification testing have been resolved and the results incorporated into OBL.
5	All OBL of the product that are necessary for operations has been tested, delivered and installed at the site necessary to for operations.
6	All user documentation have been provided.
7	Training has been provided to the users and operators on the correct operational procedures for the system.
8	Operational contingency planning has been accomplished, and all personnel have been trained.

4.13.9.4. Success Criteria

4.13.9.4.1. The Purchaser concludes that the OTRR Success Criteria given in Table 4-16~~Table 4-16~~ accomplished to complete the objectives of the OTRR.

Table 4-16 – OTRR Success Criteria

Serial	Requirement
1	The system, including any enabling products, is determined to be ready to be placed in an operational status.
2	All applicable lessons learned for organizational improvement and systems operations have been captured in the Lessons Log.
3	All waivers and anomalies have been closed.
4	System software, personnel, and procedures are in place to support operations.
5	All levels of support are planned and ready to be provided.

4.13.9.5. The OTRR shall be used as a milestone to end the System Transition Process and start the OT&E Process for a Baseline.

4.13.9.6. The Contractor shall prepare the OTRR Report and submit it within one week after the completion of OTRR.

4.13.10. Support Systems Installations

4.13.10.1. TRITON Test System

4.13.10.1.1. TRITON Test System is a test environment configured to provide a representation of the target network/security domain. It will include all the necessary configurations and interfacing systems and services to represent the live environment for test purposes. It will also include test harnesses and test data.

4.13.10.1.2. All hardware (server, storage, network elements and workstations) and Virtualisation Environment for the Test Systems will be provided by the Purchaser.

4.13.10.1.3. The Purchaser will prepare the Virtual Environment for the TRITON Test Systems (for both NS and NU Domains) at the PMIC facilities.

4.13.10.1.4. The Contractor shall provide the operating systems and any other COTS software needed by TRITON Infrastructure and Operational Software with the necessary Original Equipment Manufacturer's manuals and licenses.

4.13.10.1.5. The Contractor shall install the COTS software on the Virtualised Environment and apply the necessary configuration.

4.13.10.1.6. The Contractor shall provide the necessary licenses or service fee for the commercial data services (e.g. IHS Fairplay) to be used during the development. The licenses shall cover the use of live data services in TRITON Test Systems during system integration and acceptance tests.

4.13.10.1.7. The Contractor shall establish the "TRITON Test System – NS" on the NU Domain after SwDR-1. The Concept Demonstration System (CDS) can be installed on the Test System prepared for BL1.

4.13.10.1.8. The Contractor shall establish the "TRITON Test System – NU" on the NU Domain after SwDR-2.

4.13.10.1.9. The Contractor shall update, if necessary, the TRITON Test System – NS during Build Process-3 and 4.

4.13.10.1.10. The Contractor shall update the Test Systems at each new release until FSA.

4.13.10.2. TRITON Reference System

4.13.10.2.1. TRITON Reference System is a test environment configured to provide a certified representation of the target network/security domain, (e.g. NS). It will include all the necessary security settings, patches, network configurations and interfacing systems and services to represent the live environment as viewed from the perspective of the product, system or service being tested. It will also include representative data. Some tests, focused on a specific aspect, will require the Reference Environment to provide only a partial representation of the live environment.

4.13.10.2.2. The TRITON Reference Systems shall provide a Reference Environment for both NS and NU Domains to support test events and subsequently on-line and

off-line diagnosis, integration and generation of subsequent changes to the PBL, and testing of TRITON Operational Software and its performance.

4.13.10.2.3. The TRITON Reference Systems shall comprise a representative configuration, which includes all functionality of the TRITON installation and operational sites.

4.13.10.2.4. All hardware (server, storage, network elements and workstations) and Virtualisation Environment for the Reference Systems will be provided by the Purchaser.

4.13.10.2.5. The Purchaser will prepare the Virtualised Environment for the TRITON Reference Systems (for both NS and NU Domains) at the PMIC facilities or Mons.

4.13.10.2.6. The Purchaser will provide the operating system if MS Windows is used. Any other operating system shall be provided by the Contractor.

4.13.10.2.7. The Contractor shall provide the any other COTS software needed by TRITON Infrastructure and Operational Software with the necessary Original Equipment Manufacturer's manuals and licenses.

4.13.10.2.8. The Contractor shall install COTS software on the reserved Virtualised Environment and apply the necessary configuration for the Reference Systems.

4.13.10.2.9. The Contractor shall establish the TRITON Reference System - NU on the NU Domain at least two (2) weeks prior to the TRR (IV&V-2) for BL2.

4.13.10.2.10. The Contractor shall update, if necessary, the TRITON Reference System - NS on the NU Domain at least two (2) weeks prior to the TRR (IV&V-3) for BL3.

4.13.10.2.11. The Contractor shall update the Reference Systems at each new release until FSA.

4.13.10.3. TRITON Training System

4.13.10.3.1. TRITON Training System is a training environment similar to the TRITON Test System. There will be two separate Training Systems, one for the TRITON-NS Functional Services and one for the TRITON-NU Functional Services. Trainers and trainees will be able to access both of the TRITON Training Systems for Individual Training deployed at the Training Node Location on the NU Domain. Collective Training users will access the deployment at the Training Node on the designated training network.

4.13.10.3.2. All hardware (server, storage, network elements and workstations) and Virtualisation Environment for the Training Systems will be provided by the Purchaser.

4.13.10.3.3. The Purchaser will prepare Virtual Environment for the TRITON Training Systems (for both NS and NU Domains) at the Training Node Locations.

4.13.10.3.4. The Purchaser will provide the operating system if MS Windows is used. Any other operating system shall be provided by the Contractor.

4.13.10.3.5. The Contractor shall provide the any other COTS software needed by TRITON Infrastructure and Operational Software with the necessary Original Equipment Manufacturer's manuals and licenses.

4.13.10.3.6. The Contractor shall install COTS software on the reserved virtualised environment and apply the necessary configuration for the Training Systems.

4.13.10.3.7. The Contractor shall establish the TRITON Training System – NU on the NU Domain at least two (2) weeks prior to the TRR (FAT-2) for BL2.

4.13.10.3.8. The Contractor shall establish the TRITON Training System – NS on the NU Domain at least two (2) weeks prior to the TRR (FAT-3) for BL3.

4.13.11. Multi-Site Operation Test

4.13.11.1. The Contractor conduct a Multi-Site Operation Test (MSOT) in order to demonstrate that more than one instance of TRITON operates concurrently as designed.

4.13.11.2. The Contractor shall prepare the draft MSOT Procedure, provide it to the Purchaser at the last Site Acceptance.

4.13.11.3. The Purchaser will contribute to the MSOT Procedure according to possible operational scenarios and existing SOPs.

4.13.11.4. The Contractor shall plan, in coordination with the Purchaser, the MSOT after installation and activation of all sites are completed, and at least one TDK is operational and in use at sea.

4.13.11.5. The Purchaser will plan participation of Nations to MSOT in order to test the eligibility and flexibility of TRITON for supporting any emergency conditions.

4.13.11.6. The Contractor shall use the MSOT Procedure to conduct the test.

4.13.11.7. The Contractor shall prepare a MSOT Report to include the result of the test and the resolution plan for any problem found.

4.13.12. Support to Federated Mission Network Testing

4.13.12.1. The purpose of the Federated Mission Network (FMN) Tests is to validate that the introduction of new systems or changes to existing systems are interoperable with the FMN implementation.

4.13.12.2. The FMN Test Procedures will be developed by the Purchaser. These tests will be performed by the NCI Agency under the direction FMN secretariat. The tests will be performed at the NCI Agency The Hague or Mons, typically in two weeks.

4.13.12.3. The Contractor shall provide technical support to the FMN Testing process in accordance with the approved FMN Test Procedures.

4.13.12.4. The Purchaser will install and configure the PBL on the NCI Agency FMN Test Bed. The Contractor shall provide technical support to the installation and configuration if needed.

4.13.12.5. The Contractor shall fix and correct any discrepancies if they are related to the installed PBL.

4.13.12.6. FMN Testing shall be executed in two steps:

4.13.12.6.1. Initial Testing: The tests will be conducted and the results will be recorded. The Contractor will be given time to correct any errors or incompatibilities.

4.13.12.6.2. Final Testing: The tests will be repeated to get the accreditation.

4.13.13. Software Transition

4.13.13.1. The Contractor shall provide Software Transition for the software component defined in the relevant Work Package.

4.13.13.2. The Software Transition Process is defined in detail in Paragraph 4.17.

4.14. System Validation Process

4.14.1. General

4.14.1.1. Validation is the process of providing evidence that the system, software, or hardware and its associated products satisfy requirements allocated to it at the end of each life cycle activity, solve the right problem (e.g. correctly model physical laws, implement business rules, and use the proper system assumptions), and satisfy intended use and user needs.

4.14.1.2. System Validation Process performs a comparative assessment and confirms that the system meets the stakeholders' requirements and measures of effectiveness. Validation confirms, through assessment of the services presented to the stakeholders, that the "right" system entity has been created, i.e. is fit for its purpose and satisfies the customer.

4.14.1.3. The Contractor shall perform system validation activities in compliance with the processes defined in ISO/IEC 15288, Paragraph 6.4.8 as referred by AAP-48, Paragraph 6.4.8.

4.14.1.4. The Purchaser will perform an Operational Testing and Evaluation (OT&E) during the operational period for each delivered OBL with support from the Contractor. Although part of the validation is performed through user involvement during the development (e.g. user interface design), the final validation process will be executed during the OT&E period.

4.14.2. Operational Test and Evaluation

4.14.2.1. Operational Test and Evaluation (OT&E) is a period which consists of a test series designed to estimate the operational effectiveness of the system.

4.14.2.2. OT&E period shall start after a Baseline is set to operation (OTRR) and continue until the FSA.

4.14.2.3. The Contractor shall perform operational analysis, track system performance and account for operational availability.

4.14.2.4. The Contractor shall record and assess for the Contract relevance any discrepancies identified during the ad hoc testing and system operation.

4.14.2.5. The Contractor shall produce a report summarising the results of the operation which shall include a summary of Deficiency Reports (DRs) along with a description of those DRs that will be fixed.

4.14.2.6. The Contractor shall ensure that the users can execute their tasks using TRITON and configure the system to allow users to perform their tasks using TRITON, including configuration of permissions, of TRITON data and interfaces with other systems and information flows.

4.14.2.7. The Contractor shall record and assess for Contract relevance any discrepancies identified during the ad hoc testing and system operation.

4.14.2.8. The Purchaser will perform an OT&E with support from the Contractor personnel immediately following the installation and activation of each Baseline.

4.14.2.9. The Contractor shall provide Second and Third Level Support during the OT&E period.

4.14.3. System Validation Test Procedure

4.14.3.1. The Contractor shall develop System Validation Test Procedure (SVT-P) and deliver an initial version together with the SVP (preliminary at CDR, final at PSA).

4.14.3.2. The SVT-P shall include the following:

- Definition of the validation steps to address various operational states, scenarios and Maritime Operations that progressively build confidence in conformance of the installed capability.
- Specification of the methods, tools and techniques needed to conduct validation
- Definition of the purpose, conditions and conformance criteria for each validation test.

4.14.3.3. The Purchaser will obtain operational user community's concurrency/approval on the SVT-P and approve it.

4.14.4. System Validation Test

4.14.4.1. The Contractor shall plan and execute System Validation Test (SVT) covering both TRITON-NS and NU as defined in the SVP.

4.14.4.2. The Contractor shall ensure that any operators, enabling system for validation and associated facilities are ready in order to conduct SVT.

4.14.4.3. The Contractor shall conduct SVT to attest conformance to stakeholder requirements as documented in the SVT-P.

4.14.4.4. The Contractor shall collect and analyse data in accordance with the SVT-P.

4.14.4.5. The Contractor shall prepare a SVT Report, including the following:

- Results and tests configuration are recorded.
- Results obtained are compared with those expected.
- Validation matrix is updated with data from tests.
- Variances are identified and reported.

4.14.5. Operational Stakeholder Acceptance

4.14.5.1. Initial Operational Capability

4.14.5.1.1. Declaration of Initial Operational Capability (IOC) for TRITON Increment 1 shall occur when the Purchaser Operational Stakeholder has tested and evaluated the TRITON Increment 1 delivery on both NS and NU Domains as an assessment of operational readiness.

4.14.5.1.2. It is expected that the operational evaluation will include the use of both TRITON-NS and NU in an operational exercise during the OT&E period and will include the assessment of TRITON functional fit-for-purpose and performance while interoperating with external systems and services.

4.14.5.1.3. The Purchaser will declare the IOC based on the test reports prepared by the Contractor. The criteria to declare IOC are:

- SiAT-3 for Baseline-3 is successfully completed.
- OT&E period is executed and SOT reports delivered.
- Key operational requirements are met (e Recognised Maritime Picture is available to NATO Commands and Nations).
- One week of operation without any failure ("failure" as defined in the SRS).
- All deliverables due at the time of IOC are accepted in writing by the Purchaser.

4.14.5.2. Final Operational Capability

4.14.5.2.1. Operational Stakeholder Acceptance and declaration of Final Operational Capability (FOC) for TRITON will be achieved when all capabilities defined in the Capability Package (including future increments) are implemented and delivered. Therefore, FOC is not in the Increment 1 scope.

4.14.6. System Validation Review

4.14.6.1. The Contractor shall execute System Validation Review (SVR) as defined in AAP-20 Development Stage.

4.14.6.2. The Contractor shall plan SVR at the location where the Purchaser will indicate.

4.14.6.3. Entry Criteria

4.14.6.3.1. The Contractor shall include in planning the SVR Entry Criteria given in Table 4-17~~Table 4-17~~ and make them available to the Purchaser at least two (2) weeks prior to the SVR:

Table 4-17 – SVR Entry Criteria

Serial	Activities / Documents
1	A preliminary SVR agenda
2	Success Criteria (enhanced or adapted)
3	Stakeholders' validation requirements are up to date.
4	SyRS Baselines are up to date.
5	Requirement Traceability Matrix between Stakeholders' requirements and SyRS is up to date, in accordance with the baselines.
6	IV&V Test Reports are available.
7	Identified variances have been corrected.

8	Configuration baselines have been updated (if necessary). System configuration documentation is available.

4.14.6.4. Success Criteria

4.14.6.4.1. The Purchaser concludes that the SVR Success Criteria in Table 4-18~~Table 4-18~~ accomplished to complete the objectives of the SVR.

Table 4-18 – SVR Success Criteria

Serial	Requirement
1	SVT Report is reviewed.
2	All capabilities of the system are available as specified in SyRS.
3	All performance levels are met.
4	All levels of support are planned and ready to be provided.

4.14.6.5. The SVR shall be used as Provisional System Acceptance as the first milestone for the System Acceptance Process. The Purchaser will obtain certificate of validation from the appropriate Stakeholders.

4.14.6.6. The Contractor shall prepare the SVR Report and submit it within three (3) days after the SVR.

4.14.7. Provisional System Acceptance

4.14.7.1. Provisional System Acceptance (PSA) occurs when all capability and services are provided to MARCOM. Rolling-out the system for other Authorised Locations shall be performed after PSA.

4.14.7.2. The Purchaser concludes that the PSA Criteria in Table 4-19~~Table 4-19~~ accomplished to complete the objectives of the System Acceptance.

Table 4-19 – PSA Criteria

Serial	Requirement
1	All acceptance tests for all Baselines are completed successfully.
2	At least one week of operation without major failure (“failure” as defined in the SyRS) can be achieved.
3	On-site training of NATO personnel involved in operations and maintenance of the capability is completed.
4	All required documentation and support tools are delivered.

4.14.7.3. The Contractor shall plan and conduct Provisional System Acceptance Review (PSAR) to check the PSA Criteria, and provide PSAR Report within three (3) days after the review.

4.14.8. Final System Acceptance

4.14.8.1. Final System Acceptance (FSA) occurs when the Purchaser has evaluated the whole system and has determined that it meets the requirements of this Contract including all deliveries and services.

4.14.8.2. The Purchaser concludes that the FSA Criteria in Table 4-19~~Table 4-19~~ is accomplished to complete the objectives of the System Acceptance.

Table 4-20 – FSA Criteria

Serial	Requirement
1	Product Baseline is updated.
2	Reference Systems are updated with the current Product Baseline and activated.
3	Test Systems are available.
4	Training Systems are available
5	System Transition is completed.
6	All SiATs for all authorised locations are completed.
7	All FSiAs for all authorised locations are completed.
8	SVT is completed and the system is validated as indicated in the SVR-R.
9	All due deliverables are accepted in writing by the Purchaser.
10	Status of Deficiency Reports.
11	A copy of the System Statement of Conformance signed by the local SAA, separately for each site.
12	ILS documentation is updated.
13	Warranty Report is provided.

4.14.8.3. The Contractor shall notify the Purchaser in writing when it submits the final delivery for FSA. This notification shall be accompanied by the Final System Acceptance Report (FSA-R).

4.15. System Operation Process

4.15.1. General

4.15.1.1. System Operation Process is to use the system in order to deliver its services. TRITON shall be set to operation after each delivery. When activation of all authorised sites are completed, the system will become fully operational.

4.15.1.2. The Contractor shall perform system operation activities in compliance with the processes defined in ISO/IEC 15288, Paragraph 6.4.9 as referred by AAP-48, Paragraph 6.4.9 and AAP-20.

4.15.1.3. The Contractor shall provide Operational Support as defined in Subsection 5.4.4.6.

4.15.2. Support to Development of Standard Operating Procedures

4.15.2.1. The Contractor shall support the Purchaser with development of Standard Operating Procedures (SOPs) for using TRITON. This includes SOPs for deployment, operation and use of TRITON.

4.15.2.2. The SOP shall include multi-site operation principles.

4.15.2.3. The Contractor shall work with TRITON Operational Trainers, TRITON Administrator Trainers and relevant, appointed staff from NATO HQs in developing and documenting the SOPs.

4.15.2.4. The SOPs shall be documented based on a template for NATO SOPs.

4.15.2.5. One Master SOP document shall be developed. This Master SOP shall be tailored to specific SOPs for all NATO Commands where TRITON is to be installed.

4.15.2.6. The SOPs shall be reviewed and approved by the Purchaser and relevant staff from NATO HQs.

4.15.3. Exercise Support

4.15.3.1. The Contractor shall provide support to operational users during three (3) exercises that MARCOM will participate in. The Purchaser will inform the Contractor which exercise participation is needed one (1) month prior to the exercise.

4.15.3.2. The Contractor shall participate in the exercises and provide support including the following:

- Providing On-the-Job Training
- Helping to configure the system
- Monitoring the processes
- Logging data
- Logging and analysing performance data
- Collecting feedback from operators
- Determining HCI improvements.

4.15.3.3. CWIX

4.15.3.3.1. The Coalition Warrior Interoperability eXploration, eXperimentation and eXamination eXercise (CWIX) programme provides an opportunity for NATO Nations, Partner Nations, Contact Nations, and NATO Agencies to prove, disprove, and improve NATO CIS interoperability.

4.15.3.3.2. The Contractor shall plan and participate in CWIX, as one of the three exercises, to demonstrate the interoperability of TRITON.

4.15.3.3.3. The Contractor shall support the Purchaser for installation and configuration of TRITON for CWIX.

4.15.4. On-Site Support

4.15.4.1. The Contractor shall provide on-site support covering all levels of support at the Purchaser's premises for maintenance of TRITON during its initial operation and implementation of any subsequent modifications until FSA.

4.15.4.2. The Contractor shall provide on-site technical support to the Purchaser as part of its operational support organization. This support shall be focused on software maintenance, software testing and data migration support. The Contractor shall provide the necessary tools to migrate existing MSA/BRITE and MCCIS data into TRITON.

4.15.4.3. The Contractor shall provide designated individuals, who meet or exceed the criteria in Section 7 of the SOW for a System Support Engineer, to provide on-site support services.

4.15.4.4. The Contractor shall ensure that the individual(s) providing this support are familiar with the requirements, design, implementation, verification, transition and support of the TRITON capability.

4.15.4.5. The Contractor shall ensure that the individual(s) providing the support are capable of supporting all of the TRITON roles including Node Administrator. The Contractor shall be responsible for any preparation and training required to bring the individual(s) to the performance level required to fulfil the above roles.

4.15.4.6. The Contractor's designated individuals shall travel as required by the Purchaser's on-site representative.

4.15.5. In-Service Review

4.15.5.1. In-Service Review (ISR) is a multi-disciplined product and process assessment to ensure that the system under review is operationally employed with well-understood and managed risk. As TRITON Baselines are delivered for operational use during the OT&E period, the OBLs will be in service and subject to ISR.

4.15.5.2. The Contractor shall plan and conduct ISRs during the OT&E Period as defined in AAP-20 Utilisation Stage.

4.15.5.3. The ISR shall be quarterly unless otherwise is agreed.

4.15.5.4. The ISR shall include user feedback collection and assessment during OT&E.

4.15.5.5. The Contractor shall propose maintenance requirements according to the user feedback and plan them in the System Maintenance Process.

4.15.5.6. The Contractor shall prepare ISR Report (ISR-R) and submit it within three (3) days after the review.

4.15.6. System Transition

4.15.6.1. The Contractor shall provide support to transitioning from legacy systems to TRITON. This support shall include:

- Providing engineering support
- Developing automatic data migration tools
- Developing TRITON Simulators for Nations' use during interfacing
- Developing process for appropriate use of system functions

4.15.6.2. The Contractor shall provide support to Nations Interoperability Testing to be executed during SITs.

4.15.6.3. The Contractor shall plan and conduct System Transition Readiness Review (STRR) for reviewing the transition process from MSA/BRITE to TRITON-NU and from MCCIS to TRITON-NS.

4.15.6.4. The Contractor shall provide the STRR Report no later than three (3) days after each review.

4.16. System Maintenance Process

4.16.1. General

4.16.1.1. The Contractor shall execute the System Maintenance Process concurrently with the System Operation Process for the OBLs (i.e. BL2, 3, 4) until FSA.

4.16.1.2. The Contractor shall provide Maintenance as defined in Subsection 5.4.4.6 of this SOW.

4.16.1.3. The Contractor shall identify problems or modifications based on feedback from ongoing monitoring of the system, and take corrective, remedial or preventive actions to restore and maintain full capability. The SEWG will provide support to identify the maintenance needs and analyse the impact of changes.

4.16.1.4. The Contractor shall use ISR-Rs as input for any modifications and shall produce Engineering Change Proposal (ECP) before implementing a maintenance request.

4.16.1.5. The Contractor shall perform maintenance activities as planned in the SMP and conduct failure identification action when non-compliance has occurred.

4.16.1.6. The Contractor shall address the obsolescence issues for the COTS products used in software and hardware development in the OMP.

4.16.2. System Maintenance Documentation

4.16.2.1. The Contractor shall develop and maintain the System Maintenance Documentation as defined in Paragraph 5.4.4 based on the FBL, ABL and PBL.

4.16.3. Monthly Maintenance Review

4.16.3.1. The Contractor shall conduct Monthly Maintenance Review (MMR) to plan the maintenance activities within that month.

4.16.3.2. The Contractor shall plan MMR in the first week of each month, starting from the beginning of the Maintenance Process until the end of the Contract.

4.16.3.3. The Contractor shall prepare a MMR Report that summarises all Contractor-performed maintenance tasks and deliverables and introduces suggestions for maintenance performance improvements. The MMR Report related to the previous month shall be delivered to the Purchaser until the fifth of each month. The MMR Report shall be reviewed during the MMR.

4.16.3.4. The Contractor shall provide the Maintenance Records to the Purchaser during the MMR.

4.16.4. Experimentation, Exercise and Prototyping Support

4.16.4.1. The Contractor shall provide technical support to the Purchaser during experiments, demonstrations, and exercises. Such support may include providing technical guidance to operational users for preparing, and executing system demonstrations, or integrating third-party components for experimental purposes. Such support may include preparing demo system for a user conference, setting up the system during an exercise.

4.16.4.2. The Contractor shall also provide requirements analysis, design, implementation, integration, and test support to the Purchaser's prototyping activities associated with the capabilities provided under this Contract.

4.17. Software Transition Process

4.17.1. General

4.17.1.1. Software Transition is the transition of the software support responsibility from the Contractor to the Purchaser.

4.17.1.2. The Contractor shall provide Software Transition with a defined process for the components indicated in the relevant Work Package.

4.17.2. Software Transition Plan

4.17.2.1. Software Transition Plan (SwTrP) identifies the hardware, software, and other resources needed for life cycle support of deliverable software and describes the Contractor's plans for transitioning deliverable items to the Purchaser.

4.17.2.2. The SwTrP shall include at least the following:

- The facilities needed to support the deliverable software
- The hardware and associated documentation, needed to support the deliverable software, including computers, configurations
- Identification and description of the software and associated documentation needed to support the deliverable software
- Any other documentation needed to support the deliverable software
- Personnel and qualifications needed to support the deliverable software
- Training to be provided
- Transition planning, activities, roles and responsibilities
- Procedures for installation and checkout of deliverable items in the support environment.

4.17.2.3. The SwTrP shall be delivered to the Purchaser at least two (2) weeks prior to the Software Transition Readiness Review (SwTrRR).

4.17.3. Software Transition Preparation

4.17.3.1. The Contractor shall prepare the source files to be transitioned to the Purchaser, including any supportive batch files, command files, data files, or other files needed to regenerate the executable software. This will include identification of the necessary compiler/software development tools or database management systems that are commercially available.

4.17.3.2. The Contractor shall identify and record the exact version of software prepared for the transition in the Software Version Description (SVD).

4.17.3.3. The Contractor shall deliver all internal test documentation, test data, and test suites to allow a full or partial retest after maintenance operations by the Purchaser.

4.17.3.4. The Contractor shall update the Software Design Description of each software element (CSCI) to match the "as built" software and shall define and record:

- the methods to be used to verify copies of the software, the measured computer hardware
- resource utilisation for the software element, other information needed to support the software, and
- traceability between the element's source files and software units and between the computer hardware resource utilisation measurements and the requirements concerning them.

4.17.3.5. The Contractor shall prepare and deliver the manuals and guidance which identify and record information needed to program the computers on which the software was developed or on which it will run.

4.17.3.6. Software Source Code

4.17.3.6.1. The Contractor shall deliver all the software source code with all its building blocks (e.g. code files, batch files, configuration files, libraries) required to allow future maintenance by the Purchaser.

4.17.3.6.2. The Contractor shall perform periodic updates on the software source code at the Purchaser's premises during the Software Implementation Process. Any object code or library shall also be included.

4.17.3.6.3. The Contractor shall deliver the configuration tree of the software source code in a portable media initially at the SwTrRR. Any object code or library shall also be included. A final copy, including any changes, shall be provided at FSA.

4.17.3.7. Computer Programming Manual

4.17.3.7.1. The Computer Programming Manual (CPM) provides information needed by a programmer to write the program code in a given computing environment. This manual focuses on how the code is developed using the software development environment and source code configuration (e.g. definition of development environment, special configuration settings, essential libraries).

4.17.3.7.2. The Contractor shall prepare and deliver the CPM two (2) weeks prior to the Software Transition Readiness Review.

4.17.4. Software Transition Readiness Review

4.17.4.1. The Contractor shall plan and execute a Software Transition Readiness Review (SwTrRR).

4.17.4.2. The Contractor shall explain the SwTrP during the SwTrRR and demonstrate that the deliverable software is ready for transition.

4.17.4.3. The details of the transition planning will be agreed with the Purchaser and the software transition activities will start.

4.17.4.4. The Contractor shall prepare SwTrRR Report (SwTrRR-R) and submit it within three (3) days after the review.

4.17.5. Transitioning

4.17.5.1. The Contractor shall provide Software Maintenance Training to the Purchaser's staff as described in Paragraph 5.8.14.

4.17.5.2. The Purchaser will provide the development environment in accordance with SwTrP, on which the transitioned software will be maintained.

4.17.5.3. The Contractor shall install and check out the deliverable software in the Purchaser development environment.

4.17.5.4. The Contractor shall integrate the source code, the requirements, and the links from the requirements to test cases in the automated build environment and the Configuration Management Repository of the Purchaser.

4.17.6. Software Transition Validation Test

4.17.6.1. The Purchaser shall perform Software Transition Validation Test (SwTrVT) to demonstrate that the entire software is delivered correctly to the Purchaser, and the Purchaser has all the capabilities to maintain the software.

4.17.6.2. The Contractor shall demonstrate to the Purchaser that the deliverable software can be regenerated, (compiled/linked/loaded into an executable product) and maintained using commercially available, Purchaser-owned, or contractually deliverable software and hardware.

4.17.6.3. The Purchaser shall ensure that any further software updates (e.g. during Warranty Period) can be successfully transferred to the Purchaser and the Purchaser can re-generate the software at its own environment.

4.17.6.4. The Contractor shall prepare a SwTrVT Report (SwTrVT-R) after the SwTrVT and deliver it to the Purchaser before the Transition Validation Review.

4.17.7. Software Transition Validation Review

4.17.7.1. The Contractor shall plan and execute a Software Transition Validation Review (SwTrVR) to make sure all transition process is completed.

4.17.7.2. The Software Transition will be considered as completed if:

- All remaining items are solved
- All source code, manuals and documents to perform the programming/coding are delivered
- The Purchaser approves the SwTrVT Report.

4.17.7.3. The Contractor shall prepare SwTrVR Report (SwTrVR-R) and submit it within three (3) days after the review.

SECTION 5: INTEGRATED LOGISTIC SUPPORT

5.1. General

5.1.1. The Contractor shall provide Integrated Logistic Support (ILS) by providing the services and delivering the products as described in this Section. The terminology and process definitions are also provided.

5.2. Integrated Support Plan

5.2.1. Integrated Support Plan (ISP) includes support considerations to be incorporated in design and defining the physical support capability and resources required for the in-service organization to operate and maintain the system.

5.2.2. The ISP shall be structured according to the template provided in "NCSA OSLA-14-02 Preparation of NATO CIS Integrated Logistics Support Plans".

5.2.3. The Contractor shall develop and deliver the draft ISP at the PDR in order to define how the integration of supportability engineering is to be included in the design of the system.

5.2.4. The Contractor shall submit the draft release of the ISP to the Purchaser at PMR, an initial version at CDR and a final version at System Qualification Review (SQR) for BL2. The ISP shall be maintained and updated during the transition process and new versions shall be submitted at SQR-3 and 4.

5.2.5. The Contractor shall refer to the TRITON CMP, QP, Training Plan and all documentation (included in SOW Section 7) in the ISP.

5.2.6. The ISP shall include the details related to the support of TRITON throughout its life-cycle.

5.2.7. The ISP shall include a section related to Service Management and Control Concept which includes:

- Service interface: The demarcation of service responsibilities between the TRITON Product Baseline and the Purchaser's operational baseline.
- Security management: The tasks associated with maintaining and using the TRITON capability within the guidelines of the CSRS, SSRS, SISRS, and SecOps.
- Incident management: How the Contractor will deal with service interruptions and application faults.
- Problem management: How the Contractor will support problem/deficiency reporting, isolation, and resolution.
- Release management: How the Contractor will establish the TRITON PBL releases.
- Availability management: How the Contractor will ensure that the TRITON capability can meet its availability requirements.
- Configuration management: How the Contractor will ensure that TRITON components are identified for standardization and status monitoring in a centralised configuration managements process.

- Change management: How the Contractor will support a central change management process for TRITON implementation changes.
- Initial Service Level Agreement: An SLA, based on the NCI Agency SLA Template, identifying the service target and the responsibilities of the Purchaser for achieving this target.
- Service transition: How the Contractor will transition service responsibilities to the Purchaser to ensure that the Purchaser can support TRITON service provisioning, both at System Acceptance and after the end of the initial period of performance of this Contract.
- Warranty support: How the Contractor intends to discharge his responsibilities for system operation and maintenance at each site and describes the Contractor's approach to replacement of faulty hardware and software items.

5.2.8. ISP shall include, as an Annex, Transportation Plan (TransP). The details of TransP are given in Paragraph 5.9.2.

5.3. In-Service Support Plan

5.3.1. General

5.3.1.1. The Contractor shall prepare the In-Service Support Plan (ISSP), based on a Purchaser-furnished template, defining the responsibilities and procedures for the support and maintenance of TRITON.

5.3.1.2. The ISSP shall cover the all maintenance and support activities starting from the first OTRR until FSA.

5.3.1.3. The ISSP shall be updated at the FSA covering the future support including the Warranty period.

5.3.1.4. The Contractor shall develop System Maintenance Plan (SMP) and Obsolescence Management Plan (OMP) as annexes to ISSP.

5.3.1.5. The Contractor shall deliver the ISSP to the Purchaser at least two (2) weeks prior to the SQR.

5.3.2. System Maintenance Plan

5.3.2.1. System Maintenance Plan (SMP) shall include the following:

- The preventive and corrective maintenance strategy to sustain service in the operational environment in order to achieve customer satisfaction during OT&E period
- The scheduled preventive maintenance actions that reduce the likelihood of system failure without undue loss of services (e.g. suspension or restriction of the services)
- The number and type of replacement hardware elements to be stored, their storage locations and conditions, their anticipated replacement rate, their storage life and renewal frequency (e.g. UPS for the Deployable Kits)
- The skill and personnel levels required to effect hardware repairs and replacements, accounting for maintenance staff requirements and any relevant legislation regarding health and safety, security and the environment.

These skills include disassembly strategy, fault diagnosis techniques, re-assembly and testing sequences

- Maintenance constraints on system requirements that result from the maintenance strategy
- Maintenance impact (minor modification (low cost/temporary) or major modification (permanent).

5.3.2.2. The Contractor shall update the SMP according to the maintenance needs raised during the operation of the OBLs.

5.3.3. Obsolescence Management Plan

5.3.3.1. The Obsolescence Management Plan (OMP) shall include the following:

- Identification of appropriate strategies, resources, tools and resolution options
- How to minimise the impact of obsolescence on system support costs and availability
- How to monitor the obsolescence of COTS products, including third party software
- Mitigation plan for each identified product.

5.3.3.2. The Contractor shall update the OMP according to the most recent technological developments and status of COTS products.

5.4. Maintenance Concept

5.4.1. General

5.4.1.1. The Contractor shall develop and maintain the TRITON Maintenance Concept, which defines the maintenance environment, constraints, locations, procedures, artefacts, organization and personnel skills to maintain PBL and the OBL.

5.4.1.2. The Maintenance Concept shall refer to the functional and non-functional Maintenance Requirements of the TRITON FBL.

5.4.1.3. The Maintenance Concept shall define the First, Second and Third Level Maintenance tasks. At each of these Levels, the procedural description shall include objective(s), triggering event(s), input(s), output(s), task(s), roles and Responsibilities, Accountabilities, Consulting, and to Inform (RACI-format), constraints, exceptional case(s), and tool(s) support.

5.4.1.4. The Maintenance Concept shall define the PBL maintenance and supply flow amongst the various NATO and non-NATO locations, organizations, groups, and people.

5.4.1.5. As part of the Maintenance Concept, the System Maintenance Plan (SMP) shall define the Supply Support Requirements and shall describe the procedures for the provisioning, procurement, and acquiring of spare/repair parts, inventories, and consumable material for PBL and the OBL.

5.4.2. Hardware Maintenance

5.4.2.1. The maintenance of delivered hardware shall include the replacement of faulty parts.

5.4.2.2. Due to security regulations, all failed hard disks/drives can only be repaired or replaced on-site and cannot be removed and/or returned to the Contractor for repair. Failed hard disks will be destroyed on site. Failed hard disks shall therefore be replaced by the Contractor, at no extra cost to the Purchaser.

5.4.3. Software Maintenance

5.4.3.1. The Contractor shall perform following types of Software Maintenance in the context of Third Level Maintenance:

- Preventive Maintenance
- Corrective Maintenance
- Adaptive Maintenance
- Perfective Maintenance

5.4.3.2. Preventive Maintenance

5.4.3.2.1. The Contractor shall apply Preventive Maintenance at predetermined intervals or according to prescribed criteria and intended to reduce the probability of failure or the degradation of the functioning of a software unit.

5.4.3.2.2. The Contractor shall provide modification of the software to detect and correct latent faults before they become effective faults. Preventive Maintenance includes scheduled maintenance.

5.4.3.2.3. The Contractor shall perform Preventive Maintenance which includes the following activities:

- Monitor system operation for time schedule or other triggers for each preventive maintenance activity
- Perform scheduled maintenance (e.g. regular updates of third party software, cleaning up system log files)
- Perform safety actions per analysis or upon safety notice
- Record maintenance data.

5.4.3.2.4. The Contractor shall handle the following types of maintenance requests:

- Output of system design as a result of analysis
- Output of system use as a result of corrective action procedure
- User Defect Report - identifying system problems that need to be resolved by the Software Maintenance Process.

5.4.3.3. Corrective Maintenance

5.4.3.3.1. Corrective Maintenance is modification of the software to correct discovered problems or defects (a.k.a. bugs). It is carried out after fault recognition and intended to put a software unit into a state in which it can perform its intended function.

5.4.3.3.2. The Contractor shall perform Corrective Maintenance which includes the following activities:

- Trouble shooting
- Determining the cause

- Correcting the defect
- Generating a patch with versioning
- Testing at the Test and Reference Systems
- Applying the patch
- Testing (including regression and nominal testing)
- Recording maintenance data.

5.4.3.4. Adaptive Maintenance

5.4.3.4.1. The Contractor shall provide modification of the software to keep it usable in a changed or changing environment. This includes environment adaptation, data mapping and addition of new Information Products.

5.4.3.4.2. These adaptations shall be carried out using a disciplined systems engineering methodology following the same approach as described for the design, integration, and test of the initial TRITON Product Baseline.

5.4.3.4.3. Provided authorization from the Purchaser's Contracting Authority, the Contractor shall design, implement, integrate, test, upgrade, and provide life-cycle support for necessary adaptations to TRITON PBL to reflect findings from the OT&E period.

5.4.3.4.4. Environment Adaptation

5.4.3.4.4.1 The Contractor shall apply adaptations which may include moving from one hardware platform to another, updating infrastructure software and insertion of other software components developed by other sources.

5.4.3.4.5. Data Mapping and Addition of New Information Products

5.4.3.4.5.1 The Contractor shall provide mapping and migration of additional data to TRITON, and processing or generation of new Information Products as requested by the Purchaser.

5.4.3.4.5.2 The Contractor shall describe the process to be used to provide data mapping, migration and use of Information Products.

5.4.3.4.5.3 The Contractor shall ensure that data mapping, migration and addition of new Information Products will not interrupt TRITON Functional Services.

5.4.3.4.5.4 The Contractor shall ensure that system data are secured to avoid data loss due to data migration and addition activities

5.4.3.5. Perfective Maintenance

5.4.3.5.1. The Contractor shall apply modification on software and improve performance or maintainability in an agreement with the Purchaser. This includes studies, system enhancement, technology assessment and insertion, experimentation and data adaptation.

5.4.3.5.2. Studies

5.4.3.5.2.1 The Contractor shall research, analyse, and prepare reports, plans, or other documents related to the design, implementation, testing, transition, operation, maintenance and support of the TRITON capability as requested by the Purchaser.

5.4.3.5.3. System Enhancements

5.4.3.5.3.1 Provided authorisation from the Purchaser's Contracting Authority, the Contractor shall design, implement, integrate, test, upgrade, and provide life-cycle support to enhancements to the TRITON capability to reflect any changes in the SyRS or technological upgrade opportunities.

5.4.3.5.3.2 Such changes may include moving from one hardware platform to another, updates of system software and the use of software developed by other sources.

5.4.3.5.3.3 These enhancements shall be carried out using a disciplined systems engineering methodology following the same approach as described for the design, integration, and test of the initial TRITON PBL, also including Regression Tests and IV&V Testing.

5.4.3.5.4. Technology Assessments and Insertion

5.4.3.5.4.1 Technology Insertion is usually known as a viable way to maintain or improve the performance of products already in use through obsolescence management and service life extension, but can also be used to support accelerated fielding, since the time and resources required to integrate a piece of technology into a system should be less than developing the technology from scratch (AAP-20).

5.4.3.5.4.2 The Contractor shall assess new technology applications on TRITON and identify potential risks (integration, unforeseen negative side effects on system performance, supportability, obsolescence) in case they are used.

5.4.3.5.4.3 The Contractor's efforts should employ the latest commercially available technology (or products) in consonance with economic considerations.

5.4.3.5.4.4 The Contractor should maximise opportunities for product improvement through emerging advances in the commercial market place.

5.4.3.5.4.5 The Contractor shall integrate new hardware elements and third party software into the TRITON architecture when it is agreed with the Purchaser that a modification is necessary.

5.4.3.5.4.6 The Contractor should focus on the demonstration of clear and definable improvements in the performance, logistics supportability, reliability and maintainability of the new item.

5.4.4. System Maintenance Documentation

5.4.4.1. The System Maintenance Documentation includes System Maintenance Manual (SMM) and Maintenance Records.

5.4.4.2. The Maintenance Concept and SMM shall, at minimum, cover the maintenance tasks defined in this SOW.

5.4.4.3. For all COTS Configuration Items of the PBL, the SMM shall take maximum advantage of the existing COTS Vendor Original Equipment Manufacturer (OEM) Manuals and documentation, supplemented with the PBL adaptations, and additions.

5.4.4.4. The SMM shall define the required Maintenance Tools and Equipment including the necessary Material Data Sheet (MDS).

5.4.4.5. The Contractor shall use a reporting mechanism as Maintenance Records which shall include:

- Problem/deficiency reporting and resolution procedures – including scheduled replacement of system elements upon failure (reactive maintenance) and prior to failure (preventive maintenance).
- Maintenance Records including history of maintenance actions (reactive/preventive), failures, other trends to inform operations and maintenance personnel, and other projects creating or utilizing similar system elements.
- Key maintenance related metrics such as Mean Time between Failures (MTBF), Mean Time to Failure (MTTF) and Mean Downtime (MDT).
- Monitor and document user satisfaction with maintenance support.

5.4.4.6. Software Support Manual

5.4.4.6.1. Software Support Manual (SSM) describes how to provide First and Second Level Support to the installed TRITON Operational Software.

5.4.4.6.2. The SSM shall provide information sufficient for a technician who has attended the Training Course to be able to operate the system without supervision and to perform fault finding in support of First Level Maintenance.

5.4.4.6.3. The Contractor shall prepare and deliver separate SSMs for the following systems:

- TRITON-NS (static)
- TRITON-NU (static)
- TRITON Deployable Kit (for both NS and NU)

5.4.4.6.4. The SSM shall include at least the following information:

- Configuration settings for the modules, services and components
- How to configure the logging and uses of performance counters
- Interfaces and their settings
- Log file locations
- Logging categories
- Performance counter categories
- Additional notes specific to the systems
- An annex with trouble-shooting information (a break-down on actions to solve a full range of (potential) problems or provide workarounds)
- An annex with database management information describing a break-down from the GUI (fields and actions) down to the effected database tables, triggers and stored procedures, the TRITON Logical Data Model in full detail, the TRITON Physical Data Model, where at least triggers, foreign keys, tables/columns, stored procedures and parameters are described.
- An annex on back-up and restore procedures

- Packing, transporting, unpacking, (dis)mantling the TRITON Deployable Kit on board a ship.

5.4.4.7. Software Transition Manual

5.4.4.7.1. Software Transition Manual (STM) describes how to upgrade software data from one Baseline/Increment to another.

5.4.4.7.2. The STM shall include at least the following:

- How to perform the transition from a TRITON Baseline/Increment to the next in terms of functionality upgrade and migration of data
- How to update a TRITON installation to the next Baseline/Increment
- How to convert the data from a TRITON Baseline/Increment to the next TRITON Baseline/Increment
- How information can be exchanged between different Baselines/Increments of TRITON if necessary
- Updated documentation.

5.5. Provision of Maintenance

5.5.1. The Contractor shall provide all levels of Maintenance for the PBLs as they are delivered until FSA.

5.5.2. The Contractor-furnished proactive and reactive Third Level Maintenance shall be planned, implemented and executed according to the Maintenance Concept.

5.5.3. The Contractor-furnished Third Level Maintenance shall be provided offsite at the Contractor's premises.

5.5.4. The Contractor shall define the Maintenance Process interfaces to other processes such as the Warranty, Incident Management, Problem Management and Release Management.

5.5.5. The Contractor shall solve any deficiencies found during the System Transition Process and System Operation Process prior to the FSA. This period is the applicable Operational Testing and Evaluation period for a Baseline.

5.6. Service Management and Control Concept

5.6.1. General

5.6.1.1. The Contractor shall develop the TRITON Service Management and Control Concept covering how the Customer Support will be implemented and performed in accordance with the Purchaser’s existing Support Concept and submit it for the Purchaser’s approval.

5.6.1.2. The Purchaser’s Support Concept is arranged around four distinct levels and addresses hardware maintenance, software maintenance and service management and control functions (ITIL).

5.6.2. Purchaser’s Support Concept

5.6.2.1. The Purchaser’s First Level of Support is the local, organizational unit operating the system, supported by local support staff.

5.6.2.2. The Purchaser's Second Level of Support is formed by the Network Operations Centre, which implements the remote and Central Service Desks and employs the Purchaser's network and system operators and administrators.

5.6.2.3. The Purchaser's Third Level of Support is formed by the Service Lines and their Subject Matter Experts (SME), Service Owners and System Managers, located at The Hague, Casteau/Mons, CSSC, NCISS and NPC.

5.6.2.4. The Purchaser's Fourth Level of Support is the OEM vendor or supplier level.

5.6.2.5. Technically, there is also a Support Level Zero. This is the end-user level and includes user self-help, interaction with the local Service Desk and user-level preventive maintenance tasks, such as simple cleaning of hardware and local data management.

5.6.3. Contractor's Support Concept

5.6.3.1. At each support level, the Contractor's Support Concept shall describe the support environment, constraints, locations, procedures, artefacts, organization and personnel.

5.6.3.2. The procedural description shall include objective(s), triggering event(s), input(s), output(s), task(s), roles and responsibilities (RACI-format), constraints, exceptional case(s), and tool(s) support.

5.6.3.3. The Contractor shall define the support process interfaces to the other processes, including the existing Service Desk at the NCI Agency premises. The interface definition shall include the input and output information, its structure, the communication path (POC's), the time constraints for sending and receiving information, and quality criteria to evaluate the integrity of the interface.

5.6.3.4. The Contractor shall define the Support Concept for the TRITON Baselines delivered before the FSA.

5.6.3.5. First Level Support

5.6.3.5.1. The First Level Support tasks shall be defined and designed for military users and operators.

5.6.3.5.2. The First Level Support shall include day-to-day housekeeping tasks, visual inspections, verification of function and performance, and implementation of simple changes to the baseline configuration.

5.6.3.5.3. The First Level Support shall implement the service request and Incident Management Process in accordance with the ISO/IEC 20000 and ITILv3 framework or equivalent.

5.6.3.6. Second Level Support

5.6.3.6.1. The Second Level Support tasks shall be defined and designed for non-specialised military support personnel and shall include detailed baseline inspections and checkouts, limited calibrations, replacement of non-critical LRU's, minor equipment repairs and modifications.

5.6.3.6.2. The Second Level Support shall implement the Problem Management Process in accordance with the ISO/IEC 20000 and ITILv3 framework or equivalent.

5.6.3.6.3. Problem management tasks shall be integrated with the Problem Management Process.

5.6.3.6.4. As part of problem management the following tasks are included:

- (Re-)evaluation of incident category, criticality and priority;
- Identification of the root cause of the issue (e.g. by issue replication testing);
- Identification of workarounds;
- Identification and initial planning of possible short, medium and long-term solutions (e.g. workarounds, patches or new releases);
- Creation of Change Requests;
- Implementation planning and scheduling;
- Synchronisation with the Maintenance Process;
- Monitoring and control of the approved Change Request during implementation.

5.6.3.7. Third Level Support

5.6.3.7.1. The Third Level Support shall be defined and designed for specialised military personnel, and shall include complex repairs or replacements for hardware components, their detailed calibrations, supply support, overhaul and rebuild, implementation of major and/or critical changes to the baseline, baseline restoration, post-maintenance review, monitoring and coordination of transportation.

5.6.3.7.2. The Third Level Support shall cover the four types of software maintenance.

5.6.3.7.3. The Third Level Support shall implement the Release and Deployment Management Process in accordance with the ISO/IEC 20000 and ITILv3 framework or equivalent, assisted by an adequate Configuration Management and Change Management Process, and integrated with the Purchaser's Release and Deployment Process. In this process, solutions to software faults and hardware failures shall be developed, tested and deployed.

5.6.3.8. Fourth Level Support

5.6.3.8.1. The Fourth Level Support tasks shall include repair and replacement of faulty baseline items beyond the capability of Third Level Support.

5.6.3.8.2. If required, this level shall employ and interact with the original equipment manufacturer or item vendors to affect such repair and replacement.

5.6.4. Incident Management Process

5.6.4.1. The Contractor shall implement an Incident Management Process that resolves incidents and restores the provision of services within the terms agreed between the Purchaser and the Contractor.

5.6.4.2. The Contractor shall implement an Incident Assessment Model that categorises incidents according to impact, urgency, risk, required resources to resolve the incident and priority.

5.6.4.3. The Contractor shall comply with the existing NCI Agency business practices which are based on ITIL v3 and will be provided after signing the Contract.

5.6.4.4. The Contractor shall implement an Escalation Process that takes into account the specific site organization and the command structure.

5.6.4.5. The Contractor shall describe the required actions to resolve the incident.

5.6.4.6. The Contractor shall specify the Incident Routing that shall be applied to each site.

5.6.5. Problem Management Process

5.6.5.1. The Contractor shall implement a Problem Management Process that identifies and addresses the underlying cause of an undesirable situation, indicating the root cause of one or more existing or potential incidents.

5.6.5.2. The Contractor shall implement a systematic approach for the investigation of incidents, identification of the root cause and development of appropriate remedies.

5.6.5.3. The Contractor shall ensure the Problem Management Process successfully addresses the following objectives:

- Identification, tracking, resolution of failures.
- Symptoms and permanent or temporary solutions for failures are documented.
- Change Requests are raised to modify the infrastructure.
- Avoidable incidents are prevented.

5.6.5.4. The Contractor shall implement a Problem Classification by area (category) and the Identification shall point to the lowest level CI's that affect the problem. The classification shall be accompanied by an impact analysis, which determines the seriousness of the problem and its effect on the services (urgency and impact).

5.6.5.5. The Contractor shall assign a priority to problems, in the same way as in the Incident Management process. The classification shall include the following:

- Category - identifying the relevant domain, for example hardware or software.
- Impact - on the service.
- Urgency - extent to which deferral of the solution is acceptable.
- Risk - A factor that could result in future negative consequences; expressed as impact and likelihood
- Required resources – level of effort needed to resolve the problem.
- Priority - combination of urgency, impact, risk and required resources.
- Status - e, problem, known error, resolved, closed pending resolution.

5.6.5.6. The Contractor shall determine a combination of impact and urgency factors for incidents to be agreed with each site.

5.6.6. Release Management Process

5.6.6.1. General

5.6.6.1.1. The scope of Release Management includes the processes, systems and functions to package, design, build, test and release the assets and components required to establish or upgrade a service or product as specified in the design package. Release Management ends with the formal hand-over the verified release package to change management, who subsequently deliver a

deployment package for use in NATO managed services or for distribution to external customers.

5.6.6.1.2. Release Management ensures that the necessary (software) maintenance activities can be performed to facilitate the effective utilisation of the product as a service asset for Service Operations.

5.6.6.1.3. The Contractor shall apply a Release Management Strategy to build Release Packages, which represents a planned release for Build Processes.

5.6.6.1.4. For the purpose of this Contract, the Contractor shall assume that the Release Management function will be entirely carried out by the Purchaser with its own resources. The Purchaser will provide guidance on Release Management Process including naming, software labelling and marking (Software Identification Tags – SWID Tags), Versioning Specification, Versioning Pattern for Web Services,

5.6.6.1.5. The Contractor, however, shall liaise with the Purchaser's Appointed System Manager and with the Purchaser as far as the delivery of the TRITON additional releases, new versions, patches and bug fixes is concerned.

5.6.6.1.6. The Contractor shall manage all releases during development of each Baseline during its Build Process, during its Maintenance activities defined under this Contract. The Release Management Process will be finalised at FSA.

5.6.6.1.7. The Contractor shall maintain the releases for a fixed period of time, depending on the type of the release. Following release types shall be applicable:

- Emergency Release: An Emergency Release (patch) is only maintained until the next standard release is successfully deployed.
- Routine Release: A Routine Release is maintained for a period of at least twelve (12) months, until FSA or until the end of Warranty.
- Long Term Support Release: For software that is used in support of NATO operations or by external customers Long Term Support Release has to be maintained. This is applicable when the optional Maintenance and Support Package is activated.

5.6.6.2. Baseline Releases

5.6.6.2.1. System enhancements shall be organised and implemented as Maintenance Releases and Major Releases. The Purchaser will accept releases upon verification and validation on a Purchaser-specified Reference Systems.

5.6.6.2.2. Maintenance Release

5.6.6.2.2.1 Maintenance, bug fix or patch releases are version changes designed to fix identified critical problems such as security vulnerabilities and other bug and might also address improvements to usability or performance. It typically excludes new features or changes of the Human Machine Interface (HMI), Application Programming Interface (API), service interfaces or the data structure – unless fixing a defect or security vulnerability requires such changes. Third party systems can most likely use the systems further without modification.

5.6.6.2.2.2 Two categories of Maintenance Release are identified: “Emergency” and “Routine” and they will be processed accordingly.

5.6.6.2.2.3 A Maintenance Release incorporates one or more design changes and/or one or more fault fixes into the TRITON PBL that collectively do not affect existing ICDs or system security or technical compliance certification.

5.6.6.2.2.4 The Contractor shall plan and perform Regression Testing and IV&V Testing for Maintenance Releases.

5.6.6.2.2.5 The IV&V CCB will decide the level of effort necessary for testing the maintenance release during TRR.

5.6.6.2.2.6 The Contractor shall make the necessary documentation and test results available to the CCB prior to the TRR.

5.6.6.2.3. Major Release

5.6.6.2.3.1 A Major Release is generally a programmatic or life-cycle management decision. It is typically indicated by major enhancements and improvements such as the addition of key features to the functional baseline of a system; including major changes to the HMI concept, API, service interfaces, data structures and templates as well as new interfaces or a modified/enhanced control concept it can also include a change to the underlying platform(s) (i.e. a computer or hardware device and/or associated operating system, or a virtual environment, on which software can be installed or run). It may also refer as to the increment to an initial release.

5.6.6.2.3.2 A Major Release incorporates one or more design changes to the TRITON PBL that collectively affect one or more ICDs or system security or technical compliance certification.

5.6.6.2.3.3 The Contractor shall plan and perform both Regression and Certification Testing for Major Releases.

5.6.6.2.4. Minor Release

5.6.6.2.4.1 A Minor Release includes new features and can include minor changes of the HMI, API, service interfaces, data structure or templates. Fundamental changes such as HMI concept change are not expected. A new minor release should maintain all interfaces introduced since the previous major release.

5.6.6.2.4.2 The Contractor shall plan and perform Regression Testing for Minor Releases.

5.6.6.3. Release and Deployment Plan

5.6.6.3.1. The Release and Deployment Plan (RDP) includes all activities related to issuing a new release of the software and its deployment.

5.6.6.3.2. The Contractor shall coordinate all release and deployment planning with the Purchaser. The Purchaser will inform the Contractor about the available dates for releases.

5.6.6.3.3. Individual release activities are accumulated over a period of at least ten (10) weeks and then dispatched all at once on each Wednesday of calendar week 07 (Feb), 17 (Apr), 29 (Jul), 39 (Sep) and 49 (Dec). In case such a day coincides with an NCI Agency Official Holiday in either Belgium or The Netherlands the release day is on the following working day. The Release Calendar is given in Table 5-1~~Table 5-1~~.

Table 5-1 – Release Calendar

Release Day	2016	2017	2018
I. Week 07	17 Feb 16	15 Feb 17	14 Feb 18
II. Week 17	28 Apr	26 Apr 17	25 Apr 18
III. Week 29	20 Jul 16	19 Jul 17	18 Jul 18
IV. Week 39	28 Sep 16	27 Sep 17	26 Sep 18
V. Week 49	07 Dec 16	06 Dec 17	05 Dec 18

5.6.6.3.4. In addition there will be regular “patch days” on every third Wednesday of the month following the patterns of patch releases by Microsoft on “Patch Tuesdays”. Absolutely acute patches can also be released out-of-cycle, based on the criticality as determined by the Operating Authority.

5.6.6.3.5. A successful release does not automatically lead to the deployment of such release; deployment activities will be planned, authorised and executed separately for each NCI Agency operated network.

5.6.6.3.6. The Contractor shall adjust the releases by also keeping the deadlines.

5.6.6.3.7. The Contractor shall deliver the RDP to the Purchaser at least two (2) weeks prior to the SQR.

5.6.6.4. Key Performance Indicators

5.6.6.4.1. The Contractor shall track the Key Performance Indicators (KPI) for each release including at least the following:

- Number of releases per year (if the optional Maintenance and Support Package is activated)
- Number of change items per release
- Number of new or modified lines of code per release
- Number of incidents per release (new issues because of the release)
- Number of new problems per release
- Number of un-corrected known-errors per release.

5.6.6.4.2. The Purchaser will use the KPIs to assess the status of maintenance.

5.6.7. Handover of Software Warranty and Licenses

5.6.7.1. The Contractor shall ensure that the software licenses are correctly attributed to the Purchaser’s Organization that will actually use the application.

~~5.6.7.2. The Contractor shall provide the software warranty and licensing documentation, including accounts, related to any software subject to licensing to the Purchaser.~~

~~5.6.7.3.~~5.6.7.2. The Contractor shall ensure the warranty and license model allows for transfer of responsibility between the Purchaser and other NATO entities as required by NATO's organization structure.

~~5.6.7.4.~~5.6.7.3. The transfer of responsibility shall be carried out without incurring additional cost for the Purchaser.

5.6.8. Compliance with Operational Baselines

5.6.8.1. The Contractor shall ensure the integrity of the Operational Baseline maintained by SPA (NCI Agency) by planning and carrying out all the necessary actions to verify all necessary licenses are active and of the correct version and release as per SPA baseline.

5.6.8.2. The Purchaser will provide to the Contractor the list of software components of the latest available release of the OBL for the Contractor to verify compliance before each Baseline FAT.

5.6.8.3. The Contractor shall specify to the Purchaser at the earliest possible time the discrepancies that affect the OBL.

5.6.8.4. The Contractor shall provide all the necessary documentation, as required by the SPA, to process the request for inclusion of software in the OBL. The list of necessary documentation shall include but not limited to the following:

- System Manuals
- Design/architectural specification suitable for NITC security assessment (COTS software excluded)

5.7. Provision of Support

5.7.1. General

5.7.1.1. The Purchaser provides support to all its Information Systems under a Three-level Support Approach. The Purchaser will provide documentation from NCI Agency on the Service Management procedure in current use as PFE.

5.7.1.2. The Contractor shall provide First, Second and Third Level Support in accordance with the Purchaser's Support Concept.

5.7.1.3. The Contractor-furnished Second and Third Level Support processes shall be planned, executed, and controlled according to ISO/IEC 20000 and ITILv3 or equivalent.

5.7.1.4. The Contractor shall prepare an initial Service Level Agreement (SLA) based on a Purchaser-furnished template, defining service delivery terms and conditions for operational use and support of the TRITON capability after installation. The SLA will cover the services provided by the Purchaser to the Customer, until FSA and after FSA.

5.7.2. First Level Support

5.7.2.1. The Contractor shall provide First Level Support by maintaining a Trouble-Ticketing System and Service Desk.

5.7.2.2. Trouble-Ticketing System

5.7.2.2.1. The Contractor shall maintain his own Trouble-Ticketing System to track all the reported issues, incidents and problems.

5.7.2.2.2. The Purchaser's Trouble-Ticketing System shall be used for opening, modifying, tracking, and closing Trouble Tickets, and logging of all requests concerning the PBL and OBL.

5.7.2.2.3. The system shall be interfaced with the Purchaser's Service Desk Trouble-Ticketing System to be able to exchange (import, export) Incident Reports, Deficiency Reports and Change Requests.

5.7.2.3. Service Desk

5.7.2.3.1. Service Desk support includes on-site support to local users, incident management, and activation of Second Level Support if needed.

5.7.2.3.2. The Contractor shall implement an interim, centralised Service Desk function, located at the NCI Agency The Hague, which shall deliver the entirety of the support services for the TRITON Services.

5.7.2.3.3. The Contractor shall operate the interim Service Desk until the FSA.

5.7.2.3.4. The Service Desk shall constitute the single interface for all TRITON System Support Services.

5.7.2.3.5. The Service Desk shall handle incidents and requests and provide an interface for other activities, such as:

- Problem Management
- Release and Deployment Management
- Configuration Management
- Change Management.

5.7.2.3.6. The Service Desk shall provide First Level Support activities on a daily basis.

5.7.2.3.7. The Service Desk shall adopt the documentation, diagnostics applications and tools that are available and in use at the NCI Agency and whose description will be provided at as PFE after Contract Award.

5.7.2.3.8. The Service Desk shall be responsible for the actions listed in Table 5-2~~Table 5-2~~.

Table 5-2 – Responsibilities of the Service Desk

Serial	Requirement
1	Receive and record all calls from users.
2	Deal directly with simple requests and complaints.
3	Provide an initial assessment of all Incidents.
4	Make a first attempt at Incident resolution and /or refer to Second Level of support.
5	Monitor and escalate all Incidents according to the Incident escalation procedure.
6	Keep users informed on status and progress.

5.7.2.3.9. The Service Desk shall operate eight (8) hours per day during the NCI Agency The Hague business hours (Monday to Friday, 09:00 to 17:00, except non-working days such as Public Holidays).

5.7.2.3.10. The Service Desk shall provide its services in the English language.

5.7.3. Second Level Support

5.7.3.1. The Second Level Support shall apply to the centralised system operation, administration and management tasks to maintain services across the OBL. It covers support fault isolation, in-depth technical assistance to First Level Support staff and on-site support when necessary.

5.7.3.2. The Contractor shall provide a Second Level Support personnel as On-Site Support. The main role of Contractor's personnel resident at the NCI Agency The Hague premises shall be the following:

- To undertake required maintenance activities along with First Level Support (on-site) tasks when required.
- To act as liaison between the users resident at the operational sites and the Contractor personnel resident at Contractor's premises for the Third Level Support purposes.
- To deliver Second Level Support expertise to assist the NATO support staff in providing changes to SOPs or instructions to reflect any changes to operating or support tasks resulting from the activation of system elements.

5.7.3.3. The Contractor furnished Second Level Support process shall create and deliver a Problem Analysis Report per identified Issue or set of Issues as the result of the Problem Management Process (Paragraph 5.6.5).

5.7.3.4. The Contractor furnished Second Level Support process shall create and deliver a Change Request as the result of the Problem Management Process work steps.

5.7.3.5. The Contractor furnished Second Level Support process shall create and maintain descriptions of all solutions (Quick Solution, Work Around, Patch, Baseline Release) to known issues in a COTS software database, Known Error Database (KEDB). The KEDB shall be established during the Build Processes and link issue(s) to solution(s) and corresponding documentation with the expert Contractor POC. This KEDB shall be delivered to the purchaser.

5.7.3.6. The Contractor shall provide Second Level Support by assisting the Purchaser in the maintenance and administration of the TRITON Reference System and its use in analysing operational problems and validating changes to the PBL.

5.7.3.7. The Contractor shall provide Second Level Support for the PBL after the OTRR until the FSA.

5.7.4. Third Level Support

5.7.4.1. The Third Level Support activities shall be undertaken by the Contractor at his premises during the System Transition, until the FSA, as defined in the System Operation Process and System Maintenance Process.

5.7.4.2. The Third Level Support provides support to the Second Level Support either locally (at Contractor premises) or externally (at Purchaser operational or support sites). It covers correction of deficiencies, and implementation and validation of approved changes to the functional, developmental and PBL.

5.7.4.3. The Contractor furnished Third Level Support process shall create and deliver the software patches/fixes and/or hardware repair as approved by the CCB in response to the Second Level recommendation. Before FSA this will be subject to Purchaser Contracting Authority approval. After FSA this will only be done if the Purchaser decides to activate the optional Maintenance and Support Package.

5.7.4.4. The Contractor shall provide Third Level Support during the Warranty Period on the OBL.

5.7.4.5. The Contractor shall provide Third Level Support after the Warranty Period if the Purchaser exercises the option to activate the optional Maintenance and Support Package.

5.7.4.6. The Contractor-furnished Third Level Support shall be provided at the NCI Agency premises until FSA.

5.8. Training

5.8.1. General

5.8.1.1. The Contractor shall provide training for TRITON users and support staff through a combination of self-study aids, including System User and Administrative Manuals (hard copy and interactive electronic), Computer-Based Training (CBT) and eLearning Training Materials (e.g. On-line Tutorials and On-line Help) in accordance with [Bi-SC DIR 75-7] and TRITON Increment 1 specific courses.

5.8.1.2. The Contractor shall plan, execute and control the Training Process as defined in the [Bi-SC DIR 75-7]. The Contractor shall perform the Training Needs Analysis (TNA), the backing document to justify all the training activities for TRITON.

5.8.2. Training Needs Analysis

5.8.2.1. Perform Task Analysis

5.8.2.1.1. The Contractor shall conduct a Task Analysis in accordance with [Bi-SC DIR 75-7], to identify and list all user/operator and maintenance tasks for each PBL system, subsystem and integrated system.

5.8.2.1.2. The TNA shall include identified roles that will use TRITON to accomplish their tasks.

5.8.2.1.3. The TNA shall assess the gap between the current skills of relevant staff and the tasks they will be expected to perform in the use and support of the TRITON OBL.

5.8.2.2. Perform Target Audience Analysis

5.8.2.2.1. The Contractor shall conduct a Target Audience Analysis in accordance with [Bi-SC DIR 75-7], utilizing any information already determined by the Purchaser Training Staff and produce a summary population table. An Excel spreadsheet is recommended in [Bi-SC DIR 75-7].

5.8.2.2.2. The Contractor shall assess the current skills of operational staff that will use TRITON and the importance and difficulty of tasks via discussions with Purchaser-identified experts.

5.8.2.3. Create a List of Operational Performance Standards

5.8.2.3.1. The contractor shall produce a List of Operational Performance Standards (LOPS) in accordance with [Bi-SC DIR 75-7.

5.8.2.4. Perform a Performance Gap Analysis

5.8.2.4.1. The contractor shall conduct a performance gap analysis in accordance with [Bi-SC DIR 75-7] to determine which Performance Objectives (POs) need E&IT either in full or in part.

5.8.2.5. Perform Difficulty Importance Frequency (DIF) Analysis

5.8.2.5.1. The contractor shall conduct a DIF or other equivalent criterion analysis in accordance with [Bi-SC DIR 75-7], to determine the priority and training effort to be applied to the POs.

5.8.2.5.2. This DIF analysis shall identify the difficulty and importance of each major task to be performed by each category of roles and the frequency with which the task will be performed. A possible format is identified in the [Bi-SC DIR 75-7].

5.8.2.5.3. For each task identified in the DIF analysis, the Contractor shall assess the knowledge and skill required to perform the task and recommend how training should be provided to meet these requirements.

5.8.2.6. Finalise the LOPS

5.8.2.6.1. Once the Performance Gap and DIF analyses have been completed, the contractor shall finalise the LOPS by appending the need for training or partial training as per [Bi-SC DIR 75-7].

5.8.2.6.2. Based on the recommendations from the DIF analysis, the Contractor shall identify in the TNA which of the TRITON Training Materials and training deliveries shall be offered to meet the training requirements.

5.8.2.7. Create Learning Objectives

5.8.2.7.1. The contractor shall take all the POs in the LOPS that require E&IT and create a list of Learning Objectives (LO) in accordance with [Bi-SC DIR 75-7].

5.8.2.8. Perform Training Options Analysis

5.8.2.8.1. The contractor shall conduct a training option analysis, including a cost-benefit analysis in accordance with [Bi-SC DIR 75-7], to determine the alternatives for the overall training approach, setting and location. The preferred option will be recommended in the TNA Final Report.

5.8.2.9. Create TNA Final Report

5.8.2.9.1. The Contractor shall provide a TNA Report in accordance with [Bi-SC DIR 75-7].

5.8.2.9.2. The Contractor shall base the scope, delivery methods, and duration of TRITON training courses and materials on the TNA.

5.8.2.9.3. The Contractor shall incorporate the findings of the TNA in the Training Plan, as confirmed by the Purchaser.

5.8.2.10. Complete Programme of Instruction (POI) Document II

5.8.2.10.1. The contractor shall complete Part 1 and Part 2 of the NATO POI Document II in accordance with [Bi-SC DIR 75-7].

5.8.3. Training Plan

5.8.3.1. The Contractor shall develop and maintain the TRITON Training Plan describing how it will meet requirements for initial and follow-on training.

5.8.3.2. The Training Plan shall be structured according to the template provided in [Bi-SC DIR 75-7] and address the results of the TNA.

5.8.3.3. The Contractor shall develop and maintain the Training Course Proposal and Justification (POI Document-II) based on the results of the TNA.

5.8.3.4. The Training Plan shall describe how it will meet the training requirements found after the TNA for initial and follow-on training.

5.8.3.5. This Training Plan shall address all stages of training development, delivery, and support covered under this Contract. The Training Plan shall describe in a coherent way how training will be developed, delivered, and maintained throughout the life of the TRITON capability.

5.8.3.6. The Training Plan shall describe the training documentation.

5.8.3.7. The Training Plan shall propose a training schedule, in relation to the overall Contract schedule.

5.8.3.8. The Training Plan shall describe the process for Training Evaluation.

5.8.3.9. The Training Plan shall describe the support to be provided by the Purchaser (manpower, services and material).

5.8.3.10. The Contractor shall adapt the Training Plan structure to the TRITON capability scope and submit it for Purchaser approval not later than the CDR milestone.

5.8.4. Training Programme

5.8.4.1. Perform Instructional Analysis

5.8.4.1.1. The contractor shall perform an instructional analysis in accordance with [Bi-SC DIR 75-7] that includes, but is not limited to, the following activities:

5.8.4.1.1.1 Identify all components and sub-components of the tasks that make up the support.

5.8.4.1.1.2 Apply target population information to determine current subject matter competence (knowledge, skills and attitude).

5.8.4.1.1.3 Group and sequence the components (Enabling Objectives - EOs) and sub-components (teaching points) into units suitable for learning.

5.8.4.1.1.4 Develop Enabling Checks. For each EO, the Contractor shall create and submit an Enabling Check and its scoring criteria.

5.8.4.1.1.5 Develop a scalar diagram to document the content and structure of the instructional programme.

5.8.4.2. Develop Learning Assessment Plan

5.8.4.2.1. The contractor shall develop an assessment plan in accordance with [Bi-SC DIR 75-7], which includes, but not limited to:

5.8.4.2.1.1 A concept for achievement testing, that specifies how each LO, and critical EOs, will be assessed,

5.8.4.2.1.2 A pass/fail policy, based on results of achievement tests,

5.8.4.2.1.3 Test/retest policies,

5.8.4.2.1.4 A concept for progress testing that specifies how each EO will be assessed.

5.8.4.3. Define Instructional Strategies

5.8.4.3.1. In accordance with the guidance provided in [Bi-SC DIR 75-7], the Contractor shall identify instructional strategies covering:

5.8.4.3.1.1 Instructional methods such as demonstration-performance, case studies or lectures,

5.8.4.3.1.2 Instructional media (e.g. pictures, diagrams, video recordings, models, simulators, real equipment, ADL, CBT),

5.8.4.3.1.3 Learning environment e, centralised instruction (bringing the learners to the instruction); distributed instruction (taking the course to the learners) or a combination of both.

5.8.4.4. Propose Instructional Strategy

5.8.4.4.1. To support the Purchaser's decision on the Instructional Strategy, the Contractor shall provide a Decision memo that:

5.8.4.4.1.1 Reviews the proposed strategies for their potential effectiveness in meeting the performance requirement,

5.8.4.4.1.2 Reviews costing for affordability and comparative efficiency,

5.8.4.4.1.3 Considers risks and organizational impact,

5.8.4.4.1.4 Develops a business case if resource implications are substantial.

5.8.4.5. Complete POI Documentation

5.8.4.5.1. The contractor shall complete POI Document II Part 2 and POI Document III in accordance with [Bi-SC DIR 75-7].

5.8.4.6. Create Instructional Specifications

5.8.4.6.1. The contractor shall use the products of the Instructional Analysis to create instructional specifications approved by the Purchaser's Training Manager that include the:

- EOs,
- Teaching points with pertinent references such as specific passages in technical publications,
- Enabling Checks where appropriate, with scoring criteria.

5.8.4.7. Develop Training Material

5.8.4.7.1. The Contractor shall produce appropriate Training Materials in accordance with [Bi-SC DIR 75-7], to include some or all of the following as required:

5.8.4.7.2. Syllabus

5.8.4.7.2.1 The Syllabus shall include the following elements:

- Course title
- Course description
- Learning objectives, as identified in the TNA and confirmed in the Training Plan
- Instructional methodologies to be employed in the delivery of the course
- Total number of instructional hours
- In-class assignments or laboratories
- Evaluation tools
- Performance standards.

5.8.4.7.2.2 A shorter Training Syllabus shall be provided to course participants.

5.8.4.7.3. Student Manuals

5.8.4.7.3.1 These are reference handbooks to be used and retained by the students. The content should be based on the POI.

5.8.4.7.3.2 The Student Manual shall describe the concepts, functions, and features presented in the course, including links or references to the relevant documentation included in the TRITON Product Baseline

5.8.4.7.4. Instructor Guides

5.8.4.7.4.1 These are instructional guidelines for use by the instructor during training preparation and execution. They outline the specific training steps that must be provided to satisfy the training plan. EOs are linked to detailed steps and procedures in student manuals, user guides, and any on-line documentation.

5.8.4.7.4.2 The Instructor Guide is best structured as a series of outline lessons, providing key points for the instructor to stress, some sample questions to ask, appropriate times to inject student progress tests and practical exercises, other instructional tips, and any activity aiding student learning of the related training objective.

5.8.4.7.5. Training Presentations

5.8.4.7.5.1 Training presentation shall include all slides or other information to be presented by the instructor during the course.

5.8.4.7.6. Hand-outs

5.8.4.7.6.1 These additional aids can supplement the Student Manuals when covering areas identified as difficult and/or particularly important.

5.8.4.7.6.2 They shall cover alternative approaches and provide realistic examples of task execution.

5.8.4.7.7. Training Scenario

5.8.4.7.7.1 The Contractor shall prepare Training Scenarios to be used with TRITON Training Systems.

5.8.4.7.8. Computer Based Training (CBT) or other media where this is a recommended solution,

5.8.4.7.8.1 Training aids of all types including real equipment, references and job aids,

5.8.4.7.8.2 Question database and some sample tests in a numbered sequence with guidance on where and when they should be used during the course.

5.8.4.7.9. The Contractor shall develop and provide the Training Materials for each Training Course.

5.8.4.8. Provide Recommended Training Materials List

5.8.4.8.1. The Contractor shall create and submit a summary of the recommended Training Materials, aids and equipment.

5.8.4.9. Conduct Trainings and Transfer to the NATO In-Service Training (IST)

5.8.4.9.1. The Contractor shall create and submit course time tables, lesson plans and support materials for the PBL Training.

5.8.4.9.2. Using the lesson plans and support materials, the Contractor shall conduct training courses for the target population and the NATO trainers.

5.8.4.9.3. The Contractor shall submit an Evaluation Report for each course with recommendations for any corrective action as required;

5.8.4.10. Initial Training Requirements

5.8.4.10.1. The Contractor shall provide Operator Training and User Training for each delivered Baseline to sustain a pool of operators in accordance with the Training Plan.

5.8.4.10.2. The Contractor shall provide System Administrator Training and System Support Training for each delivered Baseline to sustain a pool of system administrator and support staff in accordance with the Training Plan.

5.8.4.10.3. The Contractor shall provide System Maintenance Training and Trainer Training to support staff in accordance with the Training Plan.

5.8.4.10.4. The Contractor shall develop a Training Programme for:

- TRITON System Administrators (Site System Admins)
- TRITON Operators (MARCOM Operators)
- TRITON General Users (Users in any NATO Command and Nations)
- TRITON Support Personnel (NCI Agency CSU staff).
- TRITON Operational Trainers (NCI Agency trainers)
- TRITON Administrator Trainers (NCI Agency trainers)

5.8.4.10.5. The Training Programme shall be reviewed by the Purchaser and operational users prior to the Design Review for each Build Process and shall be provided at least two (2) weeks prior to the review (e.g. SwDR-1).

5.8.4.11. Training Data

5.8.4.11.1. The Contractor shall develop an operationally-realistic set of TRITON data, including a representative number of each Maritime Information Entity to support training objectives for use in TRITON Training Courses and Training Materials.

5.8.4.11.2. The Contractor shall install Training Databases to support Training Sessions. The training database shall be dynamic and allow replay of training scenarios.

5.8.4.11.3. The Contractor shall update the Training Data according to the feedback from the trainees.

5.8.5. Training Readiness Review

5.8.5.1. The Contractor shall conduct Training Readiness Review (TrRR) at the Purchaser's facility (NCI Agency The Hague) using the Working Groups (as described in Subsection 4.4) structure. The Contractor shall make available all Training Materials and aids/equipment (document based and computer based).

5.8.5.2. The Contractor shall provide functionally complete Training Materials at the TrRR for each Baseline.

5.8.5.3. The Contractor shall provide the documents given in Table 5-3~~Table 5-3~~ for the TrRR.

Table 5-3 – TrRR Documents

Serial	Requirement
1	Training Needs Analysis
2	Training Plan
3	Training Programme
4	Training Course Evaluation Report (TCER) Template
5	Training Materials
6	System Manuals
7	Computer Based Training (CBT)

5.8.5.4. The Purchaser will provide comments to improve the Training Materials. The Contractor shall implement the changes directed by the Purchaser and provide updated Training Materials as part of reviews organised within the Build Processes.

5.8.6. On-line Tutorials

5.8.6.1. The Contractor shall develop a set of On-line Tutorials, as specified in the Contractual SRS, to enable TRITON end users and self-service users to perform the tasks associated with their roles.

5.8.7. Computer-Based Training

5.8.7.1. The Contractor shall develop and provide a Computer-Based Training (CBT) capability as specified in the Contractual SRS. The CBT shall be provided for BL 2, 3, and 4, and then updated until FSA.

5.8.7.2. The TRITON CBT shall complement the TRITON classroom training and On-line Help and On-line Tutorials by defining and explaining the key concepts and terminology of the C2 of Maritime Operations and processes incorporated into TRITON features and functions.

5.8.7.3. All e-learning Training Material shall be prepared in compliance with the Sharable Content Object Reference Model (SCORM) Edition 2004.

5.8.7.4. The Contractor shall ensure that the software used to produce the CBT is included in the AFPL.

5.8.8. Test Crew Training

5.8.8.1. The purpose of the Test Crew Training is to train the Purchaser and Operational Community representatives on the functionality to be tested and how the tests will be performed.

5.8.8.2. The Contractor shall provide Test Crew Training (including system overview) to the Purchaser Test Crew participating in the tests during the test events.

5.8.8.3. The Contractor shall deliver the Test Crew Training at the Purchaser's facilities.

5.8.9. On-the-Job Training

5.8.9.1. The purpose of the On-the-Job Training (OJT) is to provide hands-on training to the operational users in a normal working situation.

5.8.9.2. The OJT shall include helping the operational user to perform initial operational tasks.

5.8.9.3. Each OJT shall take no less than two (2) days.

5.8.10. Training Courses

5.8.10.1. The Contractor shall develop and deliver the Training Courses for the TRITON capability.

5.8.10.2. These Training Courses shall utilise a combination of lecture and hands-on exercises to ensure students completing a course can perform to the level agreed to in the TRITON Training Plan. The training shall include:

- Training of Purchaser staff on the TRITON capability
- Development and delivery of Training Courses and course materials
- Development and maintenance of on-line tutorials

5.8.10.3. The Training Courses shall provide training for the various categories of roles based on the TNA or specific direction from the Purchaser.

5.8.10.4. The Training Courses shall be performed using Purchaser-identified training facilities.

5.8.10.5. The Training Courses shall be provided on the TRITON Training Systems or other, Purchaser-identified equipment, without interference to operational activities.

5.8.10.6. The initially defined Training Courses to be delivered are given in Table 5-4~~Table 5-4~~. Course names and contents can be optimised according to the TNA. Each course shall also have separate subjects for TRITON-NS and TRITON-NU.

Table 5-4 – Training Courses

Course Name	Subjects	Audience
System Administrator Training	• System overview • General use of TRITON (NS/NU) • System management functions • User management • Data management	System Admins at Installation Sites and Organizational Nodes
Operator Training	• System overview	MARCOM Users (MOC Operators)

	• Detailed use of all TRITON functions (NS/NU) • User interfaces • Controlling and monitoring system technical status • Controlling and monitoring system interfaces • SOPs • Speciality functions	
User Training	• System overview • General use of TRITON functions available for General Users (NS/NU) • User interfaces	General Users at NATO Commands
System Support Training	• System overview • Support concept • Installation of TRITON (NS/NU) • Configuring the system • Configuring the interfaces • COTS components • Logging • Problem resolution • Controlling and monitoring system status • Controlling and monitoring system interfaces	NCI Agency C2 Service Line; MARCOM Support Staff
System Maintenance Training	• System overview • Support concept • Software Maintenance (1st / 2nd Level) • Problem resolution	NCI Agency C2 Service Line
TDK Maintenance Training	• System overview • Support concept • Hardware Maintenance (1st / 2nd Level) • Software Maintenance (1st / 2nd Level) • Problem resolution	NCI Agency C2 Service Line; MARCOM Support Staff
TDK User Training	• System overview • Installation and de-installation of Deployable Kit on board • General use of TDK functions (NS/NU) • User interfaces • System Management functions • Configuring, controlling and monitoring ACP interfaces • Data management • SOPs	National Representatives (ship crew)
Nations Training	• System overview • General use of TRITON functions available for General Users (NS/NU) • User interfaces • Configuring Nation interface • Controlling and monitoring Nation interfaces • SOPs	National Representatives (HQ staff)
Trainer Training	• System overview • System Administration subjects • Operator Training subjects • System Support Training subjects	NCI Agency Trainers

	• TDK User Training subjects	

5.8.10.7. Each session of a Training Course shall last no less than two (2) days and no longer than ten (10) days. The actual duration for each course shall be determined according to the TNA.

5.8.11. Course Delivery

5.8.11.1. The Contractor shall deliver Training Courses at Purchaser-specified locations using Purchaser-furnished facilities and equipment and the training version of the TRITON databases.

5.8.11.2. The Contractor shall provide each student attending a Training Course with an electronic copy and printed copy of the Student Manual for the course.

5.8.11.3. The Contractor shall provide each student attending a Training Course with a Feedback Form under paper format and request students to complete and return the form at the end of the course.

5.8.12. Training Course Evaluation Report

5.8.12.1. The Contractor shall submit to the Purchaser a Training Course Evaluation Report (TCER) for each training. The TCER shall contain the following:

- Student attendance and performance record
- Consolidated student feedback from feedback forms
- Problems encountered (if any)
- Actions taken or recommended
- Suggested follow-up actions.

5.8.12.2. The Contractor shall, as directed by the Purchaser's Project Manager, revise the Training Materials for each course to reflect student feedback from the initial session of each course.

5.8.13. Training Equipment

5.8.13.1. The Contractor shall develop the TRITON Training System for both NS and NU Domains to provide training sessions. The system configurations shall conform to their specification in the SyRS.

5.8.13.2. The Contractor shall be responsible for configuring the TRITON Training Systems and their preparation to support training sessions.

5.8.14. Software Maintenance Training

5.8.14.1. The Contractor shall provide Software Maintenance Training to the Purchaser's support staff at a Purchaser-approved location.

5.8.14.2. The training shall be at least five (5) working days for at least four (4) individuals.

5.8.14.3. The Software Maintenance Training shall include the following:

- System overview
- Software requirements overview
- Software architectural design
    - Software technology used

  - COTS products used
  - The high-level design of the software
- The detailed design of each software element
- Construction
  - Source code tree
  - Code walkthrough
  - Generation of software
- Testing and integration notes
- Installation and system configuration
- Configuration control and versioning system
- Case studies using sample modification on the source code

5.9. Management and Control of Logistic Movements

5.9.1. General

5.9.1.1. All items, including all spared and repaired goods, shall be Delivered Duty Paid (DDP), as defined in Incoterms 2010, to the NATO destinations identified in the SSS at Contractor's expense.

5.9.1.2. Prior to transportation, all deliveries shall be preceded by a Notice of Shipment. The format, content and timelines associated with this notes notice are specified in the relevant section of this document. All carriage costs shall be undertaken by the Contractor. The Contractor shall only pay the custom charges following authorisation by the Purchaser and he shall immediately inform the Purchaser of any problems that may arise (e.g. acceptance refusal by a country).

5.9.1.3. Delivery sequence of shipment related documents are shown in Figure 16~~Figure 16~~.

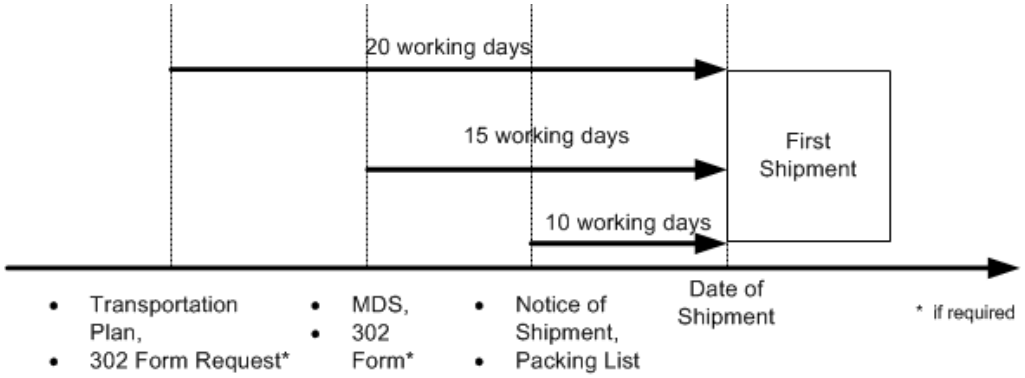


Figure 16 – Shipment Sequence

5.9.1.4. The Contractor shall be responsible for the timely request of Custom Forms 302, required for duty free import/export of supplies between certain countries. Details with regard to this requirement are specified in the relevant section of this SOW.

5.9.1.5. The Contractor shall create and maintain a Transportation Report that states the planned versus the current and final transportation results, including the delivery stages, location(s) and dates with the corresponding receiving NATO POC's and confirmations/signatures.

5.9.2. Transportation Plan

5.9.2.1. The Contractor shall develop and maintain the Transportation Plan (TransP) as an annex to ISP.

5.9.2.2. The TransP shall define all planned (partial-) shipments, locations, point of contact(s), transportation stages, schedules, and alternative schedules.

5.9.2.3. The TransP shall describe the end-to-end route, stages, and schedule of the PBL CI transportation from the Contractor's origin to its final operational destination.

5.9.2.4. The TransP shall offer alternative schedules with associated impact on the overall cost and schedule.

5.9.2.5. The Contractor shall present the initial version of the TransP for Purchaser approval not later than the CDR milestone.

5.9.2.6. The Contractor shall update the TransP if necessary and provide the updated plan at least two (2) weeks prior to the first equipment delivery.

5.9.3. Transportation

5.9.3.1. The Purchaser shall not be liable for any storage, damage or any other charges involved in such transportation of supplies prior to site delivery.

5.9.3.2. The Contractor is responsible for the availability of proper storage space and availability of material handling equipment that may be required for the equipment shipped to the destination/location. He may wish to liaise with the local Command and coordinate availability of such facilities and material through the Purchaser’s ILS Officer.

5.9.4. Preservation, Packaging and Packing

5.9.4.1. The Contractor shall, for the purpose of transportation, package, and crate or otherwise prepare items in accordance with the best commercial practices for the types of supplies (including computers, parts, CDs and documentation) involved.

5.9.4.2. All supplied items shall be packaged and packed by the shipping agent using the best commercial practices.

5.9.4.3. The packaging for deliverables shall be as follows:

5.9.4.3.1. Equipment: If the main equipment to be procured comprises servers and workstations or other electronic outfits (i.e. routers, switches), packaging shall normally be standard trade packs delivered by the manufacturer. For those repairable items that will be returned to a store/repair location, suitable re-usable packaging may be provided to ensure that they arrive at their destination secure and undamaged during transit.

5.9.4.3.2. Software CDs: In order to avoid damage, these items shall be wrapped and packaged in reinforced cardboard boxes as per standard trade packs.

5.9.4.3.3. Documentation: Packaging shall be standard trade packs.

5.9.5. Packing Lists and Marking

5.9.5.1. The Contractor shall supply packing lists for each consignment to allow for easy identification and mapping against the deliverables stated in the Schedule of Supply and Services.

5.9.5.2. Three packing lists shall be provided for each individual package/pallet as follows:

5.9.5.3. Two copies affixed outside in a sealed/weather-proofed enclosure

5.9.5.4. One copy inside the package/pallet

5.9.5.5. The packing list shall include at least the following:

- The Shipping Address
- Package number
- Contract Number
- CLIN Number as per Schedule of Supply and Services
- Item Description
- Part Number
- Serial Number
- Quantity
- Weight and Volume details
- Box number and number of boxes in the consignment
- Name and address of the Contractor, Purchaser and Consignor

5.9.5.6. In addition to standard commercial marking, all shipped packages shall show on a nameplate affixed outside of the package: the Project Name, contract number and shipping address, and the package shall be clearly marked with the text "AIS EQUIPMENT – NATO PROPERTY".

5.9.6. Notice of Shipment

5.9.6.1. Ten (10) working days prior to the delivery of any shipment of supplies, the Contractor shall provide Notice of Shipment to the Purchaser and to such other persons as are designated, in accordance with the instruction of the Purchaser.

5.9.6.2. The Contractor shall provide the Notice of Shipment with at least the following information:

- Purchaser Contract Number
- Contract line Item Number (CLIN), designation and quantities
- Items Description, Quantity and Manufacturer Part Number
- Destination
- Number and gross weight
- Consignor's and Consignee's name and address
- Method of shipment, e, road, air, sea etc.
- Date of shipment
- Number of the Form 302 used.

5.9.7. Custom Documentation

5.9.7.1. The Contractor shall be responsible for the timely request of approval of Custom Forms 302, required for duty free import/export of supplies between certain countries.

5.9.7.2. If applicable, the Contractor shall submit the Request for 302 Customs Form twenty (20) working days prior shipment date to the Purchaser.

5.9.7.3. Following receipt of the request by the Purchaser, normally a maximum of ten (10) working days are required for the issue of the form. These forms shall be originals and shall be delivered by mail/express courier. The written request for a Custom 302 form delivered by the Contractor shall contain the following information (a template for the format is available at the Purchaser):

- Purchaser Contract Number
- Contract line Item Number (CLIN), designation and quantities
- Destination
- Number and gross weight
- Consignor's and Consignee's name and address
- Method of shipment, e, road, air sea etc.
- Name and address of the freight forwarder.

5.9.7.4. If a country refuses to accept the Custom Form 302 and requires the payment of custom duties, the Contractor shall immediately inform the Purchaser by the fastest means available and obtain from the Custom Officer a written statement establishing that its country refuses to accept the Custom Form 302.

5.9.7.5. Only after having received Purchaser's approval, the Contractor shall pay these customs duties and shall claim reimbursement to the Purchaser.

5.9.7.6. The carrier shall be fully conversant with the application and use of Custom Form 302.

5.9.7.7. The Contractor shall be responsible to add the Custom Form 302 to the shipping documentation.

5.9.8. On-site Delivery

5.9.8.1. During the Site Survey, the Contractor shall obtain from the Purchaser the exact shipment addresses and NATO Points of Contact (POC).

5.9.8.2. Delivery, unless otherwise specified, shall be to a single location at each site subject to system installation.

5.9.8.3. Each site Point Of Contact shall be notified of all impending deliveries prior to their shipment. The notification shall include:

- Reception instructions
- All details of the shipped item as per Packing Lists
- Reception instructions
- An inspection and inventory check-up form

5.9.8.4. Each site POC shall be faxed a copy of the tailored reception instructions, at least by the date the shipping notice is given. The reception instructions shall include a reception check-out form to be used to inspect and inventory the received shipment.

5.9.8.5. The site POC will take delivery of the shipped goods and allow for their storage awaiting installation by the Contractor.

5.9.8.6. The Contractor shall expect that user-designated site personnel will be able to carry out a visual inspection of the received items in order to identify any external indications of damage. This will allow the Contractor to initiate a claim for damage to package content to the shipping insurance.

5.9.8.7. The Contractor shall acknowledge that the Purchaser representative cannot be held liable for not having reported any damage on received items.

5.9.8.8. The Contractor, as indicated in the reception instructions, shall request that no package be opened, even to conduct a visual inspection, unless written permission has been given.

5.9.8.9. The Contractor shall prepare and maintain a delivery schedule as part of the STrP.

5.9.9. Material Data Sheet and Inventory List

5.9.9.1. The Contractor shall provide the Material Data Sheet (MDS) to the Purchaser's ILS Officer in electronic format fifteen (15) working days before the first delivery of equipment.

5.9.9.2. The Contractor shall deliver the Inventory of Deliverables according to the MDS template with the guidelines for field completion will be provided by the Purchaser.

5.9.9.3. Right after signing of the Contract, the Contractor shall contact the Purchaser to verify the validity of MDS format. The fields included in MDS are listed below:

- Contract Line Item Number (CLIN)
- NATO Stock Number (NSN)
- Nomenclature (Short Item Description)
- Repairable item
- True Manufacturer Part Number
- True Manufacturer Code
- Vendor/Contractor Code
- Vendor/Contractor Part Number
- Quantity ordered
- Order Unit
- Serialized Item Tag
- Serial Number
- Serial Number Software Revision Level
- Serial Number Hardware Revision Level
- Other Serial Number attributes
- Subject to Property Accounting
- Currency
- Price
- Warranty Expiration Date
- Receiving/Inspection Depot

- Issue to customer
- Extended Line Item Description
- Part Number of next higher assembly
- Quantity in next higher assembly
- Quantity installed at Operating Unit (Customer Site)

5.9.9.4. Software Warranty and Licenses

5.9.9.4.1. The Contractor shall provide the software warranty and licensing documentation related to any software subject to licensing and handover them to the Purchaser as described in Paragraph 5.6.7.

~~5.9.9.4.2. The Contractor shall ensure the warranty and license model allows for transfer of responsibility between the Purchaser and other NATO entities as required by NATO's organization structure.~~

~~5.9.9.4.3. The transfer of responsibility shall be carried out without incurring additional cost for the Purchaser.~~

5.9.9.5. The Contractor shall establish and maintain at all times during the course of performance one Inventory List readily accessible by the Purchaser containing inventory information for all site deliverables (including hardware, software and documentation), their identification details and the location of all items across all the Purchaser's sites.

5.9.9.6. The inventory shall include all items delivered and shall comprise the following categories:

- Hardware, including main equipment, spare parts (where applicable) and installation materiel.
- Documentation, including COTS provider documentation and technical publications.
- Software carriers (i.e. CDs, hard drives) including COTS related software and developmental software (where applicable) including license codes and distribution target.
- Third party software packages, associated license code, point of contact (entity to which the license will be attributed within the Purchaser organization) and deployment location.

5.9.9.7. This inventory shall be exportable from the Contractor's system as an MS Excel file for delivery to the Purchaser on printed hardcopy and electronic media.

5.9.9.8. A single site deliverable inventory shall be made readily available and delivered to site together with the deliverables at the time of acceptance. Required changes shall be recorded during the acceptance process and fed back to the database.

5.9.9.9. An advance copy of the inventory shall be sent to the Purchaser's ILS Officer ten (10) working days before the first delivery.

5.9.10. NATO Codification and Labelling

5.9.10.1. The Configuration Management process shall provide for a single unique product identification numbering system for all the items delivered under the Contract.

5.9.10.2. The proposed numbering system shall be compliant with NATO Codification requirements (such as AC/135) although close compliance with this directive is not strictly required.

5.9.11. Recommended Spare Part List

5.9.11.1. The Contractor shall propose a Spare Part List for the TRITON Deployable Kits as defined in the SRS, Subsection 5.8.

5.9.11.2. The Spare Part List shall include the COTS equipment and other consumable items that are necessary for ship deployment (i.e. spare parts to be provided with TDKs for on-board First Level Support) and Second Level Support at site.

5.9.11.3. The Purchaser will have the right to procure only selected items from the Spare Part List.

5.10. Warranty

5.10.1. General

5.10.1.1. The Contractor shall provide Warranty Support for all TRITON PBL in the scope provided to the Purchaser under this Contract, for the Warranty Period.

5.10.1.2. The Warranty Support shall be applicable to all TRITON PBL elements delivered under any Work Package, without requiring further explicit reference in a Work Package.

5.10.1.3. The Warranty for TRITON PBL is limited to the scope provided by the Contractor to the Purchaser. The Purchaser, in consultation with the Contractor, may apply changes to the TRITON PBL. The scope of the Purchaser's changes and its impact on the delivered TRITON PBL will be excluded from the Warranty.

5.10.1.4. The Contractor shall ensure that the warranty conditions remain valid even if the equipment is moved or relocated during the Warranty Period.

5.10.1.5. As part of the Problem Management Process (paragraph 5.6.5) the Contractor shall identify and verify the warranty case, propose options for restoring the OBL service(s), and trigger Third Level Support or Third Level Maintenance actions.

5.10.1.6. The Contractor shall repair/ replace/ fix all hardware or software items received through the Support and/or Maintenance Process as per their internal procedures with the highest priority allocated and shall be responsible to return the Item to the NATO facility.

5.10.1.7. During the Warranty Period, repaired/exchanged goods shall be delivered directly to their original sites DDP Destination unless otherwise instructed by the Purchaser.

5.10.1.8. If the Contractor becomes aware at any time before acceptance by the Purchaser that a defect exists in any hardware or software item, the Contractor shall coordinate with the Purchaser and promptly correct the defect.

5.10.1.9. The Contractor shall be responsible for the provision of any alternative or superseding items, should the original part be no longer available ensuring ABL and OBL compliance.

5.10.1.10. During the Warranty Period the Contractor shall be responsible to implement all COTS hardware and/or software upgrades that are covered in the Warranty (it would include major version changes for the COTS).

5.10.1.11. The availability of COTS hardware and/or software upgrades shall be made known to the Purchaser and, if proposed for introduction by the Contractor for whatever reason, including any corrective action for an identified fault, shall always be subject to Purchaser approval.

5.10.2. Warranty Period

5.10.2.1. The Warranty Period for the hardware elements shall be two (2) years, starting from the time their formal acceptance after delivery.

5.10.2.2. The Warranty on repaired or replacement hardware elements is ninety (90) days from the date of return, or the remaining Hardware Warranty Period for the original covered product, whichever is longer.

5.10.2.3. The Warranty Period for the software, as OBL, shall be one (1) year, starting at the FSA.

5.10.2.4. For developed software components, the Contractor shall provide the Purchaser with a Warranty that the software component developed to satisfy the Purchaser's requirements ~~is fit for purpose~~ complies with the purposes described in this SOW and SRS. Re-using the C4ISR Visualisation Component in other applications beyond the Warranty Period of this Contract shall be excluded from the Warranty obligations.

5.10.2.5. For any breach of this Warranty, the Purchaser's exclusive remedy and the Contractor's entire liability shall be the re-performance of the deficient services or replacement of the deficient components, and if the Contractor fails to re-perform the services as warranted, the Purchaser is entitled to recover the fees the Purchaser paid the Contractor for those deficient services or components.

5.10.3. Warranty for Developed Software

5.10.3.1. The Contractor shall warrant that any developed Software Items shall perform according to the ABL and that any defects discovered shall be corrected.

5.10.3.2. The Contractor shall provide Third Level Maintenance and Support for the software during the Warranty Period.

5.10.3.3. The Warranty Support for developed software shall include software corrective and preventive maintenance.

5.10.3.4. Corrective maintenance

5.10.3.4.1. The Contractor shall provide reactive modification (take action when reported) of the software to correct discovered problems.

5.10.3.5. Preventive maintenance

5.10.3.5.1. The Contractor shall provide modification of the software to detect and correct latent faults before they become effective faults.

5.10.3.6. The Contractor shall provide to the Purchaser without charge software maintenance releases that the Contractor makes available for the software feature release licensed to Purchaser.

5.10.4. Warranty for Developed Hardware

5.10.4.1. The Warranty Support shall include replacement of any faulty element of an HDI provided by the Contractor.

5.10.4.2. The Contractor shall provide Third Level Maintenance and Support for hardware during the Warranty Period.

5.10.4.3. The Contractor shall provide for a specific remedy ~~such as an immediate correction or replacement~~ in the event a~~the~~ hardware item fails to meet the warranty conditions. This remedy may include an immediate correction/repair at the site, a replacement of the item/component with an available spare, or a replacement process as a Warranty Service.

5.10.5. Warranty for COTS Hardware and Software

5.10.5.1. The Warranty Support shall include replacement of any faulty COTS hardware unit (e.g. server, storage unit, power supply) used in TDK.

5.10.5.2. The Warranty Support shall include maintenance of any COTS software (e.g. operating system, support software that are supplied by the Contractor under the TRITON Contract) as provided by its vendor.

5.10.6. Warranty Cases

5.10.6.1. The Warranty Cases includes the defects or problems to be solved under the warranty clause. Defect means any condition or characteristic of the system that does not conform to the system specification.

5.10.6.2. Following shall be the minimum Warranty Cases:

- The deployed systems do not meet user requirements due to unacceptable failure rates
- Recorded symptoms and diagnostic results indicate that there is a defect.
- Repeatable actions that give the same faulty results
- Non-repeatable actions that give symptoms of error (not identifiable without special tests)
- Degradation of performance in time
- Software defect that causes part or whole of the system malfunctioning
- System performance is less than the performance level measured and recorded during the performance tests of each OBL.

5.10.6.3. Exclusions

5.10.6.3.1. Following cases are excluded from warranty:

- Installation or maintenance of wiring, circuits, electrical conduits or devices external to the covered products;
- Force majeure events such as war, accident, fire, explosion, water damage, earthquake, lightning or any act of nature or other such event beyond control;
- Replacement of parts or repair resulting from failure to provide and continually maintain industry accepted electrical power, air conditioning and humidity controls in accordance with the product specifications;

- Service required to repair or restore covered products due to alterations or modifications performed by persons other than authorized service representatives;
- Failure of consumable parts (e.g. fuses, batteries, cables, sockets).

5.10.6.3.2. The Warranty shall not apply to alleged defects that the Contractor demonstrates to be in or otherwise attributable to NATO-furnished property as determined, tested, and verified by the tests and procedures set forth in Paragraph –4.12 of this ~~contract~~SOW. Notwithstanding this Warranty Case, a defect is not attributable to NATO-furnished property if it is the result of installation or modification of NATO-furnished property by the Contractor or of the integration of NATO-furnished property into any system delivered under this Contract if the installation, modification or integration of the NATO-furnished property by the Contractor voids or renders unenforceable any warranties otherwise applicable to the NATO-furnished property.

5.10.6.3.3. In any dispute respecting the application of the Warranty Cases or any other claim by the Contractor that a defect existing in any system (or element) delivered under this Contract is due to a cause for which the Purchaser is responsible or which is otherwise beyond the control of the Contractor, the Contractor shall bear the burden of demonstrating that the alleged defect is not within the coverage of this system (or element).

5.10.7. Management

5.10.7.1. The Contractor shall perform Warranty Management which should include project management activities as necessary during the Warranty Period.

5.10.7.2. The Contractor shall conduct the Problem Management Process (paragraph 5.6.5).

5.10.7.3. The Contractor shall submit the Warranty Report, at the beginning of the Warranty Period, which documents the identified Warranty Cases, affected CI's, taken activities, cost and schedule. Separate Warranty Reports shall be submitted for hardware and software.

5.10.7.4. The Contractor shall provide a Warranty Service Access Point as a local or toll-free telephone number accessible Monday through Friday during regular CET business hours. This facility shall be available during the Warranty Period.

5.10.8. Service

5.10.8.1. The Contractor shall be responsible for shipment of faulty items for repair or replacement, and of the repaired or replaced item to the affected site. This support shall include cost of parts, travel and per diem and shall not attract cost to the Purchaser.

5.10.8.2. The Contractor shall ensure availability and readiness for installation of replaceable hardware items within ten (10) days of fault notification.

5.10.8.3. It is also the Contractor’s responsibility to ensure that all spare/repair parts are current and maintained in a configuration approved by the Purchaser during the Warranty Period.

5.10.8.4. For defective software elements which are part of the PBL, the Purchaser may allow additional time to complete fault isolation, remediation and testing. The Contractor shall provide an estimated completion date for the fault isolation.

5.10.8.5. The Contractor shall provide the Purchaser with instructions for handling replacement actions.

5.10.8.6. The Contractor shall provide assistance by telephone and Internet electronic mail during the Warranty Period.

5.10.9. Recording

5.10.9.1. The Contractor shall maintain a Trouble-Ticketing System to track all repair and replacement actions for hardware and maintenance issues for software.

5.10.9.2. During the Warranty Period all problems that are encountered shall be recorded to a Problem Log, together with a clear description of the problem and including classification. The entries in the Problem Log shall include but not limited to the following information:

- Software or Hardware Item, Component or Module
- Problem Description
- Date Occurred
- Business Impact (Severity)
- Priority

5.10.9.3. This classification, as well as the classification of each logged problem, shall be jointly agreed by the Purchaser and the Contractor. To allow Problem Logging on a continuous basis during the Warranty Period the Contractor shall provide appropriate means (e.g. web site) accessible at all times by the Purchaser to manage the Problem Log.

5.11. 5-Year Maintenance and Support (optional)

5.11.1. General

5.11.1.1. The Contractor shall provide Third Level Maintenance and Support after the Warranty Period for a period of five (5) years if the optional Maintenance and Support Package is invoked.

5.11.1.2. The Purchaser shall have the right to invoke the Software Maintenance and Support Package any time after the FSA.

5.11.1.3. The Contractor shall provide the following types of software maintenance as described in Paragraph 5.4.3, Software Maintenance Process.

- Corrective Maintenance
- Preventive Maintenance
- Adaptive Maintenance
- Perfective Maintenance

5.11.1.4. The maintenance shall cover all software elements and components delivered under this Contract.

5.11.2. In-Service Support Plan

5.11.2.1. The Contractor shall update the In-Service Support Plan (ISSP) which includes the SMP.

5.11.2.2. The Contractor update the ISSP quarterly.

5.11.2.3. The ISSP shall include:

5.11.2.3.1. The preventive and corrective maintenance strategy to sustain service in the operational environment.

5.11.2.3.2. The scheduled preventive maintenance actions that reduce the likelihood of system failure without undue loss of services.

5.11.2.3.3. Planning for any additional adaptive and perfective maintenance request.

5.11.2.4. The Contractor shall deliver the first version of the ISSP within twenty (20) working days after the Wok Package is invoked.

5.11.3. Resources

5.11.3.1. The Contractor shall provide the necessary engineering support per year for applying Corrective and Preventive Maintenance.

5.11.3.2. The Contractor shall provide at least one (1) Full-Time Engineer (FTE) Equivalent support per year for implementation of any Adaptive Maintenance agreed with the Purchaser.

5.11.3.3. The Contractor shall provide at least two (2) FTE Equivalent support per year for implementation of any Perfective Maintenance agreed with the Purchaser.

5.11.4. Quarterly Maintenance Review

5.11.4.1. The Contractor shall plan and conduct Quarterly Maintenance Review (QMR) in order to determine the status of maintenance activities and planning for the next activities.

5.11.4.2. The QMR shall include reviewing the maintenance request, review and update Maintenance Documentation.

5.11.4.3. The first QMR shall be conducted in the first week of January, April, July, October, whichever is the closest after the package invoke date (i.e. first week of April if the invoke date is between 1 January and 31 March.

5.11.4.4. The QMR shall be executed at the Contractor premises.

SECTION 6: LABOUR CATEGORIES

6.1. General

6.1.1. This section outlines minimum educational and experience qualifications for Contractor staff supporting Work Packages under this Contract. The labour categories identified shall be available to support all Task Areas as required.

6.1.2. Substitution of experience or education is allowed as outlined in Table 6-1~~Table 6-1~~.

Table 6-1 - Experience/Education Substitution

Education	Equivalent Education + Experience	Equivalent Experience
Associates degree		4 years of relevant experience
Bachelor's degree	Associates + 2 years of relevant experience	6 years of relevant experience
Master's degree	Bachelor's + 4 years of experience	8 years of relevant experience

6.2. Management

6.2.1. Project Manager

6.2.1.1. Responsible for project management, performance and completion of tasks and delivery orders. Establishes and monitors project plans and schedules and has full authority to allocate resources to insure that the established and agreed upon plans and schedules are met. Manages costs, technical work, project risks, quality, and corporate performance. Manages the development of designs and prototypes, test and acceptance criteria, and implementation plans. Establishes and maintains contact with Purchaser, Subcontractors, and project team members. Provides administrative oversight, handles contractual matters and serves as a liaison between the Purchaser and corporate management. Ensures that all activities conform to the terms and conditions of the Contract and Work Package procedures.

6.2.1.2. Education: Master's degree in management, engineering, or business administration. Formal certification through Project Management Institute or equivalent source.

6.2.1.3. Experience: At least fifteen (15) years of experience in development of information systems, defence systems and project management of such systems, preferably in maritime domain. At least five (5) years as the project manager for an effort of similar scope and complexity, including the application of a formal project management methodology such as PRINCE2.

6.3. Project Management Support

6.3.1. Project Control Analyst

6.3.1.1. Establishes and maintains project schedule and cost baseline and analyses risks and potential impacts. Prepares project highlight reports.

6.3.1.2. Education: Bachelor's degree.

6.3.1.3. Experience: At least three (3) years of experience in project scheduling, project control, or project monitoring and reporting.

6.3.2. Webmaster

6.3.2.1. Provides website construction and administration, develops connections between databases and web-based front ends. Generates technical reports and related documentation as required. Provides expertise in the development and maintenance of web sites. Provides training on the uploading of documents, creating pages, links and other web functions. Maintains access rights to pages on web. Maintains reports and statistics on utilisation of the Project Website.

6.3.2.2. Education: Associates degree or two years of technical training.

6.3.2.3. Experience: At least one (1) year of experience in website support and at least one year in website construction.

6.3.3. Contract Security Specialist

6.3.3.1. Provides support in areas directly pertinent to administration, supervision, and control of facility security in an industrial and/or government environment. Possesses a working knowledge of government and industrial security regulations.

6.3.3.2. Education: Bachelor's degree.

6.3.3.3. Experience: At least three (3) years of experience in Contract security administration.

6.4. Engineering and Technical

6.4.1. Senior Engineer

6.4.1.1. Performs complex engineering tasks and multiple tasks simultaneously. Assists with or plans major research and engineering tasks or programs of high complexity. Directs and coordinates all activities necessary to complete a major, complex engineering program or multiple smaller tasks or programs. Performs advanced engineering research, hardware or software development.

6.4.1.2. Education: Master's degree in engineering.

6.4.1.3. Experience: At least ten (10) years of experience in engineering positions associated with design, development, evaluation, planning and operation of information systems, defence systems and large scale C2 systems preferably in maritime domain. Lead roles for at least five (5) years of experience in projects of similar size and nature. Member of recognised professional body.

6.4.2. Intermediate Engineer

6.4.2.1. Performs engineering tasks and additional duties as assigned. Assists higher level engineers with larger tasks. Manages or directs multiple engineering tasks, directing research and development activities as required. Performs advanced engineering applications programming and analysis for systems/equipment assigned.

6.4.2.2. Education: Bachelor's degree in engineering.

6.4.2.3. Experience: At least three (3) years of experience in engineering functions associated with the review, design, development, evaluation, planning and operation of electrical or electronic components, subsystems, or systems for government or commercial use.

6.4.3. Junior Engineer

6.4.3.1. Performs engineering tasks under the direction of higher level engineers. Performs independent research, conducts studies and analysis, and participates in the design and development of complex systems.

6.4.3.2. Education: Bachelor's degree in engineering.

6.4.3.3. Experience: At least one (1) year of experience in engineering functions associated with the review, design, development, evaluation, planning and operation of electrical or electronic components, subsystems, or systems for government or commercial use.

6.4.4. Senior Systems Engineer

6.4.4.1. Plans and coordinates project management and engineering. Provides comprehensive definition of all aspects of system development from analysis of mission needs to verification of system performance. Competent in technical disciplines as applied to government and commercial information and communications systems. Prepares trade-off studies and evaluations for vendor equipment. Recommends design changes/enhancements for improved system performance. Supervises the work of a design, integration, test, and implementation team.

6.4.4.2. Education: Master's degree in engineering or computer science.

6.4.4.3. Experience: At least seven (7) years of experience in system design and integration. At least five (5) years in the design, integration, or implementation information systems, defence systems and large scale C2 systems preferably in maritime domain.

6.4.5. Intermediate Systems Engineer

6.4.5.1. Performs system engineering assignments in support of the analysis of complex system design, formulating requirements, developing alternative approaches, conduct of studies, and application of standards. May function as a member of an engineering team assigned responsibilities for specific task areas.

6.4.5.2. Education: Bachelor's degree in engineering or computer science.

6.4.5.3. Experience: At least three years of experience in system design and integration.

6.4.6. Junior Systems Engineer

6.4.6.1. Conducts research and application of system design principles for the design, development, implementation, or support as a member of assigned task staffing. Develops alternative solutions, concepts, or processes through research into assigned systems and components.

6.4.6.2. Education: Bachelor's degree in engineering or computer science.

6.4.6.3. Experience: At least one (1) year of experience in system design and integration.

6.4.7. Senior Communications Engineer

6.4.7.1. Performs communications system transition planning, engineering design for integration with processing systems, specification development, standards, interface design, testing, and the conduct of transmission and traffic studies.

6.4.7.2. Education: Master's degree in engineering.

6.4.7.3. Experience: At least seven (7) years of experience in the engineering of communications systems via all transmission media.

6.4.8. Intermediate Communications Engineer

6.4.8.1. Prepares communications systems designs and technical documentation, and other design criteria. Implements COTS and emerging communications systems and develops technical plans, documentation, and support.

6.4.8.2. Education: Bachelor's degree in engineering.

6.4.8.3. Experience: At least three (3) years of experience in the engineering of communications systems via all transmission media.

6.4.9. Junior Communications Engineer

6.4.9.1. Conducts engineering analysis, develops technical documentation, investigate communications requirements, formulates network interfaces, and assists in project/program execution.

6.4.9.2. Education: Bachelor's degree in engineering.

6.4.9.3. Experience: At least one (1) year of experience in the engineering of complex communications systems via all transmission media.

6.4.10. Senior Network Engineer

6.4.10.1. Designs network topologies and architectures. Determines applicable hardware, software, and connectivity solutions. Supports implementation through configuration set-up, testing, and training of users.

6.4.10.2. Education: Master's degree in engineering and completion of a formal network certification program.

6.4.10.3. Experience: At least seven (7) years of experience in network systems. At least five years of experience with TCP/IP wide area networks.

6.4.11. Intermediate Network Engineer

6.4.11.1. Develops detailed network interface and configuration data. Surveys and evaluates applicable products. Prepares network diagrams. Provides guidance for system deployment and support.

6.4.11.2. Education: Bachelor's degree in engineering.

6.4.11.3. Experience: At least five (5) years of experience in network systems. At least three years of experience with TCP/IP wide area networks.

6.4.12. Junior Network Engineer

6.4.12.1. Develops network interface and configuration data for system components. Surveys and evaluates network products. Prepares network diagrams. Prepares routing tables and installation and support documentation.

6.4.12.2. Education: Bachelor's degree in engineering.

6.4.12.3. Experience: At least one (1) year experience in the engineering of complex communications systems via all transmission media.

6.4.13. Systems Integration Analyst

6.4.13.1. Develops and implements solutions using the optimal technology, platform, and interfaces Researches available tools and technologies to determine alternate technology solutions. Researches, implements, and supports multiple computing platforms, operating systems, processing environments, and telecommunications technologies. May conduct cost/benefit or feasibility analyses; perform capacity analyses and planning.

6.4.13.2. Education: Bachelor's degree in engineering or computer science.

6.4.13.3. Experience: At least seven (7) years of experience in the integration and implementation of information systems, defence systems, C2 systems, preferably in maritime domain.

6.4.14. Senior Software Programmer

6.4.14.1. Performs complex program development using standard and specialised languages to create special purpose software, modify existing programs, and enhance system efficiency and integrity. Translates detailed designs into software, tests, debugs, and refines software packages. Manages software development teams in modular development of complex applications. Provides technical direction to assigned programmers.

6.4.14.2. Education: Bachelor's degree in engineering or computer science.

6.4.14.3. Experience: At least seven (7) years of experience in the design, programming, and testing of applications software.

6.4.15. Intermediate Software Programmer

6.4.15.1. Analyses systems requirements and design specifications to develop block diagrams and logic flow charts. Translates detailed designs into computer software for specific applications. Prepares documentation, including program and user documentation.

6.4.15.2. Education: Bachelor's degree in engineering or computer science.

6.4.15.3. Experience: At least three (3) years of experience in the design, programming, and testing of applications software.

6.4.16. Junior Software Programmer

6.4.16.1. Performs programming tasks based upon specifications and flow diagrams. Translates concepts into program modules for testing, debugging, refinement, and integration with other modules. Prepares draft documentation including program and user documentation. Functions as a member of a software development team under the guidance of more experienced programmers.

6.4.16.2. Education: Bachelor's degree in engineering or computer science.

6.4.16.3. Experience: At least one (1) year of experience in the design, programming, and testing of applications software.

6.4.17. System Support Engineer

6.4.17.1. Designs and integrates system support applications and protocols to meet system requirements. Analyses architectural options for performance and manageability. Analyses and designs implementations to meet specialised message formats or interfaces.

6.4.17.2. Education: Bachelor's degree in engineering.

6.4.17.3. Experience: At least seven years of experience in the design, integration, and implementation of information systems. At least three years of experience with SNMP and system support applications.

6.4.18. Senior Test Engineer

6.4.18.1. Directs test planning, design and tools selection. Establishes guidelines for test procedures and reports. Coordinates with Purchaser on test support requirements and manages Contractor test resources.

6.4.18.2. Education: Bachelor's degree in engineering.

6.4.18.3. Experience: At least ten (10) years of experience in the planning and execution of testing information systems, defence systems, and large scale C2 systems preferably in maritime domain.

6.4.19. Intermediate Test Engineer

6.4.19.1. Designs and documents unit and application test plans. Transforms test plans into test cases and executes those cases. Supervises individual tests and prepares test reports.

6.4.19.2. Education: Bachelor's degree in engineering.

6.4.19.3. Experience: At least three (3) years of experience in the design and execution of information systems tests.

6.4.20. Junior Test Engineer

6.4.20.1. Performs testing activities under supervision of more experienced test personnel. Executes defined test cases and procedures. Collects and analyses test data; prepares test reports.

6.4.20.2. Education: Bachelor's degree in engineering.

6.4.20.3. Experience: At least one (1) year in the design and execution of information systems tests.

6.4.21. Test Technician

6.4.21.1. Provides installation and administration support to information system testing. Constructs and tests prototype equipment for electrical systems and components, consistent with engineering and other specifications. Executes tests and collects test data. Assists in preparing test reports.

6.4.21.2. Education: Associates degree or two years of technical training.

6.4.21.3. Experience: At least two (2) years of experience in the configuration and administration of information systems or test and measurement systems.

6.4.22. Information Systems Security Engineer

6.4.22.1. Analyses and develops network systems and information security practices to include: operating systems, applications, TCP/IP, security architecture, multi-level security, intrusion detection, virus detection and control, PKI, vulnerability assessment. Documents findings and recommend changes in procedures, configuration, or design.

6.4.22.2. Education: Bachelor's degree.

6.4.22.3. Experience: At least three (3) years of experience in information systems security. At least five years in information systems integration, implementation, or operation.

6.4.23. Information Systems Security Specialist

6.4.23.1. Provides support in implementing procedures and practices prescribed for safeguarding and control of an automated information system and the processing of classified information.

6.4.23.2. Education: Associates degree or two years of technical training.

6.4.23.3. Experience: At least two (2) years of experience as an Information Systems Security Officer for an operational system.

6.4.24. Field Engineer

6.4.24.1. Conducts site surveys, prepares implementation plans, prepares implementation procedures, supervises installation and activation, reports on installation status, manages repair and modifications to systems/equipment, performs field maintenance, and performs system configuration changes based upon approved specifications.

6.4.24.2. Education: Bachelor's degree.

6.4.24.3. Experience: At least seven (7) years of experience in the installation and support of information systems.

6.4.25. Senior Technician

6.4.25.1. Supervises technicians in the troubleshooting, repair, installation, training, integration, and upgrade of systems and equipment. Works closely with assigned engineers and systems personnel to support implementation and activation efforts.

6.4.25.2. Education: Associates degree.

6.4.25.3. Experience: At least seven (7) years of experience in the installation and maintenance of network and information systems.

6.4.26. Intermediate Technician

6.4.26.1. Performs troubleshooting, repair, refurbishment, and installation of systems and equipment. Performs factory or field testing of systems, development of maintenance or repair procedures, and supports installation teams in specific areas of expertise.

6.4.26.2. Education: Associates degree.

6.4.26.3. Experience: At least three (3) years of experience in the installation and maintenance of network and information systems.

6.4.27. Junior Technician

6.4.27.1. Performs troubleshooting, repair, and installation functions as assigned. May be assigned as technical support technician for specific systems or hardware. Performs factory or field testing and supports installation teams as assigned.

6.4.27.2. Education: Secondary school graduate with one year of technical training.

6.4.27.3. Experience: At least two (2) years of experience installing and maintaining network and information systems.

6.4.28. System Management Specialist

6.4.28.1. Analyses, develops, and maintains operational system configuration parameters. Establishes and implements system policy, procedures and standards, and ensures their conformance with system requirements. Ensures that security procedures are established and implemented. Provides technical assistance to operational, logistics, and system engineering staff.

6.4.28.2. Education: Bachelor's degree and completion of a formal system administration or network management certification course.

6.4.28.3. Experience: At least three (3) years of experience in the administration of distributed information systems.

6.5. Implementation Support

6.5.1. Logistics Management Specialist

6.5.1.1. Provides support in the development of support documentation to include as a minimum, elements such as support equipment, technical orders, supply support and computer resources support, process of evolving and establishing maintenance/support concepts.

6.5.1.2. Education: Bachelor's degree.

6.5.1.3. Experience: At least seven years of experience in supply and support of information systems. At least three (3) years in support of distributed systems in more than one NATO nation.

6.5.2. Logistics Analyst

6.5.2.1. Creates and helps execute plans for the ILS of complex systems. Analyses adequacy and effectiveness of current and proposed logistics support provisions. Supervises the efforts of other logistics personnel in the execution of assigned tasks.

6.5.2.2. Education: Bachelor's degree.

6.5.2.3. Experience: At least three (3) years of experience in ILS planning and analysis.

6.5.3. Inventory Specialist

6.5.3.1. Creates and maintains an inventory control system. Tracks materials, coordinates shipping and receiving, and supervises packing operations.

6.5.3.2. Education: Associates degree.

6.5.3.3. Experience: At least three (3) years of experience in shipping, receiving, and inventory control.

6.5.4. Shipping and Receiving Clerk

6.5.4.1. Coordinates the shipping and receiving of materials. Tracks property using automated equipment. Performs and records materials inventory checks.

6.5.4.2. Education: Secondary school graduate.

6.5.4.3. Experience: At least three (3) years of experience in shipping and receiving.

6.5.5. Technical Writer

6.5.5.1. Develops, writes, and edits materials, briefs, proposals, instruction books, and related technical and administrative publications concerned with work methods and procedures for installation, operations and enhancement of equipment. Organises material and compiles writing assignments for clarity, conciseness, style, and terminology. Prepares and edits documentation incorporating information provided by users, and technical and operations staff. Possesses a substantial knowledge of the capabilities of computer systems. Capable of writing, editing, and generating graphic presentations.

6.5.5.2. Education: Bachelor's degree.

6.5.5.3. Experience: At least three (3) years as a technical writer.

6.5.6. Senior Configuration Manager

6.5.6.1. Establishes and maintains a process for tracking the life cycle development of system design, integration, test, training, and support efforts. Maintains continuity of products while ensuring conformity to Purchaser requirements and commercial standards. Establishes configuration control forms and database.

6.5.6.2. Education: Bachelor's degree.

6.5.6.3. Experience: At least five (5) years of experience in specifying configuration management requirements, standards, and evaluation criteria in acquisition documents, and in performing configuration identification, control, status accounting, and audits. At least three years in computer and communication systems development, including physical and functional audits and software evaluation, testing and integration. At least two years of experience with application of configuration management tools.

6.5.7. Intermediate Configuration Manager

6.5.7.1. Maintains a process for tracking the life cycle development of system design, integration, test, training, and support efforts. Maintains continuity of products while ensuring conformity to Purchaser requirements and commercial standards. Maintains configuration control records and databases.

6.5.7.2. Education: Associates degree or two years of technical training.

6.5.7.3. Experience: At least three (3) years of experience in technical system configuration management. At least two years in communication and information systems development, including physical and functional audits and software evaluation, testing and integration.

6.5.8. Junior Configuration Manager

6.5.8.1. Prepares and coordinates change requests, configuration items, and system baselines. Maintains configuration control records and databases.

6.5.8.2. Education: Associates degree or one year of technical training.

6.5.8.3. Experience: At least one (1) year of experience in technical system configuration or document management.

6.5.9. Data Control Specialist

6.5.9.1. Performs assigned portions of managing the data input into complex information systems. Analyses and administers data for both the developing team and the customer. Handles daily administrative tasks, produces and edits technical reports based on data system processing, monitors use of data and performs updates as required. Participates in all phases of system development with emphasis on the data collection, input, documentation, and acceptance phases. Designs and prepares technical reports and related documentation, and makes charts and graphs to record results.

6.5.9.2. Education: Associates degree.

6.5.9.3. Experience: At least three (3) years of experience in administration of configuration management or technical documentation.

6.5.10. Quality Assurance Manager

6.5.10.1. Establishes and maintains process for evaluating software, hardware, and associated documentation. Determines the resources required for quality control. Maintains the level of quality throughout the system life cycle. Develops project quality assurance plans. Conducts formal and informal reviews and audits at predetermined points throughout the system life cycle.

6.5.10.2. Education: Bachelor’s degree.

6.5.10.3. Experience: At least twelve (12) years in working with quality control methods and tools. At least five (5) years in supporting development projects of similar size and nature as Quality Assurance Manager.

6.5.11. Quality Assurance Specialist

6.5.11.1. Develops and implements quality standards. Reviews hardware, software, and documentation. Participates in formal and informal reviews to determine quality. Participates in the development of system quality assurance plans. Examines and evaluates design, integration, and test processes and recommends enhancements and modifications.

6.5.11.2. Education: Bachelor’s degree.

6.5.11.3. Experience: At least four (4) years of working with quality control methods and tools.

6.6. Training Support

6.6.1. Instructional Systems Designer

6.6.1.1. Conducts the research, necessary to identify training needs based on performance objectives and existing skill sets; prepares training strategies and delivery methodology analyses; and prepares cost/benefit analyses for training facilities and deliverables. Develops training delivery plan, instructional guidelines, and performance standards and assessment mechanisms. Plans and directs the work of training material developers and coordinates activities with system development staff. Supervises the implementation and adaptation of training products to customer requirements.

6.6.1.2. Education: Bachelor's Degree.

6.6.1.3. Experience: At least three (3) years of experience in the design and development of training for information systems and defence systems using an Instructional Systems Design approach such as the Systems Approach to Training, Performance-Based Training, Analysis, Design, Development, Implementation, and Evaluation (ADDIE), or Criterion Referenced Instruction.

6.6.2. Senior Training Materials Developer

6.6.2.1. Conducts the research necessary to develop and revise training courses and prepares training plans. Develops instructor (course outline, background material, and training aids) and student materials (course manuals, workbooks, hand-outs, completion certificates, and course feedback forms). Trains personnel by conducting formal classroom courses, workshops, seminars, and/or computer based/computer-aided training. Provides daily supervision and direction to staff.

6.6.2.2. Education: Bachelor's Degree.

6.6.2.3. Experience: At least five (5) years in the preparation of technical training, including CBT materials.

6.6.3. Training Materials Developer

6.6.3.1. Conducts the research necessary to develop and revise training. Develops training materials (course outline, manuals, workbooks, hand-outs, completion certificates, and course feedback forms).

6.6.3.2. Education: Associates degree.

6.6.3.3. Experience: At least three (3) years of experience in the preparation of technical training materials.

6.6.4. CBT Developer

6.6.4.1. Uses CBT tool to design and implement course flowchart, text, animation, voice, and graphic displays.

6.6.4.2. Education: Bachelor's degree.

6.6.4.3. Experience: At least three years of experience in the preparation of CBT courses.

6.6.5. Senior Instructor

6.6.5.1. Supervises trainers who conduct technical training classes. Conducts training classes. Works closely with Purchaser personnel to determine training and scheduling requirements. Develops and maintains training materials. Reviews and provides inputs for technical documentation.

6.6.5.2. Education: Bachelor Degree.

6.6.5.3. Experience: At least four (4) years of experience in systems administration or operation and at least four (4) years as technical training instructor in defence systems and maritime C2 systems.

6.6.6. Junior Instructor

6.6.6.1. Conducts technical training classes. Prepares and updates training documentation.

6.6.6.2. Education: Bachelor's Degree.

6.6.6.3. Experience: At least four (4) years of experience in systems administration or operation and at least two years as technical training instructor.

6.7. Operational Support

6.7.1. System Administrator

6.7.1.1. Administers systems operations and configuration. Maintains user accounts and profiles. Performs system backup and restoration procedures. Troubleshoots operational problems. Coordinates system configuration and performance issues with central network support staff and Purchaser site personnel.

6.7.1.2. Education: Associates degree or two years of technical training.

6.7.1.3. Experience: At least one (1) year in systems administration of Windows Server systems. At least one year in the administration and operation of X.400 systems.

6.7.2. Network Manager

6.7.2.1. Oversees administration and operation of network and service management applications. Develops and implements operating procedures. Administers upgrades to system support and network management components. Collects operational performance data and performs performance analysis.

6.7.2.2. Education: Associates degree.

6.7.2.3. Experience: At least two (2) years in administration and implementation of SNMP or other system support systems.

6.7.3. Database Administrator

6.7.3.1. Manages network-wide configuration databases. Develops and implements data synchronisation procedures and resolves database discrepancies. Maintains and publishes network configuration tables and indices. Designs and implements queries and other utilities.

6.7.3.2. Education: Associates degree.

6.7.3.3. Experience: At least two (2) years in database administration.

6.7.4. Operational Support Manager

6.7.4.1. Organises, directs and manages operational support activities. Analyses system performance data and prepares reports and assessments. Meets with Purchaser personnel to coordinate support issues and coordinates with system deployment personnel on activation and cut-over. Ensures conformance with Work Package requirements.

6.7.4.2. Education: Bachelor's degree.

6.7.4.3. Experience: At least five (5) years of experience in the administration and operation of a distributed information system.

6.8. Functional Support

6.8.1. Senior Maritime C2 Functional Specialist

6.8.1.1. Provides support in the development of doctrine; operational concepts; requirements; tactics, techniques and procedures; standard operating procedures and other functional documentation. Supports testing and operational validation. Meets with Purchaser personnel to coordinate functional and operational implementation issues. Designs and prepares reports and related documentation.

6.8.1.2. Education: Bachelor's degree.

6.8.1.3. Experience: At least ten (10) years of experience in the Maritime C2 functional area in NATO or a NATO Nation. At least three (3) years in the development of Maritime doctrine; operational concepts; requirements; tactics, techniques and procedures; standard operating procedures and other functional documentation.

6.8.2. Intermediate Maritime C2 Functional Specialist

6.8.2.1. Provides support in the development of doctrine; operational concepts; requirements; tactics, techniques and procedures; standard operating procedures and other functional documentation. Supports testing and operational validation. Meets with Purchaser personnel to coordinate functional and operational implementation issues. Designs and prepares reports and related documentation.

6.8.2.2. Education: Associates degree.

6.8.2.3. Experience: At least five (5) years of experience in the Maritime C2 functional area in NATO or a NATO Nation. At least one year in the development of Maritime doctrine; operational concepts; requirements; tactics, techniques and procedures; standard operating procedures and other functional documentation.

6.8.3. Senior Graphical User Interface Designer

6.8.3.1. Provides support in the development of user interfaces, HMI design; requirements; techniques and other special areas related to usability. Supports testing and operational validation. Meets with Purchaser personnel to coordinate implementation issues. Designs and prepares reports and related documentation.

6.8.3.2. Education: Bachelor's degree.

6.8.3.3. Experience: At least seven (7) years of experience in the C2 functional area in NATO or a NATO Nation. At least three (3) years in the design and development of HMI for C2 systems, operational concepts, requirements, techniques and ergonomics.

6.8.4. Senior Geo-Specialist

6.8.4.1. Provides support in the development of Visualisation Component; geo-concepts; requirements; techniques and other GIS concepts. Supports testing and operational validation. Meets with Purchaser personnel to coordinate implementation issues. Designs and prepares reports and related documentation.

6.8.4.2. Education: Bachelor's degree.

6.8.4.3. Experience: At least seven (7) years of experience in the C2 functional area in NATO or a NATO Nation. At least three years in the development of GIS systems, operational concepts, requirements, techniques and procedures.

6.8.5. Intermediate Geo-Specialist

6.8.5.1. Provides support in the development of Visualisation Component; geo-concepts; requirements; techniques and other GIS concepts. Supports testing and operational validation. Meets with Purchaser personnel to coordinate implementation issues. Designs and prepares reports and related documentation.

6.8.5.2. Education: Associates degree.

6.8.5.3. Experience: At least four (4) years of experience in the C2 functional area in NATO or a NATO Nation. At least three years in the development of GIS systems, operational concepts, requirements, techniques and procedures.

SECTION 7: CONTRACT DOCUMENTATION REQUIREMENTS

7.1. General

7.1.1. All documentation provided to the Purchaser shall be written in English with spelling and usage based on the Concise Oxford English Dictionary, 12th Edition.

7.1.2. All documentation deliverables must be "stand-alone" with no dependence on other documentation or applications in the Contractor's environment for its comprehension. Likewise if there are hyperlinks to other areas of the Contractor environment, they must be fully available.

7.1.3. Documents shall not be marked with corporate logos or contain warnings limiting the rights to use or reproduction. Documentation for COTS software or military software whose distribution is governed by national legislation or export control restrictions are exempt from this restriction.

7.1.4. The document formats and templates shall be subject to Purchaser's approval. The Purchaser's templates shall be used as applicable.

7.1.5. As a general principle, one subject shall be described in one document, supporting traceability and maintainability.

7.1.6. Individual documents shall not contain repeated information such as system overview. Top level documents will describe such common information whereas lower level documents refer to them.

7.1.7. Documents shall be complete, concise and sufficiently detailed for its purpose. ~~However, excessive details (e.g. source code level descriptions).~~

7.1.8. Document maintainability, including figures and drawings, shall be favoured. If figures are not embedded into the same file, a separate file including the drawings in the same order as they are used in the document shall be provided.

7.1.9. All delivered documentation may be subject to review by the Purchaser's IV&V Contractor as well as Purchaser's Project Team.

7.1.10. The security classification of the documentation shall follow agreed NATO security guidelines. Documentation developed under this project shall have its security classification shown on each page, top and bottom.

7.1.11. It is expected that none of the technical documentation requires a higher classification than NATO UNCLASSIFIED.

7.1.12. The convention to be used for numbers appearing in textual documents is for a comma to be the thousands separator and a period to be the decimal separator (e.g. 1,365,276.24).

7.1.13. The convention to be used for dates appearing in free text (e.g. quoting dates of meetings) is "day-month-year" and not "month-day-year" (e 6-4-2015 or 6 April 2015).

7.2. Documentation

7.2.1. The Contractor shall provide documentation related to the life cycle of TRITON including its development and operation.

7.2.2. Development Documents

7.2.2.1. The Contractor shall provide the development documentation as defined in the System Development Processes described in this SOW.

7.2.3. Operating Documentation

7.2.3.1. Documentation related to operating and maintenance of TRITON will cover how to use the TRITON functionality in support of the C2 of Maritime Operations, how to install and configure TRITON for static and afloat sites, how to provide its security and how to maintain the software and hardware.

7.2.3.2. The Contractor shall deliver the Operating Documentation to be used by TRITON operational users and administrators as specified in the Contractual SRS, Paragraph 4.8.2.

7.2.3.3. The Operating Documentation shall include at least the following:

- System User Manual (SUM)
- Quick User Guide (QUG)
- Briefing Manual
- System Administrator Manual (SAM)

7.2.3.4. The Contractor shall develop and maintain the Operating Documentation based on the ABL and PBL and shall describe the complete system by the explanation of functional blocks, components and system elements.

7.2.3.5. The Contractor shall make all Operating Documentation available as a printable document, printed hard copy and as an on-line source.

7.2.4. Reports

7.2.4.1. For all reports delivered under this Contract, the Contractor shall ensure the following standards are met:

7.2.4.1.1. The report shall be candid, forthright and complete.

7.2.4.1.2. The report shall contain only material that can be supported by evidence and confirmed by independent analysis.

7.2.4.1.3. The report shall provide evidence to support or justify the conclusions reached.

7.2.4.1.4. The report shall be concise. If necessary, supporting data should be placed in appendices or referenced as backup material.

7.2.4.1.5. The report shall include an Executive Summary of not more than one page in length.

7.2.4.1.6. The report shall use charts, graphs, matrices, tables, and other illustrative techniques to present data in an easily-understood form. Each illustration should be accompanied with a narrative showing how the data displayed is relevant to the process improvement.

7.3. Formats

7.3.1. Unless otherwise directed by the Purchaser, the Contractor shall furnish requested documentation as follows:

7.3.1.1. All contractual documentation (e.g. change proposals, invoices, etc.) shall be delivered in both paper and electronic format.

7.3.1.2. All project management documentation (e.g. plans, schedules, reports, etc.) shall be delivered as electronic copies in MS Office.

7.3.1.3. The rest of the deliverables shall be furnished as an electronic copy in a format which is best suited for review and maintenance by the Purchaser (e.g. Project Master Schedule in MS Project format, Project Highlight Reports in MS Word).

7.3.1.4. The Contractor shall use the same MS Office version as the Purchaser is using.

7.3.1.5. In general the following guidelines shall be used:

- MS Word for generating text documents
- MS Excel for tabular or matrix data
- MS Visio or MS PowerPoint for drawings
- MS Project for schedule
- MS PowerPoint for briefings.

7.3.1.6. Drawing files shall be provided together with the text documents.

7.3.1.7. The final versions of documents shall be converted into PDF file.

7.3.1.8. The rest of the deliverables shall be furnished as electronic copy of the agreed tools/media used.

7.3.1.9. Documentation shall be distributed as follows:

- One paper and electronic copy to the Purchaser's Project Manager.
- One paper and electronic copy to the identified IV&V Contractor.
- An electronic copy (MS Office file, drawing file and PDF file) to the Project Website.

7.3.1.10. Each document shall contain the following information for identification:

- Version of the document and version history
- Due date
- Delivery date
- CLIN number
- Status (e.g. Accepted/Approved/Draft).

7.4. Document Reviews

7.4.1. The Contractor shall submit all documentation for Purchaser review as described below. At each review cycle, the Purchaser will state if the document is likely to be accepted in its Final version.

7.4.2. During the development of a document, the Contractor may be required to provide subsequent versions of the documents (starting with version 0.1) for the Purchaser review.

7.4.3. The Contractor shall review any sub-contractor documents before submitting for Purchaser's formal review.

7.4.4. The Contractor shall provide the last Draft version (identified as version 0.9) of each deliverable for Purchaser review.

7.4.5. If the review is organized within a Build Process, the Contractor shall provide documents for the review at least two (2) weeks before the review date, and four (4) weeks otherwise, unless specified differently in the Work Package or SSS.

7.4.6. Attached to the documents to be reviewed, the Contractor shall send the invitation, including:

- Agenda
- List of Participant
- Date, time, location of the review

7.4.7. The Purchaser will provide comments, corrections, and suggested changes to the Contractor within two (2) weeks of receipt for deliverables being submitted part of the Build Process and four (4) weeks otherwise. The reports or other time-bounded documents may be reviewed in shorter duration.

7.4.8. The Contractor shall not rely on the Purchaser review process to fill in deficiencies or obtain missing parts from Purchaser.

7.4.9. In order to gain time, partial review may be applied for long documents.

7.4.10. The Purchaser will inform the Contractor about each delivery of document(s) with the state "Accepted" for internal review. The acceptance date can be used as a delivery date.

7.4.11. The Purchaser may "Reject" a document without competing a review if it is deemed to have significant deficiencies.

7.4.12. The Final version (1.0) shall be substantially complete and correct, and the delivery dates specified in the SSS will assume this.

7.4.13. The Contractor shall provide the Final version (version 1.0) of the document, for approval, within two (2) weeks after the review. The reports or other time-bounded documents may require shorter duration.

7.4.14. The Purchaser may "Approve" the Final version of a document and inform the Contractor. This document shall then be baselined.

7.4.15. Until FSA, the Contractor shall remain responsible for updating all the deliverable documents to reflect all the necessary changes (e.g. updating SDS according to a change implemented during OT&E).

7.4.16. The Contractor or the Purchaser may agree on new approaches and techniques to increase the efficiency of review process.

7.5. Contract Documentation Requirements List

7.5.1. The Contract Documentation Requirements List (CDRL) identifies the documents to be delivered under this Contract and the applicable quality standards by which they will be reviewed for acceptance.

7.5.2. The CDRL for this Contract is provided in Table 7-1~~Table 7-1~~. For each item, the table identifies the following:

- Cross-reference to the SOW paragraph requiring the document

- Document title
- Document acceptance requirements, where:
  - "A" (Approve) means the Purchaser must review and approve the initial submission and subsequent changes.
  - "I" (Information) means the item is provided to the Purchaser for information purposes only and the Purchaser will only request changes if it finds errors or omissions.
- Applicable quality standard against which the document will be reviewed for acceptance. If this SOW is the indicated Quality Standard, the term "SOW" is used.

Table 7-1 – Contract Documentation Requirements List

SOW Ref.	Title	Abbrev.	Type	A/I	When	Quality Standard
MANAGEMENT						
3.7	Project Management Plan	PMP	Plan	A	PMR	SOW
3.8	Project Product Breakdown Structure	PPBS	Annex to PMP	A	PMR	SOW
3.9	Project Work Breakdown Structure	PWBS	Annex to PMP	A	PMR	A Guide to the Project Management Body of Knowledge (PMBOK Guide) Practice Standard for Work Breakdown Structures
3.10	Project Master Schedule	PMS	Annex to PMP	A	PMR	SOW
3.12.4	Risk Management Plan	RMP	Plan	A	PMR	SOW
3.13.2	Quality Plan	QP	Plan	A	PMR	AQAP-2110, 2120, 2210
3.17	Project Highlight Report	PHR	Report	I	Monthly	PRINCE2
0	Project Management Review Report	PMR-R	Report	A	After PMR	SOW
3.16.3.6	Project Checkpoint Review Report	PCR-R	Report	I	Monthly	PRINCE2
3.12.6	Issue Register	IReg	Register	I	PMR	PRINCE2
3.12.5	Risk Register	RReg	Register	I	PMR	PRINCE2
3.13.5	Quality Register	QReg	Register	I	PMR	PRINCE2
3.3.8	Lessons Log	LLog	Register	I	PMR	PRINCE2
3.3.8	Lessons Report	LR	Report	I	At each milestone aligned to CP	PRINCE2
3.15	Minutes of Meeting	MoM	Report	A	3 days after meetings	SOW
4.6	System Development Plan	SDP	Plan	A	PMR	SOW
4.6.3	Requirements Implementation Schedule	RIS	Plan Annex to SDP	A	PMR	~~ISO 9241:2010~~SOW
4.6.4	Usability Engineering Plan	UEP	Plan Annex to SDP	A	PMR	~~ISO 13407:1999~~ ISO 9241:2010

SOW Ref.	Title	Abbrev.	Type	A/I	When	Quality Standard
4.6.5	Security Accreditation Plan	SAP	Plan Annex to SDP	A	PMR	AC/35-D/2005-REV3 AC/35-D-1021-REV3
4.12.2	Test Management Plan	TMP	Plan	A	CDR, TRR	SOW
4.12.2.15	Security Test and Verification Plan	STVP	Plan Annex to TMP	A	CDR, TRR	AC/35-D/2005-REV3
4.12.2.16	System Validation Plan	SVP	Plan Annex to TMP	A	CDR, TRR	SOW
5.2	Integrated Support Plan	ISP	Plan	A	PMR, PDR, CDR, SQR	SOW
5.9.2	Transportation Plan	TransP	Plan Annex to ISP	A	CDR	SOW
5.10.7.3	Warranty Report	WR	Report	A	FSA	SOW
CONFIGURATION MANAGEMENT						
4.7.5	Configuration Management Plan	CMP	Plan	A	PMR	STANAG-4427
4.7.11.4	Configuration Audit Report	CAuR	Report	A	TRR, SiAR	SOW
SYSTEM REQUIREMENTS ANALYSIS						
4.8.3	System Requirements Specification	SyRS	Specification	A	SRR	AC/35-D/1015-REV3
4.8.5.1	Security Risk Assessment Report	SRA-R	Report	A	SRR	SOW
4.8.6	System Specific Security Requirement Statement	SSRS	Statement	A	SRR	AC/35-D/1015-REV3
4.8.6.1	Community Security Requirement Statement	CSRS	Statement	A	SRR	AC/35-D/1015-REV3
4.8.6.2	System Interconnection Security Requirement Statement	SISRS	Statement	A	SRR	[AC/35-D/1015-REV3
4.8.8.5	System Requirements Review Report	SRR-R	Report	A	After SRR	SOW
SYSTEM DESIGN						
4.9.2	System Design Specification	SDS	Description	A	CDR	IEEE/EIA 12207
4.9.2.16	Requirements Traceability Matrix	RTM	Annex to SDS	A	CDR	SOW

SOW Ref.	Title	Abbrev.	Type	A/I	When	Quality Standard
4.9.2.12	System Security Design Specification	SSDS	Annex to SDS	A	CDR	SOW
4.9.3.7	Preliminary Design Review Report	PDR-R	Report	A	After PDR	SOW
4.9.4.8	Critical Design Review Report	CDR-R	Report	A	After CDR	SOW
SOFTWARE IMPLEMENTATION						
4.10.2.4.4	Software Requirements Specification	SRS	Specification	A	SwRR	IEEE/EIA 12207
4.10.2.5.5	Software Architecture Description	SAD	Description	A	SwDR	IEEE/EIA 12207
4.10.2.6.6	Software Design Description	SDD	Description	I	SwDR	IEEE/EIA 12207
4.10.2.5.6	Database Design Description	DDD	Description	I	SwDR	IEEE/EIA 12207
4.9.2.16	Requirements Traceability Matrix	RTM	Annex to SDS	I	SwDR	SOW
4.9.2.17	TRITON Interface Control Description (NS and NU)	ICD	Description	A	CDR, SwDR-1,2,3	SOW
4.10.2.11	Software Version Description	SVD	Description	A	After each release	SOW
4.10.2.4.6.4	Software Requirements Review Report	SwRR-R	Report	A	After SwRR	SOW
4.10.2.6.8.4	Software Design Review Report	SwDR-R	Report	A	After SwDR	SOW
4.10.2.9.2	Software Test Description	STD	Description	I	TRR	SOW
4.10.2.9.3	Internal System Test Report	IST-R	Report	A	TRR	SOW
4.10.2.7.5	Source Code Review Report	SCR-R	Report	A	TRR	SOW
4.12.12.2	Security Test and Evaluation Report	ST&E-R	Report	A	TRR	SOW
HARDWARE IMPLEMENTATION						
4.10.3.2.2	Hardware Requirements Specification	HRS	Specification	A	HwRR	SOW
4.10.3.3.2	Hardware Design Description	HDD	Description	A	HwDR	SOW
4.9.2.17	TDK Interface Control Description	ICD	Description	A	HwDR, SwDR-4	SOW
4.10.3.6.2.4	First Article Acceptance Test Procedure	FAAT-P	Procedure	A	FAAT	SOW
4.10.3.8.2	Hardware Factory Acceptance Test Procedure	HwFAT-P	Procedure	A	HwTRR	SOW

SOW Ref.	Title	Abbrev.	Type	A/I	When	Quality Standard
4.10.3.2.3	Hardware Requirements Review Report	HwRR-R	Report	A	After HwRR	SOW
4.10.3.3.4	Hardware Design Review Report	HwDR-R	Report	A	After HwDR	SOW
4.10.3.7.1	Production Readiness Review Report	PRR-R	Report	A	After PRR	SOW
4.10.3.8.1	Hardware Test Readiness Review Report	HwTRR-R	Report	A	Before HwTRR	SOW
4.10.3.8.3	Sea Acceptance Test Procedure	SeAT-P	Procedure	A	Before SeAT	SOW
4.10.3.8.3.5	Sea Acceptance Test Report	SeAT-R	Report	A	After SeAT	SOW
SYSTEM INTEGRATION						
4.12.5	Test Readiness Review Report	TRR-R	Report	A	After TRR	SOW
4.12.4	Factory Acceptance Test Procedure	FAT-P	Procedure	A	Before each TRR	SOW
4.12.12.3	System Integration Test Procedure	SIT-P	Procedure	A	TRR	SOW
SYSTEM VERIFICATION						
4.12.12.2.5	Security Operating Procedures	SecOp	Procedure	A	TRR	AC/35-D/1014-REV2
4.12.12.2.6	Security Implementation Verification Procedures	SIVP	Procedure	A	TRR	SOW
4.12.12.5.5	User Assessment Test Procedure	UAT-P	Procedure	A	TRR	SOW
4.12.12.4.6	System Supportability and Maintenance Acceptance Test Procedure	SSMAT-P	Procedure	A	TRR	SOW
4.12.12.4.11	System Supportability and Maintenance Acceptance Test Report	SSMAT-R	Report	A	After SSMAT	SOW
4.12.12.6	Regression Test Procedure	RegT-P	Procedure	A	Before RegT	SOW
4.12.13.3	System Verification Review Report	SVerR-R	Report	A	After SVerR	SOW
SYSTEM TRANSITION						
4.13.2	System Transition Plan	STrP	Plan	A	CDR	SOW, AAP-48
4.12.12.4.3	Software Installation Guide	SIG	Manual	A	TRR	SOW, SRS
4.13.3.8	Site Survey Report	SiSR	Report	A	After Site Survey	SOW

SOW Ref.	Title	Abbrev.	Type	A/I	When	Quality Standard
5.6.6.3	Release and Deployment Plan	RDP	Plan	A	SQR	SOW
5.8.3	Training Plan	TrP	Plan	A	CDR, TrRR	SOW
5.8.4	Training Programme	TrPrg	Included in TrP	A	TrRR	SOW
5.8.2	Training Needs Analysis Report	TNA-R	Report	A	After TNA	SOW
5.8.4.7	Training Materials			A	TrRR	SOW
5.8.12	Training Course Evaluation Reports	TCER	Report	A	One week after each training	SOW
5.8.1.1	System User Manual Quick User Guide Briefing Manual System Administrator Manual	SUM	Manuals	I	TRR, SQR	SOW, SRS
4.13.4	Sustainment Qualification Review Report	SQR-R	Report	A	After SQR	SOW
4.13.6.1	Pre-Installation Check Procedure	PIC-P	Procedure	A	SQR	SOW
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SOW Ref.	Title	Abbrev.	Type	A/I	When	Quality Standard
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1. INTRODUCTION

1.1. Document Purpose

This System Requirement Specification (SRS) describes the external behaviour of the services to be delivered under the Maritime Command and Control Information Services (short name: TRITON) Project. It also describes non-functional requirements, design constraints, and other factors necessary to provide a comprehensive description of the requirements for the Functional Service.

1.2. Content

"Project TRITON" is the name given to all implementation activities associated with the delivery of services in support of Maritime Command and Control contained within the Bi-Strategic Command Capability Package 9C0107 “Functional Services for Command & Control of Operations”. The name "TRITON" was chosen by Allied Command Transformation (ACT) and the NCI Agency (former NC3A) in 2009 to simplify the way in which the acquisition activities associated with this project are described.

The full scope of capabilities will be achieved through an incremental approach. The **TRITON Increment 1 Project**, authorised as an NSIP project with code 2011/0IS03081, will deliver services to provide the users with Maritime Capabilities primarily the Maritime Situational Awareness (MSA) to replace the existing MSA Operational Prototype (MSA/BRITE) as well as to provide for a replacement of Maritime Command and Control Information System (MCCIS) functionality at the operational headquarters and centres. There will be other Increments in the future to support the Planning and Execution services for supporting C2 of maritime operations as the Maritime Headquarters.

This SRS covers the scope of the Project TRITON Increment 1 only. This SRS, as stored in the requirement management tool (DOORS), contains the currently identified set of requirements for the Project TRITON Increment 1.

The acronym "SRS" will be replaced with "SyRS" during the Contract execution.

1.3. Document Overview

This document consists of 5 sections:

- Section 1 provides an introduction and the use of this document.
- Section 2 gives a list of references used in the document.
- Section 3 provides a general description of TRITON as a product.
- Section 4 contains the functional requirements comprising the required functionality and their associated requirement attributes.
- Section 5 contains non-functional requirements.
- Section 6 provides the interface requirements.

1.4. Abbreviations, Acronyms and Definitions

Commonly used abbreviations, acronyms and definitions are given in Annex-D of the SOW.

1.5. Common Definitions

Organizational Node:

An Organizational Node provides an integrated set of TRITON functionality and a virtual repository for NATO Headquarters or Centres. An Organizational Node provides a logical structuring of users, functionality and information, and may be independent of the physical node structure (e.g. a physical node may support more than one Organizational Node).

User:

A User is an authenticated, standard user of TRITON who can access general functions on a particular type of information object (e.g. Track, Vessel Information, Person Data), usually with read-only privileges, based on assigned roles.

Authorised User:

An Authorised User is an authenticated, privileged user of TRITON who is authorised to perform a management (e.g. create, read, modify, approve, release, delete) on a particular type of information object (e.g. Track, Vessel Information, Person Data) based on assigned roles and privileges. A single user or a role or a user group can be designated as authorised user.

Information Product:

An Information Product is specific C2 information approved by the authorised user and represented as a data entity or a document by TRITON. An ADatP-3 Formatted Message is an example.

Information Object:

An Information Object is any kind of information flowing within the modules of TRITON.

Maritime Information Entity:

A Maritime Information Entity is a collection of Maritime Information Elements which holds the actual operational content, Information Products or Information Objects.

Classification:

NATO information falls into three categories:

- Classified
- Unclassified (within NATO, the marking UNCLASSIFIED, combined with an ownership marking, indicates that the information does not require security protection but is to be used for official purposes. The combined marking constitutes a proprietary marking and carries no security connotation).
- Public.

All NATO classified and unclassified information should carry a marking indicating its classification. Selection of the correct classification level is based upon the definitions and guidance provided by NATO Security Policy with regard to classified information and by the Policy on the Management of NATO non-Classified Information [C-M(2002)60] with regard to unclassified information.

Classification Markings:

NATO Security Policy [C-M(2002)49] requires that access to and release of NATO classified information be controlled. NATO classified information should be clearly marked to identify the required level of protection and to indicate releasability where appropriate. The available classification markings for TRITON are given below (The words are shortened for this document only):

- NATO UNCLASSIFIED (NU)
- NATO RESTRCTD (NR)
- NATO CONFIDNTL (NC)
- NATO SECRT (NS)
- UNCLASSIFIED (UC)
- RESTRCTD
- CONFIDNTL
- SECRT

The markings to be applied to NATO information are composed of four elements which have a specific purpose and an appropriate usage:

- Ownership

- Classification
- Releasability/Dissemination Limitation
- Administrative/Category.

In addition, data exchanged between differing security classifications needs to be labelled.

Client:

A user environment which consists of a workstation, operating system with a Web browser.

Server:

A computation environment on a virtualised platform.

TRITON Client:

The TRITON User Applications and Visualisation Capability running in Web Browsers on a Standard NATO Bi-SC AIS Workstation.

TRITON Server:

The standard NATO Bi-SC AIS virtualised server environment for TRITON which consists of Application Server, management and security software, and data storage.

Recognised File Formats:

TRITON will be able export and import data using files with recognised format. These format are defined here to provide reference for the requirements in this SRS. Following formats are identified:

Recognised Graphics File Format:

- Joint Photographic Experts Group, JPG/JPEG [ISO/IEC 10918]
- Portable Network Graphics (PNG) [RFC 2083]
- Graphics Interchange Format (GIF) [GIF]
- Bitmap (BMP)

Recognised Import File Format:

- Office Open XML Workbook (xlsx) [ISO/IEC 29500]
- Comma-Separated Value (csv) [ISO/IEC 29500]
- Extensible Markup Language (XML) [XML]

Recognised Export File Formats:

- Office Open XML Workbook (xlsx) [ISO/IEC 29500]
- Office Open XML Presentation (pptx) [ISO/IEC 29500]
- csv
- XML
- Portable Document Format (PDF) [ISO 32000-1]
- Image files in Recognised Graphics File Format.

1.6. SRS Conventions

This SRS is structured to functionally decompose the system into several layers. Each function is defined with a set of Heading, Description and Requirements. These terms are also used as Object Type in the Requirements Management Tool.

1.6.1. Heading

Each level of function has its own Heading with a brief Description. The lowest level of Headings contains the applicable Requirements.

1.6.2. Description

Each Heading is followed by a Description which includes descriptive text, definitions, explanatory diagrams, figures and examples. The text explains the key functionality and gives the definitions of specific terms used in the requirements. The diagrams used in this SRS are for illustrative purposes. The descriptive text will be used to refine the system-level requirements into relevant software or hardware requirements during the System Requirements Analysis Phase. The information given in the Description is complementary to the information given in the requirements. They are used to amplify the requirement statement.

1.6.3. Requirement

Each requirement addresses only one function or sub-function where that function and the relevant key terms are defined in the Description. Although the use cases and definition of terms are not repeated inside a requirement statement, it must be accepted that the requirement is bound to the functionality explained in the Description and the definition of the terms explicitly defined (a name or a term explained in the Description).

The requirements are individually identified by a unique number which are used at all times as the specific reference for each.

Types of Requirements:

The use of "shall", "should" and "will" in requirement statements is defined as follows:

- **Shall**: This requirement is mandatory and must be implemented.
- **Should**: This requirement is not mandatory; but in case several options are available, this one is the preferred solution. If it fits into the budget the implementation is highly desired.
- **Will**: This requirement is neither mandatory nor optional for this Increment, but will be mandatory in future Increments. As such it should be considered in design and architecture solutions of the current Increment as well.

User:

If a requirement indicates a user interaction, it also tells about the type of user. There may be as many users as needed. However, since the system interacts with only one person at a time, the definite article "the" is used. The user types referred in the requirements are defined below:

- **The user:** "The user" implies a person who is already authenticated to use the system with general read-only access rights. For example, "General TRITON User" is a role which can only view the RMP without applying any change on it.
- **The authorised user: "**The authorised user" implies a person who is already authenticated to use the system with special privileges. For example, "RMP Manager" is a role having all access rights to modify the RMP, but not the Operation Plan. System Administrator is another type of authorised user who can manage the system at low level.

User Interaction:

System requirements are stated from the perspective of both the system and the user. A requirement with the phrase "TRITON shall ..." means that the system must perform a certain function described in the requirement. A requirement with the phrase "TRITON shall allow the user to ..." means that a user interaction (e.g GUI window) is necessary to invoke a functionality and view the output.

Requirement Properties:

Each requirement has the Purchaser-filled properties (attributes) to emphasise its implementation. These are given below:

- **Object Type** : Requirement
- **Domain for Static** **:** NS / NU / Both / Not Applicable

- **Domain for Afloat** **:** NS / NU / Both / Not Applicable
- **Baseline** **:** BL 1 / BL 2 / BL 3 / BL 4
- **Qualification Method** **:** Test / Demonstration / Analysis / Inspection
- **Comment** **:** An explanation or clarification for a requirement.

1.7. Qualification Provisions

The requirements will be verified through qualification, herein defined as an endorsement with a guarantee and supporting documentation that the item being qualified satisfies the specified requirement(s). Each requirement is annotated with the method(s) to be used. The basic Qualification Methods are described in the following paragraphs. Further verification methods may also be used if necessary.

Note: In some cases, more than one verification method might be required in order to verify fulfilment of a requirement.

1.7.1. Test

Test (or testing) is the operation of the system/services, or a part of it, under controlled and specified real or simulated conditions, generally using instrumentation, other special test equipment or specific test patterns to collect data for later analysis. This verification method usually requires recorded results to verify that the requirements have been satisfied. Input data and results are provided in the test procedures.

1.7.2. Demonstration

The operation of the system, or a part of the system/services, that relies on observable functional operation not requiring the use of instrumentation, special test equipment, or subsequent analysis. It is a qualitative exhibition of functional performance, usually accomplished with no or minimal instrumentation or test equipment.

1.7.3. Analysis

Analysis is the review and processing of design products (documentation, drawings, presentations, etc.) or accumulated data obtained from other qualification methods, such as manufacturer's tests of a product to be mass-produced, to verify that the system/component design meets required design criteria. It may use analytical data or simulations under defined conditions to show theoretical compliance. Modelling and simulation may be used.

1.7.4. Inspection

Inspection is an examination of the item against applicable documentation to confirm compliance with requirements. It is the visual examination of a hardware item and associated descriptive documentation. Verification is based on the human senses (sight, touch) or other means that use simple measurement and handling methods. No stimulus is necessary. Passive resources such as metre rule or gauge may be used. For software, traceable documentation and code inspection can be used.

For Non-Developmental Items (NDI), Modified NDI and Developmental Items, hardware inspection is used to determine if physical constraints are met, and hardware and/or software, inspection is used to determine if physical quantity lists are met.

2. REFERENCES

This section provides as list of references used in the document. The abbreviated document titles given in square brackets "[…]" are used to refer to documents in this list.

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[STANAG 4668]	STANAG 4668 Warship - Automatic Identification System (W-AIS) Ed.2 (NU)
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[ADatP-3]	ADatP-3 (A) NATO Message Text Formatting System (FORMETS) Concept of FORMETS (NU)
[ADatP-34]	ADatP-34 NATO Interoperability Standards and Profiles (NISP) (NU)
[ADatP-4774]	ADatP-4774 Confidentiality Metadata Label Syntax, Ed. A, February 2016 (NU)
[ADatP-4778]	ADatP-4778 Metadata Binding Mechanism for Information Sharing, Ed.A, February 2015 (NU)
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[APP-11] APP-11 (D) NATO Message Catalogue, 1 December 2015 (NU)

[APP-15] APP-15 Ed.A, Ver.1 NATO Information Exchange Requirement Specification Process, June 2013 (NU)

[APP-20] APP-20 Ed. A Ver.2 Standard Ship Designator System (NU)

[ATP-01] ATP-01 Allied Maritime Tactical Instructions and Procedures (NC)

[ATP-2] ATP-2 Vol.II Naval Cooperation and Guidance for Shipping (NCAGS) Manual (NU)

[ATP-18] ATP-18 (G) (Navy) - Allied Submarine Operations (NC)

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2.3. Bi-SC Documents

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[AC/35-D/1014-REV2]

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[NCIA-06.02.01] NCI Agency Instruction, INSTR TECH 06.02.01 Service Interface Profile for Security Services, 4 February 2015 (NU)

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3. GENERAL DESCRIPTION

3.1. System Perspective

3.1.1. Business Process Basis for TRITON

Maritime Operations are the set of military activities that are conducted by maritime air, surface, sub-surface and amphibious forces to attain and maintain a desired degree of control of the surface, sub-surface, and air above the sea, influence events ashore, and, as required, support land, air and space operations. NATO ACO operations staff requires automated command and control information services to effectively plan, execute, monitor and assess Maritime Operations in responsive and timely manner.

Situated at the Operational Level, the Headquarters Allied Maritime Command (HQ MARCOM), located at Northwood - UK, is to be prepared to deliver command and control of the full spectrum of joint maritime capabilities, and to act as NATO's principal maritime advisor. From its static location, it must plan, conduct and support joint maritime operations in order to contribute to Deterrence and Defence, Crisis Management, Cooperative, and Maritime Security within and beyond NATO's Area of Responsibility. It is to maintain comprehensive situational awareness throughout NATO's maritime area of interest and be ready to exercise C2 of a Small Joint Operation (SJO) (maritime heavy) and act as the Component Commander to support up to a Major Joint Operation (MJO), within a comprehensive approach.

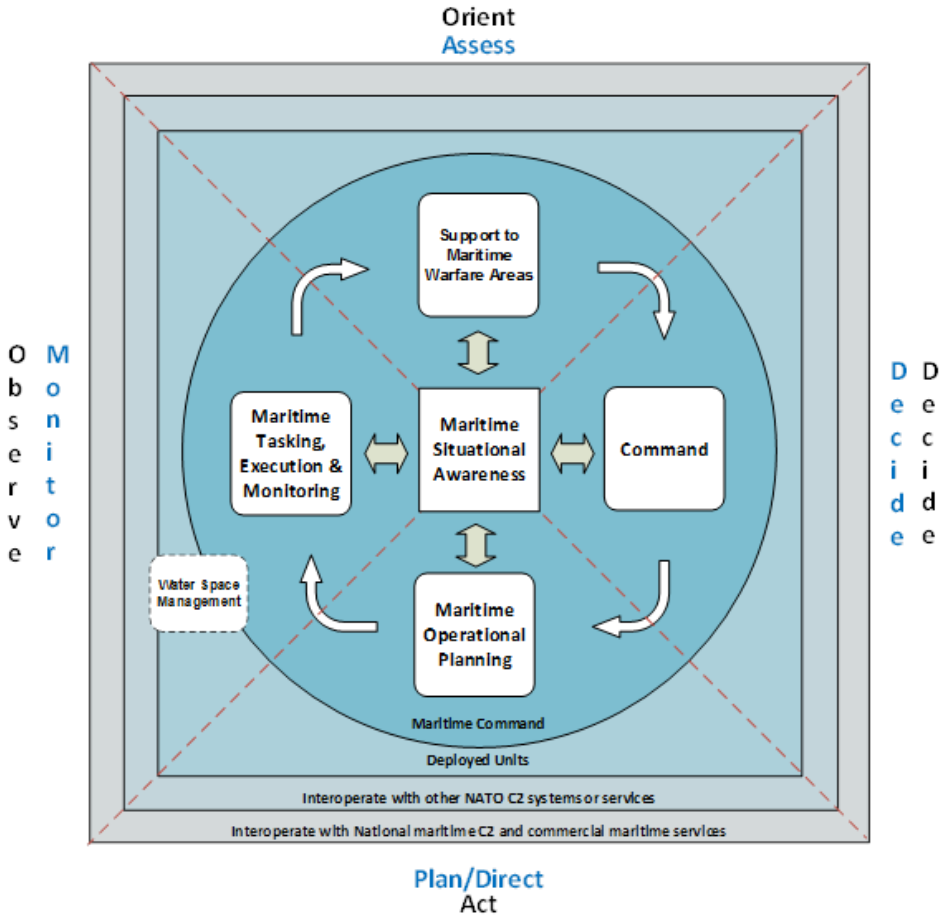
At sea, MARCOM is commanding all four Standing Maritime Groups which make up the Maritime Component of the NATO Response Force (NRF). MARCOM provides the four groups flagships with CIS support through established Deployable Kits and the necessary support during their deployments.

To ensure that these forces comply with the highest standard of readiness, MARCOM is also the leading headquarters for the organization and conduct of naval exercises within NATO. These exercises, whether maritime or joint (i.e. involving land and air components) focus on the operational certification of the units participating in the NRF, but also of the different headquarters commanding them.

HQ MARCOM operational activities follow a battle rhythm of staff functions that "specifically designed for an operations conducting process organization with a medium term decision cycle speed", with the exception of current operations using a short term daily cycle. MARCOM Battle Rhythm SOP 100 describes uses three interrelated decision cycles for short term current situations, medium term emerging situations and long term future situations (i.e. "What's next?").

Observe, Orient, Decide and Act (OODA) loop is usually drawn with arrows implying the actions are completed as a serial chain of events, with most early examples described at the tactical level. The OODA loop in higher command situations has also been referred to as a MADD diagram involving Monitor, Assess, Decide and (Plan) Direct functionality. The author of the OODA (MADD) process (by Col USAF John Boyd) actually went to great lengths to point out that it involves a continuous interaction checking between all components to produce what is effectively a set of parallel efforts. The rate at which each component is updated implies the limit on how fast a specific OODA loop can self-synchronize.

The OODA-loop diagram illustrates that TRITON needs to support command decisions by converting them using operational planning into actionable tasks for execution and monitoring the plans to assess when the outcomes justify further command decisions. The figure below illustrates the top level maritime operational relationships of five main C2 functions that TRITON must support.

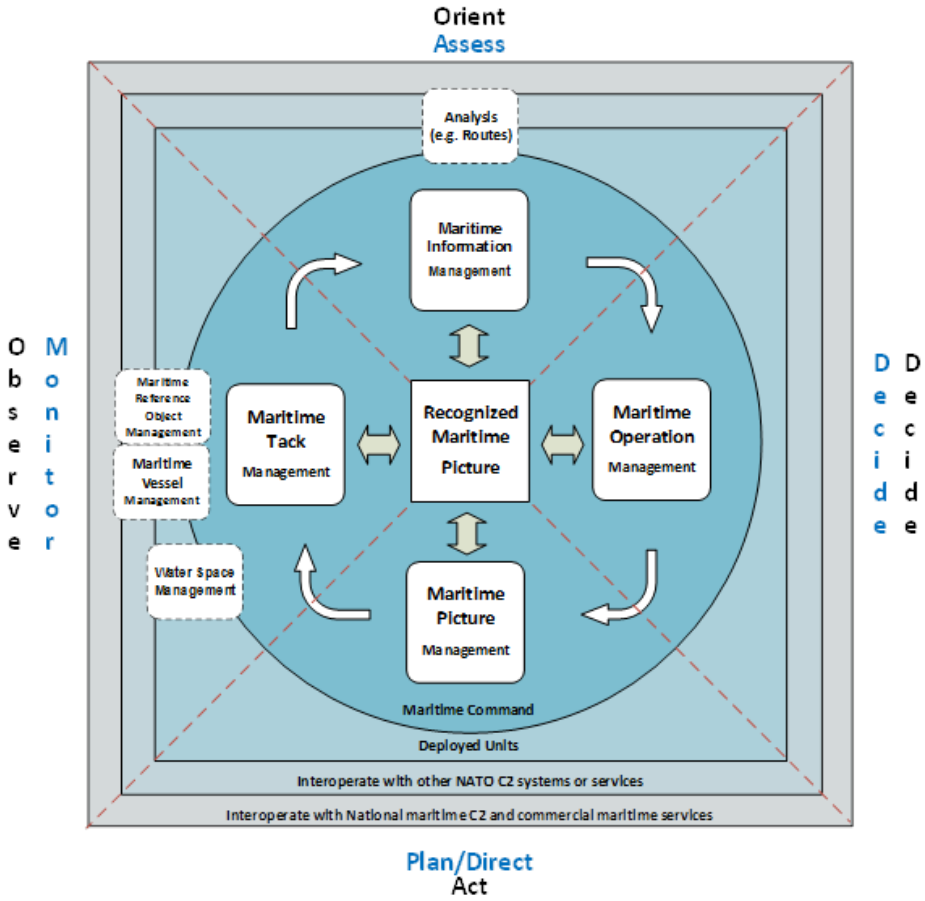


This top level OODA-loop diagram differs from most classical in that it also shows how the four components are kept informed and synchronized by Maritime Situational Awareness (MSA). This is because MSA is the key "… enabling capability which seeks to deliver the required information superiority in the maritime environment to achieve a common understanding of the maritime situation in order to increase effectiveness in the planning and conduct of operations". The need to ensure a common understanding by all participants means that MSA must be conducted at a much faster cadence than the other staff functions to ensure its products are available for the OODA loop to apply.

The diagram also illustrates how C2 activities at the heart of Maritime Command must enable direct interaction with its deployed units while also being able to interoperate with other NATO C2 systems or services, as well as National maritime C2 and commercial maritime services. Water Space Management (WSM) is shown here because, although it exists within the overall operational construct as the rest of MARCOM C2, it relies upon a distinct process to handle the special considerations for the way sub-surface traffic must be managed.

Due to asymmetric threats in the 21st Century, the realm of MSA transcends both the military and non-military realms and involves interoperability and/or collaboration with a wide variety of non-traditional data sources, organizations and actors. While this profile is unclassified, comprehensive MSA includes other architectural elements such as classified intelligence and locations of warships to provide the full Recognised Maritime Picture (RMP) upon which MSA is based.

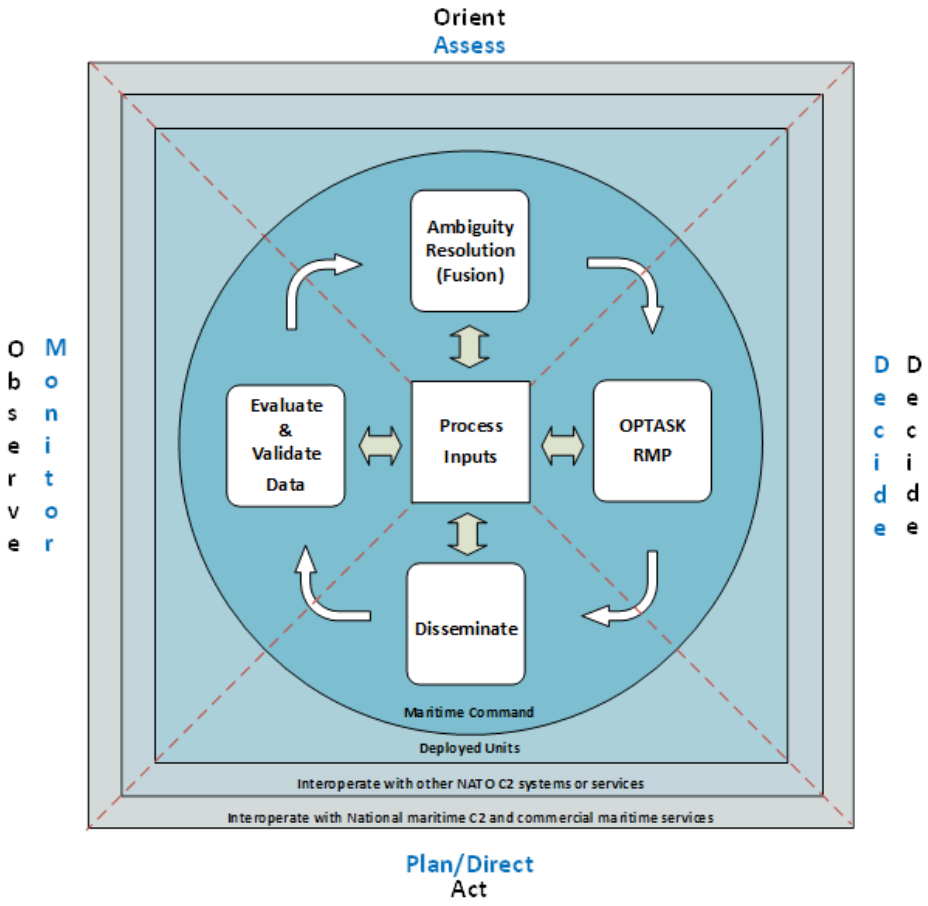
The figure below illustrates how internal MSA functions mimic the high level OODA-loop relationships, in terms of their orientation and the type of functionality they perform. The major difference is that the MSA business processes are focused on building and consuming the RMP that is the central enabling capability to conduct MSA.



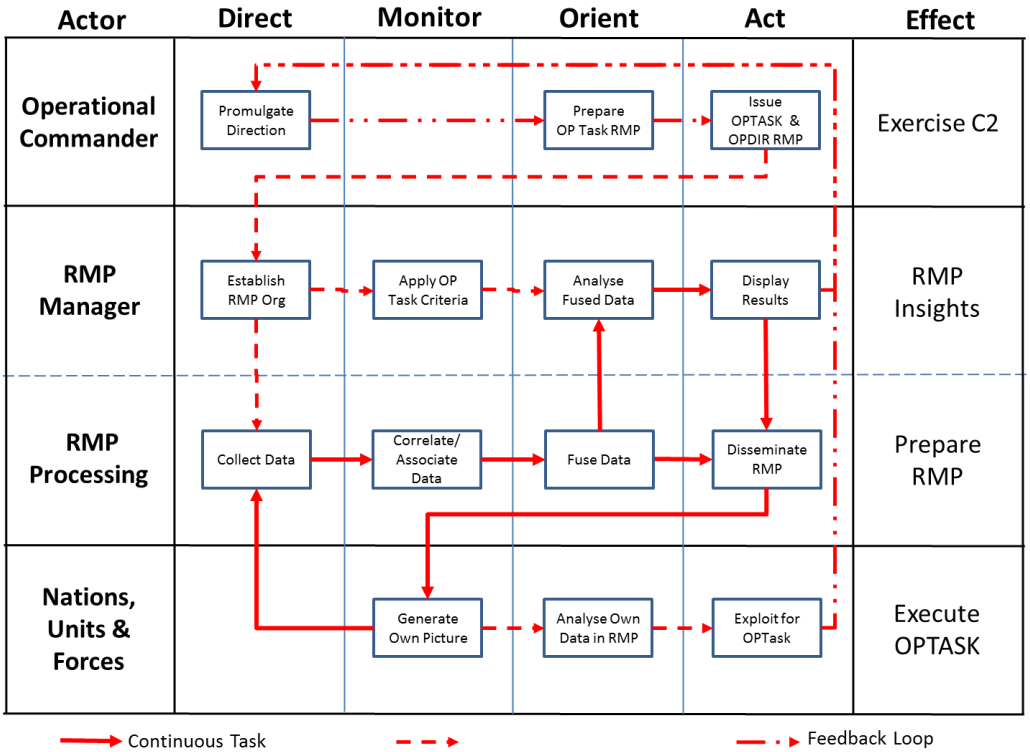
The RMP is an electronically produced display compiled from active and passive sensors covering a three-dimensional volume of interest in which all detected maritime contacts have been evaluated against threat parameters and assigned a recognition category and track number [AJP 3.1]. The RMP consists of all contacts in the maritime environment, both surface and subsurface, commercial, military and government platforms and vessels. The RMP is similar to the MSA process in that it must be updated more frequently than the surrounding OODA-loop processes.

The MSA process employs a wide range of management aspects used to build the RMP. Their positions in the OODA-loop diagram are nominal because the RMP that is accessed for MSA purposes is the product of a lower level RMP process described below.

The figure below illustrates the RMP process using OODA-loop functionality that is organized around the enabling capability of processing input data. The other four processes then refine and update data. The evaluation and validation of inputs and the dissemination of RMP updates to be highly automated and conducted continuously using the automated rules from OPTASK RMP. The ambiguity resolution of data using fusion techniques are also an ongoing activity but may require operator assessments to deal with complex cases. The RMP compilation task also includes a need to conduct detailed analysis, such as route assessments, that involve significant amount of time to complete. The intent of these is to use the results as a means to help automate portions of the fusion process.



The swim-lane version of the RMP diagram is presented below. It covers the same basic features but more clearly shows the process involves a continuous set of recurring concurrent activities involving many actors instead of a simple series of consecutive steps as implied by the OODA loop diagram. The figure below shows the RMP Process as Swim-lane OODA Loop.



The RMP swim-lane illustrates key relationships between the major actors from an OODA loop perspective. It avoids the usual tendency to describe the detailed business procedures already documented elsewhere and instead seeks to expose the major effects achieved from the RMP process. The four major swim-lanes are:

- The Operational Commander promulgating direction,
- The RMP Manager using organizational assets to seek RMP insights and automated technology to prepare the RMP,
- The RMP Processing to collect, correlate/associate, fuse and analyse the data,
- The Nations, units and forces both contribute data to and consume the RMP.

The backbone of the RMP swim-lane is the continuous task of processing to collect, aggregate (correlate/associate), fuse and analyse the data from units and forces in order to disseminate the RMP back to the units and forces for their use. That work is based on standing guidance from the Operational Commander as implemented by the RMP Manager. The process includes a feedback loop to amend operational commander direction based on insights gained while preparing the RMP or from units and forces exploiting it to pursue the OPTASK.

3.1.2. Purpose of TRITON

The purpose of the Project TRITON is to provide Functional Services for Command and Control of Maritime Operations, which will allow NATO and its Alliance members to conduct Maritime Security Operations (MSO). The services to be delivered for the entire capabilities of TRITON will provide the tools for the NATO operational user to plan and execute the full spectrum of maritime missions in a joint environment. They enable the operators to share and leverage the services provided by the Core Services implementation, as well as tools and capabilities offered through the other NATO Functional Services in order to facilitate a seamless operating environment for the users.

Currently, at the Strategic and Operational command levels, Maritime C2 processes are carried out using Maritime Command and Control Information System (MCCIS). In addition, MSA Demonstrator Prototype (MSA/BRITE) developed by ACT is used for White Shipping Monitoring. The future Maritime C2 and Information Services provide a flexible and agile command and control services for NATO operational use. At the delivery of its final Increment (possibly Increment 3), it will provide the following main capabilities for both static and afloat NATO Commands:

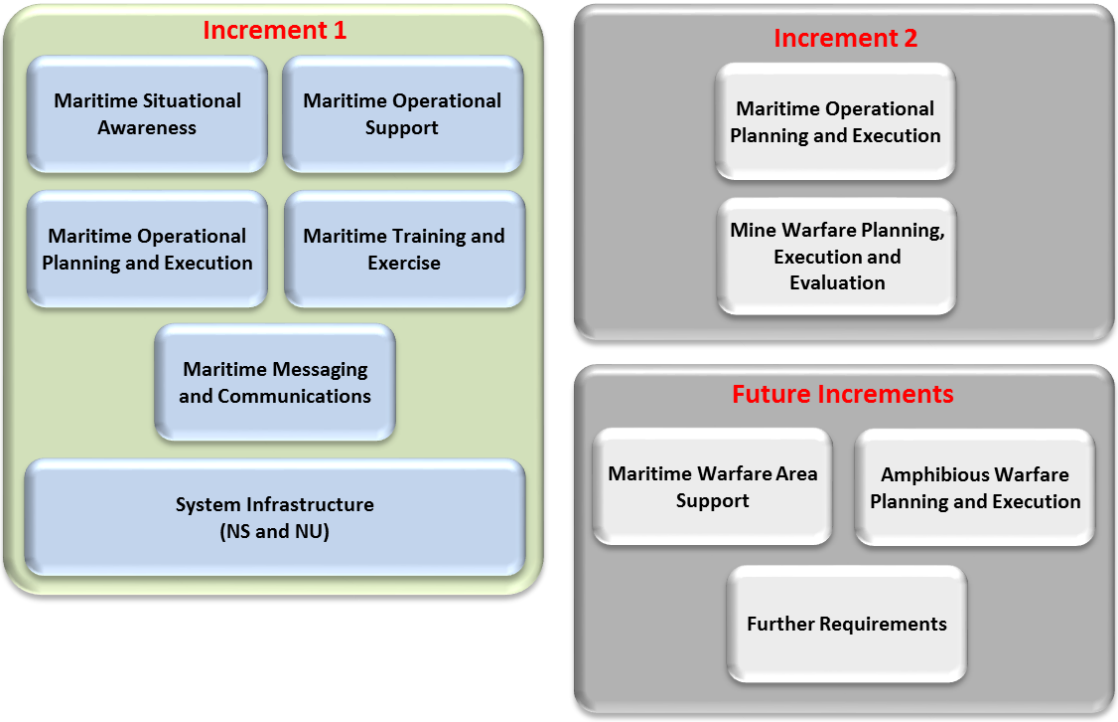
- Maritime Situational Awareness
- Maritime Operational Support
- Maritime Operational Planning and Execution
- Maritime Training and Exercise
- Information exchange with other NATO Systems or Services
- Information exchange with National maritime C2 systems and commercial maritime services.

The services delivered by the TRITON Increment 1 Project will cover a subset of overall capabilities and provide a foundation to build on for future Increments. The key capabilities to be provided through Increment 1 are:

- Replacement of MCCIS functionality that supports operational-level Maritime C2 and MSA
- Replacement of White Shipping part of the MSA functionality currently supported by the MSA/BRITE
- Utilising information received from National maritime C2 systems and commercial maritime services to build the White Picture and RMP
- Building and dissemination of RMP
- Building and dissemination of White Picture
- The basic information management of Maritime Operational Planning and Execution as a foundation for future build on

- The Water Space Management and Prevention of Mutual Interference (WSM/PMI)
- Interoperability with other NATO systems, capabilities and Functional Services
- Providing deployed functionality at sea with Deployable Kits for Afloat Command Platforms (ACP).

Future Increments will deliver the other Maritime C2 Capabilities as notionally depicted below:



3.1.3. Functionality

The objective of the Bi-SC AIS is to provide NATO commands with effective and integrated core (common to all users) and functional (specific to staff functions) services within both static and deployed contexts. The range of functional services for supporting the operational commanders includes the C2 capabilities for Air, Land, Maritime, Special Operations Forces (SOF), Joint Operations, Logistics and Intelligence.

TRITON, as the Maritime Functional Services within the Bi-SC AIS capabilities, enables users to collect, process, present and distribute information that supports the major functions of maritime operations. These services will support NATO Headquarters and Centres at both static and afloat locations. TRITON Functional Services will be operational at deployed sites, Afloat Command Platforms (ACP) in NATO-led task forces/groups basically Standing NATO Maritime Group (SNMG) and Standing NATO Mine Counter Measures Group (SNMCMG).

TRITON will be used in peacetime, exercises, and time of crisis (operations) throughout the static and deployed environments. TRITON will be used at both static and afloat NATO Command Structure to provide commanders with the required level of maritime information in order to make informed operational decisions. Nations will also be able to access TRITON functions, send their maritime information and receive RMP in various methods of information exchange.

The first Increment of the project will provide the key capabilities for both static and afloat sites. It is inferred that as NATO does not own maritime assets, Nations should be able to interoperate with TRITON from their national maritime C2 Information Systems.

TRITON will be installed only at the Authorised Locations, static or afloat sites. While static sites provide services for NATO Headquarters, afloat sites will be used by Command Task Groups as ACPs.

Afloat Command Platforms:

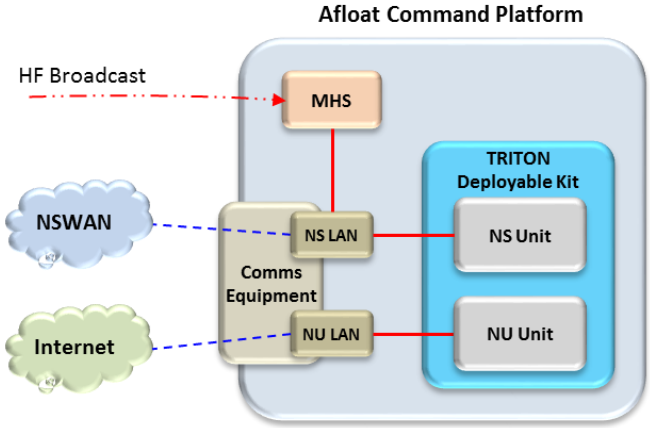
In addition static sites, "TRITON Deployable Kits" will be provided for the following platforms identified as ACPs, and installed prior to a mission:

- Standing NATO Maritime Group 1 and 2 (SNMG-1 and 2)
- Standing NATO Mine Countermeasures Group 1 and 2 (SNMCMG-1 and 2)

Other than these four instances, four spare kits will be used during task hand-over between the Command Ships.

These ACPs are expected to have the minimum CIS capabilities as defined in [MC0195/9]. The minimum level of C2 capabilities are currently described in [MC0593]. The communication methods applicable for ACPs are described in [ACP-200]. TRITON Deployable Kits will utilise the ship Local Area Network to access the NATO Wide Area Network through their communication equipment (Satellite or any other media).

ACPs will be able to exchange information with TRITON instances at static sites if communication lines are available. If no IP-level connectivity exists, ships may receive broadcasted data (e.g Formatted Messages) through the on board Message Handling System (MHS). Connecting the Deployable Kit to the ship MHS is a preference of the Nation who is providing the maritime asset. Following figure shows the possible methods of connectivity. If there is not data input from outside of the ACP, it will still be possible to enter manual data.



3.1.4. Security Domains

Maritime Functional Services will operate together with the other Bi-SC AIS Functional Services. However, some functions need to access the Internet and get information from commercial sources. Therefore, two security domains for operating TRITON are currently identified:

- NATO SECRT (NS) Operational Domain on NS Wide-Area Network (NSWAN)
- NATO UNCLASSIFIED (NU) Operational Domain on NU Network having controlled access to Internet

In future, NATO RESTRICTD (NR) network will be used as the Protected Business Network at static sites. It will cover the NU Domain as well. TRITON will be able to operate in NR domain as well as NU Domain.

The NU Domain will be used to gather information from commercial sources on the Internet and build the White Picture. The NS Domain will be used for compiling the Military Picture. With additional information and contributions needing to be kept classified, the WP will be improved further. The RMP will then be extracted from the Maritime Operational Picture (MOP) which is built using all pictures on the NS Domain.

TRITON can also be deployed in a MISSION NETWORK, which is configured specifically for a mission, having MISSION SECRT (MS) classification.

TRITON will provide Cross Domain Support which allows information transfer between differing security domains using the senario-specific NATO Information Exchange Gateways (IEG). Considering the current security regulations, only one way of information transfer from low side to high side will be allowed.

TRITON will use the Confidentiality Labels for the information objects according to the NATO Directives.

There may be further requirements to transfer selected information from high-side to low-side. In that case, TRITON will allow authorised users to control the information transfer.

In case TRITON-NS needs to exchange information with another system in a MISSION NETWORK, a scenario-specific IEG will be used.

3.1.5. System Approach

TRITON is the general name given for all implementation activities to provide all Maritime Functional Services. Although TRITON is a collection of services, the term "system" will occasionally be used for preserving functional decomposition for software and hardware including external interfaces. Throughout this document the word "TRITON" will be used as the name of the "Information System" to be developed and more extensions will be added to it in order to identify separate systems.

3.1.6. Naming Convention

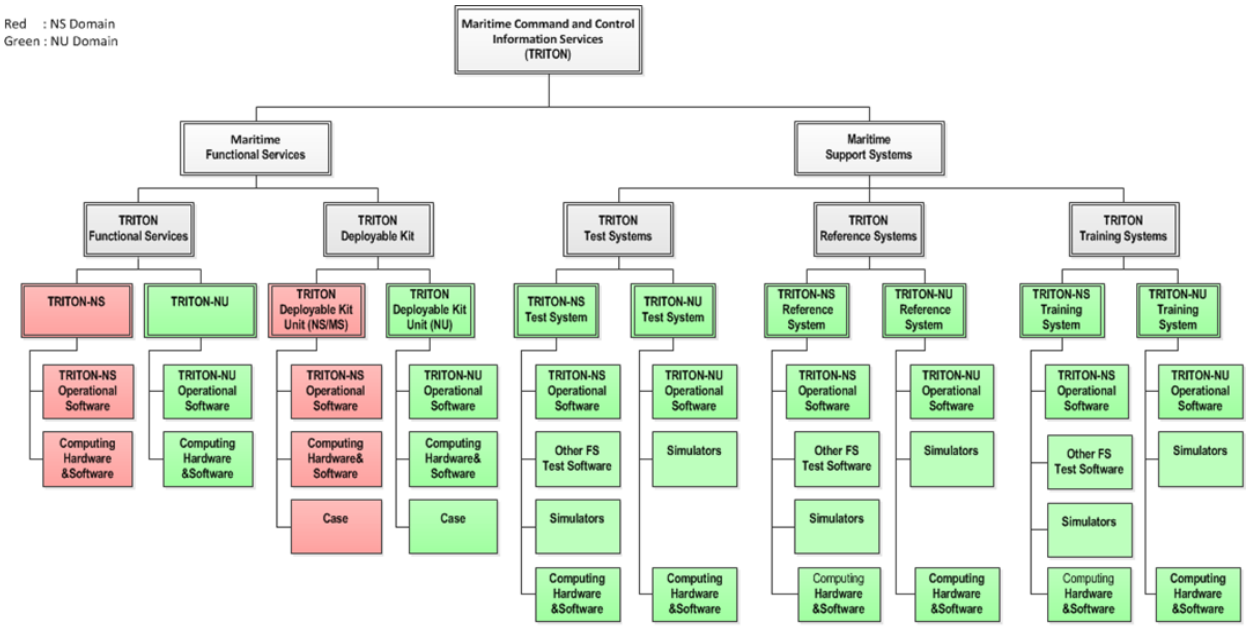
Following naming convention is used in the SRS to identify each service/system:

- TRITON : The generic name of the Maritime Command and Control Information Services.
- Maritime Functional Services: Implementation of Maritime Services within Bi-SC AIS.
- TRITON Functional Services : The name of the general Maritime Functional Services for operational use.
  - TRITON-NS : The name of the TRITON Functional Services used on the NS Domain.
  - TRITON-NU : The name of the TRITON Functional Services used on the NU Domain.
- TRITON Operational Software : The name of the overall software package to be implemented.
  - TRITON-NS Operational Software : The name of the operational software package configured for the NS Domain.
  - TRITON-NU Operational Software : The name of the operational software package configured for the NU Domain.
- TRITON Deployable Kit : The name of the system with operational software on portable hardware to be used on board ships.
- Maritime Support Systems : Implementation of support systems used for testing, maintenance and training.
  - TRITON Test System : The name of the software and hardware to be used for test purposes.
  - TRITON Reference System : The name of the software and hardware to be used for software maintenance purposes.
  - TRITON Training System : The name of the software and hardware to be used for training purposes.

The requirements in this SRS are specified as a breakdown of functions with a domain indication for each requirement. The configuration control of the operational software will allow the generation of separate software packages from the same source tree with the above-mentioned names.

3.1.7. Identification

The Functional Services and systems identified in TRITON Increment 1 Project context that form the Maritime C2 Information Services are given in the following diagram:



These services and systems with their components are described in Section 3 of this SRS.

3.1.8. Users of TRITON

The full implementation of TRITON will support the entire spectrum of NATO maritime activities, including monitoring merchant and military shipping and conducting NATO peacetime maritime operations (Operations such as Active Endeavour and Ocean Shield), as well as support for future major joint operations (Article 5) to further NATO military or political objectives.

TRITON will be used as a collection of operational-level C2 and Information Services at Maritime Headquarters and Command Centres which are called "Organizational Nodes". It is also expected that the capability will be used by the NRF HQs for Crisis Response Operations (CRO), coalition operations and other supporting activities, as authorised. Allied Command Transformation (ACT) will use TRITON capabilities for transformation experimentation related to Maritime C2 and for training and exercise purposes as well.

The maritime organizational breakdown of the Maritime Commander and subordinate Task Forces, Task Groups, and Task Elements will be using TRITON. The core of the TRITON Implementation will support the Component Commanders in planning and execution of their assigned tasks as well as providing overall situational awareness to the joint and maritime commanders.

The users at NATO Command Centres can access the TRITON services through the static systems at a centralized IT site or at other sites (Organizational Nodes). Users of Afloat Command Platforms (ACP) can also access all the TRITON services at static sites as well.

The user roles will be defined according to the current roles being used at both static and afloat command centres. In general, two groups of users will be accessing TRITON Services, and functions within those services:

- **General User:** A standard user who is capable of using the services with read-only privileges.
- **Authorised User:** A privileged user who is capable of accessing the authorised functions with privileges to manage (create, modify, delete) data.

Throughout the Command Structure, there will be roles like "General Users" who can access the general services and functions. Maritime Command (MARCOM) and selected deployed Headquarters will also have "Authorised Users" with roles like Maritime Operations Planner, RMP Manager, RMP Operator, System Technical Manager, Information Manager and Data Manager.

The role of System Administrators will be like power-user and they will be located at the Maritime Command and/or at a Central IT facility.

The non-operational installations of TRITON, as given below, will be accessed by those users having tasks in those facilities:

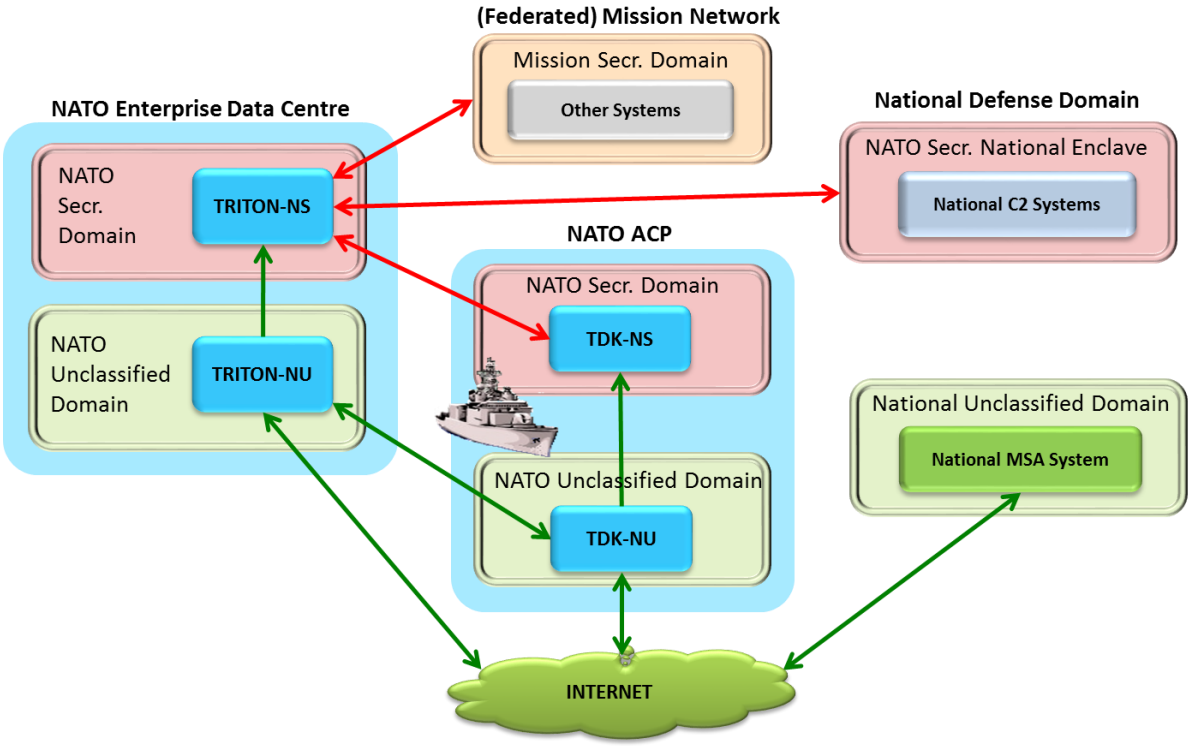
- Training System to be used for trainers and trainees (for Individual and Collective Training)
- Test System to be used by developers and maintainers at the NCI Agency
- Reference System to be used by maintainers at the NCI Agency.

3.2. Constraints

3.2.1. General Constraints

TRITON will rely on the information exchange capabilities established and maintained between NATO and non-NATO national and international information providers. TRITON will also rely on critical commercial as well as governmental transportation information and sensitive intelligence information.

Based on the Cross-Domain operation aspect of TRITON, all services will be provided for both NS and NU Domains for both static and afloat installations. TRITON operation on differing security domains is illustrated below:



Static and afloat installation of TRITON-NS can share information with other Organizational Nodes over NSWAN. The servers for each Organizational Node can also be accessed by Nations using Clients on the national side of NSWAN (National Enclave). Both static and afloat installations of TRITON-NU can

access commercial and government/non-military information resources on the Internet; it builds the White Picture and sends it to TRITON-NS over a secure connection, IEG-Data Diode.

Nations willing to share information can connect their C2 systems to the NSWAN via NATO IEG-A on National Enclave. On the other hand, Nations will continue to use MCCIS as their own national C2 system.

Nations can also access TRITON-NU over their own unclassified network. It will be Nations' responsibility to connect their systems to NSWAN.

TRITON can also exchange information with other systems on Mission Network such as MISSION SECRT Domain provided that NATO IEG-C is used and the data is labelled accordingly.

In future, static headquarters will operate on Protected Business Network including the NU Domain. Therefore, NU Domain will be combined in NR Domain.

One other primary constraint of the architecture is the available bandwidth for the ships assigned as ACPs in a Task Force/Group. ACPs will have TDKs where other ships can access TRITON services over their NSWAN connections. These connections can be as low as a couple of kilobits per second depending on the ship capability. TRITON Clients should be able to function at this low bandwidth environment with defined limitations.

In case ACP loses its connectivity to the static server, it must be able to continue its function with available data sources and local services. Database synchronisation, distributed operation, and degraded operation must be considered accordingly.

3.2.2. Relationship with Other NATO Projects/Programs

The Bi-SC AIS is one of the key elements of NATO CIS Capabilities, which includes a number of strategic sub-systems and Functional Services to be implemented under a Programme.

TRITON relationship with other NATO Functional Services is very essential for successful implementation of the full capability. Networked Interoperable Real-time Information Services (NIRIS) is one of the key enablers to receive and process Tactical Data Link information.

TRITON will also be integrated with Bi-SC AIS Core Services (Directory, Registry, e-mail etc.) as much as possible. The proper interfaces will be established with other services/systems using Service Oriented Architecture (SOA) implementation and STANAG-based information exchange baselines.

Since TRITON aims to replace the existing MCCIS and MSA/BRITE functionalities, existing data exchange methods and protocols will be preserved until full transition.

3.2.2.1. MCCIS

MCCIS provides the legacy core of the maritime C2 capabilities for NATO and will continue to exchange information in various configurations for NATO and for the Nations with TRITON. Therefore its maintenance will continue until full transition is achieved. TRITON will be designed to exchange information with the MCCIS 6.x as required.

3.2.2.2. MSA Demonstrator Fielded Prototype

The Baseline for Rapid Iterative Transformational Experimentation (BRITE) is an experimentation framework that allows for the rapid implementation of new ideas and capabilities to support experimentation. A prototype for MSA capability on BRITE (MSA/BRITE) was developed by ACT, fielded at the NATO Shipping Centre (MARCOM). It is currently maintained by the NCI Agency.

MSA/BRITE receives AIS and LRIT data from MSSIS and commercial sources, provides White Shipping Monitoring with a number of analysis functions. It will continue its operation in parallel to the initial TRITON implementation with NATO and the Nations. TRITON will be designed to make use of the information stored by MSA/BRITE as required.

3.2.2.3. NIRIS

Networked Interoperable Real-time Information Services (NIRIS) provides a platform-independent application programming interface and a web-service interface to C2 systems for reading and writing tactical data and converting message types.

NIRIS is an Enabling Service ensuring proper situational awareness via the provision of a set of services to enable data collection, dissemination and transformation to information in an interoperable manner based on NATO and commercial standards (e.g. Tactical Data Links (TDL), OTH-T GOLD, Friendly Force Tracking (FFT), and Civilian Convoy).

NIRIS consists of both hardware and software components which can be dynamically configured and deployed to provide the necessary services to support each COI's business cases within different contexts, such as data dissemination, track augmentation, data forwarding and interoperability assessments in-theatre, during exercises or to support verification and validation and training events.

TRITON will utilise NIRIS to receive surface and subsurface track information provided by the following:

- Link-11/11B
- Link 16 (and Joint Range Extension)
- Link 22 (future)
- AIS (if available)

3.2.2.4. Other Bi-SC AIS Functional Services

The capability to be acquired under the Maritime C2 Functional Services Capability Package will be a fully-integrated element of the Bi-SC AIS. In this context, TRITON will co-exist with other Functional Services like Intelligence Functional Services (INTEL-FS), Logistics Functional Services (LOGFS), Air Functional Services (AirC2IS), Land Functional Services (LC2IS), NATO Common Operational Picture (NCOP), Operations Planning Functional Services (TOPFAS) and others as they become available.

TRITON Increment 1 will have interfaces to other Bi-SC AIS Functional Services such as INTEL-FS, Environmental (ENV-FS), CBRN Defence (CBRN-FS) and NCOP.

It will have Cross-Domain Support by means of Data Diode and Information Exchange Gateway (IEG) for other systems residing in differing security domains.

3.2.2.5. BI-SC AIS Programme Management and Integration Capability

The Bi-SC AIS Programme Management and Integration Capability (PMIC) will provide the Integration Test-bed for the Bi-SC AIS. The PMIC facilities play a key role in certifying the integration and interoperability of TRITON Increment 1 with the Bi-SC AIS Core Services and other Bi-SC AIS Functional Services. It will host the TRITON Test Systems.

3.2.2.6. NATO General Purpose Communications Systems

TRITON Operational Software will be hosted by the hardware installed on NS Network; consequently data exchange will be supported by the NATO General Purpose Communications Systems (NGCS). TRITON design will accommodate the existing bandwidth and Quality of Service (QoS) limitations of the NGCS. Available bandwidth will always be considered especially for the connectivity between static and afloat servers and between Task Elements and ACP.

3.2.2.7. IT Modernisation Project

The Information Technology (IT) Modernization Project (CP 9C0150) aims to increase the efficiency and effectiveness of NATO's Information Technology (IT) infrastructure by:

- Renewing obsolete IT infrastructure with standard solutions, reducing the heterogeneity of hardware and software assets;
- Quantifying and increasing the availability of service levels
- Implementing NATO-wide Business Continuity and Disaster Recovery capabilities
- Enhancing the Information Security posture
- Increasing operational agility and flexibility by enabling reallocation of resources dynamically, as dictated by the operational situation;
- Bringing new ways of working by enabling a mobile work force
- Reducing the manpower and operations and maintenance costs required to provide and maintain services.

This project will provide the infrastructure (Virtualised Environment) to run TRITON at three Data Centres and a number of Enhanced Nodes. TRITON is expected to be compatible with the infrastructure services planned to be provided by this project. TRITON operational software will be installed on the Data Centres and other Authorised Locations as described in the SOW.

Provision of the portable hardware and operational software of TRITON Deployable Kits is included in the TRITON Increment 1 Project.

3.2.3. Solution Constraints

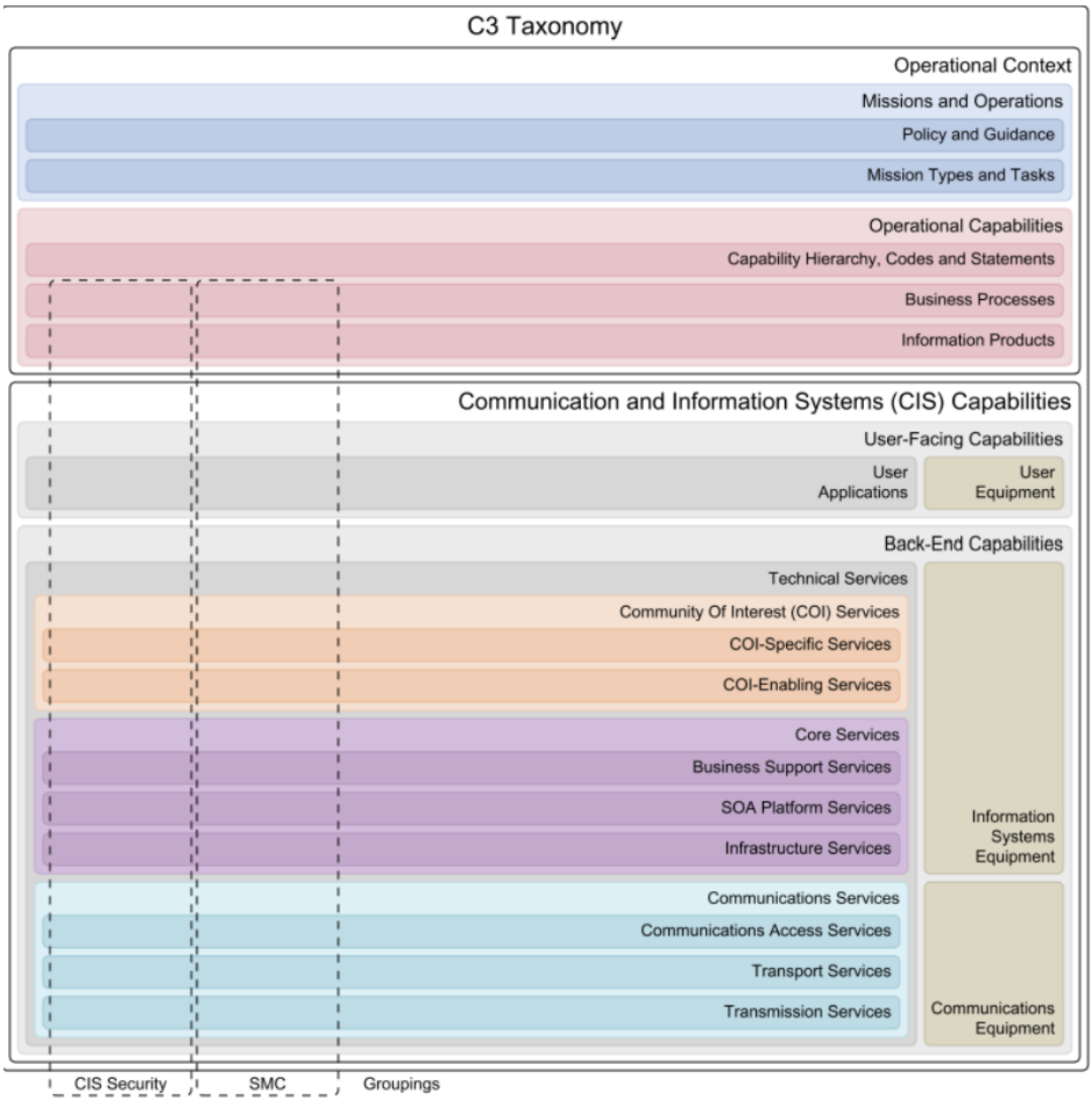
3.2.3.1. NATO Network Infrastructure

In a complex and federated enterprise like NATO there is a need for a generic structure or framework that can be used to align and synchronise various activities and projects that are on-going in parallel when the organization's CIS infrastructure transforms towards a common, network-enabled capability. TRITON will use the NATO Network Infrastructure initially defined as NATO Network Enabled Capability (NNEC) [AC/322-D(2005)0053]. This concept is being replaced with Federated Mission Network (FMN). Therefore, TRITON will use the available COI-Enabling and COI-Specific services to achieve maximum interoperability.

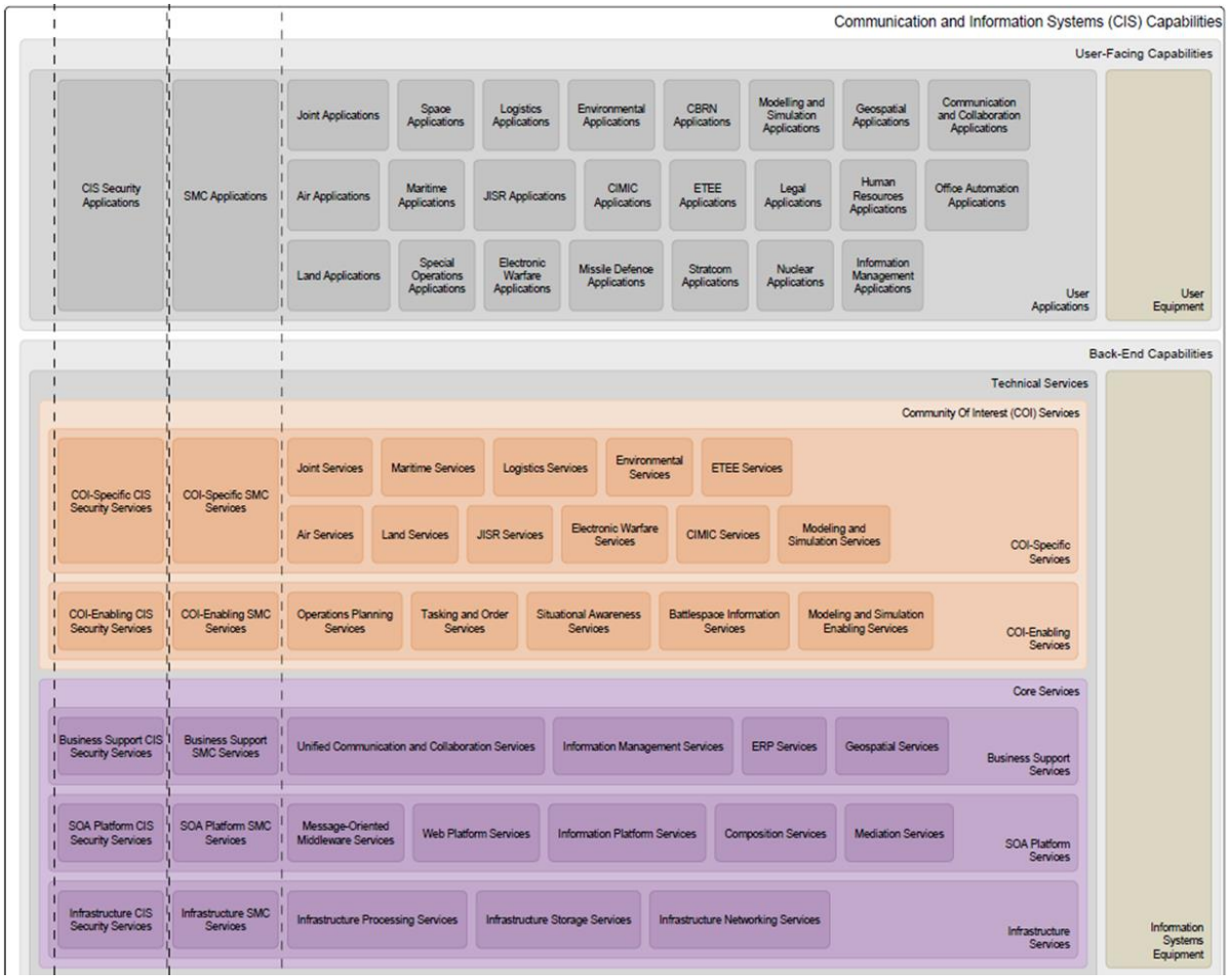
The basic services include the following but not limited to:

- Unified Communication and Collaboration Services
- Information Management Services
- Geospatial Services (Core Geographical Information System - CoreGIS)
- SOA Platform and SMC Services
- Infrastructure Services

The C3 Taxonomy [C3TAXO] provides the generic framework. The taxonomy is defined as a particular classification arranged in a hierarchical structure organised by supertype-subtype relationships. The picture below depicts the top levels of the C3 Taxonomy connecting the top-level political ambitions all the way to "the wire":



The User Facing Capabilities and Back-end Capabilities are shown below:

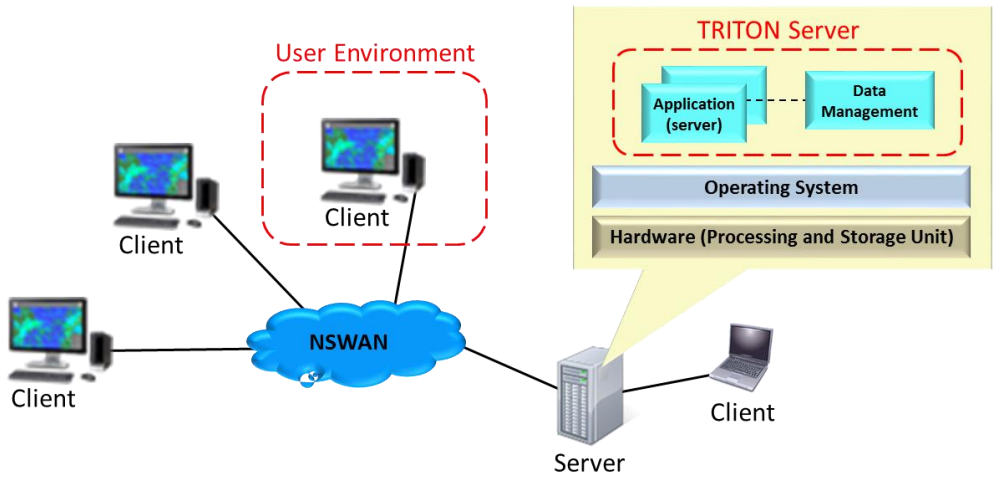


TRITON will be implemented in a SOA environment and provides the user-facing capabilities as Maritime Applications and Maritime Services.

TRITON will use the existing COI-Enabling Services and Core Services to the extent possible. The TRITON Target Architecture will take into account that some Core Enterprise Services are not entirely defined, not yet available, or will evolve. The Component-based Architecture approach will enable TRITON to leverage new Technical Services as they are implemented.

3.2.3.2. Client and Server

TRITON physical architecture consists of a "TRITON Server" which supports a high number of simultaneous users as "TRITON Clients" within the User Environment. Following figure illustrates the details of the Server running on the NS Domain.

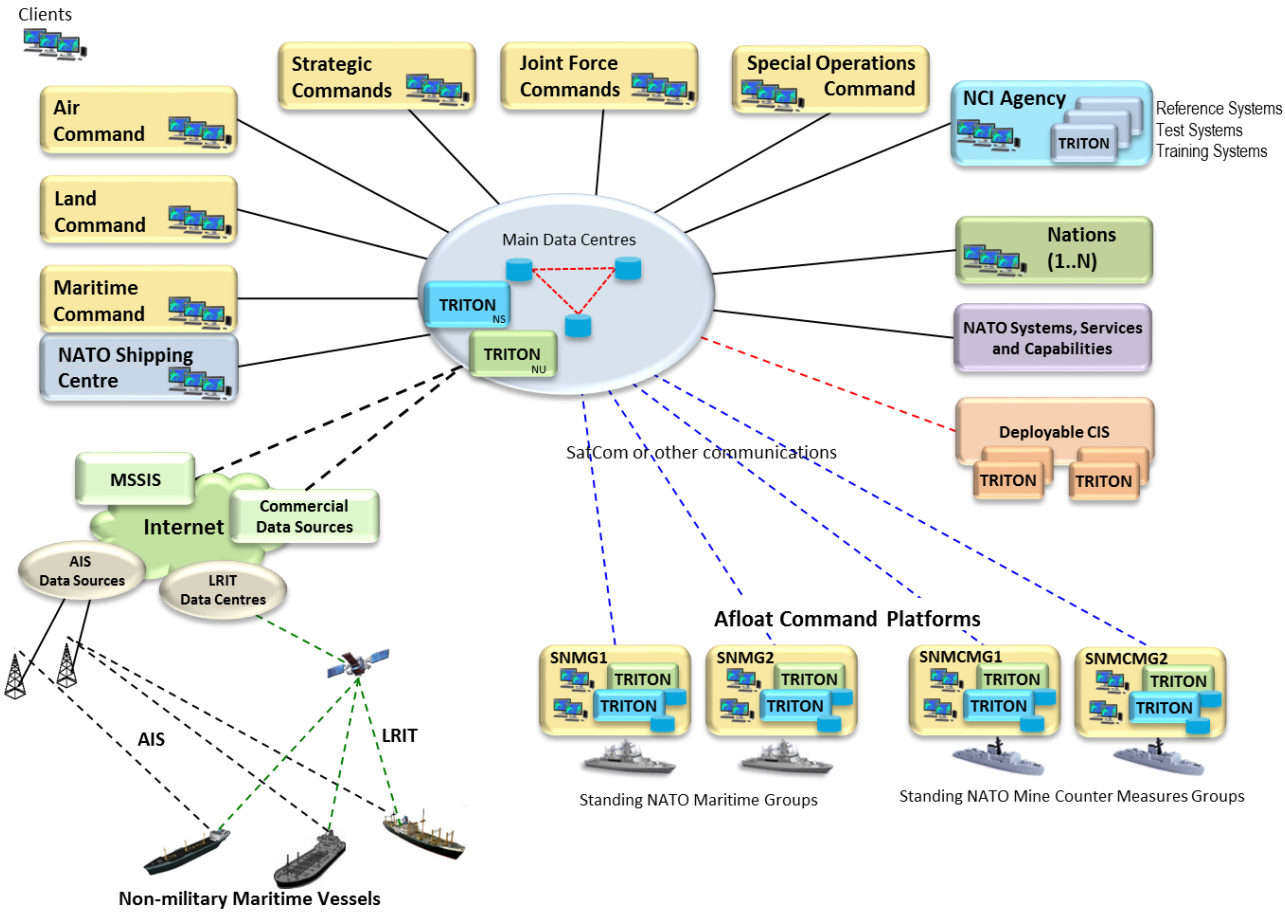


TRITON Servers will be installed on NATO Data Centres. Deployable Kits will also act as a Server. All Servers on all Instances will be synchronised in background, considering the available bandwidth and Area of Interest.

TRITON Clients provide the primary user functionality as Web-based User Applications which are accessible via standard Bi-SC AIS Web Browser (i.e. Internet Explorer).

3.2.3.3. Physical Architecture

The Physical Architecture of TRITON in operation is shown in the following picture:



TRITON will be installed on NATO Data Centres. All users from NATO commands and Nations will use "TRITON Clients" to access the services provided by the Servers. TRITON Deployable Kits will be installed on Afloat Command Platforms acting as a local server for the Task Force/Group. Afloat deployments of TRITON will have direct connection with the static servers on NSWAN allowing full functionality to be used. Allied ships not having TRITON on board will be able to access a selected TRITON Server over NSWAN using TRITON Clients.

Commercial shipping data are collected from related data centres by using Automatic Identification System (AIS) and Long Range Identification and Tracking (LRIT). AIS is a ship-born broadcast system that operates in the VHF maritime band. The AIS system is part of an international program established to support safety at sea. The International Maritime Organization's (IMO) International Convention for the Safety of Life at Sea requires AIS to be fitted aboard international voyaging ships with gross tonnage (GT) of 300 or more, and all passenger ships regardless of size.

LRIT is a designated ''International Maritime Organization'' (IMO) system which is used to collect vessel position information received from ships of IMO member states that are subject to the ''International Convention for the Safety of Life at Sea'' (SOLAS). LRIT devices on board the vessels securely transmit the ship's identity, location and date/time of the position over long ranges (via satellite). LRIT Data Centre is then disseminates this data to registered participants.

Whereas AIS is a broadcast system, data derived through LRIT will be available only to the recipients who are entitled to receive such information and safeguards concerning the confidentiality of those data have been built into the regulatory provisions.

TRITON will not directly interface the devices, but it will utilise the sources like Maritime Information Safety and Security System (MSSIS), IHS Fairplay and the LRIT Data Centre to get vessel data and build the White Picture on the NU Domain.

The WP data will also be used to aid the operators in the detection of anomalous behaviour at sea. The WP built on the NU Domain will be transferred to the NS Domain where it is enhanced with additional sources and classified information. The RMP is then built using Military and White Pictures.

The implementation of TRITON will not be bounded to the number of deployments and number of users. However, afloat deployment will consider unavailability of external services, and provide its own services to be used when operating in stand-alone mode even under low-bandwidth communication situation.

3.2.4. Implementation Environment

The Bi-SC AIS is NATO's Automated Information System used throughout the NATO Command Structure, in NATO Command Deployments and in NATO Exercises. Since TRITON is part of the Bi-SC AIS as defined in the Bi-SC AIS Reference Architecture, the implementation will be within this environment. Both static and afloat deployments of TRITON Functional Services will have the same hardware and operating systems.

3.2.5. Anticipated Workplace Environment

TRITON will be capable of operating on Local Area Networks (LAN) and Wide Area Networks (WAN). TRITON-NS will operate on the NS Domain for C2 purposes. A similar instance of the services, TRITON-NU, will operate on the NU Domain which requires controlled access to the Internet.

Working locations will be inside offices and bunkers for static sites and naval sheltered environment for afloat platforms.

TRITON may be installed on a Deployable CIS environment running in a specific Mission Network.

3.3. Assumptions

The assumptions for the technical aspects of the project are grouped in the following paragraphs.

3.3.1. Organization

NATO Command Structure does not change from that defined as of 01 December 2012 before delivery of Increment 1 of TRITON. Therefore TRITON will be deployed only at selected static command centres and Afloat Command Platforms (ACP) which need to have Server-to-Server connectivity over Wide Area Network (WAN).

3.3.2. Infrastructure

RMP:

TRITON will collect information from external systems, services and Nations, process them and build the NATO RMP. The RMP will then be made available to all NATO Command Structure and NATO Nations. NSWAN will be the primary communications and information systems (CIS) infrastructure for information exchange. The RMP may also be made available to Coalition and/or Partner Nations through the standard NATO CIS infrastructure through appropriate Information Exchange Gateways and Web services.

Information Security:

Information security with respect to the Organizational Nodes will be provided by TRITON Servers and Clients. However, data communication security (like IP crypto) is beyond the scope of the project. It is assumed that all information is exchanged securely.

ACP Connectivity:

ACPs are assumed to have sufficient communication capabilities (as defined in [MC0195/9]) to operate TRITON for both NSWAN access and Internet access. The availability of these networks on board ACPs is outside the scope of this project. However, TRITON architecture will take the bandwidth utilisation into considered during the overall design. In addition, stand-alone operation will be supported. It is assumed that ACPs have capabilities to receive Formatted Messages.

Nations Connectivity:

Nations' own CIS connection to NSWAN is outside the scope of this project.

NATO CIS Infrastructure:

The existing NATO CIS infrastructure will be used to the maximum extent possible. It is assumed that NATO infrastructure will be ready to use when TRITON needs to. There will be no other network or infrastructure specific to the provided services.

3.3.3. Other Systems

MCCIS and MSA/BRITE will remain operational until the end of the Project TRITON Increment 1 Transition Period. The Transition Period and its activities which will be coordinated with Nations is outside the scope of this project. The historical data previously collected by these systems will be used by TRITON when necessary.

Other Bi-SC AIS Functional Services are available and provide a data exchange interface suitable for developing an interface with TRITON. Integration with the Bi-SC AIS Functional Services that are not available at the time of construction will be postponed to future TRITON Increments.

All existing interfaces of MCCIS and MSA/BRITE with other systems and Nations will be preserved to achieve backward compatibility.

3.3.4. Test Environment

There will be a Programme Management Integration Capability (PMIC) Bi-SC AIS Integration Testbed (which will include representations of Bi-SC AIS Core and Functional Services as well as MCCIS and MSA/BRITE systems). TRITON Test System will be formed in PMIC laboratories to execute System Integration Testing (SIT).

3.3.5. Build Processes and Baselines

TRITON will be developed using "Incremental Development with Multiple Deliveries" approach. Each developmental cycle will be identified as a “Build Process”. The product to be delivered at the end of a Build Process is called a "Baseline (BL)".

TRITON will have four Baselines where each requirement in this SRS is initially allocated to. The Baselines and the capabilities are summarised below:

BL1:

This Baseline is named as "TRITON-NS (Partial)" and provides the following capabilities:

- System infrastructure on NS Domain
- Integration with Core Enterprise Services
- Maritime Operation Management
- Maritime Object Handling
- Maritime Picture display capability
- Interfacing with MCCIS

BL2:

This Baseline is named as "TRITON-NU (Full)" and provides the following capabilities:

- System infrastructure on NU Domain (reuse from NS Domain)
- Integration with Core Enterprise Services (NU)
- White Picture management
- Maritime Analysis functions
- Interfacing with external data sources, Nations

BL3:

This Baseline is named as "TRITON-NS (Full)" and provides the following capabilities:

- C2 support capabilities
- Operational planning (WSM/PMI)
- RMP management
- Interfacing with external data sources/services, Nations

BL4:

- This Baseline is named as "TRITON-ACP" and provides the following capabilities:
- Deployable Kit production (NS and NU)
- Local system infrastructure on NS/NU
- Interfacing with external data sources

C4ISR Visualisation Component

The geospatial visualisation capabilities of TRITON Applications will be provided by a component providing the following capabilities:

- Isolation of Client and Server using Web applications
- Displaying geospatial objects on maps
- A re-usable software component with a standard interface.

4. FUNCTIONAL REQUIREMENTS

TRITON Functional Requirements are used to specify the details of the services to be developed. This section defines the requirements under the following subsections:

- The required states and modes of operation
- TRITON Functional Services Requirements (with indication of NS or NU Domains and static or afloat sites)
- C4ISR Visualisation Component Requirements
- TRITON Deployable Kit Requirements
- TRITON Support Systems Requirements.

4.1. Required States and Modes

Primary use of TRITON will be at static sites within the NATO Command Structure. TRITON will also be used as a deployed system on NATO Afloat Command Platforms (ACP) at sea to support joint and maritime operations. For afloat and deployed operation, TRITON will operate normally, however it will also provide a degraded capability for local use with limited or no connectivity.

As a Client-Server model with Web-based access capabilities, TRITON will be used over Wide Area Networks with predefined "Operational Modes" and "Operational States". The purpose of the system will determine the Operational Mode while the runtime availability status of them determines the Operational States.

4.1.1. Operational Modes

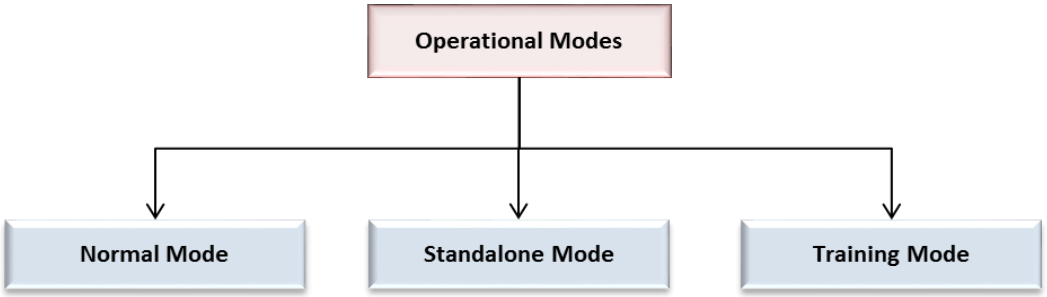
Operational Mode of TRITON defines the capability it can provide depending on its purpose. It also determines how the users will get the services provided by the system in case a mode change occurs.

4.1.1.1. Servers and Clients

For TRITON, Operational Mode of the system is determined according to its purpose and set to its Server during start-up. TRITON Functional Services can be used in one of the defined modes with certain limitations. TRITON Servers can run either on static sites or afloat sites. Clients do not have any mode of operation.

4.1.1.2. Mode Definitions

The TRITON Operational Modes are given in the following figure:



The definitions of these modes are given below:

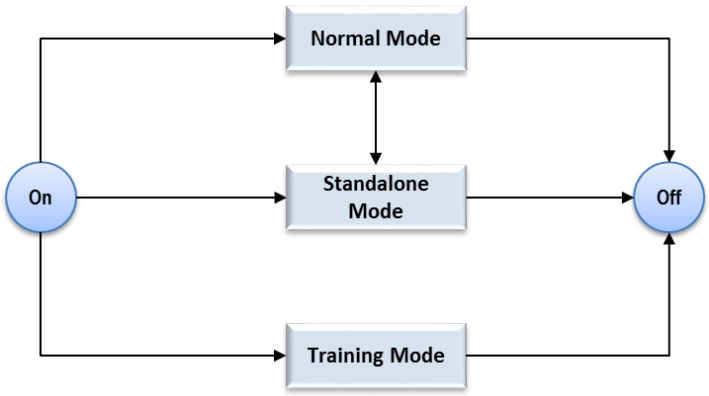
Normal Mode **:** TRITON is used for operational purpose on either a static or afloat site. The Server has connections to any other Functional Services as well as other TRITON Servers.

Standalone Mode : TRITON is used for operational purpose on an afloat site. The Server does not have any connection to other TRITON Servers or other Functional Services. Some functions of TRITON use internal core services with limited capabilities.

Training Mode : TRITON is used for training purposes. The Server runs in a closed environment and emulates the external world for training purposes.

4.1.1.3. Mode Settings

TRITON Operational Mode is set during the system initialisation. It can also be changed by operators during operation. Possible mode changes are depicted in the following diagram:



When the system is initialised for the first time, it will use the given default mode of operation. Training Mode is used in the Training System and it is initialised as Training.

Test and Reference Systems can use any of the modes.

Operational modes of TRITON-NS and TRITON-NU will be identical and managed by authorised users separately.

[T1-R001] *TRITON shall have Operational Modes, as described in the Description, which define its purpose of operational use.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R002] *TRITON shall allow the authorised user to set the Operational Mode during the system initialisation and change it during the operation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R003] *TRITON shall perform an internal check to determine if all the necessary services and interfaces are available for Standalone operation if it is initialised in Standalone Mode, and then sets its Operational State accordingly.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration
Comment : The detailed criteria for checking the availability of services and interfaces will be determined during Software Requirements Analysis.

4.1.2. Operational States

TRITON will be able to change its Operational State automatically according to the conditions occur during run-time. The Operational States are defined separately for Servers and Clients.

4.1.2.1. Server States

Normal Mode is the standard Operational Mode of TRITON for operational use. There may be more than one TRITON Instance on the same network running with full functionality. Authorised users can change the Operational Mode either during initialisation or during run-time.

4.1.2.1.1. State Definitions

Operational States of TRITON Servers in Normal Mode are defined as follows:

On **:** Server is powered on.

Maintenance **:** Server is running, ready for maintenance, but not available for operational use.

Standby **:** Operational settings are loaded, Server is running, connected to other Servers, not processing any data.

Operational **:** Server is running with full functionality and connected to other Servers.

Degraded **:** Server is running, connected to other Servers, but some functions or dependent interfaces are not available.

Shutdown **:** Server is shutting down, no command is accepted.

After the Operational Mode of TRITON is changed to Standalone, the definition of Operational States for Server is changed as follows:

Maintenance **:** Server is running, ready for maintenance, but not available for operational use.

Standby **:** Operational settings are loaded, Server is running, no connection with other Servers, not processing any data.

Operational **:** Server is running with full functionality without connection to other Servers.

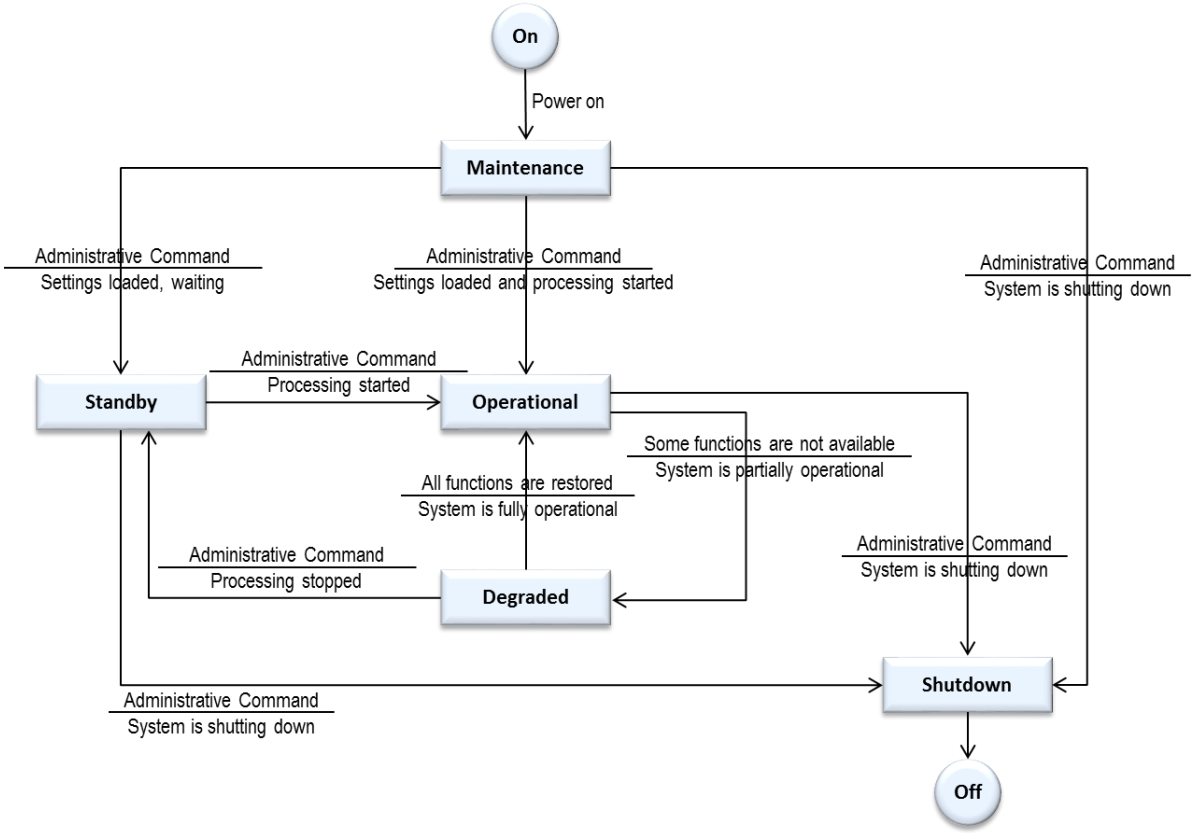
Degraded **:** Server is running, connected to other Servers, but some functions or dependent interfaces are not available.

Shutdown **:** Server is shutting down, no command is accepted.

When TRITON is in Training Mode, the Operational States for Standalone Mode are applicable.

4.1.2.1.2. State Transitions

TRITON Servers will change their operational states according to external or internal triggers. State Transitions for the Server are shown in the following sample state transition diagram:



[T1-R004] *TRITON shall monitor the system functions and interfaces that are specified in the System Configuration Settings as "critical" for operational state change.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R005] *TRITON shall allow the authorised user to modify the causes for Operational State changes in the System Configuration Settings.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R006] *TRITON shall allow the authorised user to set the Operational State to Operational or Maintenance when the system is turned on. The default shall be Operational.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R007] *TRITON shall allow the authorised user to change the Operational State manually with a notification to all users.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1

Qualific. Method : Test

[T1-R008] *TRITON shall change its state automatically from "Operational" to "Degraded" when the functions or interfaces specified in the System Configuration Settings are not available for a configurable maximum allowed time.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R009] *TRITON shall change its state automatically from Degraded to Operational when all the functions and interfaces specified in the System Configuration Settings are available for a configurable minimum allowed time.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R010] *TRITON shall switch to "Shutdown" state when an administrative command is issued by either an authorised user or the TRITON System Technical Management Function.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R011] *TRITON shall notify all Clients when the Server enters in the Shutdown state after a configurable time period (e.g. "The system is shutting down in 5 minutes").*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R012] *TRITON shall notify the authorised user if it detects connection failure to the specified TRITON Server for more than five (5) minutes while it is operating in Normal Mode, then automatically change its mode to Standalone Mode after waiting for configurable count-down period for the authorised user input.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Test

[T1-R013] *TRITON Deployable Kit shall utilise its own infrastructure to support the operational software in Standalone Mode.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration

4.1.2.2. Client States

TRITON Clients consist of Web-based applications including the Mission Application (AppView) and Visualisation Application (GeoView). Therefore their state will depend upon the connectivity with each other and with their servers. AppView determines the overall state of the TRITON Client.

4.1.2.2.1. State Definitions

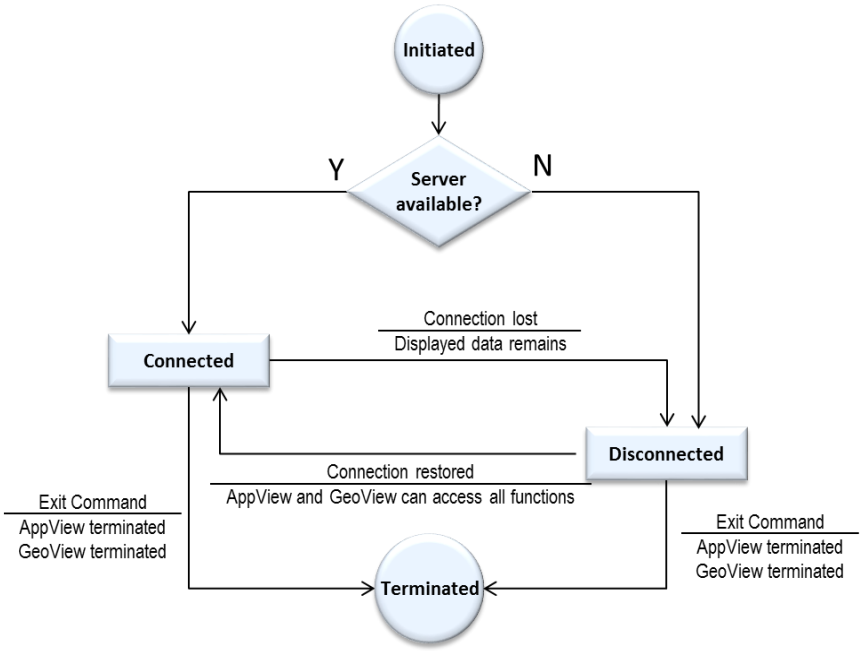
Operational States of TRITON Clients will be determined according to the Selected Server and defined as follows:

Connected : AppView is connected to the selected TRITON Application Server.

Disconnected : AppView has no connection to the selected TRITON Application Server.

4.1.2.2.2. State Transitions

The AppView state transitions are depicted in the following diagram:



[T1-R014] *TRITON AppView shall be available to all users if the standard NATO CIS Infrastructure and a workstation with a browser is available.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R015] *TRITON AppView shall be able to connect to a selected TRITON Server.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R016] *TRITON AppView shall switch to "Connected" state if it gets connected to the selected TRITON Server.*

Requirement Property :
- Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R017] *TRITON AppView shall allow the user to launch GeoView when it is in "Connected" state.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R018] *TRITON AppView shall switch to "Disconnected" state if it loses its connection to the selected TRITON Server.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R019] *TRITON AppView shall be able to detect network connection failure and automatically reconnect to the selected TRITON Server if the network connectivity is re-established within a configurable time period.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R020] *TRITON AppView shall notify the user if it loses its connection to the selected TRITON Server, keep displaying the available operational data and shall not accept any operational function command.*

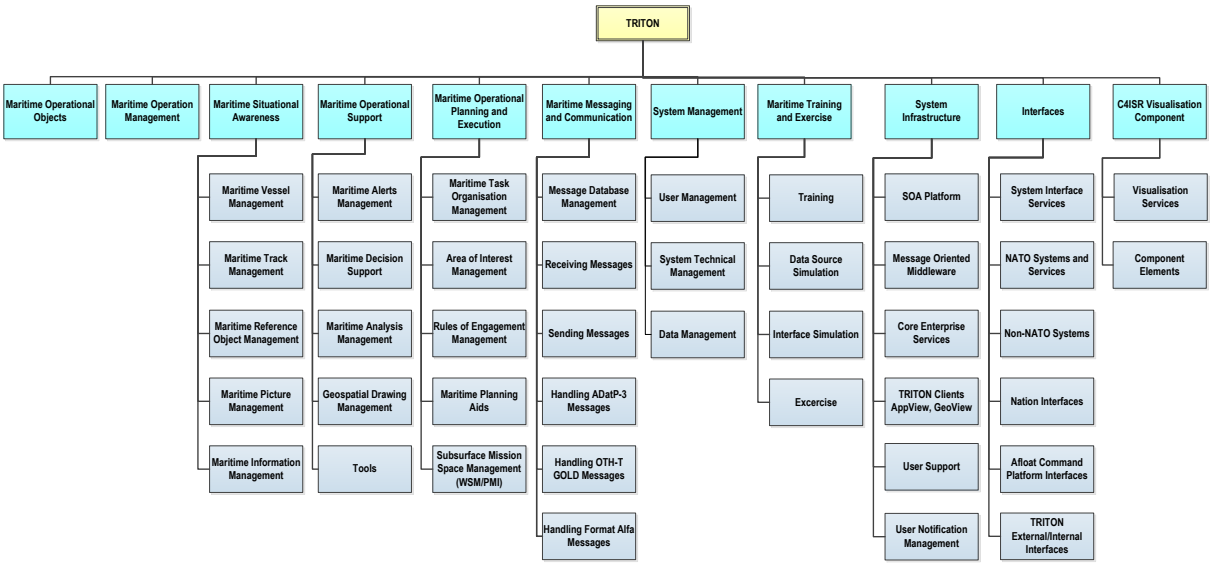
Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R021] *TRITON AppView shall terminate with an Exit Command from the user with confirmation. If GeoView has been launched, it shall be terminated when the AppView is terminated.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2. TRITON Functional Service Requirements

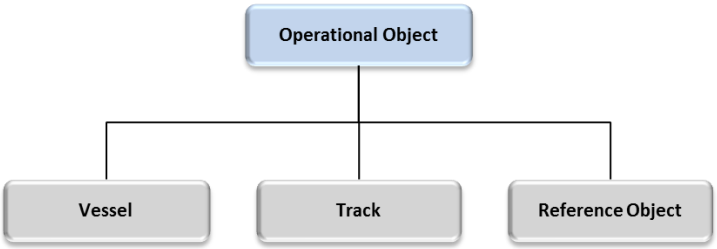
A Bi-SC AIS Functional Service enables users to collect, process, present and distribute information that supports the major functions of maritime operations which are the set of military activities conducted by maritime air, surface, sub-surface and amphibious forces to attain and maintain a desired degree of control of the surface, sub-surface, and air above the sea, influence events ashore, and, as required, support land, air and space operations. TRITON, as a full Bi-SC AIS Functional Service, will consist of a set of User Applications and Technical Services as explained in the Reference Architecture. The capabilities and functions of TRITON within the scope of Increment 1 are logically grouped into a structure. The following diagram shows the high-level breakdown of TRITON up to the second level.



Each functional group is elaborated further in the paragraphs of this Section. The lowest level components contain the system-level requirements. These components will be implemented as User Applications and Technical Services compliant to the C3 Taxonomy [C3TAXO]. Depending on the selected configuration identification method, the main functions will be mapped to system elements (configuration items and components) in the Product Breakdown Structure.

4.2.1. Maritime Operational Objects

TRITON uses Maritime Operational Objects to address all operationally related entities that need to be tracked, recorded and displayed. They are also known as Battle Space Object (BSO). A Maritime Operational Object has three entity types as shown below:



The definition of each entity type is given below:

Vessel **:** A maritime craft designed for transportation on water, such as ships, boats or submarines.

Track **:** Graphic and/or alphanumeric representation of successive positions of a moving object, point, or bearing whose position and/or characteristics are collected from sensors and/or other data sources. It can also be defined as a collated set of data associated with a track number for the purpose of representing the position and/or characteristics of point, or bearing (TRITON will use only point tracks).

Reference Object **:** A "Reference Point", a "Line" or an "Area" on earth that has an operational or tactical meaning.

Each type of entity is handled appropriately by its management functions.

4.2.2. Maritime Operation Management

Maritime Operation is a military action or the carrying out of a strategic, tactical, service, training, or administrative military mission; the process of carrying on combat, including movement, supply,

attack, defence and manoeuvres needed to gain the objectives of any battle or campaign. Maritime Operations include any actions performed by forces on, under, or over the sea to gain or exploit command of the sea, sea control or sea denial, and/or to project power from the sea. In a joint environment, maritime forces do more than simply pursue the maritime objectives of the JFC's campaign [AJP-3.1]. There may be Tasks and Nested Tasks in a Maritime Operation as well. The duration of a Maritime Operation can vary. It may be for a couple of weeks, a couple of years or continuous. An example to a long-term operation is to collect and monitor "White Shipping" at the NATO Shipping Centre.

Maritime Operation Types:

The types of Maritime Operations as defined in AJP-3.1 are listed below:

- Surveillance and Reconnaissance
- Coastal Defence Operations
- Protection of Shipping
  - Sea Control
  - Distant and Close Escort
  - Naval Cooperation and Guidance for Shipping
  - Convoying
- Sea Control Operations
  - Establishment and Maintenance of a Recognised Maritime Picture
  - Shaping Operations
  - Barrier Operations
  - Layered Defence
  - Exclusion Zones
- Maritime Power Projection Operations
  - Maritime Air Strikes
  - Amphibious Operations
  - Special Operations Forces
- Maritime Support to Joint Air Defence
- Other Maritime Operations
  - Maritime Interdiction Operations
  - Embargoes and Quarantine
  - Blockade
  - Other

Due to the nature of a maritime operation, an exercise or training, a "Maritime Operation" will be the key logical grouping factor for delivering services in TRITON. All input data is processed and grouped within the context of associated Maritime Operation. Therefore, Maritime Operations are defined as a manageable entity with its own context and the related TRITON services are applicable to a particular operation only in its context. Each operation context defines an "Environment" so that users can access the TRITON services in that Environment. This approach requires the automated management of Maritime Operations controlled by the authorised users.

Maritime Operation:

TRITON will maintain a list of Maritime Operations where each Maritime Operation is represented with at least the following attributes:

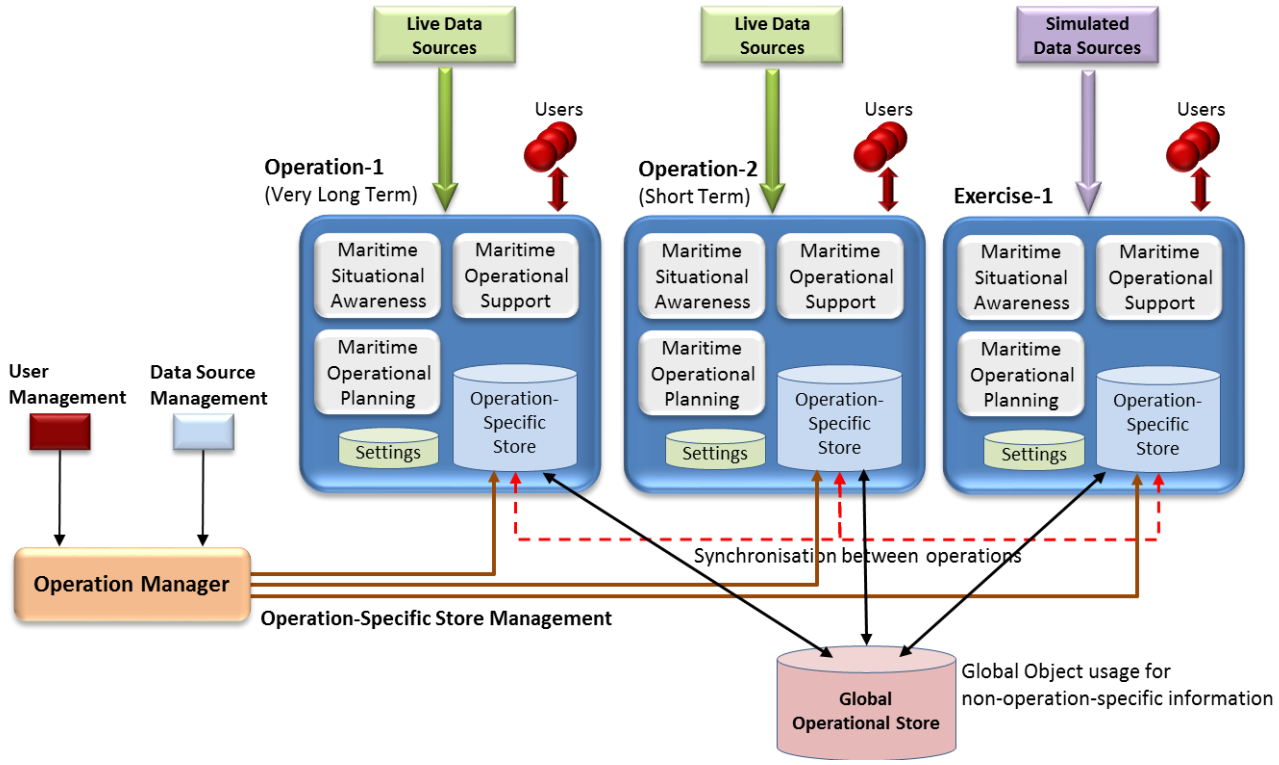
- Maritime Operation Identifier
  - Exercise Identification
  - Operation Codeword

  - Operation Alias Identifier
- Type (one of the above-mentioned operation types)
- Mode (live, exercise, mixed)
- Description (text)
- Objective (text)
- Security Classification
- Commander
- Begin/End Dates
- Status (in-preparation, active, inactive)
- Environment information (context)
- User Management data (user groups, users, privileges)
- Area of Operation (as an Area definition)
- Links to related documents (i.e. OPLAN, OPTASK RMP)
- Rules of Engagement List (associated to the ROE List)
- Associated Maritime Task Organization (see Maritime Task Organization Management)

The Maritime Operations List will be maintained by TRITON without any capacity limitation.

TRITON will maintain a logical store named as "Global Operational Store" to hold the information common to all operations at the global context. This includes the Vessel Database and other C2-related databases and lists (WSM/PMI Database etc.). When a new Maritime Operation is created, an "Operation-Specific Store" for holding the Maritime Operational Objects (Tracks, Vessels, Reference Objects and other data) is also created with a context called "Environment". This Environment is then filled with the selected information from the Global Operational Store.

The picture below depicts the concept of Operation Management, handling data flows and storing Maritime Operational Objects followed by their explanation:



Operation Manager:

The Operation Manager is a managing function in the System Management which acts as the central orchestrator to handle the creation of Environments specific to a Maritime Operation, management of users and data sources.

Users:

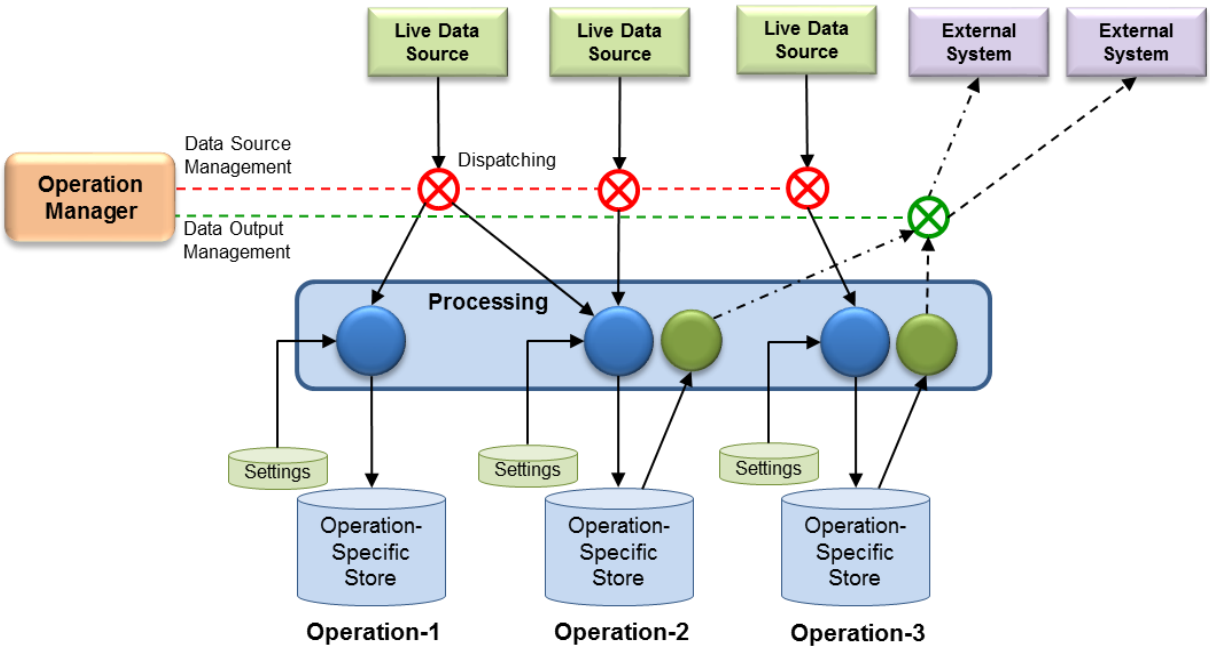
A user who wants to access TRITON services via a Client will initially be asked to select a Maritime Operation to which he/she will participate or view. After selection, the user will be able to enter into the Environment of the selected Maritime Operation. At any given time, a TRITON Client can access, if authorization provided, to as many Maritime Operations as the user wishes to access, including the RMP of that particular Maritime Operation.

Data Handling:

Operation-Specific Store also contains the data routing rules specific to the Maritime Operation so that incoming data (e.g. messages) are dispatched accordingly. The period and the destination of the generated Maritime Picture can also be handled in the same manner. The data generated in a Maritime Operation can be sent to other Operations according to their releasability labels.

Data Sources:

All external data sources (systems or services) are managed centrally by the Operation Manager which can dispatch the incoming/outgoing information flows from/to external systems/services. The Operation Manager is controlled by the Operations Administrator. The Operation Administrator manages the connection between the Operation-Specific Store and the data source by creating, modifying, deleting a connection, and monitoring their status. The concept of directing the flow of information under the control of Operation Manager is depicted in the following picture:



Operation Context:

All maritime functions will be available for any Maritime Operation regardless of their duration and classification. The logical store, Operation-Specific Store, will hold all the information related only to the Maritime Operation. It includes at least the following information:

- Name (the name of the Maritime Operation)
- Authorized users (with their roles within a Maritime Operation)
- Interfaces to external data sources (valid for the Maritime Operation)
- Operation-specific Vessels List (including COI/CCOI/VOCI/Custom Lists)

- TRITON Operational Object Databases (each object is uniquely identified in the global scope together with its security classification label and releasability label)
- Lists (e.g. C2 Areas, Person of Maritime Interest)
- There will be another store called "Settings" to hold the operation-specific configuration settings for Maritime Operational Object Management functions. Correlation Criteria settings is an example to this.

Each Maritime Operation will have its own data context with security classification and releasability labels. Operation-Specific Stores can synchronise their data according to these labels automatically.

Administration:

Each Maritime Operation has its own administration by the authorised user, Operations Administrator, who also configures the Environment including the Operation-Specific Store. Another administrative role, Operation-Specific Administrator, manages the users in a Maritime Operation and the settings for that Environment such as rules for Track Management and Picture Management. These settings can be configured according to the procedures (i.e. OPTASK RMP) associated to the Maritime Operation.

Databases:

TRITON Operational Object Databases are maintained separately in each Maritime Operation as part of their Operation-Specific Store. These databases store the Tracks, Vessels, Reference Object and other data such as WSM/PMI Areas and then used to build the RMP within the Maritime Operation Environment to conduct a specific Maritime Operation. All Maritime Operational Objects in databases have labels to indicate their releasability to Maritime Operations. When they are marked by the authorised user, the other Maritime Operations can access that information. In order to preserve the data integrity, only the authorised Maritime Operation can manage the Vessel Database in the Global Operational Store when the local one (Operation-Specific Store) is updated. All privileges to Maritime Operations are given by the Operation Manager while local settings are configured by the Operation-Specific Administrator. If necessary, off-line databases can be used to feed data into the databases within a Maritime Operation. Databases can be archived into a designated storage to be referenced later on.

Processing:

Based on the configuration settings, TRITON redirects the flow of information from/to external systems/services to its internal functions to process build the relevant databases and to output the Information Products. An example to operation-specific processing includes reception, validation, correlation, identification, association and filtering of tracks and vessels within a specific Maritime Operation. Default rules will be applied over the incoming data according to the Mode of the Maritime Operation (for example, live data will not be accepted in a simulated Maritime Operation as defined in NATO RMP SOP (Section 4, Paragraph (e) [RMP SOP]). The Operation-Specific Store will then be used to build the Maritime Operational Picture. If the local information in the Operation-Specific Store is not sufficient for identification process, then the Global Operational Store will be used. For example, if an Operation-Specific Store doesn't contain all the information for a particular vessel identification such as MMSI, IMO number, then it will look for this information in the Global Operational Store.

Accessing Maritime Picture:

The inherent way of accessing (in addition receive the disseminated information) a Maritime Picture compiled within a Maritime Operation will be achieved by first accessing the relevant Maritime Operation and then use the Picture Management capabilities. In addition, TRITON will be able to disseminate RMP using Web services and Formatted Messages.

Off-line Use:

Maritime Operations can be used for off-line data analysis purposes. A specific Maritime Operation can be created as a working environment. The user can then import data from an external archive (e.g.

an exported Vessel Database) into this Maritime Operation. Any user accessing this Maritime Operation can visualise the objects on the GeoView and perform any analysis.

Applicability:

All the functions defined in this SRS will be applicable to each Maritime Operation in an independent manner in its context.

[T1-R022] *TRITON shall maintain a list of Maritime Operations.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R023] *TRITON shall allow the authorised user to manage (create, modify, delete, import) the Maritime Operations List.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R024] *TRITON shall allow the authorised user to import Maritime Operation information from a selected TRITON Server of a selected installation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R025] *TRITON shall allow the authorised user to manage the databases in the Global Operational Store.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R026] *TRITON shall allow the authorised user to manage (create, backup, restore, delete, import, export) the Operation~~al~~-Specific Store. The user shall be able to import whole or part of previously exported Maritime Operational Object Databases into the internal databases of a Maritime Operation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R027] *TRITON shall allow the authorised user of a Maritime Operation to manage the users in that Maritime Operation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R028] *TRITON shall control and direct the flow of information coming from external data sources to a Maritime Operation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R029] *TRITON shall control and direct the flow of information to external systems/services within a Maritime Operation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R030] *TRITON shall allow the authorised user of a Maritime Operation to manage the flow of information to/from external data sources.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R031] *TRITON shall allow the authorised user of a Maritime Operation to manage the sharing of data with other Maritime Operations according to the security classification and releasability labels.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R032] *TRITON shall allow the authorised user of a Maritime Operation to make use of the shared data by other Maritime Operations according to the security classification and releasability labels.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R033] *TRITON shall allow the authorised user of a Maritime Operation to manage the configuration settings applicable to information processing.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

4.2.3. Maritime Situational Awareness

Maritime Situational Awareness (MSA) capability allows the users to consult, manage and process shipping information both military and non-military. NATO MSA is an enabling capability which seeks to deliver the required information in the maritime environment to achieve a common understanding of the maritime situation to increase effectiveness in the planning and conduct of operations.

MSA covers both the military and non-military realms and involves interoperability and/or collaboration with a wide variety of non-traditional data sources, organizations and actors. While this profile is unclassified, comprehensive MSA includes other architectural elements such as classified intelligence and locations of warships to provide the full RMP.

The maritime environment comprises the oceans, seas, bays, estuaries, waterways, coastal regions and ports. Considerable resources for merchant shipping data are available ranging from commercially available databases to transient records of vessels passing through the world's ports posted on port websites.

Information related to non-combatant (civilian) vessels may be collected from both static reference external databases such as World Port Index (WPI) or Lloyd's Marine Intelligence Unit, and dynamic sources such as Automatic Identification System (AIS), Long Range Tracking and Identification (LRIT) system as well as from operator defined data. Combatant (military) vessels can be tracked by using the Tactical Data Link capabilities, Nations' reports and information collected by ACPs. Intelligence reports and any other inputs can be used to enhance the MSA. Warships AIS (W-AIS) [STANAG 4668], [STANAG 4669] may also be used if the data is available in reporting sources.

The MSA functionality in TRITON includes the management of Maritime Operational Objects (Tracks, Vessels and Reference Objects), Maritime Picture Management and Maritime Information Management. These functions enable users to access, collate, and merge validated data to build the global Maritime Operational Picture which will then be used to build the Recognised Maritime Picture.

4.2.3.1. Maritime Vessel Management

A maritime craft will be represented as a Maritime Vessel in TRITON. Virtually all maritime vessels in the world will be stored in a database called "Vessel Database". It will hold all naval units, merchant vessels, fishing vessels, pleasure crafts and government ships like coastguard, police, customs and research. The Vessel Types are defined in APP-20 as follows:

Combatants:

Naval, Coast Guard and Government-owned vessels/craft which possess some sort of inherent armed or combat capability primarily intended for offensive use. This group of vessels has the following sub-groups:

- Submarines
- Principal Surface Combatants
- Patrol Vessels
- River/Roadstead Patrol Vessels
- Mine Warfare Vessels
- Amphibious Warfare Vessels
- Special Warfare Vessels
- Coast Guard Vessels (including law-enforcement vessels)

Non-Combatants:

Auxiliary, Service Support or Merchant/Recreational Vessel types, which tend to be role specific. They may possess an armed or combat capability intended primarily for self-defence purposes. This group of vessels has the following sub-groups:

- Auxiliary Vessels
- Service and Support Vessels
- Government-owned Vessels
- Merchant Vessels
- Recreational Vessels

Once Vessel Database is accumulated, only the authorised user can manage (add, modify, remove) the Vessel Database. The information from various data sources such as Nation reports, intelligence reports and data links is analysed and correlated, and the available Tracks can be associated with Vessels in the Vessel Database. This database provides detailed, static information for those Tracks and stores the history. The authorised users can manually update the static attributes of Vessels like activity, status, capabilities, image.

All TRITON users can issue a search to find a specific Vessel and view its attributes including the last reported position and kinematic history. TRITON displays the Vessels using the same symbology as Tracks. RMP can be enhanced using this database in addition to the Track Database.

4.2.3.1.1. Vessel Definition

A maritime vessel, for both combatant and non-combatant, is represented in TRITON with a record in the Vessel Database. The primary sets of data stored are given below:

Identification Set:

A set of attributes called "Identification Set" is used to uniquely identify a Vessels in the Vessel Database. It consists of the following:

- Country
- Vessel Name
- Name synonyms
- International call sign
- Hull number (for combatants)
- IMO number (for non-combatants)

Kinematics Data:

Kinematics Data consists of with at least the following:

- Geographical position (latitude, longitude)
- Course and a speed
- Depth (for submerged vessels)
- Updating source identification
- Date-Time Group (DTG) of update

Journey Data:

Journey Data for non-combatants consists of the following:

- Departure port, DTG
- List of Last Ports of Call (at least ten (10))
- Next Port of Call and Estimated Time of Arrival (ETA as DTG)
- Arrival port, DTG

Event Data:

Event Data for non-combatants consists of the following:

- Events (text, e.g. attempt for hijacking)
- Response to Hailing
- Area
- DTG

Activity Data:

Activity Data for combatants consists of the following:

- Activity (for surface/subsurface platforms as defined in STANAG 5516)
- Maritime Mission

- Maritime Unit Task
- Begin DTG, end DTG

History:

History data for each Vessel consists of a list of records containing the following:

- Kinematics History : A timely set of Kinematics Data
- Journey History : A set of Journey Data
- Activity History : A timely set of Activity Data
- Event History : A timely set of Event Data

Vessel Data:

TRITON will store the data related to each Vessel with a record called "Vessel Data" which includes at least the following attributes:

- Unique identification (TRITON Vessel Number)
- Identification Set (as defined above)
- Current Maritime Operation
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Picture designation (Recognised, Military, White, none)
- High Value Unit (yes/no)
- RMP designation
  - Included RMP Region identification
  - Excluded RMP Region identification
- Exercise Indicator
- Exercise Identification Set
  - Exercise Identity
  - Exercise Country (STANAG 1059, Annex C)
  - Exercise Vessel Name
- Vessel Type (combatant or non-combatant)
- For Combatants:
  - Ship Designator (one of the ship designators for combatant as defined in APP-20 Table 1A-1)
  - Class name (name of the class that the ship belongs to)
  - Sensor information (types, ranges, status, etc.)
  - Weapon information (types, ranges, status, etc.)
  - Damage status (text)
  - Endurance (fuel, oil status)
  - Speed capabilities (maximum, economical, cavitation speed (submarines))
  - Diving capability (submarines)
  - Commanding Officer
  - Activity History (as defined above)
- For Non-combatants:
  - Ship Designator (one of the ship designators for non-combatant as defined in APP-20 Table 1A-1)
  - LRIT Equipment Identifier
  - Voluntary reporting (whether or not contributing to voluntary reporting scheme with Format Alfa)
  - Number of crew

  - Number of passengers
  - Owner company and contact details
  - Speed capabilities (maximum, economical, cruise)
  - Endurance (range, duration)
  - Journey History (as defined above)
  - Detention List indication with the associated list if exists
- Standard Identity (STANAG 1241)
- AIS MMSI Number
- Physical characteristics (length, beam, draught, masthead-height, displacement, deadweight, etc.)
- Cargo (LPG, oil, chemicals, goods, material, food, machinery, container, etc.) and amount
- Built date and builder
- Launch and commissioning dates
- Propulsion (engine, steam, nuclear, sail)
- Status (operational, overhauling, maintenance, hijacked, decommissioned, lost, sank, etc.)
- Last Known Kinematics Data (as defined in the Description)
- Kinematics History (as defined above)
- Event History (Event Data)
- Image files
- Data files
- URL list for any external references
- Vessel List indication with the associated list (CCOI/COI/VOCI/Custom) if exists
- Local Remarks (text, DTG and originator)

Note: All time values are in UTC.

The attributes of Vessels will be determined according to the most recent Maritime Datasets available. Attributes as history information (Kinematics, Activity, Event, Journey) will have no capacity limitation. A configuration parameter History Period will be used to set the time period for storing data.

4.2.3.1.2. Vessel Database Management

Cuurently, there are over half a million maritime vessels of different sizes in the world. It is expected in near feature that this number will approach to five million. TRITON will maintain an internal storage called "Vessel Database" for dynamically storing and managing Vessels in all types and sizes as recognised by NATO. The Vessel Database will be optimised for quick access, update and retrieval without any physical capacity limitation, considering the future needs. The history information for each Vessel will also have no capacity limitation. For design purposes, the expected number of vessels in future will be used.

The authorised user can manage (add, modify, remove, export, import, backup) the Vessel Database. Vessel Database can be updated by importing data from external Maritime Datasets (see Maritime Information Management / Maritime Datasets). Whole or portions of the Vessel Database can be exported into a file in Recognised Export File Format.

[T1-R034] *TRITON shall maintain a Vessel Database to store all Vessels in the world in all types and sizes as recognised by NATO.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration
Comment : The Vessel Data definition will be finalised during SwDR.

[T1-R035] *TRITON shall use an optimised database structure for storing only the relevant data for relevant attributes for particular types of Vessels (for example, weapons data will be stored for only combatants).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R036] *TRITON shall allow the authorised user to manage (add, modify, remove, import, export, backup) the Vessel Database in each Maritime Operation scope. The user shall be able to export or import whole or part of the database.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R037] *TRITON shall be able to store the attribute changes made by the authorised in the Vessel Database user for at least ninety (90) days.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R038] *TRITON shall be able to store Kinematics History, Journey History, Activity History and Event History for each Vessel for a period of time set in the configuration parameter History Period.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration
- Comment : For test purposes ninety (90) days will be used.

[T1-R039] *TRITON shall allow the authorised user to set the configuration parameter "History Period" which is used for determining the period of history to be stored in the Vessel Database.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R040] *TRITON shall notify the authorised user about the Vessels if their History Period is reached with an option of time extension.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R041] *TRITON shall allow the authorised user to set the configuration parameter "Vessel History Distance" for each vessel type in order to determine the interval for updating the vessel positions in the Vessel Database.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.3.1.3. Vessel Number Management

TRITON will use multi-level Vessel Identification. System-specific internal vessel identification mechanism may be hidden from the users, but a user-level vessel numbering scheme named as "TRITON Vessel Number" (TVN) will be maintained system-wide. TVN will be a decimal number sufficiently large to address all vessels in the Vessel Database. TVNs will be used to display vessels on GeoView even if they are not associated to tracks.

Each TRITON instance may have the same vessel number scheme, but separate pools (number blocks) can be defined and allocated for each of them. Similarly, a number block is allocated for each Maritime Operation.

[T1-R042] *TRITON shall use unique decimal numbers to identify vessels at user level.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R043] *TRITON shall allow the authorised user to allocate TVN pool for the entire system and each Maritime Operation by defining the first and last vessel numbers.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R044] *TRITON shall assign a unique TVN to each new vessel added into the Vessel Database.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.3.1.4. Vessel Identity Management

TRITON can display vessels on the GeoView using the track symbology (e.g. APP-6) with the default Standard Identity (for Standard Identities see Track Identity Management) in the database.

Standard Identities:

All vessels in the Vessel Database will have the default Standard Identities as given below:

On the NS Domain:

- All alliance combatants : FRIEND
- All others : NEUTRAL

On the NU Domain:

- All types of vessels : NEUTRAL

In addition, TRITON will allow the authorised user to define the Standard Identities to be assigned to the vessels according to the current SOPs.

[T1-R045] *TRITON shall assign FRIEND as the default Standard Identity to all alliance combatant vessels in the Vessel Database and NEUTRAL to all other vessels on the NS Domain.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 1
- Qualific. Method : Test

[T1-R046] *TRITON shall assign NEUTRAL as the default Standard Identity to all vessels including the alliance combatant vessels in the Vessel Database on the NU Domain.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 1
- Qualific. Method : Test

[T1-R047] *TRITON shall allow the authorised user to assign a new Standard Identity according to [STANAG 1241] to selected vessels in the Vessel Database.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 1
- Qualific. Method : Test

4.2.3.1.5. Vessel Management

Vessels in the Vessel Database can be managed (add, modify, remove, import, export) by the authorised user. Any attribute of any Vessels can be modified only by the authorised user. Vessel Database can be updated by importing data from external Maritime Datasets. Selected Vessels can be exported into a file in Recognised Export File Format.

Vessels in different Maritime Operations can be shared if they are labelled accordingly in their Releasable Maritime Operations attribute.

[T1-R048] *TRITON shall allow the authorised user to import data from recognised Maritime Datasets into the Vessel Database.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R049] *TRITON shall check the key attributes of Vessel Data during the import process from a selected Maritime Datasets into the Vessel Database and prevent any duplications with notification.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R050] *TRITON shall be able to use a Vessel Data Import Tool to import data from a selected Maritime Datasets into a file in Recognised Import File Format.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1

Qualific. Method : Demonstration

[T1-R051] *TRITON shall allow the authorised user to be able to export data from the Vessel Database according to a given selection criteria into a user-specified file in Recognised Export File Format.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R052] *TRITON shall be able to share the Vessels in the Vessel Database among multiple Maritime Operations if they are labelled accordingly in their Releasable Maritime Operations attribute.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

4.2.3.1.6. Vessel List Management

Vessel List Management provides managing (create, update, delete) dynamic lists of maritime vessels that are subject to close interest. A list will hold the names of a number of ships with a label explaining the purpose and context of the list. Following Vessel Lists, as defined in [MC0367/2], will be identified:

Critical Contact of Interest (CCOI):

Any platform in the maritime domain conducting activities qualified as illegal by international law and considered to be an imminent threat to NATO, NATO Nations maritime security interests and/or related assets.

Contact of Interest (COI):

Any platform in the maritime domain conducting activities qualified as illegal by international law considered to be a potential threat to NATO, NATO Nations maritime security interests and/or related assets.

Vessel of Collection Interest (VOCI):

Any platform in the maritime domain involved in any activity of intelligence interest.

Custom Watch List:

Any platform in the maritime domain conducting activities that do not qualify for one of the above but raise special interest for NATO. For example, NATO Shipping Centre Priority List can be created and maintained.

For the purpose of detailed situational awareness, COIs and VOCIs are sub-categorised in reporting according to the reason that led to their classification. The following seven types are being used in accordance with international law, including any applicable treaties and customary law and with full respect for any relevant United Nations Security Council Resolutions:

- Type 1: Platform/ Owner or Company possibly associated with terrorism;
- Type 2: Platform/ Owner or Company possibly associated with Weapon of Mass Destruction (WMD) Proliferation;
- Type 3: Platform/ Owner or Company possibly associated with illegal Immigration;
- Type 4: Platform/Owner or Company possibly associated with piracy, slave trade or engaged in other activities qualified as illegal by international law;
- Type 5: Platform having displayed suspicious behaviour;

- Type 6: Platform possibly posing an environmental concern;
- Type 7: Selected platforms of armed forces of non-NATO nations and other platforms as the situation dictates.

The Vessel Lists can be shared with national authorities using formatted messages.

Vessel Information:

For each Vessel List at least the following information will be stored:

- COI Category (CCOI/COI/VOCI and Custom Watch List)
- Vessel List identification (name)
- Activity (Terror, Weapon of Mass Destruction, Immigration, Illegal, Suspicious, Environment, Military, and/or Others)
- Current Maritime Operation
- Security Classification
- Releasable Maritime Operation
- RMP designation
  - Included RMP Region identification
  - Excluded RMP Region identification
- Description of the interest of the list
- Comments (e.g. "not to be hailed without approval")
- Date of validity of the list
- List of Vessels

There may be several Vessel Lists to be maintained concurrently. Each Vessel List also contains hundreds of vessels of interest. TRITON will not have a capacity limitation to store and manage the Vessel Lists.

[T1-R053] *TRITON shall maintain Vessel Lists to store CCOI/COI/VOCI and Custom Lists as defined in the Description.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R054] *TRITON shall allow the authorised user to manage (create, modify, delete, import, export) the Vessel Lists.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R055] *TRITON shall allow the authorised user to define the default identities to be assigned to CCOI and COI vessels.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R056] *TRITON shall automatically assign the default identities to CCOI and COI vessels when the Vessel List is created.*

Requirement Property :
Domain for Static : NS

Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R057] *TRITON shall allow the user to display the Vessels in the selected Vessel List in sortable tabular form with an option to indicate it on the GeoView.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R058] *TRITON shall allow the user to display the positions of the Vessels of the selected Vessel List on the GeoView based on user-selected criteria (e.g. type, date, country, area).*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R059] *TRITON shall allow the authorised user to export selected Vessel Lists into a file in Recognised Output File Format and import Vessel Lists from a given file in Recognised Input File Format.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R060] *TRITON shall allow the authorised user to select a Vessel List and generate a Formatted Message (e.g. OTH-T GOLD CONTACT REPORT or ADatP-3 MARINTREP).*

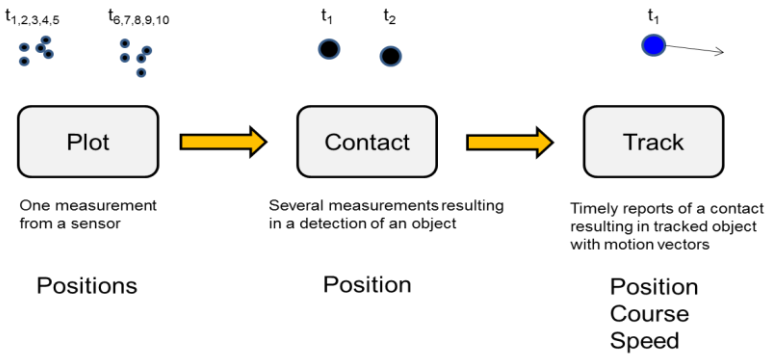
Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

4.2.3.2. Maritime Track Management

Starting from the sensor level, a sensor detection is called a "plot". Plots are used to build "contacts" reported by the sensors. Those contacts can then form a "track" if a tracking process is used either within the sensor or outside of the sensor.

A "track" is the representation of a moving object in terms of its position, course, speed and general characteristics. The information comes from external sources. Tracks may be in two forms: Point Tracks and Bearing Tracks. A Point Track may have two or three dimensions with course and speed. Bearing tracks can have only one dimension, an origin and an angle from true north.

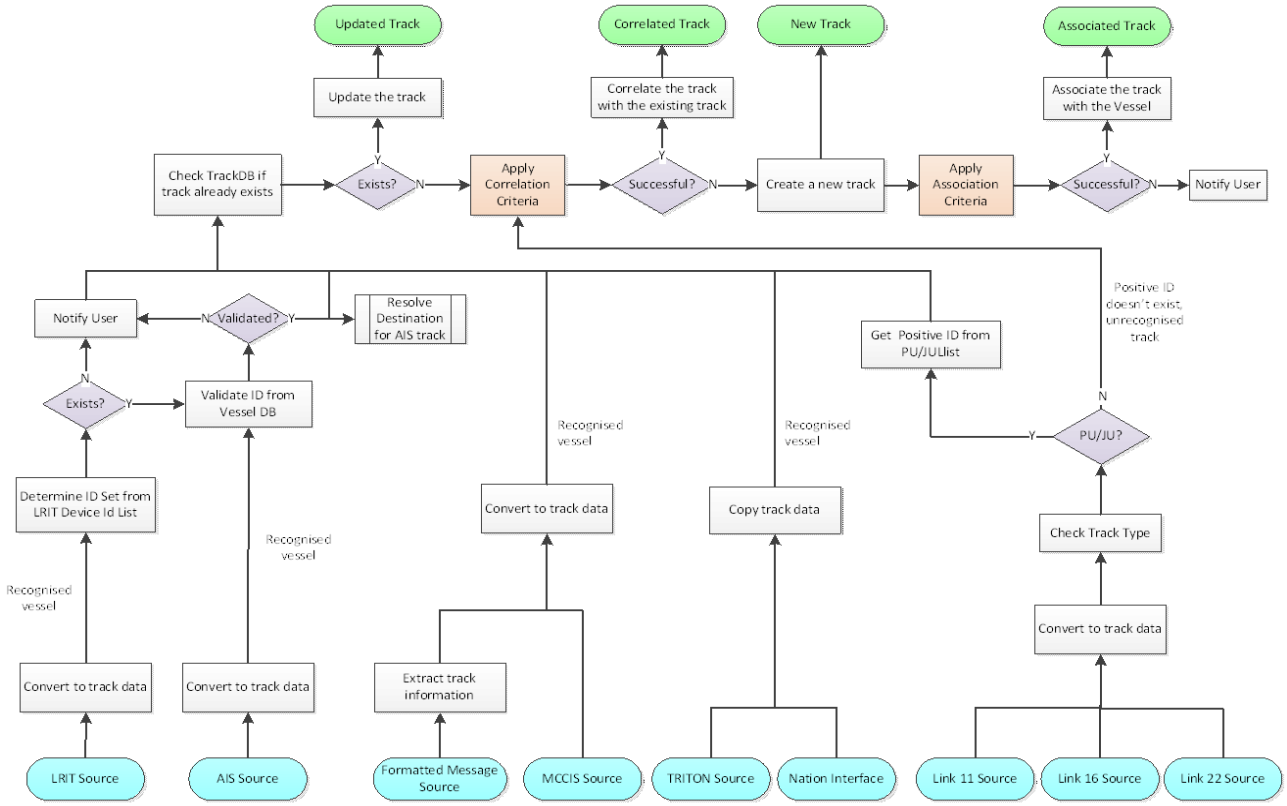
TRITON will use only point tracks, not contacts and sensor plots. The terminology distinction is depicted below:



TRITON will use the term "track" for both one-time report for a vessel and continuous on-line reporting of a vessel by a recognised source. For example, AIS track from an AIS source, NIRIS track feed or Nations' on-line track feeds are all considered as tracks. Similarly, a report received from a Nation using OTH-T GOLD message will also be treated as a track. The contact reports received from a source will be used to create a TRITON track if it doesn't exist, follow-on reports will be used to update that track. Tracks can be dropped by TRITON if no update is received within a specified time period. Tracks can also be deleted by its reporting source.

TRITON will support world-wide track management, which means all tracks detected and reported from different regions of the world will be identified uniquely in the system context. Therefore, unique number allocation will consider multiple TRITON instances.

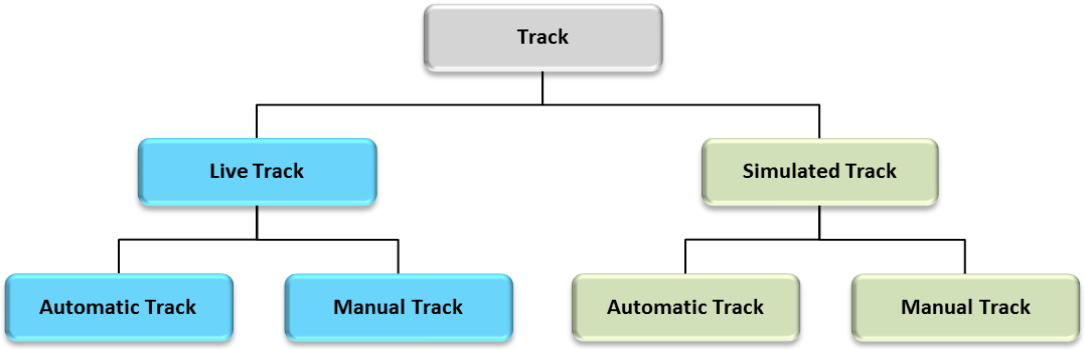
TRITON maintains an internal track store, creates tracks based on the received track data, updates them, correlates them if they are reported by different sources, and deletes them if they are deleted by source or not updated for a given time. A notional flow of data from sources to user-level tracks is illustrated in the following flowchart:



Each process and decision point is explained in relevant paragraphs and associated with requirements.

4.2.3.2.1. Track Definition

TRITON will process only point tracks using 3-dimensional coordinates. Geodetic positions (Latitude and Longitude) will be used to indicate the location on earth. Altitude and depth will be processed and displayed. TRITON track types are shown below:



The definitions of these track types are given below:

Live Track : A track that represents a real object in the world.

Simulated Track : A track that represents an imaginary object.

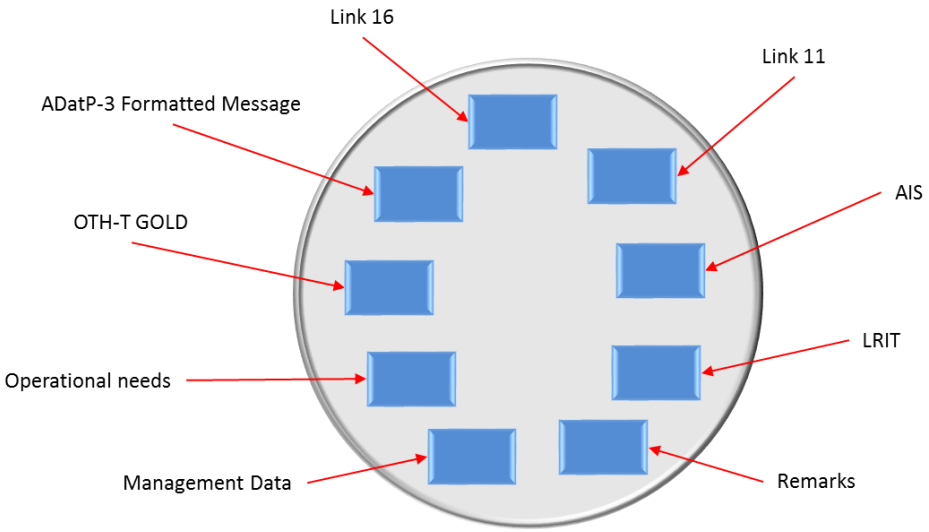
Automatic Track : A track reported by a sensor or simulator and updated continuously.

Manual Track : A track manually initiated and maintained by an operator.

AIS, LRIT, on-line Nation feed and TDL tracks are examples to automatic tracks. Nations report (via formatted messages) and user-initiated tracks are manual tracks.

The attributes for maritime objects may be different depending on the type of the vessel being tracked. TRITON will use a standard track definition internally which is a composition of several track types received from various sources. It is called "Track Data", which consists of a combined set of attributes for both combatant and non-combatant tracks. When received from external sources, depending on the type of the track, only the relevant attributes of a track will be used in the Track Data, which will then be processed, stored and displayed appropriately.

The figure given below conceptually depicts how the TRITON track definition is derived from several definitions of track:



Identification Set:

TRITON uses a set of attributes called "Identification Set" to uniquely identify a track. This set is also used to identify Vessels and includes the following:

- Country
- Vessel name
- Name synonyms
- International call sign
- Hull number (for combatants)
- IMO number (for non-combatants)

Kinematics Data:

Each Track Data record keeps the last known position and course-speed information using "Kinematics Data" which consists of the following attributes:

- Geographical position (Latitude / Longitude)
- Course and a speed (over ground)
- Depth (for subsurface tracks)
- Altitude (for air tracks)
- Elevation (for land tracks)
- Time of update (UTC)

Kinematics History:

The positions of a Track will be stored in its Kinematics History at an interval which will be computed by using a configurable system setting called "Track History Distance". The Track History Distance will be used to calculate the "Track Kinematics History Update Interval" according to the following formula:

Track Kinematics History Update Interval = Track History Distance / Current Track Speed

Example: If the Track History Distance is set to 2000 yards and the track speed is 20 kts, the Track Kinematics will be stored at every 180 seconds (3 minutes).

In a similar fashion, the positions of a Vessel associated to a Track will be updated in the Vessel Database at an interval which will be computed by using a configurable system setting called "Vessel History Distance". The Vessel History Distance will be used to calculate the "Vessel Position Update Interval" according to the following formula:

Vessel Position Update Interval = Vessel History Distance / Current Track Speed

Example: If the default for the Vessel History Distance is 2000 yards and the track speed is 10 kts, the Vessel position is to be updated at every 360 seconds (6 minutes).

The update intervals gets longer if the track speed gets lower. There will be separate Track History Distance and Vessel History Distance parameters for each vessel type (e.g. frigates, submarines, tankers, leisure boats).

Track Data:

TRITON uses "Track Data" record to store a Track in the Track Database. It will consist of at least the following attributes:

- Unique Identification (TRITON Track Number)
- Identification Set
- Source (track originator's type and identification)
- Current Maritime Operation
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- High Value Unit (Yes/No)
- Picture designation (Recognised, Military, White, none)
- RMP designation
  - Included RMP Region identification
  - Excluded RMP Region identification

- Track type (live, simulated)
- Update type (automatic, manual)
- Life cycle status
- Ship Designator (one of the ship designators for combatant and non-combatant as defined in APP-20 Table 1A-1)
- For Combatants
  - Tactical Data Link information (Link identification and Network Track Number if reported by a TDL)
  - Identity amplifier/modifying descriptor (combination of STANAG 5511 and STANAG 5516)
  - Activity (for surface/subsurface platforms as defined in STANAG 5516)
  - Special interest descriptor
- For Non-combatants
  - LRIT Equipment Identifier
  - Last Port of Call and Departure Date
  - Next Port of Call and Estimated Arrival Date
  - Destination (name and geographical position)
- Track Source (visual, radar, AIS, LRIT, asset-reported, nation-reported, intelligence, C2-system, TRITON instance, etc.)
- Other TRITON Track Number (if received from a source as another instance of TRITON)
- Environmental descriptor (surface, sub-surface, land, air, space, unknown) [STANAG 1241]
- Standard Identity [STANAG 1241]
- AIS Information (if available)
  - AIS Version
  - MMSI number
  - Receiver Type and ID
  - Heading
  - Rate of turn
- Exercise Indicator (if set)
  - Exercise Identification Set
    - Exercise Identity
    - Exercise Country [STANAG 1059] (Annex C)
    - Exercise Vessel Name
- Confidence Level
- Kinematics Data
- Time of last update
- Kinematics History (as defined above)
- Vessel of Interest status (COI/CCOI/VOCI/Custom, none)
- Local Remarks (text, DTG and originator)

Note: All time values are in UTC.

4.2.3.2.2. Track Database Management

TRITON will maintain an internal storage called "Track Database" for dynamically managing Tracks. There may be several thousands of Tracks to be managed and stored. The number of tracks will increase for White Picture as space-based AIS data sources become available, and small vessels also start using AIS devices. The number of vessels reporting AIS data will be approaching to five million

over the coming years. Therefore, TRITON Track Database will not have a physical capacity limitation. For design purposes, expected number of vessels will be used.

The Track Database will be optimised for quick access, update and retrieval.

[T1-R061] *TRITON shall maintain a Track Database to store all tracks within the Environment of a Maritime Operation with a standard "Track Data" representation as given in the Description of the Track Definition.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration
- Comment : The Track Data definition will be finalised during SwDR.

[T1-R062] *TRITON shall use a Track Database structure optimised to store only the relevant data for relevant attributes for particular types of vessels (for example, weapon information will be stored for only combatants).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R063] *TRITON shall allow the authorised user to set the configuration parameter Track History Distance for each vessel type in order to determine the interval for storing the Kinematics History in the Track Database. The details are given in the Description.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R064] *TRITON shall allow the authorised user to purge the Track Database (delete all tracks) after confirmation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R065] *TRITON shall be able to share the Track Data among multiple Maritime Operations if they are labelled accordingly in their Releasable Maritime Operations attribute.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

4.2.3.2.3. Track Source Management

TRITON will have several track sources that are identified uniquely so that multi-source and track-to-track correlation will be possible. On-line, near-real time tracks will be received from external sources data such as NIRIS, MSSIS, AIS and LRIT. NIRIS provides the interface for TDLs used by maritime platforms. One NIRIS interface may have multiple sources. Nations feed their track data and contact reports using either on-line data stream or formatted messages. Each Nation is considered as a

separate track source for TRITON. The configurable source identification information will be displayed to the user within the track information set.

TRITON will use Confidence Level for each track source. Confidence Level will be a decimal number indicating the validity or certainty of the information provided in the track data. A larger value represents a greater confidence level. Tracks reported by a source will have a default Confidence Level which can then be used as a decision aid in correlation process and RMP filtering.

A System Interface Service (see System Management) will be used for each track source, capable of handling all track reports coming from a source.

It is expected that several millions of vessels will be reporting AIS data over the coming years. TRITON will be able to handle large number of tracks reported simultaneously. For performance and scalability reasons, a track source may be separated into multiple services, and filters can be applied.

TRITON will maintain a Confidence Level Table having default values for each track source. Track sources will assign a default Confidence Level depending on the type of the track it received from external world. For example, a reported track whose source is a radar will be indicated as such.

A sample table with values between 1 and 5 is given below:

Source	Confidence Level
Track Report from a NATO Asset with positive identification	5
Track Report from a NATO Asset without positive identification	4
Tracks received from TDL via NIRIS	5
Track received from a Nation	5
NATO AGS-Radar track (no ID)	3
NATO AGS-AIS track	1
NATO AGS-processed track	5
MSSIS	1
AIS Data Source	1
LRIT Data Centre	4
Correlated AIS and LRIT tracks	3
Correlated two AIS tracks	1
Correlated Radar and AIS tracks	4

[T1-R066] *TRITON shall identify each track source uniquely (i.e. maintaining a Source ID). A System Interface Service (SIS) shall be used for each external source where each individual track source is identified with a Source ID.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R067] *TRITON shall allow the authorised user to configure track sources dynamically (add, modify, remove) without re-starting the whole Application.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R068] *TRITON shall assign the Releasable Maritime Operations label to a track source as received from the Maritime Operation Manager.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R069] *TRITON shall allow the authorised user to control (allow or prohibit) input of tracks from a selected source into a Maritime Operation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R070] *TRITON shall be able to process all tracks received from a track source by taking the performance issues into consideration. Depending on the load, scalable services, pre-filtering, configurable update rates can be used.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration
Comment : Performance criteria for high number of track inputs will be determined at the CDR.

[T1-R071] *TRITON shall assign the source identification to each track when it is received for the first time and maintain it thereafter.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R072] *TRITON shall maintain a Confidence Level Table, for each Maritime Operation, to be used as the default for track sources.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R073] *TRITON shall allow the authorised user to modify the Confidence Level Table, while the system is operating.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.3.2.4. Track Number Management

TRITON will use multi-level track identification. System-specific internal track identification mechanism is hidden from the users, but a user-level track numbering scheme named as "TRITON Track Number" (TTN) will be maintained system-wide. TTN will be a decimal number with sufficient digits to address all tracks.

Each TRITON instance may have the same track number scheme but differing pools (number blocks) can be defined. Similarly, a number block is allocated for each Maritime Operation.

Tactical Data Link (TDL) Track Numbers will also be stored in the Track Data if the tracks are received from TDLs.

[T1-R074] *TRITON shall use unique decimal numbers to identify tracks at user level.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R075] *TRITON shall allow the authorised user to allocate TTN pool for the entire system and each Maritime Operation by defining the first and last track numbers.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R076] *TRITON shall assign a unique TTN to each new track received from external sources or initiated internally.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

4.2.3.2.5. Track Identity Management

Tracks in TRITON have attributes for distinguishing them from each other by using identification information. If reported tracks have information which helps to derive country name and vessel name, then it is said to be Positively Identified. Some track sources may report tracks without positive identification but with Standard Identities.

Standard Identities:

The Standard Identities for platforms are described in STANAG 1241 and given below:

- UNKNOWN - An evaluated track that has not been identified (AAP-6)
- ASSUMED FRIEND - A track which is assumed to be a friend because of its characteristics, behaviour or origin
- FRIEND - A track belonging to a declared, presumed or recognised friendly nation, faction or group. (AAP-6)
- NEUTRAL - A track whose characteristics, behaviour, origin or nationality indicate that it is neither supporting nor opposing friendly forces (AAP-6).
- SUSPECT - A track which is potentially hostile because of its characteristics, behaviour, origin or nationality
- HOSTILE - A track whose characteristics, behaviour or origin indicate that it is a threat to friendly forces. Designation as hostile does not necessarily imply clearance to engage (AAP-6).

Tracks which have not been subject to the identification process but which are available for reporting will be reported with a status of PENDING.

Following amplifying/modifying descriptors identities can also be used for the tracks having special interest:

- KILO (friendly track with special interest)

- TRAVELLER (a SUSPECT surface track following a recognised traffic route)
- ZOMBIE (a SUSPECT air track conforming to ATC rules or following a recognised traffic pattern)

An identity other than UNKNOWN is only to be applied to a track if sufficient identification has taken place to meet the requirements of that identity.

A recognised track is defined as such because when its identification has been verified. During the RMP building process, reported tracks are evaluated by an assigned RMP Manager. Recognised tracks can then be associated to vessels in the Vessel Database.

Tracks that exist in the real world but are being used for exercise purposes can have an additional attribute named as "Exercise Indicator". When this indicator is set, the identity of friendly tracks can be amplified and marked that the track is acting as other than a FRIEND for exercise purposes and to include artificial data in certain fields. Artificial data for that track can be used for exercise purposes. The identity attribute can take the following values:

- EXERCISE PENDING
- EXERCISE UNKNOWN
- EXERCISE ASSUMED FRIEND
- EXERCISE FRIEND
- EXERCISE NEUTRAL
- JOKER (a friendly track acting as SUSPECT for exercise purposes)
- FAKER (a friendly track acting as HOSTILE for exercise purposes)

[T1-R077] *TRITON shall use Standard Identities as defined in STANAG 1241 for tracks on the NS Domain.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R078] *TRITON shall restrict the user to assign SUSPECT and HOSTILE as Standard Identities to any track or vessel on the NU Domain.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 1
Qualific. Method : Test

[T1-R079] *TRITON shall restrict Standard Identity change for automatic tracks if the authorised user has already made a change on it.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 1
Qualific. Method : Test

[T1-R080] *TRITON shall automatically assign the Standard Identity FRIEND to a received track if it doesn't have a Standard Identity but its Ship Designator is combatant and its country is one of the NATO Nations as indicated in the NATO Standard Country Code Table.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 1
Qualific. Method : Test

[T1-R081] *TRITON shall allow the authorised user to assign a new Standard Identity to a received track with Ship Designator non-combatant.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 1
- Qualific. Method : Test

[T1-R082] *TRITON shall compare the names in the Identity Set when a new positive identity (country and vessel name) is entered by a user for an existing track and notify the user if another track with the same name already exists.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R083] *TRITON shall use the associated Vessel name if the reported names for correlated tracks are differing.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R084] *TRITON shall allow the authorised user to assign Exercise Indicator and Exercise Identity to a track.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 1
- Qualific. Method : Test

[T1-R085] *TRITON shall be able to process a received track with its Exercise Identity if its Exercise Indicator is set by the originator.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 1
- Qualific. Method : Test

4.2.3.2.6. Track Life Cycle Management

TRITON automatic and manual tracks will have life cycle states that define their presence.

Initiation of automatic and manual tracks and managing their life cycle may be different due to the nature of track source, update rate and time late.

Automatic tracks need to be updated by their source at certain intervals. If they are not updated for a given time period then they are declared as "Lost". For example, AIS tracks are reported at intervals between two seconds and three minutes. If AIS information from a particular ship has not been received for a given period of time which set by the authorised user according to the type of the source and the speed of the ship, then that track becomes Lost. This may happen, for example, when the ship is out of AIS coverage (~50 nautical miles). If reporting starts again, a new track is initiated.

Similarly, other automatic track sources like TDLs or on-line feeds from NATO assets can be declared as Lost.

The default LRIT update rate is six hours, which can be increased to 15 minutes for a specified period of time. Since LRIT reports have positive identity and they are considered as manual tracks, they are never declared as Lost and the Vessel Database is updated automatically.

Manual tracks will have an attribute called "Time Late" which is the amount of elapsed time since the last report. This duration is used to determine the life of a manual track.

Track Life Cycle:

A sample definition for the track life cycle states are given below:

TRITON automatic track life cycle states:

Tentative : An automatic track is created and being checked for correlation.

Updating : Position of an automatic track is being updated.

Lost : Position of an automatic track is not updated for a Lost Track Duration.

Dropped : Automatic track is to be deleted.

Deleted : Automatic track is deleted.

TRITON manual track life cycle states:

Created : A manual track is created at a given position.

Updated : Position of a manual track is updated.

Expired : Manual track is not updated for a duration of Maximum Time Late.

Deleted : Manual track is deleted.

Lost Track Duration and Maximum Time Late are parametric values that can be altered by the authorised user in hours and minutes.

[T1-R086] *TRITON shall perform automatic and manual track life cycle management including creation, update and deletion.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R087] *TRITON shall automatically update automatic or manual tracks when new data report is received.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R088] *TRITON shall allow the authorised user to set the Lost Track Duration for automatic tracks between 30 (thirty) seconds and ten (10) minutes depending on the type of its source and speed.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R089] *TRITON shall declare an automatic track as Lost if it is not updated by its source more than the Lost Track Duration.*

Requirement Property :
- Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R090] *TRITON shall maintain the Lost tracks for the time period set by the authorised user a system configuration parameter after the user acknowledges the lost track indication.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R091] *TRITON shall allow the authorised user to set the Maximum Time Late for manual tracks up to thirty-six (36) hours with one minute intervals.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R092] *TRITON shall declare the manual track as Expired and notify to user about deletion of the track if the Maximum Time Late duration is exceeded.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R093] *TRITON shall indicate (such as blinking or faded track symbol) Lost tracks and Expired tracks on the GeoView until they are deleted.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R094] *TRITON shall continue maintaining automatic, correlated track until at least two tracks are left. If one more track is deleted, then the correlated track shall become normal track.*

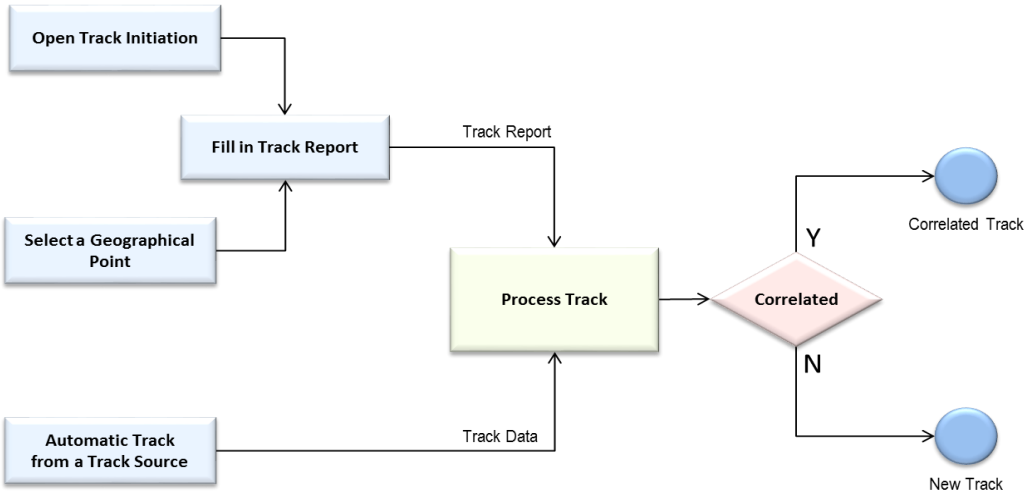
Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R095] *TRITON shall stop displaying an associated track when it is deleted.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.3.2.7. Track Initiation, Update and Deletion

TRITON will use automatic and manual track initiation. Predefined track sources can initiate tracks and update them automatically. Authorised users can initiate new tracks manually, update or delete them. The process is illustrated below:



When the Track Report or Track Data is received from a source (Track Source or User), the Identification Set of the track is used as the unique key to process the track and locate it in the Track Database. The attributes of the Identification Set are automatically derived from the track attributes such as country information. If no country information is available for an AIS track, the MMSI number will be used to derive the flag information. If the Identification Set of the track is not found in the Track Database, then a new track will be initiated. If it is found in the database, then Correlation Process will be executed.

If the attributes of an automatic track is modified by the authorised user, then subsequent updates to the same track will not change its attributes.

The authorised user will be notified if new or conflicting data for attributes is received from any source. This conflict has to be resolved before the change is applied. A notification will be issued if the track already has user-overridden attributes.

Automatic tracks cannot be deleted by the users. However, if an authorised user wants to delete an automatic track, track deletion process is applied with a notification, and a new track will be initiated at the next track report of the track source.

Dead Reckoning (DR) can be used to move a track to a new position in given time with its present course and speed. Any user can use this feature, but only the authorised user can change the track position permanently. DR will use Rhumb Line calculation for short ranges and Great Circle projection for long ranges.

[T1-R096] *TRITON shall initiate an automatic track in the Track Database when it is received for the first time from a Track Source. The process is explained in the Description.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R097] *TRITON shall allow the authorised user to initiate a manual track with default attributes (and source as the user) at a given geographical position or at the pointed position on the GeoView. The user shall fill in Track Report and submit. The process is explained in the Description.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R098] *TRITON shall allow the authorised user to manually update any attribute of a manual track. A notification shall be issued to the user if that attribute has already been changed by another authorised user.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R099] *TRITON shall automatically update the attributes of an automatic track (e.g. AIS, LRIT) when they are changed by its source. TRITON shall check the non-kinematic attributes of an automatic track when a new track update is received. The updated attribute shall be applied to the Track Data only if it is not manually overridden by the authorised user.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R100] *TRITON shall automatically update the kinematic attributes of an automatic track (e.g. AIS, LRIT) when they are changed by its source. The update rate shall be set inside the relevant System Interface Service.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R101] *TRITON shall resolve destination name into geographical position using the Destination Resolution Function when a new AIS track is created.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R102] *TRITON shall allow the authorised user to dead reckon a track or a vessel to the current time or a given time with its last known course and speed with an option of leaving at the new position or returning to the original position.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R103] *TRITON shall allow the user to dead reckon (DR) a track or a vessel to the current time or a given time with its last known course and speed without leaving it at the new position.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R104] *TRITON shall use Rhumb Line DR calculation of tracks or vessels for ranges up to sixty (60) Nautical Miles and Great Circle projection for longer ranges.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R105] *TRITON shall dead reckon a track for the amount of time given by the user. The range shall be ten (10) minutes to eight (8) hours.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R106] *TRITON shall automatically delete a manual track after Maximum Time Late has passed from its last update time.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R107] *TRITON shall automatically delete an automatic track when it is deleted by its source (e.g. track is dropped in TDL or Nation feed explicitly drops it from its feed).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R108] *TRITON shall allow the authorised user to delete a manually-initiated track. A notification shall be issued if the track has one or more user-overridden attributes or it is associated to a Vessel.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R109] *TRITON shall allow the authorised user to delete an automatic track. A notification shall be issued to indicate that the automatic track is being deleted, and a new track may be initiated at the next update.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R110] *TRITON shall allow the user to slave a Reference Point or an Area to a track on a true or relative bearing and to assign independent course and speed.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R111] *TRITON shall compute and use the Track Position Update Interval at each update process by using the Track History Distance given for the type of the vessel in the System Operational Parameters.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R112] *TRITON shall store the track positions in the Kinematic History of each track in the Track Database using the position and speed of the track at intervals indicated by the Track Kinematic History Update Interval.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R113] *TRITON shall keep the Kinematic History of a track for a duration of Maximum Time Late. After the time has elapsed, the last data position shall be dropped.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R114] *TRITON shall be able to display Kinematic History of a selected track for a user-selected period of time on the GeoView.*

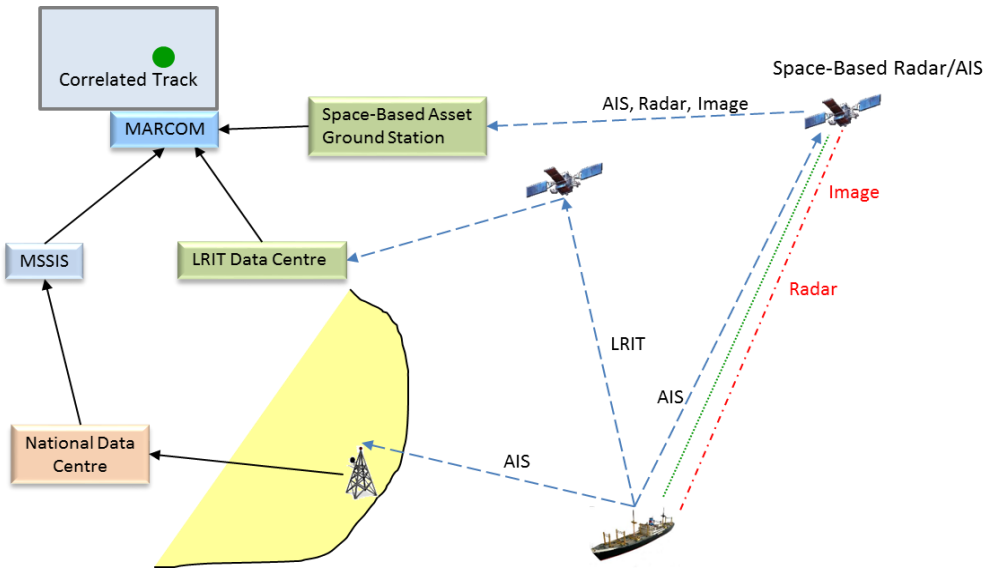
Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R115] *TRITON shall delete all data including its Kinematic History when a track is deleted by either an authorised user or the source of that track with a notification if the track has user-overridden attributes or not associated.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

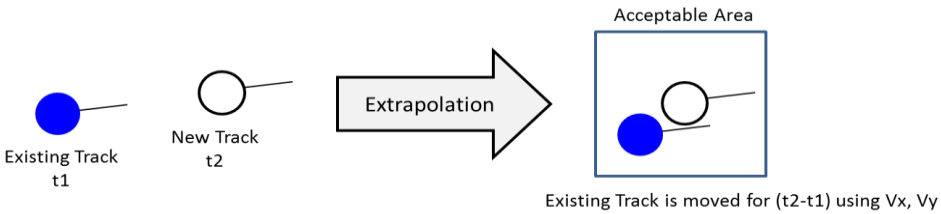
4.2.3.2.8. Track Correlation

Since TRITON will have several track sources, it is likely that the same maritime vessel may be reported to TRITON by more than one source. TRITON will handle track information received from multiple sources by using a correlation process. The objective of the correlation process is to provide the user with only one track if multiple sources report the same vessel. A scenario for correlating tracks from separate track sources, AIS and LRIT, is illustrated below:

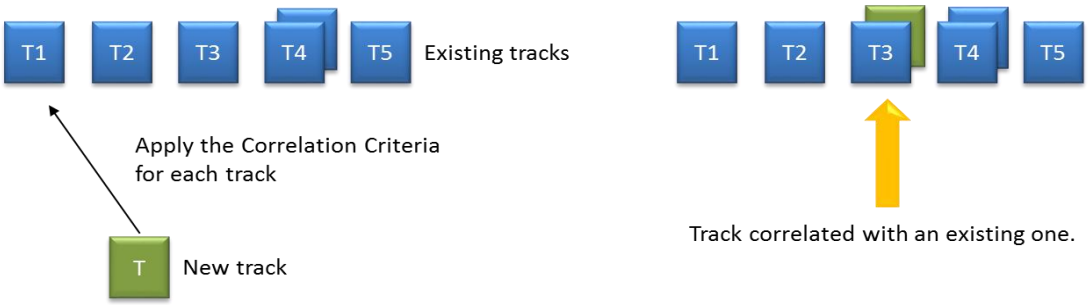


When a new real track is received, TRITON will check its positive identification and validate it. If the track has a positive identification, then TRITON will search for it in the Track Database using the Identification Set. If the Identification Set matches, then it correlates the two tracks. If not, a new track is created. If the track does not have a positive identification, then TRITON will try to correlate it automatically with an existing track using positional comparison. The nearest match will be used to correlate the tracks.

Positional comparison of tracks will be performed after extrapolation in order to bring the tracks to the same time domain. That is, the track with older update time will be temporarily moved to a future position based on its present course and speed for the amount of time difference between the two tracks' update time. If the aligned positions of the two tracks are within the allowed limits then they can be considered as correlated, the latest update time becomes the tracks update time. The concept is depicted below:



The figure below depicts how a new track is correlated with an existing one by scanning through the Track Database:



The track having higher Confidence Level will become the main track and the other one will be hidden from the users. If the new track has the same Confidence Level of the existing candidate track and the type of source is the same, then correlation will not take place. For example, an AIS track from a contracted live data source is in the Track Database. When a new AIS track from MSSIS is received, its Identification Set is searched in the Track Database and a match is found. Then, the Confidence Levels

are compared. If they the same, the time stamps are compared. If the time stamp of the new track is older than the existing one (due to processing latency in the source), then it will not be correlated.

Decorrelated tracks are treated as new tracks and processed accordingly only if their last time of update is not older than the Maximum Time Late. if so, the decorrelated track is deleted.

Correlation Criteria:

Two tracks can be correlated if the Correlation Criteria which includes at least the following checks are met:

- Both tracks are Live or both tracks are Simulated.
- Identification Set matches (Country, Vessel Name or its synonym match).
- IMO number matches.
- The differences in course and speed values are within the allowed ranges.
- The distance between the two tracks are within the allowed limit that is set by a configuration parameter.
- The basic attributes of the tracks are not conflicting (like identity, category, classification).
- Higher Confidence Level to be favoured to determine the values of the attributes.

Correlation Criteria will be configurable by an authorised user so that selected conditions can be used for correlation causing a user notification. There may be more than two tracks correlated with each other. The attributes of the correlated tracks will be combined according to the Confidence Level of the sources. The most recent and reliable kinematic information will be used to update the position of the correlated track.

Decorrelation Criteria:

Each update to correlated tracks will also cause a decorrelation check. Correlated tracks will be decorrelated if one of the conditions in the following Decorrelation Criteria is met:

- One of the basic attributes of the tracks is conflicting (like identity, category, type, classification change).
- The distance between the two tracks exceeds the allowed limit that is set by a configuration parameter.
- The differences in course and speed values are exceeding the allowed ranges.

When a track is decorrelated, it will be treated as a new track, processed as such and presented to the user. If the new track has a positive identity (e.g. unique vessel name), and it cannot be correlated then TRITON will perform an association check.

If a manual track is correlated with an automatic track, the track may be de-correlated when the distance between the tracks exceeds the allowed limit after subsequent updates to the automatic track.

Scalability:

Due to high number of tracks to be handled, special mechanisms for scaling the input and processing may be required. The design must handle scalability, especially for AIS data. For example, multiple levels can be used for the correlation; tracks of similar type are correlated first with each other, and then with the other types of tracks.

[T1-R116] *TRITON shall automatically correlate a new track with an existing track if the configurable conditions of the Correlation Criteria are satisfied.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test
Comment : The algorithm will be finalised during Software Requirements Analysis.

[T1-R117] *TRITON shall automatically correlate a new track with an existing track and notify the authorised user if one or more of the authorised user-selected conditions of the Correlation Criteria are not being satisfied.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test
- Comment : The algorithm will be finalised during Software Requirements Analysis.

[T1-R118] *TRITON shall automatically decorrelate the previously correlated tracks if the Decorrelation Criteria is satisfied.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test
- Comment : The algorithm will be finalised during Software Requirements Analysis.

[T1-R119] *TRITON shall update each track under a manually correlated track even though their attributes do not match.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R120] *TRITON shall allow the authorised user to manually correlate two tracks if automatic correlation is not successful.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R121] *TRITON shall allow the authorised user to modify the Correlation and Decorrelation Criteria in the System Operational Parameters.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R122] *TRITON shall not allow simulated tracks to be correlated with live tracks.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R123] *TRITON shall use extrapolated positions of tracks for correlation and decorrelation checks as explained in the Description.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R124] *TRITON hall keep one track if that track is correlated with another track, and display only the correlated track.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R125] *TRITON shall use the highest Confidence Level of the correlating tracks to determine the Confidence Level of the correlated track.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R126] *TRITON shall use the most recent kinematics information of the correlating tracks to set the kinematics of the correlated track (as explained in the Description).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R127] *TRITON shall treat a decorrelated track as a new track, and process it if its last time of update is not older than the Maximum Time Late. If it is older, then the decorrelated track shall be deleted automatically.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R128] *TRITON shall display correlated tracks with an indication in the GeoView (e.g. a small dot on the symbol).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R129] *TRITON shall allow the user to view the detailed track information for each track under the correlated track.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R130] *TRITON shall update each track under an automatically correlated track if their key attributes are not changed.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R131] *TRITON "should" be scalable for processing high number of tracks (e.g. over 100,000) with high update rates (e.g. less than 30 seconds) and handle correlation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration
Comment : The parameters allowing fine tuning will be determined during the Software Design.

[T1-R132] *TRITON shall be able to correlate a new track with an existing track in less than five (5) seconds within ten thousand (10,000) tracks.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.3.2.9. Track and Vessel Association

When a new live track with positive identity is received or a new positive identity is defined for an existing track, TRITON will check the Vessel Database automatically to find the matching vessel according to the Association Criteria. If the criteria are satisfied, the track will be said to be "associated" to the vessel by establishing a link between the track and the vessel. The kinematics of the track will be used to update the vessel position in the Vessel Database. When the track is displayed on the GeoView, its attributes are augmented with the information in the Vessel Database. For example, the physical characteristics of a ship is not in Track Database, but it can be stored in the Vessel Database.

Association Criteria:

Tracks will be checked against the Vessel Database with at least the following Association Criteria:

- The track is a Live Track
- The track Identification Set matches the vessel's (using the Name Matching Criteria of Search).
- The standard identification, type, category and classification attributes of the track match the vessel's.

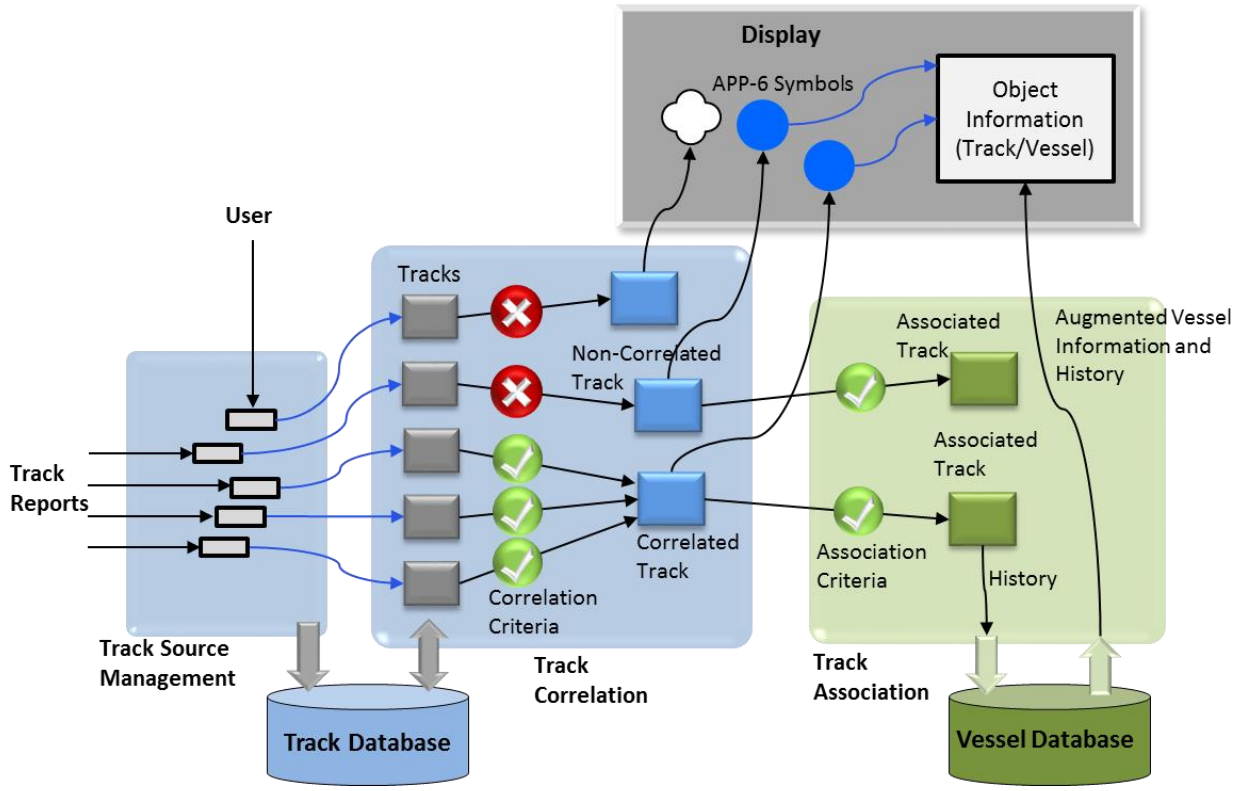
If a matching track identification is not found in the Vessel Database, the user will be notified.

Disassociation Criteria:

An associated track can be disassociated if at least one of the following Disassociation Criteria is met:

- If the Identification Set of the track is changed after an update (e.g. the name of a vessel is changed)
- If the associated track is deleted from the Track Database
- If the associated vessel is deleted from the Vessel Database.

Users will be able to display augmented vessel information for associated tracks. The relation of tracks, vessels and augmented information display is depicted below:



[T1-R133] *TRITON shall allow the authorised user to change the Association and Disassociation Criteria in the System Operational Parameters*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R134] *TRITON shall automatically associate an automatic Live Track with an existing vessel in the Vessel Database if the Association Criteria is satisfied.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test
- Comment : Bidders will be able to propose their own Association Criteria. The algorithm will be finalised during Software Design.

[T1-R135] *TRITON shall allow the authorised user to manually associate an automatic or manual Live Tracks with a Vessel even though some of the attributes of a reported Track do not match to the Vessel's.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R136] *TRITON shall display associated Tracks and their augmented information with an indication on the GeoView.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both

Baseline : BL 1
Qualific. Method : Test

[T1-R137] *TRITON shall display the TTN of the Track if it is associated to a Vessel.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R138] *TRITON shall notify the authorised user with an indication to the Track if its automatic association check fails.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R139] *TRITON shall notify the authorised user about disassociation of an associated automatic Live Track and a Vessel if one of the Disassociation Criteria is met.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R140] *TRITON shall automatically update Kinematic History, Journey History and Activity History information of a Vessel in the Vessel Database if the Vessel is associated to a Track. The kinematics information with the most recent time of update shall be used to update the Vessel kinematics.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R141] *TRITON shall compute and use the Vessel Position Update Interval at each update process by using the Vessel History Distance given for the type of the Vessel in the System Operational Parameters.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R142] *TRITON shall update the Vessel positions in the Vessel Database using the position and speed of the associated Track at intervals indicated by the Vessel Position Update Interval.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.3.2.10. Simulated Track Handling

TRITON will support simulated tracks. If a track is tagged as Simulated, then this track will not be correlated with Live Tracks and will not be associated with vessels.

[T1-R143] *TRITON shall be able to process Simulated Tracks generated by its own simulators.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R144] *TRITON shall create a Simulated Track when a simulated link track is received from a TDL via NIRIS.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 1
- Qualific. Method : Test

[T1-R145] *TRITON shall display Simulated Tracks as readily distinguishable from Live Tracks.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R146] *TRITON shall prevent correlation of Simulated Tracks with Live Tracks and association with Vessels.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

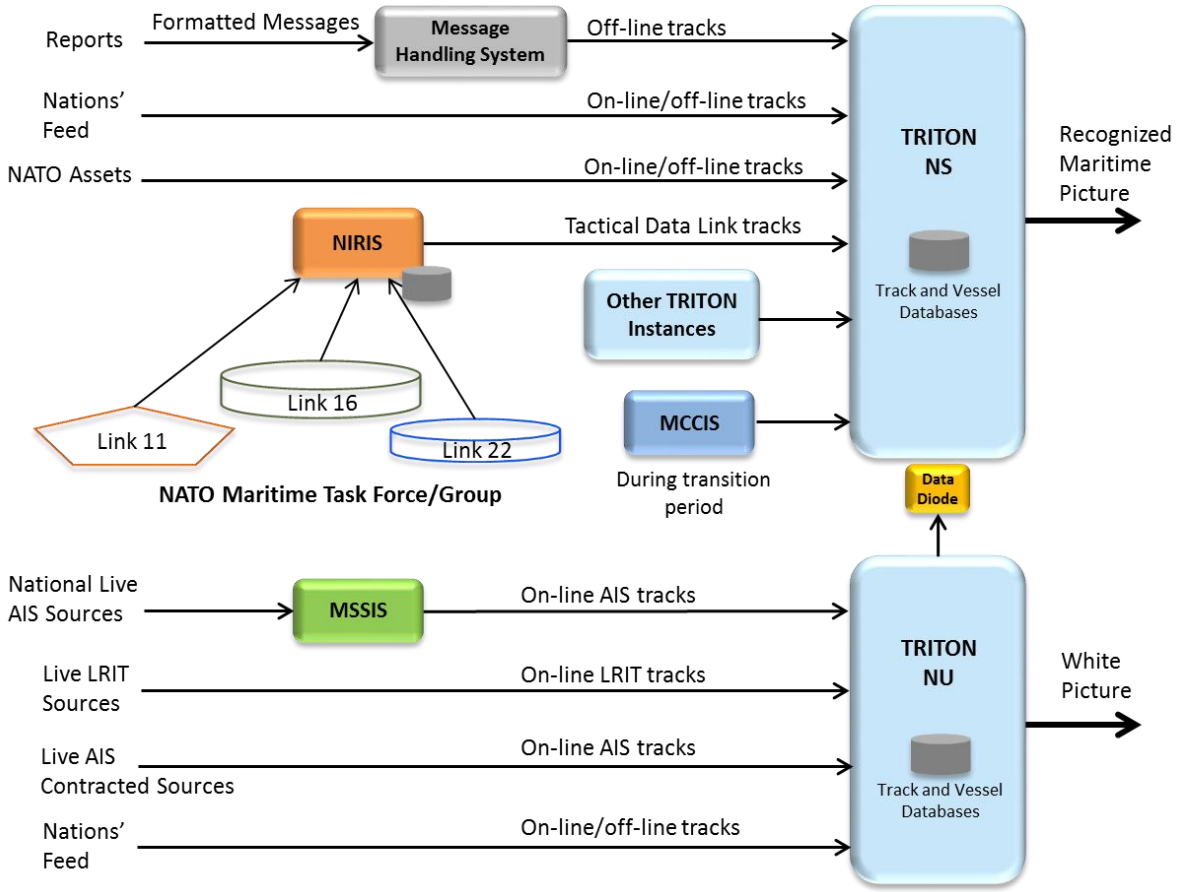
4.2.3.2.11. Track Interface Handling

TRITON will receive on-line and off-line track information from various sources. It will create internal tracks using the reports, correlate those tracks with the existing tracks if their key attributes match, associate the tracks with vessels if their key attributes match, and periodically update the Vessel Databases with the last reported positions of the track. Each update to an existing, associated track in the Track Database will also cause an update to the Vessel Database.

TRITON will not interface any physical device providing track (e.g. AIS device, Link 11). TRITON will not directly participate to any Tactical Data Link (Link 11, 16, 22) (TDL) either. However, it is expected that tactical tracks of a TDL can be received via NIRIS.

TRITON Deployable Kits will have capability to receive on-line or off-line tracks from the platform C2 system using TRITON ACP Interface.

Following picture illustrates the on-line and off-line track sources of TRITON for both NS and NU Domains.



Each track source may have its own track definition. TRITON System Interface Service (SIS) will convert the received track data into standard, internal track representation.

Although an external track source update the tracks at certain periods, TRITON SIS will update the Track Database at a lower update rate, configurable for each source, in order not to degrade the overall performance. For example, an AIS track may be updated at every 10 seconds by its source, but the TRITON SIS sends the updates to the Track Management at every 60 seconds. The update rate will be adjusted automatically if the user takes the track into close monitoring.

The tracks will be updated only when one of its attributes is changed. For example, a position update for an AIS track will be stripped from excessive and repeating data or invalid fields for not causing information clutter and performance degradation; only the changed position data will be updated.

Own Ship:

TRITON will maintain Own Ship information for each user so that the users on afloat platforms can take Own Ship to the centre of the GeoView as Own Position. Any track can also be designated as Own Ship.

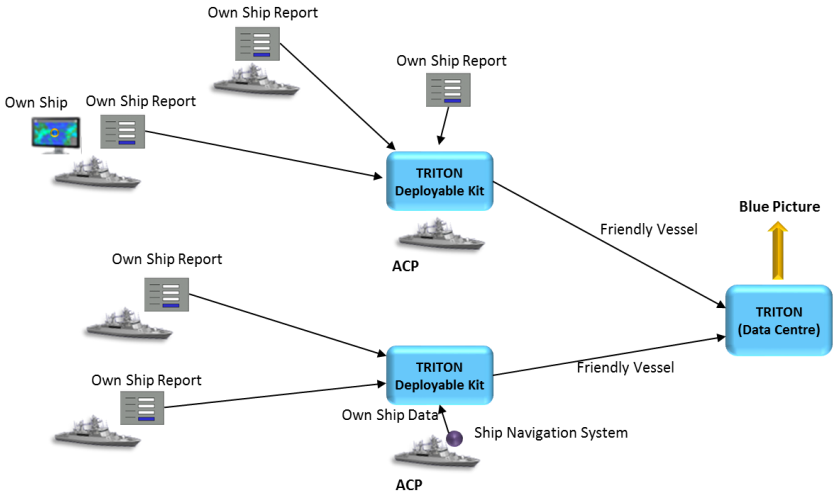
Own Ship Data:

TRITON Deployable Kits will maintain Own Ship Data which can be updated manually by the authorised user or automatically via the ACP Interface.

Own Ship Report:

Own Ship Report is similar to track reporting with a distinction that the Confidence Level has the highest value. When an authorised user on board an afloat platform fills in the data for the Own Ship Report, this information is automatically processed, and a track is initiated in the Track Database and then associated with a Vessel in the Vessel Database. If there is correlated track with this Report, the track attributes are updated with the attributes of the Report.

Handling Own Ship information is illustrated below:



[T1-R147] *TRITON shall handle track information received from external sources using standard interfaces and convert different track feeds and reports into standard, internal track representation using the TRTION Track Specification (NS or NU).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R148] *TRITON shall use configurable update rate for internal processing in each System Interface Services (SIS) which receives tracks from external sources.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R149] *TRITON shall allow the authorised user to control the internal update rate of the tracks that are received from a particular external source.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R150] *TRITON shall automatically maximise the internal update rate of the tracks assigned to the Status Board for close monitoring purposes by any user.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R151] *TRITON shall automatically maximise the internal update rate of a track if it is requested by a user in the Object Information Display (see GeoView).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R152] *TRITON shall update internal tracks when at least one attribute of a track is changed by its source.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R153] *TRITON shall use separate source identification for each SIS acting as a track source (e.g. NIRIS Interface, Formatted Message Interface, MCCIS Interface, AIS Data Source Interface).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R154] *TRITON shall allow the authorised user to exchange track data between Maritime Operations according to their releasability attribute.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R155] *TRITON shall manage Own Ship as a track and make it available for the GeoView to be displayed as Own Position.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Demonstration

[T1-R156] *TRITON shall allow the user to set a track as Own Ship on the GeoView.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Test

[T1-R157] *TRITON shall maintain Own Ship Data for the Deployable Kits.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Demonstration

[T1-R158] *TRITON shall allow the authorised user to manually update Own Ship Data for the Deployable Kits.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Test

[T1-R159] *TRITON shall allow the authorised user to create an Own Ship Report to provide reports for any afloat platform.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Test

[T1-R160] *TRITON shall process Own Ship Reports created by the authorised users on board afloat platforms and initiate manual tracks with the highest Confidence Level.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Test

4.2.3.3. Maritime Reference Object Management

Control measures are directives given to assign responsibilities, coordinate fires and manoeuvre, and control operations. They may be boundaries, special area designations, and other unique markings related to operational environment geometry and necessary for planning and management of operations. Control measure symbols represent control measures that can be portrayed graphically and provide operational information that cannot be displayed via icon-based symbols alone. They can be displayed as points, lines, areas or tactical mission tasks [APP-6].

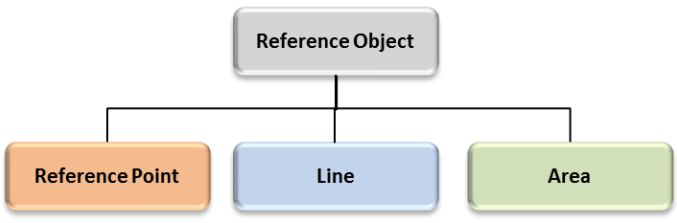
Maritime control measures are used by NATO to help the maritime component commander and his subordinate commanders to direct action by establishing responsibilities and to prevent ships, units, or aircraft from impeding one another and to impose necessary coordination. They aid the cooperation among forces without imposing needless restrictions on their freedom of action. In general terms, maritime control measures can be broken down into the following groups: points, lines, and areas [APP-6].

TRITON will support maritime control measures (reference points, special points, lines and areas) under "Reference Objects". TRITON will provide world-wide management of Reference Objects as well as within Maritime Operations, which are identified uniquely in the system context. TRITON will display the control measures according to APP-6. Control measures can be black, blue (friendly), red (hostile), green (obstacles), or yellow (chemical, biological, radiological, nuclear (CBRN) contaminated area fill).

4.2.3.3.1. Reference Object Definition

A Reference Object is a geographical or moving point, or a line or an area having an operational or tactical meaning (e.g. launch point, Data Link Reference Point, No-firing Area, minefield). Points, lines and areas are defined in support of the surveillance picture to mark points, lines or areas of special interest. Some of these move with an independent course and speed. Certain points and areas can be slaved to a moving track and its position shall be updated along with the updates to the track. This facilitates, for example, a Missile Engagement Zone (MEZ) to be established at a given position relative to a ship or force centre that is moving. Another example is Mine Danger Area.

TRITON Reference Object types are given below:

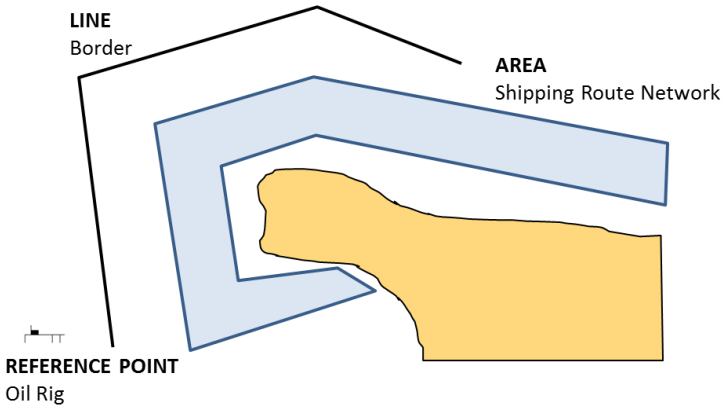


Reference Point: A Reference Point is a geographical coordinate for a special point or a real object. They are displayed using the selected symbology.

Line: A Line is a connection of at least two geographical points. It can be a polyline in any form.

Area: An Area is a closed, geographical shape. It can be a circle, ellipsis, rectangle or polygon. The last point of a multi-point area is always at the same position as the first.

The picture below shows some examples to Reference Objects on a GeoView.



Each Reference Object is represented with a set of attributes as explained and defined below:

Reference Point Data:

- Identification
  - ID Name (e.g. Mine Reference Number)
  - ID Number (e.g. 00456)
- Point Type and Amplification (to be optimised using the definitions in [STANAG 5516])
- Geographical position
- Altitude

Line Data:

- Identification
  - ID Name
  - ID Number
- Amplification (to be optimised using the definitions in [STANAG 5516])
- Geographical position of points of a line
- Drawing thickness and colour

Area Data:

- Identification
  - ID Name
  - ID Number
- Amplification (to be optimised using the definitions in [STANAG 5516])
- Geographical position of centre and radius of a circle, major/minor axis, vertices of a polygon
- Drawing and fill colours
- Transparency

Reference Object Data:

TRITON will use a record called "Reference Object Data" to store information for any type of Reference Object. It will consist of at least the following attributes:

- Unique identification (TRITON Reference Number)
- Name

- Type (Reference Point, Line, Area)
- Reference Point Data / Line Data / Area Data (to be selected depending on the Type)
- Current Maritime Operation
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Picture designation (Recognised, Military, White, none)
- RMP designation
  - Included RMP Region identification
  - Excluded RMP Region identification
- Time Validity (in hours and minutes) (defined as Time Function in STANAG 5516)
- Exercise Status
- Reference Object specific data
  - Reference Point Data / Line Data / Area Data
- Course and speed
- Time of last update
- Slaved indicator (yes/no)
- Related track
- Remark.

4.2.3.3.2. Reference Object Database Management

TRITON will maintain an internal storage called "Reference Object Database" for dynamically managing Reference Objects. There may be several thousands of Reference Objects to be stored and maintained. The Reference Object Database will be optimised for quick access, update and retrieval without any physical capacity limitation.

[T1-R161] *TRITON shall maintain a Reference Object Database to store all types of Reference Objects within the Environment of a Maritime Operation with a standard Reference Object Data representation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R162] *TRITON shall allow the authorised user to manage (add, modify, remove, import, export) the Reference Object Database.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R163] *TRITON shall be able to share the Reference Object Data among multiple Maritime Operations if they are labelled accordingly in their Releasable Maritime Operations attribute.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.3.3.3. Reference Object Number Management

Reference objects will be uniquely identified by "TRITON Reference Number" (TRN). System-specific internal identification mechanism may be hidden from the users, but a user level numbering scheme will be maintained system-wide. TRN will be a decimal number which can address all objects in the database.

Each TRITON instance may have the same Reference Object number scheme but differing pools (number blocks) can be defined. Similarly, a number block is allocated for each Maritime Operation.

Tactical Data Link (TDL) Track Numbers will also be stored in the Reference Object Data if the objects are received from links.

[T1-R164] *TRITON shall use unique decimal numbers (TRN) to identify Reference Objects at user level.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R165] *TRITON shall allow the authorised user to allocate TRN pool for the entire system and each Maritime Operation by defining the first and last Reference Object numbers.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R166] *TRITON shall assign a unique TRN to each new Reference Object received from external sources or created internally.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

4.2.3.3.4. Reference Object Life Cycle Management

TRITON Reference Objects can be created, updated and deleted locally. Those objects that are received from external sources (e.g. Tactical Data Links) cannot be modified; they can only be displayed.

Reference Objects may have life cycles controlled by either automatically or manually. They can be assigned a Time Validity value which provides automatic deletion after the specified time elapses. If Time Validity is assigned as "Permanent", the Object will not be deleted automatically.

[T1-R167] *TRITON shall perform automatic and manual Reference Object life cycle management.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R168] *TRITON shall maintain the Reference Objects starting from their creation time for a period specified in the Time Validity.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R169] *TRITON shall be able to create appropriate Reference Objects if Special Points, Lines and Areas are received from an external source such as TDL over NIRIS or Formatted Message over MHS.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R170] *TRITON shall delete a Reference Object according to the criteria associated to the type of the object (e.g. Missile Impact Point can be deleted after its impact time exceeded).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R171] *TRITON shall provide a Time Validity value for Reference Objects for controlling its presence automatically in addition to user deletion. Objects having "Permanent" Time Validity shall not be deleted automatically.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R172] *TRITON shall notify the user at least ten (10) minutes before the Time Validity of a Reference Object expires.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.3.3.5. Reference Object Creation, Update and Deletion

TRITON users will be able to manage (create, modify, update, delete) the Reference Objects in each Maritime Operation scope. Authorised users can create Reference Objects or they can be received from external sources such as Formatted Messages or TDLs. Their attributes can be modified by the authorised users or updated by their sources. Authorised users can dead reckon (DR) the position of Reference Objects if they have course and speed values. Reference Objects can be shared along with RMP if needed.

[T1-R173] *TRITON shall allow the user to manage (create, modify, delete) the Reference Objects in each Maritime Operation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R174] *TRITON shall allow the user to create a Reference Point, a Line or an Area by using the C2 Drawing facilities of the GeoView.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 1
Qualific. Method : Test

[T1-R175] *TRITON shall update attributes of a Reference Object automatically if it is received from an external source.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R176] *TRITON shall allow the authorised user to dead reckon a Reference Object to the current time or a given time with its last known course and speed with an option of leaving at the new position or returning to the original position.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R177] *TRITON shall allow the user to dead reckon a Reference Object to the current time or a given time with its last known course and speed without leaving it at the new position.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R178] *TRITON shall allow the user to dead reckon the position of a Reference Object if it has a course and speed value.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R179] *TRITON shall use Rhumb Line dead reckoning calculation of Reference Objects for ranges up to sixty (60) Nautical Miles and Great Circle projection for longer ranges.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R180] *TRITON shall dead reckon a Reference Object for the amount of time given by the user. The range shall be ten (10) minutes to eight (8) hours.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R181] *TRITON shall delete a Reference Object automatically if its external source drops it.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1

Qualific. Method : Test

[T1-R182] *TRITON shall provide the user with the capability to initiate Lines and multipoint Areas containing at least fifty (50) segments. The C2 Areas of the GeoView shall be used to visualise the Areas.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R183] *TRITON shall allow the user to assign independent course and speed to a Reference Object.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R184] *TRITON shall allow the authorised user to exchange Reference Objects between Maritime Operations according to their releasability attribute.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.3.3.6. Reference Object Association

A Reference Object is said to be "slaved" if it is associated to a Track. An example of a slaved point is a marshal point used during aircraft recovery operations aboard an aircraft carrier.

TRITON will be able to slave a Reference Object to a Track using the Reference Object Association Criteria with at least the following checks:

- There is no conflict on Track type and Reference Object type (such as slaving a DLRP to a sub-surface track or Ground Zero to a Track).
- Reference Object has a reference point to align with the Track

TRITON will maintain the association relation between the Track and the Reference Object until one of them is deleted.

[T1-R185] *TRITON shall allow the user to slave a Reference Object to an indicated Track.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R186] *TRITON shall associate a Reference Object to a Track if the Reference Object Association Criteria is not conflicting.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test
Comment : The Reference Object Association Criteria will be finalised during Software Requirements Analysis.

[T1-R187] *TRITON shall notify the user if the indicated Reference Object cannot be associated with the indicated Track.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R188] *TRITON shall allow the user to indicate the reference point of the Reference Object for aligning its position to the slaved Track.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R189] *TRITON shall cancel slaving if either the associated Track or the Reference Object is deleted.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R190] *TRITON shall keep a slaved Reference Object at its last position if the Track associated to it has been deleted.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

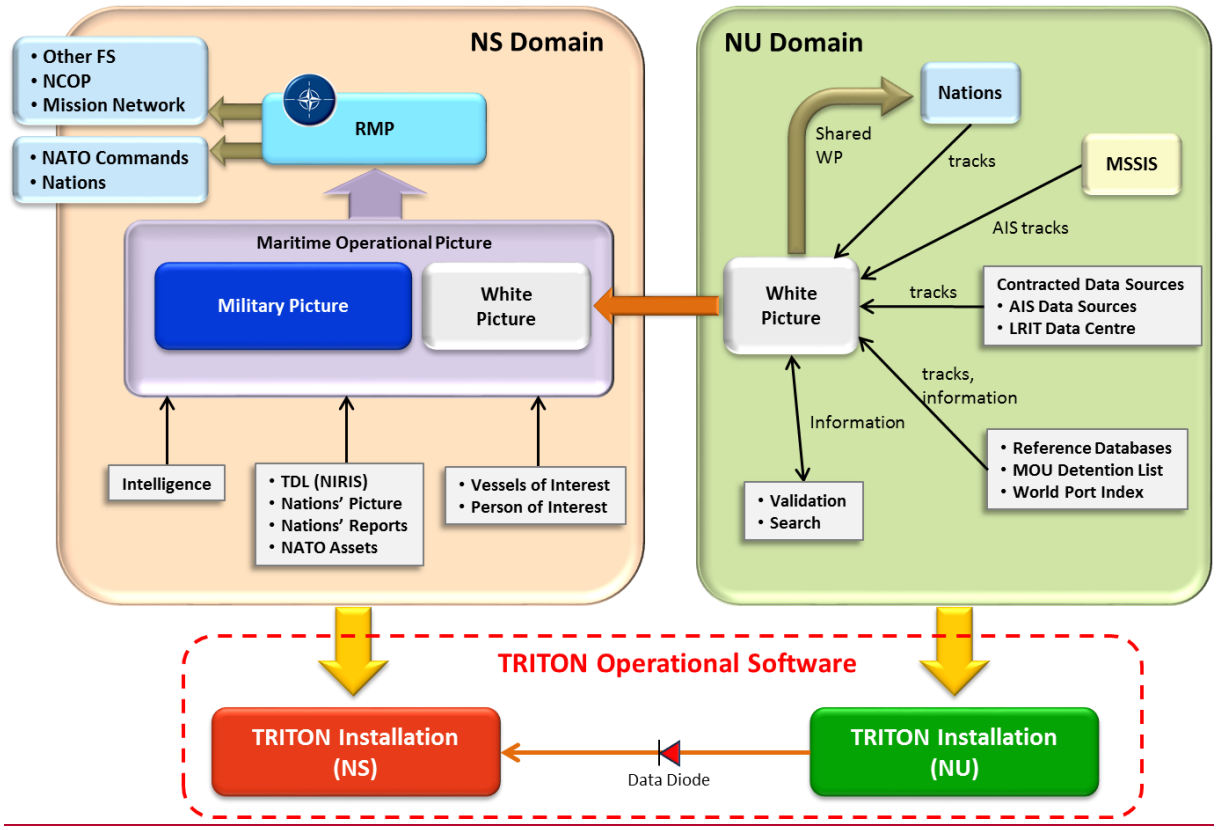
4.2.3.4. Maritime Picture Management

Maritime Picture Management functionality provides compiling and presenting the information related to both combatant and non-combatant vessels. The functionality builds the Maritime Operational Picture (MOP), in the broadest sense, which consists of all kinds of Maritime Operational Objects available. MOP is the overall collection of the following:

- **Military Picture (MP):** The collection of all recognised combatant Tracks, Vessels and relevant Reference Objects
- **White Picture (WP):** The collection of civilian maritime Tracks and Vessels with classification of non-combatants (merchant, fishing, pleasure, research, government etc.) and relevant Reference Objects.
- **Other Information:** UNKNOWN and PENDING tracks and other available supportive information

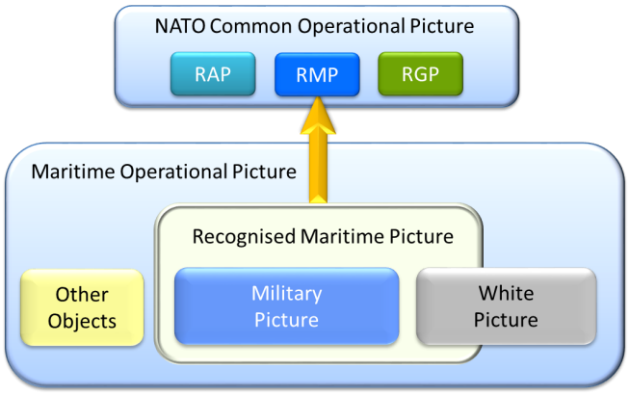
The NATO Recognised Maritime Picture (RMP) is a managed geographic presentation of processed all-source contact and information data, known at a given time, from all available assets, and compiled by an assigned RMP Manager. The RMP consists of all contacts in the maritime environment, both surface and subsurface, commercial, military and government platforms and vessels. RMP is compiled by using Military Picture and the relevant parts of White Picture.

Following figure depicts the relations and information flow between domains during maritime picture compilation:



The WP is built first on the NU Domain by using AIS and LRIT data from contracted sources and then the WP information is transferred to NS Domain. Here, the WP is elaborated more with the information received from NATO assets. The Military Picture is compiled using reports and data feeds from various NATO sources and Nations. Therefore two instances of TRITON will be at operation, one for each security domain, NS and NU.

The RMP is built on NS Domain as an operational, non-real-time, geographic presentation of recognised surface and subsurface units, forces, and operations. The RMP is one of the components of the NATO Common Operational Picture (NCOP). The relationship between these pictures are illustrated below:



The Maritime Picture Management functionality also allows the user to create, query, and retrieve current and historical information of underlying data (e.g. tracks, vessels, figures, ports, special points) comprising the MOP. It provides foundation for operational support functions, decision aid tools and maritime planning functions.

4.2.3.4.1. Operational Display

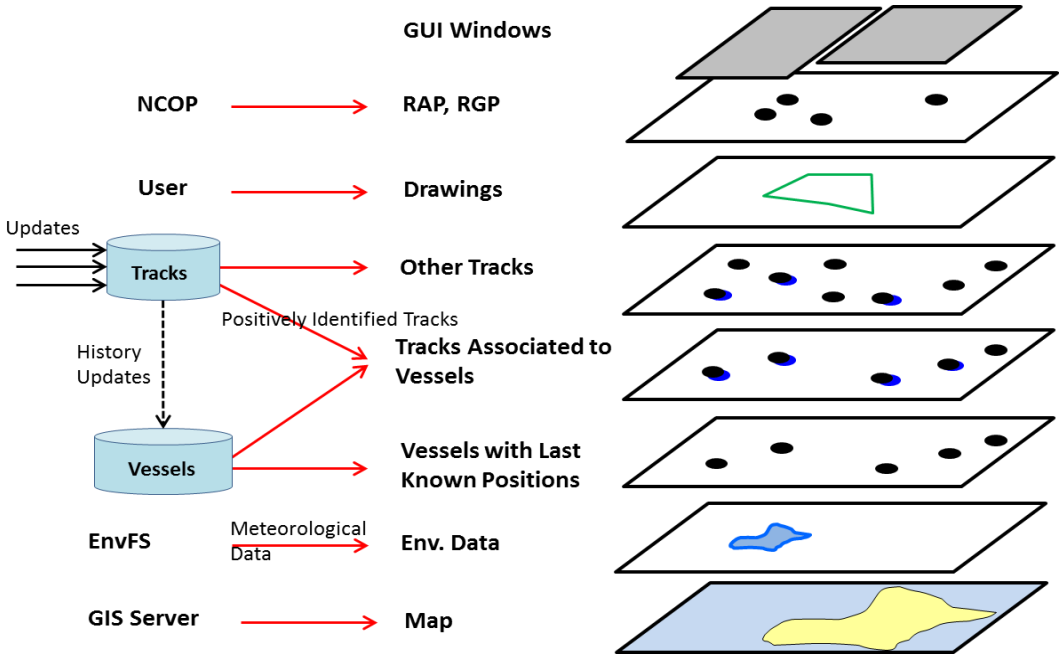
TRITON will manage all Maritime Operational Objects (Tracks, Vessels and Reference Objects), and display their detailed information on the Clients using two separate views:

Application View (AppView):

Application-specific user interfaces in textual form will be displayed in this view. When a user wants to display geospatial data, a separate application will be launched in another browser, GeoView, to display the geospatial information.

Geospatial View (GeoView):

This view displays digital maps, geospatial data, Maritime Operational Objects as well as information received from other Functional Services in separate layers (overlays). Following figure depicts how the layers are used to build the Maritime Picture.

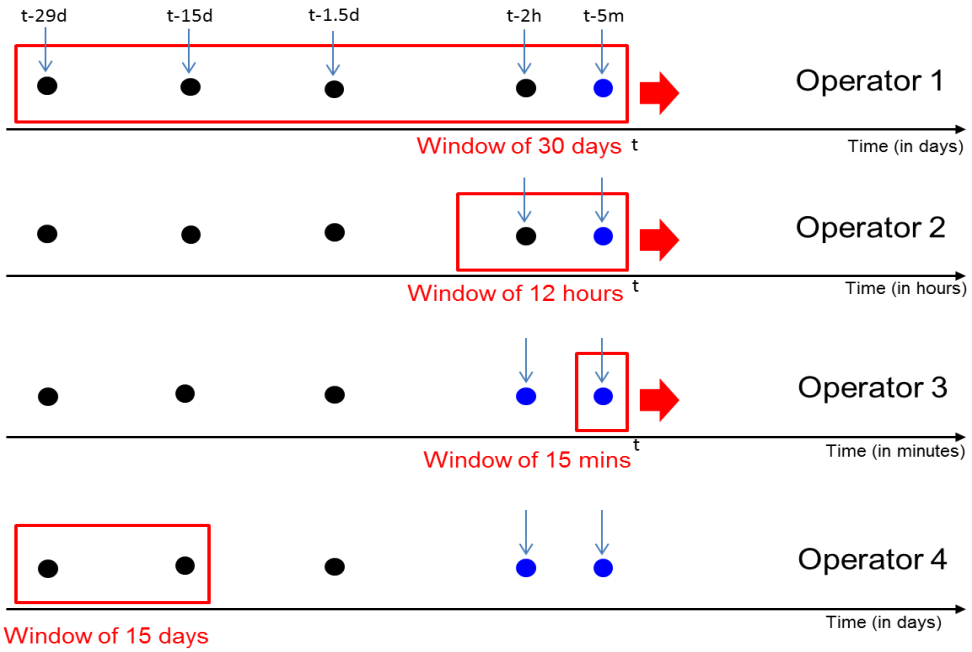


4.2.3.4.1.1. Picture Display

TRITON will be able to display all Maritime Operational Objects (Tracks, Vessels and Reference Objects) on the GeoView according to a configurable Display Criteria using a symbology set selected by the user (e.g. APP-6, NTDS). When TRITON is deployed on ACP, Own Ship indication will be set and displayed on the GeoView.

When users want to display a set of Objects, only those Objects inside the current Spatial Extent of the GeoView will be displayed and updated. Any changes in the Spatial Extent will be handled automatically. For example, when zoomed out, more objects will be displayed, but increased zoom-out will cause clustering of objects.

Users can adjust Time Windows to display Tracks and Vessels according to their operational needs. The figure below depicts how Time Windows are used for different settings with examples:

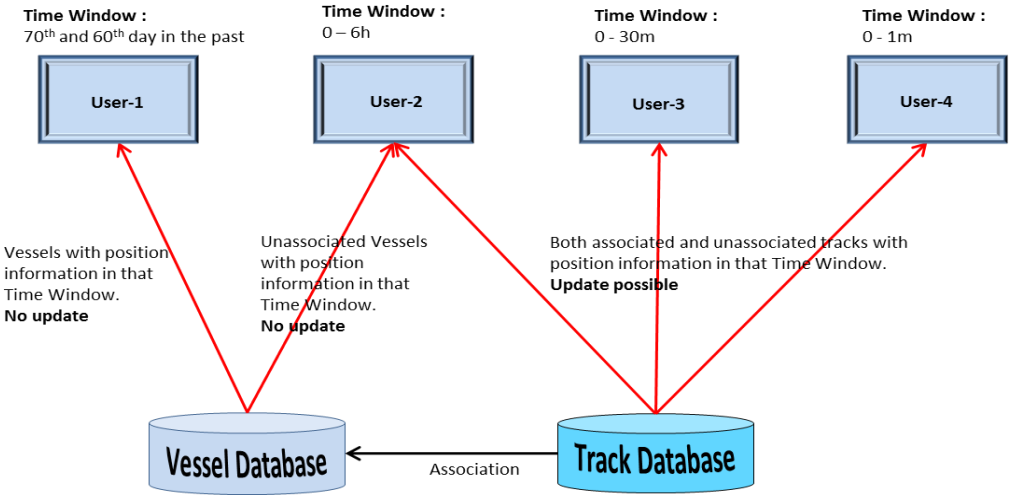


Those operators who need to work with historical data can set their Time Window long enough to cover the past activities of vessels (Operator 1 and 2). The tracks within the Window are updated and the Vessels are displayed if their last time of position update is within the Time Window.

Some operators (Operator 3) may want to see only the recently updated tracks and vessels with a specified Update Rate. Tracks will then be displayed if their last update time is within the Time Window.

Some operators can also set their Time Window totally in the past, giving a beginning and end date&time for historical analysis purposes (Operator 4). This setting prevents displaying the tracks with recent updates.

Vessels can be displayed as tracks if their last time of position update is in the Time Window. A conceptual example is illustrated in the following figure:



Examples to use of Track and Vessel Databases along with a Search function are given below:

- Display the last known positions of tankers in the indicated area, yesterday, between 0800 and 1800.
- Display the combatants of country 'C' with their last known positions in the indicated area in the last 12 hours.

Reference Objects are displayed in a similar way if their life cycle is within the Time Window.

Object Display:

TRITON will display Maritime Operational Objects in the GeoView with a symbology set selected by the user. The GeoView will adjust the spatial extent according to user-selected View Scale. The AppView will dispatch the request to filter out only those Objects within the extent and within the Time Window. For example, a user may issue a request to display the positions of the vessel 'X' between 051200ZJAN14 to 071200ZJAN14 with 60 minute intervals and plotted on the GeoView until cancellation.

Object Grouping:

Any user may view any number of Maritime Operational Objects in GeoView up to "Maximum Number of Objects to Display" setting. Depending on the number of object within the current Spatial Extent, TRITON may limit the number of Objects to be displayed by grouping more than one Object into one virtual Object. Similar types of Object can be grouped according to the distance between them. The grouping algorithm will consider the distance between objects as a configurable parameter and provide only the centre location information and number of objects grouped.

Update Rate:

If the number of Objects is less than the Maximum Number of Objects to Display for a particular GeoView, then the Objects will be displayed and the update rate for moving Objects will be determined according to the current display scale. For example, if the scale is 50 NM then the tracks can be updated as fast as they are updated by their sources. If the scale is 2000 NM, then the tracks will be updated at every 10 minutes.

[T1-R191] *TRITON shall display Maritime Operational Objects in the GeoView with a symbology set selected by the user in Layers.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R192] *TRITON shall allow the user to set a Time Window and Update Rate for Picture Display.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R193] *TRITON shall allow the user to display the last known positions of Maritime Operational Objects based on the user-selected duration in the GeoView, within the current extent (only those Objects within the GeoView Spatial Extent shall be retrieved).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R194] *TRITON shall provide and update only those Maritime Operational Objects which are inside the Spatial Extent of each GeoView. Only those Objects having the last update time within the given Time Window shall be displayed and updated.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1

Qualific. Method : Test

[T1-R195] *TRITON shall adjust the Update Rate for tracks to be displayed according to the Spatial Extent scale of the GeoView.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration
Comment : The algorithm will be finalised during the Software Design.

[T1-R196] *TRITON shall allow the user to display historical positions of Maritime Operational Objects within a given date-time period and with given time intervals, in sortable tabular format in the AppView with an option to display them in the GeoView.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R197] *TRITON shall display in AppView and GeoView, the number of Maritime Operational Objects currently displayed in the GeoView, in the Area of Interest, and the Total Number of Objects in the selected Time Window. This information may be displayed with respect to the Layers.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R198] *TRITON shall group the Maritime Operational Objects if the number of Objects to be displayed in a GeoView is greater than the "Maximum Number of Object to Display" setting.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R199] *TRITON shall be able to display the picture with the given Time Window, Update Rate and Spatial Extent within ten (10) seconds after the user request. TRITON AppView shall notify the user if the available bandwidth is not sufficient to receive the full requested picture from the server.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Test

[T1-R200] *TRITON shall notify the user if preparing and displaying the requested history information will take longer than fifteen (15) seconds.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R201] *TRITON shall display associated and unassociated tracks from Track Database and unassociated vessels from Vessel Database when users issue viewing request with a Time Window.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R202] *TRITON shall use TTN of the track in the Object Label if the Track is associated to a Vessel and TVN of the Vessel if no Track is associated.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R203] *TRITON shall display TTN, TVN and TRN in a distinguishable format (e.g. a letter indication such as T, V, R in front of the numbers) on the Object Label while displaying it on the GeoView.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R204] *TRITON shall allow the authorised user to set Own Ship when it is deployed on an ACP.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Test

4.2.3.4.1.2. Object Display Control

TRITON will be able to display Maritime Operational Objects as the Maritime Picture on the GeoView according to user-defined Display Criteria set in the Object Display Control. Users will be able to define filters for the Objects to be displayed.

Display Criteria:

The configurable Display Criteria includes at least the following:

- Object type (e.g. only Tracks)
- Selected Object Attribute(s) (e.g. combattant, leisure, tanker)
- Geographical Area (a region) (e.g. a defined geographical area)
- Display-specific settings (e.g. Layer identification).

Display Option:

When AppView displays the objects in tabular format, it will provide the user with the following options to display them in the GeoView:

- Current Display: If one object is selected, and the object is within the current map extent, then the GeoView will display the object with an indicator (e.g. a yellow circle) without changing the Map Panel extent and centre.
- Centre Object: If one object is selected, the GeoView will move the Map Panel extent to take the object to the centre of the Map Panel without changing the zoom scale, and display it with an

indicator (e.g. a yellow circle). If the object is out of the extent, the GeoView will move the extent to take that object to the centre.

- Zoom to Object: If one object is selected, the GeoView will adjust the extent to take the object to the centre with a zoom level that covers the object within a pre-set percentage distance of the extent and mark it with an indicator.
- Group of Objects: If more than one object is selected, the GeoView will apply the same rules taking the furthest points of the group (e.g. furthest tracks on each direction) to be included in the extent.

[T1-R205] *TRITON shall provide the user with the control of displaying Operational Objects in the GeoView.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R206] *TRITON shall allow the user to manage (create, save, modify, delete) Display Criteria and Display Options as given in the Description. The Ribbon Bar of the AppView may be used to activate or de-activate them.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R207] *TRITON shall filter the Maritime Operational Objects according to the selected Display Criteria and selected Display Option. This data shall be passed to the GeoView over the AppView using NMAPI.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R208] *TRITON shall allow the authorised user to adjust configuration parameters related to display options.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.3.4.1.3. Operational Information Display

Operational Information consists of detailed object information, planning information, system interface status information, results of a search in tabular form, control and monitoring functions. TRITON AppView will provide this information in relevant GUI panels and dialog boxes.

Object Information:

When a user needs more detailed information on a selected Maritime Operational Object either in a list displayed in the AppView or in the GeoView, a pop-up window called "Object Information Box" will be displayed. The Object Information Box will contain tabs which include at least the following for an object:

- Identification (e.g. ID, name, country, Standard Identity and Amplification, Category)
- Kinematics (e.g. Position, Course, Speed, Time of Last Update)

- Operational Information (e.g. Mission/Campaign/Operation, Task, Activity, Status)
- Intelligence information (query and result)
- Visual information (picture or video)
- Object-specific Information (any specific data for the object)

The user can issue an Intelligence Query to INTEL-FS regarding the object. The query result is displayed in the Object Information Box, Intelligence Tab.

Object Information Box can be used in both AppView and GeoView. The information to be displayed in the GeoView will be passed over the NMAPI.

[T1-R209] *TRITON shall be able to present Operational Information on the AppView using both dedicated panels and dialog boxes.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration
Comment : The design will be determined at SRR and finalised ad SwDR-1.

[T1-R210] *TRITON shall display the detailed information for a selected Maritime Operational Object in a pop-up window called "Object Information Box" on the View from which it is requested.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

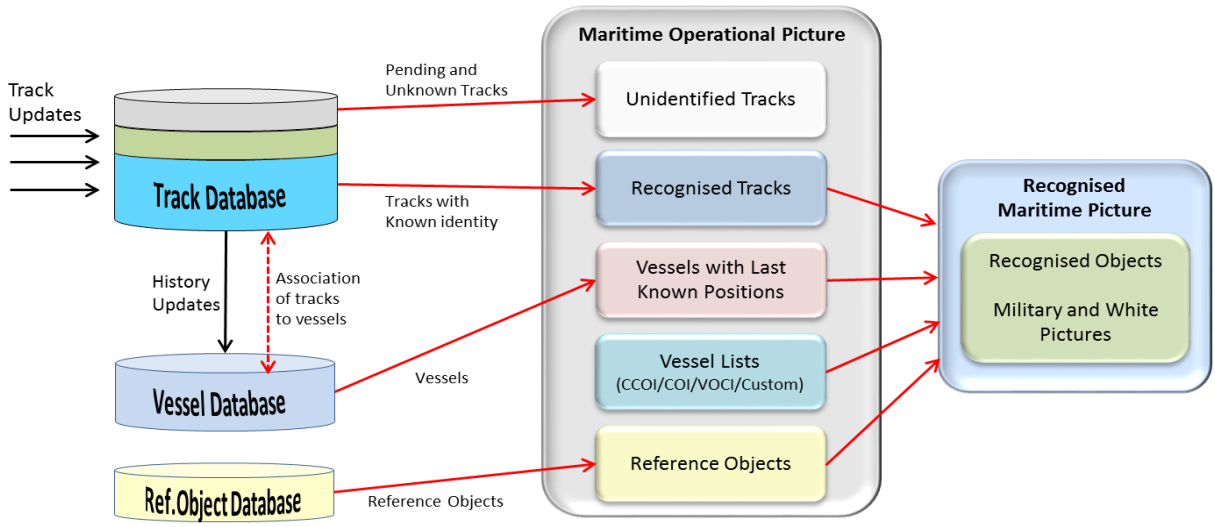
4.2.3.4.2. Maritime Operational Picture Management

Maritime Operational Picture (MOP) is the collection of all available Maritime Operational Objects. It includes all Tracks with all identities in the Track Database and all Vessels in the Vessel Database. Authorised user can see the MOP over the GeoView.

The MOP is built on the Maritime Operation Domain by using the Track Database, Vessel Database and Reference Object Database. It includes Tracks with standard identity PENDING and UNKNOWN which require further investigation in addition to the recognised Tracks having the other Standard Identities (FRIEND, ASSUMED FRIEND, NEUTRAL, HOSTILE and SUSPECT).

The recognised Tracks can be associated to vessels in the Vessel Database.

The Military and White Pictures are then used to build the RMP as depicted below:



[T1-R211] *TRITON shall build the MOP as a collection of all available Maritime Operational Objects on the NS Domain.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R212] *TRITON shall be able to display the MOP in the GeoView as a Layer.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R213] *TRITON shall allow the authorised user to modify the assigned Standard Identities for all types of Maritime Operational Objects in the MOP.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 1
- Qualific. Method : Test

4.2.3.4.3. Military Picture Management

The Military Picture (MP) contains all friendly, hostile, suspect and neutral combatant tracks and vessels. There may also be other Reference Objects (Reference Points, Lines and Areas) in the MP.

TRITON will compile the MP only on the NS Domain using the track feeds coming from Nations, on-line and off-line own status reports from NATO assets and NIRIS. The Standard Identity FRIEND will be assigned to all friendly Maritime Operational Objects. If NATO maritime assets participate in a Tactical Data Link, and the link information can be received by NIRIS, then all Participating Units (PU/JU (NU in future)) are automatically declared as FRIEND. Authorised users can select friendly Maritime Operational Objects based on a user-selected filter (e.g. area, type, task).

Other Standard Identities will be assigned according to the current operational requirements set by OPTASK RMP.

[T1-R214] *TRITON shall be able to filter the Military Picture as a separately controllable collection of information according to the Standard Identities and display them as a layers on the GeoView.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R215] *TRITON shall allow the authorised user to select Maritime Operational Objects as the Military Picture by using a filter on Standard Identity.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 1
Qualific. Method : Test

[T1-R216] *TRITON shall be able to display the Military Picture in the GeoView as a Layer.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 1
Qualific. Method : Demonstration

4.2.3.4.4. White Picture Management

White Shipping refers to commercial shipping including passenger, cargo, tanker, ferries, container vessels, fishing vessels and other non-military vessels. However, the current notion of White Shipping tends to be limited to such vessels that exceed 300 tons displacement per the IMO AIS requirement.

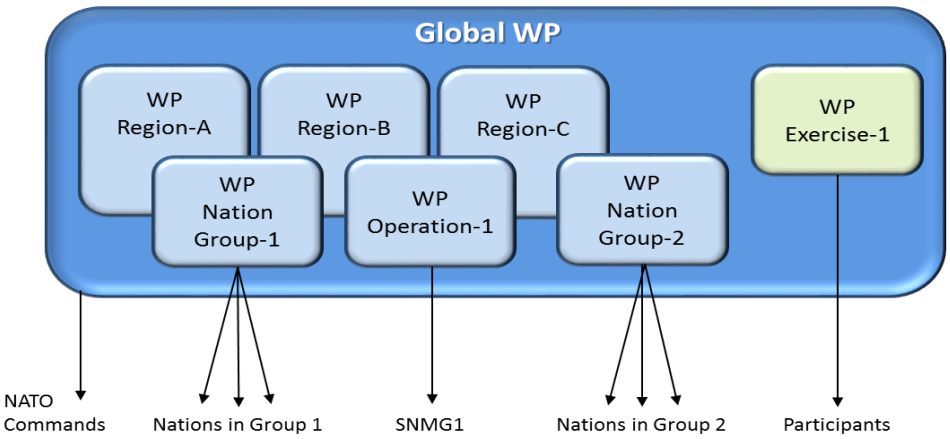
The current IMO requirement (effective 31 Dec 2004) for AIS is: "The regulation requires AIS to be fitted aboard all ships of 300 gross tonnage and upwards engaged on international voyages, cargo ships of 500 gross tonnage and upwards not engaged on international voyages and all passenger ships irrespective of size (i.e. AIS – class A).

“White+ Shipping” refers to the sharing information on all manner of commercial vessels regardless of their displacement/tonnage, length or other specifications. White Shipping displacement AIS requirement. While it is recognised that future commercial rules may mandate AIS transponders, A or B, on many other commercial vessels, including ferries, the intent of the “White+ Shipping” is to serve as a broad “other” category for commercial shipping to include all manner of non-warship vessels on the seas or in port.

The term "White Picture" will be used in TRITON to address all non-combatant (civilian) maritime vessels and tracks with classification of non-combatants (merchant, fishing, pleasure, research, government etc.). There may also be other objects like special points, lines, and areas in the WP.

TRITON will use Maritime Operational Object to represent WP data. All vessels, tracks and objects will be uniquely identified with TRITON Track or Vessel Number (TTN or TVN). In addition, country, vessel name, IMO number and MMSI number will also be used to positively identify tracks and vessels. Users can display any of these identification indicators as configurable labels on the GeoView.

According to certain operational needs, WP in global scope can be split into geographical regions so that dissemination can be managed according to the particular Area of Interest. The figure below depicts the WP Region concept:



TRITON will maintain a list of WP Regions which can be managed by the authorised user. Each WP Region has its own White Picture information, which can be disseminated at user-selected intervals. The WP Region in TRITON will have at least the following attributes:

- Region name
- Description
- Geographical Region (Area)
- Dissemination Rate

4.2.3.4.4.1. White Picture Compilation

TRITON will compile the WP first on the NU Domain using the track feeds coming from MSSIS, LRIT, AIS data sources, Nations' feed and off-line track reports. Tracks are built in the Track Database and then the Vessel Database will be updated for the associated tracks.

The WP will be built on the NU Domain and then transferred to the NS Domain. The WP on the NS Domain will be enhanced with additional track information received from NATO assets and other sources.

The WP on NU Domain can be separated into WP Regions according to geographical filters. Each Region can then be managed and shared with external users separately.

[T1-R217] *TRITON shall maintain the WP as a separately controllable and displayable collection of information on the NU and NS Domain.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R218] *TRITON shall be able to build the WP according to the settings of the Maritime Operation on the NU Domain.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R219] *TRITON shall maintain a list WP Regions for each Maritime Operation on the NU Domain.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R220] *TRITON shall be able to process received track information from external sources on the NU Domain, update the Track Database and the Vessel Database on the NU Domain.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Demonstration

[T1-R221] *TRITON shall maintain the WP on the NS Domain with the WP information received from the NU Domain and the information received from NATO assets operating on the NS Domain.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R222] *TRITON shall be able to display the White Picture in the GeoView as a Layer.*

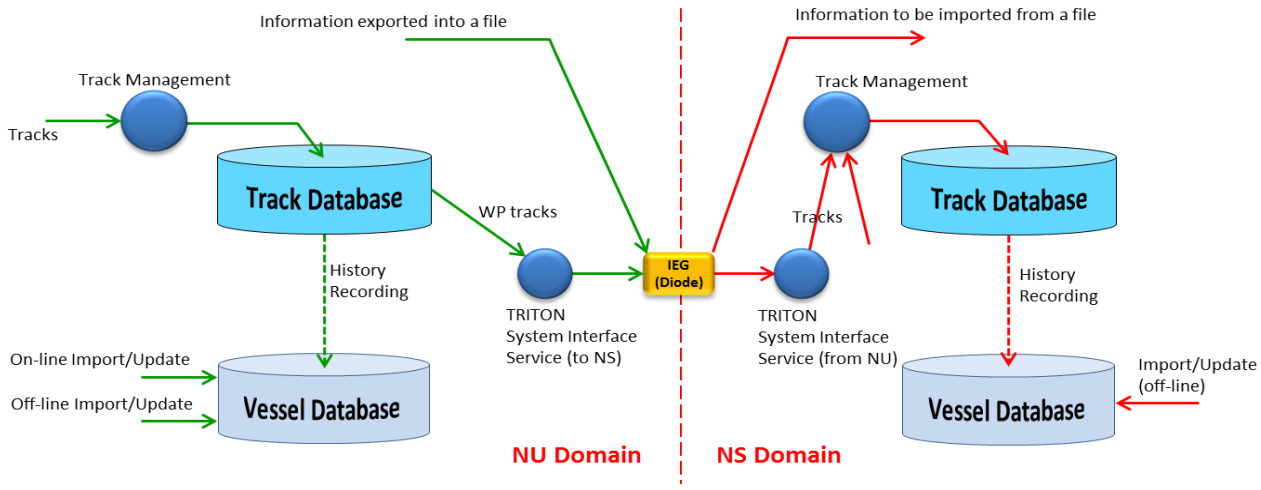
Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Demonstration

4.2.3.4.4.2. White Picture Transfer

WP will be compiled on the NU Domain, and the Maritime Operational Object Databases will continuously be updated. The track information from the Track Database will be transferred to the NS Domain automatically and continuously. An internal System Interface Service (SIS) will provide the user-monitored transfer over the Information Exchange Gateway (IEG) (requirements are in the Cross-Domain Support) with a configurable update rate. The SIS will put the data into files and send it to the IEG. The IEG accepts the labelled data in files and transfers them to the NS Domain. While transferring tracks from the NU Domain, the TRITON Track Numbers will also be transferred so that the relevant tracks can be addressed easily on the NS Domain.

On the NS Domain, another SIS receives the data coming from TRITON-NU, extracts track information and sends them to the Track Management for correlation and association process.

Following figure depicts the transfer of WP from the NU Domain to the NS Domain and the processing.



If other data needs to be transferred from the NU Domain to the NS Domain, then manual operation will be used. For example, transferring an Area can be achieved by first exporting it into a file on the NU Domain, transfer the file manually to the NS Domain over the IEG, and import the file on the NS Domain using the relevant function.

Data transfer from the NS Domain to the NU Domain will not be on-line.

[T1-R223] *TRITON shall transfer the WP information from the NU Domain to the NS Domain automatically.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Demonstration

[T1-R224] *TRITON shall allow the authorised user to control and monitor the automated data transfer from the NU Domain to the NS Domain.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Test

[T1-R225] *TRITON shall allow the authorised user to set the transfer parameters from the NU Domain to the NS Domain.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Test

[T1-R226] *TRITON shall pass the WP information to the NS Domain over the IEG-Data Diode.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Demonstration

[T1-R227] *TRITON shall be able to receive WP information from the NU Domain via the Data Diode and process the track information automatically.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R228] *TRITON shall allow the authorised user to transfer files having exported WP information from the NU Domain to the NS Domain over the Data Diode.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Test

[T1-R229] *TRITON shall allow the authorised user to receive data files from the NU Domain and import them on the NS Domain.*

Requirement Property :
- Domain for Static : NS

Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

4.2.3.4.4.3. White Picture Sharing

NATO White Picture (WP) can be shared with Nations over the NU Domain. Nations who want to make use of NATO WP will be able to use the Web service (e.g. WP Service) to receive the vessels in the indicated Area of Interest. It will also be possible for other organizations to access the NATO WP by using the Web Service.

[T1-R230] *TRITON shall make the NATO WP available to external systems through Web Services (e.g. WP Service).*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R231] *TRITON shall allow the authorised user to control and monitor the dissemination of WP information according to the Releasability Label over Maritime Operations and the RMP Regions.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

4.2.3.4.5. Recognised Maritime Picture Management

NATO RMP is a managed geographic presentation of, processed all source contact and information data known at a given time, of surface, sub-surface, amphibious and maritime air activities in the maritime operating environment. The NATO RMP is compiled in accordance with operational directives and tasking to support decision makers in the conduct of C2 of maritime forces and operations. The NATO RMP is an operational picture, not a tactical plot. It is not intended to be used to directly support weapon systems, target acquisition or engagements.

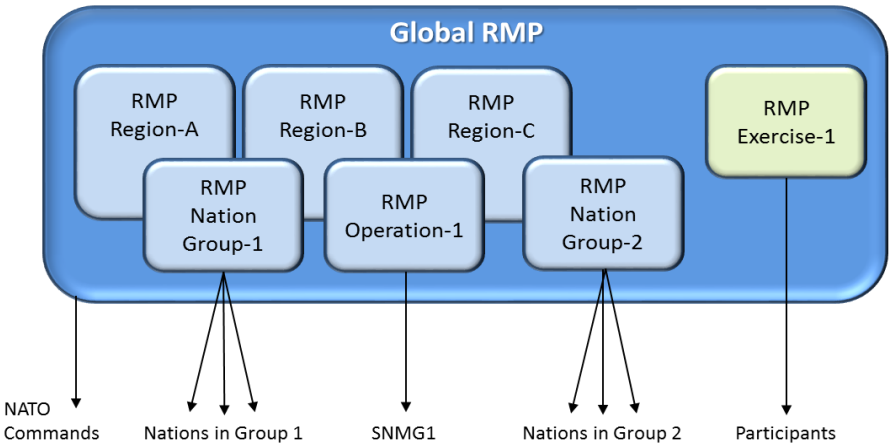
RMP data includes positional and operational data on friendly, neutral and adversary units and forces based on information provided from a variety of sources. Therefore, TRITON will build the RMP using the Military and White Pictures as components of the RMP.

Once the RMP is built, it can be shared by other Functional Services and Nations. TRITON will use the following methods to share and disseminate RMP:

- Making data available via a Web-service
- Sending track data to special users in NVG format
- Database synchronisation with other TRITON instances
- Nation Interfaces
- ADatP-3 formatted messages
- OTH-T GOLD messages

RMP is a global collection of recognised maritime objects. Although the RMP will be made available to TRITON Clients regardless of their location, it may be essential to disseminate the RMP with the currently used formats such as OTH-T GOLD messages to particular destinations. According to certain operational needs, RMP in global scope can be split into geographical regions so that dissemination can be managed according to the particular Area of Interest. For example, part of the RMP can be sent

to ACP which is conducting an operation at sea. Part of the RMP can be filtered before sending it to a particular Nation or Nation Group.



TRITON will maintain a list of RMP Regions which can be managed by the authorised user. Each RMP Region has its own Military and White Pictures, which can be disseminated at user-selected intervals. The RMP Region in TRITON will have at least the following attributes:

- Region identification
- Description
- Geographical Region (Reference Object - Area)
- Dissemination Rate

4.2.3.4.5.1. RMP Building

NATO RMP building uses filtering, validation, evaluation and correlation processes. TRITON will use the recognised (positively identified) tracks and the vessels with their last known positions assigned as Military and White Picture components. The RMP, with its components, will be made available to users allowing them to filter and display the objects within a given time frame.

The authorised user (RMP Manager) can create an RMP Region, select tracks and vessels to be included in this RMP Region by using the RMP Filter Criteria. The RMP Filter Criteria for each RMP component will provide the user to select at least the following:

- Standard Identity
- Classification
- Track Confidence Level
- Selected Vessel Lists (CCOI/COI/VOCI/Custom)

In addition, individual Maritime Operational Objects can be assigned to a selected RMP Region within the Current Maritime Operation.

All combatant vessels belonging to NATO Nations will be automatically assigned as FRIEND. The non-combatant vessels that are in Vessel List will be automatically assigned a Standard Identity and designated to relevant picture. The defaults will be as follows:

- Non-combatants (non-military) : NEUTRAL, White Picture
- VOCI Type 1 to 5 : SUSPECT, Military Picture
- VOCI Type 6 and 7 : NEUTRAL, White Picture
- COI : SUSPECT, Military Picture
- CCOI : HOSTILE, Military Picture

[T1-R232] *TRITON shall maintain a list RMP Regions for each Maritime Operation.*

Requirement Property :
Domain for Static : NS

Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R233] *TRITON shall use the recognised Tracks in the Track Database and the Vessels with last known positions in the Vessel Database on the NS Domain to build the RMP by using the RMP Filter Criteria.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R234] *TRITON shall automatically designate tracks with classification of Combatant to the Military Picture of the global RMP.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R235] *TRITON shall automatically designate the Vessel Lists according to the default Picture of the global RMP.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R236] *TRITON shall allow the authorised user to designate Maritime Operational Objects to be included in the RMP according to their RMP designation information within the Current Maritime Operation.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R237] *TRITON shall allow the authorised user to designate a selected Vessel List to be included in the RMP of the Current Maritime Operation or excluded.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R238] *TRITON shall not allow the user to designate Simulated Tracks and Exercise Tracks into the RMP if the Maritime Operation is not of type Exercise.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R239] *TRITON shall be able to display the RMP in the GeoView as a Layer.*

Requirement Property :
Domain for Static : NS

Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Demonstration

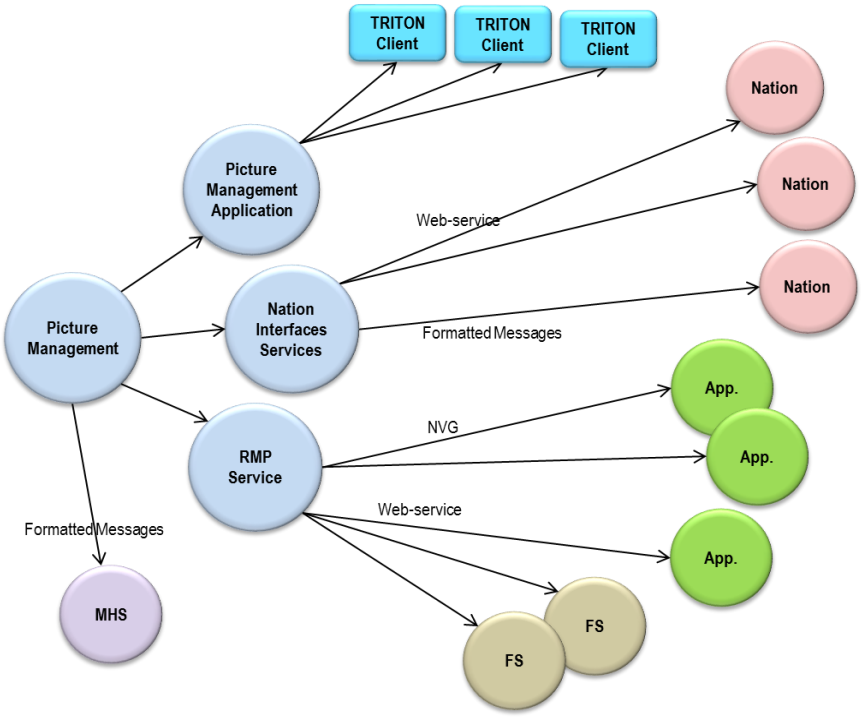
4.2.3.4.5.2. RMP Control and Sharing

NATO RMP is controlled by authorised users and can be shared with NATO Commands, HQs, Nations and other Bi-SC AIS Functional Services. While TRITON allows the users to access Maritime Operational Picture as well as RMP by means of Picture Display function configured for each Maritime Operation, it will also be able to disseminate the RMP using NVG format and APP-11/OTH-T GOLD messages. It will also make the RMP available for external access via the RMP Service. In addition, RMP can be exported into a file in a user-selected format.

Nations will be able to get any part of any RMP via a dedicated Nation Interface (Web-service).

Military and White Pictures within an RMP Region may have different dissemination rates depending on the operational use. For example, Military Picture every 20 minutes, White Picture every 60 minutes.

Following picture depicts how RMP can be disseminated with various options:



An authorised TRITON user will be able to generate Formatted Messages by either selecting Tracks on the GeoView or issuing a Track Search query.

[T1-R240] *TRITON shall make the RMP available over the RMP Service for external access.*
Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R241] *TRITON shall make the RMP available over the Nation Interface for each Nation.*
Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3

Qualific. Method : Test

[T1-R242] *TRITON shall make the RMP available over the ACP Interface for the platform on which the Deployable Kit is installed.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: NS
Baseline : BL 4
Qualific. Method : Test

[T1-R243] *TRITON shall allow the authorised user to generate a selected Formatted Message after selecting the tracks on the GeoView or from a Search Result.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R244] *TRITON shall be able to generate RMPSITSUM message based on user-selected Tracks and Reference Objects.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R245] *TRITON shall be able to generate NAVSITSUM message based on user-selected Tracks filtered for correct identity.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R246] *TRITON shall be able to generate NAVSITREP message based on user-selected Tracks filtered for correct identity.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R247] *TRITON shall be able to generate MARINTSUM message based on user-selected Tracks filtered for correct identity.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R248] *TRITON shall be able to generate MARINTREP message based on user-selected Tracks filtered for correct identity.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R249] *TRITON shall be able to generate NAVPOSREP message based on user-selected Tracks filtered for correct identity.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R250] *TRITON shall be able to generate OTH-T GOLD CONTACT REPORT message based on user-selected Tracks.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R251] *TRITON shall be able to generate OTH-T GOLD ENHANCED CONTACT REPORT message based on user-selected Tracks.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R252] *TRITON shall be able to generate OTH-T GOLD OVERLAY-2 message based on user-selected Reference Objects.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R253] *TRITON shall be able to generate OTH-T GOLD OVERLAY-3 message based on user-selected Reference Objects.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R254] *TRITON shall be able to send the generated Formatted Messages containing the RMP or its Regions to the selected destination addresses at a selected Dissemination Rate.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R255] *TRITON shall allow the authorised user to select the destination system/service and send the RMP using NVG format [NVG].*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Test

[T1-R256] *TRITON shall be able to export the RMP into Recognised Output File Format.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R257] *TRITON shall allow the authorised user to select the RMP component and export into a file in Recognised Output File Format.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

4.2.3.4.6. Operational Object Search

TRITON will provide a Search Function for finding one or more Maritime Operational Objects being stored in the internal databases. TRITON will implement the Object Search function compatible to the specification given in [Open Search]. It will be accessible via the TRITON External Services (i.e. RMP Service, ICI Service).

The Search Function will have two options: Quick Search and Detailed Search.

Quick Search:

The Quick Search option will use the following Quick Search Criteria:

- Operational Object Number (Track Number, Vessel Number or Reference Object Number)
- Country
- Vessel Name
- International Call Sign
- IMO number
- MMSI number
- Range (from a given point or an Object)

Detailed Search:

The Detailed Search Function will use the Detailed Search Criteria which contains broader set of attributes (e.g. Descriptions, Remarks) of Operational Objects stored in the databases. Users can create search queries using the database fields, values, text search with wildcards (e.g. *, ?), intervals and logical operators (AND, OR, NOT) to define detailed search. Users can build Search Filters using the Detailed Search Criteria, save them in their Workspace, and re-use them to quickly initiate a new search. Examples of Detailed Search:

- Display the tracks having Activity related to Fishing in the specified area.
- Display the tracks carrying oil from a given port.
- Display the vessels replied (participating) to hailing in a given area in a given date interval.
- Display the vessels having helicopters on board.
- List the vessels capable of carrying containers with flag A.
- Display the current locations of the vessels in the VOCI having flag B.

Name Matching Criteria:

When TRITON executes a search using a given Vessel Name, it will use the Name Matching Criteria to compare it with other Vessel Names in the Vessel Database, both the Vessel Name and Synonyms. As there may be Vessel Names which contain special characters (e.g. '!'), the Search Criteria will be able to handle them as exceptional cases using the Name Matching Criteria. These special characters can either be excluded or the closest results are returned. The Name Matching Criteria will consider at least the following:

- Removing characters which are not letters or numbers (excluding user selected special characters such as '!')
- Removing spaces
- Removing well-known prefixes like "MV", "RORO", "MT", "CF", "MR", "FB"
- Converting Arabic numbers (1, 2, 3, 4, ...) to Latin representatives (I, II, III, IV, ...)
- Calculate Levenshtein distance between two names (Levenshtein distance is a number of changes which has to be made on one string to get a second one. '0' means that strings are identical, '2' means two changes; e.g. one deletion plus one changed character).

Search Results:

The Search Results returned after a Quick or Detailed Search query execution will be displayed in sortable tabular format in the AppView, giving the closest 10 results first with an option to get more. The results can be displayed with user-selected symbols, which is provided by the Symbology Service. The user will also be able to find one or more Objects within the Search Results (e.g. sorting) and have them displayed or highlighted in the GeoView.

[T1-R258] *TRITON shall provide an Operational Object Search Capability compliant to Open Search [OpenSearch].*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R259] *TRITON shall allow the user to manage (create, modify, delete, export, import) Search Filters to be saved in the Workspace and reuse an existing one to issue a new search.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R260] *TRITON shall allow the users to search for Maritime Operational Objects stored in the databases using queries based on the given Quick Search Criteria or Detailed Search Criteria, as given in the Description. Both search criteria shall handle Vessel Name exceptions by displaying the closest the matches.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test
Comment : Search query options will be defined during Software Requirements Analysis.

[T1-R261] *TRITON shall display the search results in sortable tabular format with a capability of finding one or more Maritime Operational Objects and displaying them on the GeoView. If the Objects are included in the current Spatial Extent, they shall be highlighted, if not, user confirmation shall be requested to move the Extent to cover the last known position of the Objects.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R262] *TRITON shall display the closest ten (10) results of a search with an option to extend the number of results if a given name does not exactly match with any of the records in the databases.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test
Comment : Name matching criteria will be defined during Software Requirements Analysis.

[T1-R263] *TRITON shall be able to display augmented information from the Vessel Database if the searched tracks are associated.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R264] *TRITON shall allow the user to access the Object Search function in the context of a User Application.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.3.4.7. Operational Object Animation

TRITON will be able to animate moving Maritime Operational Objects in a given time period. The user will be able to build a data set for animation by selecting the objects, time period and speed of animation. TRITON will then display this data set in the GeoView having Timeline to control the animation.

[T1-R265] *TRITON shall be able to animate the selected Maritime Operational Objects on the GeoView.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R266] *TRITON shall allow the user to select the Maritime Operational Objects, time period and the speed of animation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

4.2.3.4.8. NATO Common Operational Picture Handling

NATO Common Operational Picture (NCOP) provides the ability to integrate the Recognised Maritime Picture (RMP), Recognised Air Picture (RAP) and Recognised Ground Picture (RGP) into a single display. It can be displayed and managed on C2 Information Systems comprised of the necessary applications to process, manage and display required data and information.

TRITON will be able to get RAP, RGP and if necessary other relevant objects from NCOP while providing RMP to NCOP via its RMP Service.

[T1-R267] *TRITON shall receive RAP and RGP and display them on separate layers in the GeoView.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R268] *TRITON shall allow the authorised user to control and monitor the NCOP Interface.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Test

4.2.3.5. Maritime Information Management

This function enables users to access, process and disseminate information from external sources (e.g. commercially available databases, Internet sites) that present a specific interest for the maritime community of interest, and to define, produce and maintain information about maritime objects and entities.

4.2.3.5.1. Reference Data Source Management

TRITON will use various data sources and recognised databases to collect information related to maritime vessels.

4.2.3.5.1.1. Maritime Datasets

Maritime Datasets are commercially provided data about all maritime vessels. For example, the Information Handling Services Inc. (IHS) Fairplay is a commercial data service providing information about vessels, owners, managers, maritime companies and shipping companies. Lloyd's Register of Ships (IHS) is used for validating merchant shipping data from unverified or external sources. IHS Jane's provides access to a series of publications that provide open source information and analysis about defence, security, transport, public safety and law enforcement.

TRITON will be able to access the Web sites as well as accessing the datasets off-line at the indicated network locations as recognised Maritime Datasets.

[T1-R269] *TRITON shall maintain a list of Network Locations to access the information related to off-line Maritime Datasets.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Demonstration

[T1-R270] *TRITON shall maintain a list of Web Sites to access the information related to Maritime Datasets on-line.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Test

[T1-R271] *TRITON shall allow the authorised user to manage (create, modify, delete) the List of Web Sites and Network Locations having Maritime Datasets.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R272] *TRITON shall allow the user to access the on-line Maritime Datasets on the specified Web Sites with a search capability.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R273] *TRITON shall allow the user to access the off-line Maritime Datasets on the specified Network Location with a search capability.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R274] *TRITON shall be able to use the search capability provided by the on-line Maritime Datasets.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R275] *TRITON shall be able to download a specified Maritime Dataset at configurable intervals from indicated addresses into local Network Location. The authorised user shall be notified about the beginning and end of update process.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

4.2.3.5.1.2. Person of Maritime Interest List

A Maritime Person of Interest is anyone associated with maritime interests. These people might include owners, past and potential crew members, pirates (suspected or confirmed), dockworkers and passengers.

TRITON will maintain lists of people related to maritime interests. There may be more than one list each having different identification. There may be several thousand people, however, TRITON will not have a capacity limitation in this list.

Person Data:

Person of Maritime Interest List consists of "Person Data" which includes the following attributes:

- Person identification
- Kind of relation with maritime interest (owner, crew member, pirate etc.)
- Activity

- Skills
- History of the commitment in the maritime community (former crews)
- Current location
- Link to the file containing additional information

Person Definitions ~~from~~ received from external sources can be combined with the existing ones if the user-selected attributes of Person Definition match.

Selected records of Person Data can be exported into a file in Recognised Export File Format.

[T1-R276] *TRITON shall maintain a list for Person of Maritime Interest for each Maritime Operation with a search capability.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R277] *TRITON shall allow the authorised user to manage (create, modify, delete) the Person of Maritime Interest List.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R278] *TRITON shall allow the authorised user to manually combine the information received from external sources with the existing ones in the Person of Maritime List ~~List~~ if the user-selected attributes of Person Data match.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R279] *TRITON shall allow the authorised user to display the vessel on the GeoView if the person in the Person of Maritime Interest List is embarked on a vessel.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R280] *TRITON shall allow the authorised user to add a file holding the list of passengers on board a Vessel in the Vessel Database.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R281] *TRITON shall allow the authorised user to filter and export the Person of Maritime Interest List in a user-specified file in Recognised Export File Format.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

4.2.3.5.1.3. Lloyd's Maritime Intelligence Unit

Lloyd's Maritime Intelligence Unit (MIU) provides information about vessel movements, shipping company, credit reports, commercial ports and terminals and marine casualty data from Lloyd's MIU Seasearcher in order to validate merchant shipping data from unverified and external sources. The information is available via subscription and is received from several sources around the world.

TRITON will maintain a list of Lloyd's MIU by importing the relevant information from Lloyd's MIU Web-site. The list maintains MIU Data with at least the following attributes:

- Vessel information
- Company

[T1-R282] *TRITON shall maintain a list of Lloyd's MIU Data.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R283] *TRITON shall allow the user to manage (create, modify, delete) the Lloyd's MIU List.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R284] *TRITON shall be able to import Lloyd's MIU data from an indicated file into the Lloyd's MIU List.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R285] *TRITON shall allow the authorised user to access on-line Lloyd's MIU dataset and import the datasets into the local list.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R286] *TRITON shall allow the authorised user to import Lloyd's MIU dataset from a file into the local list.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R287] *TRITON shall allow the authorised user to export the selected Lloyd's MIU Data into a file in Recognised Export File Format.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R288] *TRITON shall allow the user to display Lloyd's MIU List in sortable tabular form with search and filter capabilities.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

4.2.3.5.1.4. Detention List

Detention Lists contain current and historical information about banned and detained vessels and their violations in order to identify, track and investigate Vessels of Interest (VOIs). The Memorandum of Understanding (MOU) Detention Lists can be derived from a number of sites. Following are the sites to provide Detention Lists:

- Abuja MOU
- Black Sea MOU
- Caribbean MOU
- Indian Ocean MOU
- Mediterranean MOU
- Paris MOU
- Riyadh MOU
- Tokyo MOU
- Viña del Mar Agreement

The Paris MOU provides the current detained list (updated daily) and the banned list. Other sites are updated weekly or monthly.

European Maritime Safety Agency (EMSA) and Food and Agriculture Organization of the United Nations related to Illegal, Unreported and Unregulated (IUU) fishing publishes information to be considered.

MOU Detention List:

TRITON will maintain a list of MOU Detention Lists each having at least the following attributes:

- List identification
- List source
- General detention reason
- Dates of validity
- Detained Vessel List (a list of banned and detained vessels associated with vessels in the Vessel Database)

Each vessel in the Detained Vessel List will have at least the following:

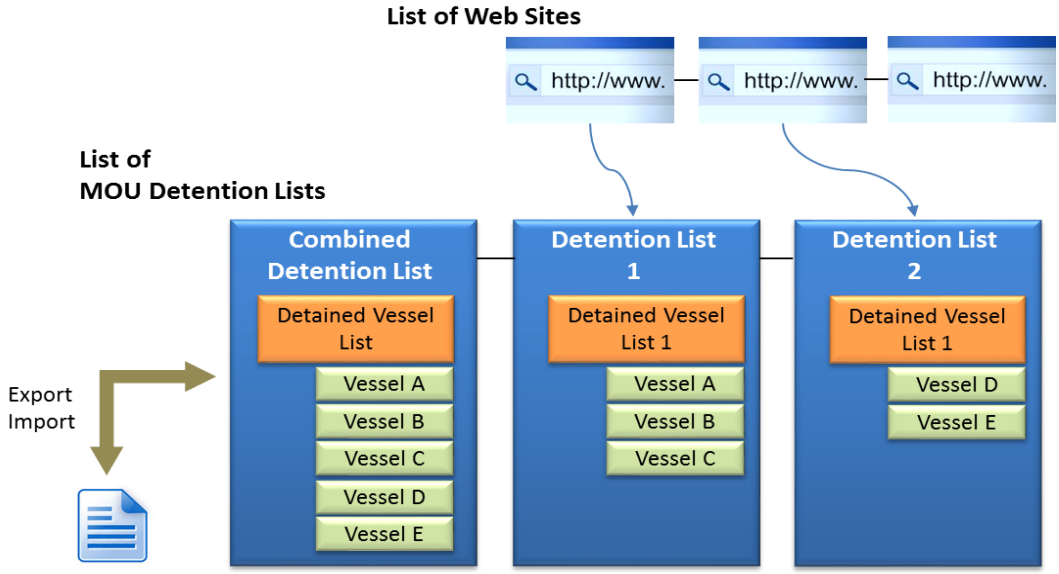
- Vessel identification
- Detention reason
- Dates and events

All vessels belonging to a detention or banning list and those flying a black listed flag, will be included in the Detention List and tagged appropriately in the Vessel Database.

TRITON will provide the user with capability to manage (create, modify, delete) the Web Sites to be searched for. TRITON will have a capability, initiated by the authorised user, to combine MOU Detention Lists by correlating information received from different sources. The Detention List Correlation Criteria will include comparison for at least the following:

- Vessel identification
- Detention events and dates

A conceptual representation of these lists is shown in the following figure:



Selected and filtered Detention Lists can be exported into a file in Recognised Export File Format.

[T1-R289] *TRITON shall maintain a list of Web Sites to scrape to access information related to MOU Detention Lists.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Demonstration

[T1-R290] *TRITON shall allow the authorised user to manage (create, modify, delete) the List of Web Sites having MOU Detention Lists.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Test

[T1-R291] *TRITON shall maintain a list of MOU Detention List to locally store information on banned and detained vessels for each Maritime Operation with a search capability.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Demonstration

[T1-R292] *TRITON shall allow the authorised user to manage (create, modify, delete) the local MOU Detention List.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Test

[T1-R293] *TRITON shall allow the authorised user to export filtered Detention Lists into a file in Recognised Export File Format.*

Requirement Property :

Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R294] *TRITON shall allow the authorised user to import data from a file in Recognised Import File Format into a local Detention List.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R295] *TRITON shall allow the authorised user to be able to combine the MOU Detention Lists received from different sources by using the Detention List Correlation Criteria.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R296] *TRITON shall allow the authorised user set the rules for the Detention List Correlation Criteria for combining MOU Detention Lists received from different sources.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R297] *TRITON shall allow the authorised user to search for specific vessel(s) through the Detention Lists over selected Web Sites and display the result in sortable tabular format.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R298] *TRITON shall associate vessels in any of the Detention Lists in the local MOU Detention List with the vessels in Vessel Database.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R299] *TRITON shall allow the authorised user to search for a vessel in the local MOU Detention Lists, display the details of the recording and the associated vessel in the Vessel Database with an option to display its position on the GeoView.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R300] *TRITON shall allow the authorised user to display the local MOU Detention Lists in sortable tabular form with an option to display the position of the selected vessel.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

4.2.3.5.1.5. Merchant Ships Characteristics

Merchant ship characteristics, including images can be retrieved from external sources such as the Office of Naval Intelligence Database (U.S.) or Marine Traffic. TRITON will be able access the specified databases and provide information to the user to validate merchant shipping data from unverified and external sources and to investigate vessels. TRITON will maintain a list of addresses to such databases.

[T1-R301] *TRITON shall maintain a list of Web Sites to scrape to access information related to Merchant Ship Characteristics.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R302] *TRITON shall allow the authorised user to manage (create, modify, delete) the List of Web Sites having Merchant Ship Characteristics.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R303] *TRITON shall allow the user to access the Merchant Ship Characteristics dataset on the specified sites.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R304] *TRITON shall allow the authorised user to manually update the Vessel Database by using the Merchant Ship Characteristics reference dataset.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

4.2.3.5.1.6. World Port Index

The World Port Index (WPI) (PUB 150) contains a tabular listing of ports throughout the world (approximately 64,000 entries) describing their location, characteristics, known facilities, and available services. The table is arranged geographically, with an alphabetical index. It is published by the Defense Mapping Agency Hydrographic Topographic Center of the U.S. National Geospatial-Intelligence Agency (NGA) based on specific selection criteria for the places included. New editions are published bi-annually.

TRITON will maintain a World Port Database internally in order to provide support to Destination Resolution process and display them on the GeoView. It also allow the user to access and query detailed information about ports of the world in support of maritime and related operations. This

database will be manually updated using the NGA database. There may be several thousands of Port Data in the database, however, there will be no capacity limitation.

Ports:

Ports in the World Port Database consists of at least the following attributes:

- Country
- Name
- Port type (naval, civilian)
- Geographical location
- Capabilities

World Port Database can be exported into a file in a user-selected format and imported data can be used to build the World Port Database.

TRITON can also consume a WFS or Gazetteer Service for handling the World Port Database if it is incorporated in the available GIS Server.

[T1-R305] *TRITON shall maintain an internal World Port Database to store the world-wide port information with a search capability.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R306] *TRITON shall maintain a list of Naval Bases in the World Port Database based on country.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R307] *TRITON shall allow the authorised user to manage (create, modify, delete) the internal World Port Database.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R308] *TRITON shall be able to import World Port dataset from a selected online source.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R309] *TRITON shall allow the authorised user to manually import data from the World Port data published by U.S. National Geospatial-Intelligence Agency (NGA) into World Port Database.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R310] *TRITON shall allow the authorised user to import data from an external file in Recognised Import File Format to build the internal World Port Database.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

[T1-R311] *TRITON shall allow the authorised user to export the internal database into a file in Recognised Export File Format.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Test

[T1-R312] *TRITON shall use internal or external World Port data to support Destination Resolution process for AIS tracks.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Test

[T1-R313] *TRITON shall allow the user to search for port(s) on either internal database or on-line database and display them as Reference Points on a Layer in the GeoView.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Test

[T1-R314] *TRITON shall be able to store classified information about Naval Bases in the World Port Database.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R315] *TRITON shall allow the user to display the selected Ports or Naval Bases on the GeoView in a Layer.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Test

[T1-R316] *TRITON shall be able to use a World Port Data Service if ~~a~~ the available GIS Server can provide (e.g. WFS, Gazetteer Service).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

4.2.3.5.1.7. Shipping Route Networks

Standard maritime shipping routes provide users important context for Maritime Information Management. A route can be defined as the representation of the typical path between two points. The following picture depicts basic maritime routes around the world.



A Route Network is an information layer providing a synthetic representation of historical vessel traffic. The ability to display a Shipping Route Network provides Pattern of Life context to users to and helps users distinguish between standard maritime traffic and possible anomalous vessel activities. A Shipping Route Network can be visualized as a number of poly-lines (lines between a series of waypoints) which provide a representation for typical vessel movements along each route.

Shipping Route Networks can represent traffic flows from a global, regional or local perspective. Regionally and locally, Shipping Route Networks may also have a seasonal component. It is therefore possible to have multiple Shipping Route Networks representing standard routes for a specific area, region, or any other Area of Operation.

TRITON will maintain a list of Shipping Route Networks where each Route Network will have summary information which further describes the characteristics of vessels using that route in summary statistics.

Shipping Route Networks can be imported from a published format like SHP or XML without any capacity limitation.

Route Network:

A Route Network will consists of at least the following attributes:

- Route unique identification
- Entry waypoint
- Exit waypoint
- Route waypoints (poly-line)
- Route transit duration
- Frequency of transits
- Route length in nautical miles
- Vessel type distribution
- Vessel flag distribution
- Vessel length distribution
- Point of departure
- Destination
- Usual speed on the network

There may be several thousands of Routes in several Shipping Route Networks.

TRITON will allow the authorised user to perform statistical analysis of the followed routes at sea during a defined period (typically several years) in a defined area in order to check the validity of the current Maritime Shipping Route Network and highlight the necessity to create a new maritime Shipping Route Network.

[T1-R317] *TRITON shall maintain a list of Shipping Route Networks to store Route Networks.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Demonstration

[T1-R318] *TRITON shall allow the authorised user to manage (create, modify, delete, import, export) the Route Networks in the Shipping Route Networks List.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Test

[T1-R319] *TRITON shall allow the authorised user to import Shipping Route Networks from a file in Recognised Import File Format.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Test

[T1-R320] *TRITON shall allow the authorised user to export Shipping Route Networks to a file in Recognised Export File Format.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Test

[T1-R321] *TRITON shall allow the authorised user to create a new Route Network by defining nodes (ports) and legs by either entering the position data for nodes manually or pointing the positions of nodes on the GeoView.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Test

[T1-R322] *TRITON shall allow the authorised user to perform statistics analysis of the followed routes at sea during a defined period in a defined area.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Test

[T1-R323] *TRITON shall allow the authorised user to check the validity of the current Shipping Route Networks by visually comparing the result of statistical analysis and the existing network.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R324] *TRITON shall allow the authorised user to search for summary statistics for selected routes in a Shipping Route Network given in Recognised Import File Format.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R325] *TRITON shall be able to display a Shipping Route Network on the GeoView in a Layer.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R326] *TRITON shall allow the user to search and display the selected Shipping Route Networks to be displayed on the GeoView.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

4.2.3.5.1.8. Internet Searching

TRITON will provide a search capability for external on-line reference databases from Recognised Web Sites on the Internet (NU Domain only). The user will be able to manage the List of Recognised Web Sites and the List of Search Queries.

The Search Queries including the attributes like Country, Class, Type, can be set by the user including the sites to be scrapped.

[T1-R327] *TRITON shall maintain a list of Recognised Web Sites and a list of Search Queries to be used for searching for information on the Internet.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R328] *TRITON shall allow the user to manage (create, modify, delete) the List of Recognised Web Sites to be used for Internet Searching.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R329] *TRITON shall allow the user to define a Search Query, including free text, to perform a search over external reference databases on the selected Recognised Web Sites.*

Requirement Property :
Domain for Static : NU

Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R330] *TRITON shall allow the user to manage (create, modify, delete) the List of Search Queries and issue a new search by using an existing Search Query.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R331] *TRITON shall be able to use the search capability provided by the reference databases (e.g. Web services).*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R332] *TRITON shall display the Internet Search results in sortable tabular format.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

4.2.3.5.1.9. Handling Country Codes

The Country Codes can be represented either as a two-letter code (alpha-2) which is recommended as the general purpose code, a three-letter code (alpha-3) which is more closely related to the country name and a three digit numeric code (numeric -3) which can be useful if using Latin script is to be avoided [ISO 3166]. NATO has a standard, [STANAG 1059], to extend the ISO 3166-1,2, and 3 if they do not provide a suitable code. Additionally, it provides exercise geographical codes (each to begin with the character 'X').

TRITON will maintain two tables to handle the Country Codes:

MMSI-Flag Mapping Table:

This table will be used to derive the flag of an AIS track from the MMSI Number in accordance with International Maritime Organization (IMO) list. The Flag is derived from the first three digits of the MMSI via the official mapping tables from the IMO.

NATO Standard Country Codes Table:

This table will be constructed in accordance with [STANAG 1059], supporting both two-letter and three-letter Country Codes. It will also indicate the NATO Nations and exercise codes. The codes defined in this table will also be used for displaying the flag icons together with the object symbols on the GeoView.

TRITON will use the Country Names based on the Country Codes included in a track report, particularly in an AIS message. It will derive the Flag of an AIS track based on its MMSI Number automatically or manually. The derived Flag may not reflect the most recent information, because it is not reported by the vessel, and it is not cross-referenced or validated by NATO Standard Country Codes. In that case, the user will be notified.

[T1-R333] *TRITON shall maintain a "NATO Standard Country Codes Table" compliant to [STANAG 1059] with a search capability.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R334] *TRITON shall allow the authorised user to manage (modify, import, export) the NATO Standard Country Codes Table.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R335] *TRITON shall maintain a "MMSI-Flag Mapping Table" compliant to the IMO Country Codes.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R336] *TRITON shall allow the authorised user to manage (modify, import, export) the MMSI-Flag Mapping Table.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R337] *TRITON shall allow the authorised user to import the MMSI-Flag Mapping Table and the NATO Standard Country Codes Table from a file in Recognised Import File Format.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R338] *TRITON shall allow the authorised user to export the MMSI-Flag Mapping Table and the NATO Standard Country Codes Table to a file in Recognised Export File Format.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R339] *TRITON shall automatically derive the Flag of an AIS track based on its MMSI Number using the MMSI-Flag Mapping Table.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R340] *TRITON shall be able to derive the Flag for a user-selected track from its Country Code using the NATO Standard Country Codes Table.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R341] *TRITON shall display the Flag of a track or vessel indicating its reference source as STANAG 1059 or IMO (for the countries that are not covered by STANAG 1059). The flag icon can be displayed together with the object symbol, and the detailed object information shall provide the descriptive information.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R342] *TRITON shall automatically assign FRIEND as the Standard Identity for an AIS track if its derived Flag is a NATO Nation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

4.2.3.5.2. Order of Battle Information Management

Operational and tactical level planning requires management of Order of Battle (ORBAT) as a collection of hierarchical information regarding friendly and enemy forces within a Maritime Operation. TRITON will maintain an ORBAT Database to store Friendly ORBAT and Enemy/Suspect ORBAT. The entire ORBAT can be displayed in a tree-like structure in the AppView. TRITON will also associate the ORBATs to Vessels in the Vessel Database when applicable. ORBAT Data, which is stored in the Database, includes as a minimum the following attributes:

- Identification (Descriptor)
- ORBAT Code
- Identity (Friendly, Suspect, Enemy)
- Owner (e.g. NATO, NATO/EAPC)
- Associated Maritime Operation
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Forces
  - Force category
  - Command Relationship
  - Units (Nation, Type)
  - Location
  - Equipment Items

TRITON will allow the authorised user to manage (create, modify, delete) the ORBAT Database manually. INTEL-FS can provide Enemy ORBAT - Maritime through its interface. TRITON will be able to receive this information and update the ORBAT Database upon user approval.

TRITON will also allow the user to display all or selected parts of the ORBAT in the GeoView if they are associated with Vessels.

[T1-R343] *TRITON shall maintain an ORBAT Database for each Maritime Operation.*

Requirement Property :

Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R344] *TRITON shall allow the authorised user to manage (create, modify, delete) the ORBAT Database.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R345] *TRITON shall be able to receive Enemy ORBAT information from INTEL-FS and update the ORBAT Database after the authorised user's approval.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R346] *TRITON shall allow the authorised user to associate maritime vessels contained in the ORBAT Database with the Vessels in the Vessel Database.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R347] *TRITON shall be able to display the ORBAT information in a tree-like structure in AppView as selected by the user (e.g. Enemy ORBAT - Maritime), and provide a search capability.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R348] *TRITON shall allow the user to display the selected ORBAT elements at their last known positions in the GeoView (on a Layer) if they are associated with Vessels in the Vessel Database.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

4.2.3.5.3. Environmental Information Management

Bi-SC AIS Environmental Functional Services (ENV-FS) enable users to collect, process, present and distribute information for Environmental Ssupport to operations. Environmental Support is the set of (military) activities that are undertaken to systematically observe and report the military significant aspects of the meteorological, hydrographic, oceanographic, and geographic characteristics of the area of operations. It generates the Recognised Environmental Picture as described in [AAP-6].

TRITON will be able to receive the Environmental Information from ENV-FS (see External Interface Requirements, Environmental FS) or import it from files in Recognised Import File Format and display it in the GeoView as Layers (i.e. .

[T1-R349] *TRITON shall be able to receive the Environmental Information and display it in the GeoView as Layers with the symbology defined in [APP-6].*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Test

[T1-R350] *TRITON shall be able to import Environmental Information from a file in Recognised Import File Format and display it in the GeoView as Layers with the symbology defined in [APP-6].*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

4.2.3.5.4. CBRN Defence Information Management

Chemical Biological and Radioactive and Nuclear (CBRN) Defence is the set of military activities that are conducted by forces to protect the NATO populations, territory or forces against attacks with CBRN weapons or agents, and to minimize the effects of these attacks. It generates CBRN Common Operational Picture.

Bi-SC AIS CBRN Functional Services (CBRN-FS) provide operational level C2 with functionalities supporting NATO to prevent CBRN incidents, to protect NATO forces from the effects of CBRN incidents, and to take recovery actions, so that NATO forces are able to accomplish the mission and maintain freedom of action in a CBRN environment. CBRN-FS enables the users to collect, process, present and distribute information that supports the major functions of CBRN Defence operations.

TRITON will be able to receive the CBRN Information from CBRN-FS (see External Interface Requirements, CBRN FS) or import it from files in Recognised Import File Format and display it in the GeoView as Layers.

[T1-R351] *TRITON shall be able to receive CBRN Information and display it on a Layer in the GeoView with the symbology defined in [APP-6].*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Test

[T1-R352] *TRITON shall be able to import CBRN Information from a file in Recognised Import File Format and display it in the GeoView as Layers with the symbology defined in [APP-6].*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

4.2.3.5.5. Intelligence Information Management

Bi-SC AIS Intelligence Functional Services, INTEL-FS, collects, maintains and disseminates intelligence information regarding non-Alliance entities. It provides intelligence support as the set of military activities that are undertaken to receive commander's direction, proactively collects information, analyses it, produces useful predictive intelligence and disseminates it in a timely manner.

TRITON will be able to receive the Intelligence Information given below:

Intelligence Information:

- Current Intelligence Situation
- Maritime Intelligence Report
- Maritime Intelligence Summary
- Enemy ORBAT
- Area Information

The authorised user will be able to issue a query regarding a maritime vessel to INTEL-FS and display the returned result in the AppView.

When Enemy ORBAT information is received, TRITON will update its ORBAT Database. When Area Information is received, TRITON will convert it to Reference Object - Area and store it in the Reference Object Database.

[T1-R353] *TRITON shall allow the user to request Intelligence Information given in the Description from INTEL-FS, and display the received information in text or sortable tabular form in the AppView.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R354] *TRITON shall be able to receive the Enemy ORBAT Data from INTEL-FS and update the ORBAT Database after the authorised user's approval.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R355] *TRITON shall be able to receive Area Information from INTEL-FS, and store it in the Reference Object Database as an Area after the authorised user's approval.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R356] *TRITON shall allow the authorised user to prepare a query regarding a maritime vessel, send it to INTEL-FS, and display the returned result in the AppView. If the INTEL-FS interface is not available, the user shall be notified.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

4.2.4. Maritime Operational Support

Maritime Operational Support is a collection of functions which help users to conduct C2 of maritime operations. Alerts, decision support tools, analysis management, drawing management and various tools assist the users.

4.2.4.1. Maritime Alerts Management

Maritime Alerts Management utilizes the User Notification Management of the System Infrastructure to notify users when a specified event occurs. There are Operational and User Defined events which can be used to set alerts. For example, an Area Alert is issued when a track enters a defined area. When an anomaly is detected, the related users will be notified. When a timer function elapsed the user gets notified.

4.2.4.1.1. Operational Alerts

Operational Alerts are predefined functions associated with notifications to users. TRITON will support notifications for at least the following operational functions:

- Area Alerts
- Maritime Anomaly Alerts
- Time-Late Alerts

4.2.4.1.1.1. Area Alerts

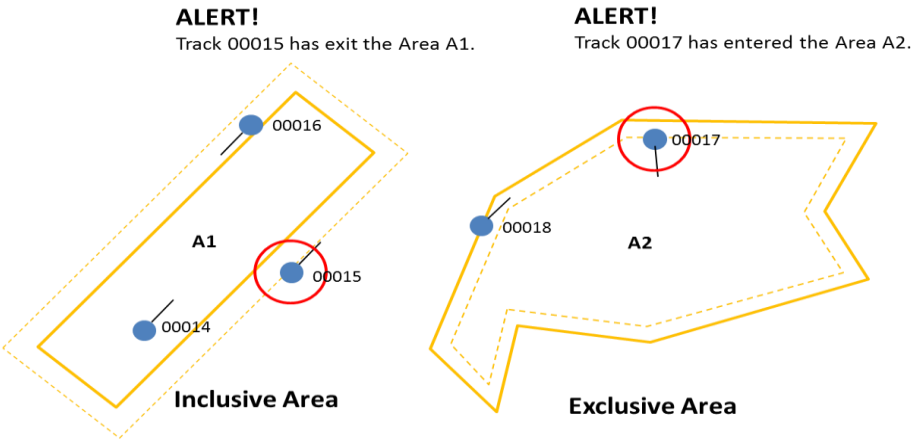
TRITON will provide the users with a capability to define an Area (a Reference Object) or Geospatial Drawings forming Areas, and set alerts when a track with user-defined criteria enters or exits. The user can set filter according to track attributes (e.g. vessel type = merchant). Tolerance Distances are used for not triggering false alerts due to inaccurate ship position reports.

Two types of Areas will be used to implement alerting:

Inclusive Area: This type of area issues alerts when a track exits it after passing through a Tolerance Distance.

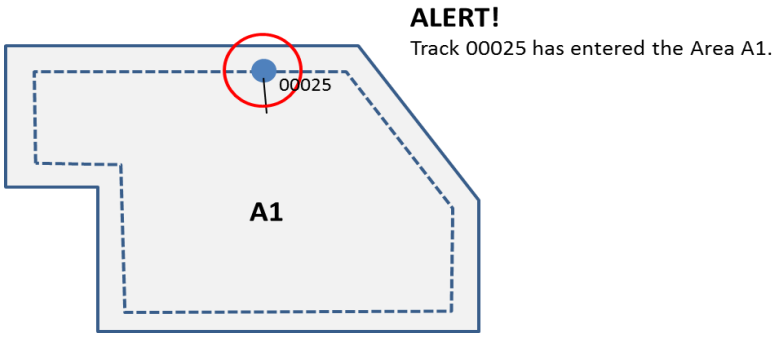
Exclusive Area: This type of Area issues an alert when a track enters it after passing a Tolerance Distance.

Examples to Inclusive and Exclusive Areas are depicted below:



Tolerance Distance is set by the user while creating the Area and displayed on the GeoView.

Geographical Proximity Area is an Area which is defined by the authorised user to automatically detect if a track with user defined filter criteria enters into. An Alert will be issued when a track enters the area. TRITON will use Exclusive Area to implement Geographical Proximity Detection.



Area Attributes:

An Exclusive or Inclusive Area will have at least the following attributes:

- Name
- Type (Exclusive, Inclusive)
- Tolerance Distance
- Interval (minimum 10 seconds, maximum 10 minutes)
- Filter
  - Attributes of Tracks (e.g. type. flag)
  - Number of Tracks
- Status (active, inactive)
- Alert.

[T1-R357] *TRITON shall allow the authorised user to define an Inclusive Area which raises an Alert when a track fulfilling the user-defined filter exits the Area, and passes through the Tolerance Distance.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R358] *TRITON shall allow the authorised user to define an Exclusive Area~~s~~ which raises an Alert ~~if~~ when a track fulfilling the user-defined filter enters the Area, and passes through the Tolerance Distance.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R359] *TRITON shall monitor Exclusive and Inclusive Areas within each Maritime Operation independently and concurrently.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R360] *TRITON shall notify the authorised user with an Alert when an active Exclusive/Inclusive Area filter is satisfied.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 2
Qualific. Method : Test

[T1-R361] *TRITON shall not issue an Alert for those tracks that are already inside or outside the defined Exclusive/Inclusive Area when the Area is created.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R362] *TRITON shall monitor the Exclusive/Inclusive Areas with checks at Intervals set by the user.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R363] *TRITON shall monitor the Grouped Areas (Exclusive or Inclusive) as one single Area.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R364] *TRITON shall be able to display the selected Exclusive/Inclusive Areas in the GeoView as Layers.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

4.2.4.1.1.2. Time-Late Alerts

Automatic tracks are updated at certain intervals. TRITON users can select both automatic and manual tracks and activate time-watchers in order to get notified if they are not updated for a specified time period. For example if a track of interest is not updated for three hours the user will be notified. Users will be able to set a Time-Late value in increments of minutes.

[T1-R365] *TRITON shall monitor all tracks and issue Time-Late Alerts if the specified Time-Late duration for a track has elapsed.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R366] *TRITON shall allow the authorised user to create Time-Late Alerts for automatic or manual tracks.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R367] *TRITON shall allow the authorised user to set Time-Late value up to thirty-six (36) hours in steps of one (1) minute for a selected track.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

4.2.4.1.1.3. Maritime Anomaly Alerts

When a maritime anomaly is detected, TRITON will issue an Alert. The maritime anomalies are defined in the Maritime Analysis Management.

4.2.4.1.2. Manual Alerts

TRITON will allow the user to issue a notification as a Manual Alert to inform a group of users about a particular event. For example, an Alert can be issued manually by a user when a hostile activity is recognised by a user. A position or a Maritime Operational Object can be used as the reference information to be indicated and displayed to the selected User Group with a user-specified annotation.

Alert Template:

~~There will be~~ Alert Templates, managed by the authorised users, ~~to~~ help users to define ~~their~~ Manual Alerts on predefined standard events. An Alert Template, selectable according to its context, consists of the following as a minimum:

- Alert ID (assigned by the system)
- Alert type (MSA, operational, etc.)
- Destination User or User Group
- Priority
- Associated Maritime Object (e.g. track, area)
- Fixed text for explaining the standard events
- Additional free text
- Time validity as DTG.

[T1-R368] *TRITON shall allow the user to issue a Manual Alert by manually entering the type, explanation, track/vessel identification, area, position and the User Group to be notified.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R369] *TRITON shall allow the authorised user to issue a Manual Alert by selecting Maritime Operational Objects on the GeoView or by using the Search function.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R370] *TRITON shall allow the user to issue a Manual Alert by using Alert Templates as defined in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R371] *TRITON shall allow the authorised user to manage (create, modify, delete) the Alert Templates.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R372] *TRITON shall be able to disseminate a Manual Alert to the users of the specified User Group.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

4.2.4.2. Maritime Decision Support

TRITON will provide decision support for operational-level decision makers by means of tools and functions. These functions can be used to build up information on the status and intention of one or more vessels by providing nautical calculations.

4.2.4.2.1. Track Statistics

TRITON will provide statistical information for tracks in the Track Database including Time-Late which is defined as the difference between the time of the last report and current time.

Track Statistical Information:

The Track Statistical Information will include at least the following:

- Time-Late statistics for all or selected tracks (by selecting tracks on the GeoView using the pointing device or by issuing a query on the databases)
- Number of tracks having updates between current time and the Maximum Time-Late ago.
- Number of current tracks per source
- Number of current military tracks
- Number of current non-military tracks (tanker, passenger, fishing, government etc.)
- Number of current correlated and associated tracks.

[T1-R373] *TRITON shall provide the user with a capability to display Track Statistical Information as given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R374] *TRITON shall compute Time-Late statistics for all or selected tracks in the Track Database in a given time window. The results shall be displayed in tabular format or graphs (if applicable).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R375] *TRITON shall display number of tracks according to their types, source, correlation and association status in a selected graph form (e.g. a bar chart of track types in a region).*

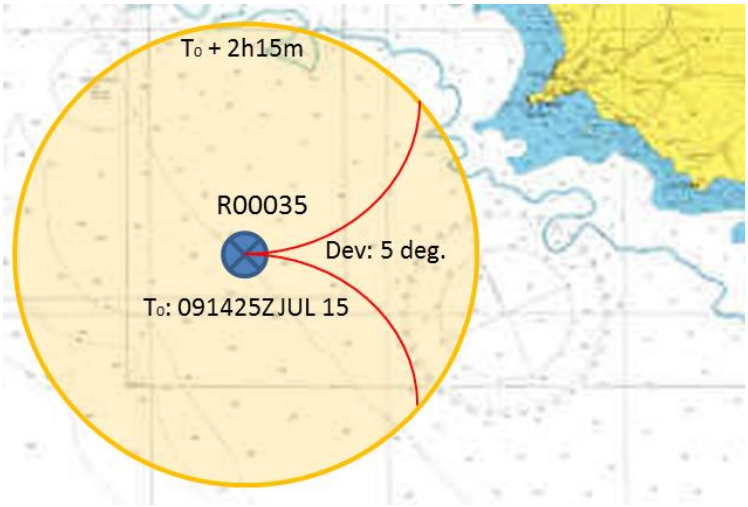
Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R376] *TRITON shall allow the user to select tracks either using the pointing device or issuing a query on the Track Database and initiate statistics calculation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

4.2.4.2.2. Furthest on Circle

Furthest on Circle (FOC) is an illustration of where an object could be at a given time based on its last known speed. If the last course is known, an anticipated course deviation can be expressed in percentage to calculate the possible location. A sample display of FOC with time labels is given below:



FOC can be active for a user-selected time period. TRITON will display FOC on the GeoView and notify the authorised user before it automatically deletes the FOC.

[T1-R377] *TRITON shall be able to initiate a FOC at an indicated position and update it automatically.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

[T1-R378] *TRITON shall be able to handle independent FOCs in each Maritime Operation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R379] *TRITON shall allow the user to initiate a FOC at an indicated point on the GeoView or manual input or getting the last updated position of a track indicated by the user with either the pointing device or track ID.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R380] *TRITON shall use the last known speed for calculating the radius of the FOC and last known course and for calculating the possible location with given anticipated course change. The visualisation on the GeoView shall be updated automatically.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R381] *TRITON shall update the FOC at intervals defined in the Configuration Settings. The default shall be sixty (60) seconds.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R382] *TRITON shall display the FOC in the GeoView as an Application-based C2 Area.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R383] *TRITON shall keep a FOC active for the amount of time set by the user. The time range shall be ten (10) minutes to eight (8) hours with an option to extend when the user informed about automatic deletion.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

4.2.4.2.3. Status Board

Status Board is used to display changing information of selected Maritime Operational Objects. It allows the user to closely monitor only those Maritime Objects of close interest. After the adding the Objects into the Status Board, their user-relevant information, separate for each Maritime Operational Object type (i.e. Track, Vessel, Reference Object), will be displayed in sortable tabular format and updated automatically. Only the authorised users can use the Status Board.

[T1-R384] *TRITON shall maintain a Status Board for each user.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R385] *TRITON Status Board shall be able display the changing information of selected Maritime Operational Objects in sortable tabular format.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R386] *TRITON shall allow the user to manage (create, modify, delete) Maritime Operational Objects for the Status Board and select the attributes to be displayed with respect to object types.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R387] *TRITON shall be able to display at least twenty (20) Maritime Operational Objects in a Status Board for each user.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R388] *TRITON shall keep the Status Board active until the user terminates it.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

4.2.4.3. Maritime Analysis Management

Maritime Analysis Management enables users to access and validate information reporting vessel position data by comparing information with internal and external data sources.

4.2.4.3.1. Track Information Analysis

TRITON will be able to perform automatic or manual analysis for detecting unexpected behaviours using the information in Track and Vessel Databases. Live data or off-line data can be used for analysis. A user can perform an analysis on databases within a Maritime Operation. If necessary, a user can import data from an archive into a Maritime Operation which is created for analysis purposes only. The user can then visualise the objects under analysis on the GeoView.

4.2.4.3.1.1. Destination Validation

TRITON will be able to validate the name of a reported destination of a track against all available locations in the world. TRITON will be able to use the following sources:

- The World Port Index Database (internal or external)
- GeoNames geographical database (www.geonames.org)
- Gazetteer Service (GIS Server)

These sources will be used to validate a given name and retrieve its geographical location (resolving destination). If more than one result are returned, the user will be able to select one and resolve the destination manually.

[T1-R389] *TRITON shall be able to validate the destination of a selected track by comparing the reported destination with the available locations in the World Port Index database, GeoNames geographical database or Gazetteer Service.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R390] *TRITON shall use an internal or external World Port Index Database to resolve the reported destination of a track.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R391] *TRITON shall be able to use Web services from GeoNames to resolve the reported destination of a track.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R392] *TRITON shall be able to use Gazetteer Service of the GIS Server to resolve destination if the service is available.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R393] *TRITON shall allow the authorised user to select the data source and validate the destination of a selected track manually in case more than one result are returned.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

4.2.4.3.1.2. Shipping Route Validation

Shipping Route validation is a process that predicts the route a track might take to its destination. The calculation takes at least the following into account:

- The current vessel position
- The resolved position of the vessel destination (resolved destination)
- The selected Shipping Route from the Shipping Route Networks.

The process derives the shortest path of the vessel from the starting position to the given destination over the given sea route.

[T1-R394] *TRITON shall derive the shortest usual path from the position of a selected vessel to its resolved destination using the selected Shipping Route.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R395] *TRITON shall allow the authorised user to perform Shipping Route Validation for a selected track.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

4.2.4.3.1.3. Vessel Identity Validation

TRITON will maintain Vessel Database to store all existing maritime vessels using their unique identity information. This database is used to validate the received identity information of a track. If the identity cannot be validated with the internal Vessel Database, then TRITON will use the user-selected, external reference databases.

Following data can be checked with relevant databases:

- IMO number
- MMSI number
- International Call Sign
- Country and vessel name

TRITON will use external reference databases for the Vessel Identity Validation process. At least the following databases can be used:

- IHS Fairplay (or any other contracted data service)
- Lloyds MIU Detention List
- At least three (3) o~~O~~ther accessible databases providing Web services over the NU Domain

If the track is validated with external reference databases, then the internal Vessel Database will be updated by the authorised user.

[T1-R396] *TRITON shall perform Vessel Identity Validation process on a selected track using first the Vessel Database. If the track cannot be validated with the Vessel Database, then TRITON shall use the external reference databases, as given in the Description, and as indicated by the authorised user.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R397] *TRITON shall allow the authorised user to add on-line or off-line reference databases to be included during the Vessel Identity Validation process.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R398] *TRITON shall inform the authorised user about the result of the Vessel Identity Validation process.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

4.2.4.3.1.4. Maritime Pattern of Life Analysis

Maritime pattern of life includes deducing information from patterns derived from historical vessel positions. Fishing density in a region during a fishing season is an example. TRITON will maintain a list of Maritime Pattern of Life Areas (as Reference Objects) defined by the authorised user based on density observations.

Pattern of Life Data:

TRITON Maritime Pattern of Life Area will consist of the following attributes:

- Name
- Area (as a Reference Object)
- Description (annotation)

These Areas can be managed and displayed in the GeoView as Layers. Further analysis can be made by the user and the Areas can be annotated.

[T1-R399] *TRITON shall maintain a list of Maritime Pattern of Life Areas to assist analysis.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R400] *TRITON shall allow the authorised user to manage (create, modify, delete, export, import) the List of Maritime Pattern of Life Areas.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R401] *TRITON shall allow the authorised user to add descriptive annotations to a Maritime Pattern of Life Area.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

[T1-R402] *TRITON shall allow the user to display the selected Maritime Pattern of Life Areas on the GeoView as a Layer.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: NU
Baseline : BL 2
Qualific. Method : Test

4.2.4.3.2. Maritime Incident Recording

TRITON will provide Maritime Incident Recording capability to record maritime incidents or events such as accidents, detaining, banning, and hijacking.

Maritime Incident:

TRITON will store at least the following information as a Maritime Incident:

- Incident type
- DTG

- Associated vessel(s)
- Geographical Position
- Incident explanation as free text.

TRITON will allow the authorised user to manage the records, including exporting and importing and association of incidents to the vessels in the Vessel Database.

TRITON will implement this capability by using Joint Operations Centre Watch~~keeper's Log~~ (JOCWatch) which was developed by the NCI Agency. JOCWatch is a standardised and widely utilised, Web-based tool to build and maintain real time Situational Awareness for mission-related security events. It enables the build-up of a historical archive of security events as a mission or operation progresses. It has its own database to store all incident related information and interface to add/publish incident information.

Events are reported and stored in the form of Event Exploitation Reports (EVENTEXPLOITREP), which is the primary message to exchange information. It is currently defined in the Reference Architecture and has been proposed to develop a new standard APP-11 message format.

The Operational Incident Report (OIR) is the native exchange format for JOCWatch. This format is a complete description of incident and log entry data within the application. By definition, JOCWatch is both a producer and consumer of OIR. Third-party applications may also access the OIR format programmatically for their own purposes.

TRITON will use JOCWatch to enter, store, view and search Maritime Incidents as Incident Recordings.

JOCWatch Web Services Specification - Operational Incident Report (OIR) – 1.2, Sep 2011 [JOCWatch WSS] defines the interface for OIR, which is an XML schema. ~~as~~ OIR will be used until the proposed message EVENTEXPLOITREP is included in APP-11. ~~XML schema defined in [JOCWatch ICD] which is a Formatted Message.~~

[T1-R403] *TRITON shall be capable of exchanging information with JOCWatch using JOCWatch OIR Service as defined in [JOCWatch ~~ICD~~WSS].*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration
Comment : First, BL3 on NS Domain will be implemented and then the same solution will be applied to BL2 on NU Domain.

[T1-R404] *TRITON shall be capable of ~~importing~~ consuming ~~EVENTEXPLOITREP XML schema~~ Operational Incident Report (OIR) from JOCWatch as defined in [JOCWatch ~~ICD~~WSS].*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R405] *TRITON shall allow the authorised user to manage (create, modify, import, export, delete) the Maritime Incidents (given in the Description) ~~via~~ by accessing JOCWatch.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R406] *TRITON shall provide access to the search capability of JOCWatch over the Incident Recordings.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R407] *TRITON shall automatically associate, upon initiation by the authorised user, a Maritime Incident to one or more vessels in the Vessel Database if the vessel identification is indicated in the incident.*

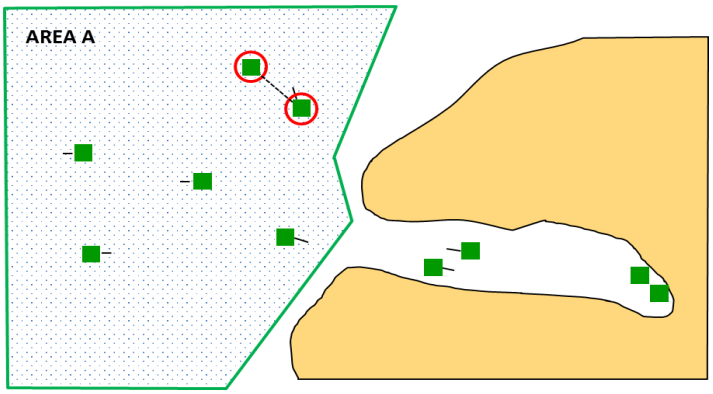
Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

4.2.4.3.3. Maritime Anomaly Detection

TRITON will provide the user with automated and manual anomaly detection functions related to civilian maritime traffic. Examples of anomalies include: ships cruising outside usual shipping lanes; ships that loiter at drift; that rendezvous; ships having AIS identification (MMSI, Name, IMO, Call Sign) discrepancies.

4.2.4.3.3.1. Rendezvous Detection

Rendezvous Detection function uses kinematic values of tracks to detect when two vessels come alongside each other within a given distance either at a full stop or low speed. The objective is to detect potential rendezvous to transfer either crew, passengers, cargo, etc. The function can be initiated at an indicated geographical area near chokes points (straits, routes) to periodically process tracks passing through the area. A conceptual representation is given below:



Rendezvous Detection Criteria:

A Rendezvous Detection Criteria with at least the following will be used to detect potential rendezvous for transfers from / to ships which may be connected to activities of potential interest:

- Two or more vessels merging within a given distance (from ten (10) yards to two-thousand (2000) yards with five-hundred (500) yards as the defaults)
- All ships are in the Rendezvous Detection Area
- Proceeding at speeds slower than a given value (default is five (5) knots)

The detection process will be conducted automatically either periodically or manually until the detection process for that area is cancelled. TRITON will keep a list of Rendezvous Detection Areas with at least the following attributes:

- Area definition (geographical location, identification as a Reference Object)
- Rendezvous Detection Criteria to be applied

- Interval from five (5) minutes to thirty (30) minutes with ten (10) minutes the default
- Notification method (alert or listing)
- Status (Active / Inactive)

TRITON will not have a limitation for the number of areas. The given number of areas and tracks will be used for performance test purposes only. The analysis processes created by users can run in the background, allowing the authorised user to monitor them.

[T1-R408] *TRITON shall maintain a list of Rendezvous Detection Areas for each Maritime Operation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R409] *TRITON shall allow the authorised user to manage (create, modify, delete) the Rendezvous Detection Area List and the processes initiated by users.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R410] *TRITON shall be able to handle at least one-hundred (100) Rendezvous Detection Areas simultaneously in global scope.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R411] *TRITON shall be able to process at least one-thousand (1000) tracks in a Rendezvous Detection Area.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R412] *TRITON shall allow the authorised user to set the values used for the Rendezvous Detection Criteria and detection process (i.e. Area definition, distance, speed, periodicity).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R413] *TRITON shall apply Rendezvous Detection Criteria, as given in the Description, to all ships within the designated area periodically or manually.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R414] *TRITON shall notify the authorised user if the current number of Rendezvous Detection Areas with given intervals cannot be processed with the current processing load.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R415] *TRITON shall inform the authorised user about the status of the current Rendezvous Detection processes and issue notification in case the Rendezvous Detection Criteria matches.*

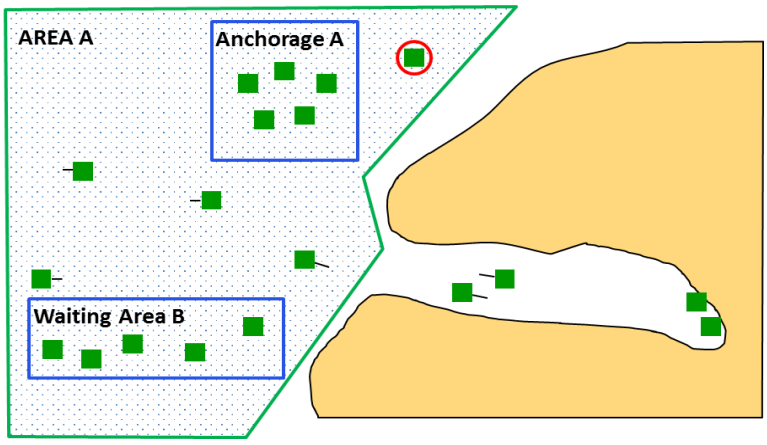
Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R416] *TRITON shall display the result of selected Rendezvous Detection process in sortable tabular form with a capability of indicating the selected the track(s) in the GeoView.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

4.2.4.3.3.2. Positional Anomaly Detection

Positional Anomaly Detection function uses the position, course and speed values of tracks to detect vessels that are loitering out of Usual Areas such as anchorage areas or waiting areas. A Usual Area is an area defined by the user to indicate the Positional Anomaly Detection will not be applicable. A waiting area or an anchorage area can be considered as Usual Areas which can be implemented using TRITON Areas and grouping function. The concept is depicted below:



Positional Anomaly Detection Criteria:

A user-configurable Positional Anomaly Detection Criteria with at least the following will be used to detect vessels behaving abnormally:

- The predicted position is within a given Detection Area but out of given Usual Areas
- Speed is less than a given value with the default of five (5) knots

The detection process will be conducted automatically either periodically or manually until the detection process for that area is cancelled.

TRITON will keep a list of Positional Anomaly Detection Areas with at least the following attributes:

- Detection Area definition (geographical location, identification as a Reference Object (Inclusive Area))

- Usual Area definition (geographical location, identification as a Reference Object (Exclusive Area))
- The Positional Anomaly Detection Criteria to be applied
- Interval - from five (5) to thirty (30) minutes; ten (10) minutes the default (0 will mean Manual)
- Notification method (alert or listing)
- Status (Active / Inactive)

TRITON will not have a limitation for the number of areas. The given number of areas and tracks will be used for performance test purposes only. The analysis processes created by users can run in the background, allowing the authorised user to monitor them.

[T1-R417] *TRITON shall maintain a list of Positional Anomaly Detection Areas for each Maritime Operation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R418] *TRITON shall allow the authorised user to manage (create, modify, delete) the Positional Anomaly Detection Area List and the processes initiated by the users.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R419] *TRITON shall be able to handle at least one-hundred (100) Positional Anomaly Detection Areas simultaneously in global scope.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R420] *TRITON shall be able to handle at least ten (10) Usual Areas for each Positional Anomaly Detection Area, which are excluded in checks.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R421] *TRITON shall be able to process at least one-thousand (1000) tracks in a Positional Anomaly Detection Area in less than ten (10) seconds.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R422] *TRITON shall allow the authorised user to configure the Positional Anomaly Detection Criteria and detection process (i.e. Area definitions, speed, intervals).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R423] *TRITON shall apply Positional Anomaly Detection Criteria, given in the Description, to all tracks and vessels within the designated area periodically at given intervals or when manually initiated by the user.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R424] *TRITON shall notify the authorised user if the current number of Positional Anomaly Detection Areas with given intervals cannot be processed with the current processing load.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R425] *TRITON shall inform the authorised user about the status of the current Positional Anomaly Detection process and issue notification in case the Positional Anomaly Detection Criteria matches.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R426] *TRITON shall display the result of the Positional Anomaly Detection process in AppView, in sortable tabular form, with a capability of indicating the selected the track(s) on the GeoView.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

4.2.4.3.3.3. Destination Anomaly Detection

Ships normally declare their destination and Estimated Time of Arrival (ETA) or Next Port of Call (NPOC) in their AIS data. TRITON will be able to perform a Destination Anomaly Detection process based on this information and the selected vessel's current course and speed.

Destination Anomaly Detection Criteria:

A Destination Anomaly Detection Criteria with at least the following will be used to detect the inconsistencies:

- Check if a destination or a NPOC is declared
- If destination or NPOC exists, then validate it first using the Destination Resolution function
- Check that if ETA can be achieved with present course and speed using ETA Verification function.

[T1-R427] *TRITON shall perform Destination Anomaly Detection process for a selected track using the Destination Anomaly Detection Criteria given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R428] *TRITON shall allow the authorised user to initiate Destination Anomaly Detection process for a selected track and display the result.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Test

4.2.4.3.3.4. Estimated Time of Arrival Anomaly Detection

Estimated Time of Arrival (ETA) is an attribute of civilian vessel information to indicate when it is planning to arrive at the indicated destination. TRITON determines if a vessel could conceivably make it to its destination in the time allotted for its arrival (based on characteristic e.g. cruising speed and positional information). TRITON calculates the speed for a selected track required to get following straight line from its actual position to its resolved destination (destination name is validated and its geographical position is found). If the calculated speed is smaller than the minimum limit or greater than the maximum limit defined by the user, then it is considered that ETA is not achievable and the user will be notified. The calculation will be performed if the range is within the user-specified limits.

[T1-R429] *TRITON shall calculate ETA of a selected track using its present speed and its resolved destination if the range is within the user-selected limits.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Test

[T1-R430] *TRITON shall allow the authorised user to select a track, define the minimum and maximum limits for speed, minimum and maximum limits for range and initiate the ETA verification.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Test

[T1-R431] *TRITON shall notify the user if the calculated speed is smaller than the minimum limit or greater than the maximum limit.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Test

[T1-R432] *TRITON shall resolve the destination of the selected track prior to ETA calculation and notify the user if the destination is not resolved.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Test

4.2.4.3.3.5. Historical Anomaly Detection

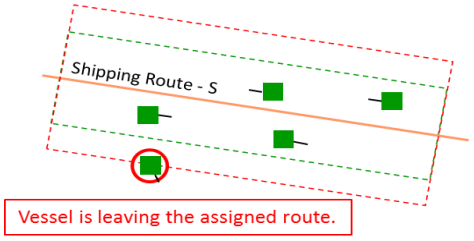
Historical Anomaly Detection includes historical, trend and pattern analysis of disparate vessel data sources in order to identify anomalous behaviour (e.g. a vessel identifying itself as a known passenger ferry but it is deviating from its normal route).

Historical Anomaly Detection Rules:

TRITON will be able to monitor vessels assigned to a particular Shipping Route with logical corridor definitions and notifies the user if the vessels leaves the corridor. The user can set the Historical Anomaly Detection Rules for a selected Shipping Route and vessels assigned to it. The Historical Anomaly Detection Rules consist of at least the following:

- Shipping Route identification
- List of assigned vessels
- Maximum range deviation from the Shipping Route (nautical miles)
- Range margin (allowed positional dislocation in nautical miles in addition to the range deviation)
- Begin and end time
- Status (active, inactive)

A notional example is given below:



Rules:	
Vessel	: V
Assigned Shipping Route ID	: S
Maximum range deviation	: 1.5 NM
Range margin	: 0.5 NM

The detection processes created by users can run in the background, allowing the authorised user to monitor them.

[T1-R433] *TRITON shall be able to monitor and detect positional dislocation of vessels assigned to a particular Shipping Route based on user-defined Historical Anomaly Detection Rules.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R434] *TRITON shall allow the authorised user to define a Shipping Route with a range and set the Historical Anomaly Detection Rules given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R435] *TRITON shall perform Historical Anomaly Detection as initiated by the users and notify the initiating user about the status of process.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

4.2.4.3.3.6. Kinematic Anomaly Detection

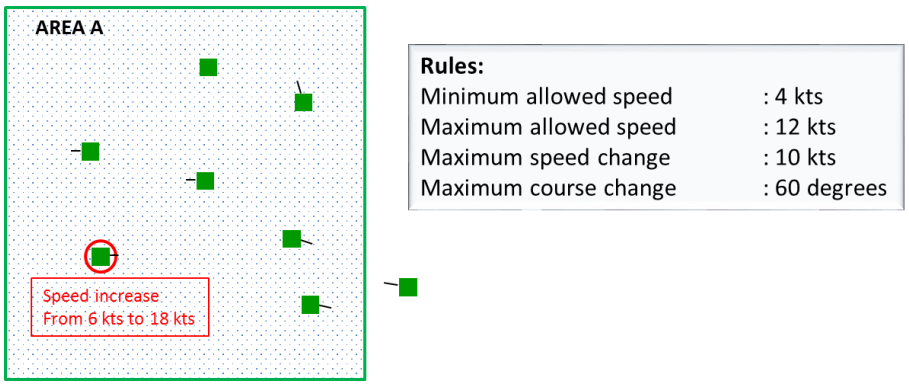
Kinematic Anomaly Detection function provides analysis of vessels with possible anomalous behaviour. Examples of this would include significant changes to course (e.g. 90 degrees in a short timeframe), change of speed (e.g. going from 5 knots to 20 knots in a short timeframe), deviating from known shipping lines in the high sea, coming to an all stop at sea without reporting any mechanical issues (perhaps to dump cargo for later collection), etc.

Kinematic Anomaly Detection Area:

TRITON will be able to detect kinematic anomalies when the user runs the function for a given time for a given Area with a set of rules. The user can set anomaly detection rules for an Area with at least the following:

- Area identification
- Minimum/maximum allowed speed
- Maximum speed change
- Maximum course change
- Begin and end time
- Status (active, inactive)

A notional example to Kinematic Anomaly Detection is given below:



[T1-R436] *TRITON shall be able to detect course and speed changes based on user-defined rules for tracks that are in a given Area.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Test

[T1-R437] *TRITON shall allow the authorised user to define an Area and rules for kinematic anomaly detection for those tracks entering that Area.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Test

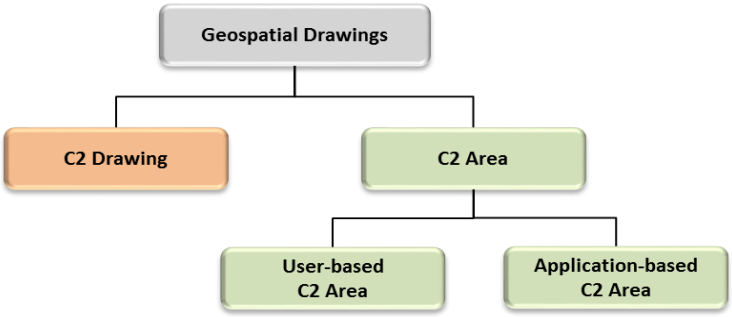
[T1-R438] *TRITON shall perform Kinematic Anomaly Detection as initiated by the users and notify the initiating user about the status of process.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Test

4.2.4.4. Geospatial Drawing Management

Geospatial Drawings (Geo-drawing) are graphical drawing objects having geospatial information which can be managed by users or applications. Their geospatial data can also be processed by applications. Users can create Geo-drawings using drawing primitives provided by the GeoView, assign values to their attributes, save them and retrieve them for displaying in a Layer.

A Geo-drawing can be created either by a user or an Application. TRITON will be able to handle the following types of Geo-drawings:



C2 Drawings are graphical objects created by users with the pointing device. Users can draw any kind of shape on a selected Layer of the GeoView using the Drawing capability. The Drawings are then used to visually enhance the Operational Picture and their geospatial data can be processed by Applications.

The users create C2 Drawings and assign values to their attributes. Examples to C2 Drawings are:

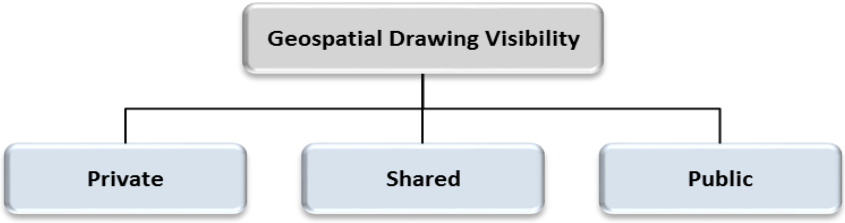
- Points (e.g. history of tracks)
- Lines (e.g. borderline, ship course, attack direction, movement indication, control features defined in APP-6)
- Areas (e.g. Exclusive/Inclusive Areas, fishing zone within national waters, danger areas).
- C2 Areas are predefined C2 Drawings having operational meaning created by a user or an Application. A formation of ships, dispositions, grids are examples.

Both types of Geo-Drawings can be associated to a track.

TRITON manages the Geo-Drawings, displays them based on their Visibility Types.

Visibility Types:

The Visibility Types of Geo-drawings are given below:



Private : Visible only by the user who has created it.

Shared : Visible to a group of users that are allowed by the creating user.

Public : Visible to all users.

Geo-drawing Attributes:

All Geo-Drawings have the following attributes (properties) as a minimum:

- Identification
- Name (or Label)
- Type (C2 Drawing, C2 Area)
- Description

- Tooltip text
- Current Maritime Operation
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Owner
- Visibility (private, shared, public)
- Layer identification
- Drawing specifications (vertices' locations, size, colour, filling etc.)
- Geographical position of the geometric centre
- Associated Maritime Operational Object
- Date and Time (DTG) of Activation and Deactivation
- DTG of Deletion
- Status (active/inactive).

4.2.4.4.1. C2 Drawing Handling

C2 Drawings can be created using the Drawing capability of the GeoView. TRITON manages these Drawings and display them on the GeoView.

[T1-R439] *TRITON shall maintain a list of C2 Drawings for each Maritime Operation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R440] *TRITON shall allow the user to manage (create, modify, delete, activate/deactivate) the C2 Drawing List.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R441] *TRITON shall allow the user to use the GeoView Drawing capability for creating C2 Drawings.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R442] *TRITON shall allow the user to set attributes (properties) of a C2 Drawing.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R443] *TRITON shall activate or deactivate a C2 Drawing according to its DTG settings.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R444] *TRITON shall allow the user to activate or deactivate a C2 Drawing.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R445] *TRITON shall display an active C2 Drawing in the GeoView on a user-specified Layer.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R446] *TRITON shall notify the authorised user fifteen (15) minutes before a C2 Drawing is automatically deleted if it has DTG of Deletion.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.4.4.2. C2 Area Handling

C2 Areas consist of the following types:

- User-based C2 Areas
- Application-based C2 Areas

4.2.4.4.2.1. User-based C2 Area Handling

User-based C2 Areas are predefined Drawings created automatically when the necessary attributes are filled by the user. TRITON will implement at least the following C2 Areas without a capacity limitation for storing:

- Simple Area (with or without inner/outer borders)
- Special areas (e.g. firing zone, danger area)
- Maritime Disposition Four-Whiskey (4W) (ATP-1 Vol.1)
- Maritime Position and Intended Movement (PIM)
- Maritime Route (ship route with waypoints)
- Maritime Shipping Route Network
- Q-Route (Naval Mine Warfare)
- Water Space Management (WSM) - Moving Havens
- Maritime Area of Interest (AOI)
- Multi-leg Channel (centre line, width, vertices)

TRITON will manage the C2 Areas generated from templates.

[T1-R447] *TRITON shall maintain a list of User-based C2 Area Templates.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R448] *TRITON shall allow the authorised user to manage (create, modify, delete) the User-based C2 Area Template List supported by the GeoView.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R449] *TRITON shall maintain a list of User-based C2 Areas for each Maritime Operation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R450] *TRITON shall allow the authorised user to manage (create, modify, delete, activate/deactivate) the User-based C2 Areas List.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R451] *TRITON shall allow the user to create a User-based C2 Area from the available Area Templates and set its attributes (properties).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R452] *TRITON shall display a User-based C2 Area on the GeoView on a user-specified Layer when activated by the user.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R453] *TRITON shall notify the authorised user fifteen (15) minutes before a User-based C2 Area is automatically deleted if it has DTG of Deletion.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R454] *TRITON shall implement Templates for the User-based C2 Areas given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration
Comment : Implementation can be scheduled according to specific requirements of a Baseline.

4.2.4.4.2.2. Application-based C2 Area Handling

Application-based C2 Areas are predefined Drawings created automatically when the necessary attributes are filled by the Application. TRITON will implement at least the following Application-based C2 Areas without a capacity limitation for storing:

- Water Space Management (WSM) - Moving Havens
- CBRN Hazardous Area
- Maritime Furthest on Circle (FOC).

[T1-R455] *TRITON shall maintain a list of Application-based C2 Area Templates.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R456] *TRITON shall allow the authorised user to manage (create, modify, delete) the Application-based C2 Area Template List.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R457] *TRITON shall maintain a list of Application-based C2 Areas for each Maritime Operation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R458] *TRITON shall be able to manage (create, update, activate/deactivate, delete) an Application-based C2 Drawing automatically.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R459] *TRITON shall display an Application-based C2 Drawing in the GeoView on a user-specified Layer when activated automatically.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R460] *TRITON shall implement Templates for the Application-based C2 Areas given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration
Comment : Implementation can be scheduled according to specific requirements of a Baseline.

4.2.4.5. Tools

TRITON will provide various utility tools to quickly compute navigational values and to assist presentation of information.

4.2.4.5.1. Unit Converter

TRITON will provide a Unit Converter which can perform conversion of units relevant to maritime domain. The Unit Converter will be able convert a given value in a selected unit to another selected unit in the areas given below:

Conversion Areas:

- Distance (Nautical Mile, Statute Mile, Data Mile, Yard, Feet, Metre, Kilometre)
- Wind speed and force (e.g. Beaufort to km/h)
- Speed (knots, Data Mile per hour, km/h, m/s, mph)
- Weight/Mass
- Length
- Area
- Volume
- Temperature
- Density/Pressure

The conversion routines will be provided as a service which can be used by other components/modules.

[T1-R461] *TRITON shall provide a Unit Converter application supported by a conversion service, which shall be made available to internal and external use.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R462] *TRITON Unit Converter shall provide the Conversion Functions conversion of nautical measurement, speed, weight/mass, area, volume, temperature and density/pressure values.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R463] *TRITON shall allow the user to activate the Unit Converter and perform conversions for the given values between selected units.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

4.2.4.5.2. Coordinate Converter

TRITON will use geographical positions in one of the following ways:

- Latitude/Longitude and Geodetic Datum
- Universal Transverse Mercator (UTM)
- Common Geographic Reference System (CGRS)

- Military Grid Reference System (MGRS)

TRITON will be able to convert a given geographical position to any other including the following types of input data:

- Degrees/Minutes/Seconds
- Decimal degrees
- Degrees and Decimal Minutes
- Degrees, Minutes and Decimal Seconds
- Other Geodetic Datum.

[T1-R464] *TRITON shall be able to convert position data from/to any of the Latitude/Longitude, Geodetic Datum, UTM, CGRS and MGRS values.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R465] *TRITON shall allow the user to enter a geographical position in one coordinate system to convert it into a selected coordinate system. A conversion service, available to internal and external use should be used (It may be combined with the unit converter).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

4.2.4.5.3. Logbook

TRITON will provide a "Logbook" to record important events having operational meaning (like a ship log). A configurable set of user and system actions will be recorded automatically in the Logbook. The authorised user can also add entries into the Logbook in free text.

Logbook Action List:

A sample set of information, in two parts, as the Logbook Action List is given below:

Operational Part:

- Sending Formatted Messages
- Dissemination of Maritime Information

Technical Part:

- Maritime Operation creation
- System mode changes, start-up, shut-down
- Addition or removal of data sources (e.g. a new AIS Data Source is added)
- Information exchange start, stop (e.g. a Nation Interface with Nation A has started at 11:00 to send RMP.)

Each record in the Logbook will have metadata which includes the event, current user, description and timestamp.

The authorised user can configure the Logbook Action List. The Logbook cannot be modified by any user, but can be viewed by the authorised user. TRITON will start logging when a Maritime Operation is created, continue logging until the Operation is deleted, and then archive it (see Archiving).

[T1-R466] *TRITON shall maintain a Logbook for each Maritime Operation.*

Requirement Property :
Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R467] *TRITON shall allow the authorised user to configure the Logbook Action List.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test
Comment : The actual events subject to logging will be determined at Software Design Review.

[T1-R468] *TRITON shall create and start a Logbook automatically when a new Maritime Operation is created.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R469] *TRITON shall allow the authorised user to explicitly stop logging data into the Logbook and start again.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R470] *TRITON shall allow the authorised user to make an entry in free text into the Logbook.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R471] *TRITON shall allow the user to view the Logbook in sortable tabular format with a search capability.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R472] *TRITON shall log an event into the Logbook with the current user, description and timestamp.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R473] *TRITON shall allow the authorised user export the Logbook in Recognised Output File Format.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 2
Qualific. Method : Test

[T1-R474] *TRITON shall archive the Logbook after a period of time as configured by the authorised user. By default the Logbook shall be archived after thirty (30) days of Logging Period. If logging activity reaches the limit of the default log file size before the Logging Period is completed, TRITON shall create another Logbook file and continue logging.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.5. Maritime Operational Planning and Execution

Maritime Operational Planning includes a number of functions for planning and C2 of maritime operations at operational and tactical level. Maritime operations include any actions performed by forces on, under or over the sea to gain or exploit command of the sea, sea control or sea denial, and to project power from the sea. Planning functions help to quickly develop an action plan to achieve a task.

TRITON manages Maritime Operations in global scope having Maritime Missions and Maritime Unit Tasks associated to that Operation. Increment 1 only manages the Maritime Operations. Missions and Tasks will be added in Increment 2.

4.2.5.1. Maritime Task Organization Management

NATO uses three systems, all in force at the same time, for organising the maritime operational units allocated to various commands as defined in AJP 3.1:

Task Organization: This type of organization structures forces to accomplish the assigned mission, and provides the necessary flexibility for meeting changing operational requirements while retaining a clear indication of the chain of command. Whenever a task organization is created, the commander shall be named in the order creating it.

Type Organization: The organization of units normally of the same type into fleets/flotillas/groups/squadrons, divisions and subdivisions together with assigned flagships, tenders, and aircraft. Type organization is mainly for national administration and logistic purposes.

Warfare Organization: The functional organization of forces assigned to conduct tasks within a specific area of maritime operations (e.g. AAW, ASUW, ASW). The warfare organization can be implemented within either a task, or type organization.

Since the term ORBAT is not commonly used in Maritime Community, TRITON will manage "Task Organizations" by storing and managing the information about Operations, NATO Maritime Task Forces, Task Groups, Task Units and Task Elements which are defined below:

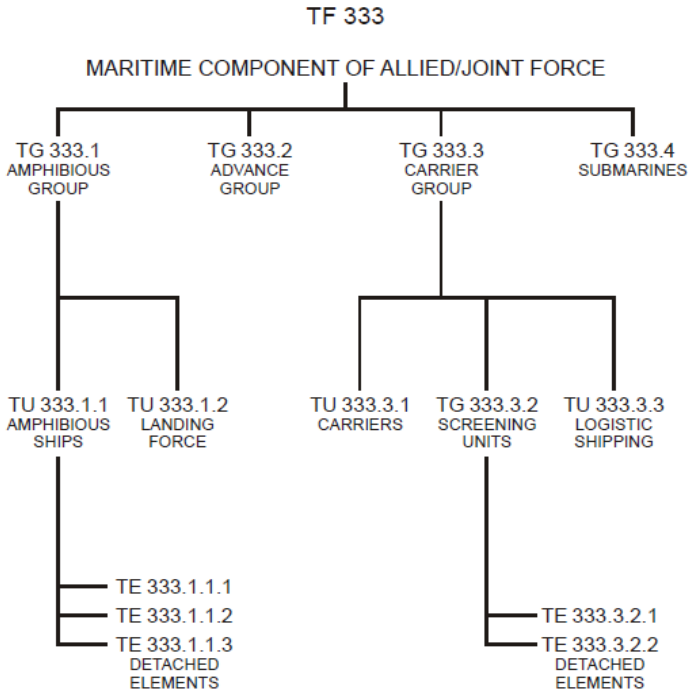
Task Force: A Task Force (TF) is a large maritime formation capable of conducting the full range of maritime operations. A TF will combine several packages normally including a carrier battle group as well as maritime air, land attack and amphibious capabilities.

Task Group: Task Groups (TG) are able to conduct and sustain maritime operations within their special warfare areas through their organic C2 capability (on a tactical level) and would possess organic support elements.

Task Unit: A Task Unit (TU) is a maritime asset which serves special purposes.

Task Element: A Task Element (TE) is a maritime asset subordinate to TUs.

Task organization is designated using task force numbers. Following figure depicts an example of command relationships [AJP 3.1]:



TRITON will maintain Maritime Task Organization within a Maritime Operation (see Maritime Operation Management). An authorised user can manage (including creation, modifying, saving) Maritime Task Organizations. TRTION will be able to display the items in the Task Organization in a tree-like display which can be expanded starting from Maritime Operation down to Task Elements.

Maritime Task Organization:

A Maritime Task Organization will be represented in TRITON with at least the following attributes:

- Unique name for the Maritime Task Organization
- Organization ID code (number set with x.x.x.x notation)
- Serial (reference to higher organization)
- Begin-end dates
- List of Task Forces, Groups and Units
- Associated Maritime Operation
- Remarks

The descriptions of organizational items used in TRITON Maritime Task Organization are given below:

Task Element:

A Task Element will be represented with at least the following attributes:

- ID code (unique)
- Serial
- Nation
- Capabilities (text)
- Functional category (i.a.w. APP-6)
- Commitment status and effective date
- Current Activity
- Future Activity
- Associated Vessel (linked to the Vessel Database with TRITON Vessel Number)
- Associated Equipment (if exists in another database)

- Ratings and effective dates (personnel strength rating, equipment holding rating, ammunition holding rating, fuel holding rating)
- Remarks

Task Unit:

A Task Unit will be represented with at least the following attributes (fields of OPSTATUNIT can be used):

- ID code (unique)
- Serial
- Nation
- Capabilities (text)
- Functional category (i.a.w. APP-6)
- Commitment status and effective date
- Current Activity
- Future Activity
- Associated Vessel (linked to the Vessel Database with TRITON Vessel Number)
- List of Task Elements
- Radio Silence status
- Associated Maritime Unit Task or Maritime Mission (text)
- Associated Target List (placeholder)
- Link to Friendly ORBAT
- Remarks

Task Group:

A Task Group will be represented with at least the following attributes:

- ID code (unique)
- Serial
- Nations
- Capabilities (text)
- Functional category (i.a.w. APP-6)
- Commitment status and effective date
- Current Activity
- Future Activity
- Objectives
- Commanders
- Areas of Interests
- List of Task Units
- Radio Silence status
- Associated Maritime Task or Maritime Mission (text)
- Associated Target List (placeholder)
- Link to Friendly ORBAT
- Remarks

Task Force:

A Task Force will be represented with at least the following:

- ID code (unique)
- Serial
- Begin-end dates
- Current Activity
- Future Activity

- List of Task Groups
- Associated Maritime Mission (text)
- Associated Target List (placeholder)
- Link to Friendly ORBAT
- Remarks.

[T1-R475] *TRITON shall maintain a list of Maritime Task Organization with attributes as given in the Description for each identified Maritime Operation.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R476] *TRITON shall allow the authorised user to manage (create, modify, save, delete, import, export) the Maritime Task Organization List.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R477] *TRITON shall display Maritime Task Organizations in a tree-like structure in the AppView, starting from Maritime Operation down to Task Elements with an option to expand at each level.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R478] *TRITON shall allow the user to view the selected units of a Maritime Task Organization in the GeoView.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

4.2.5.2. Area of Interest Management

Area of Interest (AOI) is the area of concern to a commander relative to the objectives of current or planned operations, including his areas of influence, operations and/or responsibility, and areas adjacent thereto (AAP-6). There are also following Area Types:

Area of Responsibility (AOR):

AOR is the geographical area assigned to the Supreme Allied Commander Europe. In naval operations, a predefined area of enemy terrain for which supporting ships are responsible for covering by fire on known targets or targets of opportunity and by observation.

Area of Operations (AOO):

AOO is an operational area defined by a joint commander for land or maritime forces to conduct military activities. Normally, an Area of Operations does not encompass the entire joint operations area of the joint commander, but is sufficient in size for the joint force component commander to accomplish assigned missions and protect forces. Operational area is an overarching term encompassing more descriptive terms for geographic areas in which military operations are

conducted. Operational areas include, but are not limited to, such descriptors as area of responsibility, theatre of war, theatre of operations, joint operations area, amphibious objective area, joint special operations area, and area of operations (APP-6).

AOO may have the following types:

Named Area of Interest (NAI):

NAI is a geographical area where information is gathered to satisfy specific intelligence requirements (APP-6).

Target Area of Interest (TAI):

TAI is the geographical area where high-value targets can be acquired and engaged by friendly forces.

Area Operations:

In maritime usage, operations conducted in a geographical area and not related to the protection of a specific force.

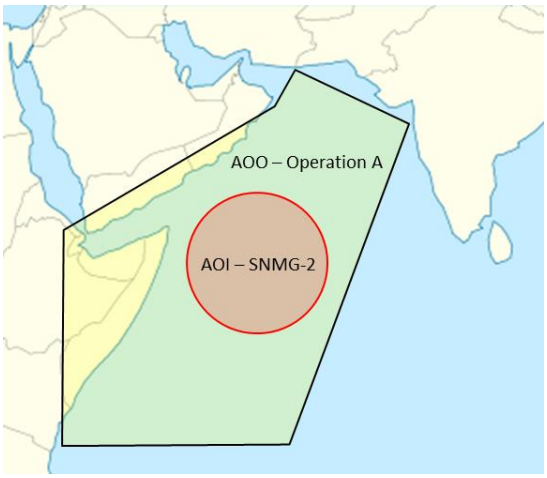
Area Search:

Reconnaissance or search of a specific area to provide new or updated information on general or specific situations and/or activities.

Area Target:

A target consisting of an area rather than a single point.

In general, AOIs are represented on the GeoView as shown below:



AOI Data:

An AOI representation in TRITON will have at least the following attributes:

- Name
- Area Type (as defined above)
- Description
- Associated Maritime Operation
- Associated Maritime Task Organization
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Area definition (a geographic area with anchor points)
- Related Areas (list of other areas within this Area)
- Type (static or slaved to a vessel)
- Slaved vessel identification
- Point of reference

TRITON will maintain a list of AOIs to be managed by the authorised users. An AOI may have nested AOIs in its structure.

TRITION on ACPs (Deployable Kits) can define an AOI with the ACP being the slaved vessel, to indicate their AOO. This AOO will then be used by the TRITON Server (via SIS TRITON) to synchronise only the relevant parts of the databases.

AOIs can also be used as an area filter for maritime analysis.

[T1-R479] *TRITON shall maintain a list of Areas of Interest (AOI) for each Maritime Operation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R480] *TRITON shall allow the authorised user to manage (create, modify, delete) the AOI List.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

[T1-R481] *TRITON shall allow the authorised user to create a static AOI with a point of reference at an indicated geographic location.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

[T1-R482] *TRITON shall allow the authorised user to slave an AOI to a vessel at its point of reference.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

[T1-R483] *TRITON shall allow the authorised user to create an AOI by either entering location values or drawing as an Area and display it on the GeoView as a layer.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

[T1-R484] *TRITON shall allow the authorised user to associate an AOI to a group, element or unit in an Maritime Task Organization.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

4.2.5.3. Rules of Engagement Management

Rules of Engagement (ROE) are directives issued by competent military authority which specify the circumstances and limitations under which forces will initiate and/or continue combat engagement with other forces encountered [AAP-6]. ROE generally limit the otherwise lawful use of force.

ROE Data:

TRITON will keep a list of ROEs for a Maritime Operation and update the list as relevant messages arrive. An ROE Data record will contain at least the following:

- Unique identification
- Associated Maritime Operation
- ROE
- Current Maritime Operation
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Status (implemented/cancelled)
- DTG
- Remarks

ROE Profile:

ROE Profile is also defined as a list of rules of engagement selected for a force assigned to a particular role or Maritime Operation within defined time and space boundaries. Following Formatted Messages are used:

- ROE Request (ROEREQ) Message is used to ask for authorisation to implement specific ROEs.
- ROE authorisation (ROEAUTH) Message is used by the North Atlantic Council (NAC)/Defence Planning Committee (DPC) to authorise implementation or cancellation of specific ROEs.
- ROE Implementation (ROEIMPL) Message is used to implement and/or cancel specific ROEs.

[T1-R485] *TRITON shall maintain an ROE List for each Maritime Operation*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R486] *TRITON shall allow the authorised user to manage (create, modify, delete) the ROE List.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R487] *TRITON shall be able to build the ROE List from a received ROEAUTH Message.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R488] *TRITON shall allow the user to display the ROE Profile.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R489] *TRITON shall maintain an ROE Request List for each Maritime Operation.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R490] *TRITON shall allow the authorised user to process the requests in the ROE Request List.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R491] *TRITON shall allow the authorised user to issue ROE Request to be processed by the higher command. Each Request will automatically enter into the ROE Request List.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R492] *TRITON shall be able to generate ROEREQ Message to assist the users of subordinate commands to prepare the message.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R493] *TRITON shall be able to generate ROEIMPL Message based on the selected ROEs in the ROE List to distribute them to subordinate commands.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R494] *TRITON shall allow the authorised user to set the ROE Status (implementation or cancellation) and notify the authorised users of the subordinate commands.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R495] *TRITON shall be able to send the ROEREQ and ROEIMPL Messages to MHS for distribution.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

4.2.5.4. Maritime Planning Aids

Maritime Planning Aids provide the planners tactical-level planning capabilities. These tools can be used to plan movements of maritime assets. Dispositions, Position of Intended Movement and Q-Routes are covered.

4.2.5.4.1. Disposition Management

A disposition is a combination of two or more formations and may be formed by linear or circular methods. TRITON provides the users with predefined templates to create dispositions, assign assets and set their visibility as Private, Shared, Public.

Disposition:

A Disposition has at least the following attributes:

- Disposition Name
- Visibility (Private, Shared, Public)
- Current Maritime Operation
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Status (active, inactive)

TRITON will keep a list of Dispositions for each Maritime Operation without a capacity limitation.

[T1-R496] *TRITON shall maintain a list of Dispositions for each Maritime Operation.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R497] *TRITON shall allow the authorised user to manage (create, modify, delete) the Disposition List.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R498] *TRITON shall allow the authorised user to set visibility, Security Classification and Releasability Label of Dispositions.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R499] *TRITON shall display Dispositions in the GeoView as a Layer with user-selected label options.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Demonstration

4.2.5.4.1.1. Disposition Four Whiskey

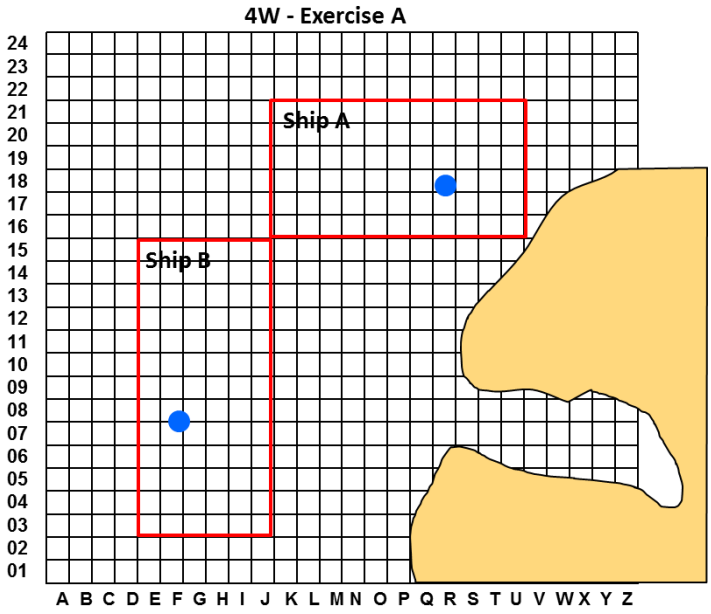
Disposition Four-Whiskey (4W) is used i.a.w. ATP-01, Vol. I, para 3218 on a pointer position or on a selected track. The Disposition 4W may be displayed as a square grid consisting of 24 x 24 to 48 x 48 cells. Units of 4W are assigned areas of the grid within which they may move about freely. One cell of the 4W grid is designated as the PIM cell and is the key to geographic positioning of the disposition. The grid can be assigned at a user point, a track or a PIM route.

Disposition 4W consists of at least the following attributes:

- Disposition
- Number of grid points
- Cell size
- Assigned ship name
- User point
- Track
- PIM track (route)

TRITON will provide the user with the capability of 4W Editor.

A sample Disposition 4W is given below:



[T1-R500] *TRITON shall maintain a list of Disposition 4W for each Maritime Operation.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R501] *TRITON shall allow the authorised user to manage (create, modify, delete) Disposition 4W List.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R502] *TRITON shall have Disposition 4W Editor.*

Requirement Property :

Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R503] *TRITON shall allow the authorised user to generate Disposition 4W i.a.w. ATP-01 on a pointer position or on a selected track with given attributes.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R504] *TRITON shall allow the authorised user to select the Disposition 4W grid boxes by either using the pointing device or manually entering the their identification.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R505] *TRITON shall allow the authorised user set visibility and status of Disposition 4W.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R506] *TRITON shall be able to display the Disposition 4W in the GeoView as a Layer.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Demonstration

4.2.5.4.2. Position and Intended Movement

Position and Intended Movement (PIM) is a navigational plot where the intended route and timeline of a unit is illustrated. PIM Routes (a.k.a. tracks) can be used for normal ship/battle group movement (navigation planning), possible threat movements, and for mission planning for aircraft and submarines.

Waypoint:

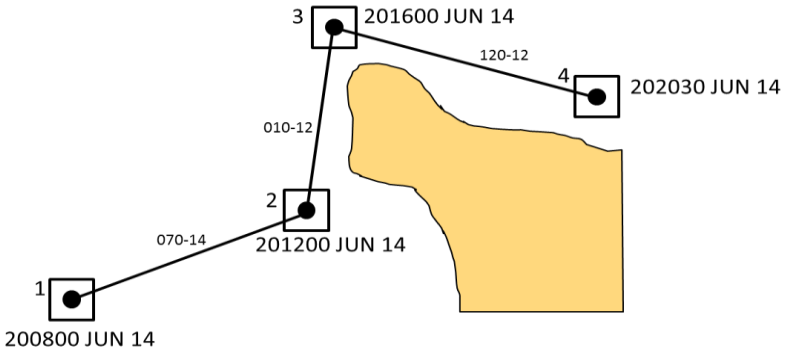
A Waypoint is a position where there is change in course and/or speed. A PIM Route consists of two or more legs separated by Waypoints. Each Waypoint has an identification, a geographical position and a DTG which indicates the time that the vessel be at that point.

Leg:

A Leg is a track which connects two Waypoints. It has a course and speed value, which the vessel must follow to reach the next Waypoint.

PIM Route:

A PIM Route is a path or a track, with a number of Waypoints connected with Legs. A PIM Route is plotted on the GeoView with a symbol indicating the Waypoint and Legs along the track. Any user can create a PIM Route by manually entering the Waypoint positions or by selecting the positions on the GeoView. A sample PIM Route display is given below:



TRITON will store PIM Routes with at least the following attributes:

- PIM Route name
- Visibility (Private, Shared or Public)
- Current Maritime Operation
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Status (active, inactive)
- List of Waypoints and Legs (any number)

Modes:

Speed-oriented:

When a PIM Route is created with a user-selected constant speed, the DTG of each Waypoint is calculated automatically as they are created. As the user sets the initial position and DTG, by either defining the First Waypoint in the list or selecting a Starting Position on the GeoView. Next creation of a new Waypoint in the list with a position causes calculation of the DTG and course. Similarly, the next selection on the GeoView causes creation of a new Waypoint with a calculated DTG and course. Modification of speed will cause re-calculation of DTG of Waypoints. Modification of Waypoint position in the list or on the GeoView will also cause re-calculation of DTG values.

Time-oriented:

When a PIM Route is created with Time-oriented method, the DTG of each Waypoint is entered manually. The speed on each Leg is calculated automatically. Modification of Waypoints will cause re-calculation of course and speed values.

When the user completes the creation of a PIM Track, he/she sets the Visibility, Security Classification, Releasability Label and saves it. If it is activated it will be displayed on the GeoView. Displaying the PIM Tracks on the GeoView is subject to the current projection system calculation.

[T1-R507] *TRITON shall maintain a list of Position and Intended Movement (PIM) Routes for each Maritime Operation.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R508] *TRITON shall allow the authorised user to manage (create, modify, delete) the PIM Route List.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R509] *TRITON shall allow the authorised user to create a PIM Route in Speed-oriented Mode by entering the constant speed and creating the Waypoints. TRITON shall calculate the DTG of each Waypoint automatically.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R510] *TRITON shall allow the authorised user to create a PIM Route in Time-oriented Mode by entering the DTG of the Waypoints. TRITON shall calculate the speed to be used at each Leg automatically.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R511] *TRITON shall allow the authorised user to create a PIM Route in the GeoView, indicating the start position and Waypoints.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R512] *TRITON shall be able to display the selected PIM Routes as a Layer in the GeoView according to their visibility settings.*

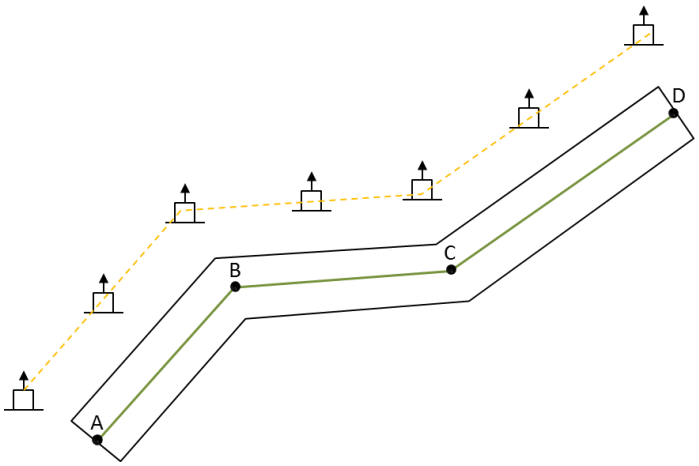
Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Demonstration

4.2.5.4.3. Q-Route Management

It would be impossible to search all mineable waters in which ships normally navigate. For this reason pre-planned, dormant, channels, routes and anchorages are surveyed during peacetime. Although they are not routes in the strictest sense, anchorages, in view of their importance to shipping, and for the fact they may be subject to Mine Countermeasures (MCM), are categorised as "routes". They should be designed in accordance with geographic features of the area and may therefore be either circular or box shape. Selection of known routes for use by allied shipping during tension or war enables environmental data and prominent sonar contacts on, or near, the routes to be collected in peacetime and compiled by national Mine Warfare Data Centres and inserted into comprehensive Mine Warfare Pilots (AMP-11) for use by MCM forces. Account is also taken in selecting routes that assist with the defence of allied shipping from air, surface, and sub-surface attack. Thus dormant routes are established ready for activation in tension or war in order that defences can be concentrated and used more economically [MTP-06].

"Q-Route" is a series of maritime routes that a ship may follow when transiting between the open ocean and port approaches. Channels are normally established to coincide with routes, the centreline of the channel being identical to the line connecting the route positions. Channels will usually be marked by offset buoys (if redundancy is required),.

A sample channel also marked with buoys is shown below:



The predefined Q-Routes are given in [AHP-7]. Users can create these routes in TRITON using this capability or importing previously defined Q-Routes.

Types of Q-Routes:

Routes may be subdivided into the following:

- Transit. A route which crosses the open water joining two coastal routes.
- Coastal. A route, normally following the coastline, which joins adjacent approach routes.
- Approach. A route which joins a port to the coastal or a transit route.
- Local. A route that connects the Fairway Buoy to the harbour.
- Link. A route, other than a coastal route, transit route or local route, which links two or more routes.
- Diversion. A route which bypasses a section or the whole of a transit, coastal, or approach route or link.
- Channel. The whole, or part of a route on which MCM operations will be or have been conducted. The width of the channel must be specified; the narrower the channel the fewer number of enemy mines likely to be found in it, and thus it is likely to be safer. The minimum width of a channel is governed by the requirements of safe navigation.
- Exercise Routes. Used solely for exercise purposes or to maintain the integrity of dormant wartime routes.
- Q-Anchorage. A wartime anchorage which is designated as a~~n~~ Q-Anchorage for use by Q-Route shipping. Q-Anchorages are subject to Q-Route security classification; they interface directly with Q-Routes and are subject to active MCM and route survey procedures. Q-Anchorages may coincide with peacetime anchorages, can be in either national or international waters and are based on the criteria laid down in MTP-06.

Q-Route Data:

TRITON will maintain a list of Q-Routes each having at least following attributes (details are in [MTP-06], [ATP-06], [AHP-1~~1~~]):

- Q-Route Identification (3 or 4 digit number)
- Q-Route Name
- Q-Route Type
- Visibility (Private, Shared or Public)
- Current Maritime Operation
- Security Classification
- Classification Colour (Red, Yellow, Green)
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Status (Dormant, Active)
- Activation DTG

- De-activation DTG
- Description (amplifying text)
- List of sections (legs)
  - Section Label
  - Geographical Position of each points along channel on the centre line
- Channel width
- Minimum depth

Although Q-Routes are related to Mine Warfare, TRITON will allow the user to create Q-Routes as C2 Areas and display them in the GeoView.

This information is made available to selected maritime assets on the NS Domain. It may also be needed to plot some Q-Routes on the NU Domain.

[T1-R513] *TRITON shall maintain a list of Q-Routes for each Maritime Operation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R514] *TRITON shall allow the authorised user to manage (create, modify, delete, export, import) the Q-Route List.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R515] *TRITON shall allow the authorised user to create a Q-Route by entering attribute values manually.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R516] *TRITON shall allow the authorised user to create a Q-Route by using the Geospatial Drawings and entering the values for the attributes.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R517] *TRITON shall display Q-Routes in Layers in the GeoView according to their visibility settings.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

4.2.5.4.4. Navigational Area Management

TRITON will be able to manage various areas having navigational importance. Following are examples:

- Transit corridors
- Avoidance areas
- Fishing areas
- Anchorage areas
- Non-anchorage areas

These areas will be defined using Reference Object-Area and maintained in a list of Navigational Areas. A Navigational Area will have the following attributes:

- Navigational Area Name
- Visibility (Private, Shared or Public)
- Current Maritime Operation
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Status (active, inactive)
- A list of Areas (as Reference Objects)
- Remark

[T1-R518] *TRITON shall maintain a list of Navigational Areas for each Maritime Operation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R519] *TRITON shall allow the authorised user to manage (create, modify, delete, export, import) the Navigational Area List.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R520] *TRITON shall allow the authorised user to create a Navigational Area using the Reference Object-Area.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R521] *TRITON shall allow the user to display selected Navigational Areas in the GeoView.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

4.2.5.5. Subsurface Mission Space Management

Sub-surface mission space used by submarines, mine countermeasure units, divers or other activities below surface is required to be managed for safety reasons. operational requirements cover the process and procedures needed to avoid mutual interference of Alliance sub-surface vehicles. The mission space is managed for war time and peace time with the following functions:

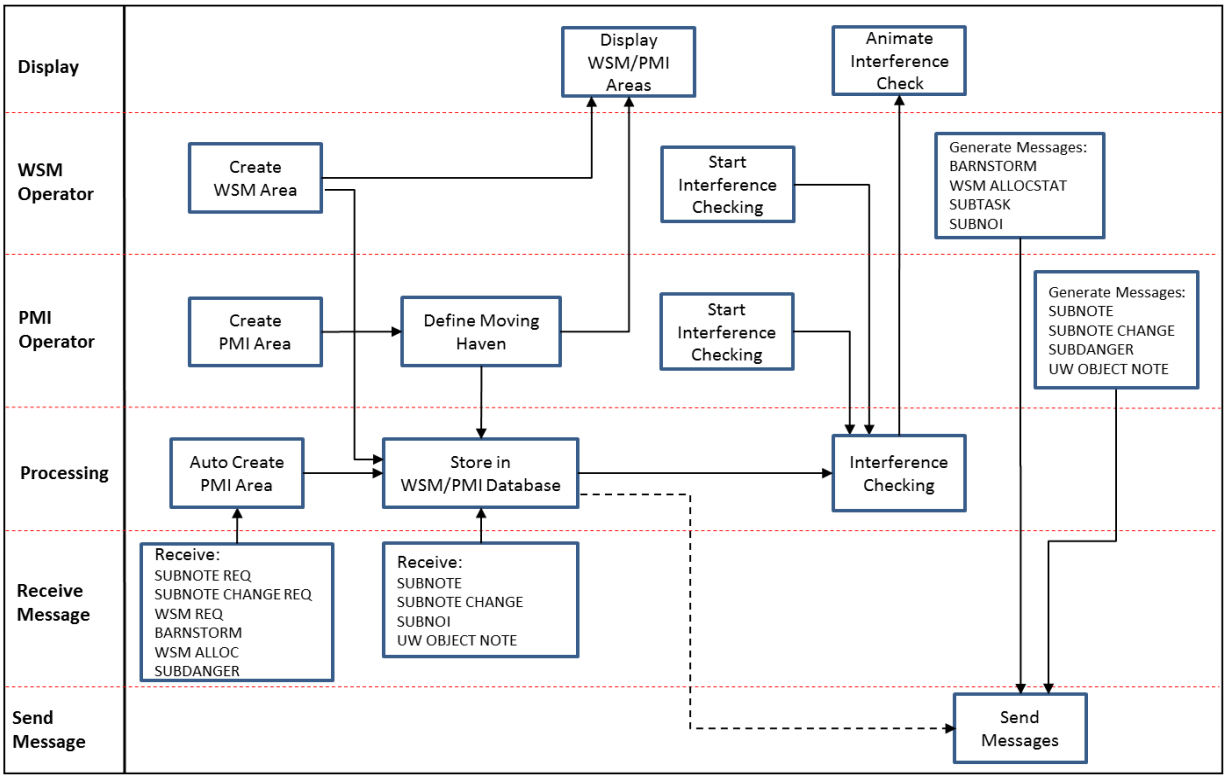
Water Space Management (WSM):

The purpose of the WSM is allocate waterspace in terms of ASW attack restrictions to permit the rapid engagement of enemy submarines while preventing inadvertent attack of friendly submarines.

Prevention of Mutual Interference (PMI):

The purpose of the PMI is to prevent interferences between submarines and any hazard for the submarine navigation.

TRITON WSM/PMI functionality will include the ability to check interferences, handle water space requests, allocations and notifications. The process is shown in the following diagram:



4.2.5.5.1. WSM/PMI Area Definition

The sub-surface mission space under water is controlled by the authorised user by defining "WSM/PMI Areas". Following areas are applicable [ATP-01]:

- ASW Free Area
- Submarine Action Area
- Joint Action Area
- ASW Area of Responsibility
- Submarine Safety Lanes
- Task Group Submarine Area

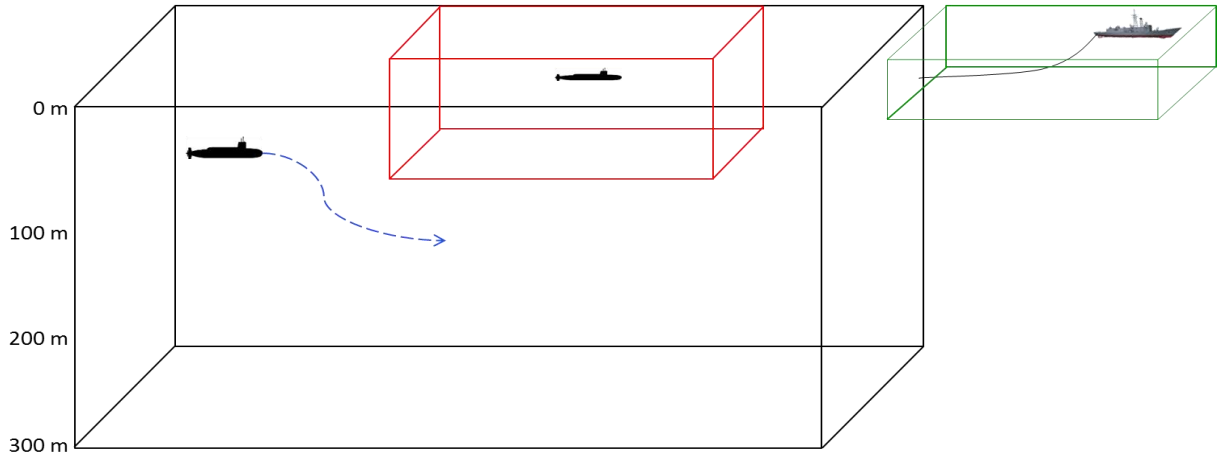
TRTION will use the following attributes to define a WSM/PMI Area, in addition to the Reference Object-Area attributes:

- Type of the Area (WSM Area, Moving Haven)
- Geographic Position of the Area
- Referenced Maritime Operational Object
- Minimum Depth
- Maximum Depth
- Moving Haven size (ahead, behind, either sides)
- Vertical Separation (below surface)

- Message Reference
  - Message Type
  - Reference Number
  - DTG
- Associated Maritime Task Unit
- Responsible Command
- Status (Activated or Deactivated)
- List of Affected Units
  - Type (submarine, other)
  - Nationality
- Remarks

Users can build and manage sub-surface WSM/PMI Areas and Moving Havens (MHN) i.a.w. ATP-18. For PMI, a MHN is a three-dimensional box that is designated to the submarine for submerged operations along a track (route). This box moves along the PIM track (route) at the Speed of Advance (SoA) of the track. Depths can be assigned for both the minimum and maximum depths.

A conceptual illustration of a PMI Area is given below:



TRITON will display the WSM/PMI Areas in 2D while doing the checks in 3D.

[T1-R522] *TRITON shall maintain a WSM/PMI Database to keep WSM/PMI Areas and tracks (routes) for supporting both WSM and PMI Functions.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R523] *TRITON shall allow the authorised user to set Visibility, Security Classification, Releasability Label of WSM/PMI Areas and modify their drawing attributes (drawing colour, fill colour, transparency).*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R524] *TRITON shall be able to display the WSM/PMI Areas and Moving Havens in the GeoView.*

Requirement Property :
Domain for Static : NS

Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R525] *TRITON shall be able to display all WSM/PMI Areas in sortable tabular format in the AppView.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R526] *TRITON shall allow the authorised user to filter the tabular format of the WSM/PMI Areas displayed in the AppView with an option to display the selected ones in the GeoView.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R527] *TRITON shall allow the user to select the WSM/PMI Areas to display them in the GeoView.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

4.2.5.5.2. Interference Check

When WSM/PMI Area is created, the authorised user can initiate an Interference Check. The checking process compares the areas and reports all conflicts between areas, tracks, grid assignments, and area sequences for surface and subsurface operations, including SUBDANGERs, UWONOTEs, HYDROLANTs, etc.

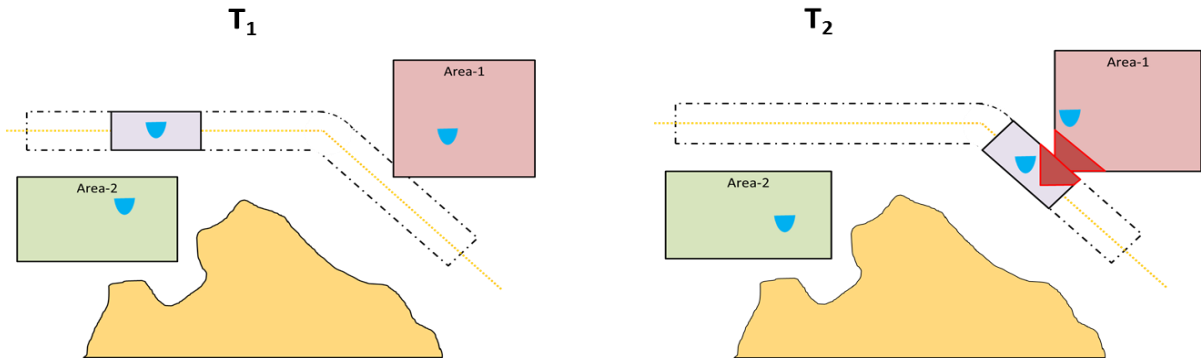
When activated, TRITON compares a given PMI Area and MHN, in three dimensions, using the Interference Check Criteria, with the other PMI Areas; in a similar way it compares the WSM Areas in two dimensions.

Interference Check Criteria:

The Interference Check Criteria consists of at least the following:

- PMI Area or MHN touches or crosses another PMI Area or MHN horizontally or vertically
- WSM Area touches or crosses another WSM Area horizontally

TRITON will also display WSM/PMI Areas and MHNs in two dimensions with top-view on the GeoView. An example showing the interference between an active area and a moving submarine with an animation is given below:



TRITON will be able to animate a given WSM/PMI Area according to the speed of the MHN using accelerated time. If there is a conflict with another WSM/PMI Area, an indication of the conflict will be displayed.

[T1-R528] *TRITON shall be able to perform Interference Check according to the Interference Check Criteria (as given in the Description) for overlapping WSP/PMI Areas and tracks assigned to different units under consideration of depth separation.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R529] *TRITON shall allow the authorised user to set a time and a horizontal distance value which is added to each direction of all WSM/PMI Areas before checking for overlap.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R530] *TRITON shall notify the authorised user if there is an interference with other areas when the user creates a new area and initiates a check process.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R531] *TRITON shall allow the authorised user to calculate the vertical separation based on ATP-18(G)(NAVY) Para. 0226 (NU).*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R532] *TRITON shall allow the authorised user to exclude specific WSM/PMI Areas from Interference Checks for specified units.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R533] *TRITON shall display all WSP/PMI Area interferences in sortable tabular format in the AppView.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R534] *TRITON shall be able to animate a selected WSM/PMI Area and Moving Haven starting from a given position, time, duration and update rate. Forward or backward animation shall be possible. The animation capability of the GeoView (Animating C4ISR Objects) shall be used.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R535] *TRITON shall allow the authorised user to initiate an animation for a selected WSM/PMI Area and Moving Haven by setting the starting position, time, duration of animation and interval for position update with at least one (1) minute steps.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R536] *TRITON shall allow the authorised user to pause the animation, modify the WSM/PMI Area and Moving Haven and resume the animation. The Timeline of the GeoView may be used to control the animation.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R537] *TRITON shall allow the authorised user to set the start time of the WSM/PMI animation to the beginning of a selected interference.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R538] *TRITON shall be able to generate SUBNOTE and SUBNOTE CHANGE messages based on user-selected Moving Havens. The user shall be able to send these messages to the Message Handling System.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

4.2.5.5.3. Prevention of Mutual Interference

The Prevention of Mutual Interference (PMI) provides the authorised user to avoid the risk of submerged interference between friendly submarines, between submarines and friendly ship-towed bodies or between submarines and any other underwater or surface objects. The PMI concept prevails in the conduct of daily operations during peacetime, including exercises.

[T1-R539] *TRITON shall allow the authorised user to manage (create, modify, delete) the PMI Areas in the WSM/PMI Database.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R540] *TRITON shall be able to generate PMI Areas as a Formatted Message.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R541] *TRITON shall allow the authorised user to generate SUBDANGER and UW OBJECT NOTE Messages. The user shall be able to send these messages to the Message Handling System.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

4.2.5.5.4. Water Space Management

The Water Space Management (WSM) is a set of operating areas and attack rules specifically defined for submarine and Anti-Submarine Warfare (ASW) assets.

TRITON will maintain the WSM Areas in the WSM/PMI Database. WSM Areas will be checked against the other WSM Areas. The authorised user will be able to create a WSM Area when a WSM Request is received. The user will be able to generate Formatted Messages using the WSM Areas.

[T1-R542] *TRITON shall allow the authorised user to manage (create, modify, delete) the WSM Areas in the WSM/PMI Database.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R543] *TRITON shall maintain a list of WSM Requests.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R544] *TRITON shall allow the authorised user to manage (create, modify, delete) the WSM Request List.*

Requirement Property :
- Domain for Static : NS

Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R545] *TRITON shall allow the authorised user to create a WSM Request in the WSM Request List when a WSM REQ message is received.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R546] *TRITON shall be able to generate BARNSTORM, WSM ALLOCSTAT, SUBTASK and SUBNOI messages based on user-selected WSM Areas. The user shall be able to send these messages to the Message Handling System.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

4.2.6. Maritime Messaging and Communication

The Maritime Messaging and Communication capability enables users to receive, prepare and send maritime-related formatted messages. It will provide a standardised messaging interface compatible with the following formats:

- ADatP-3(A) with APP-11(C) Chg.1 / APP-11(D)
- OTH-T GOLD format
- Format Alfa

TRITON will be able generate messages according to user inputs and allow the user to edit the message before sending them. All generated messages will be stored in the Message Database. Users are provided the necessary management functions such as search, retrieve and edit.

4.2.6.1. Message Database Management

TRITON will store incoming and outgoing formatted messages in a database named as "Message Database". The authorised users will be able to manage this database within each Maritime Operation. The database will contain Message Records where each record has least the following attributes:

- Message Type (ADatP-3, OTH-T GOLD, Format Alfa)
- Originator (the name of the command originating the incoming message)
- Sender (the name of the command of the message sender)
- Destination
- Channel identification
- DTG
- Message identification number
- Subject Indicator Code
- Classification
- Priority (precedence) (Flash, Priority, Operational immediately, Routine and Critical)
- Status (Received and processed, Unable to process, Deleted and Reprocessed)
- Message text

All messages will be stored in the Message Database, without a capacity limitation, providing the user with management (add, edit, delete) and archiving capabilities.

[T1-R547] *TRITON shall maintain a Message Database to store incoming and outgoing messages.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R548] *TRITON shall allow the authorised user to manage (add, edit, delete) the Message Database.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R549] *TRITON shall allow the user to search for a message according to given set of attributes, display the results in sortable tabular format and display the content of a selected message in the AppView.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R550] *TRITON shall allow the authorised user to archive Message Database and import archived data when needed.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R551] *TRITON shall provide a Message Editor with configurable default fields. The Message Editor shall have basic text editing functions to allow the user to type messages and save them.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

4.2.6.2. Receiving Messages

TRITON will be able to receive messages automatically by using System Interface Services (SIS) (e-mails, files, point-to-point connections or Formal Messaging Capability if available). Received messages will be parsed and the contained information will be processed by the relevant function. Following means will be used for receiving messages:

- ADatP-3 Formatted Messages (NS) : SIS for Message Handling System
- OTH-T GOLD Messages (NS) : SIS for Nations and other systems
- Format Alfa Messages (NU) : E-mails on the NU Domain

[T1-R552] *TRITON shall be able to receive ADatP-3 Formatted Messages from external systems via System Interface Services.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS

Baseline : BL 1
Qualific. Method : Demonstration

[T1-R553] *TRITON shall be able to receive OTH-T GOLD messages from external systems via System Interface Services.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R554] *TRITON shall validate received ADatP-3 Formatted Messages and notify the authorised user if a Formatted Message is not validated.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R555] *TRITON shall allow the authorised user to set criteria to exclude messages from parsing.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R556] *TRITON shall store unrecognised messages for editing and reparsing.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R557] *TRITON shall provide adequate documentation (e.g. Software Requirements Specification and Software Design Description) for the mappings and transformations between the supported message types and the associated Maritime Information Entity. An adequate specification is one that enables a programmer or user to understand the data transformation and validate its correctness.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

4.2.6.3. Sending Messages

TRITON will be able send prepared ADatP-3 Formatted Messages and OTH-T GOLD messages to a selected e-mail address to the MHS (see MHS Interface) using SMTP. In addition, TRITON will be able to send OTH-T GOLD messages to selected Network Addresses.

[T1-R558] *TRITON shall be able to send prepared messages to selected e-mail addresses via SMTP.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R559] *TRITON shall be able to export the prepared messages as text files.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

4.2.6.4. Handling ADatP-3 Messages

ADatP-3 specifies the Concept of NATO Message Text Formatting System (FORMETS). FORMETS is a collection of character-oriented information procedural standards suitable for the efficient exchange of information. The system includes the syntax and rules governing the representation of agreed conceptual definitions (fields), and the arrangement of these fields into sentences (sets) and message texts. FORMETS is intended to be used for all formatted character-oriented messages within the NATO Command, Control and Information System (NCCIS).

FORMETS also provides the rules, constructions and vocabulary for standardised character-oriented Message Text Formats (MTF).

TRITON will support ADatP-3 Baseline 13.1 based information exchange. Only a selected set of Formatted Messages out of the APP-11 (C) Chg.1 Message Catalogue will be used. If newer versions are available when the implementation starts, the most recent versions of the standards will be used in addition to these ones in order to keep backward compatibility with MCCIS.

TRITON will only concern with the part of a message containing the actual information that the originator wishes to communicate.

TRITON design should cover possible replacement of Message Parsing Module in future.

Used Formatted Messages:

TRITON will handle the following ADatP-3 Formatted Messages within relevant functions:

- NAVSITSUM

  The NAVSITSUM Message is used to provide a periodic summary of friendly forces giving details of their command, control, task organization, location and planned movements.

- NAVSITREP

  The NAVSITREP Message is used to report specific events, changes in location and movement, changes in readiness, or changes in major equipment status of maritime forces.

- MARINTSUM

  The MARINTSUM Message is used to provide periodic summary information pertaining to the movement of non-NATO forces in NATO maritime areas.

- MARINTREP

  The MARINTREP Message is used to provide time sensitive advisory information pertaining to the movement of non-NATO forces in NATO maritime areas.

- RMPSITSUM

  The RMPSITSUM Message is used to periodically report the location of surface and/or sub-surface contacts and/or the overlay details of a specified geographical area, comprising the RMP.

- NAVPOSREP

  The NAVPOSREP Message is used to report the location and/or intended movement of own military and auxiliary vessels and the location of military organizational entities.

- LOCATOR

The LOCATOR Message is used to report surface, subsurface, air, mines, or special interest units operating in the maritime environment.

- PURPLE

The PURPLE Message is used to provide a comprehensive summary of the activities of a mission or event.

- OPSTAT UNIT

The OPSTAT UNIT Message is used to provide the officer-in-tactical command (OTC) and other authorities or units, as appropriate, with operational and administrative information, or to report changes to this information.

- ORBATSEA

The ORBATSEA Message is used in peacetime to report the numbers and/or names of maritime forces and the readiness of the forces currently assigned to the major NATO commands, strategic commands and in periods of tension to report the names and readiness of the forces assigned to the major NATO commands following the declaration of the appropriate alert measure.

- SUBNOTE

The SUBNOTE Message is used to order and inform about the movement of a submarine.

- SUBNOTE REQ

The SUBNOTE REQ Message is a request to order and inform about the movement of a submarine.

- SUBNOTE CHANGE

The SUBNOTE CHANGE Message is used to order and inform about a change in the movement of a submarine.

- SUBNOTE CHANGE REQ

The SUBNOTE CHANGE REQ Message is a request to order and inform about a change in the movement of a submarine.

- SUBTASK

The SUBTASK Message is used to assign a submarine to the supported group/force. It also indicates the passage and movement areas.

- WSM REQ

The WSM REQ is used to request anti-submarine warfare areas for water space management.

- BARNSTORM

The BARNSTORM message is the primary method by which a Submarine Operations Authority (SUBOPAUTH) will pass all major operational control, safety and communication instructions to submarines on operational patrols and during major exercises reading a submarine broadcast.

- WSM ALLOCSTAT

The WSM ALLOCSTAT is used to promulgate Water Space Management information and to minimize mutual interference between submarines and ASW forces.

- SUBDANGER

The SUBDANGER is used to promulgate intended operations or actions hazardous to submarines

- SUBNOI

The SUBNOI is used to promulgate underwater (sub-surface) notice of intention.

- UW OBJECT NOTE

The UW OBJECT NOTE is used to provide information to appropriate authorities on a unit's intention for streaming or deployable sonic or other underwater device.

- ROEREQ

The ROEREQ is used to request authorisation to implement specific rules of engagement (ROE(s))

- ROEAUTH

The ROEAUTH is used by the North Atlantic Council (NAC)/Defence Planning Committee (DPC) to authorise implementation or cancellation of specific ROE(s).

- ROEIMPL

The ROEIMPL is used to implement and/or cancel ROE(s).

4.2.6.4.1. Processing ADatP-3 Formatted Messages

TRITON will be able to parse a received ADatP-3 Formatted Message and perform the related action according to the message information. TRITON will validate (i.e. formatted message cannot be parsed completely) each received formatted message. If validation fails, the authorised user will be notified.

If the message includes a track report then a track will be created which will attempt to correlate with an existing track. If TRITON Track Management can correlate this track with an existing one, then its position will be updated. This position update also causes a position update in Vessel Database if the track is associated with a vessel. If the new track is not correlated to a track, then a new track is created. If the track has positive identification then TRITON will associate it with a vessel and updates its position.

[T1-R560] *TRITON shall be able to process NAVSITSUM message, extract the track reports from the message and either create new Tracks or update the existing Tracks.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R561] *TRITON shall be able to process NAVSITREP message, extract the track report from the message and either create a new Track or update the existing Track.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R562] *TRITON shall be able to process MARINTSUM message, extract the contact report from the message and either create new Tracks or update the existing Tracks.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R563] *TRITON shall be able to process MARINTREP message, extract the contact report from the message and either create a new Track or update the existing Track.*

Requirement Property :
Domain for Static : NS

Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R564] *TRITON shall be able to process RMPSITSUM message, extract the track report or the Reference Object data from the message and then either create new Tracks and Reference Objects or update the existing ones.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R565] *TRITON shall be able to process NAVPOSREP message, extract the track report from the message and either create new Tracks or update the existing Tracks.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R566] *TRITON shall be able to process LOCATOR message, extract the track report from the message and either create new Tracks or update the existing Tracks.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R567] *TRITON shall be able to process PURPLE message, and display PURPLE area/route as a C2 Area drawing with the provided track information.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R568] *TRITON shall be able to process OPSTAT UNIT message, extract the unit report from the message and either create a new friendly Track or update the existing friendly Track. If the unit is in the Maritime Task Organization, it shall be updated accordingly.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R569] *TRITON shall be able to process SUBNOTE and SUBNOTE CHANGE messages, extract the PMI Moving Haven from the message and create the requested Moving Haven entry in the WSM/PMI Database.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R570] *TRITON shall be able to process SUBNOTE REQ and SUBNOTE CHANGE REQ messages, extract the PMI Moving Haven from the message and create the requested Moving Haven entry in the WSM/PMI Database.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R571] *TRITON shall be able to process BARNSTORM, WSM ALLOCSTAT, SUBDANGER, SUBNOI and UW OBJECT NOTE messages, extract the WSM/PMI Areas and create a WSM/PMI Area in the WSM/PMI Database if not exists already.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R572] *TRITON shall be able to process WSM REQ message, extract the WSM Area from the message and create the requested WSM Area in the WSM/PMI Database.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R573] *TRITON shall be able to process ROEREQ message, extract the ROE information from the message and update the ROE Request List (see ROE Management).*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R574] *TRITON shall be able to process ROEAUTH message, extract the ROE information from the message and update the ROE List.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R575] *TRITON shall be able to process ROEIMPL message, extract the ROE information from the message and update the ROE List.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R576] *TRITON shall allow the authorised user to process a selected ADatP-3 Formatted Message text file as an input for parsing.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

[T1-R577] *TRITON should have a replaceable module that handles the parsing of Formatted Messages.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Inspection

4.2.6.4.2. Generating ADatP-3 Messages

TRITON will provide the user with the capability of generating Formatted Messages and editing before sending them. In case tracks are to be selected, TRITON will perform an automatic identity check based on the Standard Identity of the selected tracks. The identity check will use the following rules to filter the tracks for correct identity:

- NAVSITSUM, NAVSITREP, NAVPOSREP messages are used for only the identities FRIEND and ASSUMED FRIEND.
- MARINTSUM, MARINTREP messages are used for only the identities NEUTRAL to HOSTILE.

TRITON will also allow the authorised user to configure the format of the message.

TRITON design should cover possible replacement of Message Generator Module in future.

[T1-R578] *TRITON shall be able to generate ADatP-3 Formatted Messages and allow the authorised user to edit the message.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R579] *TRITON shall allow the authorised user to change the configuration of the fields of the message format.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R580] *TRITON shall be able to get semi-static parameters for ADatP-3 Formatted Messages from the System Operational Parameters.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R581] *TRITON should have a replaceable module that handles the generation of Formatted Messages.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Inspection

4.2.6.5. Handling OTH-T GOLD Messages

A modified Over-the-Horizon Targeting GOLD Rev.D. (2000) (OTH-T GOLD) format is used by both NATO and National maritime HQs to automatically process received formatted data into an RMP. Although it is not a NATO format, it is included in the TRITON interface options as an optional non-NATO agreed standard.

Following modifications are applicable:

- Including AIS line from OTH-T GOLD 2007
- Using STANAG 1166 Ed. 7 or APP-20 (i.e. Ed. 8) (the most recent version to be used during implementation) as Ship Type Table
- Using MCCIS internal Table for Ship Class Table
- Using NATO Standard Country Codes Table (STANAG 1059)
- Allowing to use the Pennant Number field to indicate "COI", "CCOI" or "VOCI" for merchant vessels.
- Using OVERLAY messages to define graphics with additional attributes

TRITON will handle the following OTH-T GOLD messages:

- CONTACT REPORT

This message is used for the exchange of processed contact data or track management information between computer systems. It contains data relative to the identity, location, and movement of surface, subsurface, land, and air contacts

- OVERLAY-2

This message is used to transmit graphics information and to delete a single overlay from one computer to another.

- OVERLAY-3

This message is used to transmit single or multiple overlays, or to delete a single overlay from one computer to another with provisions for enhanced precision and accuracy reporting.

- PIM TRACK

This message is used to transmit PIM track information from one computer to another.

PING This message is used by ASW community to promulgate low frequency active ping data including source ship location and ping data.

- ENHANCED CONTACT REPORT

This message is used for the exchange of processed contact data or track management information with enhanced precision and accuracy between computer systems.

4.2.6.5.1. Processing OTH-T GOLD Messages

TRITON will be able to receive OTH-T GOLD messages automatically, parse them and perform the related action according to the message content. For each track report in the message a new track will be created which will attempt to correlate with an existing track. If TRITON Track Management can correlate this track with an existing one, then its position will be updated. This position update also causes a position update in the Vessel Database if the track is associated with a vessel. If the new track cannot be correlated with an existing track, then a new track will be created. If the received track has positive identification, then TRITON will associate it with a vessel in the Vessel Database and updates its position.

[T1-R582] *TRITON shall be able to process OTH-T GOLD CONTACT REPORT message, extract the track report from the message and either create a new Track or update the existing Track.*

Requirement Property :

Domain for Static : NS

Domain for Afloat: NS
Baseline : BL 1
Qualific. Method : Test

[T1-R583] *TRITON shall be able to process OTH-T GOLD ENHANCED CONTACT REPORT message, extract the track report from the message and either create a new Track or update the existing Track.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 1
Qualific. Method : Test

[T1-R584] *TRITON shall be able to process OTH-T GOLD OVERLAY-2 message, extract the information describing the graphics from the message and either create a new Reference Object (Reference Point, Line, Area) or update the existing one.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R585] *TRITON shall be able to process OTH-T GOLD OVERLAY-3 message, extract the information describing the graphics from the message and either create a new Reference Object (Reference Point, Line, Area) or update the existing one.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R586] *TRITON shall be able to process OTH-T GOLD PIMTRACK message, extract the included PIM track and create the PIM Route.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

[T1-R587] *TRITON shall allow the authorised user to process a selected OTH-T GOLD Message text file as an input for parsing.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 1
Qualific. Method : Test

[T1-R588] *TRITON shall use the NATO Standard Country Codes Table to map the country codes to country names.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 1
Qualific. Method : Test

4.2.6.5.2. Generating OTH-T GOLD Messages

TRITON will provide capability to generate OTH-T GOLD messages to export selected tracks.

[T1-R589] *TRITON shall be able to generate OTH-T GOLD Messages from the Picture Management Function and allow the authorised user to edit the message before sending.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test

4.2.6.6. Handling Format Alfa Messages

Format Alfa is a "process" by which civilian mariners can communicate intentions to military organizations charged with monitoring merchant traffic. The Format Alfa was developed so that merchant vessels could pass their voyage information to the NATO Shipping Centre to shorten the time required for assessment of validity. Based on the current situation, voluntary or mandatory reporting schemes may be implemented regarding entering, sailing in and leaving defined areas. Although requirements regarding information to be included in the Format Alfa can and will differ dependent on the schemes set for the specific area, its format is defined in the ATP-2(B) Volume II Naval Cooperation and Guidance For Shipping Manual (also given in www.shipping.nato.int).

The message contains the following information:

- Ship name
- Flag
- IMO number
- Inmarsat telephone number
- Time (UTC) and position
- Course
- Passage speed
- Freeboard
- Cargo
- Destination and ETA
- Last port, Departure DTG (UTC)
- Additional ports, ETA and ETD DTG (UTC)
- Start Suez Canal Transit, DTG (UTC)
- Notes and observations

Messages are received from external sources, usually via e-mail in a readable format, and then the authorised user copies them into TRITON manually. The formatted message is processed by TRITON and the track information is automatically extracted allowing the authorised user to create/update a track.

A sample message is shown below:

NAME/LauraD//

ICS/YL2209//

IMO/8226467//

CARGO/general nature of cargo//

LAST PORT/SAN DIEGO/131100ZMAY07/121100ZMAY07//

NEXT PORT/SAN JOSE/161100ZMAY07/160000ZMAY07//

ADDITIONAL PORT/SAN FERNANDO/171100ZMAY07/162100ZMAY07/

CURRENT POS/3300N 11700W/141300ZMAY07/141000ZMAY07/

WAY POINT/3800N 11722W/162044ZMAY07/161044ZMAY07//

REMARK/THIS IS A REMARK//

4.2.6.6.1. Processing Format Alfa Messages

TRITON will receive Format Alfa and Position Report messages (on-line or off-line) and the authorised user will have it processed. Format Alfa messages will be used only on the NU Domain. TRITON Format Alfa Parser validates (i.e. if the formatted message cannot be parsed completely) a received message when it is entered. If validation fails, the authorised user will be notified. The validated message will then be parsed and the track information will be extracted automatically. The authorised user can create a new track using this information or update the existing track.

TRITON will be able to tag the vessels in the Vessel Database according to their participating in this voluntary reporting scheme.

[T1-R590] *TRITON shall be able to process Format Alfa message, retrieve the track information.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Test

[T1-R591] *TRITON shall allow the authorised user to manually enter Format Alfa message text into the Format Alfa Parser for processing.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Test

[T1-R592] *TRITON shall allow the authorised user to either create a new track with the received information or update the existing track.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Test

[T1-R593] *TRITON shall be able to tag the associated Vessel in the Vessel Database reported by Format Alfa for its contribution with a DTG.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Test

[T1-R594] *TRITON shall allow the authorised user to store and manage Format Alfa messages in the Message Database.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Test

4.2.7. System Management

Since TRITON is a multi-user Functional Service, its management needs to be handled appropriately at various levels. Maritime Operation Management handles the management of Maritime Operations, their Environments, data flows in that Environment.

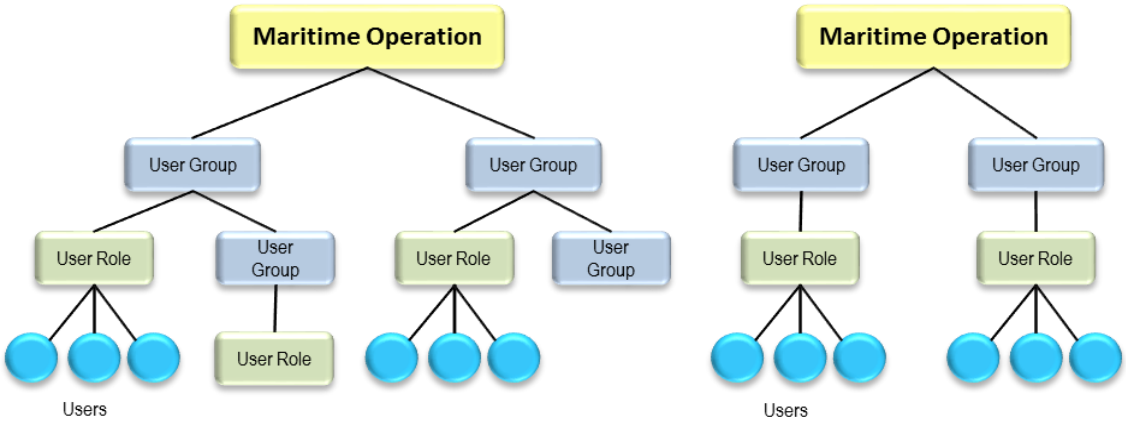
There will be a User Management capability which handles the operational users and their access privileges for each Maritime Operation.

The System Technical Management capability will provide the authorised users with managing and monitoring capability for the status of interfaces as well as general system status at any moment of time.

The Data Management capability provides the management of databases and any kind of information management.

4.2.7.1. User Management

TRITON User Management function provides the authorised users to control user management and adjust access privileges to groups, roles and users inside a Maritime Operation. TRITON users are primarily NATO Command Structure personnel that are individually introduced to the NS or NU Domain. These users can be assigned to roles which belong to user groups. A user may belong to multiple user groups. This multi-layer user management scheme is depicted below:



TRITON will only be operated by authorised users and can be accessed by general users. Only the authorised users can manage users and groups. System functions are defined as list of privileges and can be assigned to groups and roles. They can be inherited from top to down.

4.2.7.1.1. User Groups

A User Group in TRITON is defined with a name, a description, a list of roles and a list of top-level privileges. There may be several subgroups for each User Group and several User Roles for each Group or subgroup. All User Roles in the same group (or subgroup) have the same privileges.

TRITON will define at least the following User Groups as the default:

General Users : User Roles not related to an operational role but allowed to use a limited set of functions. They have read-only rights on data.

General Viewers : User Roles for view-only purposes.

Command Group N : User Roles defined for a specific Command Group (e.g. MARCOM Users). They may have Authorised Users having rights on managing data.

Administrators : User Roles having low-level control privileges.

User Groups can be created according to the organization on which TRITON is installed and used. following are examples to User Groups and subgroups:

Group : MARCOM

Subgroup : MARCOM_MOC

Subgroup : MARCOM_MOC_Picture_Managers

Group : SNMG_1

Subgroup : SNMG_1_Picture_Managers

Subgroup : SNMG_1_Commanders

Subgroup : SNMG_2_Picture_Managers

4.2.7.1.2. User Roles

TRITON User Roles are the operational roles that are necessary to use the system properly. They are defined by a set of permissions (i.e. access to objects and functionality) to perform certain operations. There may be one or more users associated to a User Role. All users have the same access privileges. There may be predefined roles and generic roles associated with predefined functions and data access privileges.

The User Roles will be defined according to the current roles being used at both static and afloat command centres. In general, two groups of users will be accessing TRITON services:

- General User (A standard user with read-only privileges).
- Authorised User (A privileged user capable of accessing the authorised functions with management privileges).

A Basic Role is one of the primary roles in the TRITON (i.e. TRITON User, Organizational Node Administrator, Enterprise Administrator, System Administrator). These roles can be assigned to users who can be General User and Authorised User.

The primary Basic Roles are given below:

TRITON User: A person having Access Rights for TRITON User Functionality. This functionality includes viewing, creating, collaborating and maintaining Maritime Information Entities. User Accounts define a TRITON User.

TRITON Organizational Node Administrator: A person having Access Rights for TRITON Organizational Node Administrator Functionality. This functionality includes managing TRITON Accounts, Access Rights, and defining Information Exchange Contracts. Organizational Node Administrators are generally members of the site staff responsible for User Management, domain value management and system configuration for that particular TRITON Organizational Node. Organizational Node Administrators are also responsible for adapting and localising production workflow sequences to guide and control processes. They can assign user permissions on types of Maritime Information Entities (e.g. Track, Vessel) and functions (e.g. Read, Create, Modify, Delete) on those objects for that particular organizational node. To simplify administration, a role may be specified from more basic roles and permission sets. Organizational Node Administrators will have the capability to perform content management functions, including data cleansing and archiving.

TRITON Enterprise Administrator: A person having Access Rights for TRITON Enterprise Administrator Functionality. This functionality includes maintaining the enterprise-wide configuration (e.g. domain values).

Enterprise Administrators are responsible for overall management and administration of the system, including both technical and procedural aspects. In general, Enterprise Administrators are identified for each mission/domain. Procedural and administrative responsibilities of the Enterprise Administrators include the creation, documentation and enforcement of operating policies and

procedures associated with functional system configuration; domain management; User access and privilege management; data stewardship; workflow management; and identification and resolution of functional issues. Enterprise Administrators are responsible for overseeing development and maintenance of Standard Operating Procedures (SOPs) and coordination with Organizational Node Administrators. The technical responsibilities of Enterprise Administrators include enterprise domain management; collection of performance and accounting data; and ensuring security mechanisms are working. Enterprise Administrators are also responsible for identifying standard production workflow sequences.

TRITON System Administrator: A person having Access Rights for TRITON System Administrator Functionality. This functionality includes the functionality for TRITON System Administration and TRITON System Maintenance. TRITON System Administration Functionality includes deploying, configuring and updating TRITON. System Administrators are generally part of NCI Agency local CIS Support Unit (CSU) personnel responsible for system and network technical issues, and for ensuring the proper configuration, network connectivity and recoverability of the system. Responsibilities of the System Administrators include network and domain management; back-up and recovery of file systems and databases; and administration of TRITON Server and applications. System Administrators are responsible for maintaining Windows User Groups and adding new users to the Windows domain, and (re)installing the system as required.

Throughout the Command Structure, there will be roles like "General Users" who can access the general services and functions. Maritime Command (MARCOM) and selected deployed Headquarters will also have "Authorised Users" with roles like Maritime Operations Planner, RMP Manager, RMP Operator, System Technical Manager, Information Manager and Data Manager.

TRITON will define at least the following User Roles as the default:

General User **:** A User not having a specific operational role but allowed to use a limited set of functions.

General Viewer: A User who is allowed to use the services as only general view.

System Manager **:** A User responsible for system monitoring, technical system management and organizational management.

Administrator **:** A super user with all low-level control privileges.

Other roles can be created according to the organization on which TRITON is installed and used. following are examples to User Roles under User Groups (subgroups):

Group : MARCOM

Subgroup : MARCOM_MOC

Role : MARCOM_MOC_Chief

Role : MARCOM_MOC_Battle_Watch_Captain

Subgroup : MARCOM_MOC_Picture_Managers

Role : MARCOM_MOC_RMP_Manager

Role : MARCOM_MOC_RMP_Operator

Role : MARCOM_MOC_WP_Operator

Subgroup : MARCOM_Operation_Planners

Role : MARCOM_WSM_Planner

Group : SNMG_1

Subgroup : SNMG_1_Picture_Managers

Subgroup : SNMG_1_Commanders

Role : SNMG_1_Commander

4.2.7.1.3. Users

A "user" refers to a person having access to the operating system (an OS User) and TRITON. This can be a TRITON User, TRITON Organizational Node Administrator or TRITON Enterprise Administrator. A user can also be an authorised user.

A User in TRITON is the same as a standard NATO user on the NS or NU Domain.

TRITON User names are retrieved from the account names in the Logical Directory on the NS Domain.

Users are assigned to User Roles. A User can be assigned to more than one User Role. A user assignment example is given below:

Group : MARCOM

Subgroup : MARCOM_MOC_Picture_Managers

Role : MARCOM_MOC_RMP_Manager

User: A.Aaaa

Role : MARCOM_MOC_RMP_Operator

User: B.Bbbb

User: C.Cccc

Role : MARCOM_MOC_Battle_Watch_Captain

User: B.Bbbb

User: D.Dddd

User: E.Eeee

User: F.Ffff

4.2.7.1.4. Privileges and Access Rights

A privilege is a permission to perform an action. They can be automatic, granted or applied for. Access Rights according to user privileges are assigned to User Groups and User Roles.

Automatic Privilege:

An automatic privilege exists when there is no requirement to have permission to perform an action. For example, viewing maritime information on the GeoView does not require a privilege. Any TRITON user can access the GeoView. Default roles have default access rights.

Granted Privilege:

A granted privilege exists as a result of allowing access to a given function by an authorised user. For example, Picture Manager role can be given a privilege to create or delete a track.

Applied:

A privilege can be applied when it is granted to a User Role at run-time.

Privileges are assigned according to Function Tables. A Function Table is a list of functions with a number of access rights for Maritime Information Entities. Following types of Access Rights are defined:

- Create
- Read
- Update/Modify
- Delete
- None.

[T1-R595] *Each user of TRITON shall be assigned Access Rights based on TRITON Roles, the privileges within that Role, and the Organization of the user. A User can be assigned one or more TRITON Roles in one or more organizations.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R596] *TRITON shall provide privileged TRITON accounts (e.g. system and security administrator accounts).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R597] *TRITON shall provide for the authorised user a set of access rights (data and applications) such that these rights can be maintained.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R598] *If a user has more than one Basic Role, the user shall have the privileges for all the Basic Roles.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R599] *TRITON shall allow the authorised user with administration privileges to set roles and permissions for a user.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R600] *TRITON shall allow only the authorised user with administration privileges to operate TRITON System Management Functionality and TRITON System Maintenance Functionality with appropriate operating system rights.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R601] *TRITON shall allow a user to have the same or different Basic Roles for different simultaneous instances of TRITON.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R602] *TRITON access controls shall ensure that users cannot access functions or Maritime Information Entities beyond those needed to execute their role.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R603] *TRITON shall allow the authorised user with administration privileges to manage (create, modify, delete) User Groups, Subgroups, User Accounts, User Roles, password details, and assign User Roles to User Accounts and manage general access privileges of individual User Accounts.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R604] *TRITON shall allow the authorised user to define unique User Groups and Subgroups within a User Group and then unique User Roles within a User Group or Subgroup.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R605] *TRITON shall maintain a Function Table having a list of functions with Access Rights given in the Description.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R606] *TRITON shall allow the authorised user with administration privileges to define privileges in the Function Table for User Groups and User Roles.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R607] *TRITON shall be able to inherit access privileges from User Groups or subgroups down to User Roles.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R608] *TRITON shall automatically change user privileges according to a predefined Function Table when the Operational State of the Server changes.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

Comment : The predefined Function Table will be defined during System Transition.

[T1-R609] *TRITON shall define sessions which provides authorisation along with authentication for each user that logs in to a Maritime Operation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R610] *TRITON shall integrate with existing users management systems from the Bi-SC AIS: Windows Active Directory and NATO Enterprise Directory Service.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

4.2.7.1.5. Identity and Session Handling

Authentication process identify the user based on the Maritime Operation selected. It controls which users are allowed to perform which functions and what permissions they have on processed data. Number of User Groups and Users in each Group can reach to several hundreds, but TRITON will not have any capacity limitation on creation of Users.

Role-based Access Control Guidelines:

- Users are associated with User Roles and also with Organizations:
- User Roles determine the functions and types of objects available to the user.
- Organizations determine the data available for use by the available functions.
- A User has permission on a particular data item only if the User has an authorised Role and is a member of that Organization.

When TRITON is to be used as a standalone application where enterprise-level authentication is not available, TRITON will implement an authentication service that requires the user to provide a valid User ID and password which are managed internally.

[T1-R611] *TRITON shall support Single-Sign-On (SSO).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R612] *TRITON shall allow the user to log out anytime and during any process.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R613] *TRITON shall automatically log out an inactive user after a defined timeout. This timeout value shall be included in the system configuration settings.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R614] *TRITON shall allow the user (with the same User ID) to access the same information and functionality from any workstation on the network (i.e. "roving user" functionality). This capability shall not depend on the availability of the Windows Active Directory.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R615] *TRITON shall be able to apply Role-based Access Control Guidelines given in the Description.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R616] *TRITON shall assign the predefined Roles to a user after the user's authentication and authorisation is completed.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R617] *TRITON shall automatically login a user who is authenticated by Windows Active Directory or the operating system.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R618] *If an enterprise-level authentication is not available, TRITON shall implement an authentication service that requires the user to provide a valid User ID and password.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R619] *For users accessing TRITON from networks which would not allow an instance of TRITON to authenticate the user, TRITON shall use the internal authentication service that requires the user to provide a valid User ID and password.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R620] *TRITON shall not store login and password details locally ~~for users that cannot be authenticated through Windows Active Directory~~ while in the Normal Mode of operation. TRITON shall be configurable to use either the enterprise-level authentication services or the TRITON authentication service (appropriate for the Standalone Mode of operation), but not both simultaneously.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R621] *The interval for password change in TRITON shall be selectable.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R622] *TRITON shall allow the authenticated users to manage their password and their user profile (e.g. e-mail address, unit) information.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R623] *TRITON shall provide help text to support the login process together with links to recover lost password and login details.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R624] *TRITON shall limit the feedback of information during authentication to prevent users gaining knowledge of the authentication process.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R625] *If an authenticated user is a member of more than one Organization (i.e. Organizational Node), the user shall be prompted to select the Organization to be used during that session.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R626] *TRITON shall ~~only~~ display ~~functionality enabled~~ only the information allowed for a particular user to view according to the viewing permissions assigned to that~~e~~ user.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R627] *TRITON shall automatically verify entries into TRITON Repository to ensure the user is authorised to effect such changes.*

Requirement Property :
Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R628] *TRITON shall display only the functionsality enabled for a particular user according to the execution permissions assigned to thate user and provide access to them.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

4.2.7.1.6. Workspaces

After successful logon, TRITON will provide the user a private working environment called "Workspace". A Workspace is a private environment that a user can alter the settings according to personal preferences. It provides the user with various options and the capability to save the Workspace. The authorised user can prepare a default Workspace and make it available to all users.

Workspaces can be customised according to user preferences for both AppView and GeoView, and when the session ends all settings are stored. At least the following information will be saved in a Workspace as personal preferences:

- AppView User Settings
  - Settings about general viewing style
  - Personal preferences
  - Search queries
- GeoView User Settings
  - Settings about general viewing style
  - Personal preferences
  - Search queries
  - Placemarks
  - Bookmarks
- Private operational data (e.g. visibility of an Area)

Mail, printer, directory or other local workstation desktop settings will be provided by the standard run-time environment on which the Client runs.

[T1-R629] *TRITON shall provide a configurable Workspace as defined in the Description for each user who is assigned to a User Role.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R630] *TRITON shall allow the authorised user to manage (create, modify, delete, export, import) the Workspaces.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R631] *TRITON shall automatically delete the allocated Workspace associated to a user when the user is de-assigned from a User Role by the authorised user.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R632] *TRITON shall allow the user to manage (import, modify, save) his or her own Workspace including the User Settings for both AppView and GeoView.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R633] *TRITON shall apply the User Settings for both AppView and GeoView at their start-up and manage them as the user applies any modification.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.7.2. System Technical Management

TRITON uses a central management capability which provides low-level system administration, management of system configuration, system interfaces and general status of components.

4.2.7.2.1. System Administration

TRITON low level management is provided by System Administrators having the highest privileges. Users, Roles and User Groups are defined by the System Administrators.

[T1-R634] *TRITON shall provide the authorised user with administration privileges to manage all access privileges.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R635] *TRITON shall allow the authorised user to manage (create, copy, modify, delete) Users, Roles and User Groups.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.7.2.2. System Configuration Management

TRITON instantiations will be configured during installation and run-time using the values stored in Configuration Ssettings. The behaviour of operational functions can also be adjusted and fine-tuned using the values stored in Operational Parameters. Only the authorised users can alter the Configuration Settings and the Operational Parameters.

4.2.7.2.2.1. System Configuration Settings

TRITON will have Configuration Settings in order to fine-tune its operation. Network address settings, database definitions, location of datasets, names of interfaces are examples to these settings. Static Configuration Settings can be applied during system installation, and the Dynamic Configuration Settings can be applied at run-time without requiring restart.

[T1-R636] *TRITON shall be able to adjust itself according to its Configurable System Settings when they are changed.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R637] *TRITON shall configure itself at start-up according to the Static Configuration Settings which shall be provided during system installation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R638] *TRITON shall allow the authorised user to manage (import, modify, save, export) the Static Configuration Settings.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R639] *TRITON shall be able to configure itself at run-time according to the Dynamic Configuration Settings which shall be modified at run-time.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R640] *TRITON shall allow the authorised user to manage (import, modify, save, export) the Dynamic Configuration Settings.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

4.2.7.2.2.2. System Operational Parameters

TRITON will use System Operational Parameters to adjust and fine-tune its operational functions at run-time. Correlation Criteria, History Distance are examples to these parameters.

[T1-R641] *TRITON shall be able to adjust and fine-tune the behaviour of its functions according to its System Operational Parameters.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1

Qualific. Method : Test

[T1-R642] *TRITON shall be able to use the System Operational Parameters to adjust the behaviour of its functions at run-time.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R643] *TRITON shall allow the authorised user to manage (import, modify, save, export) the System Operational Parameters.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.7.2.3. System Interface Management

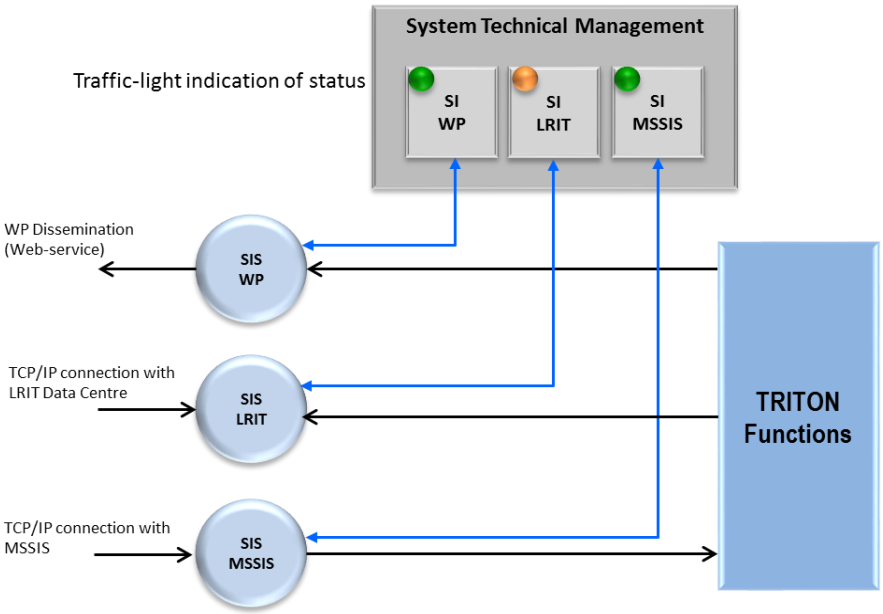
TRITON will maintain interfaces for all external systems and Functional Services. All interfaces will be managed by standard and independent software modules. Authorised users can control the interfaces and monitor their status via these modules.

4.2.7.2.3.1. System Interface Service Framework

TRITON will manage its external interfaces using separated, independent interfacing modules. According to the accepted terminology in the NATO Reference Architecture, these modules will be implemented as Technical Services in the Maritime Functional Services and named as "System Interface Service" (SIS).

TRITON will use dedicated SIS for interfacing each external system or service with an associated GUI for controlling and monitoring purposes. SIS will provide scalability and isolation of interface from the internal business logic. A SIS will report to the System Technical Management (STM) about the availability of the interface, connectivity and flow of data so that in case of a failure, appropriate recovery procedures are executed and the user is notified. STM will then display the status of the interface with traffic light representation.

The conceptual approach is depicted in the following figure:



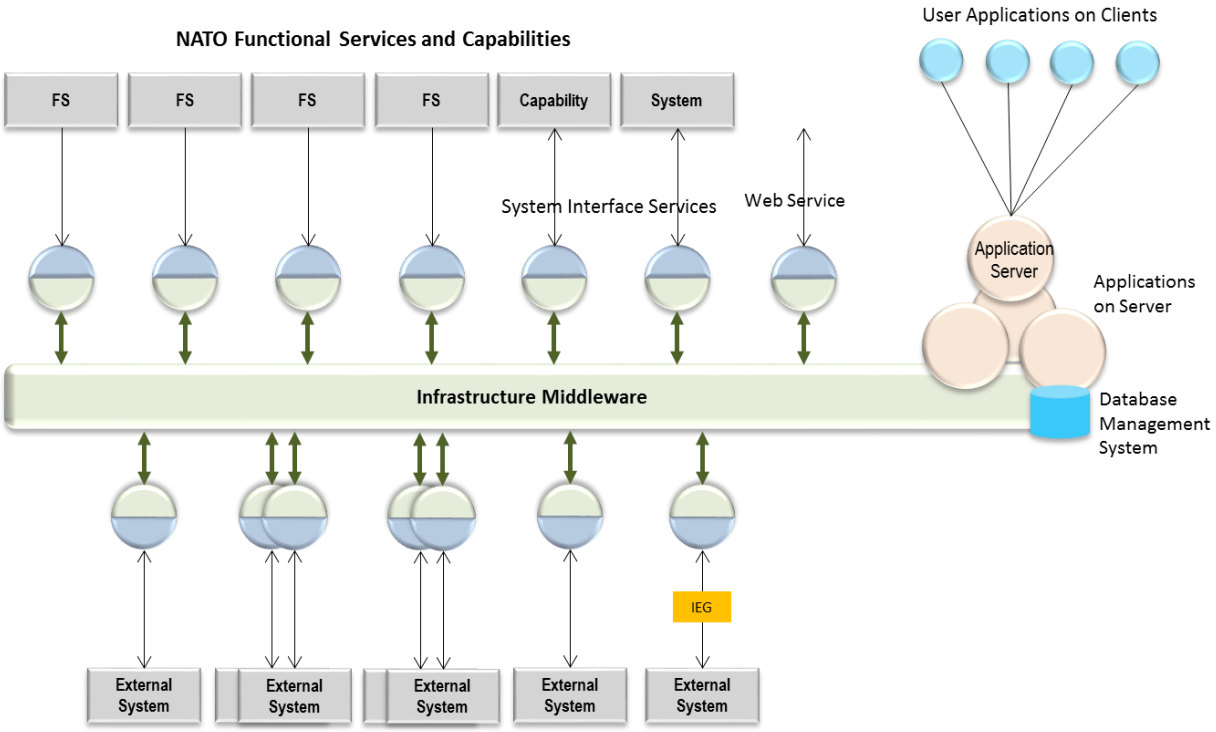
The structure of a SIS will consist of the following:

- A data exchange unit providing interface with a specific system or service
- A standard internal structure to process incoming data
- A standard internal structure to prepare outgoing data
- A standard self-reporting mechanism (own status and connectivity)
- A standard and coherent interface for internal communication mechanism
- A controlling GUI
- An error handling, reporting and recovery mechanism

Each SIS may have different tasks and even different implementation depending on the interface requirements. For example, a SIS may provide tracks to TRITON. It will then receive track information from external source in a specific format, convert it to internal track format, assign a local, internal track number along with the source identification and original track number, and send it to the Track Management component.

A SIS can be implemented as a Web service. Each SIS can be allocated onto a virtual or physical CPU for load balancing purposes.

There will be an infrastructure middleware which provides communication between each SIS and the TRITON internal functions. The conceptual illustration of the SIS Framework is given below:



Detailed diagrams for the NS and NU Domains are given in Section 5, Interface Requirements.

[T1-R644] *TRITON shall use a dedicated System Interface Service (SIS) for each identified external interface.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R645] *TRITON shall use a standard internal structure for each SIS.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection
- Comment : The structure design will be finalised by the SwDR-1.

[T1-R646] *TRITON shall use a standard status reporting and error handling functionality for each SIS.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R647] *TRITON shall process incoming data according to the interface specification and convert this data into internal data representation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R648] *TRITON shall be able to provide Web Service capability via a SIS.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R649] *TRITON shall automatically establish a dedicated connection to the external communication channel when it becomes available.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R650] *TRITON shall be able to re-establish the connection to the external communication channel in case the connection is lost.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R651] *TRITON shall convert internal data representation into external representation according to the interface specification and send the data through the physical communication channel.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R652] *TRITON shall provide data logging capability for each SIS to be enabled and disabled by the authorised user.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

4.2.7.2.3.2. System Interface Control

TRITON system interfaces will be managed centrally using the SIS Framework. The management includes control and monitoring of each SIS by means of user interaction.

[T1-R653] *TRITON shall provide the user with the information (connectivity status, interface-specific information such as data rate) related to the status of each interface.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R654] *TRITON shall provide the authorised user to control (start, stop, change mode) individual SIS.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 1
Qualific. Method : Test

[T1-R655] *TRITON shall allow the authorised user to manually allocate the selected SIS onto separate physical or virtual CPUs for load balancing purposes.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.7.2.4. System Technical Status Management

TRITON will monitor all interfaces and connections, their status and activities. Authorised users can control the individual services and modules.

4.2.7.2.4.1. Technical Status Monitoring

The interfaces of TRITON will be monitored centrally. TRITON will present the status of connections in both graphical and tabular format. Traffic Light presentation will also be used for quick recognition. In case a failure is detected, relevant actions will be taken by the system and the authorised user will be notified. The NATO Service Management and Control (SMC) Services in Enterprise Management System (EMS) will be informed according to the severity level of the error.

Key Performance Indicators (KPI) will be computed to determine the current operational status of TRITON Services. KPIs will be computed using a user-configurable table with weighed figures for each service. General overview of TRITON will be provided with a traffic light notation including the KPIs computed at intervals set by the authorised user.

KPI computation will consider at least the following:

- The current Operational Mode
- Weighed status of internal services
- Weighed status of external interfaces
- Number of users
- Available CPU power
- Available storage

TRITON will provide at least the following information to the SMC Services:

- Server location (or name)
- Operational state
- Operational mode
- Status of basic functions

[T1-R656] *TRITON shall display the status of each component and external interface in both sortable tabular form and graphical form using tree-like representation (i.e. a Dashboard).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R657] *TRITON shall allow the user to view the detailed status of a selected external interface.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1

Qualific. Method : Test

[T1-R658] *TRITON shall provide the authorised user with a configurable table of functions to compute the KPI.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R659] *TRITON shall calculate its instantaneous KPIs based on status of its services, display the KPI and update it at intervals set by the authorised user.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Test
Comment : KPI calculation method will be determined during the Software Design.

[T1-R660] *TRITON shall provide the status of its functionality to SMC Services including its KPI.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

4.2.7.2.4.2. System Mode Management

System mode will be managed by the authorised users. Operational states for each mode will be managed automatically.

[T1-R661] *TRITON shall manage its Operational Mode automatically and allow the authorised user to change it manually.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.7.2.5. System Error Reporting

TRITON will have an error collecting, error logging and reporting mechanism for maintenance purposes. All system components and modules will report their exceptions and error conditions to the error reporting mechanism with detailed information. System maintainers will be able to trace the error in the system error log starting from the highest application to the lowest level function call in the code of the module reporting the error.

TRITON will report the errors to the SMC Services according to their severity levels as well, and notify the authorised users.

[T1-R662] *TRITON shall have an error collecting, error logging and reporting mechanism.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R663] *TRITON shall allow the authorised user to access the error logs to examine the traces.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R664] *TRITON shall allow the authorised user to manage (archive, delete) the error logs.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R665] *TRITON shall report the errors to the SMC Services according to their severity levels and notify the authorised user.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.7.2.6. Client Monitoring and Control

All TRITON Clients connected to the server will be monitored. The connection status will be presented in sortable tabular and graphical form.

[T1-R666] *TRITON shall monitor the Clients connected to the TRITON Server.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R667] *TRITON shall display the status of the connected Clients in both sortable tabular form and graphical form using tree-like representation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R668] *TRITON shall allow the authorised user to view the detailed status of a selected Client.*

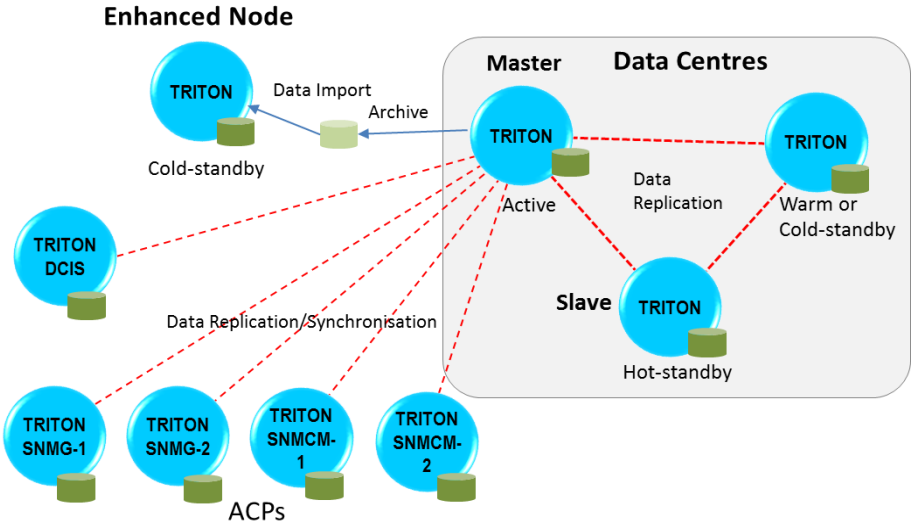
Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R669] *TRITON shall allow the authorised user to control (including force logout) the session of a selected Client.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.7.2.7. Multi-Site Operation Management

TRITON will be deployed on a number of static and afloat sites. It will be possible to operate all instances of TRITON in harmony without causing any interference and preserve its data integrity. In a failure condition, the clustering mechanism immediately activate the services on the standby system without requiring administrative intervention. Each instance of TRITON can be configured for high availability under a general Multi-site Operation Concept. The concept with a sample clustered configuration is illustrated below:



Redundancy, data replication and synchronisation will be managed as described in the following paragraphs.

4.2.7.2.7.1. Redundancy Management

Other than the redundancy provided by the server equipment (e.g. hardware backup on virtual environment), TRITON will implement Redundancy Management using active-standby methods and master-slave mechanisms over geographically dispersed instances. Only one instance having the overall control of the entire Maritime Functional Services will be favoured over concurrent instances. Other instances will align themselves according to the master. In case the master instance fails, one of the candidates (hot standby) will take over. Following definitions for TRITON instances on static sites are applicable for Redundancy Management:

Active:

Only one instance of TRITON, as the master, is active at a Data Centre as a static site. The data is mirrored to the other instances by the Data Centre infrastructure in real time. Data from the active instance can be backed up or archived on a secondary storage.

Hot-Standby:

One instance of TRITON runs as a secondary (slave) system on a Data Centre. The software components on the secondary instance are up and running, but will not process data or requests. The data is mirrored to provide identical information to the slave. In case the master fails, the slave waiting in hot standby takes over in a few seconds.

Warm-Standby:

One instance of TRITON is installed on a Data Centre. The application is available on allocated virtual environment but not running. Data is replicated by the Data Centre Infrastructure. When necessary, the application is initiated manually, configured, and start using the most recent replicated data. This generally provides a recovery time of a few minutes.

Cold-Standby:

One instance of TRITON acts as backup of the other nodes on an Enhanced Node. The hardware or virtual environment is available, the software is installed, but not configured and not running. Data is not replicated. In case of a severe failure in the other nodes, this node is powered on and the data is restored from a selected off-line archive and the operational data is accumulated over time. This generally provides a recovery time of a few hours.

Configuration:

TRITON instances can be configured during their installation. The authorised user can configure the available instances according to the dynamic situation of available nodes or Data Centres. When the new instance becomes operational (i.e. ready to process data and user commands), world-wide C2 of a Maritime Operations will be possible. When the Standard Operating Procedures (SOP) are defined and applied, overall redundancy will be achieved through Redundancy Management.

[T1-R670] *TRITON shall implement a Redundancy Management using master-slave mechanism and redundancy methods as defined in the Description. COTS solutions may be used upon Purchaser approval.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Demonstration
- Comment : The mechanism will be proposed by the Bidders and finalised during System Design. Tests will be performed during Multi-Site Operation Test.

[T1-R671] *TRITON shall allow the authorised user to configure instances of TRITON for Redundancy Management.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

[T1-R672] *TRITON shall allow the authorised user to control and monitor the Redundancy Management.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

[T1-R673] *In case the Active TRITON Instance fails, the Hot Standby Instance shall automatically take over and become operational within sixty (60) seconds.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

[T1-R674] *In case the Active TRITON Instance fails and the Hot Standby Instance is not available, the Warm Standby Instance shall become operational within fifteen (15) minutes after the manual initiation by the authorised user.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3

Qualific. Method : Test

[T1-R675] *In case the Active, Hot Standby and Warm Standby TRITON Instances fail, the Cold Standby Instance shall become operational within two (2) hours after the manual initiation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

4.2.7.2.7.2. Data Replication

The basic function of the Data Replication is to make the same operational data available on both the source and destination databases on different servers separated by WAN. Replication also supports redundancy and resilience. TRITON will use the Data Centre Infrastructure to replicate its operational data over its instances at static sites. Deployable Kits will also have a Data Replication Process controlled by the user and limited to the Area of Interest.

Data Replication Process must be performed seamlessly, even under low bandwidth conditions for ACPs, so that the users are not affected. Since bandwidth allocation is an important performance factor for ACPs, TRITON Deployable Kits will have smart Data Replication capability. The authorised user will be able to configure the Data Replication capability such as setting up data exchange rules for just a given Area of Interest.

Data Replication Process:

The Data Replication Process will be identified for each type of instance to include automatic replication of all or selected portions of TRITON internal databases. Off-line databases and interfaces will be replicated manually. Following data types will be included in replication:

- All internal databases
- Interface configurations
- System Parameters.

Latency:

Data can be synhronised with indicated servers at certain time intervals. Depending on the selected methods and available bandwidth, the latency of synchronisation between a set of selected data must be completed within a certain time period. This period can be low for static sites and higher for static and afloat site. A maximum set of data will be comprised of those Maritime Operational Objects that can be displayed on a GeoView for static instances and the objects in an Area of Interest for an afloat site. A data set marked as "Critical" must be handled with higher priority.

[T1-R676] *TRITON shall support Data Replication to ensure complete, accurate, timely, confidential and consistent data coherence between instances. Data Centre Infrastructure shall be utilised to achieve resilience.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R677] *TRITON shall allow the authorised user to configure Data Replication rules over selected data (e.g. critical, non-critical).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R678] *The maximum allowed latency for a set of selected synchronised data shall not exceed one (1) minute for static instances and three (3) minutes for afloat instances.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R679] *TRITON shall be able to replicate new data entry on the Active Instance database on the other Instances' databases based on the rules set by the authorised user.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R680] *TRITON shall be able to replicate new data instances that are marked as "Critical" no later than ten (10) second plus the average network latency of the infrastructure.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R681] *TRITON "will" be able to use Universally Unique Identifier (UUID) [ISO/IEC 9834] for Database Replication.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R682] *TRITON shall allow the authorised user to manage (configure, monitor, control) Data Replication Process for all TRITON instances.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R683] *TRITON Deployable Kits shall be able to replicate their databases on a selected TRITON Server if the full connectivity exists.*

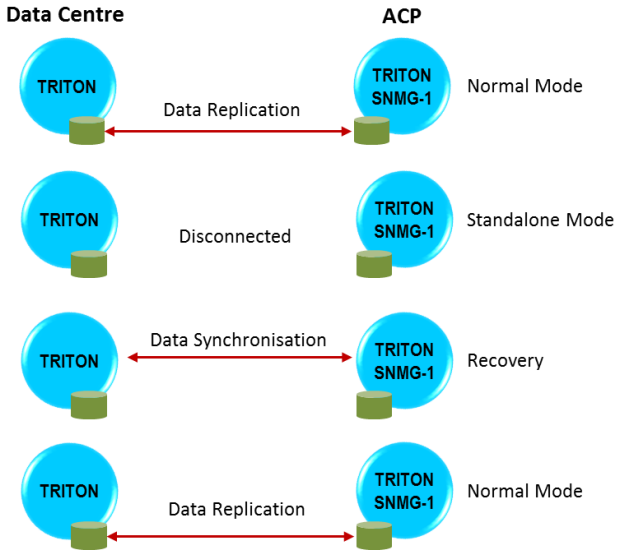
Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration
Comment : Rules for synchronisation will be determined during Software Requirements Analysis.

4.2.7.2.7.3. Data Synchronisation

TRITON will support Data Synchronisation capability which provides integrity of data among all operational instances even after a failure recovery. While Data Replication provides redundancy at database level, Data Synchronisation provides more controlled data management based on operational settings in case connectivity is temporarily lost. Data Synchronisation process must be performed seamlessly after recovery, even under low bandwidth conditions, so that the users are not

affected. Since bandwidth allocation is an important performance factor for ACPs, TRITON Deployable Kits must have smart Data Synchronisation capabilities. The authorised users will be able to configure the capability such as the data exchange rules limited for just a given Area of Interest.

An example of the use of this process is given below:



Data Synchronisation Process:

During Data Synchronisation after re-connection, the functionality over operational data must be preserved. For example, when synchronising the Track Database, track numbering, correlation relationship and operational settings need to be taken into consideration. The Data Synchronisation Process will include automatic and manual synchronisation of at least the following data:

- Maritime Operation Database
- Track, Vessel and Reference Objects that are created, modified or deleted after disconnection
- History of vessels
- User Workspace
- Any changes to user privileges

[T1-R684] *TRITON shall support Data Synchronisation Process defined in the Description to synchronise its internal databases with the selected TRITON Server. The functionality over the data shall be preserved.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R685] *TRITON shall allow the authorised user manage (configure, monitor, control) the Data Synchronisation Process.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R686] *TRITON shall notify the authorised user when any inconsistency is detected during synchronisation process.*

Requirement Property :
Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

[T1-R687] *TRITON "will" be able to use Universally Unique Identifier (UUID) [ISO/IEC 9834] for Database Synchronisation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R688] *TRITON Deployable Kit shall be able to synchronise itself with the selected TRITON Server based on the Area of Interest set by the authorised user and the available bandwidth.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration
Comment : Rules for synchronisation will be determined during Software Requirements Analysis.

4.2.7.3. Data Management

TRITON will utilise internal databases for storing Maritime Information Entities such as Track Database, Vessel Database, and Message Storage. These storages will be managed by authorised users. The database design will favour performance and data integrity.

4.2.7.3.1. Data Import and Export

TRITON functions will be able to import data from files or export own data into files in Recognised Export/Import File Formats.

[T1-R689] *TRITON shall be able to import data from a user-selected file in one of the Recognised Import File Formats according to the settings of a function.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R690] *TRITON shall be able to export data to a user-specified file in one of the Recognised Export File Formats according to the settings of a function.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R691] *TRITON shall be able to use the operating system file management to indicate the path or location of the file to be imported or exported.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.7.3.2. Databases

TRITON will maintain internal data storage as databases. It will allow the authorised user to manage (modify, delete, export, backup, archive) all data in the storage.

4.2.7.3.2.1. Database Management

TRITON databases will be managed by a Database Management System (DBMS). Each TRITON deployment will have its own DBMS, and keep track of all database activities including change history (Audit Trail) to record user activities.

NATO Infrastructure (DBMS Support):

The selected DBMS will be operating in the NATO Infrastructure, which can already support MS-SQL, PostgreSQL or Oracle, using Java, .NET or HTML/Java Script. Wherever possible, TRITON will make use of the existing NATO Infrastructure and Services, and will not use any proprietary SQL features so that it can run on any of the supported DBMS. The selected DBMS will also be able to support complex queries (a complex query is a parameter query that searches using more than one parameter value, i.e. on two or more criteria).

[T1-R692] *TRITON shall utilise a Database Management System (DBMS) to manage all internal data storage.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R693] *Each TRITON instance shall have its own DBMS, compatible with the NATO Infrastructure as explained in the Desription.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R694] *TRITON shall use only one database schema in a multiple user context (e.g. Live, Exercise, Training) during the execution and display which database is in use.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R695] *TRITON shall provide the authorised user with database management, administration, monitoring capability allowing access to all historical data.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R696] *TRITON shall provide auditing, audit trail with change recording, and activity logging mechanism with timestamps for all database activities.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1

Qualific. Method : Demonstration

[T1-R697] *TRITON databases shall be able to support complex queries as explained in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R698] *TRITON shall have "full-text search" capability of database in order to speed up free-text search in the database.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R699] *TRITON shall allow the authorised user to perform database backup and archiving manually. The backup and archive shall be full, incremental backups and archives of data to a selected static network location and onto user-indicated transportable media.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R700] *TRITON database shall support recovery facilities from backup and archive data (see Archiving).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

4.2.7.3.2.2. Database Import and Export

TRITON will be able to use the data previously stored by the legacy systems, MCCIS and/or MSA/BRITE, without any loss. During mapping from legacy systems, default values will be provided where actual values do not exist.

TRITON will also be able to export all or a portion of its databases.

[T1-R701] *TRITON shall be able to import data from legacy system (MCCIS and/or MSA/BRITE) databases without loss. On-line or off-line data migration tools shall be used to convert the existing data into the format recognised by TRITON databases.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration
Comment : The type and amount of data will initially be determined at SRR and finalised during the System Transition period.

[T1-R702] *TRITON shall perform mapping while importing data from legacy system databases.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3

Qualific. Method : Demonstration

[T1-R703] *TRITON shall be able to import data from previously exported own database.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R704] *TRITON shall assign default values during mapping of data from legacy systems to current system, if the values do not exist.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R705] *TRITON shall notify the authorised user when imported data requires overrides.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R706] *TRITON shall be able to export all or a portion of its databases together with their metadata.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R707] *TRITON shall allow the authorised user to select the set of entities to be exported based on at least Complete Database, Subset, Selected Entity Types and Specified Date.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R708] *TRITON shall protect its database integrity during exporting.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

4.2.7.3.2.3. Archiving

Data Archiving is used to move the data that is not actively used anymore in TRITON databases to off-line storage media for long-term preservation. Archived data can be imported back into their respective databases if necessary. The authorised user can archive all or part of the TRITON database with predefined rules. Short, medium and long-term implications of managing such information as well as relevant preservation requirements will be developed and maintained.

Each Maritime Operation can be fully or selectively archived independently. An archived Maritime Operation can be fully or selectively imported into the same Maritime Operation or into a new one.

Archiving will be performed according to [AC/324-D(2014)0008].

Operational Record:

Operational Record consists of information created, received and processed in the course of a NATO operation and maintained as evidence and reference information by NATO in pursuance of legal obligations, and the conduct of military or civil emergency operations. TRITON will keep Operational Records through archiving functionality together with their metadata. The TRITON Logbook will also be maintained as an Operational Record and archived. All Operational Records will be protected against unauthorised access and alteration after any encryption and password protection is removed.

[T1-R709] *TRITON shall provide complete archiving capability according to [AC/324-D(2014)0008].*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

[T1-R710] *TRITON shall provide a selective archiving capability for selected databases for a selected time period in a Maritime Operation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

[T1-R711] *TRITON shall protect Operational Records defined in the Description against unauthorised access and alteration.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R712] *TRITON shall uniquely identify archives for long term preservation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R713] *TRITON shall allow the authorised user to initiate archiving into selected storage media.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

[T1-R714] *TRITON shall allow the authorised user to import the entire or selected parts of archived data into a selected Maritime Operation or into a new Maritime Operation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

[T1-R715] *TRITON shall perform archiving after removing any encryption or password protection.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

4.2.7.3.2.4. Backup

TRITON will provide data survivability by using backups and images.

[T1-R716] *TRITON shall permit full, partial and incremental backup of both the TRITON Databases. TRITON shall be able restore the system to its exact state at the point of any full/partial backup.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R717] *TRITON shall be able to make a full backup of all or selected data automatically at a configurable frequency (e.g. every 24 hours).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R718] *TRITON shall allow the authorised user to perform full and incremental backups of all databases and software itself without impacting the system availability.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R719] *TRITON shall allow the authorised user to take the image of the system and restore a system from an existing image.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

4.2.7.3.3. Off-line Reference Data Management

TRITON will check for new external data using recognised sites or off-line data sources (e.g. IHS, Lloyds). If new data is available, it will update the Reference Data Sources which can then be imported into other TRITON installations.

Reference Data Sources can be stored on the TRITON Server as off-line data stores. Off-line Reference Data Sources can also be accessed using the interfaces provided by the vendors of commercial databases. However, TRITON will have a "Vessel Data Import Capability" to import data from Maritime Datasets into Recognised Import File Format. This file will then be used by the Vessel Database Management to update the Vessel Database.

[T1-R720] *TRITON shall allow the authorised user to check external on-line Reference Data Sources from recognised Web sites or off-line Reference Data Sources at indicated Network Locations and import data into local Reference Data Sources.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R721] *TRITON shall have a Vessel Data Import Capability to be used for importing data from Maritime Datasets into Recognised Import File Format.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R722] *TRITON shall allow the user to access the off-line Reference Databases with search and list capability.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

4.2.7.3.4. Own Ship Data Management

When TRITON is used on board a ship assigned as an ACP as a Deployable Kit, Own Ship Data will be managed automatically if an external data is provided. The data can be received through the ACP Interface according to "TRITON Own Ship Data Specification". The specification will include the following information:

- Task Unit information as used in Maritime Task Organization
- Ship position
- Course and speed
- Date and Time of update

Own Ship Data will be stored internally and made available to internal applications and services requiring information related to own ship.

[T1-R723] *TRITON shall maintain Own Ship Data.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration

[T1-R724] *TRITON shall allow the authorised user to modify Own Ship Data manually.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Test

[T1-R725] *TRITON shall be able to receive Own Ship Data from external sources automatically according to TRITON Own Ship Data Specification.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration

[T1-R726] *TRITON shall make Own Ship Data available for internal processing.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration

4.2.8. Maritime Training and Exercise

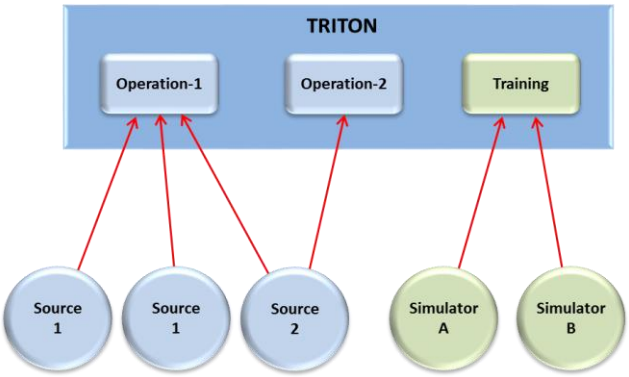
TRITON will provide the capability for training and participating in exercise while conducting live operation. It will be possible to use the Maritime Operation Management for training and exercise purposes. In addition, there will be separate Training Systems to provide individual or collective training to the operational users.

4.2.8.1. Training

TRITON Functional Services can be used for operator training during either real life operation by means of a separately-controlled Maritime Operation or in a separate Training Environment.

Training in Real System:

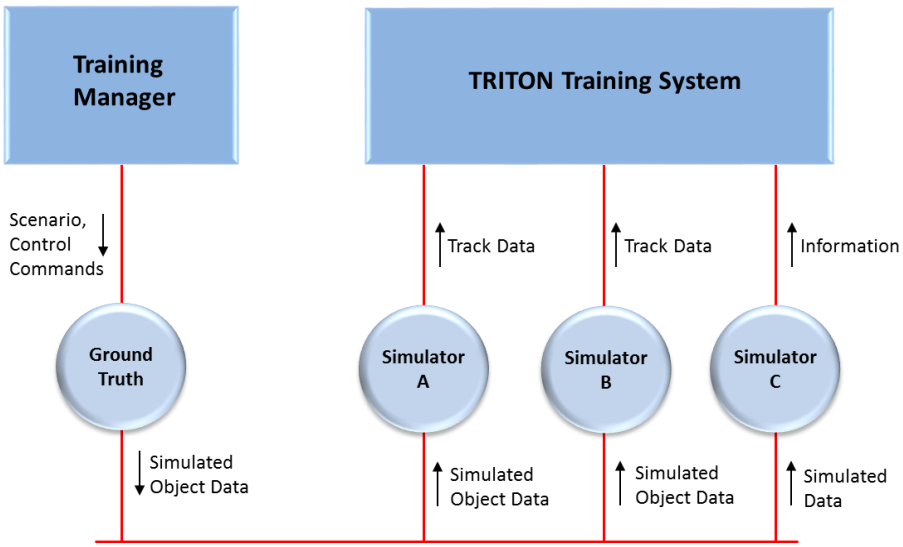
While TRITON is being used in real life, in an operational environment, a separate Maritime Operation can be created for training purposes. This could be either on static or afloat site. Simulators send their "Simulated" data to TRITON and then all TRITON functions can be used within that Maritime Operation created for training. The conceptual training capability is depicted below:



Training Using the Training System:

More independent training can be provided with TRITON Training Systems having TRITON-NS and TRITON-NU Operational Software. The TRITON Training System installed on a separate environment as a Support System is used for Individual or Collective Training purposes. Its Operational Mode set to "Training" to make it pretend as if it is in real world with real inputs.

The TRITON Training Systems will use Training Environment to simulate external data sources according to a common reference, "Ground Truth". All external simulators will then send their data as "Live" instead of "Simulated". The Training Environment will be configurable to use the available data simulators and to provide coordinated data inputs to the simulators (i.e. Object Data). A conceptual Training Environment is depicted below:



The Training Manager allows the user to define scenarios based on Simulated Objects. It will issue control commands to the Ground Truth according to the user-defined scenario to generate Simulated Object Data. These objects can then be read by the individual Simulators and corresponding track or information is generated. TRITON will then act as if it is receiving external data from a system or service.

The Training Environment should be flexible to accommodate future training needs.

Training Data:

TRITON Training Data will be stored in a Training Database associated with the Training Manager and Ground Truth. The Training Data will consist of the following:

- A database representation of an operational environment in size and coverage (i.e. all Maritime Information Entities and their relationships).
- Scenarios
- Simulated Object Data
- A dataset with evolutionary data over a period of time for training and representative evolutions for each type of Information Object/Product.

[T1-R727] *TRITON shall provide training capability using Simulated Tracks while operating in Normal or Standalone Mode.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R728] *TRITON shall provide training capability to trainees with available external system simulators while operating in Training Mode (only for the Training System in the Training Environment).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R729] *TRITON Training Environment shall have a Training Manager with scenario development and generation capability. This capability shall be able to run user-defined scenarios using user-defined dates and time, and save the scenarios for reviewing purposes.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R730] *TRITON Training Environment shall maintain a Training Database with the Training Data as defined in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R731] *TRITON Training Environment shall have a Ground Truth as a simulation engine to generate Simulated Object Data according to the scenario and user commands. The Simulated Object Data shall be made available to Simulators to generate actual information, coordinated in the same time and space domain.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R732] *TRITON shall allow the authorised user to manage (define, configure, start, stop) the Training Environment.*

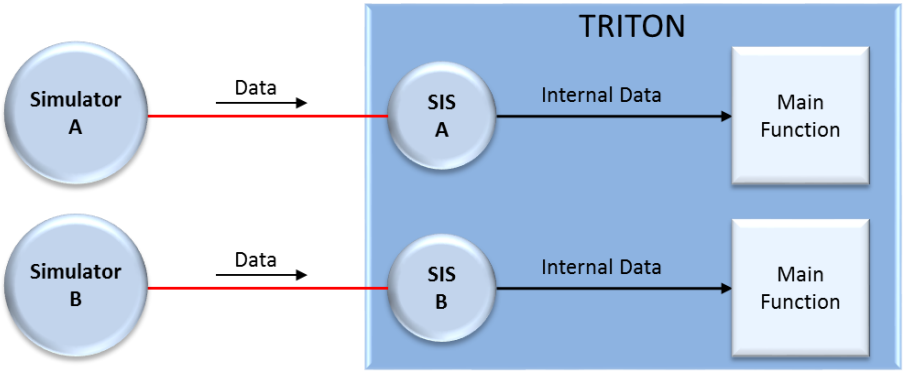
Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

4.2.8.2. Data Source Simulation

TRITON will be able to simulate external data sources for training or exercise purposes.

4.2.8.2.1. Track Simulation

TRITON will use a generic Track Simulator which can simulate certain types of external track data sources. More than one instance of the Track Simulator can be used to simulate external data sources. The concept of using Track Simulators is depicted below.



The Track Simulator will be able to simulate at least the following data sources:

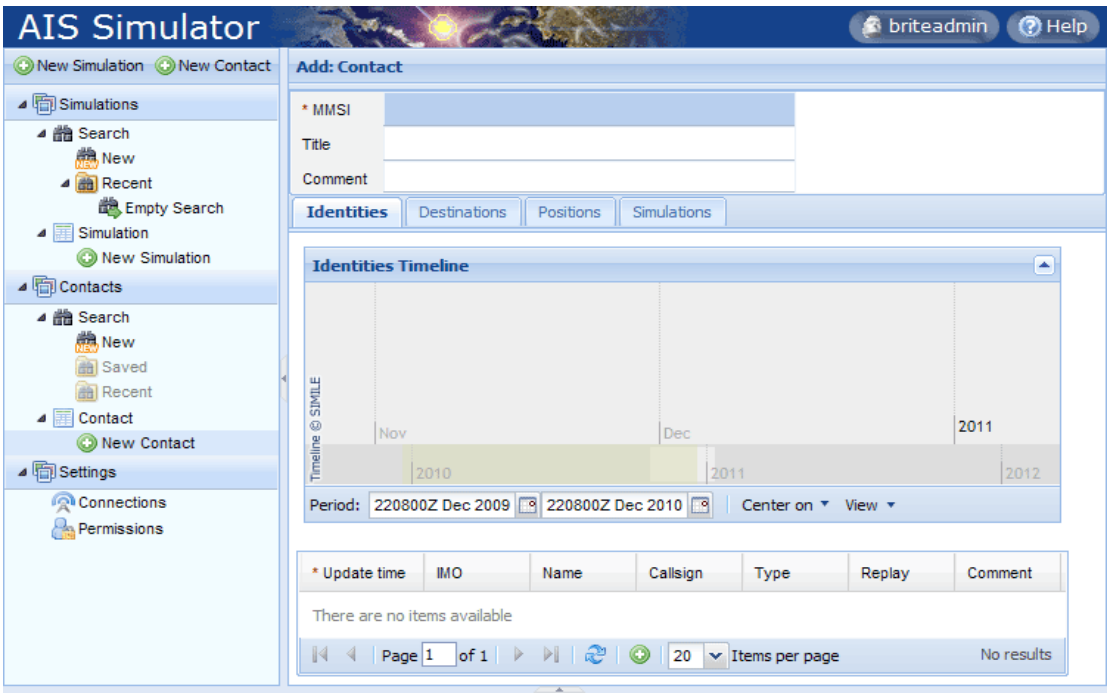
- Nation RMP Stream Simulation (NS Domain)
- Nation RMP Report Simulation (NS Domain)
- Nation WP Stream Simulation (NU Domain)

- AIS Track Stream Simulation (NS and NU Domains)

The Track Simulator will generate "Simulated" track data when TRITON operates in Normal Mode and "Live" data if it is running in Training Mode.

The user will be able to indicate an area to create the tracks either at default or random positions. The default positions of tracks have the same distances between each other until the given number of tracks fill in the area. Random positions are created by means of a random position generation within the given area. Similarly, course and speed values can be set as a standard value or randomly. The simulator can then move the tracks with these coure and speed values.

As an example, a view of the AIS Simulator used in MSA/BRITE is given below:



Track Simulator will be able to receive Simulated Object Data from the Ground Truth when it is configured to run in Training Environment.

[T1-R733] *TRITON shall be able to use Track Simulators running either with standalone control or integrated with the Training Environment.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R734] *TRITON shall be able to run multiple instances of Track Simulator provided that each instance has a separate source identification.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R735] *TRITON shall allow the authorised user to configure the Track Simulators as the replacement of actual sources and control their status.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 3
Qualific. Method : Test

[T1-R736] *TRITON Track Simulator shall detect the operational mode of the TRITON Server and generate Live Tracks if the mode is Training and generate Simulated Tracks for other modes.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R737] *TRITON Track Simulator shall allow the user to assign values to track attributes (identity, classification, initial position, course, speed, etc.) in a configurable table.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R738] *TRITON Track Simulator shall allow the user to set the update rate and edit the track attribute values while the simulator is running.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R739] *TRITON Track Simulator shall allow the user to set an area that the tracks will be created either at default or random positions with the same or random course and speed.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R740] *TRITON Track Simulator shall allow the authorised user to select a source and then manually initiate a Simulated Track at an indicated position on the GeoView when TRITON is in Normal Mode.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R741] *TRITON Track Simulator shall be able to receive Simulated Object Data from the Ground Truth and generate the Track Data when it is used in Training Environment.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

4.2.8.2.2. Nation RMP Stream Simulation

TRITON Track Simulator will be able to generate a simulated RMP for a Nation as a stream of tracks having attribute values set by the user. The source of the tracks will be set as the indication of the simulated Nation. The stream of data will be sent over TCP/UDP/IP.

[T1-R742] *TRITON Track Simulator shall have a Nation RMP Stream Simulation capability which provides tracks as a stream on TCP/UDP/IP.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R743] *TRITON Track Simulator shall be able to manage (initiate, update, drop) Nation RMP tracks with the source of the stream set as a Nation.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Test

[T1-R744] *TRITON Track Simulator shall be able to generate and update at least five-thousand (5000) tracks if it is simulating the Nation RMP as a track stream.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Test

4.2.8.2.3. Nation RMP Report Simulation

TRITON Track Simulator will be able to generate a simulated RMP for a Nation as OTH-T GOLD Formatted Messages with tracks of given attribute values. The source of the tracks will be set as the indication of simulated Nation.

[T1-R745] *TRITON Track Simulator shall have a Nation RMP Report Simulation capability which provides tracks in OTH-T GOLD Formatted Messages.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R746] *TRITON Track Simulator shall be able to manage (initiate, update, drop) Nation RMP tracks with the source of the report set as a Nation.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Test

[T1-R747] *TRITON Track Simulator shall be able to generate at least one-hundred (100) tracks into OTH-T GOLD messages and send them to the relevant Nation Interface of TRITON if it is simulating the Nation RMP as track reports.*

Requirement Property :
- Domain for Static : NS

Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

4.2.8.2.4. Nation WP Stream Simulation

TRITON Track Simulator will be able to generate a simulated WP for a Nation as a stream of tracks having attribute values set by the user. The source of the tracks will be set as the indication of the simulated Nation. The IMO and MMSI numbers will be set either in an order or randomly within a given number interval. The stream will be sent over TCP/UDP/IP.

[T1-R748] *TRITON Track Simulator shall have a Nation WP Stream Simulation capability which provides tracks as a stream on TCP/UDP/IP.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R749] *TRITON Track Simulator shall be able to manage (initiate, update) Nation WP tracks with the source of the stream set as a Nation.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Test

[T1-R750] *TRITON Track Simulator shall be able to generate and update at least five-thousand (5000) tracks if it is simulating the Nation WP as a track stream.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Test

4.2.8.2.5. AIS Data Source Simulation

TRITON Track Simulator will be able to generate AIS tracks having attribute values set by the user. The source of the tracks will be set by the user, the IMO and MMSI numbers will be set either in an order or randomly within a given number interval. The simulator will update the track positions in timely manner according to the AIS Specification.

[T1-R751] *TRITON Track Simulator shall have a AIS Data Source Simulation capability which provides AIS tracks as a stream compliant to the AIS Specification.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R752] *TRITON Track Simulator shall be able to manage (initiate, update) AIS tracks with the source of the stream set as an AIS data source name.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R753] *TRITON Track Simulator shall be able to generate and update at least five-thousand (5000) AIS tracks if it is simulating an AIS data source.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

4.2.8.2.6. ACP Stream Simulation

TRITON Track Simulator included in the TRITON Deployable Kits will be able to generate tracks coming from a ship system as a stream with attributes set by the user. The source of the tracks will be set as the indication of the simulated ACP. The stream will be sent over TCP/UDP/IP.

[T1-R754] *TRITON Track Simulator shall have an ACP Stream Simulation capability which provides tracks as a stream on TCP/UDP/IP.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration

[T1-R755] *TRITON Track Simulator shall be able to manage (initiate, update, drop) ACP tracks with the source of the stream set as the Unit Name of the ACP.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Test

[T1-R756] *TRITON Track Simulator shall be able to generate and update at least one-thousand (1000) tracks if it is simulating the ACP as a track stream.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Test

4.2.8.3. Interface Simulation

During development of TRITON, some external systems and services need to be simulated with limited behaviour. In order to be able to test the interfaces, simple Interface Simulators should be developed for test purposes. These simulators should emulate an external system/service and feed artificial data to TRITON. Their internal state does not have to accurately reflect the internal state of the external system, but provide realistic data for test purposes.

4.2.8.3.1. System Interface Simulator

During development of TRITON, some external systems and services need to be simulated with limited behaviour. In order to be able to test the interfaces, simple Interface Simulators should be developed for test purposes. These simulators should emulate an external system/service and feed artificial data to TRITON.

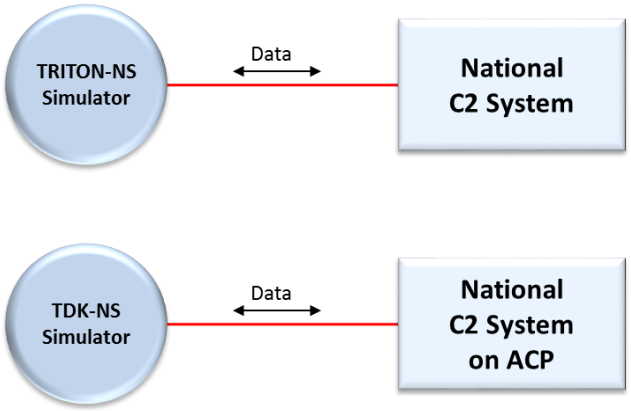
[T1-R757] *In case external systems or services are not available, System Interface Simulators "will" be developed and used for testing TRITON interfaces in the Test Environment. For example,*

if ENV-FS is not available at the time of testing, a simple interface simulator for ENV-FS will be used.

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration
Comment : Interface Simulators will be developed according to the BL needs.

4.2.8.3.2. TRITON Simulator

TRITON will have on-line interfaces with Nations through Services. In order to provide Nations to develop their own software and test it prior to integrating with TRITON, a "TRITON Interface Simulator" will be developed and provided to Nations. This simulator will emulate the TRITON External Services for Nations and ACPs on both NS and NU Domains for test purposes. The conceptual illustration is given below:



[T1-R758] *TRITON-NS Simulator shall emulate TRITON-NS External Interfaces (e.g. RMP Service, ICI Service).*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R759] *TRITON-NU Simulator shall emulate TRITON-NU External Interfaces (e.g. WP Service, ICI Service).*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R760] *TDK-NS Simulator shall emulate TDK-NS (e.g. ACP Interface - NS).*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 4
Qualific. Method : Demonstration

[T1-R761] *TDK-NU Simulator shall emulate TDK-NU (e.g. ACP Interface - NU).*

Requirement Property :
Domain for Static : NU

Domain for Afloat: N/A
Baseline : BL 4
Qualific. Method : Demonstration

4.2.8.4. Exercise

TRITON will provide the same services for both live operations and exercises. In other words, TRITON will be agnostic to an exercise or to a live operation regarding provision of services. Users can access to a Maritime Operation defined as an Exercise and perform any function within that Environment. One TRITON Instance will be able to host multiple live and synthetic (Exercise) Environments simultaneously.

The Exercise Environment will be the same as the Live Environment from the functionality and settings point of view. There may be exercises with only simulated data (synthetic) as well as live data. Exercises with synthetic data can be conducted using entirely unreal units and unreal data from simulated sources. Exercises with real units and live data can also be conducted by impersonating live sources in Exercise Environment. For example, some ships in an exercise area can act as blue forces while some ships play the roles of red forces; they can both provide live track information.

RMP for an Exercise Environment can be built independently from other Maritime Operations and disseminated with appropriate classification level. Formatted Messages are labelled accordingly as well.

TRITON can process the Standard Identities of live track reports in any Maritime Operation if their Exercise Indicator is set.

ACPs can use the same Maritime Operation for an exercise as the conducting Headquarters.

[T1-R762] *TRITON shall provide exercise management capability via Maritime Operations while operating in Normal or Standalone Mode.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R763] *TRITON shall utilise a Maritime Operation of type Exercise to conduct an exercise in fully synthetic, fully live or combined environment.*

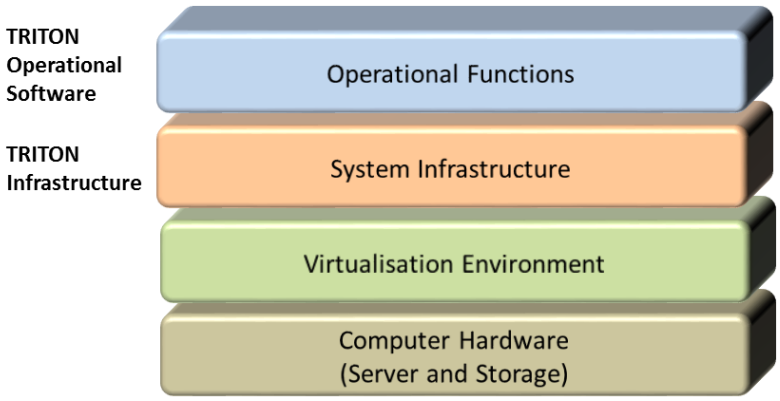
Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R764] *TRITON shall allow the authorised user to build a separate Vessel Database in a Maritime Operation for exercise purposes by importing selected Vessels from a selected Maritime Operation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

4.2.9. System Infrastructure

TRITON System Infrastructure provides a coherent foundation that supports all operational functions within the capability. The high-level, layered system architecture is illustrated below:



TRITON System Infrastructure also includes all support functions for users including user interaction, on-line help, notification, display capability and interfaces with Core Enterprise Services in a Service Oriented Architecture.

4.2.9.1. Service Oriented Architecture Platform

Service Oriented Architecture (SOA) is a software architecture within which functions are defined as independent services with well-defined interfaces which can be called separately or in defined sequences to form business processes. The interface is the focus and is defined in terms of the required parameters and the nature of the result when the service is invoked. A SOA enables services to be published, discovered and utilized [ADatP-34].

SOA provides a flexible, modular approach for implementing the functional requirements of systems, in the form of services, and a unified networking infrastructure ensures that those services can be accessed and used. A “Platform” provides a common framework, or a set of services, that are easily reused for fundamental activities. By leveraging a set of SOA Platform Services, the developers of new applications and services can avoid duplication of effort across a range of areas, leaving them to focus on adding value in the functionality of their particular area of expertise.

SOA Platform Services provide the foundation to implement Web-services in a loosely coupled environment, where flexible and agile service delivery is a requirement. They offer generic building blocks for SOA implementation (e.g. discovery, message busses, orchestration, information abstraction and access etc.) and can be used as a capability integration platform in a heterogeneous service-provisioning ecosystem. This includes the capabilities to:

- Deploy, run, manage and interconnect multiple heterogeneous services.
- Enable the creation of independent, loosely coupled service components to allow for seamless composition of these components and distribution of components across various logical and physical boundaries.
- Support SOA principles like simplified development of new service oriented applications, and reuse of existing ones, legacy applications migration capability towards SOA and service orientation.

TRITON should be able to provide services that will integrate with the existing NATO SOA architecture (Bound by NATO adopted standards – subset of standards used by main COTS). In addition, it must be able to consume the existing Bi-SC AIS services published or available.

Organization for the Advancement of Structured Information Standards (OASIS) is a global consortium that works on the development, convergence, and adoption of e-business and Web service standards. Reference Model for Service Oriented Architecture (SOA-RM) is a standard developed by OASIS.

TRITON SOA Platform will comply with SOA-RM standard. Whenever an existing standard is used other than the specified SOA standards for any reason, the rationale should be provided. Exceptional cases may apply due to legacy information exchange requirements.

NISP [ADatP-34] defines extended SOA Platform Services under the CES C3 Taxonomy for the Federated Mission Network (FMN). The FMN Profile described in [MCM-0106], addresses wide range of open standards defining SOA. TRITON should also comply with the NISP while implementing the SOA Platform. TRITON will be based on or be able to use standards that are supported by the major SOA products on the market today, like BPEL [OASIS WS-BPEL], WSDL and XML.

The Purchaser's guidance documents and Service Interface Profiles given in [NCIA-06.02.01 to 10] will be used during the detailed design of TRITON SOA Platform.

TRITON SOA Platform design will include a Service Layer in compliance with SOA and Open Standards. Following standards will be applicable:

Web Platform Services:

- IETF RFC 2616:1999, Hypertext Transfer Protocol HTTP/1.1
- IETF RFC 2817:2000, Upgrading to TLS Within HTTP/1.1
- IETF RFC 3986:2005, Uniform Resource Identifier (URI), Generic Syntax

Information Publishing:

Publishing information including text, multimedia, hyperlink features, scripting languages and style sheets on the network:

- Hypertext Mark-up Language (HTML) 4.01
- ISO/IEC 15445:2000, Information technology (Document description and processing languages -- Hypertext Mark-up Language (HTML)
- IETF RFC 2854:2000, The 'text/html' Media Type
- Hypertext Mark-up Language, Version 5 (HTML 5), W3C Candidate Recommendation, Aug 2013
- IETF: RFC 4329, 2006 (Java Script) Scripting Media Types
- OASIS Standard, Web Services for Remote Portlets Specification v2.0, 1 April 2008

Style Sheet:

Providing a common Style Sheet language for describing presentation semantics (that is, the look and formatting) of documents written in mark-up languages like HTML:

- Cascading Style Sheets (CSS) Level 2 Rev. 1 (CSS 2.1), W3C Recommendation, September 2009
- CSS Level 3, CSS Level 2 Rev. 1 (including errata) (CSS 2.1), W3C Recommendation, June 2011
- CSS Style Attributes, W3C Candidate Recommendation, 12 October 2010
- Media Queries, W3C Recommendation, 19 June 2012
- CSS Namespaces Module, W3C Recommendation, 29 September 2011
- Selectors Level 3, W3C Recommendation, 29 September 2011
- CSS Color Module Level 3, W3C Recommendation, 07 June 2011

Formatting:

General formatting of information for sharing or exchange:

- The Atom Syndication Format (Atom 1.0) [RFC 4287]
- The Atom Publishing Protocol [RFC 5023]
- Really Simple Syndication (RSS) 2.0 Specification Version 2.0.11, 30 March 2009

Geo-encoded Location:

Encoding of location as part of Web feeds:

- GeoRSS Geographically Encoded Objects for RSS feeds
- GeoRSS Simple encoding for <georss:point>, <georss:line>, <georss:polygon>, <georss:box>.
- GeoRSS GML Profile 1.0 a GML subset for <gml:Point>, <gml:LineString>, <gml:Polygon>, <gml:Envelope> of OGC 03-105r1: 2004-02-07, OpenGIS Geography Markup Language (GML) Implementation Specification version 3.1.1

Security:

Message Security for Web services (when processing classified data):

- WS-Security: SOA Platform Message Security 1.1
- XML Encryption Syntax and Processing, W3C Recommendation, 10 December 2002
- XML Signature Syntax and Processing (Second Edition), W3C Recommendation, 10 June 2008
- OASIS WS-I Basic Security Profile Version 1.1, 24 January 2010
- Web Services Security - SAML Token Profile 1.1, OASIS Standard
- Web Services Security - X.509 Certificate Token Profile 1.1, OASIS Standard

Security token issuing:

- OASIS Standard, WS-Trust 1.4
- Web Services Federation Language (WSFederation) Version 1.1, December 2006
- NPKI Certificate Policy(CertP), Rev2
- SAML Protocol (from OASIS Standard, Security Assertion Markup Language (SAML) 2.0), March 2005
- Web Services Policy 1.5 – Framework, W3C Recommendation, 04 September 2007
- WS-Security Policy 1.3, OASIS Standard

Transformation:

Transforming XML documents into other XML documents:

- XSL Transformations (XSLT) Version 2.0, W3C Recommendation 23 Jan 2007

Information Exchange:

Exchanging structured information in a decentralized, distributed environment via Web services:

- Simple Object Access Protocol (SOAP) 1.1, W3C Note, 8 May 2000 [OASIS SOAP]
- WSDL v1.1: Web Services Description Language (WSDL) 1.1, W3C Note, 15 March 2001
- Representational State Transfer (REST) in accordance with: University of California, Roy Thomas Fielding, Architectural Styles and the Design of Network-based Software Architectures: 2000, Irvine, CA
- SOAP Version 1.2 Part 1: Messaging Framework (Second Edition), W3C Recommendation, 27 April 2007
- SOAP Version 1.2 Part 2: Adjuncts (Second Edition), W3C Recommendation, 27 April 2007
- SOAP Version 1.2 Part 3: One-Way MEP, W3C Working Group Note, 2 July 2007

Publish/Subscribe:

Topic-based publish/subscribe Web services communication:

- OASIS, Web Services Base Notification 1.3 (WS-Base Notification), 1 October 2006
- OASIS, Web Services Brokered Notification 1.3 (WS-Brokered Notification), 1 October 2006
- OASIS, Web Services Topics 1.3 (WS-Topics), 1 October 2006

Addressing:

Providing transport-neutral mechanisms to address Web services:

- WS-Addressing 1.0 - Core, 9 May 2006 Web Services Addressing 1.0 – Core, W3C Recommendation, 9 May 2006

Messaging:

Reliable messaging for Web services:

- OASIS, Web Services Reliable Messaging (WS-Reliable Messaging) Version 1.2, February 2009

Query:

- SPARQL Protocol and RDF Query Language [SPARQL]

[T1-R765] *TRITON shall be able to use Web services compliant with WS-I Basic Profile Specifications using XML Schemas.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R766] *TRITON should be able to use SPARQL Protocol and RDF Query Language Web services and ontologies.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R767] *TRITON shall conform to the Reference Model for Service Oriented Architecture by OASIS (SOA-RM). As such, TRITON shall:*

- *Have entities that can be identified as services defined by the Reference Model.*
- *Show how visibility is established between service providers and consumers.*
- *Show how interaction is mediated.*
- *Show how the effect of using services is understood.*
- *Have descriptions associated with services.*
- *Show the execution context required to support interaction.*
- *Show how policies are handled and how contracts shall be able to be modelled and enforced.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R768] *TRITON SOA Platform shall isolate transformation, message routing and publish-subscribe, Business Process Execution Language (BPEL)-kind of SOA-related activities onto a Service Layer. The design shall allow future replacement of the Service Layer tasks with an external Message Oriented Middleware Services.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R769] *TRITON SOA Platform shall use HTTP as the transport protocol for information without "need-to-know" caveats between all service providers and consumers (unsecured HTTP traffic). HTTPS shall be used as the transport protocol between all service providers and consumers to ensure confidentiality requirements (secured HTTP traffic).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R770] *TRITON SOA Platform design shall comply with the standards given in the Descriptions. Any deviation of the proposed solution from the compliance of these standards shall be documented in detail with its justification.*

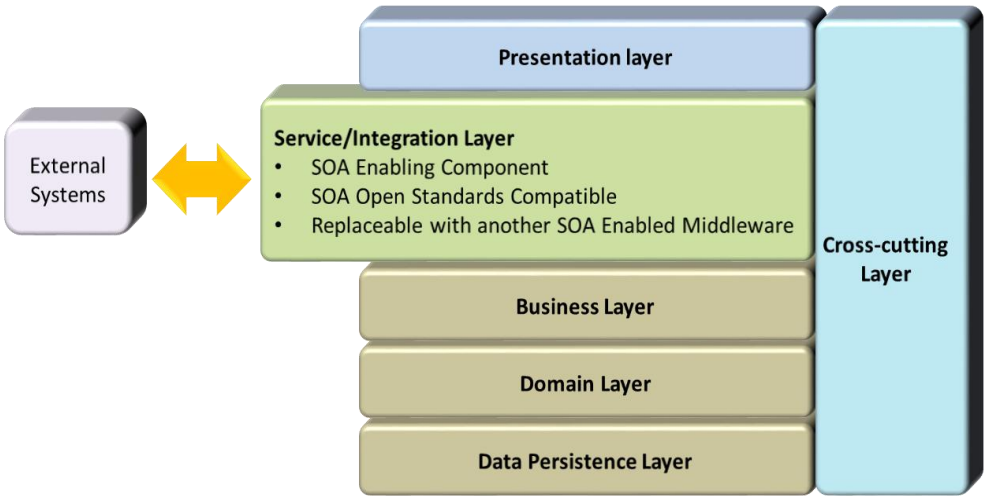
Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection
Comment : Any deviation will be subject to the approval of the Purchaser.

[T1-R771] *TRITON SOA Platform design shall comply with the Service Interface Profiles given in [NCIA-06.02.01 to 10].*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

4.2.9.2. Message Oriented Middleware

TRITON will utilise a Service/Integration Layer which can be replaced in future with Purchaser-provided Middleware Services. The concept is shown below:



TRITON should use loosely coupled modules. A topic-based, publish/subscribe mechanism can be used as defined in the Service Interface Profiles [NCIA-06.02.08], [NCIA-06.02.09], [NCIA-06.02.10].

[T1-R772] *TRITON Middleware shall be compatible with the Service Interface Profiles given in [NCIA-06.02.08], [NCIA-06.02.09], [NCIA-06.02.10].*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection
Comment : The proposed Middleware must be compatible with the given references allowing for future replacement.

[T1-R773] *TRITON Middleware should provide for any TRITON service to subscribe to hierarchical topics and receive publications over the Middleware.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 1
Qualific. Method : Inspection

[T1-R774] *TRITON Middleware should provide for consumer services to subscribe to Maritime Information Entities using the topic syntax.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R775] *TRITON Middleware should use event-driven mechanisms compliant with OASIS WS-Notifications protocols to consume event driven, time sensitive and critical Web Services of other systems.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R776] *TRITON Middleware should allow consumers to initiate and manage subscriptions.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R777] *TRITON Middleware should provide for a publication manager to manage all publications from its services.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R778] *TRITON Middleware should allow subscribers to manage their subscription.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R779] *TRITON Middleware should publish each element of the Maritime Information Entities by creating a hierarchical topics structure.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R780] *TRITON Middleware should publish each element of the Maritime Information Entities by initiating a message delivery corresponding to the topic.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R781] *TRITON Middleware should publish each element of the Maritime Information Entities with an appropriate filtering syntax to allow consumers to subscribe to a subset of those Entities.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R782] *TRITON Middleware should allow consumers to subscribe to Maritime Information Entities using the topic and filtering syntax.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R783] *TRITON Middleware should provide for subscriptions to be either infinite (i.e. a subscription remains in force until it is cancelled) or subscriptions with predefined termination time, which automatically expire (i.e. the consumer is only a subscriber for a certain amount of time).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R784] *TRITON Middleware should provide synchronisation capability to consumers with Core Data Store for a given time period using a synchronisation interface.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

4.2.9.3. Core Enterprise Services

In the frame of Core Enterprise Services (CES), the SOA platform relies on the Infrastructure Services and aids Enterprise Support Services in order to provide an integrated and coherent environment for user applications and Communities of Interest (COI). TRITON will therefore comply with CES definitions of Federated Mission Networking (FMN) Interoperability Standards Profile for Mission Execution Environment defined in NATO Interoperability Standards and Profiles, Version 8 (NISP V8).

Details of CES interfaces are given in Section 5, Interface Requirements.

4.2.9.4. TRITON Clients

"TRITON Clients" are User Applications that run in standard Web Browsers on Standard NATO Bi-SC AIS Workstations. TRITON User Applications provide the Graphical User Interface (GUI) for the users to interact with the system whereas the workstation provides the input/output devices. As a general term, a "Client" is a machine that runs a "TRITON Client".

4.2.9.4.1. Human-Machine Interface

TRITON Human-Machine Interface (HMI) consists of interface equipment and Graphical User Interfaces (GUI). The main user input devices are the standard keyboard and the available pointing device. Key

and pointing device button combinations can be used for shortcuts. The F-Keys of the keyboard can also be used to activate certain functions.

TRITON Clients will use office-type workstations compliant to NATO Bi-SC AIS Standard for user interaction. Deployable Kits will additionally have drawable keyboard-monitor module for local access. The main output device will be one or two high-resolution monitors, preferably two monitors. GUI provided by the User Applications accept user inputs from the keyboard and the pointing device, and present textual and graphical information.

[T1-R785] *TRITON Client shall provide the HMI as Web-based applications on a Standard NATO Bi-SC AIS Workstation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R786] *TRITON HMI shall handle user inputs from keyboard and the available pointing device and provide output to available displays (monitors).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.9.4.2. Web Browser Standards

TRITON will comply with the following standards for implementing the Web applications:

- HTTP [HTTP]
- URL [RFC 1738]
- URI [RFC 3986]
- OASIS Web Services for Remote Portlet Specification [OASIS-RPS]
- Common Gateway Interface (CGI) [RFC 3875]
- Asynchronous Javascript and XML (AJAX)
- HTML5 [HTML5]
- CSS [CSS]

[T1-R787] *TRITON Client shall support the standards given in the Description for implementing the Web-based applications.*

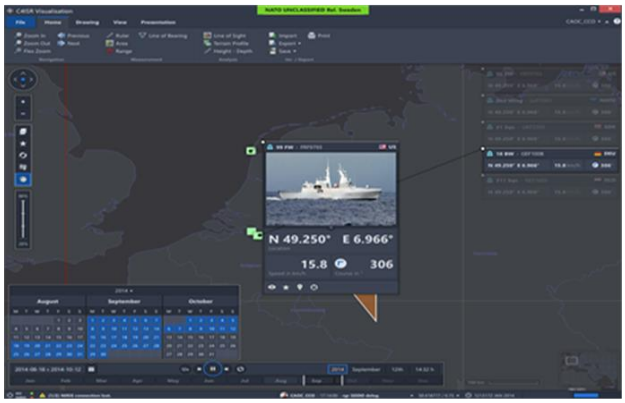
Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

4.2.9.4.3. Visualisation

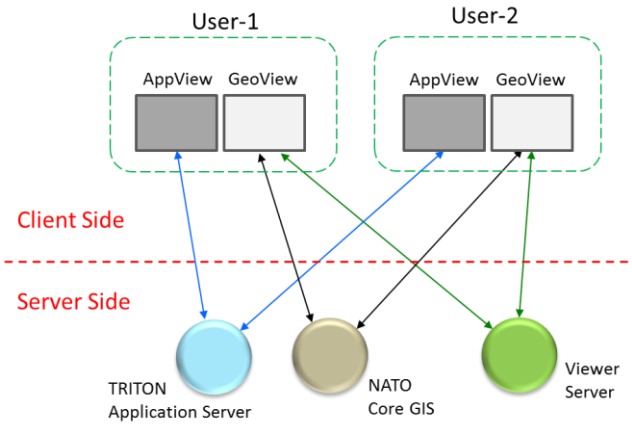
TRITON Visualisation Capability will be provided by TRITON Clients as applications running in Web browsers. There will be two Views: Application View and Geospatial View.

The Application View (AppView) will provide the HMI for TRITON Applications. The GeoView (GeoView), as part of the C4ISR Visualisation Component (VC) will provide the display of geospatial information on map. Both views will use the same look-and-feel. A sample representation of these Views (Dark Theme) is given below:



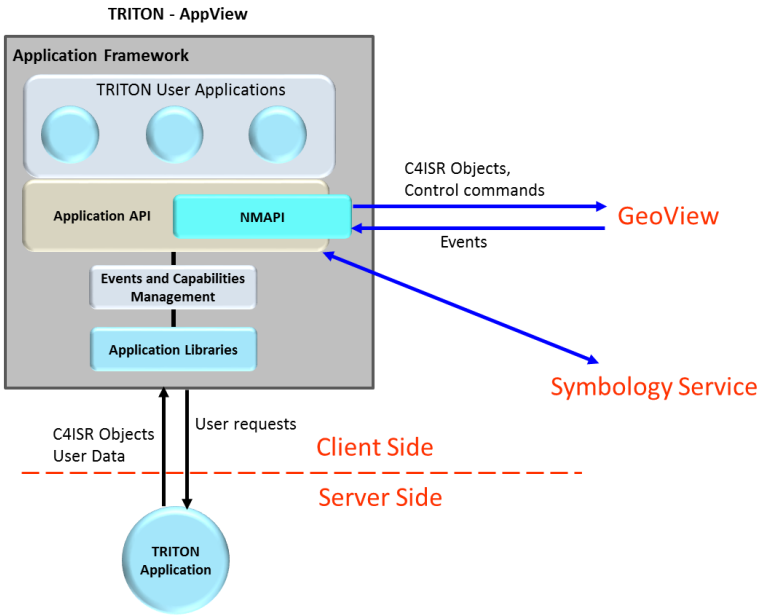


The figure below shows the general structure of the Functional Service Viewers, the interaction between the Clients and Servers. The details are given in Subsection 4.3.



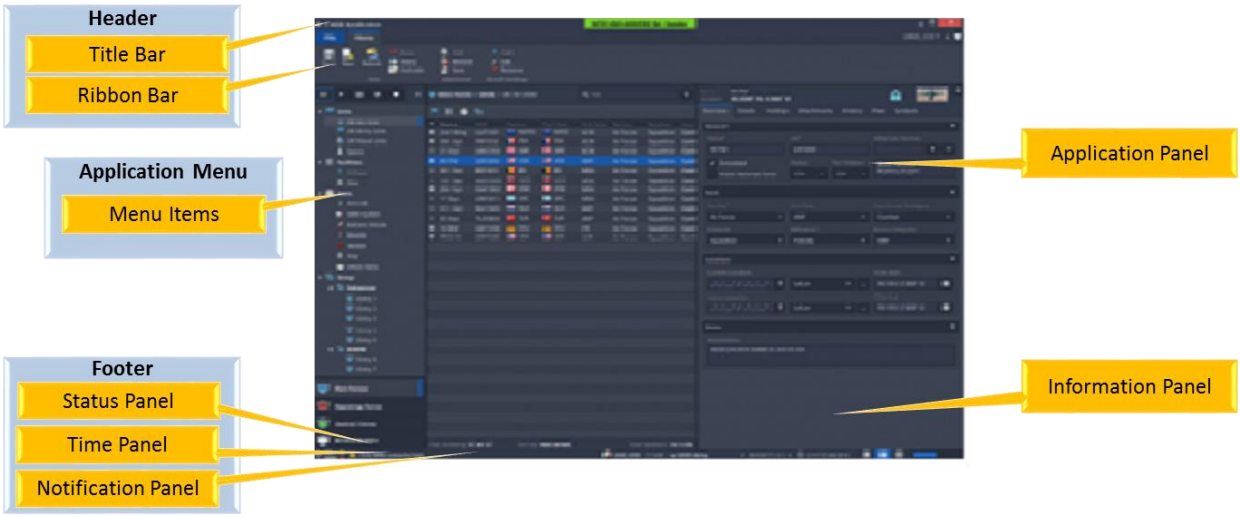
4.2.9.4.4. Application View

Application View (AppView) provides the main HMI as the User Applications for the TRITON Services. It provides the users to access individual TRITON Applications and interact with the services provided by the Functional Service. Authenticated users can launch authorised Applications as well as the GeoView. The AppView provides the management of the data specific to the domain, (e.g. Maritime data objects or Land data objects). The internal structure is given below:



The main GUI elements of the AppView will be lists and tables, hierarchical trees and detail panels, as well as dialogs to interact with the user. No map display functions will be performed by the AppView. NATO Common Map API is defined within C4ISR Visualisation Component Requirements, Subsection 4.5).

The AppView User Interface Layout is given below as an example:



The brief description and the content of the elements shown in the figure are described below:

Header:

Title Bar:

- Located at the top of the AppView
- Displays Application Name
- Displays Label of environment classification.

Ribbon Bar:

- A Command bar that organises the system functions of the selected User Application into a series of tabs
- Provides the user with the most important and most used tools for running User Applications.
- Context- and security-sensitive tabs (they change depending on the user logged in, what level of security role the user has, and what User Application is currently running).
- Displaying the currently logged-in user's name
- Displaying the Selected Operation Name
- Quick Access buttons (e.g. On-line Help).

Application Menu:

- Menu Items related to User Applications in a tree structure

Application Panel:

- A panel for displaying Application-specific information

Information Panel:

- A panel for displaying any information in tabular form (e.g. search results)

Footer:

Status Panel:

- Display the Connection status
- Displays the current TRITON Mode of Operation.

Time Panel:

- Displays the Current Time in three different Time Zones (local, operational theatre and UTC (Zulu))

Notification Panel:

- Displays errors and warnings.

[T1-R788] *TRITON shall have an Application View (AppView) which provides the HMI for User Applications per user.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R789] *TRITON AppView shall be able to launch GeoView when the user wants to display geospatial data.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R790] *TRITON AppView shall close the GeoView when the user terminates the AppView.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R791] *TRITON AppView and GeoView shall interact with each other over the NATO Map API (NMAPI) as defined in the VC ICD.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R792] *TRITON AppView shall have the general layout as given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration
Comment : The outline of the Ribbon Bar will be determined during Software Design.

[T1-R793] *TRITON AppView shall have a Title Bar to provide the user with the Functional Service Name and the current classification level. The Title Bar Component from the VC shall be used.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R794] *TRITON AppView shall have a Ribbon Bar as a series of tabs below the Menu Bar to provide the user with easy access to AppView functions. The Ribbon Bar Component from the VC shall be used.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R795] *TRITON AppView shall allow the user to select a User Application to activate or deactivate.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R796] *TRITON AppView shall have an Application Menu to provide the user with actions associated to User Applications.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R797] *TRITON AppView shall display Application Information in tabular form inside Application Panel and Information Panel.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R798] *TRITON AppView shall have a Status Panel to display the connection status and the current TRITON Mode of Operation. The Status Panel Component from the VC shall be used.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R799] *TRITON AppView shall have a Time Panel which displays the current date and time in configurable zones. The Time Panel Component from the VC shall be used.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R800] *TRITON AppView shall have a Notification Panel to display errors and warnings. The Notification Panel Component from the VC shall be used.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

4.2.9.4.5. Geospatial View

The Geospatial View (GeoView) displays map and C4ISR Objects with their geospatial information using common operational symbology. C4ISR Objects can be physical objects (e.g. units, equipment,

installations and meteorological occurrences) or non-physical entities (e.g. planning, control measures, or anticipated locations with temporarily assigned characteristics or temporary validity (APP-6)).

GeoView will be implemented by the C4ISR Visualisation Component as described in Subsection 4.3.

[T1-R801] *TRITON Client shall have a Geospatial View (GeoView) integrated with the Application View (AppView) running on a standard Client Workstation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R802] *TRITON shall only use the C4ISR Visualisation Component as the GeoView.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R803] *TRITON GeoView shall be able to display maps, Maritime Operational Objects, external graphical information and images in Layers.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

4.2.9.5. User Support

TRITON User Support will provide the users with On-Line Help, printing and presentation support.

4.2.9.5.1. On-line Help

TRITON will be used by organizations in various time zones throughout NATO territories and other areas of NATO operations. During crisis, use of TRITON will be high and over extended working hours. An on-line help capability will be required to supplement the Help Desks. The TRITON users will be able to access On-line Help capability while operating the system. The On-Line Help will be organised in sections as given below:

Contents: Providing access to all help pages and organised in a logical manner by topic or procedure.

Index: Providing users with both the ability to search for keywords in all Help pages and retrieve a list of those pages in which those keywords appear and the ability to select and trigger such a query from a list of all keywords.

[T1-R804] *TRITON shall support On-line Help describing all functionality of the TRITON capability by using Contents, Index and associated Search.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Inspection

[T1-R805] *The TRITON On-line Help shall translate every use case and scenario into a browsing sequence. Every browsing sequence shall be structured according to the user workflow.*

Requirement Property :
- Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R806] *TRITON shall allow the user to be able to access Help Function at any stage of execution of a function.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R807] *TRITON On-line Help shall describe each TRITON function, the interrelationships between and the logical sequence of functions.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R808] *TRITON On-line Help shall explain all menu items, dialog windows, data entry and query fields implemented in the TRITON Product Baseline.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R809] *TRITON On-line Help shall include a glossary providing definitions of all terms and acronyms implemented in the TRITON Product Baseline.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R810] *All definitions in the TRITON glossary shall be available in roll-over, pop-up windows linked to every appearance in On-line Help of the corresponding term or acronym.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R811] *In TRITON, each dialogue, menu item, toolbar item, function, field or button (each item on the screen) shall have an On-line Help option. This shall be clearly visible, but not intrusive.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R812] *TRITON On-line Help shall provide meaningful advice and hints to users appropriate to the actions they are trying to take.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 2
Qualific. Method : Inspection

[T1-R813] *TRITON On-line Help shall be concise, compact and clear to the user.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R814] *TRITON On-line Help shall include screenshots of TRITON HMI. The screenshots shall be provided in a suitable lightweight format (e.g. GIF, PNG) approved by the Purchaser.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R815] *Pictures in the TRITON On-line Help showing more than five (5) GUI elements/controls shall have a clickable image map describing each element.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R816] *If the TRITON On-line Help topic requires a large picture that does not fit on a normal page, a reduced copy shall be additionally included on the Help page that will expand to its full size on user request.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R817] *TRITON On-line Help shall be context-sensitive (i.e. based on a specific point in the state of the software and providing help for the situation that is associated with that state on action being performed).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R818] *The Security Classification of any example data that is displayed in TRITON On-line Help shall not be higher than NATO UNCLASSIFIED.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R819] *TRITON On-line Help context-sensitive GUI elements shall be linked to the relevant User Manual topics.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 2
Qualific. Method : Inspection

[T1-R820] *In TRITON, all source code elements shall be configured to link the GUI elements to their context-sensitive topics.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R821] *TRITON On-line Help shall provide access to interactive training to guide users through procedures and functions.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R822] *The TRITON On-line Help shall be given by a small pop-up screen or infotip screen. This screen shall appear quickly and be very easy to hide, for instance clicking anywhere within it.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R823] *TRITON On-line Help shall open a dedicated Web page when the user requests access to the full content of the On-line Help. The On-line Help shall not be preventing the user to access TRITON functions.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R824] *TRITON shall allow the user to hide the On-line Help screen just by clicking anywhere else, or there shall be another single action hiding mechanism.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R825] *TRITON On-line Help shall include a searchable Index that allows the user to locate keywords or phrases (identified by enclosure within double-quotation marks) in the User Manual.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R826] *TRITON shall support search queries for finding help items in the On-line Help.*

Requirement Property :
Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R827] *TRITON shall be able to display search query results for finding help items in the On-line Help in a list. TRITON shall display the help item when the user selects a query result in this list.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

4.2.9.5.2. Computer-Based Training

TRITON will provide a Computer-Based Training capability which allows the users give themselves self-training on business flows. The requirements below are applicable to any CBT development effort and will be compliant with [Bi-SC DIR 75-2] and will be designed by a certified instructional system designer and certified training specialist compliant with International Board of Standards for Training, Performance and Instruction (IBSTPI) [IBSTPI].

[T1-R828] *TRITON shall provide a Computer-Based Training (CBT) capability for both TRITON-NS and TRITON-NU.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R829] *TRITON CBT shall provide interactive training by defining and explaining the key concepts and terminology of the TRITON features and functions.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R830] *TRITON CBT shall complement the TRITON On-line Help function by defining and explaining key concepts and terminology of the TRITON operational process incorporated into TRITON features and functions.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R831] *TRITON CBT packages shall be capable of conducting on-site, in-house initial and sustainment training of staff users.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R832] *TRITON CBT shall include training functionality within and between each component to maintain user proficiency in TRITON.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R833] *TRITON CBT content package shall be compliant to Sharable Content Object Reference Model (SCORM) Edition 2004 or newer.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R834] *TRITON CBT shall be integrated with TRITON On-line Help so that the users can switch back and forth between On-Line Help and the CBT without losing the navigation history.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R835] *TRITON CBT shall be accessible from the On-line Help that is available in each User Application and shall allow the user to select the relevant chapter/paragraph of the CBT.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R836] *TRITON CBT shall be accessible on any Bi-SC AIS workstation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R837] *The TRITON CBT shall provide links to applicable keywords in the TRITON On-line Help function.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R838] *TRITON CBT shall provide lessons for a subject or group of related subjects for at least three (3) hours.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R839] *TRITON CBT shall use the same general appearance of the GUI as the TRITON Functional Services itself.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 3
Qualific. Method : Inspection

[T1-R840] *TRITON shall establish a workflow to guide the users to the CBT feature and run the training program and record the results.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R841] *TRITON CBT shall be limited to the allocated functions to the user positions and roles and the applicable security restrictions.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

[T1-R842] *TRITON CBT shall share the access rights given for TRITON Functional Services and these access rights shall be managed from the same User Management function.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R843] *TRITON CBT "should" be easy to maintain without having to apply all HMI modifications.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

4.2.9.5.3. On-line Tutorials

TRITON will provide On-line Tutorials to enable TRITON end users and self-service users to perform the tasks associated with their roles. The On-line Tutorials will be integrated with TRITON On-line Help so that users can switch back and forth between help and tutorials without loss of navigation history. The On-line Tutorial will include at least the following:

- Key concepts and terminology
- Navigation through the information architecture
- Common data entry, query, and reporting tasks
- User interaction with the system
- Answers to frequently-asked questions, derived from student and user feedback, including the initial Baselines.

[T1-R844] *TRITON shall have On-line Tutorials integrated with TRITON On-line Help.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R845] *TRITON On-line Tutorials shall be accessible from the TRITON Clients.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R846] *TRITON shall adhere to the Microsoft standard GUI methods for accessing on-line documentation resources.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R847] *TRITON On-line Tutorials shall be integrated with TRITON On-line Help so that the users can switch back and forth between On-Line Help and the On-line Tutorial without losing the navigation history.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

4.2.9.5.4. Frequently Asked Questions

Frequently Asked Questions (FAQ) is a list of information to support the NCI Agency Service Desk and other support organizations. The TRITON FAQ List will be maintained by the authorised user and accessible to any user.

[T1-R848] *TRITON shall maintain a list of Frequently Asked Questions (FAQ).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R849] *TRITON FAQ shall be integrated with On-line Help functionality.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R850] *TRITON shall allow the authorised user to maintain (add, modify, delete) questions in the TRITON FAQ List.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R851] *TRITON shall allow the user to perform search in the TRITON FAQ List and display the results in sortable tabular form.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R852] *TRITON shall allow the user to ask questions to the NCI Agency Service Desk in electronic form by using the TRITON FAQ.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R853] *TRITON shall support answering the user questions by sending back existing or newly-added FAQ entries.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

4.2.9.5.5. Printing

TRITON will enable the users to take printouts for the following:

- Query results
- Messages
- Screenshot of the AppView
- Screenshot of the GeoView.

[T1-R854] *TRITON shall support printing to local and network printers including printing into a file in Portable Document Format (PDF).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R855] *TRITON shall ensure that the application maintains stability when printing if no printer is installed.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R856] *TRITON shall be able to print user-selected Information Products and screenshot to the resolutions supported by the printer or output device.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R857] *TRITON shall support printing documents that contain, text in various sizes, styles and colours using TrueType and Postscript fonts.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R858] *TRITON shall support printing to printers with Long File Names (e.g. printer names include all legal Long File Name characters and are at least 128 characters long).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R859] *TRITON shall support printing of landscape, portrait and all other supported paper sizes and layouts.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R860] *TRITON shall allow the user to preview (Print Preview) a TRITON print product before it is printed.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R861] *The VC Print Preview shall display the print content to the user with the selected printer settings.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

4.2.9.6. User Notification Management

User Notification includes warnings and alerts. TRITON will provide a mechanism to handle warnings and alerts for supporting Maritime Alerts Management. Modal and modeless dialog boxes will be used to notify the users depending on the type of notification.

4.2.9.6.1. Warnings

Warnings are critical and non-critical notifications with predefined types. Predefined warning types will have at least the following:

- Critical warning (e.g. system failure, database error, connection loss)
- Non-critical warning (Operational, System Management)

Critical warnings are non-maskable notifications while non-critical warnings can be masked by the user via filtering on warning types. TRITON will issue warnings when predefined events occur. For example, System Administrator will be notified with a critical warning when the database capacity threshold has been reached. When a technical error such as connection loss happens, all users will be notified with a critical warning. If a conflict in identity analysis is detected a non-critical warning will be issued to the authorised users (such as RMP Operators).

Critical warnings can be acknowledged or snoozed for a time period determined as a system parameter. Non-critical warnings can be removed from the system when an authorised user cancels it or the originating system component removes it.

[T1-R862] *TRITON shall issue a critical warning when a predefined event that effects the system operations occurs.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test
Comment : The predefined events will be determined during the Software Requirements Analysis.

[T1-R863] *TRITON shall use modal popup window with acknowledge option for critical warnings to notify the authorised user.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R864] *TRITON shall allow the authorised user to acknowledge a critical warning with a popup window.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R865] *TRITON shall remove a critical warning when the authorised user acknowledges it.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R866] *TRITON shall postpone a critical warning if the authorised user snoozes it.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test
Comment : Snooze time will be system parameter.

[T1-R867] *TRITON shall issue a non-critical warning of a predefined type when a predefined event that needs to be escalated to user occurs.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test
Comment : The predefined events will be determined during the Software Requirements Analysis.

[T1-R868] *TRITON shall provide the authorised user with a listing of non-critical warnings with filtering on warning types.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1

Qualific. Method : Test

[T1-R869] *TRITON shall allow the authorised user to cancel non-critical warnings.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R870] *TRITON shall automatically remove non-critical warnings when the state of the originating component changes.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R871] *TRITON shall use unique identification numbers for each event requiring notification and provide a brief explanation for the cause of the warning and the guidance to recover.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.2.9.6.2. Alerts

Alerts are non-maskable notifications when a user sets an alert for a predefined event. Predefined events may be operationally defined or manually defined by a user. Operational Alerts are defined as a function of the system. User defined alerts can be set by users depending on the GUI of the function and issued with the information set by the user. For example, a user may want to set an Area Alert for a particular track. A user may want to get notified if a track is timelate. Another user may want to set a Communication Alert when a new message is received giving the brief information of the message. Alerts will have priority values as High, Medium and Low. Users can set these priority values to Alerts to get notified accordingly.

An Alert will consist of at least the following attributes:

- Name
- Type
- Priority (high, medium, low)
- Associated event (e.g. timelate, deletion, Area Alert)
- User
- Notification method

[T1-R872] *TRITON shall maintain an Alert List for each authorised user.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R873] *TRITON shall allow the authorised user to manage (create, modify, delete, set, cancel) the Alert List.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 1
Qualific. Method : Test

[T1-R874] *TRITON shall allow the user to set an Alert for a recognised event.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R875] *TRITON shall allow the authorised user to view the Alert List in sortable tabular format.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R876] *TRITON shall use modeless popup window with acknowledge option for notifying users.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

4.3. C4ISR Visualisation Component Requirements

The C4ISR Applications within the Bi-SC AIS Functional Services are based on Web technology. As the requirements in terms of visualisation capabilities are quite similar, a general C4ISR Visualisation Capability will be provided by TRITON Increment 1 Project and delivered as a set of re-usable software components. Visualization refers to portrayal of assets in a geospatial context utilizing a graphical user interface usually containing a map component.

A "component" is by definition an independently deliverable part of a system providing access to its strictly delineated functionality through well-defined interfaces using well-defined invocation mechanisms. A software component is an installable piece of software that performs a specific function. It has well-defined specifications and functions, conforms to the integrity perspective (fully responsible for ensuring integrity of its data) and offers a well-defined interface, hiding internal information and implementation details. It may be packaged and deployed alone. It can be instantiated multiple times with multiple, and differing, implementations.

This subsection specifies the requirements for the C4ISR Visualisation Component (VC) which will be designed and developed as a separate Build Process within the TRITON Project. The VC will be comprised of a number of sub-components. The requirements are associated to three Baselines:

- VC-BL 1
- VC-BL 2
- VC-BL 3

The deliveries at these Baselines will be aligned to the TRITON Baselines so that the each TRITON delivery can use the VC to meet the minimum requirements.

4.3.1. General Architecture

A typical generalized architecture for Web-based C4ISR Visualisation Capability consists of the following architectural building blocks:

Functional Service Application Server:

An Application Server that hosts the Functional Services which provides the business logic, calculations, user and data management. The Functional Service provides data to the AppView for consumption and receives commands, and data, from the AppView for further processing.

Mission Application Information Display (AppView):

The Client Side portion of the User Application through which the User interacts to engage the Functional Service. It is briefly called the "Application View" (AppView). It is driven by User interaction to display functional service data utilising specific service interfaces and UI components. Often the format of the Functional Service specific data is text or numeric and may be presented as lists or in tabular form.

C4ISR Objects:

A set of objects, physical and non-physical, events and tasks that have operational meaning and a geospatial representation. Typically these objects are presented to the User using a set of standardized symbols. Physical objects include tracks, units, equipment, installations, meteorological occurrences, etc. Non-physical objects include planned objects, control measures, or anticipated locations with temporarily assigned characteristics or temporary validity.

GIS Server:

A Geospatial Information Services (GIS) including map and processing services as required.

Geospatial Information Display (GeoView):

The Client Side portion of the User Application through which the user interacts to visualise C4ISR Objects in a geospatial context (map) using standardized military symbology. The UI component provides the means for the user to interact with the C4ISR Objects, including the means to visualize the properties of the object. This display is briefly called "Geospatial View" (GeoView). The GeoView provides user events to the AppView and receives commands and data from the AppView for processing. The GeoView will interact with the GIS Server to provide the geospatial context for the C4ISR Objects visualisation.

Viewer Server:

An Application Server that hosts the Server Side functionality of the GeoView. The Viewer Server provides the means to configure the GeoView for a specific Functional Service.

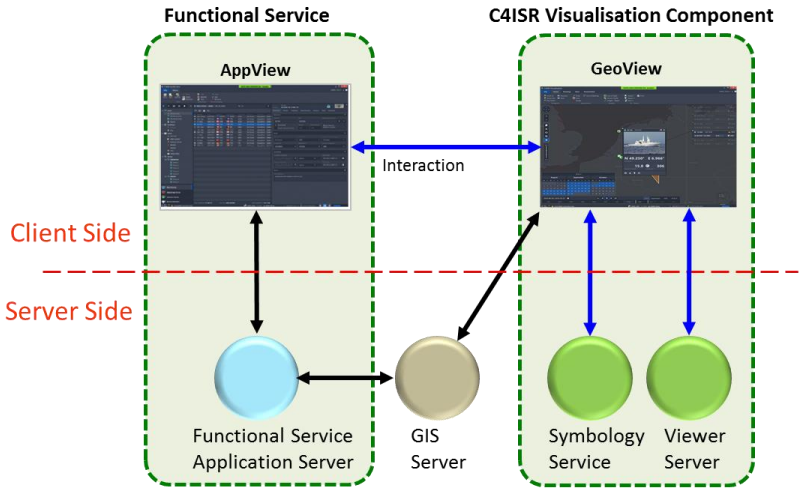
Symbology Service:

A service that provides an image representation of C4ISR Objects according to military symbology standards. The Symbology Service supports rendering of all point, line, area and multi-point based C4ISR Objects. The symbology related components of the AppView and GeoView are data driven and populated by the metadata provided by the Symbology Service of the supported symbologies standards and symbols.

C4ISR Visualisation Component:

The combination of GeoView, Viewer Server and Symbology Service is called the "C4ISR Visualisation Component". It will briefly be called the "VC".

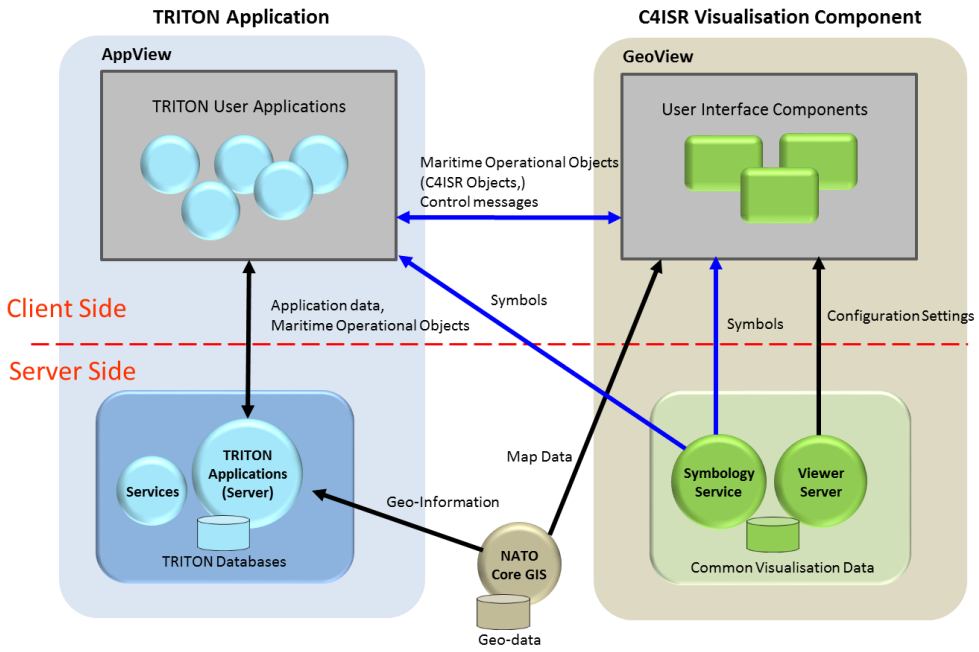
The relationship of the elements are shown below:



4.3.1.1. TRITON Architecture

The geospatial visualisation of the TRITON Functional Service will be implemented using the VC and NATO Core Services. The NATO Core GIS will be used as the default GIS Server. If necessary, The NATO Core GIS Server may be replaced by another GIS Server, complying with the same set of standardized interfaces.

The high-level architecture of the TRITON geospatial visualisation is illustrated in the figure below:



TRITON Applications on the Client Side interact with the Client Application Framework and the TRITON Applications on the Server Side. The TRITON AppView provides the user interface in a Web browser.

The GeoView, running on the Client side of the VC has a Client Visualisation Manager which interacts with the AppView and the NATO Core GIS as well as the Viewer Server and the Symbology Service.

4.3.1.2. Operational Modes

The VC can be used in two modes of operation:

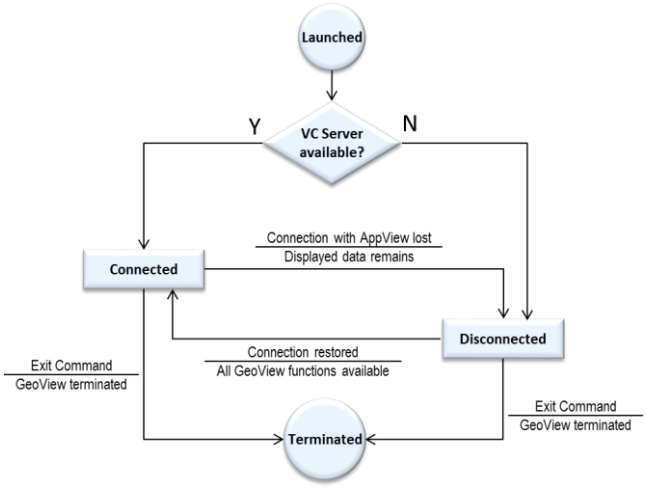
- Integrated Mode
- Standalone Mode

4.3.1.2.1. Integrated Mode

In Integrated Mode, the VC receives data from the Application Server of the Functional Service through the AppView. The Server Side of the VC (Viewer Server) is modeless. The Client-side of the VC, the GeoView, will have two states depending on the connectivity with the Viewer Server. These are:

- Connected : GeoView is connected to the Viewer Server.
- Disconnected: GeoView is not connected to the Viewer Server.

The state transition diagram for the Client Side of the VC is given below:



When the GeoView is instantiated by the AppView, it tries to connect to the Viewer Server. If it connects, then it enters the Connected State; if not, it enters the Disconnected State.

If the GeoView loses its connection to the Viewer Server, its state changes to Disconnected, losing its connectivity to the GIS Server as well. It will then keep displaying the existing maps and Objects using a local caching mechanism for a configurable time period. During this period, user data requests will not be accepted. When the network connection is restored, the GeoView switches to Connected State again. The VC GeoView can be terminated at any time with the user command and confirmation.

[T1-R877] *The VC GeoView (the Client-side of the VC) shall have Connected and Disconnected States in the Integrated Mode of operation.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R878] *The VC GeoView shall be fully operational when it is in Connected State.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R879] *The VC GeoView shall be able to store the visible C4ISR Objects and relevant geospatial information (received from the GIS Server) in a local cache to be used when it is switched to Disconnected State.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

[T1-R880] *The VC GeoView shall be able to continue to display the cached C4ISR Objects and their relevant geospatial information when it is in Disconnected State. The C4ISR Objects being displayed shall be deleted after a configurable time period with a notification to the user.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Test

[T1-R881] *The VC GeoView shall display the connectivity status and notify the user in case its connection to the VC Server is lost more than a configurable time period. The default time period to switch to Disconnected State shall be thirty (30) seconds.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R882] *The VC GeoView shall be able to display, as a minimum, a Topographic Base Map covering the entire Earth surface when a higher scale map is not available.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R883] *The VC GeoView shall be able to switch to Connected State automatically when the connection is restored.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R884] *The VC GeoView shall be terminated when the user closes the browser or explicitly exits from the GeoView with confirmation. The GeoView external connections shall be reset at termination.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R885] *The VC GeoView shall be terminated automatically when AppView is terminated.*

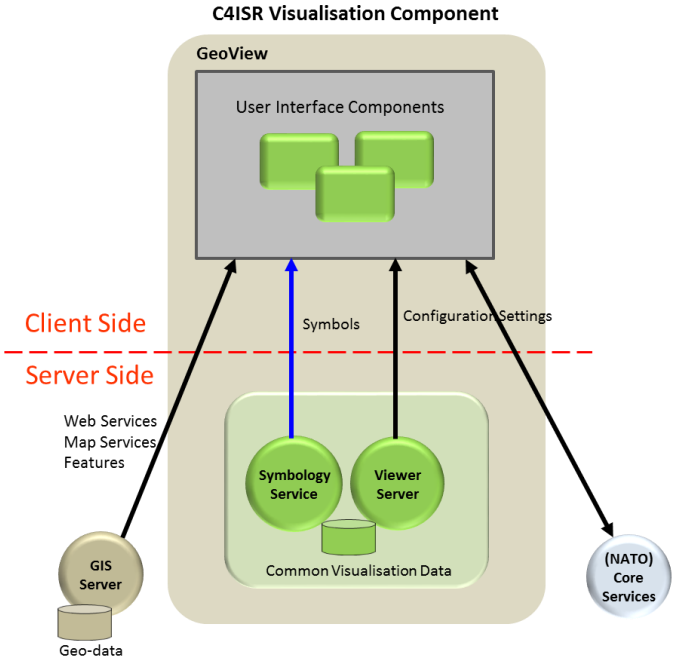
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R886] *The VC Viewer Server shall manage connections of GeoViews and handle the disconnected and terminated GeoViews.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.1.2.2. Standalone Mode

The VC can also be used as a standalone application without any Functional Service. When it is deployed as a standalone application, the users will be able to visualise maps, features and other data provided by the available services. A conceptual representation of Standalone Mode is given below:



The VC will be able to use NATO Core Services as required when it is deployed as a standalone application. For example, an Identity and Access Management service will handle the necessary authentication and access control. Similar services should be provided if NATO Core Services are not available.

[T1-R887] *The VC shall be able to run as a standalone application in Standalone Mode when it is packed as a component, deployed and configured. This type of operational use shall be limited to displaying the Geo-information provided by the GIS Server.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

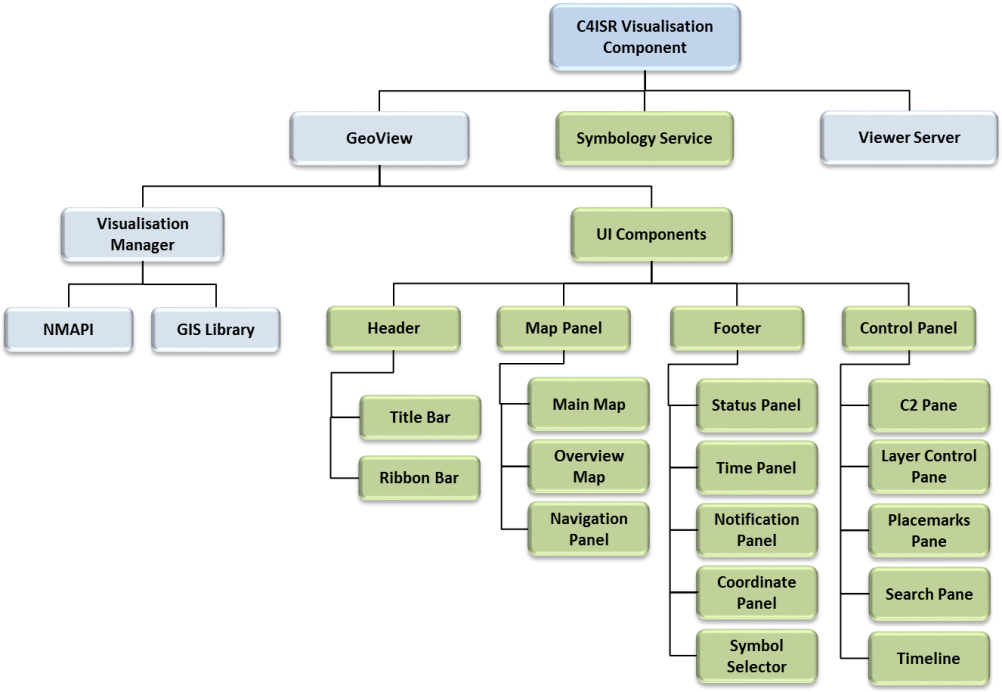
[T1-R888] *The VC shall be able to integrate NATO Core Services as required when it is deployed as standalone application.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

4.3.2. C4ISR Visualisation Component Elements

The VC consists of several sub-components as building blocks called "elements". Some of these elements need to be re-used in other systems/services in order to provide a uniform user experience across the all Functional Service Applications. Therefore, the VC will provide a suite of “Reusable Software Elements” having independent functions. These software elements will be designed at a granular level, supporting maximum re-use.

The initial set of Reusable Software Elements are shown in green in the diagram below:



The set of Reusable Software Elements may be added to, or individual elements extended, in the future. All elements will be documented as part of the VC ICD.

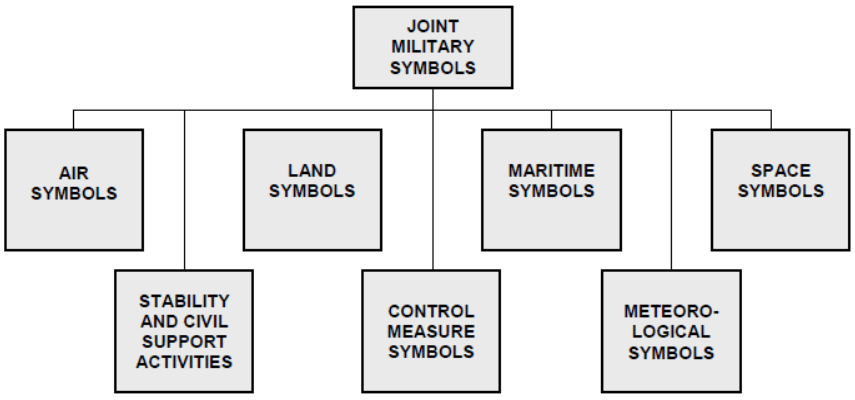
The VC Elements are described in the following paragraphs.

4.3.2.1. Symbology Service

All instances of the VC will use a single source for the provisioning of military symbology. The VC Symbology Service will provide the standard set of symbols to be primarily used by GeoViews, but also in support of AppViews (e.g. an icon in a tree). In order to improve network efficiency, the default and most used symbol sets will be transferred to the Client side during GeoView initialisation. The Service which will be implemented as a Web service (loose coupling), will provide Symbol Sets.

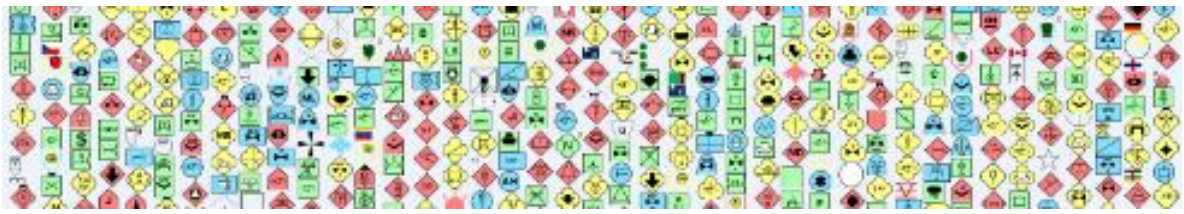
Symbol Set:

A Symbol Set encompasses the graphic representation of units, equipment, installations, and other elements and activities relevant to joint military operations. It contains the building blocks for joint military symbols from the domains air (chapter 2), land (chapter 3), sea/maritime (chapter 4), space (chapter 5) and the display of stability activities and civil support activities. A symbol may consist of text, image and vector to define an object. Following diagram shows the joint military symbol sets generated to support planning and conduct of joint operations described in [APP-6].



Sprite Sheet:

A Sprite Sheet is a single image containing all the point symbols for a given symbology standard. A small part of s typical Sprite Sheet is given below as a sample:



Portrayal Catalogue:

A Portrayal Catalogue, as defined in [ISO 19117], contains supported standard symbols and rules. It also includes labels, annotations and the publication of those definitions. The Symbology Service will provide a Portrayal Catalogue which includes the following standards:

- APP-6 (A)
- APP-6 (B)
- STANAG 2019 - APP-6 (C) (D when available) [APP-6]
- MIL-STD-2525D [MIL-STD-2525D]
- U.S. Naval Tactical Data System (NTDS) (OTH-T GOLD Specification) [OTH-T GOLD]
- IHO S-52 [IHO S-52]
- IHO S-4, INT 1 [IHO S-4]
- User-defined, customised symbol sets

Country Codes and Flags:

The VC will use the same country codes defined in the Functional Service (see TRITON Country Code Handling and NATO Standard Country Code Table). The Symbology Service will store the flags as indexed by the NATO Standard Country Codes Table. This table, also having the exercise countries and flags, will be shared by the Service and configured by the authorised user.

Interface:

The Symbology Service will also provide a separate interface to AppView in case symbols are used as an icon in a table or in a tree.

The Symbology Service Interface will be described in the VC ICD as a Service Interface Profile.

[T1-R889] *The VC shall have a Symbology Service as a Web service to provide standard symbol set to be used in the GeoView and AppView. In order to improve network efficiency, default and most used symbol sets will be transferred to the Client side during initialisation.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R890] *The VC Symbology Service shall maintain a Portrayal Catalogue.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R891] *The VC Symbology Service Portrayal Catalogue shall support the standards given in the Description. It shall include labels, annotations and the publication of those definitions. It*

"should" include Civil-Military Cooperation (CIMIC) symbology set as defined in [AM-86-1-1].

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R892] *The VC shall allow the authorised user to configure the Symbology Service. For example, the most used symbols can be defined with respect to the Functional Service.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R893] *The VC Symbology Service shall enable all GeoViews and AppViews to apply the supported symbol sets to features and C4ISR Objects in an automated fashion.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R894] *The VC Symbology Service shall have mechanisms to improve network efficiency (e.g. providing a subset of the default and most used symbols during the initialisation, caching the used symbols).The caching of Sprite Sheets and tile maps shall also be supported by consumers and proxy services.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Inspection

[T1-R895] *The VC Symbology Service shall be able to provide one or more symbols upon request.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R896] *The VC Symbology Service shall provide the means to retrieve a Sprite Sheet, as defined in the Description, as a single image containing all the point symbols for a given symbology standard.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R897] *The VC Symbology Service shall provide the means to specify the general size of symbols provided in a Sprite Sheet.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R898] *The VC Symbology Service shall provide the means to retrieve a tile map applicable to a Sprite Sheet for a given symbology standard.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R899] *The VC Symbology Service shall be able to provide country flags, as icons, indexed by the NATO Standard Country Codes Table. The table shall be configured by the authorised user.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R900] *The VC Symbology Service shall provide the means to add user-defined symbols to the Portrayal Catalogue.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R901] *The VC Symbology Service shall provide the means to add new Symbol Sets to the Portrayal Catalogue.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R902] *The VC Symbology Service shall provide the means to retrieve metadata for a single symbol, including the semantic meaning of the symbol.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R903] *The VC Symbology Service shall provide the means to retrieve metadata for the configured symbol sets and individual symbols, sufficient to support data driven UI components for finding and selecting symbology.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R904] *The VC Symbology Service shall have Service Interface Profile documented in the VC ICD.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

4.3.2.2. Viewer Server

The Viewer Server is the Application Server for the GeoView. It also stores, processes and provides configuration-related information needed to run the VC. The Configuration Management function provides the authorised user with a capability to configure the settings as required by a Functional Service. The Configuration Settings will include the following:

- Default GIS Server
- Map Store Settings
  - Map Service Request Timeout
  - Predefined WMS URL List
  - Predefined WFS URL List
  - Gazetteer Service URL List
  - WPS URL List
- Spatial Extent Settings
- Overview Map Ratio
- Start-up Settings
  - Layer Display (e.g. transparency, brightness, contrast)
  - View Scale Range (e.g. minimum, maximum, steps)
  - Clustering (e.g. on, off, radius, colour)
  - Labels (e.g. visibility, font, colour, text, position)
  - Tooltips (e.g. map tooltip font, size, colour))
  - Symbols (e.g. fill, size, show flag, standard)
  - Tinting
  - Grid (e.g. line style, colour, width, spacing, polar grid settings)
- Applicable themes
- Applicable rules for User Settings

All settings will have default values.

[T1-R905] *The VC Viewer Server shall provide the Application Server functionality.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Inspection

[T1-R906] *The VC shall store the internal Configuration Settings given in the Description inside the Viewer Server.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

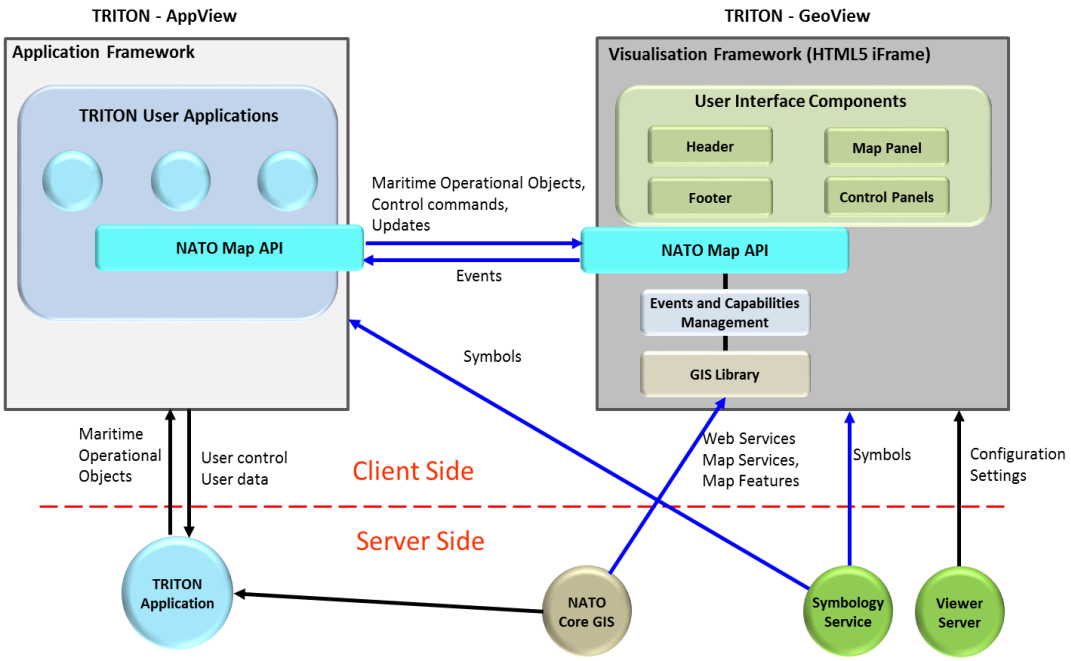
[T1-R907] *The VC shall allow the authorised user to manage the Configuration Settings.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.2.3. GeoView

The GeoView consists of a Client Visualisation Manager and a number of User Interface Components. The Client Visualisation Manager interacts with the AppView for the purpose of exchanging commands, events and data (e.g. C4ISR Objects) with the Functional Service Application. The Client Visualisation Manager subsequently interacts with Map Panel and other User Interface Components to achieve the desired user experience.

The internal structure of the GeoView for TRITON Functional Service is shown below as an example:



Visualisation Framework:

This framework implements the entire GeoView as a browser-based application.

User Interface Components:

The GeoView user interface is provided by a set of software modules grouped as Header, Map Panel, Control Panel and Footer. These components will be provided as "Reusable UI Components". They are defined in detail in the following paragraphs.

NATO Map Application Programming Interface (NMAPI):

The AppView will interact with the GeoView using the "NATO Map Application Programming Interface" (NMAPI) to send and receive commands, events and data (e.g. C4ISR Objects). The NMAPI will bind the commands, events and data to specific visualisation functions of the Map Panel, GIS Library and UI Components within the Client Visualisation Manager.

Events and Capabilities Management:

The commands, events and data received by the GeoView will be validated by the Events and Capabilities Management module for syntax, structure, completeness and validity, prior to processing by downstream components.

GIS Library:

The GIS Library provides the Client Side interface to the configured GIS Server for the purpose of consuming map-related Web Services. It will implement all necessary interfaces provided by the NATO Core GIS.

[T1-R908] *The VC Visualisation Framework shall implement the visualisation capability as a browser-based application.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Inspection

[T1-R909] *The VC shall provide a suit of re-usable software modules as "Re-usable UI Components".*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Inspection

[T1-R910] *The VC Reusable UI Components shall have independent functionality which can be integrated into the application in which they are required.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Inspection

[T1-R911] *The VC Reusable UI Components shall have API documented in the VC ICD.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Inspection

[T1-R912] *The VC shall validate all data according to predefined syntax, structure, completeness and validity, types and limits received from external interfaces prior to processing.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R913] *The VC shall manage the display-related events sent by the AppView to geospatially locate C4ISR Objects and to display them on the map using the Portrayal Rules.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R914] *The VC GIS Library shall implement the Web services to interact with the NATO Core GIS.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Inspection

4.3.2.4. GeoView User Interface Components

The User Interface Components include the following:

- Header
- Map Panel
- Control Panels

- Footer

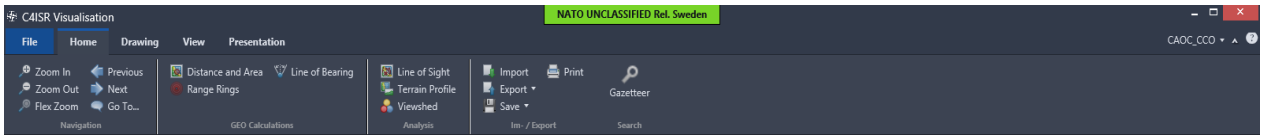
The details are described in following paragraphs.

4.3.2.4.1. Header

The Header Component consists of the following elements:

- Title Bar
- Ribbon Bar.

A sample layout of the Header is given below:



4.3.2.4.1.1. Title Bar

The Title Bar is the topmost element of the GeoView. It displays the following:

- Functional Service Application Name
- Label of environment classification (in colours specified in the Style Guide which will be provided by the Purchaser during implementation)
- Window controls.

[T1-R915] *The VC GeoView shall have a Title Bar to display the Functional Service Application Name and coloured label containing the environment classification (a.k.a. security policy, classification and release caveats).*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Inspection

[T1-R916] *The VC GeoView Title Bar shall allow the user to control (minimise, maximise, close) the window associated with the Title Bar.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.2.4.1.2. Ribbon Bar

The Ribbon Bar is a command bar that organises the GeoView functions into a series of tabs. It displays the following:

- Tabs
- All GeoView function groups as tabs
- Selected Operation Name
- Currently logged-in user's name
- Quick Access Buttons (e.g. On-line Help)
- Ribbon hide/show button

[T1-R917] *The VC GeoView shall have a Ribbon Bar as a series of tabs to provide the user with easy access to all GeoView functions and control (show, hide) the Graphical Components.*

Requirement Property :
Domain for Static :

Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration
Comment : The final layout of the Ribbon Bar will be determined during the Software Design.

[T1-R918] *The VC GeoView Ribbon Bar shall display the currently logged-in user's name and the selected Operation Name.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R919] *The VC GeoView Ribbon Bar shall have Quick Access Buttons (e.g. On-line Help).*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R920] *The VC GeoView Ribbon Bar shall be configurable to show/hide tabs, panels, buttons and fields as required.*

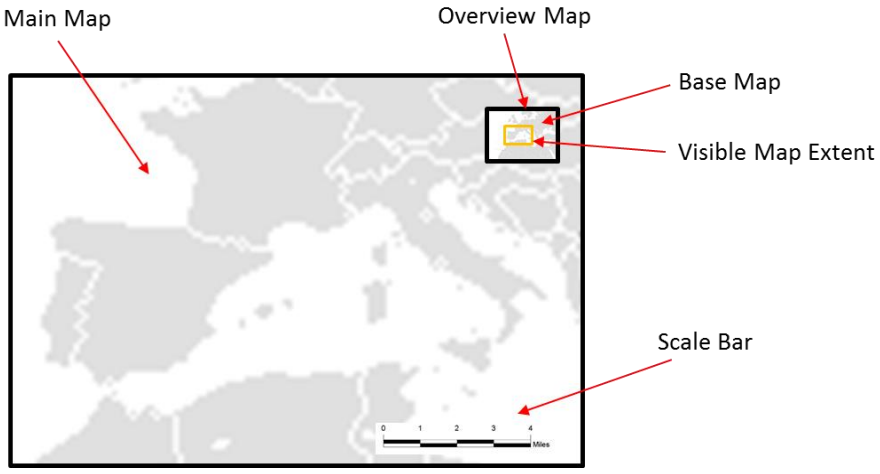
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R921] *The VC GeoView Ribbon Bar shall be configurable to add new ribbon components (buttons, tabs, panels, fields, combo-lists, etc.) as required.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.2.4.2. Map Panel

The Map Panel provides the visualisation of user-selected digital maps, charts, features and C4ISR Objects. A sample view of the Map Panel is given below:



4.3.2.4.2.1. Main Map

The VC will handle digital maps using standard interfaces and display them in its Map Panel. Following is the terminology to be used:

Chart:

A chart, especially a nautical chart, has special unique characteristics including a very detailed and accurate representation of the coastline, which takes into account varying tidal levels and water forms, critical to a navigator. Charts also provide detailed information on the area beneath the water surface, normally not visible to the naked eye, which can and is very critical for the safe and efficient navigation.

Map:

A map emphasizes land forms, including the representation of relief, with shoreline represented as an approximate delineation usually at mean sea level. It serves as a reference guide to provide predetermined course, usually a road, path, etc., to be followed.

Main Map:

A Main Map is the background, either a chart or a map, displayed inside the Map Panel.

Base Map:

A Base Map provides a user with context for a map. Any information can be added to a Base Map by overlaying additional layers and information on top of it. A Base Map may be topographic, imagery, elevation, air or maritime chart.

Map Legend:

A Map Legend is a box that displays the meaning of the symbols used in the map. They may be in vector or matrix (image) format.

[T1-R922] *The VC GeoView shall have a Map Panel to visualise user-selected maps, features and C4ISR Objects.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R923] *The VC GeoView shall display a Base Map inside the Map Panel as generated by the selected GIS Server.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R924] *The VC GeoView Map Panel shall display the Map Legend when enabled by the user.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R925] *The VC GeoView Map Panel shall display restrictions for the visualized data, including copyright, limited distribution and releasability.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1

Qualific. Method : Demonstration

[T1-R926] *The VC GeoView Map Panel shall provide the means to visualise map, feature and C4ISR Object data as a set of Layers.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R927] *The VC GeoView Map Panel shall provide the means to re-order the Layers to achieve the desired visualisation.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R928] *The VC GeoView Map Panel shall be able to display multiple Layers allowing the user to switch between them (swipe) temporarily.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

4.3.2.4.2.2. Overview Map

The Overview Map is a miniature map, inset in the display, which shows the Base Map at a smaller scale. The current visible map extent is shown with a rectangle, allowing the user to navigate by dragging or resizing the extent rectangle.

The VC GeoView will align the navigation using the Overview Map with the Map Panel Navigation Functions. The selected Base Map colour scheme and the selected map projection will be applied to the Overview Map. When the map projection, the colour scheme or the extent of the Base Map is changed, the Overview Map will be updated accordingly. The user will be able to navigate through the Base Map using the rectangular indicator inside the Overview Map.

[T1-R929] *The VC GeoView shall display a configurable Overview Map inside the Map Panel, which shows the Base Map at a smaller scale indicating the current visible section with a rectangle. The rectangle shall indicate the extent of the Base Map in a user configurable ratio.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R930] *The VC GeoView shall allow the user to navigate through the Base Map by dragging and resizing the rectangle in the Overview Map.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R931] *The VC GeoView shall align navigation of the Overview Map with the Map Panel Navigation Functions and the selected Base Map projection.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R932] *The VC GeoView shall allow the user to enable/disable and change the location of the Overview Map.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.2.4.2.3. Scale Bar

Scale Ratio is the scale of a map as the ratio of a distance on the map to the corresponding distance on the ground in particular map projection considering the Earth's curvature (e.g. 1:100,000). The VC GeoView Scale Bar indicates the Scale Ratio and distances at this scale. The Scale Bar can display two measurement units simultaneously as set in the user preferences. In order to keep the displayed distances of the Scale Bar in a reasonable range of not less than 1 or more than 1000, the distance units shall change from km to m or miles to yards and vice versa.

[T1-R933] *The VC GeoView shall have a Scale Bar which displays the Scale Ratio and distances at this scale with one or two measurement units as defined by the user preferences.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R934] *The VC GeoView Scale Bar shall label the distances with the selected unit. Adequate units to keep the numbers in a reasonable range between 1 and 1000 should be used.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R935] *The VC GeoView Scale Bar shall automatically be updated when the scale of the Map Panel is changed, i.e. with each zoom in or zoom out.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R936] *The VC GeoView shall allow the user to enable/disable and change the location of the Scale Bar.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.2.4.2.4. Displaying Maps

The VC will display maps received from the available Map Server using WMS [OGC WMS] and WMTS [OGC WMTS]. The default Map Server is the NATO Core GIS. If it is not available, other Map Servers, compliat to [Core GIS SIP] can be used.

The VC GeoView will display a Base Map as a background for locational reference. The user will be able to select the Base Map and configure its settings (e.g. displaying the Map Legend).

[T1-R937] *The VC shall allow the user to select the Base Map from the Map Catalogue provided by the GIS Server.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 1
- Qualific. Method : Test

[T1-R938] *The VC Map Panel shall be able to use a WMS [OGC WMS] to get the maps. The VC shall support WMS Versions 1.0.0, 1.1.0, 1.1.1 and 1.3.0 as defined in [Core GIS SIP].*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 1
- Qualific. Method : Demonstration

[T1-R939] *The VC GeoView shall be able to display received maps in JPEG or PNG (with transparency). GIF and JPEG2K "should" be supported.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 1
- Qualific. Method : Demonstration

[T1-R940] *The VC Map Panel shall be able to use a WMTS [OGC WMTS] to get the map tiles. The VC shall support WMTS Version 1.0.0.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 1
- Qualific. Method : Demonstration

[T1-R941] *The VC Map Panel shall display the Base Map received via a WMS. If the WMS is not used as a Base Map, the background of the WMS Layer shall be displayed as transparent.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 1
- Qualific. Method : Demonstration

[T1-R942] *The VC shall be able to add a WMS and WMTS to the Layer Manager.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 1
- Qualific. Method : Demonstration

[T1-R943] *The VC shall be able to use Geospatial Web Map Services as defined in [Core GIS SIP]. The VC shall also be able to use other Geospatial Services like Gazetteer and Web Processing Services as provided by the GIS Server.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R944] *The VC Map Panel shall use WGS84 as the default datum.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R945] *The VC Map Panel shall be able to display a selected map within ten (10) seconds on a Client running on a Standard Workstation on a standard NATO Static Site Network.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.2.4.2.5. Displaying Map Labels

Map Labels are descriptive text for map functions displayed on the Map Panel. The Map Labels are dynamically positioned on the Map Panel. The Map Labels are subject to de-cluttering in case they are overlapping. Users can change their position with a user-defined angle and given at/along/inside direction as well as displaying or hiding them. The user will be able configure the Map Label Settings including the Label Text, fonts (True Type Fonts, Open Type Fonts, PostScript Fonts) and positions.

[T1-R946] *The VC GeoView Map Panel shall be able to display Map Label Text as provided by WFS, Shape File, Drawing Layers or C2 Layers.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R947] *The VC GeoView Map Panel shall display or hide Map Labels according to the Label Settings of a Layer.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R948] *The VC GeoView shall allow the user to configure Map Label, fonts (True Type Fonts, Open Type Fonts, PostScript Fonts) and position through the Map Label Settings.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R949] *The VC Map Panel shall de-conflict overlapping Map Labels at the time of map creation.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.2.4.2.6. Coordinate Reference Systems

A Coordinate Reference System uses a set of coordinates (for position coordinates an ordered pair or 2-tuple) to uniquely determine the position of a geospatial element on a 2D manifold approximating the Earth's surface, usually through a rotational ellipsoid. A Coordinate Reference System is a combination of the Coordinate System and a Geodetic Datum. The datum defines the realisation of the reference ellipsoid in terms of shape, orientation and translation. The datum shall be fixed to WGS84. The VC GeoView will support the following Coordinate Reference Systems:

- Geographic (also called Ellipsoidal) Coordinates (Latitude / Longitude)
- Universal Polar System (UPS)
- Universal Transverse Mercator (UTM) Projection
- Military Grid Reference System (MGRS)
- Common Geographic Reference System (CGRS)
- Global Area Reference System (GARS)

[T1-R950] *The VC GeoView Map Panel shall support the Coordinate Reference Systems given in the Description.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R951] *The VC GeoView shall allow the user to select a Coordinate Reference System to be used in the display of locations.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R952] *The VC GeoView shall allow the user to select a Coordinate Reference System to be used for the input of locations.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.2.4.2.7. Map Projection

A Map Projection defines the function how the coordinates in a coordinate reference system shall be mapped to a flat surface, the map or in that case the flat computer screen. The VC GeoView Map Projection will be set by the Base Map on the Map Panel. The GeoView shall support the following Map Projections:

- Plate carree (Geographic Latitude / Longitude converted from angular to distance units)
- Mercator projections (conformal cylindrical mapping)
  - Universal Transverse Mercator (UTM)

- Transverse Mercator
- Web Mercator

- Universal Polar Stereographic (UPS) (North, South) (conformal stereographic mapping to a polar plane)
- Cylindrical Equidistant
- Lambert's Conformal Conic
- Polyconic.

[T1-R953] *The VC GeoView Map Panel shall support the Map Projections given in the Description.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R954] *The VC GeoView shall allow the user to select the desired Projection from a list of supported Map Projections.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.2.4.2.8. Map Scaling

Map Scaling is the control of the View Scale of the Map Panel. Ribbon Bar and the View Scale Bar of the Navigation Panel can be used to set the View Scale. Following predefined Fixed View Scales will be supported:

- 1:100.000.000
- 1:50.000.000
- 1:20.000.000
- 1:10.000.000
- 1:5.000.000
- 1:2.000.000
- 1:1.000.000
- 1:500.000
- 1:250.000
- 1:100.000
- 1:50.000
- or larger in support of specific Areas of Interest.

[T1-R955] *The VC GeoView shall adjust the View Scale of the Map Panel according to the user selected View Scale. Any used Web services shall also be scaled accordingly.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R956] *The VC GeoView Map Panel shall ensure that the expansion process during scaling occurs non-disruptively so that no outages are required, no reconfiguration of the existing storage is needed, and the user can continue working during scaling.*

Requirement Property :

Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R957] *The VC GeoView Map Panel shall compute the Cluster Distance of symbols in correlation with changing the View Scale and apply automatically.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R958] *The VC GeoView shall allow the user to set the current View Scale of the Map Panel by selecting a Fixed View Scale with from a configurable list (the default values are given in the Description) on the Ribbon Bar, by entering a scale value manually or by using the View Scale Bar.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R959] *The VC GeoView Map Panel shall apply de-cluttering of labels for every View Scale change if enabled by the user.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R960] *The VC GeoView shall display the current View Scale of the Map Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

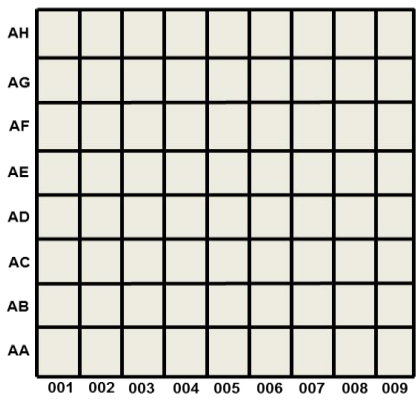
4.3.2.4.2.9. Grid Network

The Grid Network, also known as "graticule", displays the reference lines and labels on the Map Panel. The VC GeoView will support the following Grid Reference Systems:

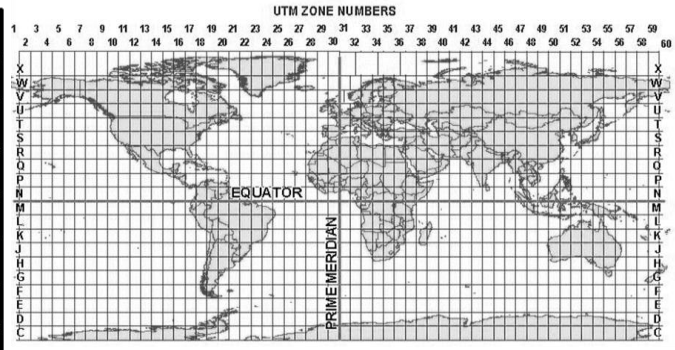
- Geographic Latitude-Longitude (parallels and meridians)
- Polar
- Universal Transverse Mercator (UTM)
- Military Grid Reference System (MGRS)
  - Grid zone designator
  - Area Identifier
  - Numerical location
- Common Geographic Reference System (CGRS)
  - Latitude
  - Longitude
- Global Area Reference System (GARS)
  - Cells and designators (30-minute)

- Quadrants (15-minute)
- Areas (5-minute)

Samples for GARS and MGRS are given below:



GARS



MGRS

The Base Map projection adapts the grids to the active projection. Attributes of the Grid Network are composed of graticule lines (i.e. lines where one coordinate value remains constant), labels and their styles. The VC GeoView will use the following Grid Parameters to structure the Grid Network:

- Bottom left location
- Top right location
- Row prefix
- Column prefix
- Labelling.

Grid Line Calculation:

The number of grid lines to be displayed will be calculated dynamically based on the map extent. Only grid lines of certain rounded values will be displayed (i.e. if in angular units multiples of 1°, 2°, 5°, 10°, 30° or 1', 2', 5', 10', 30' or 1", 2", 5", 10", 30" – whatever fits best into the map view). If the coordinates are in distance units, the grid lines to be displayed will be multiples of 1 * 10^n, 2.5 * 10^n, 5 * 10^n, where n is an integer number, whatever fits best.

[T1-R961] *The VC GeoView Map Panel shall support displaying the Grid Reference Systems given in the Description.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R962] *The VC GeoView Map Panel shall comply with STANAG 2211 and [Bi-SC 80-4] for geodetic datum, Map Projections and Grid References.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Inspection

[T1-R963] *The VC GeoView Map Panel shall display a Grid Reference System when received from the AppView according to the parameters given in the Description.*

Requirement Property :
Domain for Static :

Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R964] *The VC GeoView shall allow the user to show, hide, and configure the graticule ticks, lines and their colour for each Grid Reference System.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R965] *The VC GeoView shall allow the user to show or hide the grid lines and show or hide the grid labels.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R966] *The VC GeoView Map Panel shall use the Grid Line Calculation as explained in the Description to compute the number of grid lines to be displayed.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.2.4.2.10. Navigational Controls

Navigational Controls cover the user control of the Map Panel in spatial content. The user will be able move around the map, change its view and scale, and select objects for processing.

4.3.2.4.2.10.1. Navigation Icons

The Navigation Icons include a Panning Icon and a View Scale Icon. They allow the user to pan the Map Panel by pressing the direction buttons of the icon and changing the scale of the Map Panel. The user can move the visible extent of the map to four directions. A sample Panning Icon is given below:



[T1-R967] *The VC Map Panel shall have Navigation Icons for panning over the map and changing the View Scale.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R968] *The VC Navigation Panel shall allow the user to pan and to change the View Scale through interaction with the Panning and View Scale icons.*

Requirement Property :

Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.2.4.2.10.2. Cursor

The cursor is moved using the available pointing device. The cursor position is displayed continuously on the Coordinate Panel. When a location is clicked on the Map Panel that position is marked with special marker and the geographic information can be used for processing.

[T1-R969] *The VC GeoView shall allow the user to move the cursor with the available pointing device.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R970] *The VC GeoView shall allow the user to pick a geospatial position by clicking on the Map Panel. This information can further be used for processing (e.g. copy to clipboard).*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.2.4.2.10.3. Pan

The Pan Function allows the user to move around the Map Panel. The scale of the Map Panel will not change while panning. When the Pan Function is invoked, the cursor takes the shape of a hand over the Map Panel. When the user clicks and holds, the cursor changes to grabbing hand and moves the map together. The Navigation Icons or keyboard arrow keys can also be used to pan the Map Panel.

[T1-R971] *The VC GeoView shall pan the Map Panel according to the user control.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R972] *The VC GeoView shall allow the user to pan the Map Panel with the pointing device (click and drag).*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R973] *The VC GeoView shall allow the user to pan the Map Panel by pressing the Navigation Icons.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R974] *The VC GeoView shall allow the user to pan the Map Panel by using keyboard arrow keys.*

Requirement Property :

Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R975] *The VC GeoView shall allow the user to pan the Map Panel by using multi-touch gestures (i.e. drag) when a touch-screen device is used.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Test

4.3.2.4.2.10.4. Centre

The Centre Function provides the user to bring the selected position to the centre of the Map Panel. The user can invoke the Centre Function by either using the Ribbon Bar or keyboard Function Keys. The Centre Function will take the selected location or C4ISR Object as the reference.

[T1-R976] *The VC GeoView shall take the centre of the Map Panel to a position indicated by the user.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R977] *The VC GeoView shall allow the user to take the selected position as the centre of the Map Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R978] *The VC GeoView shall allow the user to enter a geographic position as the centre of the Map Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R979] *The VC GeoView shall allow the user to use Own Position as the centre of the Map Panel with an option to follow. If that option is selected, the Map Panel centre shall follow the Object as it changes its position.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R980] *The VC GeoView shall allow the user to use Ribbon Bar or keyboard Function key to invoke the Centre Function.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1

Qualific. Method : Test

[T1-R981] *The VC GeoView shall allow the user to select a C4ISR Object as the centre of the Map Panel with an option to follow the Object. If that option is selected, the Map Panel centre shall follow the Object as it changes its position.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.2.4.2.10.5. Select

The Select Function allows the user to select Objects or map features on the Map Panel. The user will be able to select more than one object (multi-select) by either selecting them one by one using a key (Shift or Ctrl) and button (left) combination or a circle or a polygon (shape-based selection). Selected Objects or features will be highlighted (e.g. a circle around it, altered font colour) with a user-configurable indication mark. The user will then be able to perform an action on the selected object.

[T1-R982] *The VC GeoView shall be able to apply a function to one or more selected Objects.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R983] *The VC GeoView shall highlight the selected Objects or map features with a user-configurable indication mark.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R984] *The VC GeoView shall allow the user to select one or more Objects or map features on the Map Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R985] *The VC GeoView shall allow the user to use a key-button combination (e.g. Control + Click) or a circle or a polygon to select more than one Object.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R986] *The VC GeoView shall provide a manageable list for multi-selection of Objects. The user shall be able to add more Objects to the selection list or remove Objects from the list.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.2.4.2.10.6. Zoom

Zoom Function provides the user with an ability to "Zoom In" or "Zoom Out". Zoom In enables the user to display an area of the Map Panel in more detail by increasing the map scale. Zoom Out enables the user to display in a larger region by decreasing the map scale.

Zoom Function can be invoked by the following Zoom Control Actions:

- Pressing the Plus or Minus Icons on the Ribbon Bar
- Using the Navigation Icons
- Selecting one of the provided default zooming scales
- Entering a zoom factor
- Using keyboard combinations (e.g. Ctrl + '+' to zoom in and Ctrl + '-' to zoom out)
- Using keyboard and pointing device scroll function (e.g. Ctrl + Wheel)
- Invoking a selection area (by drawing a rectangular shape to include the area to be zoomed in)
- Using a grid (e.g. an applied CGRS is selected and the Map Panel zooms into it).

[T1-R987] *The VC GeoView shall change the Map Panel Viewing Scale as the user zooms in or out.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R988] *The VC GeoView shall allow the user to control the zoom level of the Map Panel by using one of the Zoom Control Actions given in the Description.*

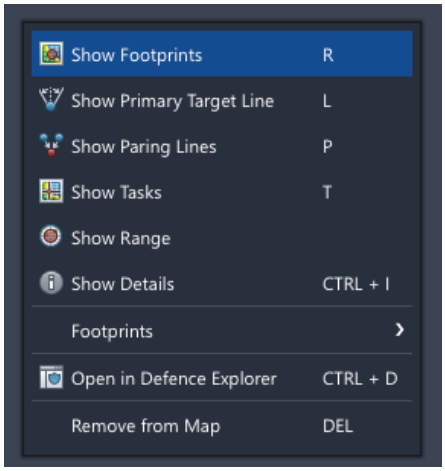
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R989] *The VC GeoView shall allow the user to control the zoom of the Map Panel through multi-touch gestures (i.e. pinch-to-zoom) when a touch-screen device is used.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Test

4.3.2.4.2.10.7. Context-sensitive Menus

The VC GeoView will display a Context-sensitive Menu when the right button of the pointing device is pressed. The content of the menu is determined according to the area of the component in which the cursor is positioned. A sample view of the Context-sensitive Menu is given below:



[T1-R990] *The VC GeoView shall display Context-sensitive Menus when the right button of the pointing device is pressed. The content of the menu shall be determined according to the area of the component in which the cursor is positioned.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R991] *The VC GeoView Context-sensitive Menus shall activate the selected function.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R992] *The VC GeoView Context-sensitive Menus shall be configurable to allow the addition of menu items, including sub-menus.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R993] *The VC GeoView Context-sensitive Menus shall be configurable to allow the enabling or disabling of menu items.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R994] *The VC GeoView Context-sensitive Menus shall be configurable to allow the hiding or showing of menu items.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R995] *The VC GeoView Context-sensitive Menus shall be configurable to allow the association with a shortcut keystroke with a menu item.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.2.4.2.10.8. Goto

The Goto Function allows the user to mark a specified geographic position of a location. If the specified location is in the current Spatial Extent, the mark will be positioned on that location; if not the location will be brought to the centre of the Map Panel. The Goto function can be invoked from the Ribbon Bar.

[T1-R996] *The VC GeoView shall be able to mark an entered Goto location if it is in the current Spatial Extent; if not the location will be brought to the centre of the Map Panel (panning).*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R997] *The VC GeoView shall allow the user to enter a position of a location to be marked when the Goto Function is invoked.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R998] *The VC GeoView shall allow the user to convert the entered value(s) from one Coordinate System to another.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Test

4.3.2.4.2.10.9. Bookmarks

A Bookmark is a one-click access capability for a particular display arrangement, including the area of interest. The selected Base Map, its settings, current area of interest, Layers, Panel and Display Settings are examples to the information to be saved as a Bookmark. When the user assigns a name and saves the current view of the GeoView as a Bookmark, it will be possible to retrieve the same view later on. There may be as many Bookmarks as the user wants to save. All Bookmarks are stored in the user Workspace as User Settings. Bookmarks can be accessed from the Ribbon Bar.

[T1-R999] *The VC GeoView shall be able to save the current view of the GeoView as a Bookmark.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Test

[T1-R1000] *The VC GeoView shall maintain a list of Bookmarks per user, accessible from the Ribbon Bar.*

Requirement Property :
Domain for Static :
Domain for Afloat:

Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1001] *The VC GeoView shall allow the user to manage (add, retrieve, modify, delete) the Bookmark List.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1002] *The VC GeoView shall apply the settings of the selected Bookmark to the GeoView.*

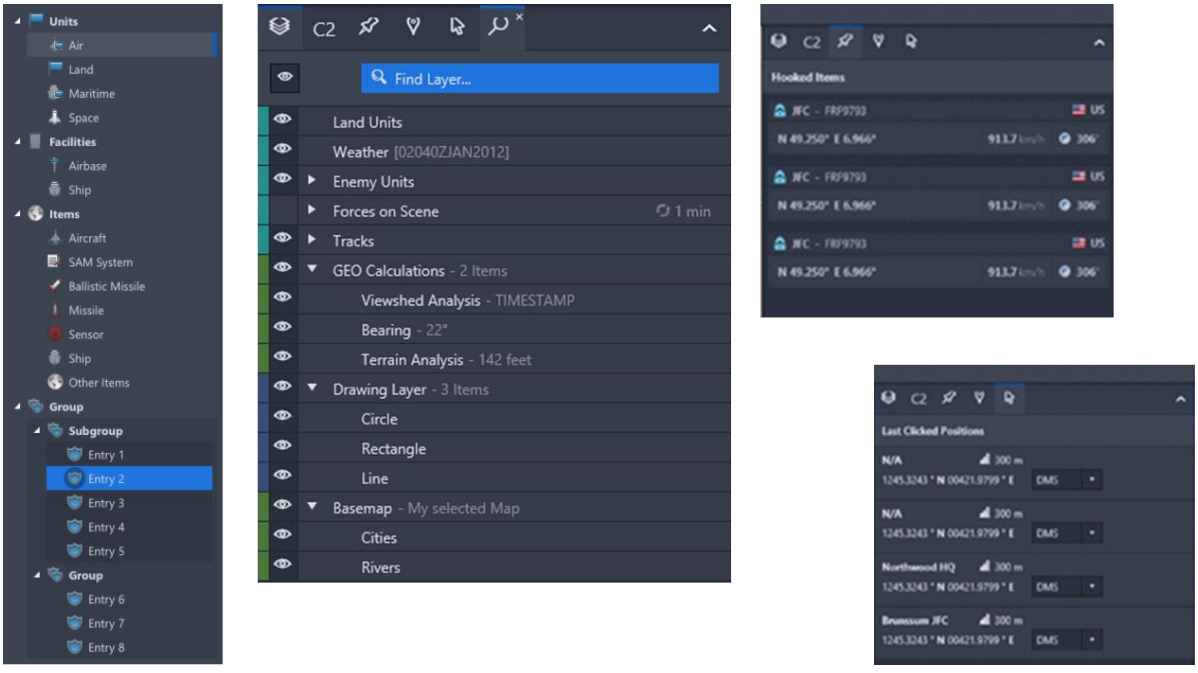
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.2.4.3. Control Panel

The Control Panel of the GeoView provides the user with the capability to control the display of C4ISR Objects and map features. It includes the following functions as separate Panes:

- C2 Pane
- Layer Control Pane
- Placemarks Pane
- Timeline
- Search Pane

A sample Control Panel with sample Panes is given below:



4.3.2.4.3.1. C2 Pane

The C2 Pane provides support to the user with command and control aspects of the visualisation. It lists the types or categories of C4ISR Objects that are currently displayed in the Layers of the Map Panel in a tree structure. This tree shows the entries by categories and is used to present hierarchical information. Each item within the tree may contain sub-items which are part of the next level of the

hierarchy. The tree items containing sub-items can be expanded and collapsed to show or to hide these items. A sample view is given below:

Following types of information can be displayed as C4ISR Objects and map features:

- C4ISR Objects with symbology
- NATO Vector Graphics (NVG) [NVG]
- KML/KMZ [OGC KML]
- Web Services related to Geo-information (OGC WMS and OGC WMTS according to Map Rendering Services SIP)
- Shape File (compatible to NATO Core GIS) (ESRI Shape File)
- Gazetteer data

The C2 Pane supports functions which are common to all tabular views such as grouping, filtering, arranging column visibility, copying selected items metadata to clipboard, printing and exporting the list functions.

When a filter is applied in the Pane, only the filtered items are displayed on the Map Panel.

[T1-R1003] *The VC GeoView shall have a C2 Pane to control the display of C4ISR Objects in Layers of the Map Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1004] *The VC GeoView shall allow the user to configure the C2 Pane content.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1005] *The VC GeoView C2 Pane shall allow the user to group C4ISR Objects according to a common attribute (e.g. Country, Type) by applying a filter.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1006] *The VC GeoView C2 Pane shall display the content in a tree structure with at least eight (8) levels.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1007] *The VC GeoView C2 Pane shall allow the user to navigate within the tree structure by expanding and collapsing.*

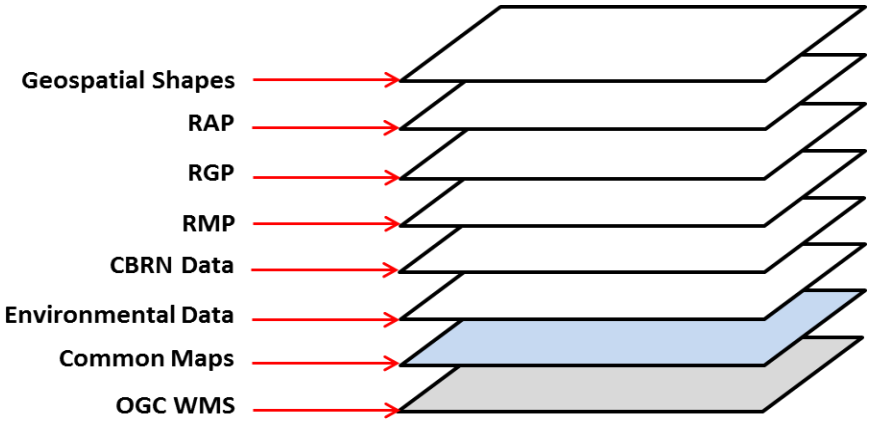
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1008] *The VC GeoView C2 Pane shall allow the user to make multiple selections of C4ISR Objects or feature types in the tree structure.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.2.4.3.2. Layer Control Pane

A "Layer" is a collection of geographic features which may consist of raster or vector data displayed on the Map Panel. "Overlay" is also another term used for indicating the graphical objects displayed in a Layer. All Layers have a source of data and managed by either the GeoView or AppView. Users can select which Layers are active at a time. A conceptual representation of layered display is given below:



AppView can send data to a specific Layer as a push. For example, CBRN Data can be displayed on a CBRN Layer as sent by the AppView . On the other hand, when a Layer is activated, its data can be requested from the AppView (as a pull).

The Layer Manager of the VC GeoView handles the data input for Layers and their display settings. The features of a Layer may come from different sources. They may be local data holdings or feeds from C4ISR Applications. C4ISR Application may be KML services, NVG services, Web Feature Services [OGC WFS], Web Mapping Services [OGC WMS], or Web Map Tiling Services [OGC WMTS]. A service itself may deliver geospatial data structured in a hierarchy of several layers.

The Layer Control Panel allows the user to view and edit the Layer Display Settings. Each Layer has its own Display Settings which include at least the following, if applicable by the resource:

- Identification
- Visibility (show/hide)
- Labelling status (on/off)
- Tinting
- Opacity
- Style
- Clustering Settings (see Displaying C4ISR Objects)
- Selected Object Attribute(s)
- Number of C4ISR Objects in the map extent

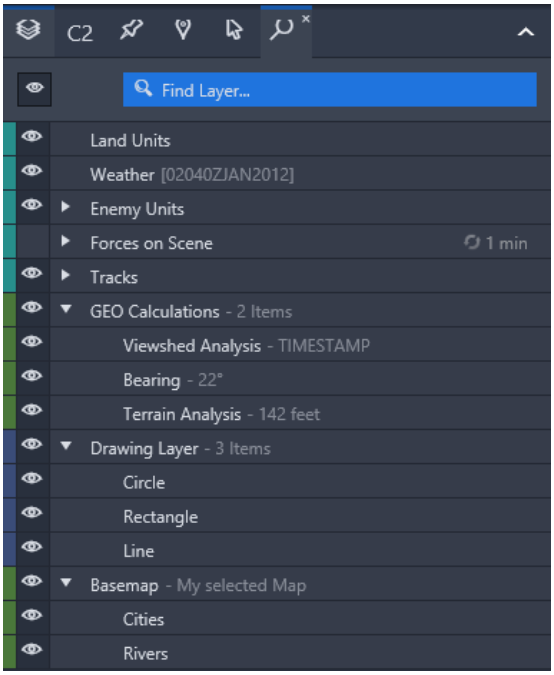
Indicator, if data is time-stamped to support animations

The priority for rendering the map is given by the order of levels in the Layer Control Pane. The lowest Layer has lowest priority. The metaphor is like looking at the layers from above with their visibility, transparency, opacity, and tinting settings applied.

The Layer Control Pane will have Table of Contents (TOC) functionality which provides management of all Layers and Web Services used in the Map Panel. The Pane the Web services, individual geospatial layers browsed and layers created/shared by users in a tree structure. The management capabilities include the following:

- Listing the Layers and Web services with thumbnails
- Adding, removing Layers and services
- Collapsing and expanding the tree structure.
- Changing the order of features in the tree
- Creating (or renaming) thematic groups to classify layers and services

A sample Layer Control Pane is given below:



[T1-R1009] *The VC GeoView shall be able to display C4ISR Objects and map features on separate Layers.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1010] *The VC GeoView shall maintain a list of Layers where each Layer is controlled by its own Display Settings.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1011] *The VC GeoView shall have a Layer Manager to control receiving data from an Application and displaying it on the specified Layer according to Layer Display Settings.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1012] *The VC GeoView Layer Control Pane shall allow the user to manage (add, modify, remove, configure) the Layers and Web services*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1013] *The VC GeoView Layer Control Pane shall allow the user to configure the Layer Display Settings for each Layer as given in the Description.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1014] *The VC GeoView Layer Control Pane shall allow the authorised user to restrict general user access to certain Layers which are displayed on the Map Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1015] *The VC GeoView Layer Control Pane shall allow the user to zoom to (or Goto) a selected feature. The scale of this zoom shall be customizable in the User Settings. The selection of the feature shall be possible either by a simple query or by identifying the feature or location by clicking at a location on the map.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1016] *The VC GeoView Layer Control Pane shall allow the user to set the Map Panel view to "fit to the full spatial extent" covering all features of a particular Layer.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1017] *The VC GeoView Layer Control Pane shall allow the user to temporarily switch off (flicker) a Layer to see what is underneath without having to hide it.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Test

[T1-R1018] *The VC GeoView Layer Control Panel shall allow the user to temporarily move a Layer onto another Layer (swipe). When the swipe function is invoked, the Map Panel shall display two Layers with a line to control the swiping to left or right.*

Requirement Property :
Domain for Static :
Domain for Afloat:

Baseline : VC-BL 3
Qualific. Method : Test

[T1-R1019] *The VC GeoView Layer Control Panel shall display brief information about the metadata of each layer or service while hovering the cursor on it.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

4.3.2.4.3.3. Placemarks Pane

A Placemark is a geographic location having a name and symbol. The VC will maintain a Placemark List as a list of stored map context information for the user to quickly access different Areas of Interest. When the user wants to mark a Spatial Content, the VC will store it in the Placemark List. The user can then select one of those marks and invokes the Goto Function to mark the location on the Map Panel. The VC will also support sharing Placemarks among the users (by setting their visibility to private, shared, public), importing and exporting them in KML/KMZ format.

The Control Panel will have a list of Placemarks as a Pane allowing the user to access them easily.

[T1-R1020] *The VC GeoView shall maintain a Placemark List.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1021] *The VC GeoView shall allow the user to manage (add, delete, modify, search, set visibility, show, hide) the Placemark List.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1022] *The VC GeoView shall allow the user to export the selected Placemarks in the Placemark List to an exported Placemark file in KML/KMZ format.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1023] *The VC GeoView shall allow the user to import Placemarks from a exported Placemark file in KML/KMZ format.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1024] *The VC GeoView shall allow the user to select a Placemark and invoke the Goto Function to mark the location on the Map Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:

Baseline : VC-BL 1
Qualific. Method : Test

4.3.2.4.3.4. Timeline Panel

The Timeline Panel is the control of the Geo Player to display time-stamped geospatial data in chronological order. In that way changes in the situation can be visualised, for example to show the movement of C4ISR Objects. The user can specify the replay period via a date and time picker for the start and end time of the animation. The user can choose the speed and direction (forward or backward) of this animation. It may be in actual time or accelerated time or in slow motion. A timeline bar is used to control the animation with Play, Replay, Pause, Fast Forward, Fast Backward buttons. The date and time will be displayed and updated continuously.

The Timeline Panel will appear automatically when an animation is activated by the Geo Player.

[T1-R1025] *The VC GeoView shall have a Timeline Panel which controls the replaying a given set of geospatial data as explained in the Description.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1026] *The VC GeoView Timeline Panel shall allow the user to pick the date and time of the replay period.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1027] *The VC GeoView Timeline Panel shall appear automatically when an animation is activated by the Geo Player.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

4.3.2.4.4. Footer

The Footer has the following panels:

- Status Panel
- Time Panel
- Notification Panel
- Coordinate Panel

4.3.2.4.4.1. Status Panel

The Status Panel displays the current status of the VC. Examples to status information are given below:

- Network connection status
- Mode of Operation
- Current Operational State

[T1-R1028] *The VC GeoView shall have a Status Panel for displaying the status information given in the Description.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1029] *The VC GeoView Status Panel shall be able to display status information as received from the VC or AppView.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.2.4.4.2. Time Panel

The VC will display the current date and time in the Time Panel. The Panel will be able to display time in three different time zones. These are: Local, Operational Theatre Time and UTC (Zulu) Time. The default will be UTC.

[T1-R1030] *The VC GeoView shall have a Time Panel to display the current date and time in decimal units.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1031] *The VC GeoView Time Panel shall display the current time in local time zone, operational theatre time zone or UTC.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1032] *The VC GeoView Time Panel shall allow the user to select the time zone. The default shall be UTC.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1033] *The VC GeoView Time Panel shall allow the user to select the format for the display of the date time.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.2.4.4.3. Notification Panel

The Notification Panel will display any errors or warnings related to the VC (or Application). Only the non-critical errors which are not requiring user acknowledgment will be displayed.

[T1-R1034] *The VC GeoView shall have a Notification Panel to display non-critical errors or warnings.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1035] *The VC GeoView Notification Panel shall be able to display error or warning messages sent by the VC or Application.*

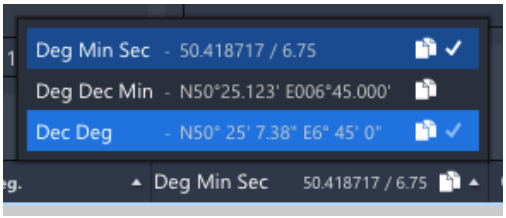
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.2.4.4.4. Coordinate Panel

The Coordinate Panel displays the coordinates of the cursor position. Following information related to the cursor position will be calculated and displayed:

- Geographic location (Latitude / Longitude)
- Grid location (with respect to the selected grid)
- Elevation/depth (based on a digital terrain or elevation model)
- Slope (based on a digital terrain or elevation model)

The values are updated as the cursor moved around the Map Panel. The Coordinate Panel will have configurable settings. A sample view is given below:



The user will be able to configure the display, units, and enabling/disabling each display.

[T1-R1036] *The VC GeoView shall have a Coordinate Panel to display the position information of the cursor position.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1037] *The VC GeoView shall display the elevation/depth and slope information based on the cursor position on the Coordinate Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1038] *The VC GeoView shall use Web Services provided by the GIS Server to get the elevation/depth and slope information of an indicated position.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1

Qualific. Method : Inspection

[T1-R1039] *The VC GeoView shall allow the user to enable/disable the displaying of elevation/depth and slope information.*

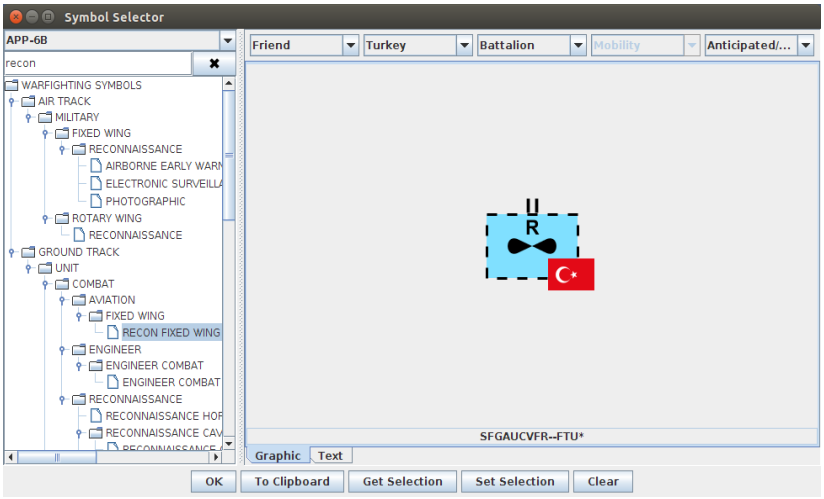
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1040] *The VC GeoView shall allow the user to configure the Settings of the Coordinate Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.2.4.4.5. Symbol Selector

The Symbol Selector provides the user access to the symbol metadata from the Symbology Service for the purpose of selecting an appropriate symbol for a given C4ISR Object or C2 Drawing, or visualising the metadata of a specific symbol. A sample Symbol Selector user interface is given below:



[T1-R1041] *The VC GeoView shall provide a Symbol Selector.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

[T1-R1042] *The VC GeoView Symbol Selector shall allow the user to choose a symbol from those provided by the Symbology Service.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Test

[T1-R1043] *The VC GeoView Symbol Selector shall support all symbology standards available through the Symbology Service.*

Requirement Property :
Domain for Static :

Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

[T1-R1044] *The VC GeoView Symbol Selector shall support all point, line, area and multi-point based symbology provided by the Symbology Service.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

[T1-R1045] *The VC GeoView Symbology Selector shall utilise the Symbology Service for the rendering of the symbols.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

[T1-R1046] *The VC GeoView Symbol Selector shall consume the Symbology Service metadata for the purpose of presenting the available symbology to the user.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

[T1-R1047] *The VC GeoView Symbol Selector shall display the symbol and metadata associated with a selected C4ISR Object or C2 Drawing.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

[T1-R1048] *The VC GeoView Symbol Selector shall provide the means to display the Symbology Service metadata in a tree format.*

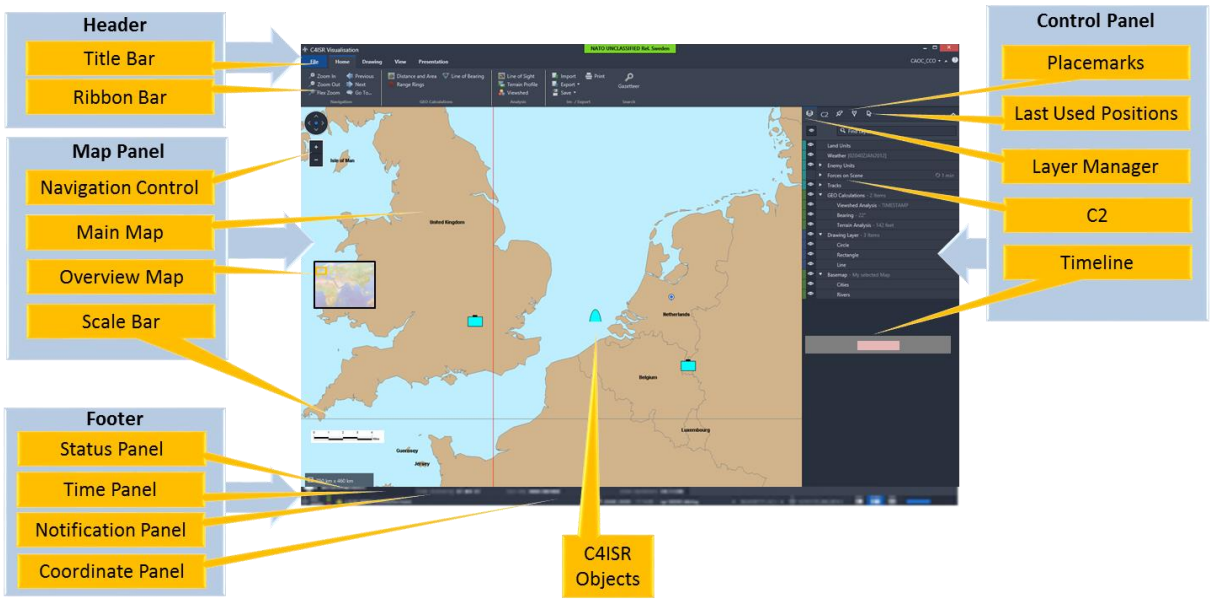
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

[T1-R1049] *The VC GeoView Symbol Selector shall provide the means to search for a symbol and display the results in a tree format.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

4.3.3. User Interface Layout

The GeoView User Interface Layout indicating the main groups of graphical components is given below as an example:



4.3.4. Handling Geospatial Objects

Geospatial Objects are entities having geographic data. The main objects that are subject to be displayed by the GeoView are C4ISR Objects (e.g. track symbols, figures) and geo-information (e.g. map features). These Objects are displayed in the GeoView according to user-selected criteria.

4.3.4.1. Displaying C4ISR Objects

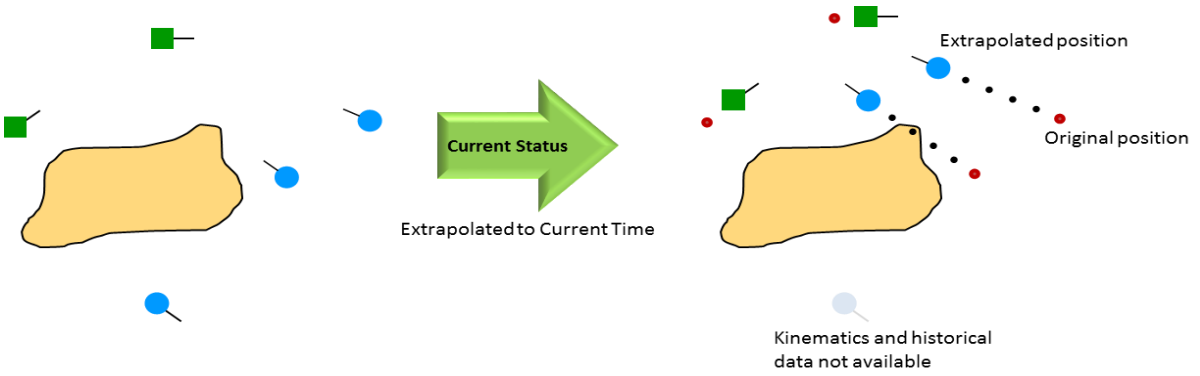
All C4ISR Objects, both military and non-military, will be displayed on the Map Panel with predefined symbols when they are sent by the AppView. The Map Panel extent will be adjusted according to the request issued by the AppView to display selected C4ISR Objects (e.g. Move Extent, Zoom to Object). The Symbol Set will be provided by the VC Symbology Service.

4.3.4.1.1. Object Display

The VC GeoView will receive the C4ISR Objects to be displayed from the AppView according to the current map extent. The Objects being displayed on the Map Panel will be updated when their attributes are updated by the AppView.

Current Status:

The GeoView will display Objects at their reported positions as received from the AppView. However, if the user wants to view the "Current Status", the GeoView will extrapolate the positions of all moving Objects to the current time using their last known kinematics (position and movement vectors, e.g. course and speed for dead reckoning). Objects will be displayed on the map after their future position is calculated without considering the geographical locations (e.g. ships may appear on land). Therefore, this tentative status will be displayed for a configurable amount of time (e.g. one minute) with an indication to the user (e.g. a warning on the Status Panel) and the markers at the original positions with trailing dots. An example is shown below:



[T1-R1050] *The VC GeoView shall request C4ISR Objects from the AppView to display on the Map Panel with their geospatial information. The request filter shall be derived from the current Map Extent.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 1
- Qualific. Method : Demonstration

[T1-R1051] *The VC GeoView shall update the positions of the displayed C4ISR Objects when they are updated by the AppView.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 1
- Qualific. Method : Demonstration

[T1-R1052] *The VC GeoView shall be able to extrapolate positions of the displayed C4ISR Objects to current time using the last known kinematics when the user wants to view the Current Status as defined in the Description.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 1
- Qualific. Method : Test

[T1-R1053] *The VC GeoView shall be able to extrapolate the positions of all visible C4ISR Objects when the user wants to view the Current Status, and display the Objects at their future positions as defined in the Description for a configurable amount of time.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 1
- Qualific. Method : Test

[T1-R1054] *The VC GeoView shall use the last known kinematics of C4ISR Objects for extrapolation to current time. If the movement vectors of an Object are not available at the last position update, then the VC shall derive movement vectors from the historical positions available within the last six (6) hours. If no historical position is available, then the Object will not be extrapolated to future position and displayed with faded symbol.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 1

Qualific. Method : Test

[T1-R1055] *The VC GeoView shall be able to extrapolate the positions of all visible C4ISR Objects when the user wants to view the Current Status, and display the Objects at their future positions as defined in the Description for a configurable amount of time or until the user cancels.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1056] *The VC GeoView shall allow the user to view the Current Status as defined in the Description.*

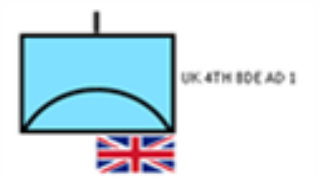
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1057] *The VC GeoView shall allow the user to set duration to view the Current Status. The duration shall be configurable between five (5) seconds to one minute.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.4.1.2. Symbology

The VC will use symbols to display military and non-military Objects on the Map Panel. A sample symbol is given below:



The VC will also display the Speed Leader or Direction & Movement [APP-6] of a moving Object if enabled. A flag will be displayed if enabled by the user.

[T1-R1058] *The VC GeoView shall display the C4ISR Objects on the Map Panel using the symbology standards supported by the Symbology Service.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1059] *The VC GeoView shall allow the authorised user to manage (publish, update, delete) symbols and associated rules from the Portrayal Catalogue of the Symbology Service.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1060] *The VC GeoView shall allow the user to select a Symbol Set from the list of available sets provided by the Symbology Service and set it as a personal default.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1061] *The VC GeoView Map Panel shall apply the selected symbol set to all objects and features automatically.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1062] *The VC GeoView Map Panel shall be able to display symbols with faded colours when such a feature is functionally required. For example, when all Objects are extrapolated to future positions, those Objects not suitable for extrapolation will be displayed with faded symbols temporarily.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1063] *The VC GeoView Map Panel shall display the Speed Leader or Direction & Movement [APP-6] of a moving Object if enabled.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1064] *The VC shall use the mechanisms provided by the Symbology Service to improve network efficiency (e.g. receiving only a subset of the default and most used symbols during the initialisation, caching the used symbols and Sprite Sheets (see Symbology Service)).*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Inspection

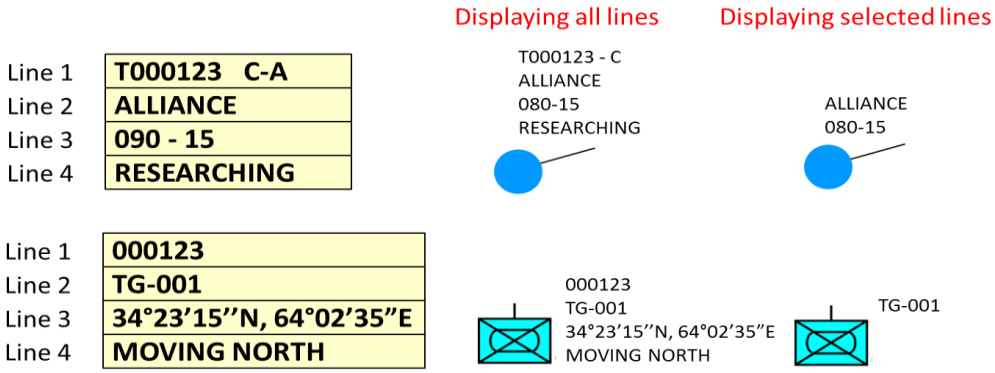
4.3.4.1.3. Object Labels

Object Label is a small text box for displaying a brief information related to a C4ISR Object. The size, background colour, text font/face/size and colour of Object Labels will be configurable. Their general positions with respect to the symbol are also configurable (e.g. top-right, right). The text box has a configurable number of lines and characters where each line can be addressed. The AppView determines what to be displayed on the Object Labels. Following information can be displayed on Object Labels as an example:

- Object Identification number (e.g. Track Number) (given by the Application)
- Special status indicator (e.g. correlated track indicator, associated track indicator)
- Name
- Kinematic information (e.g. Course, Speed)

- Special description

Sample Object Labels are given below:



The authorised user identifies the lines of the Object Labels. Any user can then select the lines to be displayed and configure their appearance.

Following font types will be supported as a minimum:

- True Type Fonts (Calibri, Arial, Helvetica as a minimum) (as available on the Client Workstation)
- Open Type Fonts
- PostScript Fonts.

[T1-R1065] *The VC GeoView shall display Object Labels as a configurable text box at a user-selected position with respect to the symbol.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1066] *The VC GeoView shall receive data to be displayed on Object Labels from the Application.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1067] *The VC GeoView shall support the Object Label fonts given in the Description.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1068] *The VC GeoView shall allow the authorised user to configure the general structure and size of the Object Labels.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1069] *The VC GeoView shall allow the user to configure the appearance (lines to be displayed, background colour, text type/size and colour) of the Object Labels.*

Requirement Property :
Domain for Static :

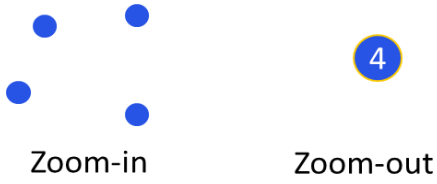
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1070] *The VC GeoView shall allow the user to re-position Object Labels by selecting, dragging and dropping at any position of the Map Panel.*

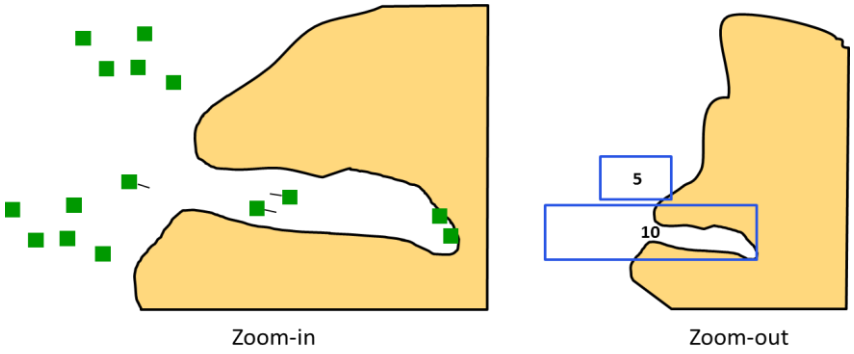
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.4.1.4. Clustering

Clustering is described as symbolising multiple C4ISR Objects with a single symbol. The purpose of this function is to delineate overlapping symbols in a limited area. Clustering provides a more aesthetic an efficient display with increased usability. Clustering identifies groups of objects in a Layer that are within a given Cluster Distance. The Cluster Distance is dependent on the scale at which the Map Panel is displaying and on the size of the symbol; as zoomed in, fewer points are clustered and as zoomed out, more points are clustered. The Clustering Function draws a graphical link between the overlapping objects and its cluster centroid. Following is an example for displaying clustered point objects with a distinguishable (e.g. yellow circle) indication and a label indicating the number of objects:



When the zoom scale becomes very high and not suitable for displaying even clustered object symbols, the number of objects within a rectangle will be displayed. The size of the rectangle will be determined using the scale factor and number of objects within that rectangle. A sample view is shown below:



The user will be able to configure Clustering settings which includes Clustering Distance, scale, number of allowable objects in one rectangular area and excluded features. When Clustering is enabled, the GeoView will automatically cluster objects according to the user settings. Disabling the Clustering will return the Map Panel to normal display with object symbols.

[T1-R1071] *The VC GeoView shall allow the user to enable/disable Clustering for a selected Layer.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1072] *The VC GeoView shall allow the user to configure Clustering settings which includes at least the clustering distance, scale, number of allowable objects in one rectangle and excluded features.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1073] *The VC GeoView shall automatically cluster overlapping point symbols displayed on the Map Panel according to the user settings when Clustering is enabled.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1074] *The VC GeoView shall provide an option to exclude an Object from clustering.*

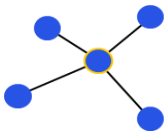
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1075] *The VC GeoView Map Panel shall re-cluster symbols when the content of the layer is changed.*

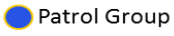
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.4.1.5. Object Grouping

The C4ISR Objects displayed on the Map Panel can be grouped manually to indicate a logical connection between them. A combined symbol at the geometric centre of the group will be used to indicate the location of the group when Clustering is enabled. Following is an example to displaying grouped point objects with a distinguishable (e.g. yellow circle) indication and a label set by the user:

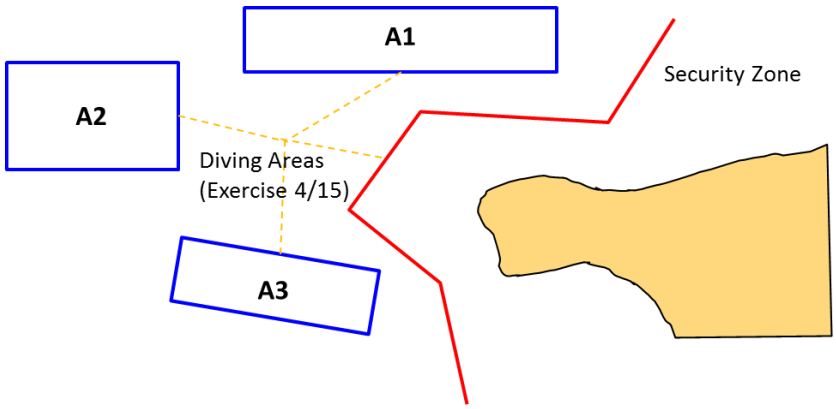


Zoom-in



Zoom-out

Following is an example to grouping of Areas:



When Clustering is enabled, the manually grouped objects will be taken into consideration.

[T1-R1076] *The VC GeoView shall display a group of Objects with a combined symbol at the geometric centre of the group. A single Object Label shall be used which includes the text of the individual Object Labels.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1077] *The VC GeoView shall display the grouped Objects when Clustering is enabled.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1078] *The VC GeoView shall allow the user manage Object Grouping (e.g. selecting logically-related objects (e.g. tracks, areas), assigning a label and an annotation).*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1079] *The VC GeoView shall update the centre of the object group when the object positions are updated.*

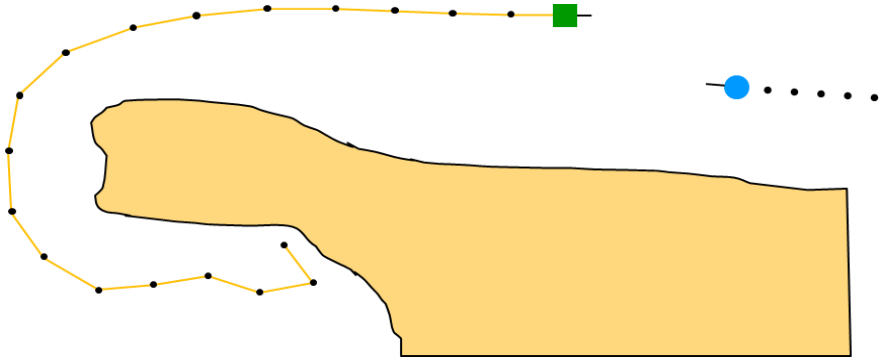
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1080] *The VC GeoView shall rearrange grouping if an object is deleted and disable grouping automatically when only one object remains.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

4.3.4.1.6. Object History

The GeoView will be able to display historical positions of selected objects based on the user-selected duration and intervals. An example of displaying history is depicted below:



The GeoView will display the History Tail (the last positions within a configurable time with connection routes) for all moving Objects for their last known positions. The number of positions shall be user configurable. For example, the last five position will trail the Object as it moves.

[T1-R1081] *The VC GeoView shall be able to display historical positions of moving C4ISR Objects on the Map Panel when enabled.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 2
- Qualific. Method : Demonstration

[T1-R1082] *The VC GeoView shall allow the user to configure historical position settings including duration and intervals for a set of selected C4ISR Objects.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 2
- Qualific. Method : Test

[T1-R1083] *The VC GeoView shall display the History Tail (the last positions within a configurable time) for all moving Objects for their last known positions. The number of positions shall be user configurable in the Display Settings.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 2
- Qualific. Method : Test

4.3.4.1.7. Label De-confliction

The Label De-confliction Function provides the capability to de-conflict overlapping Object Labels and Map Labels on the Map Panel. All labels will be displayed without conflicting each other. If there is not enough space to display all labels belonging to all objects in the current view, then the size of the labels will be reduced.

This function applies to any object displayed with its corresponding label on the Map Panel.

If the function is enabled, then the GeoView will declutter the labels automatically when the Map Scale or the number of visible objects are changed. If the function is not enabled, the user can change the label locations manually. Re-enabling the function will override all manual changes.

[T1-R1084] *The VC GeoView shall be able to declutter Object Labels according to their position, number of visible objects and the available space in the current view.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1085] *The VC GeoView shall allow the user to enable/disable Label De-confliction for a selected layer.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1086] *The VC GeoView shall de-conflict the Object Labels and Map Labels automatically if the function is enabled for a selected layer.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1087] *The VC GeoView shall de-conflict the labels automatically when the Map Scale, position of objects, the number of visible objects in the layer or content, font and size of the labels are changed.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1088] *The VC GeoView shall allow the user to change the label locations manually if the function is not enabled.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1089] *The VC GeoView shall, when re-applying the declutter function, strive to keep the majority of the label locations constant. The intent is to avoid most labels jumping to a new location with each application of the declutter function.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.4.1.8. Tinting

"Tinting" is to change the appearance of symbols and labels. The Tinting Function will allow the user to change the following attributes of the displayed symbols and labels:

- Colour
- Line pattern

- Line width
- Fill pattern
- Point symbol
- Text font
- Transparency
- Classification methods
  - Equal Range
  - Quantile
  - User-defined Ranges
  - Unique value.

The VC GeoView will be able to generate default groups like "grouping by equal interval" and "grouping by unique value tinting".

[T1-R1090] *The VC GeoView shall be able to apply tinting of symbols and labels as set by the user for each Layer.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1091] *The VC GeoView shall allow the user to change the attributes of the symbols and labels given in the Description.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1092] *The VC GeoView shall be able to generate default groups like "grouping by equal interval" and "grouping by unique value tinting".*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.4.1.9. Object Information Display

The VC GeoView will display following types of information when a C4ISR Object on the Map Panel is selected:

Simple Information:

When the cursor is hovered on a C4ISR Object symbol, only the Simple Information will be displayed as a tooltip. The Simple Information includes the following:

- Identification (Name, ID Number or blank)
- Kinematics (if moving) (Course/direction, Speed)

Default Information:

When the Object symbol is selected (double-clicked or a menu item selected from the Context-sensitive Menu) the Default Information will be displayed in a pop-up box called "Object Information Box" (also known as a Flyout). The content of this box will be configured according to Application needs.

The Default Information will include the following:

- Identification (Name, ID Number or blank)
- Country (if applicable)
- Standard Identity, Category (APP-20 for ships)
- Class/type
- Kinematics (Course/general direction, Speed)
- Position (Latitude / Longitude or a grid information)
- Location (e.g. port name, a city)
- Date-Time Group (DTG) of update
- Link for further information

Detailed Information:

When the user needs more detailed information about a selected C4ISR Object, the GeoView will augment the detailed information according to the type of the Object and display it in the Object Information Box. The Detailed Information will include the following:

- Identification (Name, ID Number)
- Country (if applicable)
- Standard Identity and Amplification, Category (APP-20 for ships)
- Kinematics (Course/general direction, Speed)
- Position (Latitude / Longitude or a grid information)
- Location (e.g. port name, a city)
- Operational Information (e.g. Mission/Campaign/Operation, Task, Activity, Status, Destination, Last Port)
- Object-specific Information (specific data for vessels, battle-space objects)
- Image (photo of the vessel)
- DTG of update
- Figure supported by the Application.

Object Information Box will be configured by the Application according to the type of the Object. It will be able to display all detailed information in grouped tabs enabling the user to directly access a group. A Box will stay on the Map Panel until it is closed by the user.

[T1-R1093] *The VC GeoView shall display the Simple Information, given in the Description, for a selected C4ISR Object, as a Tooltip when the cursor is hovered on its symbol.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1094] *The VC GeoView shall display an Object Information Box as a flyout when the user selects a symbol. The Box can be docked on the GeoView.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1095] *The VC GeoView shall allow the user to activate an Object Information Box as a flyout by either double-clicking on a symbol or selecting from the Context-sensitive Menu or pressing an Function Key.*

Requirement Property :
Domain for Static :

Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1096] *The VC GeoView shall be able to display a configurable number of separate Object Information Boxes simultaneously with indications (e.g. lines to the symbols) to the related Objects.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1097] *The VC GeoView shall configure the content of the Object Information Box as defined by the AppView according to the type of the selected C4ISR Object.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1098] *The VC GeoView shall display the Default Information, given in the Description, in an Object Information Box when a C4ISR Object is selected.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1099] *The VC GeoView shall display the Detailed Information, given in the Description, in the Object Information Box when detailed information for the C4ISR Object is requested by the user.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1100] *The VC GeoView shall be able to retrieve the augmented information from the AppView and display it in the Object Information Box as defined by the AppView.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1101] *The VC GeoView shall allow the user to adjust the update rate of a C4ISR Object being displayed in the Object Information Box. When the user quits the Box, the update rate shall be reset to its configured parameter.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.4.1.10. Tooltips

Tooltips will provide brief information about the C4ISR Objects or Map Features when the cursor is positioned on an object symbol. Tooltips can be enabled or disabled.

[T1-R1102] *The VC shall display a Tooltip for a C4ISR Object or a Map Feature when the cursor is hovered on its symbol for more than five-hundred (500) milliseconds. The Tooltip shall be removed when the cursor is moved away or when a duration given in the Configuration Settings has elapsed. The default shall be five (5) seconds.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 1
- Qualific. Method : Test

[T1-R1103] *The VC GeoView shall allow the user to configure Tooltip text format (e.g. font, size, colour) as part of the User Settings.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 1
- Qualific. Method : Test

[T1-R1104] *The VC GeoView shall allow the user to configure Tooltip text as part of the related Object attributes. Same structure as Object Labels shall be used for Tooltips.*

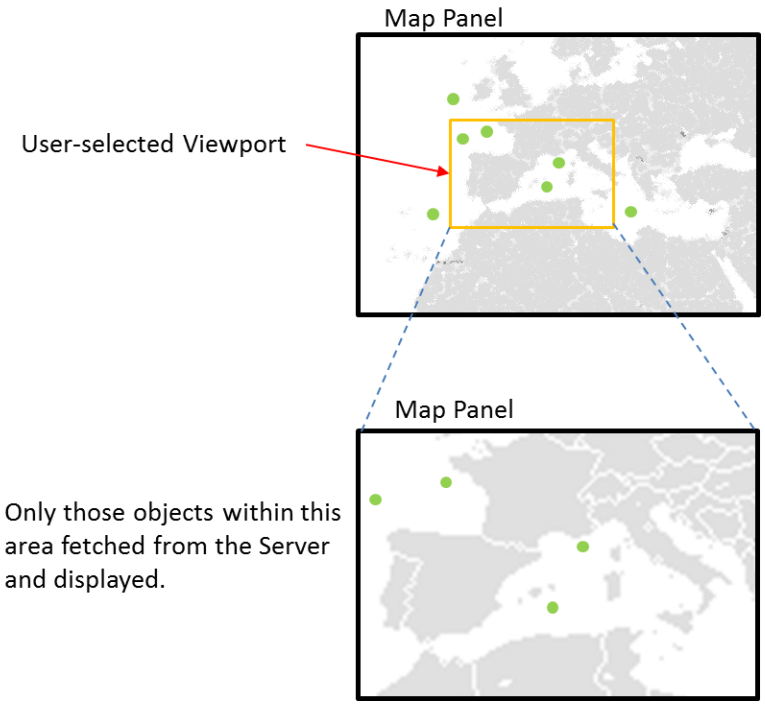
Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 1
- Qualific. Method : Test

4.3.4.2. Managing Spatial Extent

A Spatial Extent is a rectangular area calculated using the screen coordinates in pixels, grain and extent (the size of a pixel and resolvable unit). Once the geographical area is determined with respect to the current View Scale and the screen resolution, a geographical filter is applied on the Objects and only those Objects passing the filter are processed. The user can either zoom in around the centre point of the Map Panel or by drawing a rectangle to indicate the new map extent.

The VC GeoView will automatically adjust the content according to the Map Panel scale and its size, and manage the data to be displayed. As the scale or size of the Map Panel changes, the GeoView will automatically calculate the Extent size in terms of pixels on horizontal and vertical axis, which maps onto distances from the centre location, and then request the data within that area. As the scale of the Map Panel gets smaller, the number of Objects increases.

When the user draws a rectangle on the Map Panel and sets a coverage area, this area will then be used to request only the relevant data from the AppView. The size of coverage area, consequently the number of Objects, will not be affected by the size and scale of the Map Panel. The selection method is illustrated below:



Diagonal coordinates of the Extent rectangle will be sent to the AppView via a NMAPI to make the Functional Service Application clip the C4ISR Objects falling into the defined area (applying geo-filter). The list of clipped Objects will then be sent to the GeoView to be rendered on the Map Panel.

[T1-R1105] *The VC GeoView shall manage the Spatial Extent when the user zooms in or zooms out or draws an extent rectangle.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 1
- Qualific. Method : Test

[T1-R1106] *The VC GeoView shall send the calculated rectangular coverage area to the AppView via NMAPI and shall render the returned features and C4ISR Objects.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 1
- Qualific. Method : Demonstration

[T1-R1107] *The VC GeoView shall allow the user to set the Spatial Extent Mode with an area selection.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 1
- Qualific. Method : Test

[T1-R1108] *The VC GeoView shall adjust the Spatial Extent according to the request defined by the AppView for displaying selected C4ISR Objects.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 1
- Qualific. Method : Demonstration

[T1-R1109] *The VC GeoView shall be able to update the default data of the C4ISR Objects in the current Spatial Extent with a rate of at least one-thousand (1000) Objects per minute for a Client running on a Standard Workstation on a standard NATO Static Site Network.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.4.3. Displaying Geo-Information

Geo-Information includes the following:

- Geo features
- Topographic features
- Political features
- Meteorological features
- Place names (Gazetteer data)

Map Rendering Service refers to Geospatial Services that return map graphics, primarily as images, portraying a specific geospatial region. It covers:

- User-specific electronic maps, like portrayals of a specific geospatial region (e.g. formatted as media types image (jpeg, gif, svg+xml)).
- Service metadata as a machine readable description (e.g. formatted as media type text/xml) of the information content provided by the service, and the corresponding request parameter.

[T1-R1110] *The VC GeoView shall be able to display Geo-information given in the Description.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1111] *The VC GeoView shall be able to display Application-specific features provided by the NMAPI.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1112] *The VC GeoView shall be able to interrogate the GIS Server for OGC compliant Web Services, list the available Services and display the selected services as Layers.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1113] *The VC GeoView shall allow the user to select the Web Services for displaying as Layers.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1114] *The VC GeoView shall display attribute data associated with the displayed Geo-features and AppView-features.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1115] *The VC GeoView shall be able to apply filter to the Geo-information features based on attribute data.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1116] *The VC GeoView shall display Geo-information according to the current Projection and Coordinate System.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.4.4. Displaying KML and KMZ

Keyhole Markup Language (KML) [OGC KML] is an XML tag based syntax that holds geographic information (geospatial drawings, symbology and attributes) in a file with the ".kml" extension. KML files and their related images (if any) can be compressed using the ZIP format into KMZ archives. The VC GeoView Map Panel will be able to display KML/KMZ data in Layers.

[T1-R1117] *The VC GeoView shall be able to display data given in KML/KMZ format in a Layer of the Map Panel with their descriptions and tags.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1118] *The VC GeoView shall be able to add a KML/KMZ Layer to the Control Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1119] *The VC GeoView Map Panel shall be able to process a file in KML/KMZ format indicated by the user.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1120] *The VC GeoView shall allow the user to select a KML/KMZ file or a drag the file and drop it over the Map Panel to display the content. If the file format is incorrect the user shall be notified.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1121] *The VC GeoView shall be able to export the contents of a Layer to a KML/KMZ file as indicated by the user.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.4.5. Displaying NVG

NATO Vector Graphics (NVG) data file format is an XML document defined by NATO [NVG]. The document has a prescribed structure that is defined by the XSD file. Graphics primitives are only a small set and represent only the geometric primitives with a unique structure (e.g. point, line, polyline, polygon, ellipse, etc.). The VC GeoView will be able to display NVG data in Layers as indicated by the AppView. For example, displaying RAP and RGP in separate Layers.

[T1-R1122] *The VC GeoView shall be able to display NVG data in Layers of the Map Panel indicated by the Application. The Layer Manager shall control the flow of data.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1123] *The VC GeoView shall be able to display description and tag of NVG data as detail.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1124] *The VC GeoView shall be able to add a NVG Layer to the Control Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1125] *The VC GeoView shall allow the user to select a file having NVG data or a drag the file and drop it over the Map Panel to display the content. If the file format is incorrect the user shall be notified.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1126] *The VC GeoView shall be able to process a file having NVG data indicated by the user.*

Requirement Property :
Domain for Static :
Domain for Afloat:

Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1127] *The VC GeoView shall be able to export the contents of a Layer to a NVG file as indicated by the user.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.4.6. Displaying Media

The VC GeoView will be able to display images in Recognised Graphics File Format. The user will be able to edit (resize, adjust brightness etc.) an image file in Recognised Graphics File Format by using an Image Viewer. If the image file has geodetic information, like GeoTIFF [GeoTIFF], the VC will use the GIS Server to convert it into WMS and display it on the Map Panel. An example to this usage is an ortho-image taken from air.

If an object is associated with an image or a video file, the image can be displayed in the Object Information Box and the video can be displayed in a pop-up player allowing the user to control the replay.

[T1-R1128] *The VC GeoView shall have an Image Viewer to display image files in Recognised Graphics File Format.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1129] *The VC GeoView Image Viewer shall allow the user to manage (open, resize, adjust colour and brightness, save) image files.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1130] *The VC GeoView shall be able to display images related to C4ISR Objects in the Object Information Box of that object.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1131] *The VC GeoView shall have a Media Player to display video allowing the user to control the replay.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1132] *The VC GeoView shall be able to display the content of a GeoTIFF file which is processed by the GIS Server and served as WMS.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1133] *The VC GeoView shall allow the user to manage (load, edit geodetic information, adjust colour, save, send to GIS Server) GeoTIFF files and have them displayed on the Map Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

4.3.4.7. Animating C4ISR Objects

The VC GeoView will be able to animate a given set of moving C4ISR Objects in a given time period using the Geo Player function. The data set will be provided by the AppView. The history of one or more selected tracks, Waterspace Management Area animation are examples. The Timeline Panel will allow the user to control the Geo Player, including starting/stopping/pausing the play, adjusting the play speed.

[T1-R1134] *The VC GeoView shall have a Geo Player which can animate a given set of C4ISR Objects with geospatial, date and time data. The data set shall be received from the AppView.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

[T1-R1135] *The VC Geo Player shall perform the object animation on a separate layer of the Map Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

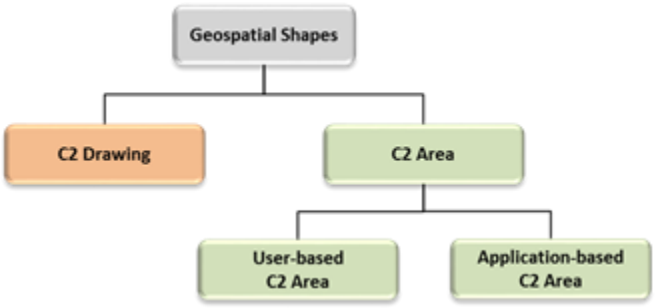
[T1-R1136] *The VC Geo Player shall be controlled by the Timeline Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

4.3.5. Handling Geospatial Drawings

Geospatial Drawings (Geo-drawings) are graphical drawing objects, with geometry and other properties which can be managed by users or applications. These Geo-drawings can be processed by AppView. Users can create Geo-drawings and digitize their geometry using drawing primitives, assign values to their attributes, save them and retrieve them for displaying in a Layer.

The VC GeoView will be able to handle the following types of Geo-drawings:



4.3.5.1. C2 Drawings

C2 Drawings are graphical objects created by users with the pointing device. Users can draw any kind of shape (open, closed or composite) on a selected Layer of the Map Panel using the Drawing Primitives. The Drawings are then used to visually enhance the Operational Picture and their geospatial data can be processed by the Functional Service Application.

The users create C2 Drawings and assign values to their attributes. Examples to C2 Drawings are:

- Points (e.g. history of tracks)
- Lines (e.g. borderline, flight line, ship course, attack direction, movement indication)
- Areas (e.g. Exclusive/Inclusive Areas, fishing zone, danger areas).

4.3.5.1.1. C2 Drawing Primitives

C2 Drawings can be created using the Drawing Palette which allows the user to draw on the Map Panel using Drawing Primitives and the pointing device. The Palette includes the following Basic Drawing Primitives:

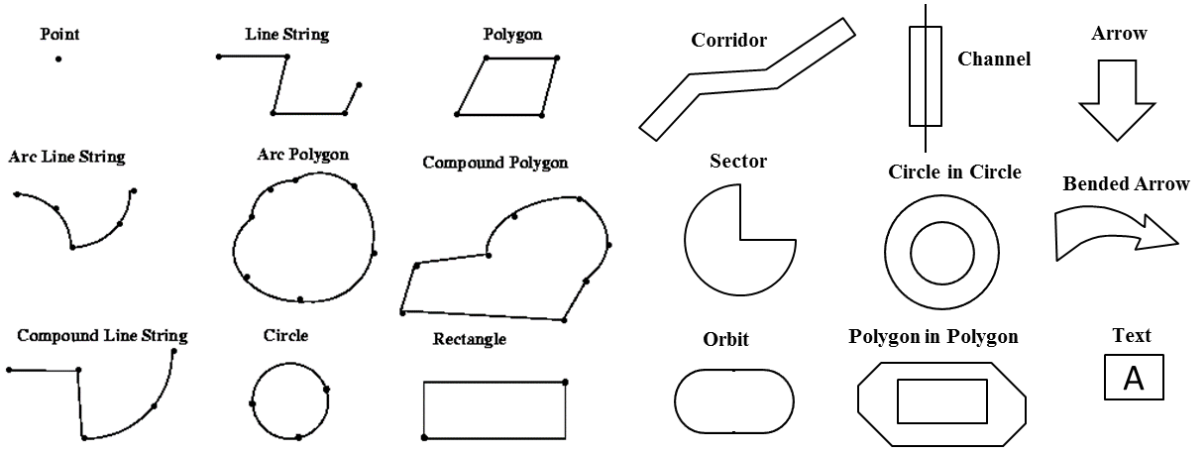
- Point
- Point cluster
- Multi-point
- Line
- Arrow (Line based or as a directed corridor)
- Bended Arrow
- Polygon
- Arc (Circular Arc, Elliptic Arc)
- Arc line string
- Arc polygons
- Compound polygon
- Compound line string
- Circles
- Ellipse
- Orbit (see [NVG])
- Optimized rectangle
- Fan area (aka ArcBand)
- Freehand drawing
- Composite (a group of primitives)
- Text

In addition to these Basic Drawing Primitives, Complex Drawing Primitives can also be used. An example to this is an indication of Fishing Zones (as an Area) within National Waters (as Lines). Following is an example list of Complex Drawing Primitives:

- 2D Corridor (a closed area with legs)

- Channel (a corridor with a centre line)
- Sector
- Circle in circle
- Polygon in polygon
- Control Measures (e.g. large arrows)
- When 3D Display is implemented, following 3D Primitives will be included:
- Surface Volume (Polygon, Ellipse, etc.)
- 3D Corridor
- Sphere / hemisphere
- Cone Volume

Samples of the Drawing Primitives are shown below:



[T1-R1137] *The VC GeoView shall support a drawing capability on the Map Panel by using a Drawing Palette and the pointing device.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1138] *The VC GeoView shall allow the user to create a C2 Drawing on the Map Panel using the Drawing Palette and the pointing device.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1139] *The VC GeoView shall allow the user to associate symbology with individual Drawing Primitives in the C2 Drawing.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1140] *The VC GeoView shall allow the user to undo and redo for the drawing actions while creating a C2 Drawing using the Primitives and the pointing device.*

Requirement Property :
Domain for Static :

Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1141] *The VC GeoView shall allow the user to associate descriptive text (annotation) with each Drawing Primitive.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1142] *The VC GeoView shall allow the user to create Complex Drawings by combining Drawing Primitives from the Drawing Palette.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1143] *The VC GeoView shall allow the user to create a composite Drawing Primitive composed of multiple Drawing Primitives. The composite Drawing Primitive indicates that all contained Drawing Primitives are treated as a single representation of the concept being expressed.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1144] *The VC GeoView shall allow the user to associate metadata with each Drawing Primitive.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1145] *The VC GeoView shall allow exclusion areas to be specified on all area based Drawing Primitives.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1146] *The VC GeoView shall allow Min and Max Altitude to be specified on all area based Drawing Primitives.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

4.3.5.1.2. C2 Drawing Properties

C2 Drawings will have attributes called "Properties". When the user creates a C2 Drawing, the Properties will be available with defaults. If the user wants to manage the C2 Drawing, its Properties must be filled in. C2 Drawing Properties include at least the following:

- Identification
- Label
- Description
- Tooltip text
- Security classification
- Releasability label
- Owner
- Visibility (private, shared, public)
- Group of primitives (to form a complex C2 Drawing)
- Geographical position of the geometric centre
- Layer to display
- Status (active/inactive)
- AppView Defined Metadata
- User Defined Metadata

When multiple Drawings are combined to form a new C2 Drawing, the properties of the final C2 Drawing will be used for processing.

[T1-R1147] *The VC GeoView shall maintain a list of Properties for each C2 Drawing as given in the Description.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1148] *The VC GeoView shall allow the user to assign values to the C2 Drawing Properties.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1149] *The VC GeoView shall allow the user to modify a C2 Drawing by changing its Properties.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.5.1.3. Handling C2 Drawings

A user can create a C2 Drawing using the Drawing Primitives on a user-indicated Drawing Layer of the Map Panel if the Layer is set to Editable. If the C2 Drawing is to be used for visualisation purposes temporarily, the C2 Drawing will be deleted at log-out. If the C2 Drawing is intended to be used for processing, the user has to fills in its Metadata, including the Properties, and saves it. The VC GeoView will pass this Metadata to the AppView for further management and processing. The AppView then manages (create, save, modify, delete, activate/deactivate, export, import) the C2 Drawing as operationally needed.

C2 Drawings can be exported or imported in the following formats:

- SVG
- NVG
- KML/KMZ.

The VC GeoView will be able to render the imported C2 Drawings.

[T1-R1150] *The VC GeoView shall allow the user to manage (create, modify, delete) the C2 Drawings.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1151] *The VC GeoView shall allow the user to select an Editable Layer as an active Drawing Layer. Only the selected Drawing Layer shall be used for creating a new C2 Drawing.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1152] *The VC GeoView shall be able to send the Metadata of a C2 Drawing to the AppView, using the NMAPI, for further management and processing.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1153] *The VC GeoView shall be able to receive the Metadata of a C2 Drawing, from the AppView, using the NMAPI, and display it on the indicated Layer of the Map Panel according to the current Map Projection.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1154] *The VC GeoView shall allow the user export a selected C2 Drawing into a file of type SVG, NVG, KML or KMZ.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1155] *The VC GeoView shall allow the user import a previously exported C2 Drawing from a file, in SVG, NVG, KML or KMZ format, and display it on the Map Panel according to its Properties.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

4.3.5.2. C2 Areas

C2 Areas are predefined Drawings created automatically based on "Templates" when the necessary Metadata and Properties are provided. This type of Drawing can be created by either a user or by an Application.

4.3.5.2.1. C2 Area Templates

C2 Area Templates contains the definition of predefined C2 Drawings. They are used to create instances of C2 Areas according to operational needs. A C2 Area Template holds all the necessary information to render a new C2 Area with default settings.

C2 Area Templates can be defined by means of a "Template Editor" within the VC. An authorised user creates a C2 Area Template by adding attributes to a Drawing structure. The Template Metadata is then created and the Template is saved in the Functional Service context. A Template may have the following attributes as a minimum:

- Identification
- Label
- Description
- Tooltip text
- Security classification
- Releasability label
- Owner
- Visibility (private, shared, public)
- List of Drawing Primitives (to form the C2 Area)
- Geographical position
- Layer to display
- Status (active/inactive)
- Time data

When a Functional Service wants to create an instance of an existing C2 Area Template can, its AppView will use the structured Metadata file to send the information the GeoView where it will be rendered. New instances of C2 Areas are managed (create, save, edit, delete, activate/deactivate, export, import) by the Functional Service internally.

[T1-R1156] *The VC GeoView shall be able to generate C2 Areas from predefined Templates.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1157] *The VC GeoView shall provide a Template Editor to build C2 Area Templates.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1158] *The VC GeoView shall allow the authorised user to manage (create, edit, save, delete) the C2 Area Templates.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2

Qualific. Method : Test

4.3.5.2.2. User-based C2 Areas

"User-based C2 Areas" are generated by users by means of a User Application having interaction with the VC Drawing capability. A user selects a C2 Area Template from the list, fills in the attributes and creates a C2 Area which can be displayed on the Map Panel when activated.

The VC will provide the following Default User-based C2 Area Templates as a minimum:

- Simple Area (with or without inner/outer borders)
- Maritime Disposition Four-Whiskey (4W)
- Maritime Position and Intended Movement (PIM)
- Maritime Route (ship route with waypoints)
- Maritime Shipping Route Network
- Q-Route (Naval Mine Warfare)
- Water Space Management (WSM) - Moving Havens
- Maritime Area of Interest (AOI)
- Multi-leg Channel (centre line, width, vertices)

[T1-R1159] *The VC GeoView shall implement the Default User-based C2 Area Templates given in the Description for TRITON Increment 1.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1160] *The VC GeoView shall be able to create a User-based C2 Area from a Template and display it on the indicated Layer of the Map Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1161] *The VC GeoView shall allow the user to create a User-based C2 Area using a Template.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1162] *The VC GeoView shall be able to receive the Metadata of a User-based C2 Area, from the AppView using NMAPI, and display it on the indicated Layer of the Map Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1163] *The VC GeoView shall be able to update a User-based C2 Area automatically when its Metadata is modified by the user or AppView.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2

Qualific. Method : Demonstration

4.3.5.2.3. Application-based C2 Areas

"Application-based C2 Areas" are generated and managed by Functional Service Applications. An Application can create a C2 Area according to the Template, passes the Metadata to the GeoView over AppView, using the NMAPI. This type of C2 Areas cannot be modified by the users, only the originating Application can modify the attributes such as the new location according to a calculated course and speed or the new shape.

The VC will provide the following Default Application-based C2 Areas as a minimum:

- Water Space Management (WSM) - Moving Havens
- Maritime Furthest on Circle (FOC)
- CBRN Hazardous Area.

[T1-R1164] *The VC GeoView shall implement the Default Application-based C2 Area Templates given in the Description.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1165] *The VC GeoView shall be able to receive the Metadata of an Application-based C2 Area, from the AppView using NMAPI, and display it on the indicated Layer of the Map Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1166] *The VC GeoView shall be able to update an Application-based C2 Area automatically when its Metadata is updated by the AppView over the NMAPI.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

4.3.5.2.4. Displaying C2 Areas

Users or Functional Service Applications can create C2 Areas using the Area Templates. Their metadata, visibility, security classification and releasability labels as set by the Applications are used for displaying them on the Map Panel. If the C2 Area is activated, then it can be processed by the Application. For example, a WSM Area can be created by a user, saved, but not activated. When it is necessary to use the Area during an operation/mission, it can be activated.

4.3.6. Handling Geospatial Information

The VC will be able to import or export data files having geospatial information.

4.3.6.1. Gazetteer

A gazetteer is a geographical dictionary or directory used in conjunction with a map or atlas. They typically contain information concerning the geographical makeup, social statistics, and physical

features of a country, region, or continent. Content of a gazetteer can include location of objects, dimensions of peaks and waterways, population and literacy rate.

The gazetteer data can be provided through the following means:

- Gazetteer Service of the NATO Core GIS
- A separate Gazetteer Web Service
- Gazetteer data to be loaded.

The service should be compliant to OGC Gazetteer Specification / Recommendation Paper / Discussion Paper, which is currently the OGC Discussion Paper "Gazetteer Service Profile of the Web Feature Service Implementation Specification".

The GeoView will provide access to Gazetteer Function via the Ribbon Bar.

[T1-R1167] *The VC GeoView shall be able to use the Gazetteer Service of the NATO Core GIS.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1168] *The VC GeoView shall be capable of utilising the gazetteer data via an available Gazetteer Web Service.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1169] *The VC GeoView shall allow the user to load the gazetteer data from a selected source.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1170] *The VC GeoView shall allow the user to search for features in the gazetteer.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1171] *The VC GeoView shall display the gazetteer search results in sortable tabular format with an option to indicate the selected item on the map.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1172] *The VC GeoView shall hold gazetteer dataset as a vector dataset, with the place names as attributes.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

4.3.6.2. Search

The VC GeoView will provide the user with a search capability to look for particular C4ISR Objects or map features using queries. The Search Results will be displayed in sortable tabular format with options to find a particular Object and display it on the Map Panel.

The GeoView will provide access to the Search Function via the Ribbon Bar.

[T1-R1173] *The VC GeoView shall provide a Search capability to allow the user to look for a C4ISR Object or map feature using a query.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1174] *The VC GeoView Search shall display the Search Results in sortable tabular format with an option to find and display an item on the Map Panel. The search results shall enable hyperlinks within attributes.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1175] *The VC GeoView Search shall allow the user to constrain the search to a geographic area defined by the user, a feature or C4ISR Object.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

4.3.6.3. Geo-Data Export and Import

The VC will be able to export and import data for Layers.

Recognised Geo-Output File Format:

The VC will be able to export the data of a Layer into a file with the following formats:

- NATO Vector Graphics (NVG) [NVG]
- Keyhole Markup Language (KML/KMZ) [OGC KML]
- Office Open XML Workbook (xlsx)
- Shape File

If indicated, the exported data can be saved into Recognised Graphics File Format (as defined previously).

Recognised Geo-Input File Format:

The VC will be able to import data from a file in the following formats into a Layer:

- NVG
- KML/KMZ
- csv
- Text (with specified delimiters)
- Shape File

The VC will be able to activate the import process when the user drags a file into GeoView and drops it.

[T1-R1176] *The VC shall be able to export components (i.e. the current view including all Layers, symbology, annotations, etc.) of the Map Panel into a file in Recognised Geo-Output File Format (including a reloadable file format compatible with the NATO Core GIS and data exchange formats) as defined in the Description or in Recognised Graphics File Format (as defined in Paragraph 1.5).*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1177] *The VC shall be able to export selected layers into a single file for NVG and KML/KMZ.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1178] *The VC shall be able to export and losslessly compress all files referring to the same Shape File into an archived file (e.g. zip).*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1179] *The VC shall keep classification, releasability, user name and timestamp information in NVG and KML/KMZ files as a key-value pair while exporting. For Shape File, classification shall be kept as a "zip" file name. Timestamp and user name of a Shape File shall be kept in geospatial metadata in XML format compliant to [STANAG 2586].*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1180] *The VC shall be able to export individual or selected set of features as an NVG or KML file.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1181] *The VC shall be able to import active elements from a Recognised Geo-Input File Format as defined in the Description into a Layer indicated by the user.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1182] *The VC shall be able to activate the import process when the user drags a file and drops it into the GeoView. If the process cannot be completed, the user shall be notified.*

Requirement Property :

Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1183] *The VC GeoView shall allow the user to select the elements to be exported into a Recognised Geo-Output File Format as defined in the Description and provide the file name and path.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

4.3.6.4. Screenshot

The Screenshot Function allows the user to capture part or whole of the Map Panel and all its visible layers and save it in a Recognised Graphics File Format (as defined in Paragraph 1.5). The function asks a file name and file path from the user to save the screenshot. Only the Base Map or map features indicated by the user and the visible layers can be captured and saved.

[T1-R1184] *The VC GeoView shall be able to capture the Map Panel and all its visible layers as a screenshot and save it in a file in Recognised Graphics File Format given in Paragraph 1.5.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1185] *The VC GeoView shall allow the user to select only the Base Map or indicated Map Features including the visible Layers to be captured as a Screenshot.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1186] *The VC GeoView shall allow the user to save the Screenshot into a file with a user-provided name and path.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1187] *The VC GeoView shall allow the user to send the Screenshot directly to a printer.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

4.3.6.5. Printing

The VC will enable the users to take printouts for at least the following:

- Screenshot of the Map Panel

- Selected map in the selected scale with a selected set of features, Map Legend and copyright information in high quality with any resolution the output device supports
- Selected Layer with selected C4ISR Objects and map features

[T1-R1188] *The VC shall support printing to local and network printers including printing into a file in Portable Document Format (PDF) at a user defined resolution.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1189] *The VC shall ensure that it maintains stability when printing if no printer is installed.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1190] *The VC shall be able to print Map Panel Screenshot to the resolutions supported by the printer or output device.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1191] *The VC shall support printing to printers with Long File Names (e.g. printer names include all legal Long File Name characters and are at least 128 characters long).*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1192] *The VC shall support printing of landscape, portrait and all other supported paper sizes and layouts.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1193] *The VC shall allow the user to preview (Print Preview) the print content before it is printed.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1194] *The VC Print Preview shall display the print content to the user with the selected printer settings.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

4.3.6.6. Presentation Support

The VC will be able to generate presentation slides based on user-selected areas on the Map Panel including the C4ISR Objects and export them into Office Open XML Presentation (pptx) files.

Presentation Options:

The user will be able to select at least the following options for generating slides:

- Each active Layer, as seen by the user, to be included in one slide as one single image
- Each active Layer, as seen by the user, to be included in separate slides as individual images
- Each C4ISR Object symbol as an individual image in the slide in the order same as the selected Layers.

[T1-R1195] *The VC shall be able generate presentation slides and export them into an Office Open XML Presentation (pptx) file.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1196] *The VC shall allow the user to configure the presentation slide master outline, select the Presentation Options given in the Description, and initiate the export.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1197] *The VC shall allow the user to define a coverage area on the Map Panel, select the C4ISR Objects and geospatial information to be included in the presentation slides.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

4.3.7. Geo Processing Tools

Geo Processing Tools allow the user to calculate geographic distances (as a line or a path), forward azimuth, area, line of sight, and depth analysis. Calculations are performed for the current projection.

4.3.7.1. Distance Measurement

The Distance Measurement Function will provide the user with capability to measure distances between two points on the Map Panel as a straight line in the projected plane map or as geodesic line on the spheroid surface (i.e. the shortest connection of the two points on the Earth's best fitting ellipsoid).

It will also be possible measure distance as a path. A path may consist of several sections of geodesics (great circles). The geodesic in a map projection is a curve (for lines) or for multiple segments a curve set (for path).

Distance calculations between two geographical points will be performed on the surface of the earth, i.e. the height attributes will not be taken into account. However, if the distance calculation is performed with a C4ISR Object, the height or depth of the Object will be taken into account and the slant range (shortest straight distance) will be displayed separately.

The user will be able to move the vertices of the measurement line or line string to new positions for new meaurements.

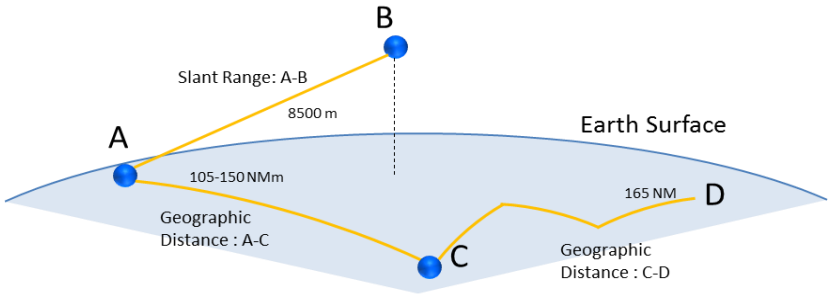
Distances will be presented in common units like Data Mile, Nautical Mile, Metres, Kilometres, Yards as selected by the user. The visualisation of the line, line string, curve or curve set will be adjusted according to the map projection in use in the Map Panel.

Base Lines:

Following Base Lines will be used for azimuth (bearing) calculation:

- True North
- Magnetic North (if World Magnetic Model is available)
- Grid North.

A sample distance measurement concept is illustrated below:



[T1-R1198] *The VC GeoView shall allow the user to measure the horizontal distance between two user-selected points as a line in the projected map plane.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1199] *The VC GeoView shall calculate and display the horizontal distance between two points and the bearing from the starting point using the selected Base Line (as given in the Description) for grid bearing calculation.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1200] *The VC GeoView shall allow the user to measure the horizontal distance and the slant range (if applicable) between two selected C4ISR Objects.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1201] *The VC GeoView shall calculate the distance between two selected C4ISR Objects based on their last known positions and display the true bearing from the first object to the second and the distance. The height or depth attribute of the Objects shall be taken into account for slant range calculations and displayed separately.*

Requirement Property :
Domain for Static :
Domain for Afloat:

Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1202] *The VC GeoView shall allow the user to measure the horizontal distance between two points following a path with any number of waypoints.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1203] *The VC GeoView shall calculate and display the total distance of a path with waypoints according to the current map projection.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1204] *The VC GeoView shall allow the user to move any vertex of the measurement line or of the path to a new position by using the pointing device.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1205] *The VC GeoView shall adjust the visualisation of the moved measurement line or path according to the current projection and re-compute the projected curve and the values for starting and end bearing.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

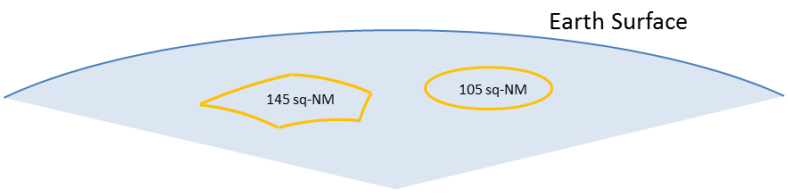
[T1-R1206] *The VC GeoView shall display the measured path on the Map Panel, in units selected by the user, until it is cleared or a new measurement is started.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.7.2. Area Measurement

The Area Measurement Function will provide the user with a capability to measure areas within a polygon or circle. The area will be calculated as a footprint on the spheroid considering the current projection.

A sample area measurement concept is illustrated below:



[T1-R1207] *The VC GeoView shall allow the user to measure an area determined by a polygon or a circle drawn by the pointing device.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1208] *The VC GeoView shall compute the area of the footprint based on the current projection system and display it in units selected by the user. The area of a polygon shall be calculated when the polygon shape is completed (closed), and the area of circle shall be calculated continuously as the pointer is moved.*

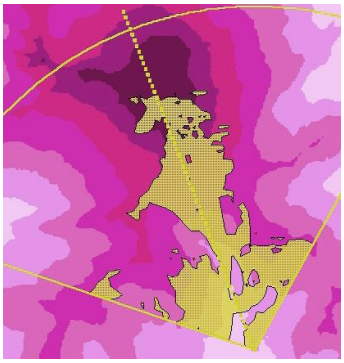
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.7.3. Line of Sight Analysis

The Line of Sight (LOS) Analysis Function displays visible locations, using land elevation data, in a defined circle centred at an observation point or a sector of the circle. The VC GeoView uses the LOS Service and Elevation Service provided by the available GIS Server and displays the returned values.

Currently, NATO Core GIS provides the LOS and Elevation Service using the ArcGIS Server technology. The Client can consume the WPS hosted by ArcGIS Server.

As additional parameters the observer's height and the height of the target above ground shall be provided. A sample view is given below:



The calculation is performed by the GIS Server according to user settings including the centre point, height, distance and sector.

[T1-R1209] *The VC GeoView shall allow the user to perform LOS Analysis if the available GIS Server can provide it as a service.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1210] *The VC GeoView shall be able to use LOS Service and Elevation Service provided by the GIS Server.*

Requirement Property :
Domain for Static :
Domain for Afloat:

Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1211] *The VC GeoView shall allow the user to set the parameters of a LOS Analysis by manually entering values.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1212] *The VC GeoView shall allow the user to set the centre point of a LOS Analysis by selecting a geographical point on the map. If the height information is available on the map, it shall be used in the calculation.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1213] *The VC GeoView shall allow the user to perform more than one LOS Analysis and display them on the Map Panel as layers.*

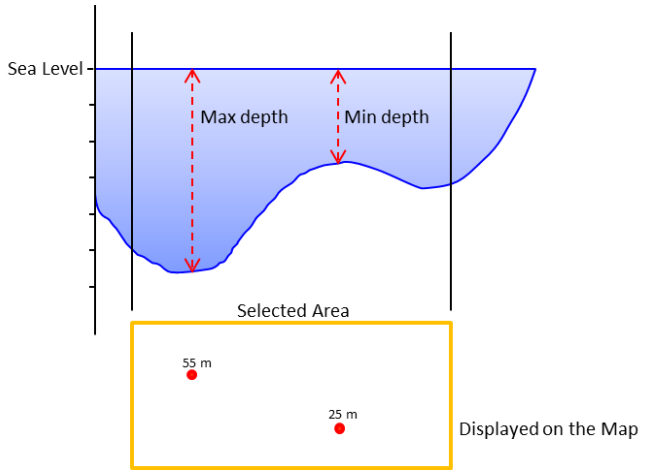
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1214] *The VC GeoView shall allow the user to delete the selected LOS illustration from the Map Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.7.4. Depth Analysis

The Depth Analysis Function determines the maximum and minimum depths in a user specified area, and displays them. The maximum depth is the highest depth value and the minimum depth is the lowest depth value below the sea level within a given area. The following figure shows how the calculation is displayed:



For depth calculations, the function uses an Elevation Service of the available GIS Server and displays the result in all supported Map Projection. Currently, NATO Core GIS provides the Depth/Elevation Service using the ArcGIS Server technology. The Client can consume the OGC-compliant WPS hosted by ArcGIS Server.

[T1-R1215] *The VC GeoView shall be able to use Depth/Elevation Service provided by the GIS Server for depth analysis.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1216] *The VC GeoView shall allow the user to perform Depth Analysis if the available GIS Server can provide it as a service.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1217] *The VC GeoView shall allow the user to set the parameters of a Depth Analysis by manually entering area values or drawing a circle or polygon on the Map Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1218] *The VC GeoView shall allow the user to perform more than one Depth Analysis and display them on the Map Panel as Layers.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

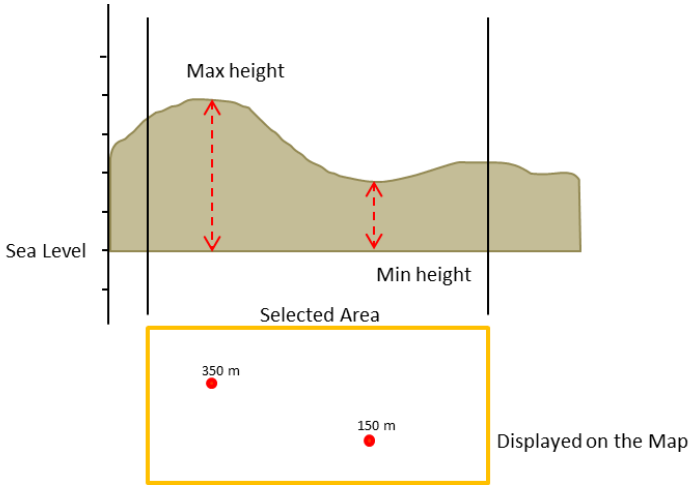
[T1-R1219] *The VC GeoView shall display the minimum and maximum depth values of the selected area on the Map Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

4.3.7.5. Height Analysis

The Height Analysis Function determines the maximum and minimum height in a user specified area, and displays them. The maximum height is the highest elevation value and the minimum height is the lowest elevation value within a given area. The height values are measured against the mean sea level.

The following figure shows how the calculation is displayed:



For height calculations, the function uses an Elevation Service of the available GIS Server and displays the result in all supported Map Projection. Currently, NATO Core GIS provides the Depth/Elevation Service using the ArcGIS Server technology. The Client can consume the OGC-compliant WPS hosted by ArcGIS Server.

[T1-R1220] *The VC GeoView shall be able to use Depth/Elevation Service provided by the GIS Server for height analysis.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1221] *The VC GeoView shall allow the user to perform Height Analysis if the available GIS Server can provide it as a service.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1222] *The VC GeoView shall allow the user to set the parameters of a Height Analysis by manually entering area values or drawing a circle or polygon on the Map Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1223] *The VC GeoView shall allow the user to perform more than one Height Analysis and display them on the Map Panel as Layers.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

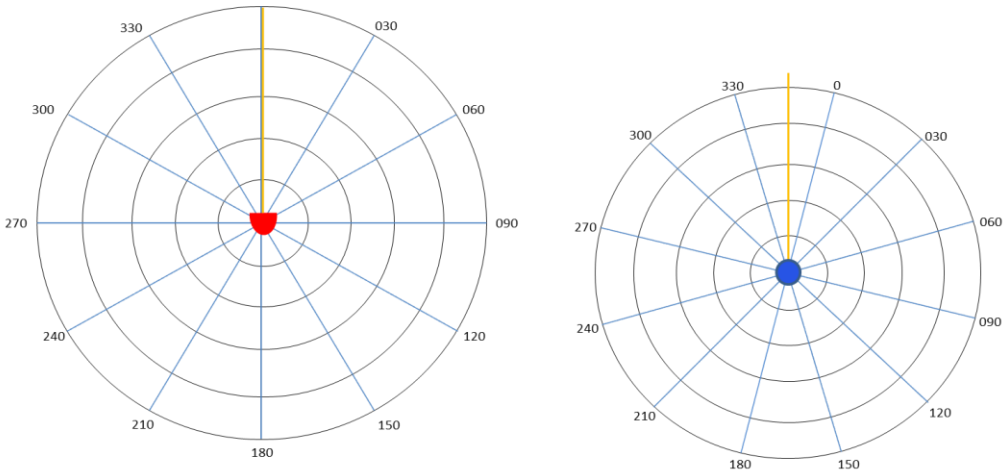
[T1-R1224] *The VC GeoView shall display the minimum and maximum height values of the selected area on the Map Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:

Baseline : VC-BL 2
Qualific. Method : Demonstration

4.3.7.6. Range Rings

Range Rings are a number of concentric circles with bearing indications on the outer circle. There are bearing lines at every 30 degrees. These circles and bearings are displayed as a layer using a selected position or a C4ISR Object as the centre. Sample Range Rings are shown below:



A set of Range Rings will have at least the following attributes:

- Position of the centre
- Radius (in yards, nautical miles, metres, kilometres)
- Number of rings
- Orientation (given in degrees or match to heading)
- Drawing colour

The display helps to build quick orientation when concentrating on a special object at operational level. There may be more than one set of Range Rings displayed on the Map Panel, each having different centre and different orientation (True North to 359 degrees True).

[T1-R1225] *The VC GeoView shall allow the user to configure the settings related to the Range Rings.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1226] *The VC GeoView shall allow the user to initiate displaying Range Rings by selecting its position on the map or selecting a C4ISR Object.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1227] *The VC GeoView shall display Range Rings according to user defined parameters on the Map Panel as a separate layer. The distances are referring to geodesic distances on the Earth ellipsoid (potentially a spherical approximation) and shall be rendered in the map in the map projection.*

Requirement Property :
Domain for Static :

Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1228] *The VC GeoView shall adjust the size of the Range Rings with respect to the current map scale.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1229] *The VC GeoView shall display the Range Rings with orientation from True North to three-hundred fifty-nine (359) degrees True.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1230] *The VC GeoView shall display the Range Rings with orientation which dynamically matches with the heading of the selected (slaved) object if it has heading value.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

4.3.8. 3D Visualisation

Symbols are used to convey information about objects in space. In most C2 applications, this has been accomplished by an orthogonal (directly overhead) view, such as when looking at a map. C2 symbols have been overlaid on top of geospatial information or a “map background” to provide a geospatial context to locate the military object of interest at a geographic position. Attributes of the object are visually encoded in the symbol to communicate information about the object to the observer.

As C2 symbology has evolved from hand-annotated paper maps to automated computer display screens, views other than orthogonal (2D) have become practical. Non-overhead views or dynamic viewing positions such as “fly-through” displays provide new ways in which a warfighter can better perceive and understand the operational environment.

3-Dimensional (3D) visualisation of operational theatre which gives the illusion of depth or varying distances with elevated symbols is becoming a growing demand for both operational and tactical level C2 systems. They support decision makers to better understand the tactical situation. Following are examples to using 3D in operational environment:

Air/Land/Maritime C2 Systems:

- Tactical data display (Air, Land, Maritime Picture)
- Sensor/weapon coverages
- Flight corridors
- Air defence design
- Air strike design
- Underwater bathymetry

Tactical Ballistic Missile Defence (TBMD):

- Viewing Defence Design Data (e.g. Missile Operating Areas, Weapon Volumes, Sensor Volumes, Areas)
- Track Data (e.g. ballistic missile tracks and trajectories, impact point)
- Viewing Defence Design Analysis for TBMD (supporting planning)
- Play-back of real-time events (supporting after-action analysis and reporting of TBMD)
- Defence Design Surveillance coverage viewing (supporting planning)
- TBMD real-time viewing (supporting current operation, test events and demonstration).

The VC will provide a foundation for 3D visualisation with future growth capability. It is expected that terrain data maps [DTED] will be used as provided by the GIS Server and the C4ISR Objects will be displayed with symbols using their height/depth attributes on the Map Panel.

4.3.8.1. 3D Display Framework

Since the earth surface is not entirely in modelled in 3D, the VC is expected to support to Pseudo-Three-Dimensional (2.5D) Display which refers to the presentation of information that gives the perception of depth or varying distance, as in a non-orthogonal viewing angle. In other words, a viewing angle that is not perpendicular to the surface of the earth. C4ISR Objects are displayed with symbols in a 2.5D display of the surrounding environment.

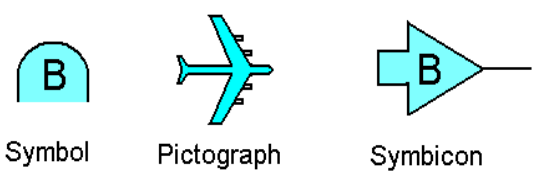
The VC GeoView will be able to display C4ISR Objects having 2D symbols in a 2.5D display of the surrounding environment. The definitions and approach for 2.5D defined in MIL-STD-2525D Appendix K [MIL-STD-2525D] may be used to build a 3D Display Framework for the VC GeoView.

The user will be able to switch between 2D and 3D on the Map Panel. The 3D Display of the Map Panel will be able to display maps with terrain data as received from the GIS Server. Object symbols will be provided by the Symbology Server. Guidance for handling the objects in 2.5D environment is provided in the standard. For example, the use of Terrain Draping is given below:

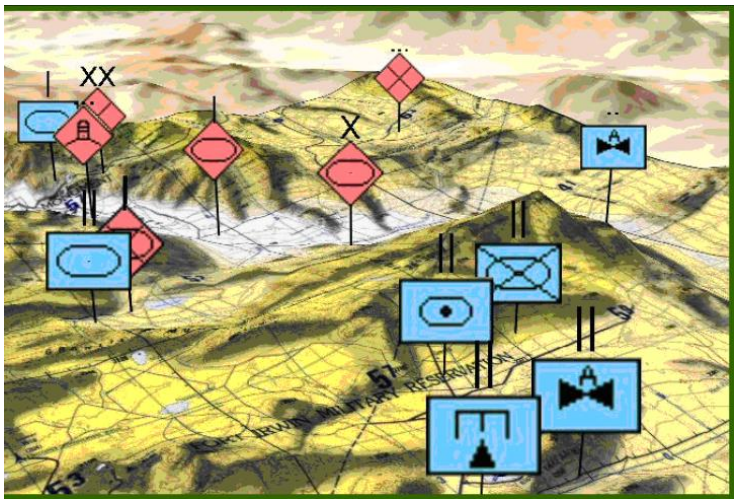


Symbols:

In addition to 2D symbols, as defined MIL-STD-2525D or APP-6, a new approach, a combination of symbols and icons called "symbicon" can be used in 3D Display. Following is an example to symbicon:

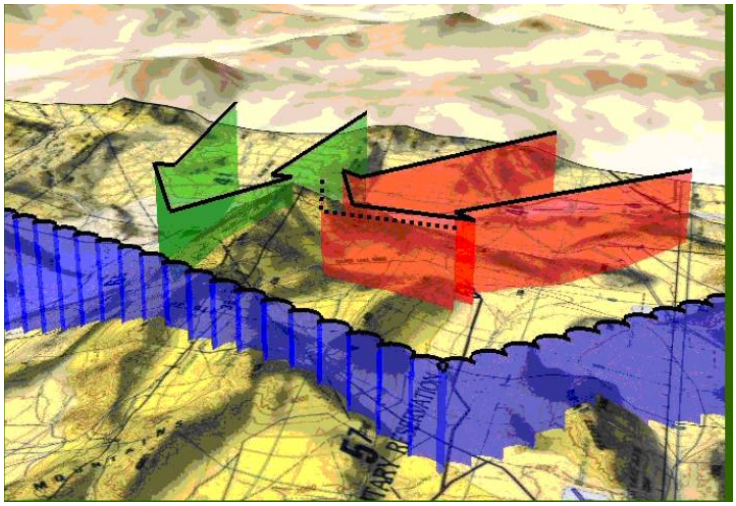


For displaying the C4ISR Objects in an operational environment, billboarding technique or symbicons can be used as shown below:

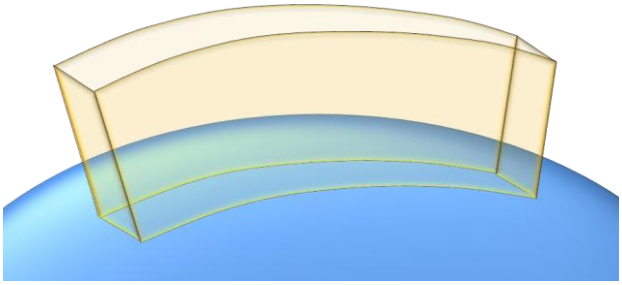


Control Measures:

The control measure symbols can be displayed over the terrain as draped or extruded. The extruded measures are shown below:



When control measures are implemented, vertical planes such as walls of corridors, will be drawn perpendicular to the earth's surface, resulting in different distance values between the lower edges and the higher edges due to the curvature of the earth. The figure below illustrates a volume of Air Space.



Fly-through:

The 3D Display will provide the user with a capability to fly over the terrain at a configurable direction and speed, also controllable by the pointing device and keyboard.

[T1-R1231] *The VC shall provide infrastructure for supporting Three-Dimensional (3D) or Pseudo-Three-Dimensional (2.5D) Display capability. The guidance in [MIL-STD-2525D] should be used.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration
Comment : This qualification test will be executed as a demonstration of displaying maps with terrain data and objects in 3D environment as a proof of concept. The other requirements are provided for guidance, but will be preferred to have at the time of delivery. Acceptance tests will be executed at VC-BL3 according to the demonstrated capability.

[T1-R1232] *The VC GeoView "should" allow the user to select 2D or 3D Display in the Map Panel. The 3D Display should be used in the Map Panel with configurable settings (e.g. default height of the Viewpoint, perspective ratio).*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Inspection

[T1-R1233] *The VC "will" receive maps with terrain data from the GIS Server, display them in a 2.5D environment as guided in [MIL-STD-2525D].*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Inspection

[T1-R1234] *The VC 3D Display "should" be able to display C4ISR Objects in a 2.5D environment as described in [MIL-STD-2525D] using Symbicons and Marker Posts.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Inspection

[T1-R1235] *The VC 3D Display "should" be able to provide fly-through over the terrain.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Inspection

[T1-R1236] *The VC 3D Display "should" allow the user to control the fly-through using the pointing device and keyboard.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Inspection

4.3.8.2. Navigation

When users navigate around a 3D display, they can very easily lose any understanding of their current geographical location and perspective. Orientation and navigation control are required to facilitate the

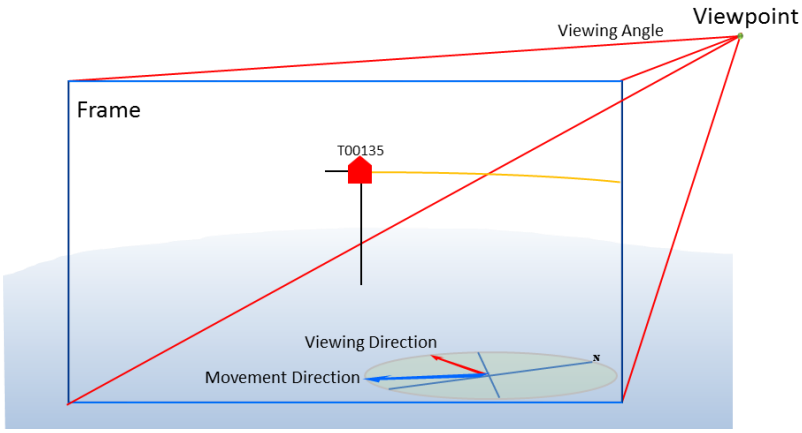
operational use of a 3D display, such that when an operator navigates through 3D space (e.g. moves along a flight corridor or rotates around the globe) the display provides an indication of the geographical location of the user (based on the current cursor position), alignment (looking north or otherwise) as well as providing the ability for the user to return easily to a known default location.

Navigation Controls:

The VC 3D Display will allow the user to control navigation on the Map Panel using the available pointing device and keyboard. Navigation Controls will include the following:

- Viewpoint : A geographic position with adjustable height.
- Viewing Angle : The direction originated from the Viewpoint with azimuth and tilt (usually between 25 and 65 degrees from horizon).
- Viewing Direction : The direction which the centre line of the view is looking.
- Movement Direction : Angle of movement with respect to True North in a fly-through.
- Movement Speed : Movement speed on a Movement Direction at a fixed height in a fly-through.
- Perspective : The ratio of near and far frames to give the depth of view (a configuration setting).

Some of these definitions are illustrated in the figure below:



The 3D Display will be able to apply different Viewing Angles and Movement Direction (e.g. looking towards North, but moving towards East) in a fly-through. The 3D Display will also show the Direction Indicators including the Viewing Direction and Compass Directions (North, South, East, West). The user will be able to save a View Point and Viewing Angle as the Default Viewpoint which can be accessed quickly during a fly-through.

Slaving:

The Viewpoint can be slaved to a moving C4ISR Object (e.g. an aircraft) at a configurable distance and angle. It is updated automatically as the kinematics of the object is updated. The position of the slaved object should be extrapolated according to a configurable frame rate to achieve the illusion of a smooth animation.

[T1-R1237] *The VC 3D Display "should" provide navigation control by adjusting the Navigation Controls given in the Description.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Inspection

[T1-R1238] *The VC 3D Display "should" allow the user to navigate through the Map Panel by changing the Navigation Controls given in the Description with the combination of the pointing device and the keyboard.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Inspection

[T1-R1239] *The VC 3D Display "should" allow the user to return to the Default Viewpoint using the Navigation Controls.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Inspection

[T1-R1240] *The VC 3D Display "should" be able to render the display, including the terrain data and movement of C4ISR Objects at a rate of at least fifteen (15) frames per second at a display resolution of at least 1280x1024 when navigation is started.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Inspection

[T1-R1241] *The VC 3D Display "should" be able to initiate a fly-through over the terrain by setting the Navigation Controls given in the Description.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Inspection

[T1-R1242] *The VC 3D Display "should" display the Direction Indicators in a fly-through.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Inspection

[T1-R1243] *The VC 3D Display "should" allow the user to change the settings during a fly-through.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Inspection

[T1-R1244] *The VC 3D Display "should" be able to slave the Viewpoint to a selected C4ISR Object so that it moves together with the Object from a user-selected distance during the lifecycle of the Object. For example, the Viewpoint can be slaved to an aircraft and updated as the kinematics of the aircraft is updated. The Object motion "should" be extrapolated according to a configurable frame rate with a default of fifteen (15) Hertz.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Inspection

[T1-R1245] *The VC 3D Display "should" allow the user to select a C4ISR Object, select a distance, Viewing Angle, Viewing Direction relative to the Object motion, and initiate a fly-through. The fly-through "should" be stopped when the users stops it or the Object is deleted.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Inspection

4.3.8.3. Animation

The 3D Display will be able to animate the motion of selected C4ISR Objects with the geospatial data provided by the AppView in a 2.5D environment. The animation can be controlled with the GeoView Timeline and watched at a default distance computed with respect to the speed of the Object. The history tail of the Object can be displayed as an option. The user will be able change the Viewpoint during the animation.

[T1-R1246] *The VC 3D Display "should" be able to animate the motion of selected C4ISR Objects with the geospatial data provided by the AppView.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Inspection

[T1-R1247] *The VC 3D Display "should" allow the user to control the animated motion using the GeoView Timeline.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Inspection

4.3.9. User Settings

The VC GeoView will provide the user with the capability of applying User Settings as personal preferences. The User Settings will be stored in the Functional Service context and transferred to the GeoView over the AppView using the NMAPI. The user will be able to modify personal preferences and save them in the Workspace. When the user logs out, all of the current settings will be saved automatically.

4.3.9.1. Theme Selection

The VC GeoView will allow the user to select one of the predefined set of display themes. Style Sheets will be used in common to provide the same look-and-feel with the AppView.

[T1-R1248] *The VC GeoView shall support configurable Themes for the GUI elements.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

[T1-R1249] *The VC GeoView shall provide a Dark Theme and Light Theme as the default.*

Requirement Property :
Domain for Static :

Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

[T1-R1250] *The VC GeoView shall maintain a list of Personal Themes.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

[T1-R1251] *The VC GeoView shall be able to use Style Sheets.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

[T1-R1252] *The VC GeoView shall allow the user to manage (load, modify, save) the Personal Theme List.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Test

[T1-R1253] *The VC GeoView shall allow the user to select a predefined Theme.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Test

4.3.9.2. Most Used Functions

The VC GeoView will provide the user a list of last most used functions where applicable. Examples of use are: Search queries, hot functions of the Ribbon Bar. The most used functions are determined over the last 200 functions invocations and will therefore dynamically changed based on the user behaviour. The number of functions in the stack should be configurable.

[T1-R1254] *The VC GeoView shall have a list of the last used functions, if applicable, the Most Used Functions.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

[T1-R1255] *The VC GeoView shall allow the user to manage (add, modify, delete) the Most Used Functions List.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Test

[T1-R1256] *The VC GeoView shall execute the function when the user selects it from the Most Used Function List.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

4.3.9.3. Own Position

A geographic position can be entered as Own Position or a C4ISR Object can be selected as Own Position. If a C4ISR Object designated as Own Position received from the API (from AppView), Own Position will be set to this Object. If it is not defined, the user will be able to enter any geographic location or any Object as Own Position.

[T1-R1257] *The VC GeoView shall be able to receive a C4ISR Object designated as Own Position from the AppView (as part of the API) as an option.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1258] *The VC GeoView shall allow the user to set Own Position to a geographic position or to a selected C4ISR Object.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : BL 2
Qualific. Method : Test

4.3.9.4. Display Settings

The VC will allow the user to change preference settings for display. The Display Settings will include the following:

- Map Settings (Base Map)
- Coordinate Panel Settings
- Map Query Result Settings
- Selection Display Settings
- Measurement Settings
- Spatial Extent Settings
- Overview Map Ratio
- Layer Display Settings
- View Scale Range Settings
- Scale Bar Units
- Clustering Settings
- Object Display Settings (e.g. update rate, duration of extrapolation)
- Object Label Settings
- Map Label Settings
- Symbol Settings
- Tint Settings (e.g. percentage)
- Grid Settings (e.g. on, off)
- Navigation Mode Settings
- Theme Settings
- Locale Settings

- 3D Display Settings

Each setting will have its own defaults.

[T1-R1259] *The VC shall be able to retrieve the personal Display Settings given in the Description from the AppView using the NMAPI and apply them.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1260] *The VC shall allow the user to configure the Display Settings according to personal preferences and send them to the AppView using the NMAPI to be saved in the Functional Service Application context.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1261] *The VC shall automatically save the Display Settings when the user terminates the GeoView or logs out from the AppView.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1262] *The VC shall provide the defaults for the Display Settings as set by the authorised user.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.10. Security

The security aspects of the GeoView will be inherited from the Functional Service Applications over the AppView. The general security requirements given in Subsection 5.2 will be applicable.

[T1-R1263] *The VC shall conform the security requirements defined for TRITON in Subsection 5.2.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.11. Error Handling

The VC will handle errors and report them to the AppView. It is the AppView's responsibility to take the necessary action depending on the type and severity of the reported error. The VC errors will be documented in the VC ICD.

[T1-R1264] *The VC shall handle all occurring errors and report them to the AppView.*

Requirement Property :
Domain for Static :
Domain for Afloat:

Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1265] *The VC shall notify the user when an error occurred within the sub-components of the VC.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

4.3.12. On-line Help

The VC will have an on-line help capability to assist the user for both Integrated and Standalone Mode of operation. The On-Line Help will be limited to basic functions of the VC, and will not include the AppView functions. It will be organised in sections as given below:

Contents: Providing access to all help pages and organised in a logical manner by topic or procedure.

Index: Providing users with both the ability to search for keywords in all Help pages and retrieve a list of those pages in which those keywords appear and the ability to select and trigger such a query from a list of all keywords.

Application: A link to On-line Help provided by the AppView (if exists).

[T1-R1266] *The VC shall support On-line Help describing the basic functionality of the VC by using Contents, Index with its associated Search and a link to the On-line Help provided by the AppView (if exists).*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1267] *The VC On-line Help shall translate every use case and scenario into a browsing sequence. Every browsing sequence shall be structured according to a generic user workflow.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Inspection

[T1-R1268] *The VC shall allow the user to access the On-line Help function at any stage of execution of a function.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Test

[T1-R1269] *The VC On-line Help shall describe each basic VC function, the interrelationships between and the logical sequence of functions.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Inspection

[T1-R1270] *The VC On-line Help shall explain all menu items, dialog windows, data entry and query fields implemented in the VC Product Baseline.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Inspection

[T1-R1271] *The VC On-line Help shall include a glossary providing definitions of all terms and acronyms implemented in the VC Product Baseline.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Inspection

[T1-R1272] *All definitions in the VC glossary shall be available in roll-over, pop-up windows linked to every appearance in On-line Help of the corresponding term or acronym.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1273] *The VC shall provide On-line Help option for each dialogue, menu item, toolbar item, function, field or button (each item on the screen). This shall be clearly visible, but not intrusive.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1274] *The VC On-line Help shall provide meaningful advice and hints to the users appropriate to the actions they are trying to take.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Inspection

[T1-R1275] *The VC On-line Help shall be concise, compact and clear to the user.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Inspection

[T1-R1276] *The VC On-line Help shall include screenshots of the GeoView. The screenshots shall be provided in a suitable lightweight format (e.g. GIF, PNG) approved by the Purchaser.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Inspection

[T1-R1277] *Pictures in the VC On-line Help showing more than five (5) GUI elements/controls shall have a clickable image map describing each element.*

Requirement Property :

Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Inspection

[T1-R1278] *If the VC On-line Help topic requires a large picture that does not fit on a normal page, a reduced copy shall be additionally included on the Help page that will expand to its full size on user request.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1279] *The VC On-line Help shall be context-sensitive (i.e. based on a specific point in the state of the software and providing help for the situation that is associated with that state on action being performed).*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1280] *The Security Classification of any example data that is displayed in VC On-line Help shall not be higher than NATO UNCLASSIFIED.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Inspection

[T1-R1281] *The VC On-line Help context-sensitive GUI elements shall be linked to the relevant User Manual topics.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Inspection

[T1-R1282] *The VC On-line Help shall be given by a small pop-up screen or infotip screen. This screen shall appear quickly and be very easy to hide, for instance clicking anywhere within it.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1283] *The VC On-line Help shall open a dedicated Web page when the user requests access to the full content of the On-line Help. The On-line Help shall not be preventing the user to perform on the GeoView.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1284] *The VC GeoView shall allow the user to hide the On-line Help screen just by clicking anywhere else, or there shall be another single action hiding mechanism.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 2
- Qualific. Method : Test

[T1-R1285] *The VC On-line Help shall include a searchable Index that allows the user to locate keywords or phrases (identified by enclosure within double-quotation marks) in the User Manual.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 2
- Qualific. Method : Demonstration

[T1-R1286] *The VC shall support search queries for finding help items in the On-line Help.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 2
- Qualific. Method : Demonstration

[T1-R1287] *The VC On-line Help shall be able to display search query results for finding help items in the On-line Help in a list. The VC GeoView shall display the help item when the user selects a query result in this list.*

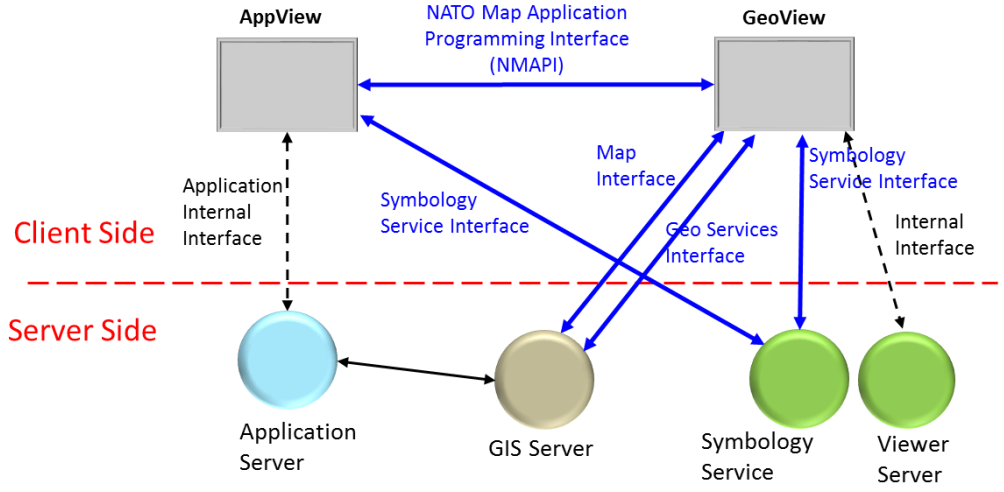
Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 2
- Qualific. Method : Demonstration

[T1-R1288] *The VC On-line Help shall be prepared as a compiled/scripted HTML help file (.chm) which shall include all project-related source elements and graphics.*

Requirement Property :
- Domain for Static :
- Domain for Afloat:
- Baseline : VC-BL 2
- Qualific. Method : Demonstration

4.3.13. External Interfaces

The external interfaces of the VC are indicated with red lines in the figure given below:



These interfaces are described below and will be defined in an Interface Control Description (ICD).

4.3.13.1. Application Programming Interface

The Client Side of the VC, the GeoView, will utilise built-in browser technology such as HTML5, Javascript. It provides a messaging interface between the AppView and GeoView. The user interface events received from the AppView will then be converted to map management and geo-information management functions in the GeoView.

The VC will implement an Application Programming Interface (API) documented in the VC ICD.

4.3.13.1.1. NATO Map API

The interface between the AppView and the GeoView will be compliant to Common Map Application Programming Interface 1.3.0 (CMAPI) [CMAPI]. As there may be extensions to this API, the NATO-specific CMAPI will be renamed as NATO Map Application Programming Interface (NMAPI). One major extension is the definition of C4ISR Objects which include as least the following attributes:

- TRITON Track Definition
- TRITON Reference Object Definition (Reference Point, Line, Area)
- Own Position (to be received as Own Ship track from TRITON AppView)
- Geospatial Shape Definition (Point, Line, Area, Volume)
- Object Management Commands (e.g. create/update/delete object, request information)

[T1-R1289] *The VC shall provide an API named as "NATO Map API" for interfacing between the AppView and GeoView.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1290] *The VC shall implement CMAPI v1.3.0 for the NMAPI.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration
Comment : If a newer version is published, its implementation will be considered at Software Requirements Review.

[T1-R1291] *The VC NMAPI shall include definition of C4ISR Objects and their data model.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Inspection

[T1-R1292] *The VC NMAPI and integration issues shall be defined and documented in the VC ICD for enabling the use of the VC within other Functional Services.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Inspection

4.3.13.1.2. Application Framework

Any AppView interfacing with the VC will implement the NMAPI in its own framework. The VC documentation will provide the necessary standards and specifications to implement the NMAPI.

[T1-R1293] *The VC shall provide the necessary implementation details in its documentation to implement the API within the interfacing Application.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Inspection

4.3.13.2. Map Interface

The Map Interface contains the following profiles:

- Web Map Service (WMS) Standard Version 1.3.0, 2006 [OGC WMS]
- Open Geospatial Consortium (OGC) Web Map Tile Service (WMTS) Version 1.0.0, 2010 [OGC WMTS]
- OGC Web Processing Service (WPS) Version 1.0.0, 2010 [OGC WPS]
- Web Services Common Standard Version 2.0.0, 2010 [OGC WSCommon]

The profiles consist of amendments, restrictions and exceptions that further refine the WMS, WMTS and WPS Standards, in order to meet the specific needs of a Map Rendering Service and WPS.

Any Map Rendering Service must implement the profile of the WMS and WMTS.

[T1-R1294] *The VC shall have an interface with the NATO Core GIS relying on file and information exchange formats described in GIS Services Standards and File Formats [Core GIS SIP].*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1295] *The VC shall have interfaces compliant with Web Services Common Standard [OGC WSCommon].*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1296] *The VC shall be able to receive data in NVG and KML format, and display them.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.13.2.1. Web Map Service

Web Map Service (WMS) is a service type defined by the Open Geospatial Consortium, Inc. (OGC) via OGC WMS Standard for serving collections of layers as map images. WMS focuses on flexibility in Client request enabling clients to obtain exactly the final image they want. A WMS client can request that the server creates a map by overlaying an arbitrary number of map layers offered by the server in any supported coordinate reference system.

WMS operations can be invoked using a standard web browser by submitting requests in the form of Uniform Resource Locators (URLs). To connect to a WMS, the URL needs to be known. The content of such URLs depends on which operation is requested. In particular, when requesting a map the URL indicates:

- what information is to be shown on the Map Panel,
- what portion of the Earth is to be mapped,
- the available coordinate reference system,
- the output image width and height.

The client may request that the map layers be rendered using a specific server advertised style or even use a style provided by the client when the WMS server implements the OGC Styled Layers Descriptor (SLD) standard.

The VC will use the WMS which reads the following formats:

- Vector
  - ESRI Shapefile
- Raster:
  - Multiresolution Seamless Image Database (MrSID)
  - Enhanced Compression Wavelet (ECW)
  - JPEG
  - JPEG2000
  - PNG
  - GeoTIFF
  - Compressed ARC Digitized Raster Graphics (CADRG)
  - ARC Digitized Raster Graphics (ADRG)
  - Controlled Image Base (CIB)
- Digital Terrain Elevation Data (DTED) [DTED]
- Maritime Charts:
  - Digital Nautical Chart (DNC)
  - Electronic Navigational Chart (ENC)
  - S-57
  - Additional Military Layers (AML)

[T1-R1297] *The VC shall be able to consume OGC-compliant, WMS defined by the OGC specifications [OGC WMS].*

Requirement Property :

Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1298] *The VC shall be able to display the maps in JPEG and PNG (with transparency) provided by the WMS. The map formats given in the Description shall be applicable.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.13.2.2. Web Map Tile Service

The function describes the display of a Web Map Tile Service (WMTS) map service received from a map server. WMTS Implementation Standard provides a standard based solution to serve digital maps using predefined image tiles. The WMTS serves a single tile of a single layer of a map. WMTS is a service type defined by the Open Geospatial Consortium, Inc. (OGC) via OGC WMTS Standard.

WMTS operations can be invoked using a standard web browser by submitting requests in the form of Uniform Resource Locators (URLs).

Strategy of the WMTS forces to perform image overlays on the client side by requesting map images which are in general not exactly at the right position thereby forcing the clients combine the geo-referenced mosaic tiles obtained from the server and clip the mosaic to the map image of interest. This restriction of image requests to a fixed, predefined set allows for servers to scale based on communication processing abilities rather than image processing abilities because servers can pre-render the images and can use image caching strategies. The fixed set of images also enables network providers to cache images between the client and the server, reducing latency and bandwidth use.

The WMTS standard complements the existing Web Map Service (WMS) standard of the OGC, targeting to improve the response time of a server by trading in the flexibility in the request, and shifting some of the functionality to the client.

The goal of providing a WMTS enabled service is performance orientation and scalability.

[T1-R1299] *The VC shall be able to use OGC-compliant, WMTS-based services defined by the OGC specifications [OGC WMTS].*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.13.2.3. Web Processing Service

Web Processing Service (WPS) interface provides rules for standardizing how inputs and outputs (requests and responses) for invoking geospatial processing services, such as polygon overlay, as a Web service. The WPS defines how a client can request the execution of a process, and how the output from the process is handled. It defines an interface that facilitates the publishing of geospatial processes and clients' discovery of and binding to those processes. The data required by the WPS can be delivered across a network or they can be available at the server. WPS can describe any calculation (i.e. process) including all of its inputs and outputs, and trigger its execution as a web service. WPS supports simultaneous exposure of processes via HTTP GET, HTTP POST and SOAP, thus allowing the client to choose the most appropriate interface mechanism. The specific processes served up by a WPS

implementation are defined by the owner of that implementation. Although WPS was designed to work with spatially referenced data, it can be used with any kind of data.

In many cases geospatial or location data, including data from sensors, must be processed before the information can be used effectively. The OGC WPS Interface Standard provides a standard interface that simplifies the task of making simple or complex computational processing services accessible via web services. Such services include well-known processes found in GIS software as well as specialized processes for spatio-temporal modelling and simulation. While the OGC WPS standard was designed with spatial processing in mind, it can also be used to readily insert non-spatial processing tasks into a web services environment.

The WPS standard provides a robust, interoperable, and versatile protocol for process execution on web services. It supports both immediate processing for computational tasks that take little time and asynchronous processing for more complex and time consuming tasks. Moreover, the WPS standard defines a general process model that is designed to provide an interoperable description of processing functions. It is intended to support process cataloguing and discovery in a distributed environment.

[T1-R1300] *The VC shall be able to use OGC-compliant, WPS-based services defined by the OGC specifications [OGC WPS].*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.13.3. Geo Services Interfaces

The Geo Services Interfaces are programmatic interface specifications describing the available Geo Services. The Geo Services Interfaces describe how to use a service via its network address, interfaces, data model and transport methods. The Geo Services Interfaces include the following:

- Web Processing Service (WPS)
- Web Map Service (WMS)
- Web Map Tile Service (WMTS)
- Web Feature Service (WFS)
- Web Coverage Service (WCS)
- Catalogue Service for Web (CSW)
- Gazetteer Service

The Map Rendering Service covers both WMS and WMTS.

[T1-R1301] *The VC shall be able to use the Geo Services given in the Description as Geo Services Interfaces.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1302] *The VC shall provide feedback to the user within five (5) seconds in a static network environment when a Geo Service is invoked by the user. If the data cannot be made available within ten (10) seconds, the user shall be notified with an option to cancel the request.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3

Qualific. Method : Test

4.3.13.4. Symbology Service Interface

While the GeoView is displaying the C4ISR Objects using the symbols provided by the Symbology Service, some User Applications on the AppView may also display C4ISR Objects with appropriate symbols within its tabular format. In that case, the AppView can access the Symbology Service to get the user-selected set of symbols.

The Symbology Service will provide a Service Interface Profile (SIP) to define its external interface.

[T1-R1303] *The VC Symbology Service shall have a Web service for its interface defined in its Service Interface Profile.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1304] *The VC ICD shall include the Service Interface Profile for the Symbology Service.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Inspection

4.3.13.5. Interface Control Description

The Interface Control Description (ICD) of the VC will cover all interfaces given below:

- NMAPI defining the AppView and GeoView interactions
- Interfaces with the GIS Server
- Symbology Service - SIP
- Data handling
- Error handling
- User Settings
- Applicable standards.

The ICD will be developed incrementally.

[T1-R1305] *The VC shall have an ICD describing all the API, integration procedures, and interfaces with the GIS Server and Symbology Server, data and error handling mechanisms and applicable standards.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1306] *The VC ICD shall be developed and made available in increments.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Inspection

4.3.13.6. Conformance Test Kit

The VC will have a Conformance Test Kit which will allow testing the external interfaces and correctness of computations. This Kit will include the following:

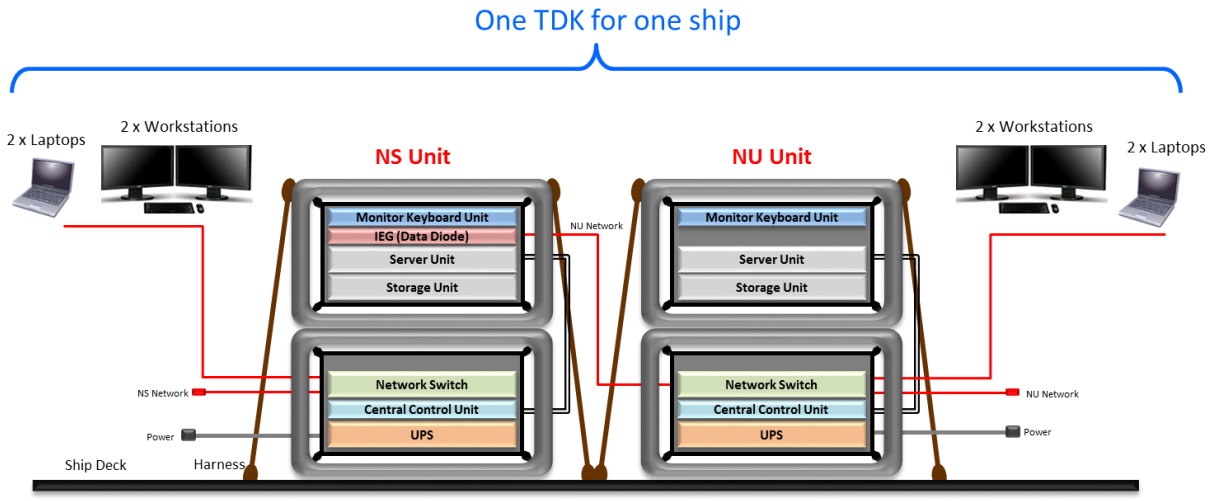
- Test Harness (e.g. simple interface simulators, value generators)
- Test Procedures (e.g. how to test a function subject to conformance)
- Test Data
- Test Results

[T1-R1307] *The VC shall have a Conformance Test Kit to allow testing the external interfaces and correctness of the computations.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : BL 3
Qualific. Method : Inspection

4.4. TRITON Deployable Kit Requirements

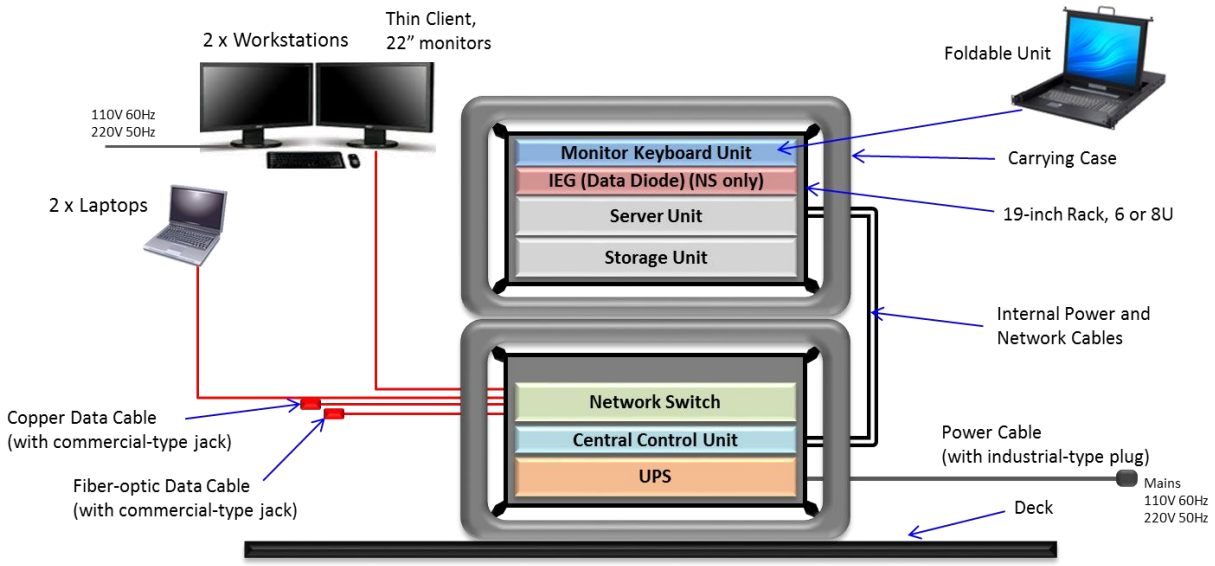
TRITON Deployable Kits (TDK) will be used on board the Afloat Command Platforms (ACP) to provide computing platform for TRITON Operational Software in both Normal and Standalone Mode. TDK will be transferred to a ship in special carrying cases, installed in a designated, sheltered compartment on board, and fixed to deck by means of special installation harnesses. A complete TDK for one ship consisting of one NS Unit and one NU Unit is shown below:



The main components of one TDK Unit are specified in the following paragraphs.

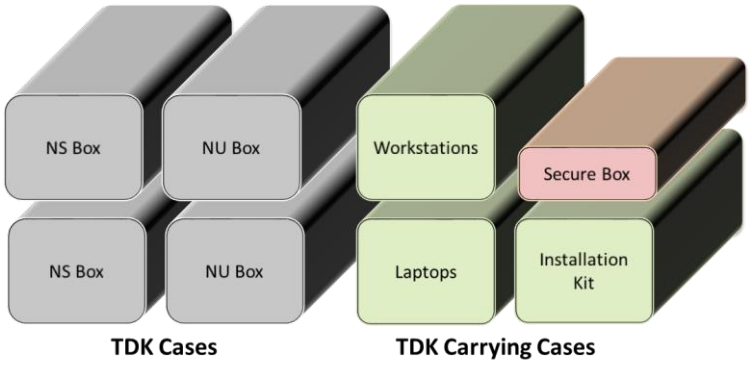
4.4.1. TDK Hardware

One TDK consists of two units: NS Unit and NU Unit. Each Unit consists of one or two cases, each enclosing a 6 or 8 RU (1 Rack Unit = 4.4 cm) rack to hold the computing hardware and other units. TDK Units will have the same hardware and infrastructure software with an exception of IEG (Data Diode). A notional representation of single TDK Unit is given in the picture below:



The TDK Hardware consists of computing hardware, network elements and power supply units placed in portable, ruggedized cases. Workstations and other material will be placed in special carrying cases.

The size of ship hatches or openings restricts the location where the TDK is mounted. Therefore the TDK will use portable carrying cases easy to carry with a not-to-exceed size and weight, allowing assembling and dismantling inside a ship compartment. The TDK design should consider the total size to be as small as possible due to ship passage ways. A possible packing of one complete TDK is notionally illustrated below:



4.4.1.1. TDK Case

TDK Cases will be used to host the Computing Hardware, network and support units. The number of TDK Cases for one TDK Unit should not be more than two.

[T1-R1308] *TDK Case shall enclose a 19-inch rack with height not exceeding eight (8) Rack-Unit (RU).*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

[T1-R1309] *TDK Case shall be watertight, dust proof, crush proof, equipped with anti-vibration shock mounts and Automatic Pressure Equalization Valve (suitable for transportation with air cargo).*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both

Baseline : BL 4
Qualific. Method : Inspection

[T1-R1310] *TDK Case size shall not exceed one hundred and twenty (120) cm long X seventy (70) cm wide X sixty (60) cm high.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1311] *TDK Case weight including the content shall not exceed sixty (60) kg in total.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1312] *TDK Case shall have handles or special harnesses both on their sides and on top (in order to be able to carry in vertical position over ship ladders and durable enough to use crane).*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1313] *TDK Case shall have detachable wheels with locking mechanism.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1314] *TDK Case shall have front and end lids with securing locks and keys.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

4.4.1.2. Carrying Case

TDK Client Workstations, Installation Kit, small spare parts and other material such as user manuals will be placed in additional ruggedized Carrying Cases with protective inner cushions.

The TDK Cases can also be used to store the Installation Kits during transportation.

[T1-R1315] *TDK Carrying Case shall be watertight, dust proof, crush proof and lockable, equipped with inner cushions, Automatic Pressure Equalization Valve (suitable for transportation with air cargo), handles and wheels.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1316] *TDK Carrying Case size shall not exceed one hundred and twenty (120) cm long X seventy (70) cm wide X sixty (60) cm high.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1317] *TDK Carrying Case weight including the content shall not exceed sixty (60) kg in total.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1318] *TDK Carrying Case interior design shall be configurable.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1319] *TDK Carrying Case used as the Secure Box shall have security labels and locks.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

4.4.1.3. Uninterruptible Power Supply

Each TDK will be able to operate on board ships that may have different power options. Due to the nature of ship environment, continuous power needs to be maintained using an internal Uninterruptible Power Supply (UPS). TDK UPS will provide continuous operation for a short time and orderly shutdown possibility for a non-determined outage period.

[T1-R1320] *TDK UPS shall support all components within a TDK Unit for at least thirty (30) minutes after the main power is gone.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration

[T1-R1321] *TDK UPS shall be able to operate using both 110 VAC 60Hz and 220 VAC 50Hz as the main power input.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration

[T1-R1322] *TDK UPS shall have replaceable batteries.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

4.4.1.4. Central Control Unit

The start-up and shut-down sequence of the components of a TDK Units will be controlled by a Central Control Unit (CCU). The CCU will distribute power to all units and send automatic control commands to start-up and orderly shut-down the units in case UPS limit is exceeded. Authorised users will also be able to issue shut-down command to completely turn-off all units via the Client. The workstations will use other power sources available at their compartments.

CCU will be able to utilise Simple Network Management Protocol (SNMP) to communicate with other units.

[T1-R1323] *Each TDK Unit shall have a Central Control Unit (CCU).*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection
- Comment : COTS component will be preferred.

[T1-R1324] *TDK CCU shall have power distribution capability to all components inside the TDK Cases.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

[T1-R1325] *TDK CCU shall monitor the main power and the UPS status continuously.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Demonstration

[T1-R1326] *TDK CCU shall be able to detect main power loss within one second and provide a visual and an audible notification (e.g. beep and flashing light).*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Demonstration

[T1-R1327] *TDK CCU shall have a control switch to initiate the start-up and shut-down sequences.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

[T1-R1328] *TDK CCU shall provide the System Management with the current power status (i.e. power source as external or UPS, UPS power percentage and remaining time to auto shut-down) using SNMP.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Demonstration

[T1-R1329] *TDK CCU shall provide a single Grounding Point for all components inside the TDK Cases using grounding cables (sheets).*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

[T1-R1330] *TDK CCU shall be able to receive a shut-down command from the server unit and initiate the orderly shut-down process for all components.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Test

[T1-R1331] *TDK CCU shall issue an automatic shut-down command to all components if the UPS remaining power gets below the critical threshold.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Test

4.4.1.5. Monitor Keyboard Unit

A 19-inch, slide-out keyboard and a fold-down LCD monitor and a built-in Keyboard Video Mouse (KVM) Switch will be used for maintaining the TDK computing hardware. A sample view of this unit is given below:



[T1-R1332] *Each TDK Unit shall have a 19-inch, one (1) RU, slide-out standard English QWERTY keyboard with built-in two-button pointing device and a fold-down colour LCD monitor with at least Full HD resolution connected to the Server Unit.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

4.4.1.6. Installation Kit

TDK will have an Installation Kit including a fixing gear, power cables, grounding cables and data cables.

[T1-R1333] *TDK shall have an Installation Kit including a fixing gear, power cables, grounding cables and data cables.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4

Qualific. Method : Inspection

[T1-R1334] *TDK Installation Kit shall have harnesses and gears to securely fix the TDK Cases on the deck allowing both vertical (one case on top of the other one) and horizontal (side-by-side) orientation.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1335] *TDK Installation Kit shall allow the installation crew to fasten the TDK Cases on the deck to withstand ship movements at Sea State seven (7).*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration

[T1-R1336] *TDK Installation Kit shall allow the installation crew to unfasten the TDK Cases, move them to another compartment and fasten them there in case of a re-planning or an emergency.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration

[T1-R1337] *TDK Installation Kit shall have at least ten (10) metres of power cable with an industrial type plug and potential adapters for each of the NS and NU Unit.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1338] *TDK Installation Kit shall have at least twenty (20) metres of both fibre-optic and copper Gigabit Ethernet cables (CAT-6) with commercial-type jacks (i.e. RJ-45) for each of the NS and NU Unit.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1339] *TDK Installation Kit shall have a grounding cable (sheet) to connect the TDK Unit Grounding Point to the ship grounding point. A combined grounding cable can be used for both units.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

4.4.1.7. Computing Hardware

TDK computing hardware will consist of Server Unit and a Storage Unit to provide the computation services described in Subsection 5.4. Depending on the available COTS products, Server and Storage Units may be combined.

4.4.1.7.1. Server Unit

The TDK Server Unit will provide the server capabilities. If the product selected as Server Unit cannot handle the required storage capacity locally, then a separate Storage Unit will be used. The specifications given in Subsection 5.4 for static site Server Unit can be used after scaling down for TDKs.

[T1-R1340] *TDK Server Unit shall host the TRITON Operational Software configured for ACP.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

[T1-R1341] *TDK Server Unit shall be 19-inch rack type whose chassis height does not exceed two (2) RU.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

[T1-R1342] *TDK Server Unit shall have at least two (2) physical CPUs each having at least four (4) cores.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

[T1-R1343] *TDK Server Unit shall have at least one-hundred-and-twenty-eight (128) Gigabytes of memory.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

[T1-R1344] *TDK Server Unit shall have graphics support capability for the local fold-down KVM.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

[T1-R1345] *TDK Server Unit shall have at least five (5) Terabytes of storage. If SAN is used, one (1) Terabytes of local storage shall be included in the Server Unit.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

[T1-R1346] *TDK Server Unit shall be compliant to the general specifications for the static site Server Unit.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

[T1-R1347] *In case processing capacity for the TDK Server Unit is considered to be less than the required level, then additional components shall be provided and integrated into the existing infrastructure, including the management features.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

4.4.1.7.2. Storage Unit

If the selected TDK Server Unit does not have sufficient storage capability then a Storage Area Network (SAN) will be used. The specifications given in Subsection 5.4 for static site Storage Unit can be used after scaling down for TDKs.

[T1-R1348] *TDK Storage Unit shall be 19-inch rack type whose chassis height does not exceed two (2) RU.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

[T1-R1349] *TDK Storage Unit shall have a capacity of at least five (5) Terabytes.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

[T1-R1350] *TDK Storage Unit shall be compliant to the general specifications for the static site Storage Unit.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

[T1-R1351] *In case storage capacity of the TDK Storage Unit (including I/O performance, Storage Network Capacity and licences) is considered to be less than the required level, then additional components shall be provided and integrated into the existing infrastructure, including the management features.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

4.4.1.7.3. Network Elements

TDK will use a Network Switch to establish connection with external Local Area Network and internal units, also supporting the Storage Area Network. Client workstations will be connected to this local switch to access TRITON services. External access will use Unshielded Twisted Pair (UTP) or fibre cables. The specifications given in Subsection 5.4 for static site Network Switches can be used after scaling down for TDKs.

[T1-R1352] *TDK Network Switch shall be 19-inch rack type whose chassis height does not exceed two (2) RU.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

[T1-R1353] *TDK Network Switch shall support at least 10/100/1000 Mbps UTP and 1/10 Gbps fibre channels.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

[T1-R1354] *TDK Network Switch shall have at least eight (8) UTP and eight (8) fibre ports.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection
- Comment : Fibre port type will be determined at HwRR.

[T1-R1355] *TDK Network Switch shall have manageability, routing and Quality of Service capability.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

[T1-R1356] *In case networking capacity (ports, bandwidth or other performance levels, licences) for the Network Elements is considered to be less than the required level, then additional components shall be provided and integrated into the existing infrastructure, including the management features.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Inspection

4.4.1.7.4. IEG-Data Diode

Data Diode is a piece of equipment which provides one-way, secure information transfer. The TDK-NS will have an IEG-Data Diode. An approved commercial product which can be found in NATO Information Assurance Product Catalogue (NIAPC) (http://www.ia.nato.int) can be used.

[T1-R1357] *The IEG-Data Diode shall provide secure, one-way data transfer from the NU Domain to the NS Domain.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: NS
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1358] *The IEG-Data Diode shall be compliant to the specification provided by the Purchaser.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: NS
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1359] *The IEG-Data Diode shall be in a form of 19-inch rack type whose chassis height does not exceed one (1) RU.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: NS
Baseline : BL 4
Qualific. Method : Inspection

4.4.1.7.5. Client Workstations

TDK will include Workstations to host TRITON Clients. As a standard, each Workstation will be a Thin Client with one or two monitors. Each TDK Unit will have two Workstations. In addition, laptops can be used for smaller compartments. Each TDK Unit will have two laptops.

The current minimum requirements are given below:

Thin Client:

- Processor : 2 or more cores (64-bit OS support)
- Memory : 8GB
- Display Output : Dual Display (capable of 1920x1200@60Hz on each display)
- Network Interface : 1000 Base-SX ability to support 1000Base-T
- Peripheral : Monitor, keyboard, mouse
- Optional : Audio input/output, Webcam

Laptop:

- Processor : 2 or more cores (64-bit OS support)
- Memory : 8GB, expandable to 16GB
- Local Storage : 240GB
- Graphics : Triple display capable of 1920x1200@60Hz on each display, compatible with DirectX12 and OpenGL 4.4
- Network Interface : 1000Base-T Gigabit Ethernet RJ45, WiFi IEEE802.11 n/ac
- Peripheral : External mouse
- Additional : Webcam, microphone array, smart card reader

The detailed configuration will be determined according to the proposed design, technical availability and NATO Standard Workstation definition at time of TDK HwRR.

[T1-R1360] *TDK Unit shall have two (2) Workstations and two (2) Laptops to be used as TRITON Clients.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1361] *TDK Client Workstation shall have a similar configuration to the NATO Workstation Hardware Configuration as a Thin Client. The Server Unit shall provide the computing platform for the Thin Clients.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection
Comment : The detailed computer specifications will be determined during the HwDR of TDK.

[T1-R1362] *TDK Client Workstation shall have two (2) twenty-two (22) inch monitors with at least Full HD (1920 x 1080) resolution, one standard English QWERTY keyboard and one mouse with two buttons and a wheel.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1363] *TDK Client Workstation and Laptop "should" have small form factor, preferably in industrial standards, suitable to be used on board ships in small, air-conditioned compartments with 110/220V 50/60Hz.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection
Comment : The Bidder shall propose options compliant to the Purchaser's approved computer specifications.

[T1-R1364] *TDK Client Laptop shall have a similar configuration to the NATO Laptop Hardware Configuration with at least Full HD (1920 x 1080) screen resolution, standard English QWERTY keyboard and touch-pad with two buttons.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection
Comment : The detailed laptop specifications will be determined during the HwDR of TDK.

4.4.2. TDK Software

The TDK Software includes the infrastructure software and TRITON Operational Software.

4.4.2.1. Infrastructure Software

The Infrastructure Software for the TDK Server consists of the following:

- Virtualisation Software
- Operating System
- Database Server
- Web Server
- Security and Support Software.

These components will be compliant to the Computer Resource Requirements given in Subsection 5.4.

Each TDK Unit will have additional software packages and Infrastructure Services to provide functionality in Standalone Mode. Core Enterprise Services will be replicated if possible, otherwise similar functionality will be provided. The local Core Services will include at least the following packages and services:

- Domain Services
- Directory Services
- Security Services
- Local Geospatial Services (GIS Server).

[T1-R1365] *TDK Infrastructure Software shall be identical to the static site Infrastructure Software.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1366] *TDK Infrastructure Software shall be configurable according to the operational use of TDK.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1367] *TDK Infrastructure Software shall have its own Core Services to be able to operate in Standalone Mode. Instances of NATO Core Enterprise Services shall be used.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration

[T1-R1368] *TDK Infrastructure Software shall support automated monitoring of devices and services via Simple Network Management Protocol (SNMP).*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration

[T1-R1369] *TDK Infrastructure Software on each TDK Unit shall be able to support at least fifty (50) concurrent users.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration

4.4.2.2. Local Geospatial Services

TRITON will normally use the NATO Bi-SC AIS Core GIS as the Geospatial Services at static sites. The Deployable Kits, on the other hand, will have Local Geospatial Services (GIS Server) to support Standalone Mode of operation. In case NATO Core GIS is not available for Deployable Kits, an Interim Local Geospatial Service will be provided for each TDK Unit. If the NATO Core GIS becomes available for deployed platforms, the Interim Local Geospatial Service will be replaced.

The Interim Local Geospatial Service will provide, as a minimum, map handling capability with an interface compliant with the Service Interface Profile that NATO Core GIS provides.

If NATO Core GIS is not available on the NU Domain for even static sites, the Interim Service to be developed for BL2 on the NU Domain can also be used in TDKs.

[T1-R1370] *TDK shall utilise a Local Geospatial Service in both Networked and Standalone Modes for each Unit.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration

[T1-R1371] *TDK shall use the NATO Bi-SC AIS Core GIS as the default Local Geospatial Service if available. If the NATO Core GIS is not available for TDKs, an Interim Local Geospatial Service shall be provided. This interim solution can be replaced by the NATO Core GIS when it becomes available.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Test

[T1-R1372] *TDK Interim Local Geospatial Service shall provide, as a minimum, map handling capability with an interface compliant with the Service Interface Profile that NATO Core GIS provides [Core GIS SIP].*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Test
Comment : The detailed functions of the Interim Local Geospatial Service will be determined at SRR and the capability definition will be finalised at CDR.

[T1-R1373] *TDK Interim Local Geospatial Service shall be able to use the geo-information exported from the NATO Core GIS.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration

[T1-R1374] *TDK Interim Local Geospatial Service shall provide means to import the geo-information and Geospatial Service configurations already exported from the NATO Core GIS.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration

[T1-R1375] *TDK Interim Local Geospatial Service shall be readily available as a re-usable component in any context in both NS and NU Domains with no additional license cost if open source or custom-developed components are used.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 4
Qualific. Method : Inspection

4.4.2.3. TRITON Operational Software

TRITON Operational Software configured for ACPs will be used on TDK. The Operational Software for TDK will meet the requirements marked as "BL 4" and "Domain for Afloat". The requirements marked as "NS" for Domain are applicable to the NS-Unit, and those marked with "NU" are applicable to the NU-Unit. Each TDK Unit will also provide capabilities for interfacing ship systems if there are any available ones. The ACP interfaces are specified in Section 5 in detail.

[T1-R1376] *TDK shall host the TRITON-NS Operational Software configured for ACP on the NS-Unit.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: NS
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1377] *TDK shall host the TRITON-NU Operational Software configured for ACP on the NU-Unit.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: NU
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1378] *TDK shall have its own installation tools and configuration procedures to install and operate the TRITON Operational Software.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

4.5. TRITON Support Systems Requirements

During the development and maintenance of the TRITON Operational Software, Test Systems and Reference Systems will be used as Support Systems. These Support Systems will be installed at the NCI Agency premises, PMIC or an indicated Data Centre. They will be accessible by developers and maintainers.

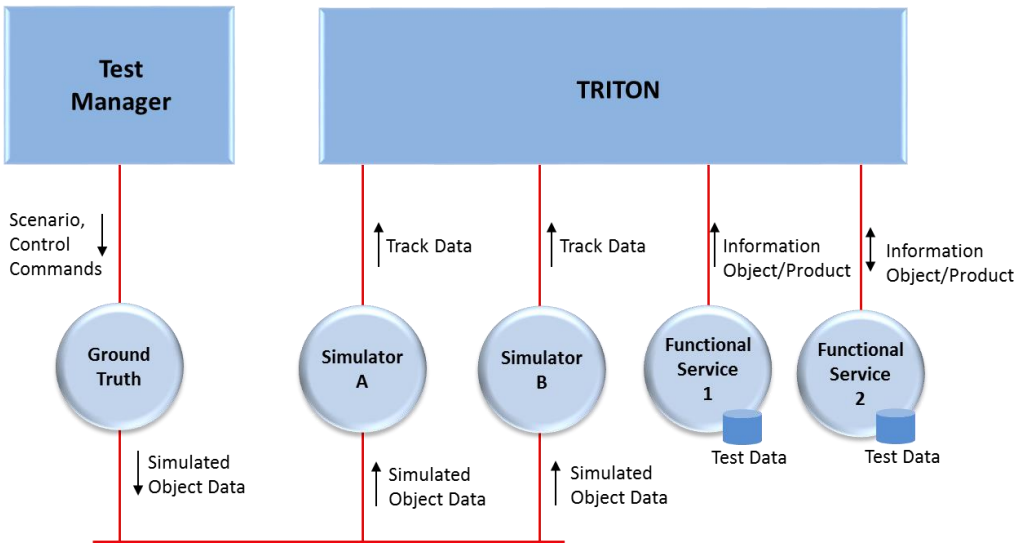
Training Systems as another type of Support System, will be used to provide training courses to operational users.

All Support Systems will be installed on the NU Domain at either PMIC or Data Centre. They will be configured to represent the NS and NU Domain systems.

The general guidance and requirements given in Subsection 5.4 (Computer Resource Requirements) will be valid for all Support Systems.

4.5.1. TRITON Test Systems

The TRITON Test System provides a Test Environment (test-bed capability) for developers and maintainers. The Test System will also be used for System Integration Test and User Assessment Tests before the site installation and delivery of each Baseline or maintenance releases. There will be two separate Test Systems, one for testing the TRITON-NS Functional Services and one for testing the TRITON-NU Functional Services. The conceptual configuration of the Test System is illustrated below:



If the TRITON Operational Software under test requires external data, the Test Environment will provide either the systems themselves or their simulators. While testing certain functions, the Test Manager shown in the picture will provide scenario to configure the Ground Truth to inject realistic data. For example, Track Correlation function requires more than one data source reporting the same vessel. The test of this function will be performed using Simulated Object Data generated by the Ground Truth at the same time domain and fed into the Track Simulators.

The Test Systems will also be used as TRITON Interoperability Test Centre (TITC) to support testing Nation Interfaces with each Nation.

4.5.1.1. Operational Software

The TRITON Operational Software configured as TRITON-NS and TRITON-NU will be used in the Test Systems. TRITON-NS configuration and TRITON-NU configuration will be installed on separate Test Systems running on the NU Domain.

The software configuration will provide the necessary test environment to support official acceptance tests.

[T1-R1379] *TRITON Test Systems shall have the TRITON Operational Software Baseline to be tested.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1380] *TRITON Test Systems shall provide interface simulators and test data to test the interfaces for any external system.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 1
- Qualific. Method : Demonstration

4.5.1.2. Infrastructure

TRITON Test Systems will have the same infrastructure as TRITON Functional Services on the NS and NU Domains.

[T1-R1381] *TRITON Test Systems shall have their own Virtualised Environment including operating systems and any other required third party software.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1382] *TRITON Test Systems shall have the same Infrastructure Software as the TRITON Functional Services at static sites.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1383] *Each TRITON Test System shall be able to support at least one-hundred (100) concurrent users.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 1
- Qualific. Method : Demonstration

4.5.2. TRITON Reference Systems

The TRITON Reference Systems will be identical to the TRITON Test Systems. They will be kept operational through the system operational life. There will be two separate Reference Systems, one for the TRITON-NS Functional Services and one for the TRITON-NU Functional Services. Both systems will be installed on the NU Domain at the Purchaser's test facilities.

4.5.2.1. Operational Software

TRITON Operational Software configured as TRITON-NS and TRITON-NU will be used in the Reference Systems. TRITON-NS configuration and TRITON-NU configuration will be installed on separate Reference Systems running on the NS and NU Domains respectively.

The software configuration will provide the necessary test environment to support formal acceptance tests.

[T1-R1384] *TRITON Reference Systems shall have the TRITON Operational Software Baseline to be tested.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Inspection

[T1-R1385] *TRITON Reference Systems shall provide interface simulators and test data to test the interfaces for any external system.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Demonstration

4.5.2.2. Infrastructure

TRITON Reference Systems will have the same infrastructure as TRITON Functional Services on the NS and NU Domains.

[T1-R1386] *TRITON Reference Systems shall utilise the Virtualised Environment provided by the Purchaser.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Inspection

[T1-R1387] *TRITON Reference Systems shall have the same Infrastructure Software as TRITON Functional Services at static sites.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Inspection

[T1-R1388] *Each TRITON Reference System shall be able to support at least one-hundred (100) concurrent users.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Demonstration

4.5.3. TRITON Training Systems

The TRITON Training Systems will be similar to the TRITON Test Systems. There will be two separate Training Systems, one for the TRITON-NS Functional Services and one for the TRITON-NU Functional Services. Trainers and trainees will be able to access the TRITON Training Systems installed on the NU Domain.

The Training Systems will have the Training Environment as defined in Paragraph 4.2.8.

4.5.3.1. Operational Software

The TRITON Training Software will be similar to the TRITON Operational Software with an addition of simulators. The TRITON Simulators will be used to provide simulated data for training purposes while TRITON is in Training Mode.

[T1-R1389] *TRITON Training Systems shall have the TRITON Operational Software installed as Operational Baseline.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Inspection

[T1-R1390] *TRITON Training Systems shall have the Training Environment to simulate external systems and services based on user-based scenario.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A

Baseline : BL 2
Qualific. Method : Inspection

4.5.3.2. Infrastructure

TRITON Training Systems will have the same infrastructure as TRITON Functional Services of the NS and NU Domains.

[T1-R1391] *TRITON Training Systems shall utilise the Virtualised Environment provided by the Purchaser.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1392] *TRITON Training Systems shall have the same Infrastructure Software as TRITON Functional Services at static sites. Instances of NATO Core Services shall be used to the extent possible.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1393] *Each TRITON Training System shall be able to support at least one-hundred (100) concurrent users.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Demonstration

5. NON-FUNCTIONAL REQUIREMENTS

5.1. Quality Requirements

The quality requirements include system/software product quality model as defined in [FDIS 25010]. The TRITON Operational Software needs to be developed considering modern software quality aspects and verified during the development process.

Product quality properties are reliability, performance efficiency, usability, security, compatibility, maintainability and portability. Each characteristic is composed of a set of related sub-characteristics and described in the following paragraphs.

5.1.1. Performance Efficiency

Performance efficiency is the performance of a system relative to the amount of resources used under stated conditions. Performance efficiency for the TRITON Operational Software is considered for both Server and Client.

The Client hardware should be able to provide sufficient non-real time performance and graphics display capability with appropriate hardware and communication infrastructure.

Performance characteristics will be measured by taking into consideration only the network load arising from TRITON; the communication delays on the underlying network due to other Bi-SC Functional Services will not be included in the measurement.

5.1.1.1. Performance by Time Behaviour

Time behaviour is the degree to which the response and processing times and throughput rates of a product or system, when performing its functions, meet requirements. In case of failure, which is defined as an error or cessation in the operation of the software requiring, as a minimum, a restart of the application, TRITON will be able to switch to the dedicated Static Backup Server.

TRITON will become available after its first start-up according to the Initial Availability Criteria given below:

Initial Availability Criteria:

- Application server and all necessary services are active
- Server is ready to receive external data from its interface services
- User login window becomes available on the Client.

[T1-R1394] *TRITON Functional Services shall become available according to the Initial Availability Criteria as given in the Description within ten (10) minutes after the operating system of the TRITON Server is started up.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R1395] *TRITON shall complete mode changes in less than five (5) minutes and become ready to accept user input in less than ten (10) minutes for both static and afloat Servers.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

[T1-R1396] *In case a critical failure in the TRITON Static Server is detected, the authorised user shall be notified, and TRITON Functional Services shall be switch to the specified secondary Static Server within five (5) minutes after the authorised user acknowledgement. The authorised user shall continuously be informed about the status of the server change process.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test
Comment : Further conditions for switching servers will be determined during the Software Requirements Analysis.

[T1-R1397] *TRITON shall be available for accepting user commands within thirty (30) seconds after accessing or starting a user application via a Client at a static site.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Test

[T1-R1398] *TRITON shall be available for accepting user commands within sixty (60) seconds after accessing or starting a user application via a Client at an afloat site.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Test

[T1-R1399] *TRITON shall be able to support at least twenty (20) concurrent update events per node.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R1400] *TRITON shall be able to update the Maritime Operational Objects to be displayed at Clients with a rate of at least one-thousand (1000) tracks per minute.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R1401] *TRITON shall provide a response to a user, in either AppView or GeoView, in any environment, for any action, in less than five (5) seconds.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

5.1.1.2. Performance by Bandwidth Efficiency

Bandwidth is still an important performance bottleneck for afloat platforms. TRITON will be able to perform its functions under low bandwidth conditions such as less than 500 Kbps. The bandwidth

considerations will be applicable for both server-to-server communications and client-server interactions.

Caching mechanisms and compression methods will be used to increase efficiency.

[T1-R1402] *TRITON shall be designed and implemented to minimise the use of network bandwidth (e.g. caching, light-weight previewing, metadata exchange, lazy loading, query paging) and computational resources.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

[T1-R1403] *TRITON shall implement a caching mechanism to improve user performance and minimise bandwidth utilisation wherever possible.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection
Comment : Further details for performance figures will be determined during System Requirements Analysis and finalised at CDR.

[T1-R1404] *TRITON shall use data compression methods to reduce bandwidth usage by at least twenty-percent (20%) during information exchange between TRITON Servers.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

[T1-R1405] *TRITON Clients shall be able to operate with selected static TRITON Servers using network bandwidth as low as five-hundred (500) Kbps and network latency as high as five-hundred (500) milliseconds. The efficiency shall be tested on the Test System simulating the bandwidth and latency characteristics.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test
Comment : The operation criteria shall be finalised at SRR.

[T1-R1406] *TRITON ACP Server shall be able to synchronise itself with a selected static Server using five-hundred (500) Kbps of network bandwidth on the Test System. The test shall be executed in a test environment simulating the bandwidth.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Test

5.1.1.3. Performance by Network Status

When there is a reduced level of service that may impact one or more of the TRITON Operation Services (e.g. reduction in service due to bandwidth limitations or a communication degradation affecting some part of the LAN and/or WAN), TRITON Server will change its operational state to "Degraded".

TRITON Deployable Kit will be able to operate with local sources when disconnected from WAN, switch to "Standalone" mode, and continue providing services with local data and resources. The authorised user will be able to change the opeational state manually. When the state becomes Normal again, the Kit will synchronise itself with a static server.

[T1-R1407] *When the LAN is degraded by more than fifty percent (50%),TRITON shall automatically change its operational state to "Degraded" and shall be capable of providing the same range and level of services to individual users with a reduction in performance not more than fifty percent (50%).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration
- Comment : The performance level in degraded state will be defined at CDR.

[T1-R1408] *TRITON Deployable Kit shall be able to operate in Standalone Mode when WAN connectivity is lost more than a configurable time period. The detection of the loss of WAN connectivity will be subject to the netwotk infrastructure located on board.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Demonstration

5.1.1.4. Resource Utilisation

Resource utilisation is the degree to which the amounts and types of resources used by a product or system when performing its functions meet requirements.

The hardware resources provided to TRITON will be utilised in the most efficient way by the application software. Therefore its design and implementation must consider minimising the use of computational resources.

[T1-R1409] *TRITON shall notify the authorised user when seventy-five percent (75%) of the allocated storage is reached.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1410] *TRITON shall not exceed fifty percent (50%) of the dedicated processor capacity in average.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

5.1.1.5. Capacity

Capacity is the degree to which the maximum limits of a product or system parameter meet requirements.

TRITON will have databases to store Maritime Information Entities and some lists. This SRS does not define a capacity limit for any storage or processing. The figures given in this SRS to indicate database

capacity or list sizes will only be used for test purposes. They will not be considered as limitation to the general capacity of the system or any of its functions.

Each TRITON Instance at the static sites will have a scalability of service from a single user up to a number of concurrent users with sufficient data storage capability. The initial number of users for each TRITON instance are provided in SOW. However, these figure shall not be used as limiting factor for the capacity.

[T1-R1411] *TRITON shall be able to provide service for at least five-hundred (500) concurrent users per Instance at static sites. The test shall be executed in a test environment with virtual users.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Test

[T1-R1412] *TRITON shall not have any licensing restrictions on the number of users who can simultaneously access a particular functionality.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Inspection

[T1-R1413] *TRITON shall be able to support at least twenty percent (20%) increase in users with no performance degradation during surge situations.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R1414] *TRITON shall be able to support storage size of at least ten (10) Terabytes per Instance at static sites.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Inspection

[T1-R1415] *TRITON shall have growth potential beyond the figures given to indicate data storage capacity, database or list sizes, and shall not deem any limitation on design.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Demonstration

5.1.2. Compatibility

Compatibility is the degree to which a product, system or component can exchange information with other products, systems or components, and/or perform its required functions, while sharing the same hardware or software environment.

5.1.2.1. Co-existence

Co-existence is the degree to which a product can perform its required functions efficiently while sharing a common environment and resources with other products, without detrimental impact on any other product.

TRITON, as a full Functional Service, is expected to work with other Functional Services on the same network environment. No error condition must be raised due to co-existence.

[T1-R1416] *TRITON shall operate with other Bi-SC AIS Functional Services in the same environment without causing any error condition in itself or in other systems.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Demonstration

5.1.2.2. Interoperability

Interoperability is the degree to which two or more systems, products or components can exchange information and use the information that has been exchanged.

Interoperability for TRITON is the ability to act together coherently, effectively and efficiently to achieve Allied tactical, operational and strategic objectives as defined in AAP-6.

TRITON will be able to receive automated, near real-time multi-format track feeds, and force element data from other automated C2 information systems and process them. It can also accept operational pictures produced by other NATO Commands and Joint Headquarters to produce a complete Recognised Maritime Picture. This includes support for aggregation tools to merge NATO, national, and non-NATO data and services as required by the operations in progress.

The capabilities delivered under Project TRITON will be the primary source of the NATO RMP. This capability will be interoperable with the NATO Functional Services as well as with the latest version of MCCIS available at the time of interfacing. As a key rule, TRITON will keep the existing interfaces that the legacy systems use for backward compatibility and interoperability. It will also strive to use existing interoperability profiles for MSA and intends to provide any new profiles into the NATO Interoperability Standards and Profiles (NISP) volumes [ADatP-34].

TRITON will provide the necessary mechanisms to ensure complete, accurate, timely, confidential, consistent and coherent information between the distributed Data Centres. Data will be replicated automatically in all databases whenever it is changed, and that is recognised by the replication mechanism.

[T1-R1417] *TRITON shall provide coherent interfaces for others to access its services. The External Interfaces are described in Section 6.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1418] *TRITON shall be compliant to the standards given in the NISP [ADatP-34].*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

5.1.3. Usability

Usability is the degree to which TRITON can be used by the operators to achieve the defined goals with effectiveness, efficiency and satisfaction in the context of general use. TRITON Operational Software needs to be understood, learned, used and attractive to the user, when used under specified conditions.

5.1.3.1. Appropriateness Recognisability

Appropriateness recognisability is the degree to which users can recognise whether a product or system is appropriate for their needs. It will depend on the ability to recognise the appropriateness of the product or system's functions from initial impressions of the product or system and/or any associated documentation.

[T1-R1419] *TRITON "should" provide the user with capabilities that are easy to understand to perform user functions.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

5.1.3.2. Learnability

Learnability is the degree to which a product or system can be used by specified users to achieve specified goals of learning to use the product or system with effectiveness, efficiency, freedom from risk and satisfaction in a specified context of use.

Learnability relates to the amount of training needed by users to allow them to use the system efficiently and effectively. Features that minimise training needs are therefore highly desirable. The training should follow as closely as possible the procedures that will be used in the real-world subject areas.

The learnability of TRITON is the capability of TRITON Functional Services to be understood, learned, used and attractive to the user, when used under specified conditions. TRITON is expected to have a high degree of learnability, making it very easy to use even the first time. TRITON will be compliant with [Bi-SCD 75-2] and [MC458/2] and accredited in accordance with [Bi-SCD 75-7].

It is expected that any user with basic computer skills can operate TRITON with a brief training. Specialist training in operational procedures and advanced GIS functionality may require additional training time.

During the GUI design, generally-accepted best practices as well as the Purchaers's HMI Style Guide will be used to ensure usability.

[T1-R1420] *TRITON shall have role-based access control to authorise users on functionalities according to certain expertise (e.g. WSM Operator, RMP Operator).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1421] *Any user with basic computer skills shall be able to operate TRITON general user functions with no more than two (2) days of training.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both

Baseline : BL 1
Qualific. Method : Inspection

[T1-R1422] *A user with basic system administrator skills (i.e. MS Windows system administrator) shall be able to install the TRITON Infrastructure and Operational Software, and configure it, perform node adminsitration tasks (e.g. manage users, manage domain values) with a maximum of one (1) week of System Administrator Training.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.1.3.3. Operability

Operability is the degree to which a product or system has attributes that make it easy to operate and control. Operability corresponds to controllability, (operator) error tolerance and conformity with user expectations as defined in [ISO 9241-110].

[T1-R1423] *TRITON shall allow the user to control all the functionality associated to a specific application.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1424] *TRITON shall provide the user to always enter data with correct type and format.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1425] *TRITON shall provide the user with error tolerance by restricting inappropriate function execution (e.g. the user shall be prevented to press a button which is not allowed at a certain stage of a function).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.1.3.4. User Error Protection

User error protection is the degree to which a system protects users against making errors. TRITON will have the following Error Management capabilities in AppView and GeoView:

- System malfunctions due to a software or hardware failure (e.g. a problem with the disk drive)
- User inputs not recognised by the system
- Data entry or logical errors on the part of the user
- Unexpected consequences resulting from user inputs.

[T1-R1426] *TRITON shall be tolerant to input errors. Users shall be given guidance and suggestions to help them correct or overcome mistakes they have already made.*

Requirement Property :
Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1427] *TRITON shall provide Error Management capability which is readily distinguishable from other displayed information (e.g. Pop-up Error Window).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1428] *TRITON shall provide the users with meaningful error messages and informed about the actions they need to take in order to fix or at least to report the problem.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

5.1.3.5. User Interface Aesthetics

User interface aesthetics is the degree to which a GUI enables pleasing and satisfying interaction for the user.

5.1.3.5.1. User Friendliness

TRITON must provide a user-friendly interface for operational users who vary considerably in their experience in the operational domain, technical skills, and frequency and time spent using the system. In order to help the user feel at ease with the system, some general principles are to be followed. They ensure that the GUI is as close as possible to common applications that the users are used to manipulate on their personal computers. These principles are mainly the ones standardised in [ISO 9241-210]~~, particularly in parts 10 to 17~~.

The following requirements represent the main aspects of the norm to be respected by TRITON. They deal with dialogue principles along with data presentation and availability of accurate guidance information.

The TRITON GUI (both AppView and GeoView) will comply with the following criteria and guidance:

User Guidance Information:

- Prompts indicate that the system is available for input.
- Feedback provides information in response to the user's input.
- Status is user guidance information that indicates the current state of components in the system hardware and/or software.

Menu Aspects:

- Menu structure, such as logical categories, grouping options and ordering items
- Menu navigation, including titles and access time
- Option selection and execution, including selection methods, use of the keyboard
- Menu presentation, including placement and use of icons

Dialogue Principles:

- Suitability for the task: The dialogue will be suitable for the user's task and skill level.
- Self-descriptiveness: The dialogue will make it clear what the user shall do next.
- Controllability: The user will be able to control the pace and sequence of the interaction.

- Conformity with user expectations: The dialogue will be consistent and correspond to the user characteristics, such as task knowledge, education and experience, and to commonly accepted conventions.
- Error tolerance: The dialogue will be forgiving, which means that despite evident errors in input, the intended result shall be achieved with either no or minimal corrective action by the user.
- Suitability for individualization: The dialogue will be able to be customized to suit the user needs.
- Suitability for learning: The dialogue will support and guide the user in learning how to use of the system.

Information Presentation Criteria:

- Clarity: Information will be conveyed quickly and accurately.
- Discriminability: Information will be able to be distinguished accurately.
- Conciseness: The system will provide only the information necessary to complete the task.
- Consistency: The same information will be presented in the same way throughout the application.
- Detectability: The user's attention will be directed to the information required.
- Legibility: Information will be easy to read.
- Comprehensibility: The meaning of the information will be clearly understandable.
- Unambiguity: The information will not be open to varying interpretation. Units of measure will be displayed where appropriate.

[T1-R1429] *TRITON shall provide User Guidance Information, given in the Description, which is readily distinguishable from other displayed information.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1430] *TRITON shall use menu dialogues with the Menu Aspects, given in the Description, when use of the system is infrequent and the user does not know what options are available and shall be considered in order to provide the user with useful information in due time and low effort.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1431] *TRITON shall comply with the Dialogue Principles given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1432] *TRITON shall comply with the Information Presentation Criteria given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1433] *TRITON shall keep page size limited on one screen and in order to reduce the need for scrolling to see the submit button.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1434] *Interactions with TRITON with a pointing device or keyboard shall produce similar results in and throughout all applications.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1435] *TRITON shall maintain changes of data entered on any form and inform the user on cancellation of change (or browse away from form) for loss of data.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1436] *TRITON shall notify the user who has initiated an action that processing of the action has started and convey the sense of processing progress (by means of a progress indicator, dialog boxes).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

5.1.3.5.2. Ease of Navigation

TRITON will provide user ease of navigation through menus and standardised GUI widgets, following logical orders. It will always be possible to access more detailed information via drill-down features. For example, a summary of Track Label can be available on the GeoView, and more information can be accessed by initiating a detailed Track Information dialog box. Even more detailed augmented information can be accessed if the track is already associated to a vessel.

[T1-R1437] *TRITON shall make navigation possible with both keyboard and pointing device and both shall be self-explanatory.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1438] *TRITON shall provide on-screen "drill-down" features to view lower-level details (where and whenever lower level details are available).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1439] *TRITON shall reflect the updated information to all levels while a user is in drill-down process.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1440] *TRITON table columns shall be selectable and switchable so as to present data in any desired form, complex sorting and filtering capabilities shall be provided on the table rows.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1441] *TRITON shall support editing of displayed information in a logical order. The GUI forms shall allow navigation using the tab key in a logical order. This means that the tab order shall represent the same logical order shown on screen.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1442] *TRITON shall disable the submit button for a form on click and re-enabled after any change to the entry content. This prevents clicking twice or more resulting in duplicate entries.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1443] *TRITON shall provide GUI layouts which are uniform and standardised.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1444] *TRITON shall disable the submit button for a form after it is clicked, and re-enable it after any change to the entry content is made (This prevents clicking twice or more times resulting in duplicate entries).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1445] *TRITON shall not use the ENTER key to trigger form submission, especially in cases where forms are too long to display on one screen (e.g. where the submit button may fall below the initially visible area).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1446] *TRITON shall automatically display scrolling bars (horizontal and vertical) when information does not fit onto one screen.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1447] *TRITON shall provide Breadcrumbs on the GUI to indicate the current location of the user within the system functions.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

5.1.3.5.3. Appearance

The look of the TRITON GUI is expected to resemble the interfaces of existing operational systems or operational prototypes, with which users are already familiar. The existing capabilities have been evolved based on user feedback and the requirement is intended to reduce disruption to operational missions, to minimise training costs, and to increase the likelihood of user acceptance and satisfaction.

[T1-R1448] *The look of the TRITON GUI shall resemble the interfaces of existing operational systems or operational prototypes, with which users are already familiar.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1449] *The design of the TRITON GUI shall be based on a single theme with variations. TRITON shall have a common look and feel carried across the entire application's GUI within which a small number of similar but easily distinguished layouts are used. Similar parts of the application should have similar GUIs and layouts throughout the application.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1450] *Visual elements and interaction schemes of the TRITON GUI shall be reused on similar functions and features. Uniformity is created this way, which helps users to understand where they are and what they can do.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1451] *TRITON GUI shall use a consistent font across Applications.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1452] *TRITON GUI shall be structured so that options, features and functions of the application are organised in a way that reflects their relationships.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1453] *The presence of required fields and their styling shall always be noted in advance. Although it is common to flag required fields with an asterisk, this shall be noted at the top of the form, not as a footnote at the bottom. Redundant flagging of required fields with a special character or glyph plus bolding, highlighting, outlining, or a distinct colour shall be considered as the best practice.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1454] *TRITON shall support the display of textual data in tabular displays with backgrounds, tabs, buttons and borders that are semi opaque. Transparency of a panel in the display shall be configurable by the user.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1455] *Web-based functionality under TRITON "should" be designed with a GUI conforming [W3C MWBP] which can be customised for viewing on mobile devices.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

5.1.3.5.4. Menus, Pointing Device Actions and Shortcuts

TRITON GUI will have a standard approach for using menus, pointing device actions and keyboard shortcuts to control the GUI.

TRITON will use the following options:

- Selections Options:
  - Menu (Select All)
  - Context-sensitive menu (right button)
  - Accelerators (Ctrl+A)
  - Pointing device (click, drag)
  - Arrow keys
- MS Windows Accelerators:
  - CTRL+C (Copy)
  - CTRL+X (Cut)
  - CTRL+V (Paste)
  - CTRL+Z (Undo)
  - DELETE (Delete)
- Selection Functions:

- Select All
- Deselect All
- Invert Selection

[T1-R1456] *TRITON GUI shall produce similar results for actions initiated by a pointing device (mouse of trackball) or keyboard throughout all applications. The options given in Description shall be used.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1457] *TRITON GUI shall provide clickable (selectable) links and buttons that are clearly distinguishable from non-clickable text.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1458] *TRITON GUI shall make keyboard shortcuts available to access functions.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1459] *TRITON GUI shall support Selection Options as given in the Description and extended selection by Ctrl (i.e. individual selected items) and Shift (i.e. select from-to) keys.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1460] *TRITON GUI shall support normal MS Windows Accelerators given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1461] *TRITON GUI shall support context (i.e. right-button) menus. The use of context menus shall be limited for advanced options only. General and common functions shall also be accessible through the Ribbon, view or dialog buttons.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1462] *TRITON GUI shall support the Selection Functions given in the Description unless otherwise specified.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 1
Qualific. Method : Demonstration

5.1.3.5.5. Role-based Presentation

TRITON GUI will present the data according to the privileges of the user role and adopts its menus. It will hide or clearly disable (e.g. grey out) functionality not appropriate at the time, including items on second-level and lower-level menus and dialogue boxes.

[T1-R1463] *TRITON GUI shall work on the principle of "visibility" which means the application shows Users whatever they need for the current task without distracting or overwhelming them with unrelated tasks or options.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1464] *TRITON GUI shall filter user-accessed information according to the user's authorisation, so that users can only see what they are allowed to view and/or change (including both data and functionality).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1465] *TRITON GUI shall only show functionality (e.g. menu items, buttons, selections) that is appropriate to the situation based on user role and permissions and object status. TRITON shall hide or clearly disable (e.g. grey out) functionality not appropriate at the time, including items on second-level and lower-level menus and dialogue boxes.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1466] *TRITON GUI shall be minimised according to what the user can do. The GUI shall only show entities and attributes (e.g. forms and fields) and functions (e.g. menus and buttons) that are actually available within the security authorisation of the user. Disabled functions due to permissions shall not be shown at all.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

5.1.3.5.6. Data Entry

TRITON GUI will provide coherency checks for data entry provided by its Applications' GUI.

Location Information Entry:

TRITON will identify and parse the location information entered by the user in the following formats:

- Degrees/Minutes/Seconds
- Decimal Degrees
- Degrees and Decimal Minutes

- Degrees, Minutes and Decimal Seconds
- Military Grid Reference System (MGRS)
- Universal Transverse Mercator (UTM).

[T1-R1467] *TRITON GUI shall display the expected input format on all form fields to the user if the label is not clear enough (e.g. date input format - ddmmyyyy or dd-mm-yyyy). This may be done via tooltips, greyed-out example content, additional labels, or some other means.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1468] *TRITON GUI shall be tolerant to the delimiters of input format, including Date format (e.g. dd-mm-yyyy could also be entered as ddmmyyyy or d-m-yy without error or picked from a calendar) and Location format (e.g. latitude/longitude could be entered as degrees-minutes-seconds or degrees.decimal degrees).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1469] *TRITON shall apply automatic layout (format) of data where possible (e.g. correct format of dates).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1470] *TRITON shall prevent ambiguity and make it clear what information in what format is required for each data entry field. All information shall have its units of measure when applicable (e.g. degrees, metres, yards, knots, seconds).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1471] *For all attributes related to geographic coordinates, TRITON GUI shall allow the user to enter geographic coordinates in a single text field (not requiring the user to copy/paste more than once to input a geographic value). TRITON shall automatically identify and parse the Location Information Entry as given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R1472] *TRITON GUI shall use predefined drop-down or pull-down lists in appropriate situations to speed up the entry if information and prevent input mistakes. Open text input fields shall be avoided to prevent errors during input.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1473] *TRITON GUI shall allow usage of the keyboard to directly input the code of a value of a list. TRITON shall verify the code and match it against the Domain Values for that list.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1474] *TRITON GUI shall retain entered data even after use of the back or reload button or any other user action except conscious choice to delete the data or empty (or reset) the web form fields.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1475] *TRITON GUI shall not lose, discard, or corrupt user input without user consent.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

5.1.3.5.7. Real-Estate Management

Real-estate in GUI indicates the valuable information presented in a page. The layout of TRITON GUI design should provide sufficient information to users in even different screen sizes.

[T1-R1476] *TRITON GUI shall keep page size limited on one screen and in order to reduce the need for scrolling to see the submit button to the extent possible. For additional information tabbed forms shall be used, where appropriate.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1477] *TRITON GUI shall be designed to support various screen sizes. TRITON pages shall expand to the right size of the user screen to the extent where the GUI is not distorted.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1478] *TRITON shall allow grouping of items with expand/minimise buttons (Microsoft Explorer style) in tree views, or using a "group by column" feature in tabular views.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1479] *TRITON shall provide wizards if input of certain information requires filling out more than one form, or require a form larger than one screen. This means long forms or lists shall be split up over different subpages (or tabs) within the wizard.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

5.1.3.5.8. Time Display

Time will be displayed in military domain. Date-Time-Group (DTG) is a special convention for military. Its format is:

DDHHMMZ MMM YY

Ø9163ØZ JUL 15

Additional use of date and time will comply with ISO 8601.

[T1-R1480] *TRITON shall use Coordinated Universal Time (UTC) (temps universel coordonné) for all time stamps and DTGs to be stored internally.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1481] *TRITON shall display time in UTC by default. It shall be displayed on the GUI with Zulu Time Zone.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1482] *TRITON shall present the local time of any other possible time zone if selected by the user.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1483] *TRITON shall clearly identify time values as Zulu (e.g. 0815Z) or Local in user displays and logs.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1484] *TRITON shall represent date/time data according to ISO 8601 [ISO 8601] by default. Application-specific displays of date/time data shall use the military convention for DTG.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

5.1.3.5.9. Standard Functionality

TRITON GUI will support standard functionality such as copying and pasting, undo/redo, screen tips etc.

[T1-R1485] *TRITON GUI shall support copying and pasting from other applications via the Clipboard (including text and graphics). The copy and paste action shall take into account the view and the status of the view (e.g. sorting, labelling) from which the information was copied and into which type of application it was pasted. As an example, information copied from a Matrix View and pasted into Microsoft Excel shall cause the information to be placed into corresponding cells (i.e. not a single cell containing all copied/pasted information) in the same sort order.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1486] *TRITON GUI shall allow an operation to apply to multiple-selected objects where possible.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1487] *TRITON GUI shall render row and column headers for data matrices.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1488] *TRITON GUI shall allow the user to sort (with an initial default of 'ascending') the contents of a matrix or list by clicking on the column header for the attribute on which the sort is to be based.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R1489] *TRITON GUI shall allow the user to reverse the sort order (i.e. ascending to descending, descending to ascending) by clicking again on the column header for the attribute on which the current sort is based.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R1490] *TRITON GUI shall allow the user to select which columns are displayed in matrix-views (i.e. hide/unhide columns). The user shall be able to store the column selection as a preference.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R1491] *TRITON GUI shall allow the user to select the order in which columns in a matrix-view are displayed. The user shall be able to store the column order as a preference.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R1492] *TRITON GUI shall allow the user to enable or disable screen tips and visual aids.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R1493] *TRITON GUI shall support screen tips (as titles or alt-text) on all icons and attributes that offer added explanation and assistance.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1494] *TRITON GUI shall provide undo/redo functionality for changes to objects to the largest extent possible (not limited to formatting), at least until the last save action.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1495] *For changes that cannot be undone, TRITON shall ask the user to confirm with an additional warning about the irreversible effect of the action.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1496] *TRITON GUI shall save the positions and states of the GUI elements for each user between application sessions, and shall restore the GUI on starting another session.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1497] *TRITON GUI shall allow the user to navigate on tabular lists row-by-row or by paging.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R1498] *TRITON GUI, when suitable, shall use asynchronous technologies, to provide native application's responsiveness experience on the Web interface.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

5.1.3.5.10. Defaults

TRITON will be able to manage default data for entries.

[T1-R1499] *TRITON GUI shall provide auto-completion feature with session-available information to be filled automatically by TRITON (i.e. date/time, name and other profile information of the user, classification). This shall apply to "entry fields" (including text-fields, drop down lists, radio-buttons).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1500] *TRITON GUI shall apply automatic layout (format) of data where possible (e.g. capitalisation of names, correct format of dates, geographic positions).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1501] *TRITON shall provide data defaults where applicable.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

5.1.3.5.11. User Feedback

Feedback in Human Factors Engineering can be defined as the perceivable reaction of a system to an operator control action. Feedback makes the user aware about the effects of his/her actions. The reaction to a user control action can either be directly perceived (e.g. by observation of the input element itself) or the effects of the control action can be observed from the system's reaction.

Feedback can be before, during and after a user action.

Feedback before a user action may be, for example, realised by change of colour an input element in an appropriate way when the user moves the cursor over it in order to make the user aware of the function which would be activated by a click. Feedback during the action is given when, for example, a button is being pressed and the GUI models the movement of the button which is immediately perceivable (e.g. button pressed). Feedback after the action applies after the click, that is, when a system function has been selected. Although every function has to be associated with an immediate visible reaction like changing of the displayed information, it can also have multiple characteristics.

Even if the execution takes some time the user must always be correctly informed about the status of the execution. The exact way to inform the user depends on the delay time. For shorter waiting periods (< 5 seconds) messages such as "please wait", the busy cursor might be acceptable, but for longer periods this kind of feedback is frustrating for the user. The least stressing method is an indication of a time countdown, that is, the time remaining for the system to complete the operation. This indication must, however, be fairly correct. If such a time display is not possible, other sorts of indications may

be adequate to show progress, such as a percent value or a progress scale. If appropriate, a means should be provided by which the operation can be cancelled or aborted. Any such indication will be removed when the operation has been completed.

In addition, when a control attempt wasn't successful (e.g. entering a wrong value) the user requires the right kind of feedback. This could be one form of Context-sensitive On-line Help or some special error feedback (error message), dependent on the function.

All TRITON GUI components will provide user feedback for each user action.

[T1-R1502] *TRITON GUI shall provide user feedback for each user action.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1503] *After the user has initiated a prolonged action, TRITON GUI shall inform that processing of an action has started and convey the sense of processing progress (by means of an animated progress indicator such as sand glass and progress bar). Where the action is quantifiably measurable (e.g. performing N actions) the animation shall provide a quantifiable display (e.g. a progress bar, time remaining). Where the action is not quantifiably measurable (e.g. awaiting a response) the animation shall provide a generic display (e.g. sand glass).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1504] *TRITON GUI shall provide prompts (i.e. allow cancellation or confirmation) when input or changes may be lost due to navigation or logging out.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1505] *TRITON GUI shall provide user feedback on required fields which have not been correctly entered (i.e. by highlighting the field or the field label in red).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

5.1.3.5.12. Tooltips

TRITON GUI will provide Tooltips to support inexperienced users for especially icon-based controls. When the user hovers the cursor over a symbol, a Tooltip describing the function of that symbol will be displayed.

[T1-R1506] *TRITON GUI shall provide Tooltips to describe the function when a user hovers the cursor over a GUI symbol.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both

Baseline : BL 2
Qualific. Method : Demonstration

5.1.3.6. Accessibility

Accessibility is a set of features that will make an application usable for people with certain disabilities.

[T1-R1507] *Sufficient contrast shall be used throughout the application. Highlighting information shall not rely on colours only.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1508] *TRITON GUI shall comply with "Level A" of the Web Content Accessibility Guidelines as defined by the W3C (see [WCAG]).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1509] *The TRITON accessibility features shall apply to the application GUI, including the help pages, CBT pages, the error/warning/notification messages, etc.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1510] *TRITON information on screens shall also contain text. Reliance on pictures or icons alone is not desired.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1511] *TRITON shall scale the user interface to fit the screen when low resolutions are used for poor vision accessibility.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.1.3.7. Language

TRITON will use English language through all its displays and internal documentation and source code.

[T1-R1512] *TRITON shall use "UK English" as the default language. This shall apply to all system and supporting components, including views, dialogs, help screens, tooltips, CBT, error/notification/warning messages and documentation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 1
Qualific. Method : Inspection

[T1-R1513] *TRITON shall allow the user to set localisation (alternative languages/regional settings).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R1514] *All TRITON On-line Help screens, CBT pages and User Guides shall have a score of at least forty (40) in the Flesch Reading Ease test.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R1515] *TRITON shall use the common Maritime Domain terminology consistent with this SRS and other NATO documents.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1516] *Labels used in TRITON shall be context-dependent, meaningful and descriptive to the function or action at hand.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1517] *TRITON internal development documentation shall be in English.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1518] *TRITON source code shall be readable in English (i.e. variables, functions and procedures shall be in English).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.1.4. Reliability

Reliability is defined as the capability of TRITON to maintain a specified level of performance when used under specified conditions.

A "failure" is defined as an error or cessation in the operation of the software requiring, as a minimum, a restart of the application. For Services, a failure is characterized by the inability of the Service to perform its operation For Web-based applications, an error requiring the user to reload the browser will be considered a failure.

Graceful Degradation:

TRITON will not completely lose its functionality in case some errors occur in its dependent services. It will gracefully degrade and change its Operational State to Degraded when the conditions in the System Configuration Settings occur. A "graceful degradation" means all TRITON functions unrelated to the unavailable services should continue to work and the situation is recoverable when the dependencies are working again. The capability will not raise exceptions, or even crash, but will elegantly notify the users and if possible will continue to provide some functions using the available resources.

Note that in some cases a graceful degradation can mean no access to TRITON (e.g. unavailability of Security Services won't allow the authentication of new users).

TRITON will gracefully degrade in the condition where one or more of the following Dependent Services are not available:

- Geospatial Services (GIS Server)
- Directory Services
- Enterprise Management Services
- Security Services
- E-mail Services
- General Web-service unavailability/time-out
- Network connectivity

The status of internal components will be reported to Enterprise SMC via System Management.

[T1-R1519] *TRITON shall gracefully degrade in case the conditions given in the System Configuration Settings and the Dependent Services given in the Description are not available (see Operational States and State Transitions). The status of internal components shall be reported to Enterprise SMC via System Management.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1520] *TRITON shall provide data integrity during mode and state changes. The last state of data before the state change shall be preserved.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

5.1.4.1. Maturity

Maturity is the degree to which a system meets needs for reliability under normal operation. System should be able to avoid failure as a result of faults.

[T1-R1521] *TRITON Operational Software at each installed operational node shall exhibit a Mean-Time-Between-Failure (MTBF) characteristic of less than one (1) failure in twenty-four (24) hours, and that shall not be affected by the total number of nodes which are active during that period. The MTBF measurement shall not include failures resulting from factors determined to be external to TRITON (e.g. loss of domain controller).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 4
Qualific. Method : Analysis

5.1.4.2. Availability

Availability is the degree to which a system, product or component is operational and accessible when required for use. Availability of TRITON is defined as the capability of the TRITON Operational Software to be in a state to perform a required function at a given point in time, under stated conditions of use.

TRITON non-availability time is measured by adding the Downtime period (time elapsed from Time of Occurrence to Time of Recovery) for each system, service or application failure. Measurements of availability will not include failures resulting from factors determined to be external to TRITON (e.g. loss of domain controller, loss of network connectivity).

The overall TRITON capability reliability and availability will be based on the TRITON application set, the underlying site infrastructure capability, and external communications. For deployed capability, TRITON will follow the on-board or on-site survivability procedures.

Following table indicates the Levels of Operational Continuity for the desired availability:

Level	Operational Continuity						Disaster Recovery	
	% Availability	Monthly Unplanned Downtime	Monthly Planned Downtime	Degraded Service	Max Restoration time	Max Allowable Data Loss	Recovery Time	Recovery Point
L1	99.99	<1 hr	<1 hr	None	1 hr	1 hr	N/A	N/A
L2	99.9	1 hrs	6 hrs	Minimal	2 hrs	4 hrs	4 hrs	8 hrs
L3	99	7 hrs	12 hrs	Some	4 hrs	8 hrs	12 hrs	24 hrs
L4	98	14 hrs	36 hrs	Allowed	12 hrs	24 hrs	48 hrs	48 hrs

[T1-R1522] *TRITON, including hardware, infrastructure and Operational Software, shall be available for use at static sites (via Data Centres) twenty-four (24) hours per day, three-hundred and sixty-five (365) days per year with an availability of ninety-nine point zero percent (99.0%) (Level 3 of Operational Continuity).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Analysis

[T1-R1523] *TRITON Operational Software shall be available for at least ninety-nine point nine percent (99.9%) of time (Level 2 of Operational Continuity) at Data Centres using multi-site operation capability.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Analysis

[T1-R1524] *TRITON Deployable Kit, including the hardware, the infrastructure and the Operational Software, shall be available at least ninety-nine point zero percent (99.0%) of time (Level 3 of Operational Continuity).*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both

Baseline : BL 4
Qualific. Method : Analysis

[T1-R1525] *One TRITON instance shall provide a Mean-Time-To-Repair (MTTR) of one (1) hour or less.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Analysis

[T1-R1526] *TRITON shall always be available for any incoming service request even though it is executing time-consuming function.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R1527] *TRITON shall ensure system availability to users so that they do not experience interruption of services as a result of intermittent connection, except as it impacts their direct access to Web Application Server for an in-progress action. Intermittent connection is defined as loss of connectivity that is less than thirty (30) seconds.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R1528] *TRITON shall ensure system availability to users so that they do not experience interruption of services as a result of Limited Bandwidth. Limited Bandwidth is defined as a bandwidth of less than sixty-four (64) kbps for afloat sites and five-hundred-and-twelve (512) kbps for static sites.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R1529] *TRITON shall ensure system availability to users so that they do not experience interruption of services as a result of high latency. High latency is defined as latency exceeding one-thousand-and-one-hundred (1100) milliseconds.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R1530] *In case of TRITON failure the availability interruption shall not exceed two (2) hours in eighty percent (80%) of cases for an individual TRITON user at static site. In no case shall the availability interruption exceed twenty-four (24) hours for an individual TRITON User at static site. Measurements of availability shall not include failures resulting from factors determined to be external to TRITON (e.g. loss of domain controller, loss of network connectivity).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 3
Qualific. Method : Demonstration

[T1-R1531] *TRITON non-availability time shall be measured by adding the Downtime period (time elapsed from Time of Occurrence to Time of Recovery) for each system, service or application failure.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

5.1.4.3. Accuracy

Accuracy is defined as the degree of conformity of a measured or calculated value to its actual or specified value.

[T1-R1532] *TRITON shall provide accuracy of timing for information object time stamps (e.g. time of update) to one second. Other system-level functions (e.g. process synchronisation) may require additional accuracy as required for correct operation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1533] *TRITON geographic location accuracy shall be less than 0.0001 minutes, distance accuracy less than one metre (i.e. sub-metre accuracy) for translation of values (UTM, Latitude/Longitude, others). Confidence interval shall be shown within values.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1534] *TRITON shall ensure consistency and accuracy of all the data displayed on all open views and applications.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.1.4.4. Fault Tolerance

Fault tolerance is defined as the ability of the software product to maintain a specified level of performance in cases of software faults or of infringement of its specified interface.

TRITON is expected to handle errors in a way that helps users rather than disturb or otherwise hinder their work.

The TRITON capability will mainly be available on static NATO Command sites. At each of these locations TRITON will take advantage of the site's disaster recovery infrastructure and processes, or those procedures relevant to remote access and hosting in accordance with the NATO IT Modernisation Plan.

TRITON will gracefully degrade when the Dependent Services (see Reliability) are not available.

[T1-R1535] *TRITON shall not have any unhandled exceptions. All errors shall be handled and minimise the impact upon the users workflow.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1536] *TRITON shall notify the user for potential loss/deletion of information objects during modification of any information object (e.g. by cascading deletion). When prompted by a notification about the data that might be lost/deleted, the user shall be able to choose the action that shall be taken by the system (e.g. cancel, continue).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1537] *TRITON shall automatically report errors and suggested corrective actions with respect to the creation, change, exchange and storage of data elements, objects and products.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1538] *TRITON messages (e.g. error, warning, notification, and informative messages) shall contain initiating module information, and contain context sensitive help and directives on where to find answers and solutions. Technical or debugging error scripts are not acceptable (e.g. "Java object 01 not accessible").*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1539] *TRITON shall report errors in context (e.g. given within the same page where they are encountered). An error message shall be displayed or provided in a popup. Invalid entries shall be highlighted or marked so they can be quickly identified and corrected.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1540] *TRITON shall popup screens or windows are used to report about errors. They shall be closable with a single click.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1541] *TRITON shall display only one error report popup screen for the same error.*

Requirement Property :
- Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1542] *TRITON shall not in any case permit loss of user-entered data due to receipt of an error or other message. User input shall never be lost, discarded or corrupted unless a user actually chooses to delete or reset the input.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1543] *TRITON shall allow a user to report problems, bugs and change requests when they encounter a problem or an unexpected result. The feature shall send a message to the Organizational Node Administrators for their review. The user shall not need to do any configuration of the actual sending of the message; the system shall handle that automatically.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1544] *TRITON error messages shall provide the users the capability of attaching the user comments on the nature of the problem in addition of automatic reporting the error messages, screen dumps and other related system data for problem reports.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1545] *TRITON error message content shall allow the TRITON System Administrator to re-create the conditions when the problem occurred (e.g. the appropriate screen and information content that caused the problem).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1546] *TRITON Server shall gracefully degrade in the condition where any dependent services and components are not available and notify the user for the limited functionality. Upon restoration of services, TRITON Server shall become fully operational. TRITON shall change its Operational State accordingly.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1547] *TRITON shall be able to queue requests to an unavailable Core Service and deliver them when the Service becomes available again. TRITON shall change its Operational State accordingly.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.1.4.5. Recoverability

In the event of an interruption of communications TRITON will be capable of operating in a stand-alone mode, which will require the capability to export and import planning products for transmission via e-mail or other means between planning locations at one command or amongst several commands.

[T1-R1548] *In case of a TRITON Server failure, TRITON shall be capable of switching to a TRITON Backup Server within three (3) minutes.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R1549] *TRITON operation shall not be interrupted during incorporation of in-service equipment updates or maintenance software updates.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

5.1.4.6. Survivability

Survivability is the quantified ability of a system, subsystem, equipment, process, or procedure to continue to function during and after a natural or man-made disturbance. TRITON is expected to ensure the survival of data and associated functional services in defined conditions.

Data survivability can be supported in two ways:

- Backups: taking periodic full or incremental 'snapshots' of the data store to mitigate the risk of system/storage failure.
- Archiving: removing and storing data that is no longer required for use from the system, thus reducing the size of the data store (and improving performance).

[T1-R1550] *TRITON shall support fail-over in its architecture. Clients shall be able to survive failure of the Application Server without crashing or affecting the stability of the overall system.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R1551] *TRITON shall be able to roll-back if transactions are not completed due to an error.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R1552] *TRITON shall provide data survivability by using backups and archiving.*

Requirement Property :
Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R1553] *TRITON shall automatically detect the availability and re-establishment of network connectivity and shall automatically continue or restart tasks that were on-going at the time a failure occurred, initiate subsequent tasks as though network connectivity had not been lost, provide a visual notification of the connectivity status (connected, limited, unconnected) and highlight a change in status.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R1554] *TRITON shall not cause data corruption or loss of data integrity due to connection failure or other hardware/software failures.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

5.1.5. Maintainability and Supportability

Maintainability and supportability refer to the ability of TRITON to be effectively maintained and supported in the field. Attributes include the ability to implement improvements or adaptation of the system to reflect changes in environment and in requirements and functional specifications. Software maintainability is defined as the capability of the software product to be modified. Modifications may include corrections, improvements or adaptation of the software to changes in environment, and in requirements and functional specifications.

TRITON will be easy to maintain with COTS hardware and software in order to minimise the operating and maintenance costs.

Supportability also includes installability of the operational software. Installability is the degree of effectiveness and efficiency with which a product or system can be successfully installed and/or uninstalled in a specified environment.

At each deployed location, the TRITON Operational Software will be integrated with the central management system supporting the site CIS. This will allow adequate fault isolation and troubleshooting interfaces to enable the system maintainers to restore the TRITON functionality in a timely manner.

5.1.5.1. Installation

TRITON will be installed on Data Centres having Bi-SC AIS Virtualised Environment.

[T1-R1555] *TRITON components shall be capable of being installed by a MS Windows Installer or similar service/product installation package in any Bi-SC AIS approved platform.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1556] *TRITON shall be capable of being installed and correctly run on multi-processor and multi-core systems.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1557] *TRITON shall support successful installation on both 32-bit and 64-bit operating systems (e.g. where the default program files folder is "Program Files (x86)").*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1558] *TRITON shall allow the authorised user to install all or selected components of TRITON IInfrastructure and Operational Software.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1559] *TRITON shall detect, during installation, if the user has insufficient privileges required for installation (e.g. folder or registry access). TRITON shall report the details of the access failure to the user before aborting the installation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1560] *The TRITON installer shall detect and appropriately address issues of disk space and drives with "not enough" space prior to beginning installation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1561] *The TRITON installer shall detect and appropriately address a previous installation of the same application. In this case, the installer shall notify the authorised user and prompt if the user wants to reinstall, repair or cancel, and proceed accordingly.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1562] *The TRITON installer shall detect and appropriately address an earlier version of the application. In this case, the installer shall notify the authorised user and prompt if the user wants to upgrade or cancel the installation, and proceed accordingly.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1563] *The TRITON installer shall detect and appropriately address files protected by MS Windows File Protection (if MS Windows is chosen as the operating system) or other operating system file protection function, and not attempt to replace these files.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1564] *TRITON shall ensure that all shared application files are referenced during installation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1565] *TRITON shall install into "Program Files" application directory by default or allow alternate directory/drive to be selected for installation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1566] *TRITON shall support successful installation and running on non-English language versions of MS Windows (e.g. the Italian version of MS Windows uses "Programmi" instead of "Program Files") if MS Windows is chosen as the operating system.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1567] *TRITON shall allow, as appropriate, "Complete", "Typical" and "Custom" installation options to perform complete (i.e. all components), typical (i.e. typical components for a standard installation) and custom (i.e. User-selected components), respectively.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1568] *TRITON shall provide an installation supported by a complete, clearly-worded Installation Manual.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1569] *TRITON shall ensure the ability to re-run, allow addition or removal of components that have been or are still to be installed.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1570] *The TRITON installer shall detect and appropriately address components shared with other applications. The installer shall not adversely affect other installed applications.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1571] *The TRITON installer shall detect and appropriately address issues of disk space and drives with "not enough" space prior to beginning installation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1572] *The TRITON installer shall detect and appropriately address files protected by MS Windows File Protection (if MS Windows is chosen as the Operating System), and not attempt to replace these files.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1573] *The TRITON installer shall detect and appropriately address the presence or absence of special hardware (e.g. Deployable Kit Central Control Unit).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1574] *The TRITON installer shall set-up Program group/folders as appropriate. All expected program group folders, shortcuts and links (icons) shall appear correctly and be installed where expected.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1575] *TRITON shall allow termination of the installation before it is complete. Cancellation of an installation shall terminate the process and remove all program files and directories, registry entries, program and group directories, as appropriate, retaining all shared and system files. Restart of the installation shall allow the installation to complete without error.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1576] *Once installed by an administrator, TRITON shall be usable by all authorised users of the system (i.e. it shall not require all users to have administrator privileges).*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.1.5.2. Uninstallation

TRITON Operational Software will be able to uninstall itself if the authorised user initiates the process.

[T1-R1577] *TRITON shall provide a capability to uninstall the TRITON Operational Software and individual applications.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1578] *The TRITON Uninstallation Capability shall be available from the Control Panel's add/remove programs applet (Application Manager) for only the authorised user.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1579] *TRITON shall prompt the authorised user to confirm the uninstallation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1580] *The TRITON Uninstallation Capability shall remove all program files and folders, registry entries, program and group folders, as appropriate, retaining all shared and system files.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1581] *The TRITON Uninstallation Capability shall retain all shared and system files, and shall not adversely impact other installed applications.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.1.5.3. Co-existence

Co-existence is defined as the ability of the software to co-exist with other independent software in a common environment sharing common resources.

[T1-R1582] *Installing, running and uninstalling the capability shall not adversely impact other applications or the system it is installed on, running on or uninstalled from.*

Requirement Property :
Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.1.5.4. Configuration Data

TRITON configuration data will be temporarily stored during installation, and the Registry file size will not grow too much.

[T1-R1583] *TRITON shall store temporary files only in the user's temporary folder.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1584] *TRITON shall not store any user data in Registry unless approved by the Purchaser.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1585] *TRITON shall ensure that the application stores user configuration data in User Profile to prevent log-in delays, etc.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.1.5.5. Remote Automated Deployment and Reporting

TRITON will allow the use to remotely deployment, restoring, configuration, and reporting of the Operational Software. Both static and afloat sites can be remotely controlled. If MS Windows is chosen as the Operating System, then MS System Center Configuration Manager can be used.

[T1-R1586] *TRITON shall support remote deployment, restore, configuration and uninstallation of all TRITON components and updates.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1587] *TRITON shall support collection and reporting of asset inventory metrics for all TRITON components using Microsoft System Centre Configuration Manager, if MS Windows is chosen as the operating system, including memory, operating system, peripherals, services, login tracking, licensing, software existence and usage.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.1.5.6. Usage Scope and Limitations

NATO intends to be able to manage, install and use TRITON using their own resources on sites and locations decided by NATO without restriction on the product.

[T1-R1588] *TRITON shall be installable and executable by NATO resources only.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1589] *TRITON shall bear no limitation on the usage scope in term of time, duration and location of usage.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1590] *TRITON usage shall be permitted for any type of event or activities, including but not limited to training, demonstration, exercise, static, deployed, mobile, civil or military locations, aircrafts or ships.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1591] *TRITON shall not bear additional licences and charges for deployment of TRITON if used in a NATO context (exercise, mission, static and deployable commands, NRF).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.1.5.7. Supportability

Supportability for TRITON is the degree of providing First and Second Level Support to the Operational Software.

[T1-R1592] *TRITON Operational Software shall permit the authorised users to perform First Level of Support, such as routine daily administration, data management, disaster recovery and back up at the local level.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1593] *TRITON Operational Software shall permit the authorised users to perform Second Level of Support such as client/server installation, configuration management, help desk, identification of required corrective actions, etc., remotely from a centralised support site.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 1
Qualific. Method : Inspection

5.1.6. Portability

Portability is the capability of the software product to be transferred from one environment to another.

5.1.6.1. Environment

Environment for TRITON indicates the computing platform.

[T1-R1594] *TRITON Operational Software shall run on both 32-bit and 64-bit Intel architecture.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1595] *TRITON Client shall be able to be run in any Web Browser present and Web Browser plug-ins present on the Approved Fielded Product List at the time of deployment.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1596] *TRITON Client software shall run natively (no emulation) on the Standard NATO Bi-SC AIS Workstation (Desktop Environment).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1597] *TRITON shall support the use of IPv6 without impaired functionality and performance within a network environment.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1598] *TRITON shall not rely on the NetBIOS interface to communicate with other applications, clients or management services. Disabling NetBIOS shall not affect the applications operation or interoperability in any way.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1599] *TRITON shall run successfully independent of environment regional settings (e.g. decimal symbol, date/time format).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 1
Qualific. Method : Inspection

5.1.6.2. Customisability

Customizability is the ability of a product or system to offer extensions to existing functionality to better suite the needs of a user. TRITON will allow a user, where appropriate, to set personal preferences for the display of units (e.g. distance in yards or metres), display of date/time information, display of geographic information.

[T1-R1600] *TRITON shall support customisation of user environment with Workspaces.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1601] *TRITON shall allow a change to the GUI only when committed separately by the authorised user. If no commit is entered, the GUI will revert to the previous state.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.1.6.3. Adaptability

Adaptability is the degree to which a product or system can effectively and efficiently be adapted for different or evolving hardware, software or other operational or usage environments. Adaptability also includes the scalability of internal capacity (e.g. screen fields, tables, transaction volumes, report formats, etc.).

[T1-R1602] *TRITON Operational Software shall be adaptable to newer versions of the virtualised environment.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1603] *TRITON Operational Software output design shall be adaptable to changing environment. It shall be possible to apply changes on the system display and output such as screen layouts, data fields, table formats, report formats.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.1.6.4. Replaceability

Replaceability is the degree to which a product can be replaced by another specified software product for the same purpose in the same environment.

[T1-R1604] *TRITON shall support replaceability through reusable software components. The defined software component for this Increment shall be the "C4ISR Visualisation Component".*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

[T1-R1605] *TRITON Deployable Kit shall support replaceability through hardware components.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

5.1.7. Modularity

Modularity is the degree to which a system or computer program is composed of discrete components such that a change to one component has minimal impact on other components.

[T1-R1606] *TRITON design shall support modular approach by defining Components, User Applications and Technical Services as defined in NAF [AC/322-D(2007)0048] and [C3TAXO].*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.1.8. Reusability

Reusability is the degree to which an asset can be used in more than one system, or in building other assets. TRITON will support reusability through reusable components.

[T1-R1607] *TRITON design shall include identifying and implementing reusable software components. The defined reusable software components for this Increment shall be the C4ISR Visualisation Component.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

[T1-R1608] *TRITON design shall include reusing software modules and libraries that are developed for a particular function.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

5.1.9. Analysability

Analysability is the degree of effectiveness and efficiency with which it is possible to assess the impact on a product or system of an intended change to one or more of its parts, or to diagnose a product for deficiencies or causes of failures, or to identify parts to be modified.

[T1-R1609] *TRITON shall provide the authorised user with capabilities to measure the performance level of the Operational Software.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1610] *TRITON shall provide the authorised user with capabilities to diagnose for causes of failures.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1611] *TRITON shall provide the authorised user with capabilities to analyse the system output against the actual data inputs (e.g. by comparing the result of a process when data is input).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1612] *TRITON shall have input data logging capability for analysing external system interfaces.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1613] *TRITON shall allow the user to turn on and off the input data logging capability.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

5.1.10. Modifiability

Modifiability is the degree to which a product or system can be effectively and efficiently modified without introducing defects or degrading existing product quality.

[T1-R1614] *TRITON design shall support maintenance of software modules without effecting the rest of the system.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.1.11. Testability

Testability is the degree of effectiveness and efficiency with which test criteria can be established for a system, product or component and tests can be performed to determine whether those criteria have been met

[T1-R1615] *TRITON shall be designed and implemented to allow testing and validating the whole or part of the Operational Software.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.1.12. Scalability

Scalability is defined as a desirable property of a system, a network or process, which indicates its ability to either handle growing amounts of work in a graceful manner, or be readily enlarged.

TRITON will be scalable for its computation and storage capacity vertically and horizontally. As an example for vertical scalability, TRITON will allow the database server, Web services, interface services and various data management tools to run on separate machines. Horizontal scalability example is to run more than one application server within one instance to increase the overall performance.

[T1-R1616] *TRITON shall be scalable and technically upgradeable to maintain performance against threat growth.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1617] *TRITON shall use an architecture that allows vertical scalability and allows the various components to be deployed on separate machines.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1618] *TRITON shall use an architecture that allows horizontal scalability and allows the same component to be deployed on multiple machines without interference.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1619] *TRITON shall be dimensioned and configured to scale in performance to support at least twenty percent (20%) increase in users at each site and at least twenty percent (20%) growth in data per year for five (5) years without degradation of performance.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1620] *The TRITON databases shall be dimensioned to support all the relevant data based on current estimates of numbers and sizes of Maritime Information Entities and provide an additional twenty percent (20%) of space a year for five (5) years.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.2. Security Requirements

Security is the degree to which a product or system protects information and data so that persons or other products or systems have the degree of data access appropriate to their types and levels of authorisation.

TRITON security will protect information and data so that unauthorised persons or systems cannot read or modify them. Only the authorised persons or systems can access to them.

For purposes of this SRS, the following definitions are used:

Authentication : Verifying the identity of the user or consumer of a service or application.

Authorisation : Ensuring that the consumer is able to perform a particular action on a resource.

Confidentiality : Ensuring that data is not disclosed to unauthorised parties, usually through the use of encryption.

Data Integrity : Ensuring that the data has not been altered in transit.

Non-repudiation: Ensuring that neither the sender nor the receiver of a message can deny having sent or received it.

Accountability : Ensuring that there is a permanent record of any transaction, which can be retrieved and analysed outside the scope of a transaction.

TRITON will comply with the Bi-SC AIS Community Security Requirement Statement (CSRS) for Secure Automated Information System. TRITON is required to operate primarily on the NS and NU Network. However, it may also be used on NR (aka Private Business Network - PBN) and Mission Network (possibly MS) when deployed.

The Security Accreditation Authority (SAA) will be the NATO Security Accreditation Board (NSAB), who will be responsible for assigning security accreditation for TRITON software. Nations desiring to utilise TRITON for their national purposes will be responsible for their own security accreditation to be installed on their networks.

5.2.1. General

In general, NATO Security Requirements are specified in [ACO-70-1]. This document covers all aspects of security (physical, document, personnel, etc.). However, for the purposes of TRITON, more specific requirements for security are defined.

[T1-R1621] *TRITON-NS shall run on the NS Network provided by both static and afloat sites.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1622] *TRITON-NU shall run on the NU Network provided by both static and afloat sites.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: NU
- Baseline : BL 2
- Qualific. Method : Demonstration

[T1-R1623] *TRITON-NU shall be able to run on the NR Network (aka Private Business Network - PBN) if it is available on the static sites.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: N/A

Baseline : BL 2
Qualific. Method : Inspection

[T1-R1624] *TRITON shall be able to run on a Mission Network if it is deployed and configured.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Inspection

[T1-R1625] *TRITON shall be compliant with NATO document [C-M(2002)49] for the protection of NATO classified information, supporting systems services and resources in CIS, or other storing devices, processing and transmitting systems.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1626] *TRITON shall operate in the "System High" mode of operation with security levels. That is, all individuals with access to the system are cleared to the highest classification of the information stored, processed or transmitted within the system, but not all individuals with access to the system have a common need to know for the information stored, processed or transmitted within the system.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.2.2. Compliance with Bi-SC AIS Security Requirements

The following INFOSEC functionalities will be provided by the BI-SC AIS:

Confidentiality:

Military-grade NATO IP Cryptographic Equipment (NICE) will provide confidentiality to user data as well as cryptographic separation between security domains (e.g. NS, NU, MS). Information exchange between these security domains will be achieved through appropriate Boundary Protection Services (BPS). As a minimum, NICE will be located at each boundary between the Local Area Networks (LANs) and the NATO Wide Area Network (WAN). This will ensure that all user data will be encrypted prior to transmission across the NATO WAN. Software application layer mechanisms will be used for Community-of-Interest (COI) separation.

Integrity:

Digital signatures and authentication services will be used by various protocols (e.g. SNMP, IPSEC) to provide integrity and strong authentication to user data and network configurations. The NATO Public Key Infrastructure (NPKI) will enable these specific security services. XML Digital Signature standards should be used as applicable [XML-Digital Signature].

Infrastructure security as provided by the Bi-SC AIS Infrastructure will be transparent to TRITON.

[T1-R1627] *The security settings of TRITON shall be compliant with the Secure AIS CSRS for Bi-SC AIS Security Settings and File Systems.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1

Qualific. Method : Inspection

[T1-R1628] *TRITON shall be capable of operating across multiple security domains including National, NATO, Coalition and Mission. These domains shall include SIGINT COINS, NS, MS, NR and NU networks) in accordance with the security policy set by the Purchaser.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1629] *Performance of a TRITON instance on a security domain shall not be degraded more than 10% because of the presence of other security domains.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1630] *TRITON shall be compliant with the security infrastructure as provided by the Bi-SC AIS Core Services. The Service Interface Profiles [NCIA-06.02.01], [NCIA-06.02.02], [NCIA-06.02.03], [NCIA-06.02.04] shall be applicable.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1631] *TRITON shall adhere to NATO INFOSEC security requirements as specified in [ACO-70-1].*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.2.2.1. Bi-SC AIS Security Settings

The Security settings in effect on the NS WAN environment are categorised using the categories below:

- Account Policies: Password policies, account lockout policies and Kerberos policies.
- Local Policies: Audit policy, User rights assignment, security options.
- Event Log Settings: Settings for event log parameters itself (e.g. max size of audit file).
- Restricted Groups: Membership of security-sensitive user groups.
- System Services: Start-up and permission for system services.
- Registry: Permissions for registry keys (for MS Windows).
- File System Permission: Permissions for folders and files.
- Removal of Certain Folders and Files: Removal of some default files and registry keys.
- Installation of Devices: Settings for installation of specific hardware devices (e.g. floppy/USB drives, microphones).
- Configuration of Specific Software Modules: Settings for use of security-related software modules (e.g. MS Windows DHCP, RAS, etc.)
- BIOS Settings: Security related configuration data for BIOS.

Details of standards applicable to the security settings are given in NATO Information Assurance Technical Centre (NIATC) Security Settings. NATO Computer Incident Response Capability (NCIRC)

provides configuration guides for a variety of COTS products which can be selected and applied according to the selected solution.

[T1-R1632] *TRITON shall be capable of operating within the NS, MS, NR and NU WAN environment (including servers, network, services and workstations) in the presence of the approved NATO Security Settings (target version to be provided by the Purchaser during the Design Stage).*

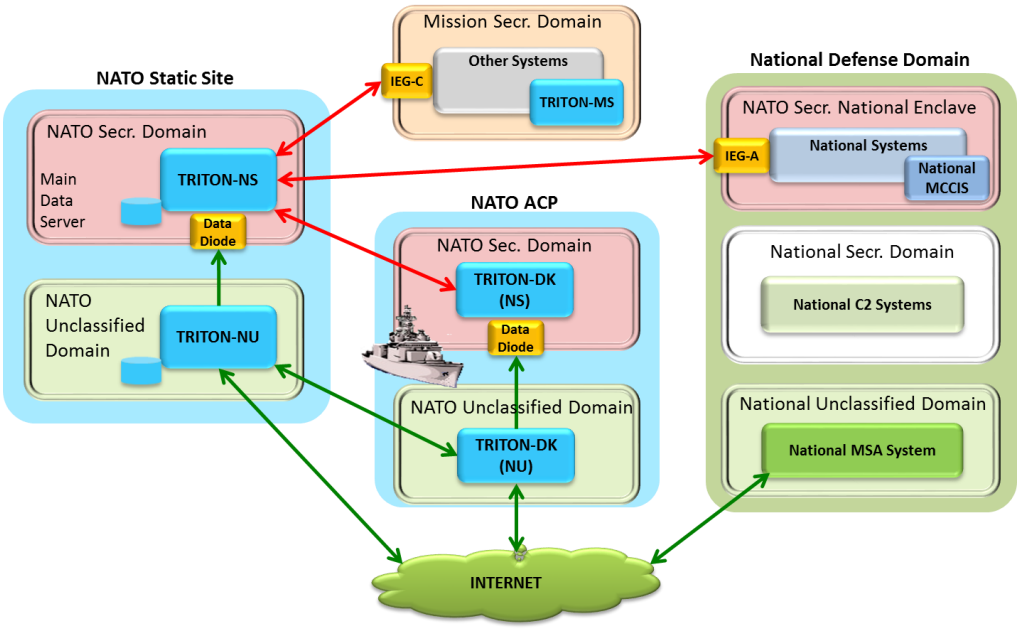
Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1633] *TRITON shall be compliant to the NCIRC Configuration Guides which will be provided by the Purchaser according to the selected COTS products. Any deviations from the approved security settings shall be identified by the Contractor prior to testing and shall be subject to approval of the Purchaser.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

5.2.2.2. Cross-Domain Support

TRITON Functional Services will operate in multiple security domains (NS, MS, NR, NU) where rules, regulations and category of personnel are different. In order to make information available across these domains, multiple procedures and devices are needed. Cross-domain Support is necessary when TRITON is used in a distributed environment for creating and feeding the Information Products from various sources spreaded across differing security domains. Possible scenarios for cross-domain operation of TRITON are illustrated below:



TRITON will provide cross-domain operation by enabling data transfer from differing security domains using Information Exchange Gateways (IEG). Currently, a gateway solution called "Data Diode" is used to transfer information from the NU Domain to the NS Domain (one way). TRITON will use this Data Diode to pass White Picture information from NU to NS Domain on both static and afloat sites.

NATO Nations already have direct connection to NS Domain using IEG Scenario A. Nations having access to NS Domain will also be able access TRITON services.

When TRITON is installed on a Mission Network, IEG Scenario C will be used to exchange information.

TRITON will provide labels on the data that needs to be exchanged over IEGs.

5.2.2.2.1. Data Labelling

Since IEGs pass only the labelled data, TRITON will assign a Confidentiality Label to the relevant data objects according to [ADatP-4774] and [ADatP-4778].

Confidentiality Label:

Confidentiality Label will include the following:

- Authority (e.g. NATO, NATO/EAPC (Euro-Atlantic Partnership Council)
- Classification marking (e.g. NS, NU)
- Releasability (e.g. Releasable to AUS/FIN, Releasable to ISAF, Releasable to Coalition)

Confidentiality Labels will be bound to the information object using an appropriate binding mechanism. The methods of binding are defined in the NATO Directives.

[T1-R1634] *TRITON shall assign Confidentiality Labels as defined in [ADatP-4774] and [ADatP-4778] to all Maritime Information Entities including information products, information objects, messages, files, bounded data streams that are subject to be transferred over IEG.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1635] *TRITON shall use a binding mechanism to indicate the relationship between a Maritime Information Entity and its label(s) or marking. The methods of binding are defined in the NATO Directives.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1636] *TRITON shall maintain Confidentiality Label information for Maritime Information Entity across TRITON Services.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1637] *TRITON shall maintain Confidentiality Label information for Maritime Information Entity in the data sent by every Web services that TRITON expose.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1638] *TRITON shall support Confidentiality Labels upon Maritime Information Entity entry and create the corresponding Security Classification using approved NATO labelling standards*

for each Maritime Information Entity. "Entry" refers to direct creation in TRITON. Entities imported from an external system/file shall be required to have security labels.

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1639] *TRITON shall maintain Security Classification on received information using Confidentiality Labels across all TRITON Services and using NATO approved labelling standards.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1640] *TRITON shall create Confidentiality Label upon information production based on Security Classification.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1641] *TRITON shall sign the Confidentiality Label using the source entity credentials upon production of information.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1642] *TRITON shall allow the authorised user to set the Confidentiality Label of any Maritime Information Entity.*

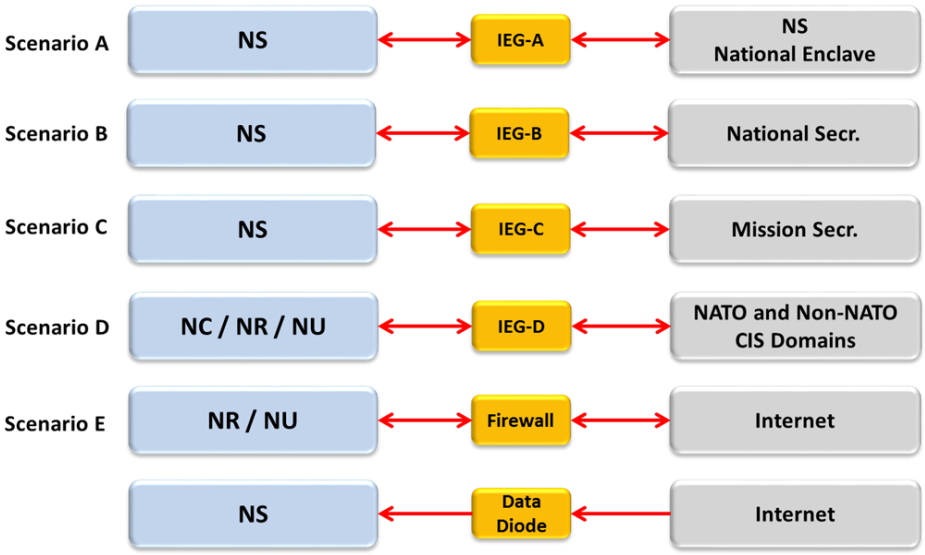
Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

5.2.2.2.2. IEG

TRITON will make use of IEGs provided by the Purchaser. The Data Diode and IEG-A will be used according to current regulations. Other types of IEGs may be used in future depending on the operational needs and approval status.

IEG Scenarios:

The currently identified IEG Scenarios are shown below:



[T1-R1643] *TRITON shall be able to use the IEG-A to securely exchange information with Nations on National Enclaves.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Inspection

[T1-R1644] *TRITON shall be able to use IEG-C to securely exchange information with Mission Network when necessary.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Inspection

[T1-R1645] *TRITON shall be able to use the existing Data Diode to securely transfer information from the NU Domain to the NS Domain on static sites (e.g. transferring WP from TRITON-NU to TRITON-NS).*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Inspection

[T1-R1646] *TRITON shall make use of the Data Diode to securely transfer information from the NU Domain to the NS Domain on TRITON Deployable Kits.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: NS
- Baseline : BL 4
- Qualific. Method : Inspection

5.2.2.3. Web Security Features

5.2.2.3.1. Validation of Input

Improper validation of input from Web requests may expose vulnerabilities that an attacker can use to attack backend components (e.g. databases) through the Web application.

All input values will be validated if they are of correct type and within the allowed limits. For example, when a user enters a course value, the system will check that the entered value is between 0.0 and 359.9. If not, the user will be notified. Following values are subject to validation:

- Data types (e.g. string, integer, real)
- Allowed character sets
- Minimum and maximum length
- Whether null is allowed
- Whether the actual parameter is required or not
- Whether duplicates are allowed
- Numeric range
- Specific patterns (e.g. regular expression)
- Maritime specific values (e.g. ship speed must be less than 100 kts, geographic positions must be in degrees).

[T1-R1647] *TRITON shall validate all user input at the front end of the User Interface before accepting and using it.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1648] *TRITON shall automatically validate the entries, given in the Descripton, into TRITON to ensure that they conform to the required formats and limits.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

5.2.2.3.2. Enforcement of Access Control

Improper access control features can be exploited to access other users' accounts, view sensitive files or use unauthorised functions.

Forced Browsing:

Forced browsing is an attack the aim of which is to enumerate and access resources that are not referenced by the application, but still can be accessible.

Path Traversal:

A path traversal attack is one that aims to unauthorised navigate through the file system and access files and directories that are stored outside Web root folder, particularly by manipulating variables that reference files with "dot-dot-slash (../)" sequences. Path traversal attacks include providing relative path information as part of a request (e.g. ../../etc/passwd). TRITON will prevent "path traversal" past access control checks.

[T1-R1649] *TRITON shall ensure that privilege restrictions of authenticated users are properly enforced.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1650] *TRITON shall not rely on the secrecy of identification information (i.e. IDs) for protection.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1651] *TRITON shall prevent Forced Browsing, as defined in the Description, past access control checks.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1652] *TRITON shall prevent Path Traversal, as defined in the Description, past access control checks.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1653] *TRITON shall securely configure and enforce file permissions. Unless specifically authorised by the Purchaser, only files that are specifically intended to be presented shall be marked as readable. Best practices suggest that most directories should not be readable, and very few files, if any, should be marked as executable.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1654] *TRITON shall prevent compromise of information via client-side caching, including best practice use of mechanisms such as HTTP headers and meta tags.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.2.2.3.3. Authentication and Session Management

Improper protection of account credential or session may compromise passwords, keys, session cookies or other tokens, allowing an attacker to bypass authentication restrictions or assume other Users' identities.

[T1-R1655] *TRITON shall use the Directory Services or operating system to authenticate a user. TRITON shall not maintain its own set of usernames and passwords.*

Requirement Property :
Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1656] *TRITON shall ensure that account credential and session tokens are properly protected.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1657] *TRITON shall lock user accounts for which a configurable number of failed authentication attempts have been made to await administrator action. By default, TRITON shall lock user accounts after three (3) failed login attempts.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1658] *TRITON shall protect authentication details in the storage. All authentication details shall be stored in either hashed or encrypted form to protect them from exposure, regardless of where they are stored.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1659] *Authentication details shall not be hard-coded in any part of the source code. Decryption keys shall be strongly protected to prevent unauthorised access.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1660] *TRITON shall protect user credentials in transit. TRITON shall employ encryption of the entire authentication transaction using SSL or similar technologies.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1661] *TRITON shall protect session IDs. TRITON shall protect the user's entire session via SSL to ensure that the session ID (e.g. session cookie) cannot be read off the network. Session IDs shall never be included in any URL or sent in the referrer header to prevent caching by the browser. Session IDs shall be long, complicated random numbers which cannot be easily guessed. Session IDs chosen by a user shall not be accepted.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1662] *TRITON shall not submit authentication and session data as part of a GET. Authentication pages shall be marked with all varieties of the no cache tag to prevent use of the back button in the web browser and re-submission of the credentials. Best practices suggest the use of "autocomplete=false" flag to prevent storing of credentials in autocomplete caches.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1663] *TRITON shall allow the System Administrator to set a "timeout" period which shall automatically log-out any sessions which have been inactive for that period of time. The system administrator shall be able to disable this feature.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1664] *TRITON shall allow the System Administrator to prevent multiple concurrent authentications from the same user from different locations (IP addresses). The system administrator shall be able to disable this feature.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

5.2.2.3.4. Cross-Site Scripting

Without proper protection, a Web application can be used as a mechanism to transport an attack to an end user's browser, causing a user's Web browser to execute a malicious script. A successful attack can disclose an end user's session token, attack the local machine or spoof content to fool the user. TRITON will take precautions to prevent Cross-Site Scripting (XSS). Best practice suggests Conversion of Characters given below to the appropriate HTML entity encoding:

Character	Encoding
>	&#60
<	&#62
&	&#38
"	&#34
'	&#39
(	&#40
)	&#41
#	&#35
%	&#37
+	&#43
-	&#45

[T1-R1665] *TRITON shall perform validation of all headers, cookies, query strings, form fields and hidden fields.*

Requirement Property :
- Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1666] *TRITON shall ensure that the HTTP TRACE method is turned off on all Web servers to prevent compromise of cookie data.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1667] *TRITON shall encode user-supplied output using the best practices for Conversion of Characters to prevent XSS.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.2.2.3.5. Injection Flows

Web applications pass certain parameters when they access external systems or the local operating system. If an attacker can embed malicious commands in these parameters, the external system may execute those commands on behalf of the web application. Injecting valid SQL queries through the username and password fields could allow the application to send the query through to the database, allowing the attacker to query the database or authenticate using someone else's credentials.

[T1-R1668] *TRITON shall constrain the input by validating it for type, length, format and range.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1669] *TRITON shall use type-safe SQL parameters. Input shall be treated as a literal value, and TRITON shall not treat it as executable code.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1670] *TRITON shall use filter routines that sanitise the code, adding escape characters that have special meaning to SQL.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1671] *TRITON shall create custom error pages to prevent server error messages from being disclosed.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1

Qualific. Method : Inspection

5.2.2.3.6. Buffer Overflow

Web application components that do not properly validate input can be 'crashed', and in some cases used to take control of a process. These components can include CGI, libraries, drivers and web application server services or components. An attacker may take full control of the system being targeted or kill a process.

[T1-R1672] *TRITON shall be configured with the latest patches to the web and application server products.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1673] *TRITON shall ensure that application code which accepts input from Users via the HTTP request provides appropriate size checking on all inputs.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.2.2.3.7. Improper Error Handling

Improper handling of error conditions which occur during normal operation can expose vulnerabilities. If an attacker can cause errors to occur that the web application cannot handle, they may gain detailed system information, deny service, cause security mechanisms to fail or, in some cases, crash the server.

[T1-R1674] *TRITON shall use custom error pages to prevent server error messages from being disclosed.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.2.2.3.8. Unsecured Storage

Web applications can use cryptographic functions to protect information and credentials. These functions and the code to integrate them have proved difficult to code properly, resulting in weak protection.

[T1-R1675] *TRITON shall properly apply selected asymmetric encryption mechanisms (SSL and SQL server security mechanisms) according to the standards approved by NATO Infosec Technical Centre (NITC) to protect information and credentials.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.2.2.3.9. Application Denial of Service

Due to application coding errors, it may be possible for an attacker to consume web application resources to a point where other legitimate Users can no longer access or use the application. Attackers may also be able to lock Users out of their accounts or cause the entire application to fail. TRITON will protect itself against application denial of service using best practices.

[T1-R1676] *TRITON shall protect itself against application denial of service using best practices.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1677] *TRITON shall limit the number of resources allocated to any user to a bare minimum. For authenticated users, TRITON shall consider implementing quotas to limit the amount of load a particular user can put on the system.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1678] *TRITON shall limit the number of requests a user can have active at any one time.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1679] *TRITON shall avoid unnecessary access to databases or other expensive resources. Consideration should also be given to caching the content received by unauthenticated Users instead of generating it or accessing databases to retrieve it.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

5.2.2.3.10. Unsecured Configuration Management

A strong server configuration standard is critical to secure a Web application. These servers have many configuration options that affect security and are not generally secure by default. For example, if a Web application is not secured, an attacker may be able via directory traversals to get to directories where authentication details are stored.

TRITON will secure its configuration using the following best practices:

- Disabling unused services on the TRITON Servers
- Disabling default accounts, and accounts no longer used
- Correctly configuring permissions and accounts
- Correctly configuring logging and alerts

[T1-R1680] *TRITON security mechanisms shall be properly configured according to the best practices.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1

Qualific. Method : Inspection

[T1-R1681] *TRITON components and software elements shall be configured with the latest security patches and updated with the latest security guidelines from the NATO Information Assurance Technical Centre (NIATC).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.2.2.4. File System

TRITON will support accessing to the file system using MS Windows standards. The (Secure) Bi-SC AIS-supported devices are given below:

- Local drives:
  - NTFS drives
  - FAT16 drives (floppy disk)
  - FAT32 drives
- Remote (network) machines mapped by drive letters and UNC paths
- Compressed/uncompressed drives.

[T1-R1682] *TRITON shall support access to the file system using MS Windows standards, including long file names and legal naming characters.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1683] *TRITON shall allow saving to and opening from the (Secure) Bi-SC AIS-supported devices given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

5.2.3. Accountability, Auditability and Non-Repudiation

Accountability is the degree to which the actions of an entity can be traced uniquely to the entity. TRITON is to provide and record traceability of changes (data, objects, products, key data elements) for use by authorised users to:

- Gather further information about the data element in question
- Resolve conflicts
- Classify data elements according to their sources
- Discover and remove errors.

Non-repudiation is the degree to which actions or events can be proven to have taken place, so that the events or actions cannot be repudiated later. TRITON will ensure non-repudiation through Logbook Function (Maritime) and Audit Logging mechanism.

5.2.3.1. Audit Logging

TRITON will be able to record all errors and faults and trace them for auditing and non-repudiation purposes.

[T1-R1684] *TRITON shall provide audit capability for all types of Maritime Information Entities by recording important events into Audit Log.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1685] *TRITON shall use the details of the External Service user and of the Logged-in User to maintain the audit traceability.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1686] *TRITON traceability mechanisms shall be embedded in the data itself and independent of the way data are exchanged.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1687] *TRITON audit tracing system shall be permanently effective.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1688] *All errors and faults in TRITON shall be recorded in an Error Log which shall be centrally and locally maintained.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1689] *TRITON Error Log and Audit Log shall contain all required information in order to provide the support staff with interpretable and comprehensive information about the cause and nature of the error/change.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1690] *TRITON shall allow the authorised user to view the audit traceability for the objects authorised for a user.*

Requirement Property :
- Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R1691] *TRITON shall allow the authorised user to view faults and errors in the Error Log.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R1692] *TRITON shall allow the authorised user to select the events to be logged in the Audit Log.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

5.2.3.2. User Auditing

TRITON will be able to record all user activities in traceable User Audit Logs.

[T1-R1693] *TRITON shall record in traceable Audit Logs all selected transactions, database activities, technical events (e.g. dataset synchronisation, directory replication) and accessing of data.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R1694] *TRITON shall ensure that any Information Object can always be traced to its original source (i.e. Organizational Node, User and/or system).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1695] *TRITON shall maintain a record of the date, time and user that created an Information Object in the Audit Log.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1696] *TRITON shall maintain a record of the date, time, details of the change and user that last modified an Information Object.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1697] *TRITON shall support audit trailing to all user and TRITON system actions and user activities if so configured.*

Requirement Property :
Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1698] *TRITON shall log all configurations changes with the trace to persons or systems if so configured.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1699] *TRITON shall log the use of all system functions and their corresponding messages including data exchanges with the trace to persons or systems if so configured.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1700] *TRITON shall log a user action by user, timestamp and function name(s) if so configured.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1701] *TRITON shall log changes by user, timestamp, field name, new value and old value if so configured.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

5.2.3.3. System Monitoring

Auditable Events:

TRITON will log each of the following Auditable Events in the Audit Log:

- System start-up and shutdown
- Log-on and log-off of individual users
- Changes to permissions and privileges of users and groups
- Changes to security relevant system management function
- Any access to audit log
- Deletion, creation or alteration of the security audit records
- All privileged operations
- All updates of system access rights
- All attempts to delete, write or append the audit files.

System Events for Warning:

- Low network bandwidth : Organizational Node-specific
- Almost out of disk space : TRITON Server specific
- Almost out of table space : TRITON Server specific.

System Events for Error:

- Crashing of software components
- Unplanned and recovering of a connection with a terminator
- Incorrect received data
- Replication failure.

[T1-R1702] *TRITON shall record each of the Auditable Events given in the Description in the Audit Log.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1703] *TRITON shall associate individual user identities to Auditable Events, and shall include date and time of the event, type of event, user identity, and the outcome (success or failure) of the event.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1704] *TRITON shall notify the authorised user and the Enterprise Management System when the Audit Log reaches ninety-percent (90%) of its maximum permitted size.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1705] *TRITON shall archive the Audit Log after a period of time as configured by the authorised user. By default the log shall be archived after forty-eight (48) hours of Logging Period. If the log activity reaches the limit of the log file size before the Logging Period completed, TRITON shall create another log file and continue logging with notification to the authorised user.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1706] *TRITON shall use integrity checking countermeasures to ensure that the Audit Log has been archived successfully after each archiving process.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1707] *TRITON shall generate warning for the System Events for Warning given in Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1708] *TRITON shall generate error condition for the System Events for Error given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1709] *TRITON shall allow the authorised user to display system events using standard system management tools like the MS Windows Management Console and TRITON System Technical Management functions.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1710] *TRITON shall allow the authorised user to filter and sort system events by date/time range, event Identifier, event type, category, description text, Operating System (OS) User/OS User Group, or source.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1711] *TRITON shall allow the authorised user to perform system event log clearing and backup.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1712] *TRITON shall be able to generate debug messages with multiple levels of verboseness.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1713] *TRITON shall allow the authorised user to dynamically set (i.e. a node configuration setting) the level of verboseness for debug messages.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1714] *TRITON shall notify the user when a system event of type "Error" arises.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1715] *TRITON shall log a memory dump of the whole system when TRITON Server crashes.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 1
Qualific. Method : Inspection

[T1-R1716] *TRITON shall be able to maintain a Performance Log, selectively (i.e. as a configuration setting) logging queries and accesses to Maritime Information Entities.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1717] *TRITON shall allow the authorised user to review the Performance Log.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.2.4. Authenticity

Authenticity is the degree to which the identity of a subject or resource can be proved to be the one claimed. Following Authentication Standards will be applicable:

- Microsoft Active Directory, ver 2008 R2
- Kerberos, Open Group - Kerberos, version 5
- LDAP related protocols.

[T1-R1718] *TRITON shall implement Identification and Authentication (I&A) for uniquely identifying and authenticating users.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1719] *TRITON shall comply with the Authentication Standards given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.2.5. Authorisation

Authorisation consists of ensuring that the consumer is able to perform a particular action on a resource. TRITON User Management function will be used to handle authorisation.

[T1-R1720] *TRITON shall provide authorisation for an authenticated user after login. The associated privileges shall be given to the user during the authorisation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.2.6. Confidentiality

Confidentiality is the degree to which a product or system ensures that data are accessible only to those authorized to have access.

Confidentiality of TRITON will ensure that data is not disclosed to unauthorised parties, usually through the use of encryption. It will display the Security Classification of the current environment.

In line with C-M(2002)49-COR5, the Security Classification in TRITON will include:

- Authority: Policy Identifier/ Information Ownership, e.g. NATO, NATO/EAPC (Euro-Atlantic Partnership Council), ISAF (International Security Assistance Force);
- Classification: Classification marking, e.g. NS, MS, NR, NU;
- Releasability: Category/Caveats, e.g. Releasable to AUS/FIN, Releasable to ISAF, Releasable to Coalition.

[T1-R1721] *TRITON shall protect its data for confidentiality purposes.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1722] *TRITON shall ensure that Security Classifications are automatically included into all TRITON products (showing the highest classification of information they contain).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1723] *TRITON shall provide visual confirmation to users of the Security Classification of the displayed data. The visual confirmation shall include a configurable colour-based visual cue in addition to text to indicate classification. The highest Security Classification shall be displayed as the Header on both AppView and GeoView.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1724] *TRITON shall use the Security Classification as a domain value for each Maritime Operation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1725] *TRITON shall insert a Security Classification construct into headers/footers and metadata of generated, created or exported reports, MS Office files and PDF files. The user shall be prompted during the process. By default TRITON shall propose the highest classification level of the selected objects. If no classification is specified for the selected objects, then the repository classification level shall be proposed. The user shall be able to override the proposed classification level by choosing another level.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 1
Qualific. Method : Inspection

[T1-R1726] *For generated or export file formats that do not use headers/footers (e.g. screen, print-out, MS Excel files) TRITON shall include the Security Classification of a file into an appropriate part of the file so that it is clearly visible to users.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.2.7. Data Protection Policy

Data integrity is the degree to which a system, product or component prevents unauthorized access to, or modification of, computer programs or data.

TRITON must be used in compliance with the "TRITON Data Protection Policy" to provide data integrity. The policy affords protection according to the following outline conditions which must be supported by appropriate technical and/or procedural measures as required.

5.2.7.1. Protection of System and Maritime Information

TRITON will be able to protect its own software and all the Maritime Information it uses.

[T1-R1727] *TRITON shall ensure that the system, the information and functionalities are only available to authorised users using authorised functionality.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1728] *TRITON shall ensure that access to system and information available users only via authorised TRITON applications, unless specifically authorised.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1729] *TRITON shall ensure that mechanisms to provide access to system and information via authorised TRITON applications shall not, as a side effect, also provide access via non-authorised applications.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1730] *Maritime Information Entities within TRITON shall be updated/removed by only authorised users.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1731] *TRITON shall prevent access by non-TRITON Users (e.g. external systems) to Maritime Information Entities marked as unfinished products.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1732] *TRITON shall ensure that unfinished products are not shared with, or included in data exchanges with other systems.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1733] *TRITON shall contain residual information protection mechanisms to ensure that deleted information is no longer accessible (i.e. information that has been logically deleted).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1734] *TRITON shall ensure that newly created objects do not contain information that shall not be accessible.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1735] *TRITON shall prevent a user to open simultaneously more than one 'database' (e.g. operational, training, exercise) being opened by a single TRITON application execution.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

5.2.7.2. Protection of Licensed Information

Some information (e.g. Maritime Datasets, LRIT feeds) within TRITON may be subject to licensing agreements. Access control will be applied to this type of data.

[T1-R1736] *TRITON shall be able to restrict the access to collections of information based on user attributes (e.g. Country, Organization).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1737] *TRITON shall allow the access to collections of information to be limited based on the number of simultaneous users.*

Requirement Property :
- Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1738] *TRITON shall allow the auditing of access to collections of information (e.g. number of simultaneous users).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.2.7.3. Protection of Personal Information

TRITON will protect personal information such as user profile, workspace, data related to persons.

[T1-R1739] *TRITON shall provide protection and management of Personal Information (e.g. User Profile and expertise information) held within TRITON.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1740] *TRITON shall provide protection and management of information related to people such as Person of Maritime Interest.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.3. Safety Requirements

TRITON will not require any safety precautions as it does not have any interface with weapons or emitting systems. Only operator safety due to using workstations will prevail.

5.3.1. Safety at Static Deployment

Safety rules at static sites will be applicable.

5.3.2. Safety at Afloat Deployment

Deployable Kits will be used on board ships, safety regulations will apply. The portable equipment will be fixed accordingly.

[T1-R1741] *The TRITON Deployable Kits shall be able to withstand ship movements at Sea States at least seven (7) without harming surrounding equipment and personnel.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1742] *The TRITON Deployable Kits shall be able to withstand instantaneous shocks up to one G from any direction without causing any harm to surroundings (i.e. no parts or pieces will be scattered around).*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1743] *Each carrying case of the TRITON Deployable Kit shall be carried safely by two persons.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1744] *Each carrying case of the TRITON Deployable Kit shall be safely lifted by a crane using its designated handles.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

5.4. Computer Resource Requirements

All instances of TRITON at static sites will run on the Virtualised Environment provided by the Enterprise Data Centres. The infrastructure components, hardware and software, are described below.

Hardware:

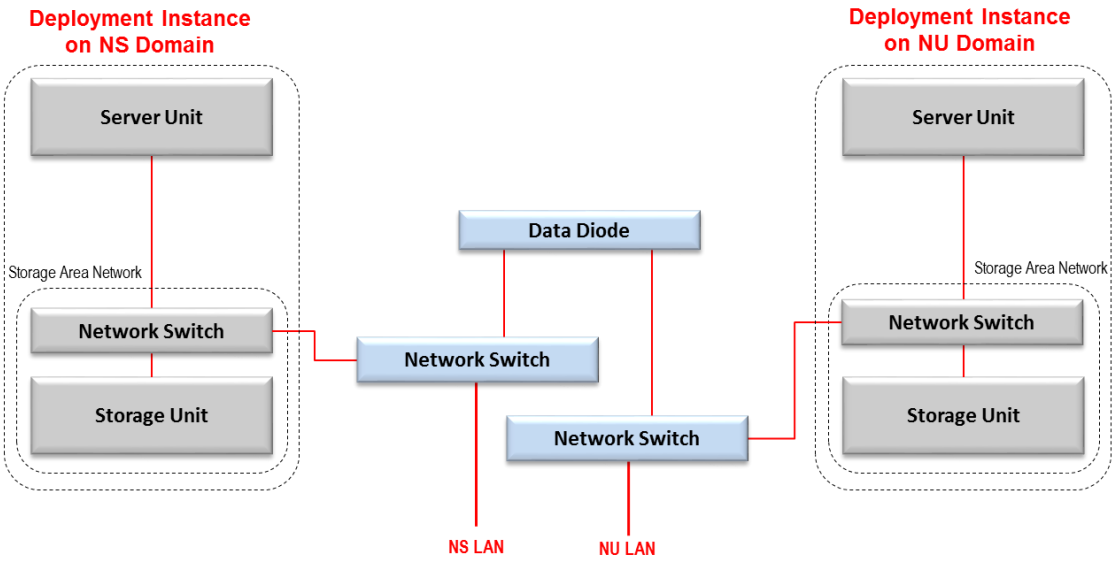
The typical specification of the main hardware components used static sites are given below as example (upgraded hardware may be available at the time of TRITON installation):

- Server Unit
  - Minimum 2 CPUs with 10 core per CPU
  - Intel Xeon 3GHz Level 2 cache or higher model CPU
  - 19 inch rack mountable, not exceeding 8RU (1 Rack Unit = 4.44 cm)
  - 256GB or more memory
  - Dual embedded Gigabit network interface with load balancing and fail-over support
  - Integrated full HD graphics support with HDMI
  - Minimum 2 USB ports
  - At least 1TB or more SCSI or SATA Hard Disk Drive
  - On-board, integrated SCSI or SATA Controller supporting RAID 0/1/1+0/5
  - Fibre Channel Host Bus Adapter (HBA), 64-bit PCI to 2GB FC multi-mode (duplex) optical interface with auto speed negotiation, 2GB/1GB auto sensing, dual homed
  - USB mouse/keyboard ports,
  - Management functions (Integrated SNMP, Performance, Storage, Remote Management)
- Storage Unit
  - 10TB or more storage capacity
  - Minimum 8 server attachments to a single array
  - Hot pluggable drives
  - SATA Disk Drive support
  - 19 inch rack mountable, not exceeding 4RU
  - Redundant controllers

  - High availability (hot spare disk drive support, multi-path failover, snapshots, cloning, cloning, local/remote mirroring, non-disruptive upgrades)
  - On-board 512MB battery-backed cache,
  - RAID 0, 1, 4 support
  - 2GB disk cache
  - 2GB / 1GB Fibre Channel Frequency Capable Support, 200 Mbytes/sec data transfer throughput to all SAN clients
  - Primary & Secondary Interlink (ICL) interfaces
  - Management functions (global online spare rebuild, online storage capacity expansion, multiple host storage access, remote configuration & monitoring, cluster aware, point in-time snapshots, interoperability with one or more systems management frameworks, MS SMS and MOM, compatible with common enterprise backup software products)
- Network Switch
  - 8 x External (user accessible) 2GB ports
  - 19 inch rack mountable, Small Form-factor Pluggable (SFP)
  - Universal ports (E, F, FL) Self-configuring (auto-sensing) based on switch type (U port)
  - At least 16 Fibre Channel Switches, supporting minimum 3 ISL hops between any two N Ports
  - Full line-speed switching for each port at 400MB/sec per port, 40,000 cached I/Os per second, Full-Duplex data transfer for each port
  - Full cascade ability for expansion
  - Able to interoperate in a redundant configuration which supports load distribution and static mapping between LUNs and HBAs
  - Hot-pluggable SFP interfaces, 10/100 RJ45 Ethernet (management port), SNMP, Telnet and other management tools/protocols
  - Data transfer over auto-sensing 2GB / 1GB Fibre Channel Frequency Capable (full duplex)
  - Management functions (Fabric Manager to fully support delivered switches, event monitoring, preferably through MS MOM)
- Protective Cases
  - 19 inch standard racks supporting both front and rear component installation in accordance with IEC 297-3
  - 2000mm tall, 800mm wide and 1000mm deep, floor mountable
  - Rack frame, mounting supports, shock and vibration mounts and brackets
  - Lockable, shatterproof glazed glass front door
  - Perforated steel back door
  - At least two 250V-15A power distribution units, each supporting at least 10 outlets
  - Equipment trays shall be installable at a raster of ½ RU
  - Adjustable feet, side panels, perforated top panel, grounding braids for side panels, power distribution to installed equipment with two independent power rails, adequate ventilation/cooling for installed equipment for a normal office environment
- Data Diode
  - An approved commercial product which can be found in NATO Information Assurance Product Catalogue (NIAPC) at http://www.ia.nato.int

All indoor equipment will be able to operate under temperatures ranging between +10 degrees C and +35 degrees C, withstanding the accumulation of residual dust and sand as can be expected in moderately sheltered office environment.

The hardware structure (provided at static sites) for TRITON NS and NU is depicted below:



Existing Network Elements on Organizational Nodes and NATO Standard Workstations as Clients will be used to access the TRITON Applications on Servers.

Infrastructure:

TRITON will run on an infrastructure with the following components:

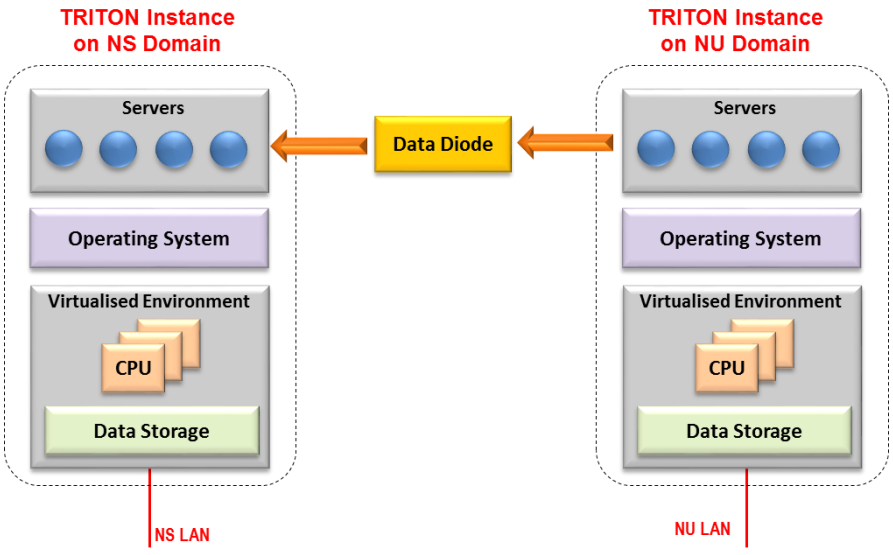
- Virtualised Environment
- Operating System
- Virtualised Server
- Virtualised Data Storage
- Network Configuration
- Client Environment

5.4.1. Virtualised Environment

TRITON Operational Software will run on a virtualised environment provided at the Enterprise Data Centres. Virtualised environment will be provided for both NS and NU Domains.

Virtualised Environment Configuration:

A sample Virtualised Environment Configuration to run TRITON instances on the NS and NU Domain is depicted below:



The requirements for the infrastructure services needs to be identified in terms of Service Parameters.

Service Parameters:

The Service Parameters will include the following:

- Virtual Machine units of specified CPU
- Number of Virtual Machine units
- Memory
- Disk capacity, disk I/O
- Network bandwidth and network I/O parameters
- Security classification of the targeted network.

[T1-R1745] *The TRITON infrastructure requirements for each instance shall be identified in terms of Service Parameters as defined in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1746] *The Virtual Machine Performance Parameters shall be scaled not to exceed fifty percent (50%) load on average in twenty-four (24) hours.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1747] *TRITON shall use Open Virtualisation Format, Option B. Mission Participant can create single, pre-packaged appliances and service providers can export and import virtual machines that can run across different virtualisation platforms.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1748] *TRITON shall be able to execute in the virtualisation hypervisor environments supported by NATO, namely "MS Hyper-V Server 12 or later" and "VMWare 5.5 or later"~~MS Hyper-V Server 12 virtualisation surrounding~~.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1749] *The Server deployment package (virtual appliance or installation package) shall be tested against the ~~following~~ used hypervisors, configured in accordance with NATO Security Settings "VMWare ESXi 5.5 ~~and~~ or later" and "Microsoft Hyper-V 2012 ~~and~~ or later".*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.4.2. Operating System

Bi-SC AIS Functional Services are currently using Microsoft Windows Operating System (Microsoft Windows Server 2012 R2) on a Virtualised Environment. After IT Modernisation, it will be Microsoft Windows Server 2016. Only the version in AFPL can be used.

Although other operating systems can technically run on the provided Virtualised Environment, due to supportability and maintainability reasons, new Bi-SC AIS Functional Services are expected to be compatible with the existing operating systems. Other solutions which include different operating systems need to be documented in detail with the necessary justification and be subject to Purchaser's evaluation and approval. Such deviation will address complete lifecycle of the proposed stack including but not limited to the integration into NATO Enterprise Management System for Testing, Deployment, Operation, Updating and Troubleshooting.

[T1-R1750] *TRITON shall use a COTS Operating System on a Virtualised Environment. If the proposed solution does not use MS Windows, it shall be specified, documented, justified and the necessary licenses shall be provided.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1751] *TRITON shall comply with the latest versions of the operating system available and supported by the Bi-SC AIS Servers and Workstations. This should include all versions of the operating systems planned to become available for the Bi-SC AIS prior to the TRITON System Integration Tests.*

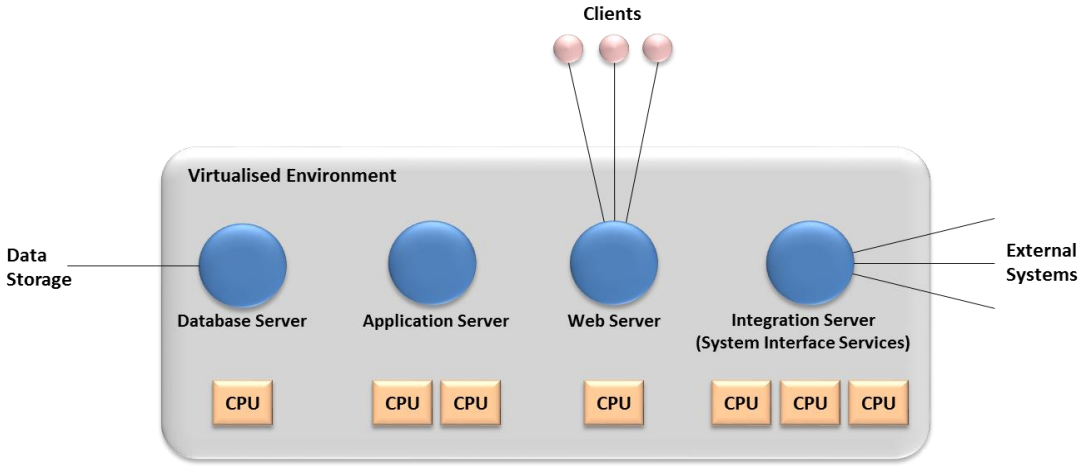
Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1752] *The Operating System selected for TRITON shall have an operating lifetime of at least five (5) years. Any deviations shall be described and justified in the Obsolescence Management Plan (OMP). Standard documentation shall be provided.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

5.4.3. Virtualised Servers

TRITON will utilise Virtualised Servers running on the Virtualised Environment. A sample Virtualised Environment is depicted below:



The servers, their functionality and CPU allocation will be determined during the System Design considering the performance, scalability and load balancing.

Server Components:

The Virtualised Server will use the following Server Components:

- Operating System (The proposed Operating System or Microsoft Windows Server 2016 (or later))
- Database Server
- Web Server Software
- Virus Scan Software
- Backup Software
- Compression Software

[T1-R1753] *TRITON shall be able to utilise Virtualised Server provided by the Virtualised Environment.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1754] *TRITON Virtualised Server shall be designed considering performance, scalability and load balancing factors.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1755] *TRITON Virtualised Server shall use the Server Components given in the Description. Any necessary third-party software and licenses shall be provided for each instance of TRITON.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1756] *TRITON Virtualised Server shall be compatible with the native file system used on NATO Servers. Any deviation shall be documented in detail with justification and be subject to the Purchaser's evaluation and approval.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 1
Qualific. Method : Inspection

5.4.4. Virtualised Data Storage

TRITON will utilise the Data Storage Service provided on the Virtualised Environment according to the Service Parameters.

The TRITON Operational Software must be isolated from the physical parameters of the Data Storage environment.

[T1-R1757] *TRITON shall be able to utilise Virtualised Data Storage provided by the Virtualised Environment.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1758] *The TRITON Operational Software shall not have any direct dependency to the physical parameters of the storage environment (such as disk type, connection type, Storage Area Network and protocol) provided by the Virtualised Environment.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1759] *All UNC, File Path, Drive Letter or similar storage location settings used in TRITON Virtualised Data Storage shall be parametric, configurable, and possible to automate for unattended installation, backup, recovery. No hard-coded location setting shall be used.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.4.5. Third-Party COTS Software

TRITON may use third-party COTS Software or Open Source Software to support its functions.

Infrastructure Software:

The minimum specifications for such software, if used for infrastructure, are given below:

- Operating System: Microsoft Windows Server 2016 (or later)
- Database Management System/Server: Microsoft SQL Server 2014 (or higher)~~,~~ or Oracle 11g (or higher) or PostgreSQL Version 9 (or higher)
- Web Server Software: Microsoft Internet Information Services (IIS) ~~(~~Version 6 (or higher) or Apache HTTP Server Version 2.0 (or higher) or Eclipse Jetty Version 9 (or higher)~~(use of TOMCAT or JETTY can be evaluated upon request)~~
- Virus Scan Software (Server): ~~If not~~ McAfee Total Virus Defence Suite (for TDKs only)~~, to be provided by the Contractor~~
- Backup Software: Veritas Backup Exec Advanced Server (for TDKs only)
- Compression Software: Operating system feature or Winzip or equivalent

[T1-R1760] *TRITON may use third-party COTS Software or Open Source Software to support its Infrastructure Software. Samples are given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1761] *The third-party COTS Software shall be the latest commercial version with the latest updates, unless agreed by the Purchaser.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1762] *The licensing for all third-party COTS Software components (including versions/editions, client access licenses, etc.) shall allow the component to take full advantage of the number of allocated processors and memory of the Virtualised Server to support the maximum number of users.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1763] *All third-party COTS Software shall have standard product documentation, a product support and validity time of at least five (5) years. Any deviations shall be described in the Obsolescence Management Plan.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1764] *TRITON may use COTS Software in its architecture in place of dedicated solutions when the functionalities of a COTS product matches the requirements for a service with no or minimal adaptation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1765] *When COTS solutions are used, adaptations shall be delivered as additional services that complement the COTS Software native functionalities.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.4.6. Network Configuration

TRITON will utilise the site LAN for connecting to NSWAN and other systems/services on the network. The Operational Software must be isolated from the physical parameters of the network.

[T1-R1766] *All URL, DNS, IP Addressing and similar network settings used in TRITON shall be parametric, configurable, and possible to automate for unattended installation, backup, recovery. No hard-coded address settings shall be used.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.4.7. Client Environment

TRITON Client will be able to run on Standard NATO Bi-SC AIS Workstations connected to the appropriate LAN (NS or NU Domain) to access TRITON Servers. Bi-SC AIS Functional Services are currently using Microsoft Windows 7 as the worstation operating system. After the IT Modernisation, it will be Microsoft Windows 10.

Client Configuration:

Considering the future IT Mnisation, following is a standard Client Environment with minimum specifications:

- Workstation : Desktop, Laptop or Thin Client computer (only those laptops approved by the Purchaser)
- CPU : Intel-based, multiple cores
- RAM : 4 GB
- Disk Space : 120 GB (for desktops and laptops)
- Graphics : Minimum integrated graphics
- Desktop Monitors : 1 x 25", 2 x 20", 2 x 24", Possibly touch screen
- Resolution : Minimum 1920 x 1080 (Full HD), 1920 x 1600 or higher are preferred
- Laptop Monitor : min. 15" Possibly touch screen
- Operating System : Microsoft Windows 10 or higher (including 32-bit and 64-bit editions)
- Browser : Microsoft Internet Explorer 11 (or higher) or a secondary browser approved by the Purchaser (current alternative is Firefox ESR 45)

[T1-R1767] *TRITON Client shall be able to run on a NATO Standard Workstation with the Client Configuration given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1768] *TRITON Client installation requirements (workstation software, add-ons, plug-ins) shall be clearly defined in advance and their use shall be subject to approval of the Purchaser.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1769] *TRITON GUI shall be able to handle normalised input events which are not bounded to an input device. The GUI should have growth potential to be used on mobile devices with touch screens conforming to [W3C WBMP].*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both

Baseline : BL 3
Qualific. Method : Inspection

5.5. Design and Construction Constraints

5.5.1. Reference Architecture

The NATO Reference Architecture includes the following basic elements:

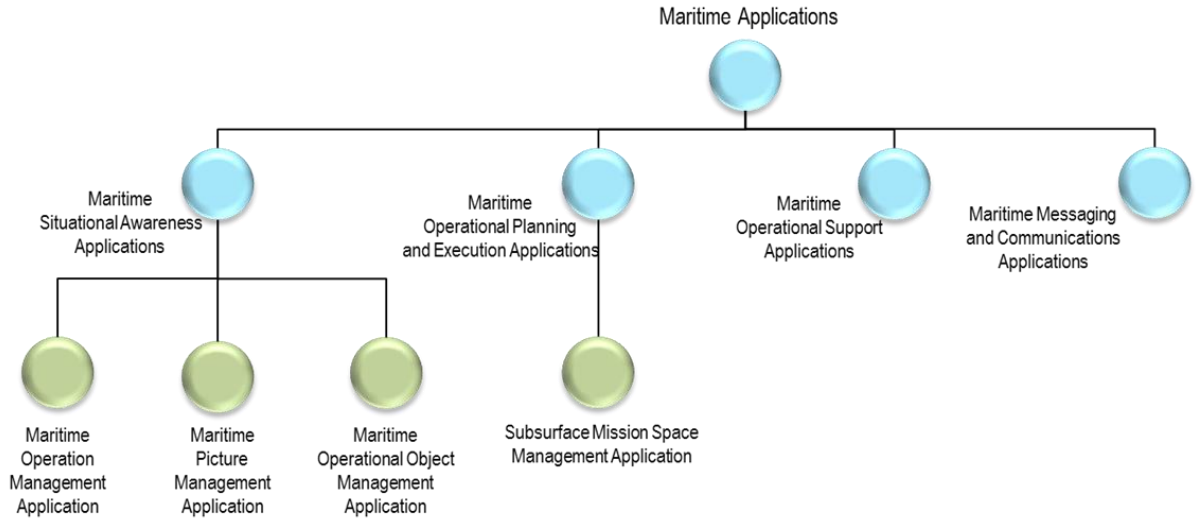
- User Applications
- Technical Services
- Information Products

5.5.1.1. User Applications

User Applications, also known as application software, software applications, applications or apps, are computer software components designed to help a user perform singular or multiple related tasks. User Applications run on User Appliances and provide the logical interface between human and automated activities. Within the C3 Taxonomy and based on TOGAF 9, the objective of the "User Applications" layer is to "define the major kinds of application system necessary to process the data and support the business".

User Application descriptions identify information and functional requirements for the user to perform specific tasks. The Application's context within a Community of Interest (COI) determines whether information and/or function is the primary discriminator used to build the User Application hierarchy.

TRITON User Applications will be determined according to the functions defined in this SRS. Following diagram gives an example of such a decomposition. The User Applications in leaf positions (green) will be the actual running components that the user will activate.

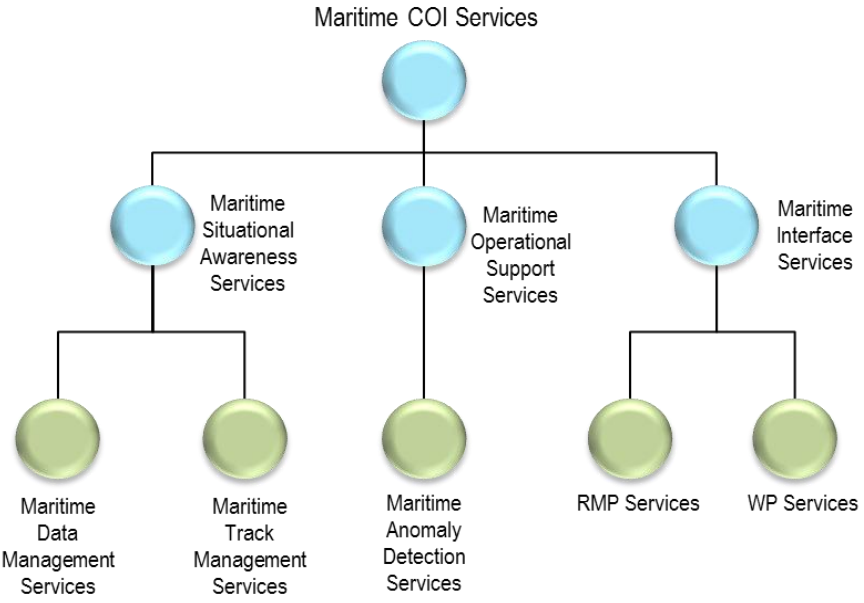


5.5.1.2. Technical Services

Technical Services provide the foundation for NATO's Network Enabled Capabilities. Technical Services are implemented using a federated model that allows NATO and the Nations to jointly provide a robust and secure platform on top of which applications can be run. Technical Services must support all NATO mission types and should be transparent to operational users. Technical Services must implement agreed and open standards and must exhibit plug-and-play properties.

Core Enterprise Services (CES) are a Set of Common Information Services that support all COIs and must be available to all members.

COI-Specific Services are network-enabled services that support one or many collaborative groups of users with shared goals, interests, missions or business processes. The services are primarily meant for COI consumption. They provide functionality required by particular C3 and C4ISR user communities in support of NATO operations and exercises during peacetime, crisis and conflict. TRITON Technical Services are considered as COI-Specific services and located under the "Maritime COI Services" group as notionally illustrated below:



5.5.1.3. Information Products

An Information Product is considered to be a final product in the form of information that a person needs to have. Information Products may contain a number of information elements in various forms such as facts, data, or opinions. An Information Product may be a document, a Formatted Message or a collection of information from a database. When made available through services information products can be produced or consumed by User Applications either in the same Functional Service or from other Functional Services.

Some of the Information Products that will be supported by TRITON Applications have already been defined in the Reference Architecture. The definition of the Information Products will be finalised at System Design. Some of the Maritime Information Objects can be defined as Information Products.

5.5.2. Architectural Views

TRITON will use the NATO Architecture Framework (NAF), Version 3.0 [[AC/322-D(2007)0048]~~NAF 3~~] as the reference for generating architectural views together with the NATO Maritime Reference Architecture which defines the exchange of Information Products between Functional Services. The services to be delivered under Project TRITON will develop the Information Products and facilitate the information exchange as defined in that model and [C3TAXO]. The architecture will be developed based on the Architecture Development Method described by The Open Group Architecture Framework (TOGAF) [TOGAF] version 9 or higher.

[T1-R1770] *TRITON shall be designed considering ~~with~~ the standards given in the section "Applicable Standards". Any proposed deviation shall be subjected to the Purchaser's approval.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1

Qualific. Method : Inspection

[T1-R1771] *The proposed software architecture, development environment, middleware and the separation of components (Human-Machine Interface, Business and Data) for TRITON shall be documented and explained in detail.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1772] *TRITON shall expose selected functionality as Technical Services, as components of SOA to encourage reuse and interoperability with other applications in a distributed way. The criteria used for selection of functionality shall be documented.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1773] *The TRITON Technical Services shall comply with the C3 Taxonomy [C3TAXO].*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1774] *TRITON shall, where applicable, make use of Representational State Transfer (REST) architecture according to the Service Interface Profile given in [NCIA-06.02.07] to make resources available over a URL in promotion of interoperability.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1775] *The TRITON design process shall balance design implementation with cost for implementation and support to minimise life cycle cost. TRITON design shall take into account the technical, support and cost impacts for NATO.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.5.3. Browser-based Functionality

TRITON user functionality will be implemented as Web applications accessible by a Web Browser.

[T1-R1776] *TRITON user functionality shall be provided via browser-based Web applications, except as specifically waived by the Purchaser.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1777] *TRITON user functionality shall require only a browser and should not require the installation of additional software, components or plug-ins on the user workstation, except as specifically waived by the Purchaser.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

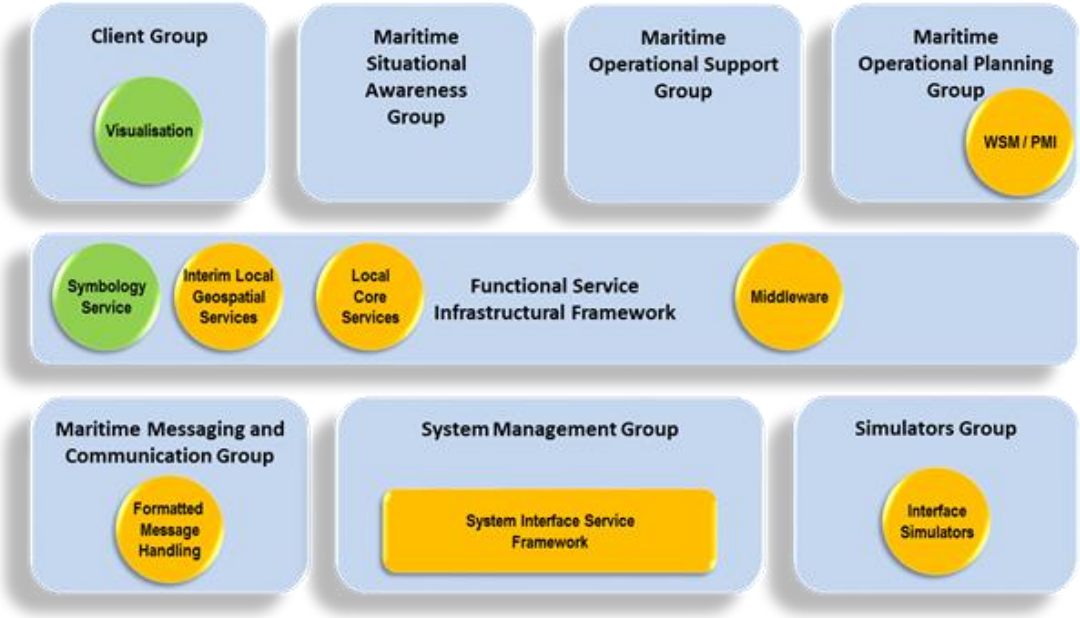
[T1-R1778] *TRITON shall use browser-based applications with standard internet addressing, Universal Resource Locator (URL) and Universal Resource Identifier (URI).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

5.5.4. Component-Based Development

TRITON will be implemented using component-based development approach. A "Component" is a collection of software modules with well-defined external interfaces enabling loosely-coupled operation. Components can be replaced by other implementation or can be reused for implementing other developmental items, even in other projects.

The figure below shows the logical collection of components and modules that implement the functions specified in this SRS.



The Frameworks are expected to be designed and implemented to provide a robust, coherent infrastructure for the current and future Increments. The circles are the currently identified and potential reusable software Components. Of these, C4ISR Visualisation Component, indicated as green circles, will be delivered as a separate package. The other components (yellow circles) should be implemented as replaceable components. In future, it should be possible to replace these components with new ones when the Purchaser decides to do so.

[T1-R1779] *TRITON software architecture shall be able to support loosely-coupled software components through an infrastructural framework.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

[T1-R1780] *TRITON shall integrate with the C4ISR Visualisation Component at both server and client side.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1781] *TRITON "should" have a Middleware as a replaceable component to provide communication between all internal components.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

[T1-R1782] *TRITON "should" have a WSM/PMI Component to provide basic computation for subsurface mission space management.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Inspection

[T1-R1783] *TRITON "should" have Formatted Message Handling Component as a replaceable component to handle (parse or prepare) Formatted Messages.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

[T1-R1784] *TRITON "should" have Interface Simulators as replaceable components to simulate interfaces of external systems as defined in the Interfaces Section.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1785] *TRITON "should" have an Interim Local Geospatial Service as a replaceable component in case NATO Core GIS is not available for static or afloat sites.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1786] *TRITON "should" have Local Core Services as replaceable components to support standalone operation of TRITON Deployable Kits.*

Requirement Property :
Domain for Static : NU

Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

5.5.5. Implementation Constraints

TRITON design will aim to minimise the total system life cycle costs, including its Operations and Maintenance (O&M). TRITON will use Bi-SC AIS Core Services available at the static sites. TRITON will provide wide area access over the NATO General Purpose Communications Systems (NGCS) which provides the backbone for connectivity among NATO Commands and Nations. The bandwidth limitations for ACPs will also be considered during the system design. All components of TRITON will use the same software architecture.

[T1-R1787] *TRITON shall be designed to work within the Bi-SC AIS environment as a Functional Service without causing any interference to other Functional Services. All components of TRITON shall use the same software architecture.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1788] *TRITON Deployable Kits shall be designed to work in low bandwidth for synchronising their databases with a static TRITON instance over the available communication environment.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

5.5.6. Programming Languages

TRITON software will be developed with any variations from the languages or specifications given below as "Preferred Languages":

Preferred Languages:

- C# [ISO/IEC 23270:2003]
- Common Language Infrastructure (CLI) [ISO/IEC 23271:2003] [ISO/IEC 23272:2003]
- Java SE Version ~~6 [JSR 270]~~ 8 or newer
- C++ [ISO/IEC 14882]
- JavaScript [ECMA 262]
- HTML.

XML Standards:

XML	: W3C - eXtensible Markup Language (XML), version 1.0 (5th Edition)
XSD	: W3C - XML Schema Definition, version 1.1 (April 2012)
XSL	: W3C - eXtensible Stylesheet Language, version 1.0
XML NS	: W3C - Namespaces in XML
XSLT	: W3C - XSL Transformations
XPATH	: W3C - XPATH 2.0
XQUERY	: W3C - XQUERY 1.0
Schematron	: Document Schema Definition Languages (DSDL) [ISO/IEC 19757]

XMLENC : W3C - XML Encryption Syntax and Processing

XMLDSIG : W3C - XML Signature Syntax and Processing

TRITON information that is customarily exchanged using a well-known open standard does not have to be made available in XML. For example, programs may transfer image data in JPEG format. There is no requirement to develop an equivalent XML representation for these.

[T1-R1789] *TRITON "will" be developed using the latest version of Microsoft Visual Studio .NET if C# is used as the programming language.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1790] *TRITON shall be compatible with the .NET Framework version 4.5 or newer if .NET Framework is utilised for development.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1791] *TRITON shall comply with the standards and language specifications given in the Description as the Preferred Languages. Any variations from the languages or specifications shall be agreed with the Purchaser.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1792] *TRITON scripting language and standard shall be JavaScript and compliant to [ECMA-262].*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1793] *TRITON shall not use DCOM, COM, ActiveX and/or COM+ unless specifically authorised in advance by the Purchaser.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1794] *TRITON shall use XML as the main data and document format. The XML Standards given in the Description shall be used.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1795] *All information exchanged across TRITON boundaries shall be available in XML format.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.5.7. Code Documentation

TRITON software source code will be documented as in-line comments providing sufficient readability and understandability. Comments can be extracted and formatted to augment technical documentation. In order to reduce the code size and improve the transfer time, the source code comments of the client applications must be removed by an automated process before entering into production.

Basic Usage of Comments:

- Each class definition explaining the purpose of the class
- Each member function explaining what the function does, including descriptions of input parameters and return values
- Each member variable explaining what the variable means (including unit of measure where appropriate)
- Each type definition (enums) explaining what the type represents
- Explanation of a specific computation algorithm
- Algorithm references to external sources.

[T1-R1796] *All TRITON software source code shall be documented with in-line comments using the best practices in the level of commenting.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1797] *Comments in TRITON source code shall clarify the intent of the code by considering the Basic Usage of Comments given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1798] ~~*Comments in TRITON source code shall be formatted according to the "XML Comments" format (i.e. beginning with three forward slashes "///" and using XML comment tags) allowing extraction and formatting for augmenting technical documentation.*~~*Comments in TRITON source code shall be formatted according with best practices applicable to the specific programming language and allow for the automated extraction and formatting for augmenting technical documentation. The source code comments of the client applications shall be removed by an automated process before entering into production.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.5.8. Coding Standards

TRITON software implementation will use best practices for coding. .NET components will be developed in conformance to Microsoft's ".NET Framework Design Guidelines" and in compliance of the following Microsoft FXCop Static Code Analysis Tool rule sets:

- Microsoft Basic Correctness Rules
- Microsoft Basic Design Guideline Rules
- Microsoft Extended Correctness Rules
- Microsoft Extended Design Guideline Rules
- Microsoft Minimum Recommended Rules
- Microsoft Security Rules

If another development framework is used, the appropriate coding standards for the platform will be followed, as approved by the Purchaser.

[T1-R1799] *Whilst the specifics of coding syntax are not specified, a convention shall be adopted and applied consistently across all code artefacts for each programming language employed. Sample sets of rules are given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection
Comment : The coding syntax(es) will be agreed with the Purchaser during Software Requirements Analysis.

[T1-R1800] *TRITON ".NET" components shall be developed in conformance to Microsoft's ".NET Framework Design Guidelines" and in compliance of the Microsoft FXCop Static Code Analysis Tool rule sets.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1801] *All code delivered as part of the TRITON Contract shall comply with the standards defined in the SRS. Code derived from other sources (e.g. prototype systems, COTS products, open source components) shall be refactored as necessary to meet standards.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.5.9. Free and Open Source Software

TRITON may use Free and Open Source Software (FOSS) components. If such software is used, they will comply with the NATO strategy on the use of Open Source Software in NATO systems [AC/322-D(2009)0015].

[T1-R1802] *TRITON may use Free and Open Source Software (FOSS) components which shall comply with the NATO strategy on the use of FOSS in NATO systems.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3

Qualific. Method : Inspection

[T1-R1803] *Any TRITON component based on FOSS shall be provided with the source code of the FOSS. The source code shall correspond to the delivered component (i.e. same version), and that component shall be capable of being built from the delivered source code with the provided documentation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

[T1-R1804] *Use of a FOSS component shall not limit the deployment or use of the TRITON in any way and shall not require the release of code developed for TRITON.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

[T1-R1805] *Any component-based on FOSS shall be verified for compliance to other non-functional requirements, including security requirements.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

5.5.10. Code Refactoring

Code refactoring is a disciplined technique for restructuring an existing body of code, altering its internal structure without changing its external behaviour, undertaken in order to improve some of the non-functional attributes of the software.

Advantages of code refactoring include improved code readability and reduced complexity to improve the maintainability of the source code, as well as a more expressive internal architecture or object model to improve extensibility.

[T1-R1806] *All code delivered as part of TRITON shall comply with the Contractor's QA Standard. The Contractor's QA Standard shall be approved by the Purchaser. Code derived from other sources (e.g. prototype systems, COTS products, open source components) may be refactored as necessary to meet standards when proposed by the Contractor and approved by the Purchaser.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

5.5.11. Data Modelling

TRITON Data Modelling will include the following models:

Conceptual Model:

TRITON Conceptual Data Model will contain semantics, identifiers (i.e. attributes with semantics that identify and record so-called “natural keys”), and syntax.

Logical Model:

TRITON Logical Data Model will contain identifiers (a.k.a., “natural keys”), normalization and semantic, surrogate key (a.k.a., “artificial key”) and syntax.

Physical Data Models:

TRITON Physical Data Model will propose an External Data Model compliant with SQL2 [ISO/IEC 9075]. All the models included in the Physical Data Model will be normalized up to 3rd normal form (Relational Model).

Behaviour Model:

TRITON Behaviour Model will contain sequence of operations, object states and interactions, state machines and rules related to the data model.

Metadata:

The metadata used in the Data Modelling will be compliant to [AC/322-D(2014)0010].

[T1-R1807] *TRITON shall have documented Conceptual, Logical and Physical Data Models.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1808] *TRITON Data Model documentation shall be compliant with RAS (OMG Reusable Asset Specification).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1809] *TRITON Data Model file format for the system of record shall be XMI (OMG XML Metadata Interchange).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1810] *TRITON Data Model shall support multiple Security Classifications.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1811] *TRITON Data Model shall internally use storage values in International System (S.I.) units (unless otherwise specified).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1812] *TRITON Data Model shall be compliant with the NATo Core Metadata Specification [AC/322-D(2014)0010].*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.5.12. Registry Settings

TRITON Functional Services will use the MS Windows Registry. All settings will be documented.

[T1-R1813] *All usage of the MS Windows Registry by TRITON Applications shall be fully documented in the User Guides.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1814] *TRITON shall not use Registry hives other than HKEY_LOCAL_MACHINE (during installation) and HKEY_CURRENT_USER (during application operation) except as approved by the Purchaser not later than the System Detailed Design.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.5.13. Time Management

TRITON will use secured time source as a reference time for all internal computation, time stamping and display. Static sites will provide Secure Time source. Deployable Kits will use internal System Time. Separate instances of TRITON will use UTC while exchanging time-stamped data. For example, database synchronisation of Deployable Kits and Data Centre will use the same time zone, Zulu, in order not to cause any conflict with local time.

[T1-R1815] *In order to set the time of TRITON Services, TRITON shall verify and complement Operating System time with an external Secured Time source.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1816] *TRITON shall use the same time source for all time stamping services and application within the same Server.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1817] *TRITON Instance shall be able to synchronise itself with a Time Server in compliance with NTPv4 [IETF RFC 5905].*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1818] *TRITON Deployable Kit shall use the internal Time Server when it is switched to Standalone Mode.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: Both
- Baseline : BL 4
- Qualific. Method : Demonstration

[T1-R1819] *TRITON shall set a centralised time across all services based on the Secured Time.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1820] *TRITON shall allow the authorised user to select the Time Server available on the network.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Test

[T1-R1821] *TRITON shall use a separate Training Time and maintain the correspondence between Training Time and Secured Time.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R1822] *TRITON shall notify the authorised user if the available time source has more than one (1) second different than the current internal time.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: N/A
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1823] *TRITON shall notify the authorised user if time-based computations result in unexpected behaviour. For example, last time of update of a track is greater than the current time.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1824] *TRITON Clients shall use the time source available on their own network.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

[T1-R1825] *TRITON shall use UTC while exchanging time-stamped data among servers.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both

Baseline : BL 1
Qualific. Method : Demonstration

5.6. System Environment Requirements

Static sites will provide the necessary computing environment for hosting the TRITON Functional Services. There is no specific requirement for provision of enhanced environment protection for static sites on which TRITON will be installed.

Afloat sites require certain protection for hardware to operate in naval sheltered environment. TRITON Deployable Kits will have semi-ruggedized cases to protect computing hardware for afloat deployments. Environmental requirements given in this Subsection are applicable for only TDKs.

[T1-R1826] *Certificate of Conformance for not using hazardous material shall be delivered for any hardware component developed under this Contract.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1827] *The equipment used indoors shall be subject to temperature ranging between +10 degrees C and +35 degrees C.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1828] *The equipment used indoors shall be subject to humidity ranging from 10 to 90% non-condensing.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1829] *The equipment used indoors shall be able to withstand the accumulation of residual dust and sand as can be expected in moderately sheltered environment.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1830] *The equipment used indoors shall be fully operational on altitudes at least 3.000 m above mean sea level.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1831] *Best commercial practices shall be used to ensure that prolonged periods of exposure to a fungus environment will not result in evidence of fungal growth on component or equipment surfaces.*

Requirement Property :

Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1832] *Any equipment openings (e.g. fans or heating devices) associated with the risk of letting sand, dust, water, snow, and/or moisture into the equipment and shall be described and solutions to overcome the risk of these affecting system availability shall be defined.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1833] *All connectors and cables shall have bungs and caps firmly attached to them so that they cannot be lost, in order to prevent the ingress of sand, water and dust. Exceptions to this requirement shall be addressed on a case-by-case basis, and are subject to review and approval by the Purchaser.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1834] *The equipment shall be made with non-corroding or suitably protected materials corresponding to the area of operation for a minimum of three (3) years.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

[T1-R1835] *All equipment shall be capable of operating in close proximity to other COTS equipment without causing mutual interference problems. Tested and documented compliance with officially recognised Electromagnetic Interference or Electromagnetic Compatibility standards is sufficient to meet this requirement (e.g. Emission Standard EN55022, Immunity Standard EN50022 or FCC Part 15 Class A).*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Inspection

5.7. Training-Related Requirements

In addition to the training courses for system administrators and operational users, TRITON will provide the potential users with Computer-Based Training (CBT) capability.

5.8. Logistic-Related Requirements

5.8.1. Spares

A Spare Part List will be defined for the TRITON Deployable Kits. In principle, each identified Hardware Component/Unit used in TDK will be defined as a spare item. The Spare Part List will include at least the following:

- One TDK Case with 19-inch rack (empty)
- One Carrying Case (empty)
- One Monitor Keyboard Unit (drawable)
- One Server Unit
- One Data Storage Unit
- One Network Switch
- One Central Control Unit
- One Data Diode
- One UPS
- One Installation Kit (including cables and sockets)
- Any special harness to fix the units.

[T1-R1836] *TRITON Deployable Kit Spare Part List shall include at least the items given in the Description.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: N/A
Baseline : BL 4
Qualific. Method : Inspection
Comment : The List of Spare Parts with part numbers and prices will be proposed by the Bidder.

5.8.2. Operating Documentation

The operating documentation of TRITON covers how to use the TRITON functionality in support of the C2 of Maritime Operations, and how to perform the administration at static and afloat sites. It includes Manuals for Users and System Administrators.

- TRITON will have separate operating documentation for the following systems:
- TRITON Functional Services (for both NS and NU)
- TRITON Deployable Kit (for both NS and NU)
- TRITON Training System (for both NS and NU)

5.8.2.1. System User Manuals

System User Manuals (SUM) will include, but not limited to, the following subjects:

- Preface, purpose and target audience
- Detailed system block diagrams showing all interfaces with descriptions
- General capability descriptions
- Drawings, illustrations, photographs, and diagrams
- Description of each function with screenshots
- Error conditions
- Basic fault isolation methods
- Terms and definitions.

[T1-R1837] *TRITON shall have System User Manuals (SUM) for each applicable system which includes the subjects given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.8.2.2. Quick User Guide

Quick User Guide (QUG) is short form of System User Manuals.

[T1-R1838] *TRITON shall have a Quick User Guide (QUG) which describes the frequently-used user functions and main GUI windows.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1839] *The TRITON QUG should be printed on a single page, double-sided, durable paper.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.8.2.3. Briefing Manual

Briefing Manual is a presentation (in PDF and MS PowerPoint presentation) which describes the basic capabilities of TRITON and user functionality.

[T1-R1840] *TRITON shall have a Briefing Manual which provides a brief overview of TRITON user functionality and the processes that these functions support.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

5.8.2.4. System Administrator Manual

System Administrator Manuals (SAM) help the System Administrators to install and maintain the system. TRITON SAM will include, but not limited to, the following subjects:

- All functions required for System Administration
- Configuring the system (using configuration settings and parameters)
- Managing user accounts
- Maintaining the access rights on Maritime Information Entities
- Maintaining the exchange of Maritime Information Entities between organizations
- Configuring the system for a specific Maritime Operation
- Maintaining and updating domain values (aka reference data)
- Installation and commissioning instructions
- Standard Operating Instructions (preparation, installation, starting, stopping, monitoring, de-installation)
- Procedures for handling geospatial data (e.g. importing maps from NATO Core GIS)
- Configuration
- Fault Finding Techniques
- Component list
- Reference OEM documentation.

[T1-R1841] *TRITON shall have a System Administrator Manual (SAM) which includes the subjects given in the Description.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

6. INTERFACE REQUIREMENTS

TRITON will use the existing interoperability profiles for MSA and provide any new profiles into the NATO Interoperability Standards and Profiles [ADatP-34] (NISP) volumes after all implementation is completed. The interfaces will basically use the TRITON Data Model, which will be compliant to NATO Core Metadata Specification.

Interfaces to external systems and services will be over Local Area Network as part of the operational network. The primary physical interface types are TCP/UDP IP, Web services, streaming and file transfer.

TRITON will provide well-defined interfaces and services so that Nations will be able to continue to interoperate with NATO to aid in the exchange of data for the compilation of the RMP.

6.1. Interfaces

6.1.1. System Interface Services

[T1-R1842] *TRITON shall implement a SIS Framework providing isolated processing capability. Utilisation of multiple CPUs and load balancing shall be considered during system design and deployment.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

6.1.2. Interface Control Description

TRITON will use the Interface Control Description (ICD) documents for other systems/services to implement an interface for each of them. TRITON itself will also have an ICD to describe its own external interfaces/services available to other systems/services. This ICD will include information on concept, standards, syntactic and semantic details, rules of exchanging data, recovery and security aspects. Services must be defined using SoaML [SoaML].

ICD Content:

The content of this ICD will include, where applicable, at least the following information:

- Description of the concept how and why the exchanged information is used
- A list of the applicable technical standards
- A catalogue of the services and interfaces exposed by TRITON
- A detailed description of the interfaces, including diagrams, data elements, data formats, performance values, communication protocols, security settings, etc. (using modelling languages)
- Descriptions of data elements (syntactic and semantic details)
- Units of measure required for the data element, such as seconds, meters, kilohertz, etc.
- Limit/range of values required for the data element (for constants provide the actual value)
- Accuracy required for the data element
- Precision or resolution required for the data element in terms of significant digits
- Data type, such as integer, ASCII, fixed, real, enumerated, etc.
- Data representation/format
- Frequency at which the data element is calculated or refreshed (e.g. 1 KHz or 5 message/second)
- Legality checks performed on the data element
- Priority of the data element

- Service Descriptors, identifying the services endpoints, a detailed description of the of the service operations and service parameters
- All related artefacts such as WSDL, schema files and descriptors
- Message descriptions
- Error codes and descriptions
- Interface priority
- Security aspects
- Communications protocol
- Recovery mechanisms.

[T1-R1843] *TRITON shall have an Interface Control Description (ICD) having the content given in the Description for its External Interfaces/Services. The External Interfaces/Services are described in Subsection 6.2.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

6.1.3. Interface Mechanisms

The primary physical interface types are:

- Network Communication (TCP/UDP IP) (streaming)
- Web services
- File exchange
- Direct database access
- API.

6.1.3.1. Network Communication

TRITON will establish Network Communication using given network addresses, port numbers and protocols. Following are the applicable Network Communication Interface Standards:

Application Layer:

- Messaging : SMTP (RFC 821, 1869, 1870)
- Domain Name Service : DNS (IETF STD 13)
- File Transfer : FTP (IETF STD 9)
- Bulletin Board : Network News Transfer Protocol NNTP (RFC 977)
- Data interchange : XML (XML 1.0) JavaScript Object Notation (JSON) [RFC 7159]
- Instant Messaging and Presence : XMPP (RFC 6120, 6121, 6122)

Transport Layer:

- TCP (IETF STD 7)
- UDP (IETF STD 6)

Network Layer:

- Internetworking : IPv4, IPv6 Border Gateway Protocol (BGP4) (RFC 1771)

[T1-R1844] *TRITON shall comply with the Network Communication Interface Standards given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1

Qualific. Method : Inspection

[T1-R1845] *TRITON shall be able to use TCP/IP or UDP/IP for interfacing external Network Addresses.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R1846] *TRITON shall be able to reconnect automatically within one second if the TCP/IP or UDP/IP connection is broken.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R1847] *TRITON shall use configuration settings for Network Communication Parameters.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R1848] *TRITON shall allow the authorised user to alter the configuration settings for a Network Communication.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

6.1.3.2. Web Services

Web services are today's most widely used and popular implementation of SOA. They provide a standard means of interoperability between different software applications, services, components running on a variety of platforms and/or frameworks.

The architecture style defining a SOA describes a set of patterns and guidelines for creating loosely coupled systems that enable a clear separation between the Service Provider and Service Consumer. The Service Provider is the one, who publishes a service description and provides the implementation of the service; whereas the Service Consumer is the one who invokes the service without knowing any implementation details about the service. This approach not only enables a loosely coupling integration between systems, but also simplifies the integration by hiding the unnecessary implementation details.

Web services are intended to provide self-describing, self-contained, modular units of software application logic that provide defined business functionality. Web services are consumable software services that typically include some combination of business logic and data. Web services can be aggregated to establish a larger workflow or business transactions. Inherently, the architectural components of web services support messaging, services description, registries and loosely coupled interoperability.

TRITON support for Web services is required to enable applications to streamline the sharing of data across different functional services, support integration, and reduce development time of new capabilities.

TRITON will use Web services as part of its External Interfaces, to make data available for external access. All Service Inter-Operability Points (SIOP) (for the Web services) will have Service Interface Profiles (SIP) describing the service in a standard modelling language such as SoAML [SoaML].

[T1-R1849] *TRITON shall provide an implementation supported by Extensible Mark-up Language (XML) technology and standards for all external interfaces.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Inspection

[T1-R1850] *All Web services published by TRITON shall adapt a single, consistent exception handling and error reporting mechanism within the SIS Framework as defined in its SIP.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Demonstration

[T1-R1851] *TRITON Web service design shall consider alternative response mechanisms where a long running process between request and response results (e.g. sync-on-async pattern interaction).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Inspection

[T1-R1852] *TRITON shall avoid the practice, as both a publisher and consumer, of treating Web services as a high frequency, pollable call.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Inspection

[T1-R1853] *TRITON shall observe the best practice of preferring primitive types for Web service parameters.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Inspection

[T1-R1854] *TRITON shall consider the best practice of avoiding long running Web services to be a design goal.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Inspection

[T1-R1855] *TRITON shall observe best practice and prefer message-based interactions over the remote procedure call (RPC) style while implementing Web services.*

Requirement Property :
- Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1856] *TRITON Web services shall observe best practice in the design of chunky interfaces to realise the design goal of minimising round trips.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1857] *TRITON Web services shall be non-sticky (avoid maintaining server state between calls) in order to facilitate scaling out of web services.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1858] *TRITON shall incorporate a compression mechanism for both request and response payloads of Web services.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1859] *TRITON shall use the event-driven mechanisms compliant with OASIS WS-Notifications protocols to consume event driven, time sensitive and critical web services of other system.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1860] *TRITON shall provide Service Interface Profiles (SIP) for all its Service Inter-Operability Points (SIOP) (Web services) using service modelling language.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1861] *TRITON shall promote usage of SOA, by isolating the existing interfaces to the lowest level of communication and transforming information from these channels to SOA compatible means. (i.e. Legacy System Adapter concept in SOA, integration with legacy systems, protocols, etc.)*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

6.1.3.2.1. Web Service Standards

TRITON will use the standards by the following organizations:

- World Wide Web Consortium (W3C)
- Web Services Interoperability Organization (WS-I)
- Internet Engineering Task Force (IETF)
- Organization for the Advancement of Structured Information Standards (OASIS)

TRITON will use the ratified standards (WS-* and others) in the implementation of Web services. The references are given below:

- WS-I Basic Profile 1.1
- WS-I Basic Security Profile 1.1
- WS-I Simple SOAP Binding Profile 1.0
- WS-I Attachments Profile 1.0
- W3C, Web Services Security: SOAP Message Security 1.1, 1 February 2006.
- W3C, Web Services Security: SAML Token Profile 1.1, 1 February 2006.
- W3C, Web Services Security: X.509 Certificate Token Profile 1.1, 1 February 2006.
- W3C, XML Signature Syntax and Processing, 10 June 2008.

[T1-R1862] *TRITON shall use the standards given in the Description for the implementation of Web services.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1863] *TRITON shall be compliant with the W3C, Web Services Security standards given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1864] *TRITON shall provide W3C XML schemas to express all XML file formats.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1865] *TRITON shall use the XML to facilitate publish and subscribe information brokering as a standard language.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1866] *TRITON shall be able to make all information exchanged across its boundaries available in XML format.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1867] *TRITON shall validate all received XML files against the schemas published by the suppliers.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1868] *TRITON shall have the syntax of the XML documents it accepts and produces in its ICD using models and XML schemas.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1869] *TRITON shall use the SOAP XML format to exchange information between the service provider and the service requester.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1870] *TRITON shall support both SOAP Web and RESTfull Services to exchange information between the service provider and the service requester.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1871] *TRITON shall use the Web Service Description Language (WSDL) XML format to describe the Web services provided.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1872] *TRITON shall use the Universal Description, Discovery and Integration (UDDI) protocol [OASIS-UDDI] to publish the Web service metadata.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1873] *TRITON shall use XPATH expressions or Schematron to specify semantics that cannot be captured by XML Schema.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1874] *TRITON shall prefer, where appropriate, XmlReader or SAX-based parsers over DOM type in-memory expansions.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1875] *TRITON Web services shall be compliant with the W3C, XML Digital Signature Standard and Processing.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1876] *TRITON shall support XML, Namespaces, XPath, XSLT, XQuery to perform XML-level transformation of document instances. All XML W3C Recommendations shall be supported.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

6.1.3.2.2. Web Service - Service Level Agreement

TRITON will provide a Service Level Agreement (SLA) for the Web Services that it will expose. The SLA will include Quality of Service.

[T1-R1877] *Each TRITON Web service shall be delivered in conjunction with a Web Service - SLA.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1878] *TRITON Web Service SLA shall specify performance target values for Availability, Throughput and Response Time, including specification of local and wide-area network capability dependencies.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1879] *TRITON Web Service SLA shall specify security configurations for authentication, authorisation, confidentiality, integrity and non-repudiation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1880] *TRITON Web Service SLA shall provide adequate documentation, using a service modelling language, for the meaning of the documents it produces or accepts (An adequate definition is one that enables a programmer or user to understand the meaning of the data and determine whether it is suitable for the intended use). This documentation shall be expressed as annotations on the XML schema for the XML payload.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1881] *TRITON shall supply a text definition for every element, attribute, and enumeration value defined in the schema.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1882] *TRITON shall publish the XML schema for every external XML interface it defines.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

6.1.3.2.3. Web Service Performance

TRITON will provide External Interfaces based on the Web services concepts that will allow validated clients to access data and functionality. The non-functional performance requirements for Web services will be specified in their Web Service SLA.

[T1-R1883] *TRITON Web services shall meet the non-functional performance requirements specified in their Web Service SLA.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1884] *TRITON shall provide mechanisms to monitor and audit the performance, availability, throughput and response times of Web services that it publishes.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

6.1.3.2.4. Web Service Security

The non-functional security requirements for Web services will be specified in their Web Service SLA to include authentication, authorisation, confidentiality, integrity and non-repudiation.

[T1-R1885] *TRITON Web services shall meet the non-functional security requirements specified in their Web Service SLA.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1886] *TRITON Web services shall be compliant with [OASIS WS-Security] set of specifications for publishing and consuming web services.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1887] *TRITON Web services shall support auditing and non-repudiation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1888] *TRITON Web services shall support point-to-point integrity.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1889] *TRITON Web services shall support point-to-point confidentiality.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1890] *TRITON Web services shall incorporate authorisation according to the Role-Based Access mechanisms.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1891] *TRITON Web services shall incorporate authentication.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1892] *TRITON shall implement role-based access for accessing external services and service operations.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1893] *TRITON shall use approved X.509 certificates produced by the responsible security administrators.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1894] *TRITON shall sign a validated service request to external services using its Bi-SC AIS credentials defined in its X.509 certificate.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1895] *TRITON shall only accept data signed by external services with valid X.509 certificates.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

6.1.3.2.5. TRITON as a Service Consumer

TRITON will be able to consume services from other Functional Services on NS Domain. If commercial services are available on the Internet, TRITON-NU will be able to consume those services.

[T1-R1896] *TRITON shall use the Role-Based Access Mechanism for authorization and authentication purposes, for systems interfacing with TRITON.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1897] *TRITON shall be able to communicate with NATO Meta-data Registry and Repository to find the available services that it can interact with.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1898] *TRITON shall validate the received XML documents against the schemas published by external parties.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

6.1.3.2.6. TRITON as a Service Provider

TRITON will provide External Interfaces based on Web services.

[T1-R1899] *TRITON shall provide interfaces based on the Web services concept which will allow validated clients to access data and functionality. TRITON shall also provide Web service interfaces for the data that it will accept from external systems (e.g. Nations' input).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R1900] *TRITON shall support both read-only Web services with select and filter capabilities; and write Web services with insert, update, and delete capabilities.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Inspection

[T1-R1901] *TRITON shall register its Web services to the NATO Meta-data Registry and Repository. If this is not possible, then it shall build and maintain an XML Registry defining its XML interfaces.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Inspection

[T1-R1902] *TRITON shall publish the W3C XML schemas for every external XML interface it defines. Every element in the defined schema shall be documented using annotations and Interface Control Description document.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Inspection

[T1-R1903] *TRITON shall guarantee that the XML documents that are generated are valid according to the XML schema that has been published.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Inspection

[T1-R1904] *TRITON shall provide an implementation supported by XML technology for all external interfaces.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Inspection

[T1-R1905] *TRITON shall allow the authorised User to export a web service into an XML file in order its data would be consumed by disconnected external systems.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 2
- Qualific. Method : Inspection

[T1-R1906] *Every Web service method in TRITON shall also include a NATO Confidentiality Label field to determine the sensitivity of the data that is sent. This label will be used by NATO Information Exchange Gateway (IEG) in cross-domain data exchange.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both

Baseline : BL 2
Qualific. Method : Inspection

6.1.3.3. File Exchange

TRITON will require file exchange, in some instances, to enable the exchange of information with external systems for reasons of legacy, security, connectivity, capability or efficiency. Bespoke file formats, where possible, will use XML as the primary mechanism for file-level information exchange.

[T1-R1907] *TRITON shall use XML as the primary mechanism for file-level information exchange.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1908] *TRITON shall provide adequate documentation for the content and meaning of the file formats it produces or accepts. An adequate definition is one that enables a programmer or user to understand the meaning of the data and determine whether it is suitable for its intended use. TRITON shall supply a definition for every element, attribute, and enumeration value defined in the file format.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1909] *TRITON shall, to the extent possible, validate the format and contents of all incoming and outgoing files according to the documented format.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

6.1.3.4. Direct Database Access

In TRITON, direct database access may be required to enable information exchange with external systems and components. TRITON will use a Direct Database Access Control Mechanism to allow such access. Authorised users can access the database.

[T1-R1910] *In TRITON, as a design rule, direct database access by external systems should be avoided.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1911] *TRITON shall allow the authorised users to directly access the database used in TRITON.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1912] *TRITON shall allow the controlled access of authenticated and authorised external systems or components to internal databases via the Direct Database Access Control Mechanism*

for information items (e.g. records, files) and structures (e.g. tables, directories) to perform an authorised function.

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection
Comment : Direct Database Access Control Mechanism will be proposed by the Bidders and finalised during Software Design.

6.1.3.5. Multi-lateral Interoperability Program Data Exchange Mechanism Information Exchange

Multi-lateral Interoperability Program (MIP) Data Exchange Mechanism (DEM) Information Exchange may become available to future Increments of TRITON. Therefore TRITON should have a growth potential to implement information exchange defined by MIP-DEM.

[T1-R1913] *TRITON "should" have a growth potential to implement information exchange defined by MIP-DEM.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Inspection

6.1.3.6. Application Programming Interface

TRITON may need to use Application Programming Interface (API) in some special cases. An adequate definition for an API is one that enables a software architect or developer to understand the meaning of the interface and determine whether it is suitable for its intended use. For each API component, TRITON will fully document the interface, including:

- Mechanisms for securely invoking the API
- Available methods and functionality
- Available information elements, including attributes and enumeration values
- Error handling.

[T1-R1914] *As a design rule, the use of an API "should" be minimized in TRITON to the extent possible.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1915] *TRITON shall provide adequate documentation for any API it supports.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1916] *TRITON shall allow authorised external systems or components to access the TRITON API.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1

Qualific. Method : Inspection

[T1-R1917] *TRITON shall allow the controlled access of authenticated and authorised external systems or components through its API.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

6.1.4. Information Products

An Information Product is any final product in the form of information that a person needs to have. Information Products consists of several Information Elements and can be seen as any communications or representation of knowledge such as facts, data, or opinions in any medium or form.

The Information Products that TRITON will consume or produce are given in each interface. TRITON will be able to export selected information as an Information Product into a file in Recognised Export File Format.

During the System Requirements Analysis and Design phases, the detailed information about these products, their attributes and their relationship with other Functional Services will be identified in detail, and relevant functionality associated to attributes of incoming products will be implemented.

One of the primary Information Product for TRITON is a "Track". A set of attributes described in the Track Management function will be used to define a track as "TRITON Track Specification". This specification, defined for NS and NU Domains, will be used to exchange track information with external systems/services including Nations.

[T1-R1918] *TRITON shall be able to export selected information as an Information Product into a file in Recognised Export File Format. For example, a WSM Area can be saved into a Formatted Message as an Information Product.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1919] *TRITON shall use the "TRITON Track Specification - NS" to receive tracks from external systems and to make the RMP available as an Information Product to the external world on the NS Domain. The TRITON Track Specification - NS shall be documented in the TRITON ICD.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS
Baseline : BL 1
Qualific. Method : Inspection
Comment : TRITON Track Specification - NS will be finalised during the Software Requirements Analysis.

[T1-R1920] *TRITON shall use "TRITON Track Specification - NU" to receive tracks from the external world and to make the WP available as an Information Product to the external world on the NU Domain. The TRITON Track Specification - NU shall be documented in the TRITON ICD.*

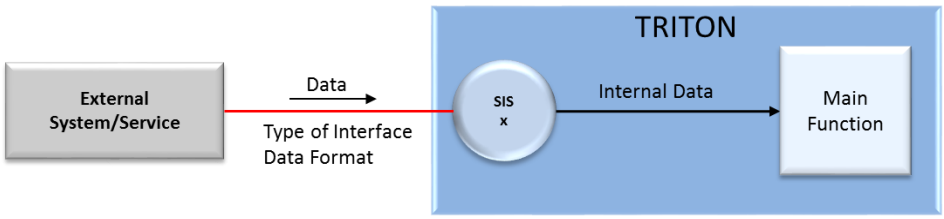
Requirement Property :
Domain for Static : NU
Domain for Afloat: NU

Baseline : BL 2
Qualific. Method : Inspection
Comment : TRITON Track Specification - NU will be finalised during the Software Requirements Analysis.

6.2. External Interface Requirements

TRITON has interfaces with external systems and services in order to be able to exchange information. Some of these interfaces are on the NS Domain, and some of them are on the NU Domain.

TRITON interface requirements for all external systems/services and how a SIS is used will be explained in this Section using a representation as given below:



A SIS may provide a Web service or establish a Network Communication with an external system or access a Web service of another system.

6.2.1. NATO Systems and Services

6.2.1.1. NATO Bi-SC AIS Core Services

TRITON will be compliant with the Core Enterprise Services (CES) Framework v1.2 and the recommended CES standards.

6.2.1.1.1. Windows Domain Services

MS Windows Domain Services provide Security and Directory Services to the Bi-SC AIS Domain. In case TRITON needs to be exposed to consumers external to the Bi-SC AIS domain, claims-based security will be applied, as described in "SOA Platform Information Assurance Services". TRITON will also be able to access services that make use of claims-based authorisation.

Directory data specific to TRITON will be stored using the Directory Storage Services (see "Directory Storage Services") instead of making use of the Bi-SC AIS Active Directory.

Standards:

- IETF STD 13:1987 / IETF RFC 1034:1987, Domain Names – Concepts and Facilities
- IETF RFC 1035:1987, Domain Names - Implementation and Specification.

[T1-R1921] *TRITON shall be integrated with the Bi-SC AIS Directory Services based on MS Windows Active Directory in compliance with the standards given in the Description.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1922] *TRITON shall interface with the Active Directory Forest on the NSWAN.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1

Qualific. Method : Demonstration

[T1-R1923] *If TRITON requires a schema change, these schema extensions shall be documented.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration
Comment : Any changes to the schema will be submitted for approval to the Purchaser during Software Design.

[T1-R1924] *TRITON shall be compatible with Windows Active Directory services and protocols (e.g. LDAP).*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1925] *TRITON shall support, as appropriate, Active Directory read, write, change operations.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1926] *TRITON shall support interoperability with the name resolution mechanism in the Directory Services.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1927] *TRITON shall support integration with MS Windows Server 2016 (or later) File and Print Services (including publishing and lookup through Active Directory).*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1928] *TRITON shall support integration with MS Windows Server 2016 (or later) built-in services (e.g. Internet Information Services, RUP, Terminal Server).*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1929] *TRITON shall support integration with MS Windows Server 2016 (or later) Security Services.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

Comment : Any reliance on legacy NTLM authentication will be submitted for approval to the Purchaser during the Software Design.

[T1-R1930] *TRITON shall support integration with Active Directory-supported Security Access Control (e.g. ACL, security groups).*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1931] *TRITON shall be able to operate with the latest security settings from the NATO Information Assurance Technical Centre (NIATC) without change.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration
Comment : Any changes to the standard security settings shall be submitted for approval to the Purchaser during the Software Design.

6.2.1.1.2. SOA Platform Information Assurance Services

TRITON will be able to use the Bi-SC AIS SOA Platform Information Assurance (IA) Services. The Service Interface Profiles given in [NCIA-06.02.01], [NCIA-06.02.02], [NCIA-06.02.03] and [NCIA-06.02.04] are applicable.

[T1-R1932] *TRITON shall provide for SAML-based authentication and authorization.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1933] *TRITON shall use a Policy Decision Point to evaluate a request and provide the authorisation decision for services.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1934] *TRITON shall use a Policy Enforcement Point as defined in [NCIA-06.02.04] to secure all Services.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1935] *TRITON shall use a Security Token Service as defined in [NCIA-06.02.02] to generate, validate and exchange security tokens.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1936] *TRITON shall be compatible with the Service Interface Profile for Security Services as defined in [NCIA-06.02.01], [NCIA-06.02.02], [NCIA-06.02.03] and [NCIA-06.02.04].*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1937] *If the Bi-SC AIS SOA Platform IA Services are not available, TRITON shall establish its own supporting services for the NS and NU Domains.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R1938] *TRITON shall ensure that no security warnings are generated in the applicable system log as a result of normal operation.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

6.2.1.1.3. Directory Storage Services

TRITON will be able to operate with NATO-wide Enterprise Directory Services (NEDS) through Lightweight Directory Access Protocol (LDAP) [RFC4510] and [ACP-133].

[T1-R1939] *TRITON shall interface with the NATO-wide Enterprise Directory Services (NEDS) through Lightweight Directory Access Protocol (LDAP) [RFC4510].*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1940] *TRITON shall be compatible with the Enterprise Directory Services SIP ~~(to be provided by the Purchaser)~~ [NCIA-06.02.05].*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1941] *TRITON shall include the necessary administration tool(s) to manage the interface with the NEDS if required by the NEDS Agreement.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1942] *TRITON shall be able to use the NEDS Directory as its own directory.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A

Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1943] *In case TRITON cannot use the NEDS Directory as its own directory, then it shall establish its own directory and that directory shall interface with the NEDS either through the NEDS Meta-Tool or directly by reading/writing into the NEDS Directory through LDAP, and as required by the agreement.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

6.2.1.1.4. Enterprise Management System

TRITON will report its internal performance metrics (Key Performance Indicators), enterprise-level errors and suggestions to the Bi-SC AIS Enterprise Management System (EMS). Following are examples to the reported metrics:

- Status
- Fault rate
- Response time
- Load
- Availability

TRITON will also use its own error collection and reporting mechanism internally.

[T1-R1944] *TRITON shall report its internal performance metrics, enterprise-level errors and suggested corrective actions to the Bi-SC AIS EMS automatically.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1945] *TRITON shall be able to report its performance values (load, transaction ratio, active users, active sessions) to the NATO EMS environment (in addition to any project specific requirements).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

6.2.1.1.5. E-mail Services

TRITON will be able to use the Bi-SC AIS E-mail Services.

[T1-R1946] *TRITON shall be integrated with the Bi-SC AIS E-mail Services based on MS Exchange.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1947] *TRITON shall be compatible with Bi-SC AIS E-mail Services and protocols (e.g. MAPI and SMTP).*

Requirement Property :

Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1948] *E-mail messages produced by TRITON to be provided to the Bi-SC AIS E-mail Services shall be compatible with the formats used in the Bi-SC AIS (e.g. classification header).*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

6.2.1.1.6. NATO Information Portal

When NATO Information Portal (NIP) is used for information management purposes, TRITON will be able to send or receive Information Products to/from the NIP. Current Increment will support the interface standards for the NIP for sending or receiving Information Products.

[T1-R1949] *TRITON shall support the information exchange interface standards for the NATO Information Portal.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Inspection

6.2.1.1.7. Metadata Repository Services

A metadata registry is a system that contains information that describes the structure, format and definitions of data. Typically, a registry is a software application that uses a database to store and search data, document formats, definitions of data, and relationships among data.

NATO is developing a NATO Metadata Registry and Repository (NMRR) to support implementation of federated network. The purpose of the NMRR is to provide a (conceptually) centralised source of technology-based representations of standards and Standardization Agreements in order to improve visibility and enable interoperability among and between various NATO, national and non-governmental organization (NGO) systems in a net-centric environment.

In the context of the NMRR, the registry would contain the so-called metacards (i.e. metadata that facilitates the discovery of the artefacts such as security information, resource description, format and content), whereas the repository would contain the artefacts themselves (e.g. the schemas describing the structure of a particular type of data, the semantics encapsulated in this structure and dependencies between individual schemas.

Metadata registration and service discovery capabilities interim to the delivery of the NMRR are anticipated. TRITON is therefore expected to register its Web Services and other artefacts in available metadata registry and service registry.

[T1-R1950] *TRITON Web Services shall support WSDL to specify the way to connect to supported Web Services, and the structure of messages that are exchanged with them.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R1951] *TRITON shall use, when applicable, the NATO Guidance for XML naming and design (see [EAPC(AC/322-SC/5-WG/4)N(2008)0004]) as a reference to work with XML artefacts.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1952] *If available, TRITON shall use the NATO Metadata Registry and Repository (NMRR) or other metadata repository services on the related security domain.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Demonstration

6.2.1.1.8. Service Discovery Services

Service Discovery Services (or Service Registry) provide a set of services that enable the formulation of search activities within shared space repositories (e.g. catalogues, directories, registries). It provides the means to articulate the required service arguments, provide search service capabilities, locate repositories to search and return search results.

[T1-R1953] *TRITON shall support discovery of Web Services via service discovery/registry mechanisms.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1954] *TRITON shall be able to communicate with the provided service discovery/registry mechanism to discover available services which it can utilise.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 1
- Qualific. Method : Inspection

6.2.1.1.9. Malware Detection Services

TRITON will be able to run with the available Malware Detection Services and anti-virus software.

[T1-R1955] *TRITON shall coexist (i.e. work correctly and not adversely impact other applications) with Bi-SC AIS standard Anti-Virus software during installation and operation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection

[T1-R1956] *TRITON shall be equipped with security software that can detect malicious software contained in files of TRITON-delivered workstations and servers. The software shall have the ability to scan any file or directory to detect any malicious software. The supplied software shall be compatible with the NATO Anti-Virus management centre and approved by the Purchaser.*

Requirement Property :
- Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

6.2.1.1.10. Generic Security Services Application Programming Interface

TRITON will use security services provided by Core Enterprise Services.

[T1-R1957] *TRITON shall use Generic Security Services Application Program Interface (GSS-API), if possible, as the API for accessing security services.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1958] *TRITON security API shall be compliant with [RFC2078].*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1959] *TRITON primary security services (access control, confidentiality, integrity, authentication, and non-repudiation) shall be supported by X.509.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1960] *TRITON X.509 support to primary security services shall be compliant with NATO Public Key Infrastructure (NPKI).*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

6.2.1.2. NATO Bi-SC AIS Enabling Services

Enabling Services in C3 Taxonomy provides foundation for other Community of Interest Services (COI).

6.2.1.2.1. NIRIS

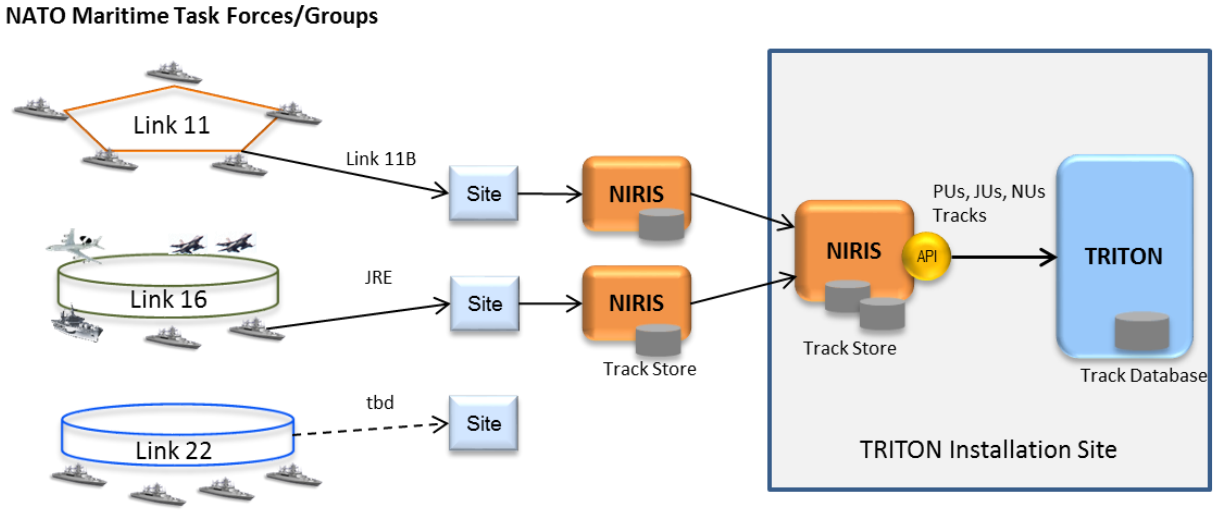
Networked Interoperable Real-time Information Services (NIRIS) is a C2 Enabling Service ensuring proper situational awareness via the provision of a set of services to enable data collection, dissemination and transformation to information in an interoperable manner based on NATO and commercial standards (e.g. Tactical Data Links).

NIRIS processes TDL messages, builds its Track Store, and provides tracks in a NIRIS-specific format (NIRIS TrackStore Synchronisation Server Format) or Web-service.

When a TDL network is established at sea, one of the Participating Units (PU) in the Link 11 network should forward Link 11 messages to Link 11B and transmit them to a static site over an IP network. Similarly, a Link 16 J-Units (JUs) should use Joint Range Extension (JRE) to pass TDL messages to a static site. Link 22 interfaces to pass NILE Unit (NU) data will be defined in the future. NIRIS deployments at those static sites can then access the TDL data, process the messages and built their own Track Stores.

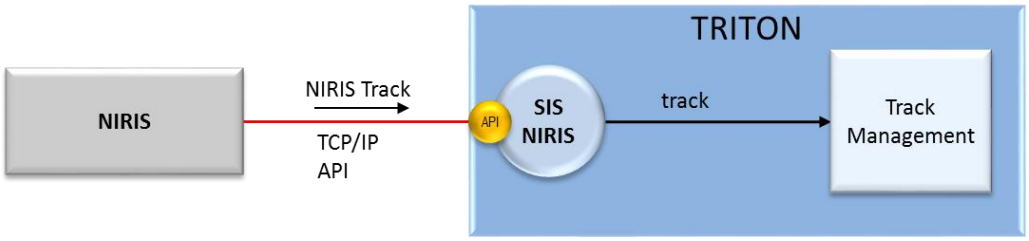
These Track Stores are then made available to client applications via NIRIS Application Program Interface (API).

TRITON can receive surface and subsurface track information along with PU/JU (NU in future) information from NIRIS. The connectivity of TDLs to TRITON via NIRIS is depicted in the following figure:



As NIRIS can receive tracks from several different track sources, SIS NIRIS will be able to handle the tracks coming from NIRIS with different source identification.

Following figure depicts how NIRIS will be interfaced:



[T1-R1961] *TRITON shall have a dedicated interface for NIRIS on the NS Domain.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R1962] *TRITON shall allow the authorised user to select which NIRIS Server will be used for interfacing.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Test

[T1-R1963] *TRITON shall be able to receive surface and subsurface tracks from NIRIS using the NIRIS API according to [NIRIS ICD].*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Test

[T1-R1964] *TRITON shall be able to receive available tactical information from NIRIS using the NIRIS API according to [NIRIS ICD].*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R1965] *TRITON shall be able to handle multiple track sources coming from the same NIRIS interface.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

6.2.1.3. NATO Bi-SC AIS Functional Services

TRITON is required to communicate with a number of systems or Functional Services of Bi-SC AIS using the defined interface mechanisms. These Functional Services include:

- Environmental FS (ENV-FS)
- CBRN Defense FS (CBRN-FS)
- Intelligence FS (INTEL-FS)

6.2.1.3.1. Environmental FS

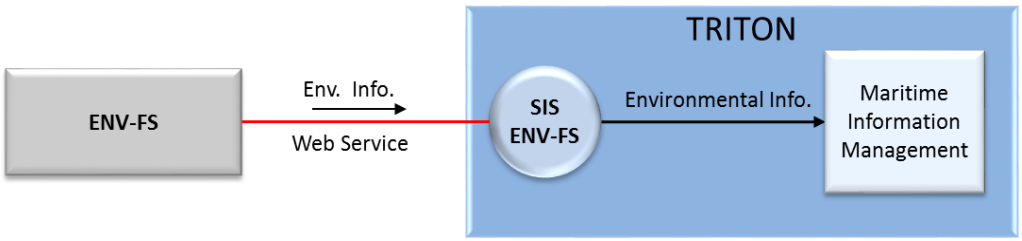
TRITON will have an interface with ENV-FS (if it is available) and receive the Environmental Information as defined below:

Environmental Information:

- Present Weather Assessment (WMS or KML)
- Wind direction and speed
- Observation Plots
  - Temperature
  - Pressure
- Weather Risks to Air, Land, Maritime Operations (WMS or KML)
- Astronomic Data such as Night Illumination (WMS or KML)

If Satellite or Radar Imagery is available in GeoTIFF or JPEG2000 format, TRITON will be able to receive them, have them processed by the available GIS Server and display them in the GeoView.

The TRITON interface with ENV-FS is depicted below:



If ENV-FS is not available, TRITON will interface with the interim solution called "VISUAL Meteorological Enclave" (VISME). The ENV-FS ICD will be used when it becomes available. The interface with VISME may be limited upon its capabilities at the time of TRITON implementation.

As a secondary option, if Environmental Information becomes available via NATO Core GIS as Web Map Service (WMS), TRITON will be able to use that service to retrieve information.

[T1-R1966] *TRITON shall have a dedicated interface for ENV-FS on the NS Domain and implement [ENV-FS ICD].*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R1967] *TRITON shall be able to receive Environmental Information, given in the Description, from ENV-FS according to [ENV-FS ICD] and process it in Environmental Information Management function. If Core GIS can provide it as a service, this service shall be used.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test
Comment : The availability of information will be determined at Software Requirements Analysis for BL3.

6.2.1.3.2. CBRN Defence FS

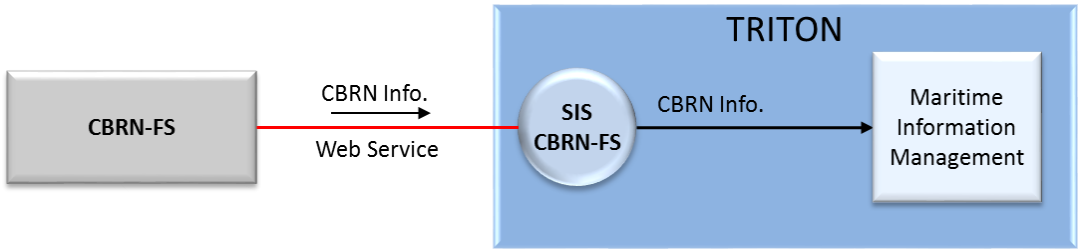
TRITON will have an interface with CBRN-FS (when it is available) and receive the CBRN Information as defined below:

CBRN Information:

TRITON will be able to receive the following CBRN Information from CBRN-FS (if it is available):

- CBRN Incidents
- CBRN Threats and Hazards
  - Hazard and contaminated areas
  - Areas of endemic diseases
  - Waste areas
- Roughness areas (topography)
- Safe areas.

The TRITON interface with CBRN-FS is depicted below:



[T1-R1968] *TRITON shall have a dedicated interface for CBRN-FS on the NS Domain and implement [CBRN-FS ICD].*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R1969] *TRITON shall be able to receive CBRN Information, given in the Description, from CBRN-FS according to [CBRN-FS ICD] and process it in CBRN Information Management function.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test
Comment : The availability of information will be determined at Software Requirements Analysis for BL3.

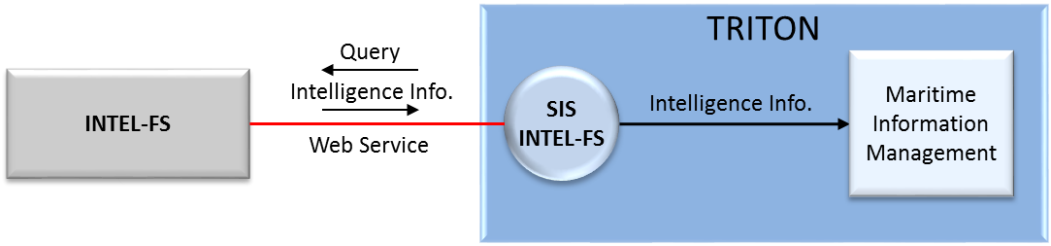
6.2.1.3.3. Intelligence FS

INTEL-FS Spiral 1 provides access to its information via Web Services. Some information products will be provided by Spiral 2. TRITON will have an interface with INTEL-FS and receive the Intelligence Information given below through the INTEL-FS Web Services:

Intelligence Information:

- Current Intelligence Situation
- Maritime Intelligence Report
- Maritime Intelligence Summary
- Enemy ORBAT
- Area Information

The TRITON interface with INTEL-FS is depicted below:



[T1-R1970] *TRITON shall have a dedicated interface for INTEL-FS on the NS Domain and implement [INTEL-FS ICD].*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R1971] *TRITON shall be able to receive the Intelligent Information given in the Description from INTEL-FS according to [INTEL-FS ICD] and process it in Intelligence Information Management function.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R1972] *TRITON shall be able to send a query to INTEL-FS prepared according to [INTEL-FS ICD] to request intelligence information on an object, and process the returned result in Intelligence Information Management function.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A

Baseline : BL 3
Qualific. Method : Test

6.2.1.4. NATO Systems and Capabilities

6.2.1.4.1. Message Handling System

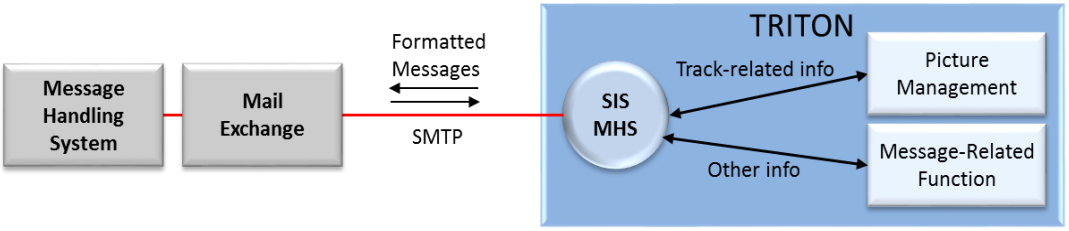
NATO uses a common military Message Handling System (MHS) to exchange text-based messages such as ADatP-11. TRITON will be able to exchange messages as electronic mail attachments with the MHS on the NS Domain using SMTP. Following Formatted Messages will be received from MHS:

- NAVSITSUM
- NAVSITREP
- MARINTSUM
- MARINTREP
- RMPSITSUM
- NAVPOSREP
- LOCATOR
- PURPLE
- OPSTAT UNIT
- SUBNOTE
- SUBNOTE CHANGE
- SUBNOTE REQ
- SUBNOTE CHANGE REQ
- BARNSTORM
- WSM ALLOCSTAT
- SUBDANGER
- SUBTASK
- SUBNOI
- UW OBJECT NOTE
- WSM REQ
- ROEREQ
- ROEAUTH
- ROEIMPL

Following Formatted Messages will be sent to MHS:

- NAVSITSUM
- NAVSITREP
- MARINTSUM
- MARINTREP
- RMPSITSUM
- NAPOSREP
- SUBNOTE
- SUBNOTE CHANGE
- BARNSTORM
- WSM ALLOCSTAT
- SUBTASK
- SUBNOI

Following figure depicts how MHS will be interfaced over Mail Exchange:



[T1-R1973] *TRITON shall have a dedicated interface for MHS over Mail Exchange on the NS Domain.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R1974] *TRITON shall be able to exchange Formatted Messages with Mail Exchange using SMTP.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Test

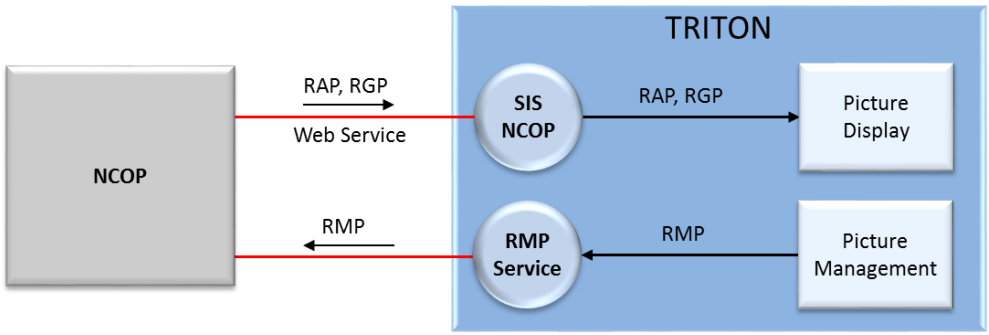
6.2.1.4.2. NCOP

NATO Common Operational Picture (NCOP) provides collective information related to the Operational Picture for a selected area/campaign. NCOP provides component pictures to other Functional Services. TRITON will make the RMP available for NCOP via its RMP Service.

TRITON will receive the following information from NCOP:

- Recognised Air Picture (RAP)
- Recognised Ground Picture (RGP)

The interface with NCOP is depicted below:



[T1-R1975] *TRITON shall have a dedicated interface for NCOP on the NS Domain.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R1976] *TRITON shall be able to receive RAP from NCOP via NCOP Web Service according to [NCOP ICD].*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3

Qualific. Method : Test

[T1-R1977] *TRITON shall be able to receive RGP from NCOP via NCOP Web Service according to [NCOP ICD].*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

6.2.1.4.3. MCCIS

MCCIS is the existing Maritime C2 System being used for operational and tactical levels. Until the complete retirement of this system, TRITON will have an interface with the existing MCCIS Server(s) to send or receive information using the OTH-T GOLD Messages.

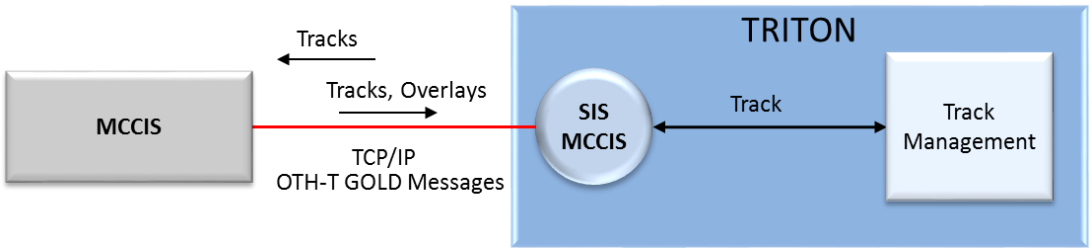
TRITON will be able to receive the following information from MCCIS:

- CONTACT REPORT
- ENHANCED CONTACT REPORT
- OVERLAY-2
- OVERLAY-3
- PIMTRACK

TRITON will be able to send the following information to MCCIS:

- CONTACT REPORT
- ENHANCED CONTACT REPORT

The interface with an MCCIS Server is depicted below:



If more than one MCCIS Server are needed to be interfaced for on different locations, a separate SIS will be instantiated with a unique identification. TRITON will be able handle information coming from different MCCIS Servers.

[T1-R1978] *TRITON shall have a dedicated interface for each MCCIS Server on the NS Domain.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration

[T1-R1979] *TRITON shall be able to receive track and overlay information from MCCIS Server using OTH-T GOLD Messages.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Test

[T1-R1980] *TRITON shall be able to handle interfaces with more than one MCCIS Server.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R1981] *TRITON shall be able to send selected track information to the selected MCCIS Server using OTH-T GOLD Messages.*

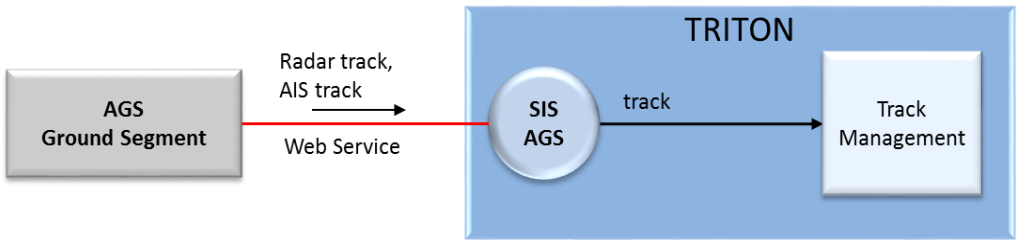
Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

6.2.1.4.4. Alliance Ground Surveillance System

Alliance Ground Surveillance (AGS) (CP 0A0201) provides a fully integrated capability of near real-time, continuous, releasable, raw (pre-exploited) data, and surveillance information in all weather conditions concerning friendly, neutral, and opposing forces from a stand-off position.

The Alliance Ground Surveillance Core System consisting of Air (assets), Ground (facilities and deployable capacities), and Support Segments.

TRITON will be able to receive track information from AGS Ground Segment using the provided Web service on the NS Domain. The interface with AGS is depicted below:



[T1-R1982] *TRITON shall have a dedicated interface for AGS on the NS Domain.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R1983] *TRITON shall be able to receive Track Data from AGS via a Web service if the [AGS ICD] is available at the time of implementation. If not, a generic Track Data interface shall be provided for test purposes.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R1984] *TRITON shall be able to receive AIS track data from AGS via a Web service. If AGS is not available at the time of implementation, the interface shall be tested with simulated AIS data.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

6.2.2. Non-NATO Systems and Services

TRITON will use data received from Non-NATO systems and services to build the WP. These sources include the following (all on the NU Domain):

- AIS Data Source
- MSSIS
- AIS Data Services (e.g. IHS Fairplay Services, exactEarth Services)
- LRIT Data Centre
- Space-Based Asset Source (AIS data and other services)
- Format Alfa (message-based reporting).

6.2.2.1. AIS Data Source

Automatic Identification System (AIS) is an automatic tracking system used on ships and by vessel traffic systems for identifying and locating vessels by electronically exchanging data with other nearby ships, AIS base stations, and satellites. AIS is designed to be capable of providing information about the ship to other ships and to coastal authorities automatically. The regulation requires AIS to be fitted aboard all ships of 300 gross tonnage and upwards engaged on international voyages, cargo ships of 500 gross tonnage and upwards not engaged on international voyages and all passenger ships irrespective of size.

An AIS transceiver sends data reports at the following intervals:

Ship at anchor or moored	: 3 min
Ship 0-14 knots	: 12 sec
Ship 0-14 knots and changing course	: 4 sec
Ship 14 – 23 knots	: 6 sec
Ship 14 – 23 knots and changing course	: 2 sec
Ship > 23 knots	: 3 sec
Ship > 23 knots and changing course	: 2 sec

An AIS transceiver sends the following data (in AIS Message Type 1):

- Maritime Mobile Service Identity (MMSI) number (a unique nine digit identification number)
- Navigation status ("at anchor", "under way using engine(s)", "not under command", etc.)
- Rate of Turn (right or left, from 0 to 720 degrees per minute)
- Speed Over Ground (SOG) (0.1-knot resolution from 0 to 102 knots)
- Position accuracy
- Longitude (with accuracy of 0.0001 minutes)
- Latitude (with accuracy of 0.0001 minutes)
- Course Over Ground (COG) (relative to true north with accuracy of to 0.1°)
- True Heading (0 to 359 degrees)
- Time Stamp (UTC Seconds, the seconds field of the UTC time when these data were generated)

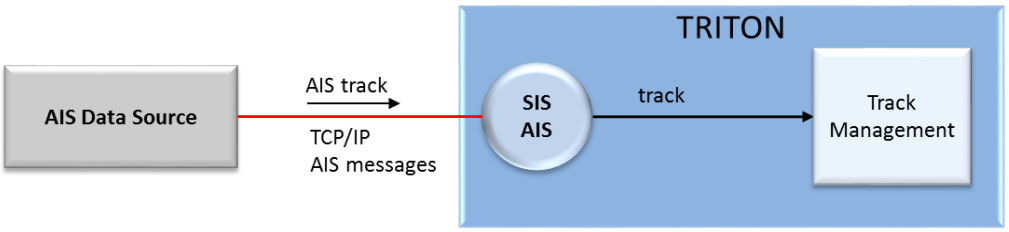
In addition, the following data (in AIS Message Type 5) are broadcast every 6 minutes:

- MMSI number
- AIS version
- IMO Number (a seven digit number that remains unchanged upon transfer of the ship's registration to another country)
- Call Sign (international radio call sign, up to seven characters, assigned to the vessel by its country of registry)
- Name (20 characters to represent the name of the vessel)

- Ship and Cargo (code of vessel classifications)
- Dimensions (distances from reference position to Bow, Stern, Port, Starboard in meters)
- Position Fix Type (code of classification of the method used to fix geographic position)
- Estimated Time of Arrival (ETA) at destination (UTC month, day, hour, minute)
- Draught (0.1 meter to 25.5 meters)
- Destination (max. 20 characters)
- Data terminal status

More information on AIS can be found in [IEC 62320].

TRITON will not have a direct interface to an AIS device, but it will be able to receive AIS messages or AIS tracks from a data source or a data centre over an IP network using a dedicated interface as depicted below:



TRITON will be able to receive data from any number of independent AIS Data Sources on either NS or NU Domain, depending on its operating domain.

The design should be scalable to handle large number of tracks.

[T1-R1985] *TRITON shall have a dedicated interface for each AIS Data Source specified on either NS or NU Domain.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R1986] *TRITON shall be able to receive AIS track data from a dedicated source on the NU Domain.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R1987] *TRITON shall be able to receive AIS track data from a dedicated source on the NS Domain if data source is available at the time of System Integration.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

6.2.2.2. MSSIS

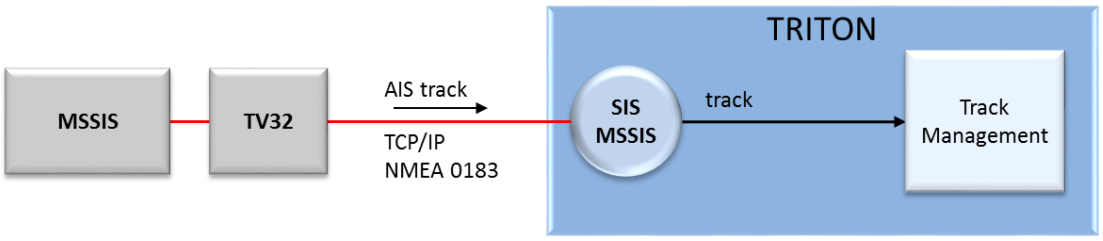
Maritime Safety and Security Information System (MSSIS) is a freely-shared, unclassified, near real-time data collection and distribution network. Its member countries (more than 70) share data from AIS, coastal radar, and other maritime-related systems.

MSSIS is intended to promote multilateral collaboration and data-sharing among international participants, with a primary goal of increasing maritime security and safety. Data sources may range

from a single sensor to an entire national vessel tracking network. MSSIS is perfectly suitable as a one-stop source for streaming global maritime data. Because the data distributed by MSSIS maintains its original, internationally recognised format and is delivered to users in near real-time, member organizations are able to utilize the feed to meet their specific mission requirements.

This Internet-based system is developed by US Department of Transportation (DOT) Volpe Center where a maritime picture of commercial activity (White Shipping) is freely shared in near real-time amongst partner maritime nations and organizations. The system tracks more than 62,000 vessel and distributes raw AIS data collected from world-wide sources (www.volpe.dot.gov) (2014). TeleView-32 (TV32) is the standard MSSIS interfacing software available to users.

MSSIS is one of the AIS data input for the current MSA/BRITE in NATO. TRITON will have a dedicated interface to MSSIS via its interfacing unit TV32 on the NU Domain, as shown below, to receive AIS tracks with NMEA 0183 format.



[T1-R1988] *TRITON shall have a dedicated interface for MSSIS via TV32 on the NU Domain.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Demonstration

[T1-R1989] *TRITON shall be able to receive AIS messages from TV32 using NMEA 0183 format via TCP/IP connection over the Internet.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Test

[T1-R1990] *TRITON shall be able to process all data received from MSSIS without any loss.*

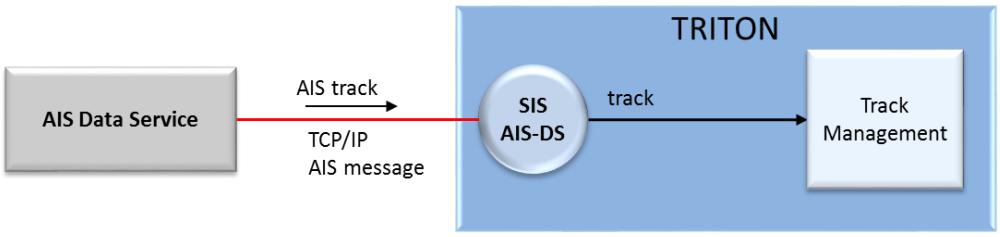
Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Test

6.2.2.3. AIS Data Services

TRITON will be able to use commercial AIS Data Services based on contract made by NATO. These services provide AIS data over the Internet. Following are examples to possible services:

- IHS Fairplay Data Services (Maritime Insight & Information, IHS Maritime) (www.ihs.com)
- exactEarth (exactAIS) (www.exactearth.com)

TRITON will have a dedicated interface for each contracted AIS Data Service on the NU Domain to receive AIS tracks as a stream and process them. A dedicated interface is depicted below:



There may be as many interfaces as the contracted data services, including their recovery services. TRITON will be able to receive live data or stored data from these services.

[T1-R1991] *TRITON shall have a dedicated interface for a contracted AIS Data Service on the NU Domain.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Demonstration

[T1-R1992] *TRITON shall be able to receive AIS data from a contracted AIS Data Service via TCP/IP connection over the Internet.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Test

[T1-R1993] *TRITON shall be able to process all data received from a AIS Data Service without any loss. Lost track reports shall be recorded as KPI.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Test

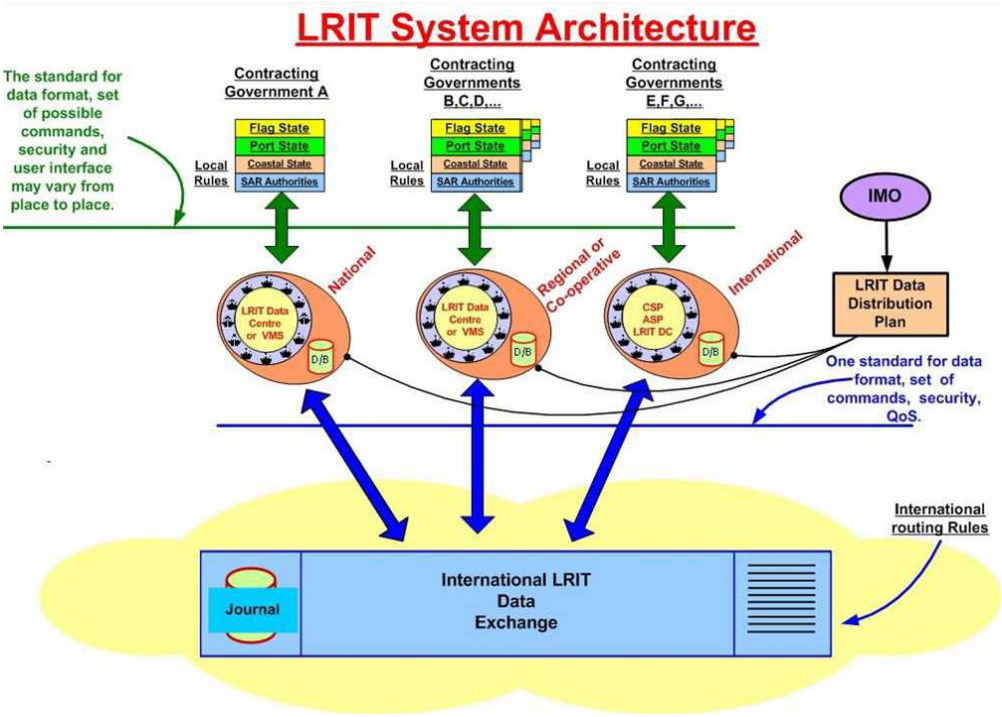
[T1-R1994] *TRITON shall allow the authorised user to adjust the update rate of tracks received from AIS Data sources.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Test

6.2.2.4. LRIT Data Centre

Long-Range Identification and Tracking (LRIT) system provides for the global identification and tracking of ships. The obligations of ships to transmit LRIT information and the rights and obligations of SOLAS Contracting Governments and of Search and rescue services to receive LRIT information are established in regulation V/19-1 of the 1974 SOLAS Convention. The LRIT system consists of the shipborne LRIT information transmitting equipment, the Communication Service Provider(s), the Application Service Provider(s), the LRIT Data Centre(s), including any related Vessel Monitoring System(s), the LRIT Data Distribution Plan and the International LRIT Data Exchange. Certain aspects of the performance of the LRIT system are reviewed or audited by the LRIT Coordinator acting on behalf of all SOLAS Contracting Governments.

LRIT System Architecture is depicted below (www.imo.org):



Current regulations require vessels to automatically transmit identity and position with date/time at 6-hour intervals. Time interval between LRIT reports can be changed to a maximum frequency of every 15 minutes when necessary (i.e. when approaching to high traffic area). LRIT Position Reports sent by ships contain the following information:

- Latitude
- Longitude
- Time Stamp (Date and time of the position)
- Shipborne Equipment Id (an Identifier used by the shipborne equipment)

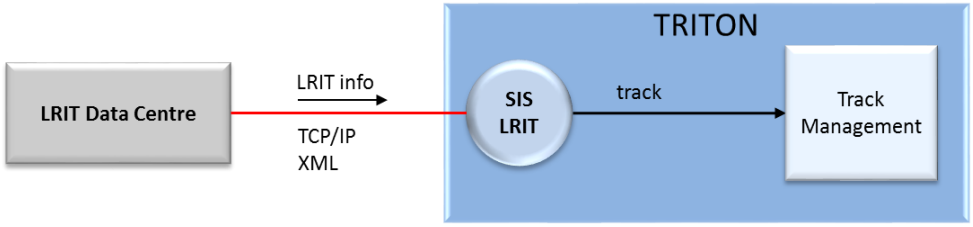
LRIT information is provided to Contracting Governments to the 1974 SOLAS Convention and Search and rescue services entitled to receive the information, upon request, through a system of National, Regional and Cooperative LRIT Data Centres using the International LRIT Data Exchange. The Technical Specifications are provided in www.imo.org.

LRIT Data Centre collects and provides LRIT information to its users according to the Data Distribution Plan (DDP). LRIT DDP defines rules and access rights (i.e. which users can receive what LRIT information). The DDP server is managed by IMO and is populated by SOLAS Contracting Governments, following IMO technical specifications.

International LRIT Data Exchange (IDE) routes LRIT information between LRIT Data Centres according to the DDP. TRITON will access the contracted LRIT Data Centre over Internet and receive the following LRIT information in XML format:

- IMO Number
- MMSI Number
- Name
- Latitude
- Longitude
- Time Stamp (Date and time of the position)
- Data provider

The interface with the LRIT Data Centre is depicted below:



[T1-R1995] *TRITON shall have a dedicated interface with a contracted LRIT Data Centre to receive LRIT Position Reports on the NU Domain.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Demonstration

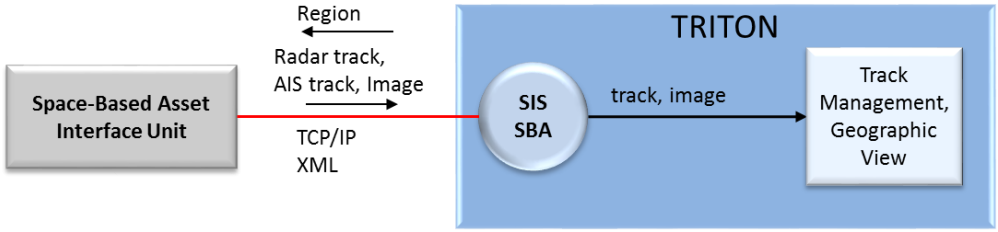
[T1-R1996] *TRITON shall extract track information from LRIT Position Reports, resolve identity of the vessel and process it as a new track or update an existing track.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Test

6.2.2.5. Space-Based Asset Source

Space-Based Assets (SBA) like Satellite Radar or Satellite AIS (S-AIS) can be used as data sources to increase Maritime Situational Awareness. TRITON will be able to interface with a provided SBA through a contracted service. It is expected that the SBA services will be available through an Interfacing Unit (SBA-IU). This unit will provide tracks and images based on a regional request. TRITON will be able to send region request with a timeframe and receive radar and AIS track data for that region.

TRITON will provide a generic interface with minimum functions for future adaptation of SBA as depicted below:



Following data will be sent to the SBA-IU:

- Region (geographic position of rectangular vertices)
- Surveillance Timeframe (start DTG, end DTG)
- Minimum vessel size to be detected

Following data will be received from the SBA-IU:

- Available radar tracks (geographical position, heading, speed, size information)
- AIS tracks
- Image of the region (with geographical location information)

If the external service is not ready at the time of development, the interface will be tested with only test data.

[T1-R1997] *TRITON shall have a dedicated interface for a generic SBA-IU on the NU Domain.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R1998] *TRITON shall allow the authorised user to define a region with a timeframe and issue a surveillance request to the SBA-IU.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Test

[T1-R1999] *TRITON shall generate an XML file that includes the surveillance request and send it to the SBA-IU.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Test

[T1-R2000] *TRITON shall be able to receive track data in XML file or as a stream from the SBA-IU.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Test

[T1-R2001] *TRITON shall be able to receive an image file from the SBA-IU with geospatial data and display it in the GeoView in a separate Layer.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Test

[T1-R2002] *TRITON shall provide an SBA-IU Simulator for interface test purposes.*

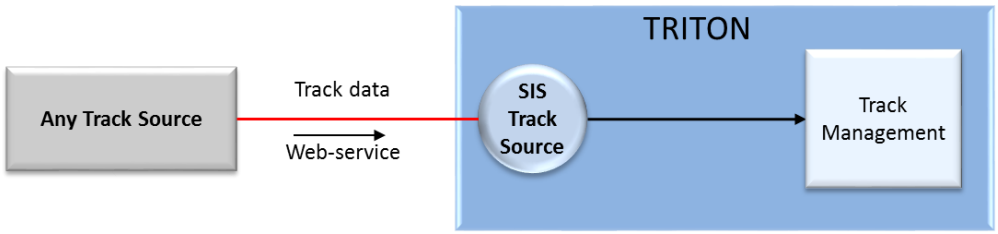
Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R2003] *TRITON SBA-IU Simulator shall be able to receive surveillance area request from TRITON, and send a predefined image file and at least one-hundred (100) radar and one-hundred (100) AIS tracks in the surveillance region.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Test

6.2.2.6. Generic Track Source

TRITON will provide a generic interface to be used for integration of additional track sources. The Generic Track Source Interface is depicted below:



The Generic Interface Module, "SIS Track Source", will be a re-usable software module which consists of a standard part and a modifiable part to implement an interface for a particular track source. The SIS will convert the external track data into internal data format. The modifiable part can be developed and introduced to the system by using the configuration capability of the System Management. There may be more than one track source interface that can be added to a TRITON instance. The configurable track interfacing capability may have certain limitations as the internal data format cannot be changed.

[T1-R2004] *TRITON shall provide a Generic Track Source Interface module which can be implemented according to a particular external system interface specification.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R2005] *TRITON Generic Interface Module shall have a re-usable software module which consists of a standard and a modifiable part to implement an interface for a particular track source. The interface module shall be introduced to the system by configuring the System Management.*

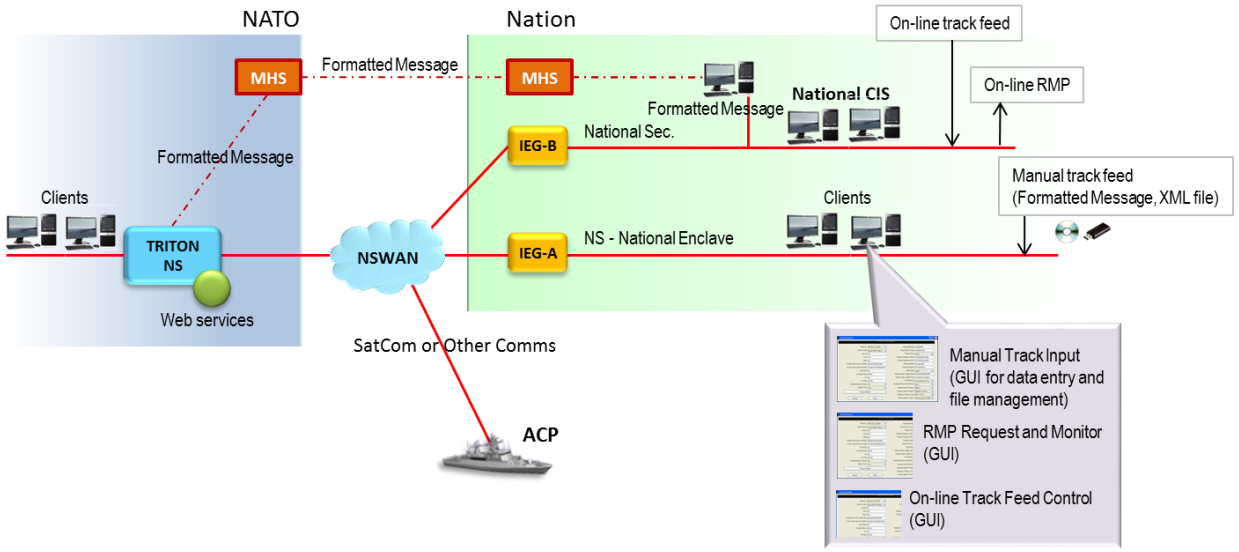
Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Demonstration

6.2.3. Nation Interfaces

Nation Interfaces have two forms: Static and Afloat. Static Interfaces are used to exchange information with Nations (HQs) on both NS and NU Domains. Afloat Interfaces are used to exchange information with Command Ship systems on both NS and NU Domains.

6.2.3.1. Nation Interface - NS

All Nations as users of TRITON on the NS Domain will be able to access TRITON services using TRITON Clients as Web-based User Applications. In addition, TRITON will provide an interface for each Nation to send or receive information. The conceptual information exchange with Nations on the NS Domain is shown below:

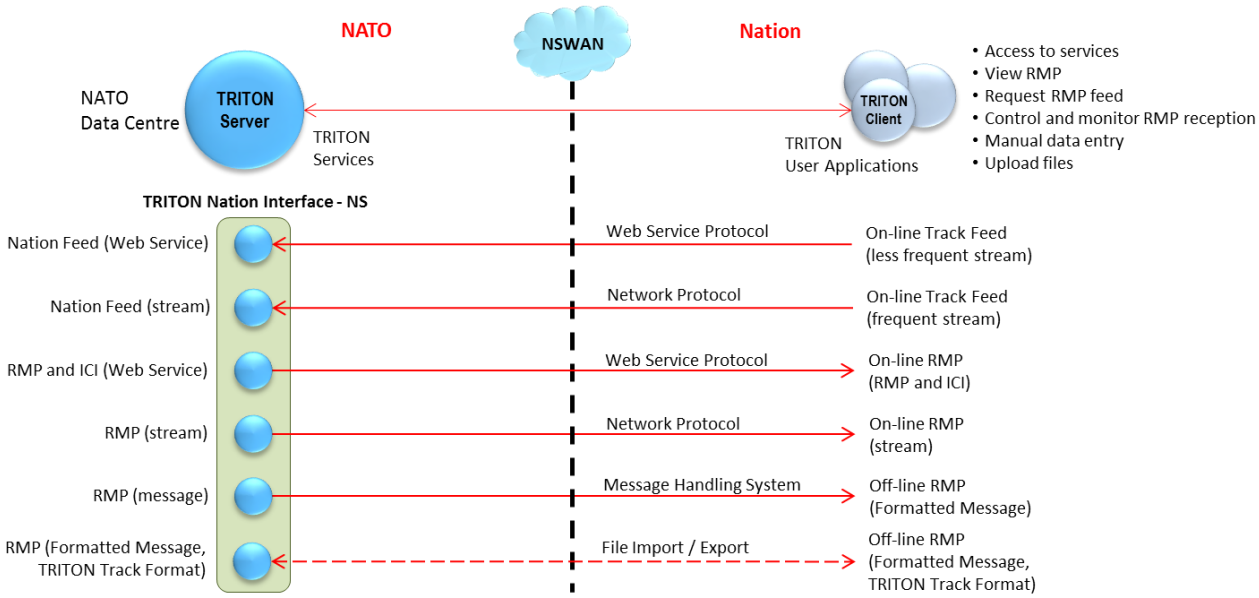


If on-line connectivity exists between NSWAN and National CIS, the information can be exchanged on-line via Web services or stream on TCP/UDP/IP. If there is no on-line connectivity, then the data can be entered into TRITON manually by using the Web-based User Application or by uploading an existing file, provided that the file is previously uploaded on the NS Domain.

While a new information exchange mechanism for track streaming will be used, the existing OTH-T GOLD messages will also be used for backward compatibility. TRITON will be able to send and receive at least the following Formatted Messages to/from Nations:

- CONTACT REPORT
- ENHANCED CONTACT REPORT

Following figure depicts the possible information exchange options:



TRITON Nation Interface - NS will have the capability to receive the following information from a Nation's system:

- Track Feed (Nation's RMP) as a stream, according to the TRITON Track Specification - NS
- Track Feed with Formatted Messages

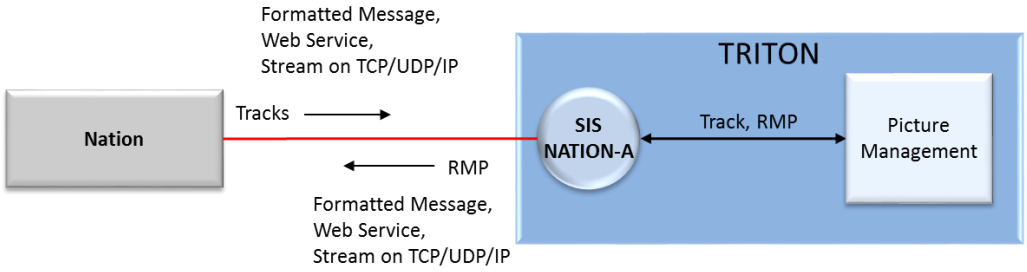
TRITON Nation Interface will have the capability to send the following information to a Nation:

- RMP as a stream on TCP/UDP/IP, in compliance with the TRITON Track Specification - NS

- RMP with Formatted Messages.

Note that a Nation is actually a "National System".

The interface is depicted below:



Nations will be able to receive the RMP according to the following RMP Specification:

- Indication of Maritime Operation
- Filter Criteria on Maritime Operational Objects (Tracks, Vessels, Reference Objects)
- Full RMP, MP or WP components
- RMP Region
- Timelate (1 minute to 24 hours)
- Update rate (1 minute to 60 minutes)
- Requester address

The Nation Interface will have the capability to provide all or filtered Maritime Operational Objects within an RMP Region as specified in the RMP Request. Maritime Operational Objects can be filtered according to their attributes such as Ship Designator, country. A specific vessel can also be requested by indicating its key attributes (e.g. country and vessel name).

[T1-R2006] *TRITON shall have a dedicated interface per Nation as a service on the NS Domain.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R2007] *TRITON shall allow the authorised user to control and monitor each Nation Interface - NS.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R2008] *TRITON shall allow a National System to register to the Nation Interface with the RMP Specification as given in the Description.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R2009] *TRITON shall make the RMP available according to the RMP Specification via the Nation Interface - NS as a Web Service.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3

Qualific. Method : Demonstration

[T1-R2010] *TRITON shall be able to send the RMP to a registered Nation as a stream on TCP/UDP/IP in compliance with the TRITON Track Specification - NS.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R2011] *TRITON shall be able to receive track reports from a Nation as a Web Service in compliance with the TRITON Track Specification - NS.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R2012] *TRITON shall be able to receive track reports from a Nation as a stream on TCP/UDP/IP in compliance with the TRITON Track Specification - NS.*

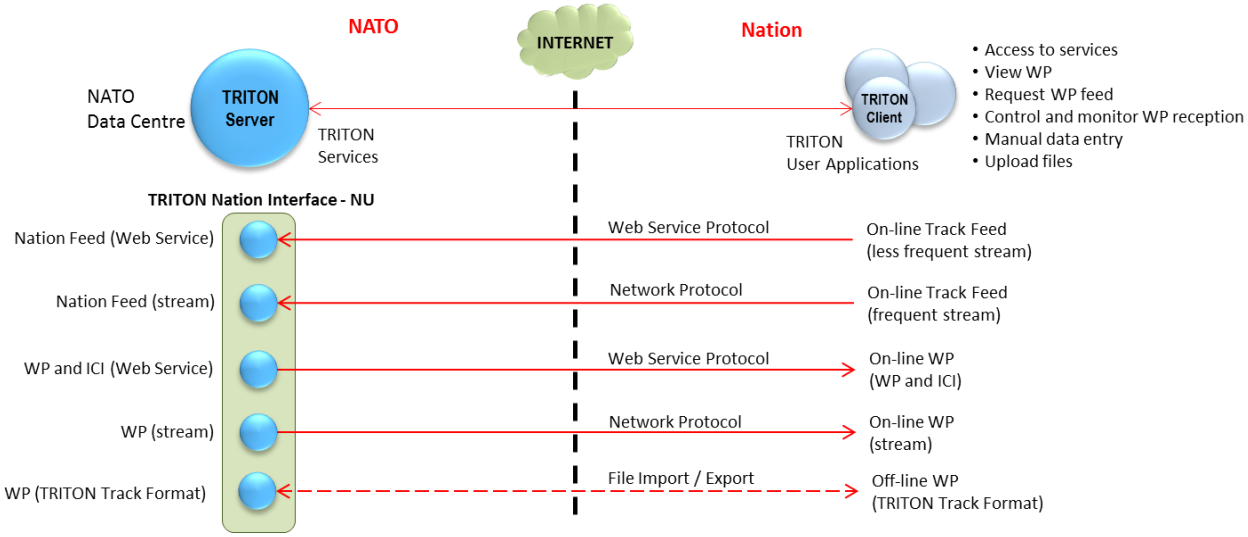
Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R2013] *TRITON shall allow the authorised user to specify the destination addresses for the Nation to which the RMP will be disseminated with point-to-point Formatted Messages.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

6.2.3.2. Nation Interface - NU

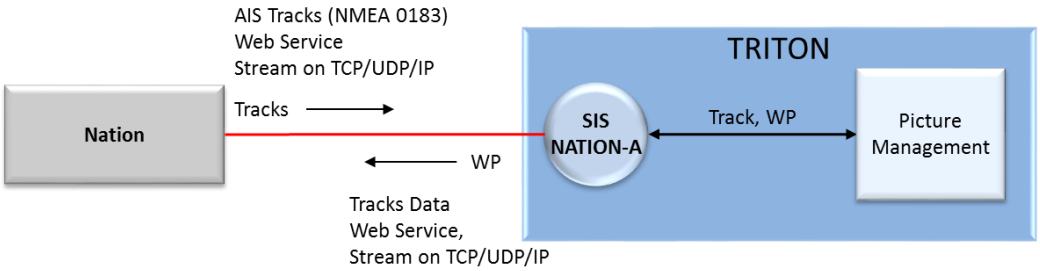
All Nations as users of TRITON on the NU Domain will be able to access TRITON services using Web-based Clients. In addition, TRITON will provide an interface for each Nation to send or receive information. The conceptual information exchange with Nations on the NU Domain is shown below:



TRITON Nation Interface - NU will have the capability to receive track feed (Nation's WP) from a Nation as a stream, in compliance with the TRITON Track Specification - NU or AIS data in NMEA 0183.

TRITON Nation Interface will have the capability to send the WP as a stream, in compliance with the TRITON Track Specification - NU.

The interface is depicted below:



Nations will be able to receive the WP according to the following WP Specification:

- Indication of Maritime Operation
- Filter Criteria on Maritime Operational Objects (Tracks, Vessels, Reference Objects)
- WP Region
- Timelate (1 minute to 24 hours)
- Update rate (1 minute to 6 hours)
- Requester address

Each Nation Interface - NU will have the capability to provide all or indicated type(s) of Maritime Operational Objects within a WP Region as specified in the WP Request. TRITON will disseminate the WP as a data stream on TCP/UDP/IP in compliance with the TRITON Track Specification - NU.

[T1-R2014] *TRITON shall have a dedicated interface per Nation as a service on the NU Domain.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Demonstration

[T1-R2015] *TRITON shall allow the authorised user to control and monitor each Nation Interface - NU.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Test

[T1-R2016] *TRITON shall allow a National System to register to the Nation Interface with the WP Specification as given in the Description.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Test

[T1-R2017] *TRITON shall make the WP available according to the WP Specification via the Nation Interface - NU as a Web Service.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Demonstration

[T1-R2018] *TRITON shall be able to send the WP to a registered Nation as a stream on TCP/UDP/IP in compliance with the TRITON Track Specification - NU.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Test

[T1-R2019] *TRITON shall be able to receive track reports from a Nation as a Web Service in compliance with the TRITON Track Specification - NU or AIS data in NMEA 0183 format.*

Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Test

[T1-R2020] *TRITON shall be able to receive track reports from a Nation as a stream on TCP/UDP/IP in compliance with the TRITON Track Specification - NU or AIS data in NMEA 0183 format.*

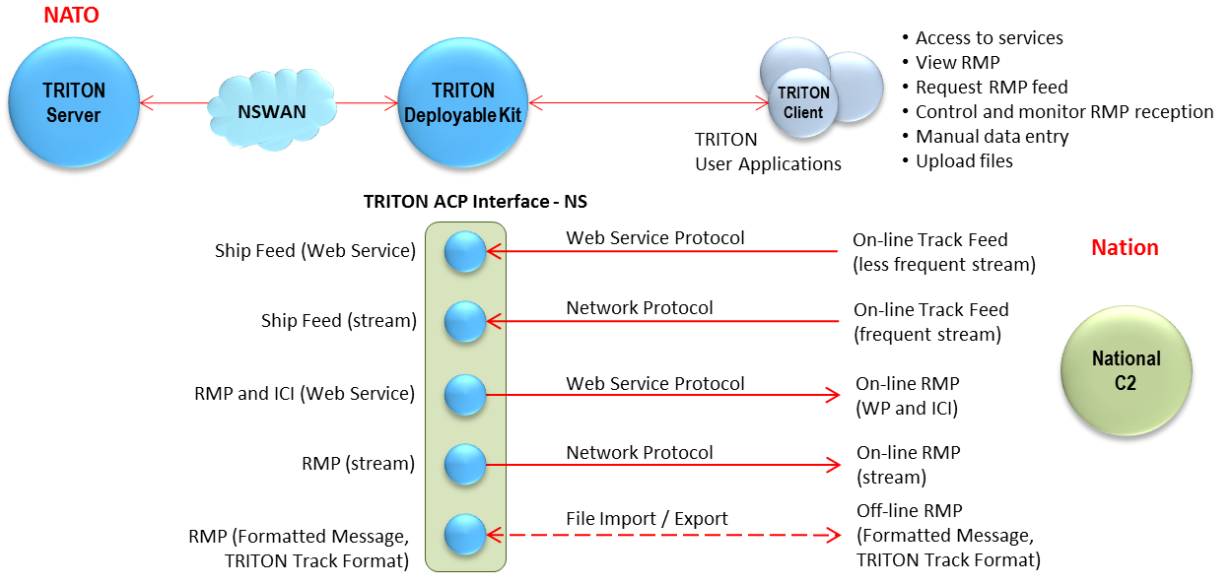
Requirement Property :
- Domain for Static : NU
- Domain for Afloat: N/A
- Baseline : BL 2
- Qualific. Method : Test

6.2.4. Afloat Command Platform Interfaces

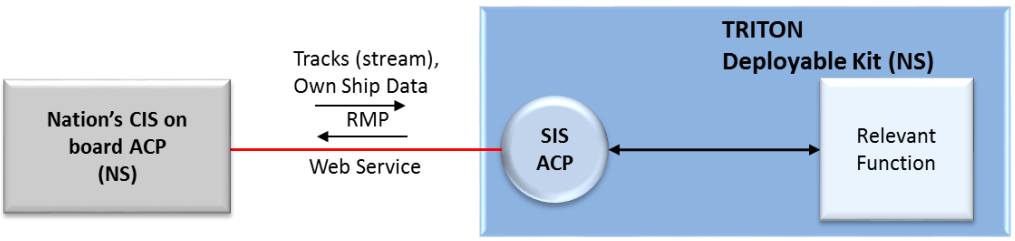
TRITON will provide interfaces for the Command Ship (ACP) within the TRITON Deployable Kits. Formatted Messages will also be handled in order to preserve backward compatibility.

6.2.4.1. ACP Interface - NS

TRITON Deployable Kit - NS (TDK-NS) ACP Interface will have similar capabilities as the Nation Interface-NS and the RMP Service. In addition, the ACP Interface will contain Own Ship Data handling capability. The interface options are defined below:



TRITON will be able to make the RMP available to ship systems over the ACP Interface according to the RMP Specification as defined in the Nation Interface - NS. Own Ship Data can be received from external sources using the TRITON Own Ship Data Specification. The TDK-NS ACP Interface is depicted below:



[T1-R2021] *TDK-NS shall have an ACP Interface on the NS Domain for interfacing the systems available on the Command Ship.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: NS
- Baseline : BL 4
- Qualific. Method : Demonstration

[T1-R2022] *TDK-NS shall allow the authorised user to control and monitor the ACP Interface - NS.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: NS
- Baseline : BL 4
- Qualific. Method : Test

[T1-R2023] *TDK-NS shall allow an external system to register to the ACP Interface with the RMP Specification (as described in Nation Interface - NS).*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: NS
- Baseline : BL 4
- Qualific. Method : Test

[T1-R2024] *TDK-NS shall make the RMP available according to the RMP Specification (as described in Nation Interface - NS) via the ACP Interface as a service.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: NS
- Baseline : BL 4
- Qualific. Method : Inspection

[T1-R2025] *TDK-NS shall be able to receive track reports from an external system as a stream in compliance with the TRITON Track Specification - NS via the ACP Interface - NS.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: NS
- Baseline : BL 4
- Qualific. Method : Test

[T1-R2026] *TDK-NS shall be able to receive Own Ship Data from external systems as a stream in compliance with the TRITON Own Ship Data Specification via the ACP Interface - NS.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: NS
- Baseline : BL 4
- Qualific. Method : Test

[T1-R2027] *TDK-NS shall maintain Own Ship Data and automatically initiate and update a track with the highest Confidence Level.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: NS
Baseline : BL 4
Qualific. Method : Test

[T1-R2028] *TDK-NS shall allow the authorised user to manually enter the attributes of Own Ship Data.*

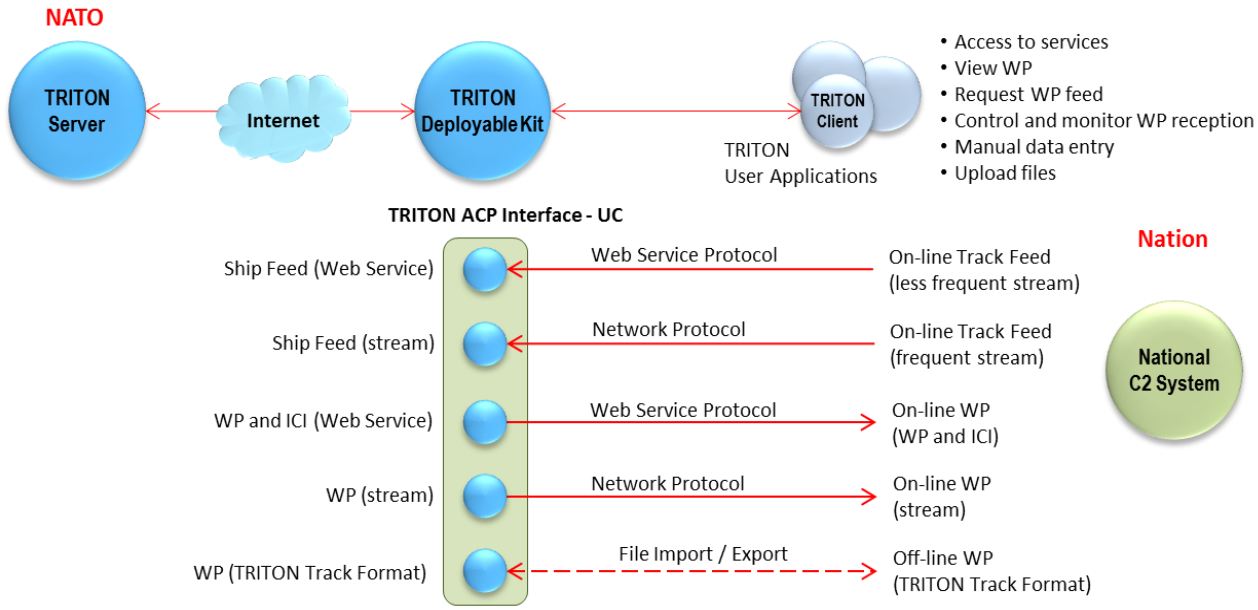
Requirement Property :
Domain for Static : N/A
Domain for Afloat: NS
Baseline : BL 4
Qualific. Method : Test

[T1-R2029] *TDK-NS shall have the RMP Service to be activated and controlled by the authorised user if needed.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: NS
Baseline : BL 4
Qualific. Method : Test

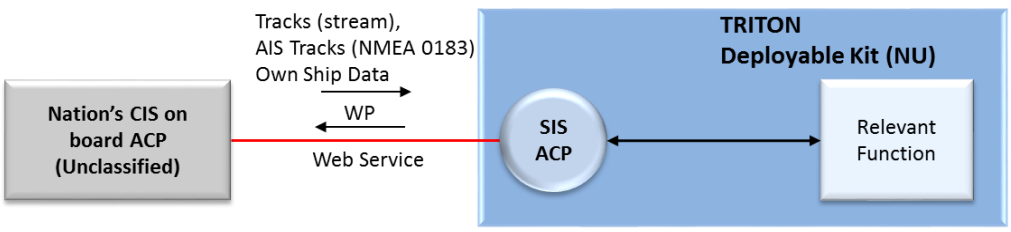
6.2.4.2. ACP Interface - NU

TRITON Deployable Kit - NU (TDK-NU) ACP Interface will be similar to the Nation Interface - NU and the WP Service. The interface options are given below:



TRITON will be able to make the RMP available to ship systems over the ACP Interface according to the RMP Specification as defined in the Nation Interface - NS. Own Ship Data can be received from external sources using the TRITON Own Ship Data Specification.

The TDK-NU ACP Interface is depicted below:



[T1-R2030] *TDK-NU shall have an ACP Interface on the NU Domain for interfacing the systems available on the ACP.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: NU
- Baseline : BL 4
- Qualific. Method : Demonstration

[T1-R2031] *TDK-NU shall allow the authorised user to control and monitor the ACP Interface - NU.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: NU
- Baseline : BL 4
- Qualific. Method : Test

[T1-R2032] *TDK-NU shall allow an external system to register to the ACP Interface with the WP Specification (as described in Nation Interface - NU).*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: NU
- Baseline : BL 4
- Qualific. Method : Test

[T1-R2033] *TDK-NU shall make the WP available according to the WP Specification (as described in Nation Interface - NU) via the ACP Interface as a service.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: NU
- Baseline : BL 4
- Qualific. Method : Inspection

[T1-R2034] *TDK-NU shall be able to receive track reports from an external system as a stream in compliance with the TRITON Track Specification - NU via the ACP Interface - NU.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: NU
- Baseline : BL 4
- Qualific. Method : Test

[T1-R2035] *TDK-NU shall be able to receive Own Ship Data from external systems as a stream in compliance with the TRITON Own Ship Data Specification via the ACP Interface - NU.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: NU
- Baseline : BL 4
- Qualific. Method : Test

[T1-R2036] *TDK-NU shall maintain Own Ship Data to automatically initiate and update a track with the highest Confidence Level.*

Requirement Property :
- Domain for Static : N/A
- Domain for Afloat: NU
- Baseline : BL 4
- Qualific. Method : Test

[T1-R2037] *TDK-NU shall allow the authorised user to manually enter the attributes of Own Ship Data.*

Requirement Property :

Domain for Static : N/A
Domain for Afloat: NU
Baseline : BL 4
Qualific. Method : Test

[T1-R2038] *TDK-NU shall have the WP Service to be activated and controlled by the authorised user if needed.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: NU
Baseline : BL 4
Qualific. Method : Test

6.2.4.3. Message Handling System Interface

TDK-NS will have an interface with on-board Message Handling System (MHS) if available. The interface will be the same as static site MHS Interface using E-mails.

[T1-R2039] *TDK-NS shall have a dedicated interface service for MHS over Mail Exchange.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: NS
Baseline : BL 4
Qualific. Method : Demonstration

[T1-R2040] *TDK-NS shall be able to exchange Formatted Messages with Mail Exchange using SMTP.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: NS
Baseline : BL 4
Qualific. Method : Test

6.2.5. TRITON External Interfaces

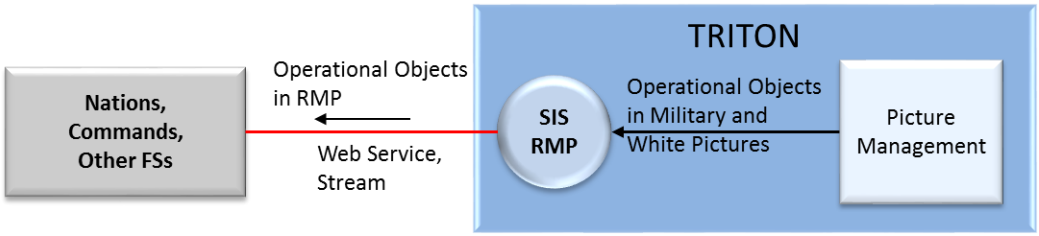
TRITON will provide interfaces to the external world primarily as Web services and streaming services. Point-to-point dedicated interfaces with Formatted Messages will also be provided in order to preserve backward compatibility. The TRITON ICD will include the Service Interface profiles for these Web Services.

6.2.5.1. RMP Service

While TRITON provides all users with the capability of accessing Maritime Operational Picture (using Picture Management Applications) as well as the RMP, it will also make the RMP information available for external users via Web services and Formatted Messages. The "RMP Service" will provide dissemination of Military and White Picture as separate RMP components, including all Maritime Operational Objects and other relevant information to the requester with the most appropriate means. Nation Interfaces (or ACP Interfaces) also provide Web services and other options to receive the RMP.

Reference Objects (Lines, Areas, Reference Points) will be made available through the RMP Service as part of the RMP.

The external interface for the RMP Service is depicted below:



RMP Specification:

External systems/services will be able to receive the RMP according to the following RMP Specification:

- Indication of Maritime Operation
- Filter Criteria on Maritime Operational Objects (Tracks, Vessels, Reference Objects)
- Full RMP, MP or WP components
- RMP Region
- Timelate (e.g. 1 minute to 24 hours)
- Update rate (e.g. 1 minute to 60 minutes)
- Requester address

The RMP Service will have the capability to provide all or filtered Maritime Operational Objects within an RMP Region as specified in the RMP Request. Maritime Operational Objects can be filtered according to their attributes such as Ship Designator, country. A specific vessel can also be requested by indicating its key attributes (like country and vessel name).

TRITON will be able to disseminate the RMP using the following formats:

- As a track data stream, in compliance with the TRITON Track Specification
- As Formatted Messages for tracks
- As NVG for tracks
- As NVG for Reference Objects (also known as Overlays)

The RMP Service will also have a search capability compliant to Open Search [Open Search].

[T1-R2041] *TRITON shall have an interface service named as "RMP Service" on the NS Domain.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Inspection

[T1-R2042] *TRITON shall make the RMP available according to the RMP Specification as given in the Description via a Web service.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Inspection

[T1-R2043] *TRITON shall allow external systems/services to register themselves to the RMP Service with the RMP Specification.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R2044] *TRITON RMP Service shall provide a search capability compliant to Open Search [Open Search].*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R2045] *TRITON shall allow the authorised user to control and monitor the RMP dissemination process.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R2046] *TRITON shall be able to provide the RMP to external systems/services as a track data stream in compliance with the TRITON Track Specification - NS within one second after applying the requested RMP Specification including filtering.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R2047] *TRITON shall be able to send the RMP to the external systems/services using Formatted Messages and point-to-point communication.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R2048] *TRITON shall be able to send the RMP to the external systems/services using NVG format according to [NVG].*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R2049] *TRITON Deployable Kit (NS) shall have the same RMP Service if activated and controlled by the authorised user.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: NS
Baseline : BL 4
Qualific. Method : Demonstration

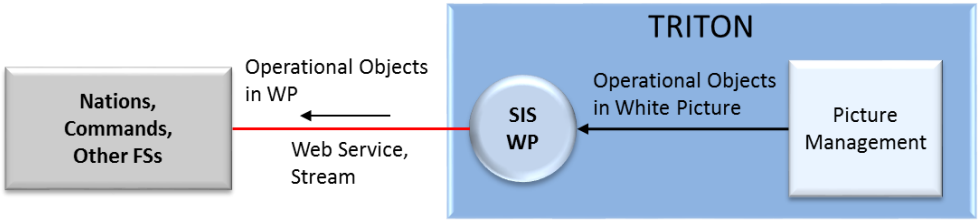
[T1-R2050] *TRITON RMP Service interface shall be defined in the TRITON ICD.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Demonstration

6.2.5.2. WP Service

TRITON will make the White Picture (WP) available on unclassified domain as a service in a concept similar to the RMP Service. All Maritime Operational Objects will be made available through the "WP Service" as part of the WP. External systems/services can register themselves to this service and receive the WP.

The external interface for the WP Service is depicted below:



WP Specification:

External systems/services will be able to receive the WP according to the following WP Specification:

- Indication of Maritime Operation
- Filter Criteria on Maritime Operational Objects (Tracks, Vessels, Reference Objects)
- WP Region
- Timelate (1 minute to 24 hours)
- Update rate (1 minute to 6 hours)
- Requester address

The WP Service will have the capability to provide all or indicated type(s) of Maritime Operational Objects within a WP Region as specified in the WP Request. The WP Service will have a search capability compliant to Open Search [Open Search]. TRITON will disseminate the WP as a data stream in compliance with the TRITON Track Specification - NU.

[T1-R2051] *TRITON shall have an interface service named "WP Service" on the NU Domain.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Test

[T1-R2052] *TRITON shall make the WP available according to the WP Specification as given in the Description via a Web service.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Test

[T1-R2053] *TRITON shall allow the external systems/services to register themselves to the WP Service with the WP Specification.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Test

[T1-R2054] *TRITON shall be able to provide the WP to external systems/services as a track data stream in compliance with the TRITON Track Specification - NU within one second after applying the requested WP Specification including filtering.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Test

[T1-R2055] *TRITON WP Service shall provide a search capability compliant to Open Search [Open Search].*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R2056] *TRITON shall allow the authorised user control and monitor the WP dissemination process.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Test

[T1-R2057] *TRITON Deployable Kit (NU) shall have the same WP Service if activated and controlled by the authorised user.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: NU
Baseline : BL 4
Qualific. Method : Demonstration

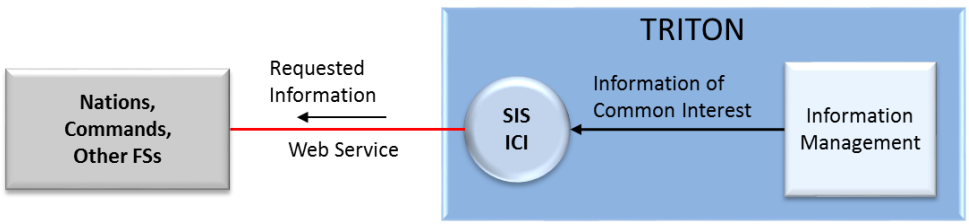
[T1-R2058] *TRITON WP Service interface shall be defined in the TRITON ICD.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Inspection

6.2.5.3. Information of Common Interest Service

TRITON will make certain maritime information named as "Information of Common Interest" (ICI) available to external systems/services as a Web Service. The authorised systems/services can access this information.

The external interface for the Information of Common Interest, "ICI Service", is depicted below:



The ICI Service, "ICI Service", provides the following information:

- Maritime Task Organization List (NS)
- Area of Interest (NS)
- Rules of Engagement List (NS)
- WSM/PMI Areas (NS)
- Vessel List (CCOI/COI/VOCI and Custom Watch List) (NS)

- Person of Maritime Interest List (NS)
- Lloyd's Maritime Intelligence Unit List (NS, NU)
- Detention List (NS, NU)

The ICI Service on relevant domain will provide the information according to its classification. The details of the interface will be determined at software design phase and included in the TRITON ICD.

The ICI Service will provide a search capability compliant to Open Search [Open Search].

[T1-R2059] *TRITON shall have an interface service named as "Information of Common Interest (ICI) Service" on both NS and NU Domains.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R2060] *TRITON shall allow the authorised user to control the releasability of Information of Common Interest.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Test

[T1-R2061] *TRITON shall make the Maritime Task Organization List available via the ICI Service.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R2062] *TRITON shall make the Area of Interest List available via the ICI Service.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R2063] *TRITON shall make the Rules of Engagement List available via the ICI Service.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R2064] *TRITON shall make the WSM/PMI Areas available via the ICI Service.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R2065] *TRITON shall make the Vessel List available via the ICI Service.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3

Qualific. Method : Test

[T1-R2066] *TRITON shall make the Person of Maritime Interest List available via the ICI Service.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R2067] *TRITON shall make the Lloyd's Maritime Intelligence Unit List available via the ICI Service.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Test

[T1-R2068] *TRITON shall make the Detention List available via the ICI Service.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Test

[T1-R2069] *TRITON shall make the requested data available within one second via the ICI Service.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Test

[T1-R2070] *TRITON ICI Service shall provide a search capability compliant to Open Search [Open Search].*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R2071] *TRITON Deployable Kit (NS and NU) shall have the same ICI Services if activated and controlled by the authorised user.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration

[T1-R2072] *TRITON ICI Service interface shall be defined in the TRITON ICD.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Inspection

6.3. TRITON Internal Interface Requirements

TRITON Internal Interfaces will be dependent upon the selected architecture. Each module and inter-module interfaces will be defined during the System Design phase.

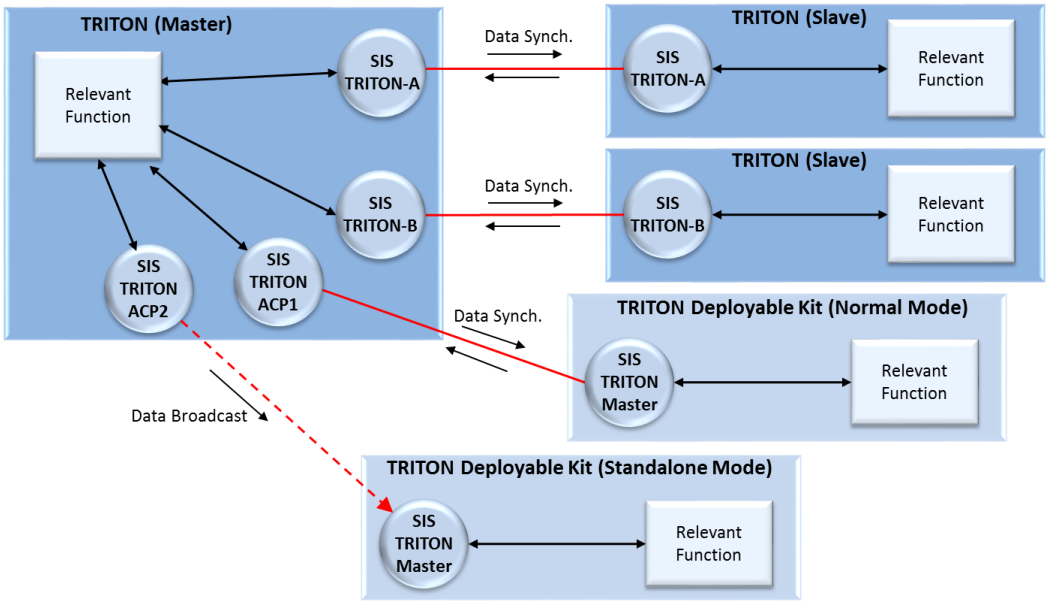
The interfaces between separate TRITON installations are considered as internal interfaces.

6.3.1. TRITON Internal Interfaces

All interfaces between TRITON User Applications, Technical Services, internal modules and components will be documented in the Interface Requirements Specifications and Interface Design Description.

6.3.2. TRITON-to-TRITON Interfaces

TRITON will be installed at more than one location and will be used concurrently. All TRITON Instances (static or afloat) will be able to exchange information between their servers to preserve consistency and data integrity, also providing resilience. Therefore, each TRITON Instance will have a dedicated interface service (SIS TRITON-name) for exchanging information with the other TRITON Instances to support Multi-site Operation (see System Technical Management). Since there will be more than one instance active simultaneously, a mechanism such as "master-slave" will be established to achive continuous data integrity. The concept is illustrated below:



The Master TRITON Instance will handle all External Data Exchange, build the RMP and disseminate it. Other TRITON Instances, the Slaves, will replicate the Maritime Information as received from the Master (see Multi-site Operation Management). If the Master Static Site loses its connectivity to general NSWAN for a configurable period of time, then another Static Site having connectivity to NSWAN will be set as the Master; its interfaces will be activated appropriately and other TRITON Instances will be slaved to this new Master. When the old Master regains the connectivity, it will synchronise its data from the current Master until an explicit swap.

TRITON Servers should be able to exchange data in the background even under low bandwidth conditions. This may require special mechanisms to handle exceptions such as lost data packets, frequent disconnection and re-connection. The design of the relevant SIS must handle these drawbacks, trying to achieve the maximum resilience without stalling user accessibility (i.e. user access to data should not be slowed down due to data synchronisation).

The same mechanism will be applicable for the NU Domain and the Internet.

If an ACP cannot connect to the WAN (NS or NU) due to communication system failure, bad weather or operational restrictions (e.g. EMCON), the TRITON Deployable Kit (NS or NU Unit) onboard will change the mode of operation to Standalone and continue its operation with limited functionality.

The Deployable Kit will be able to operate with local data or manually-input data. If the communication equipment can provide receive-only IP capability to the LAN, TRITON will be able to receive data from external sources even though it is in Standalone Mode. Requests cannot be sent out but any received data from the LAN can be received and processed. Considering this situtation, the interface of the Deployable Kit indicated as the SIS TRITON-Master in the above figure, will be able to listen a dedicated IP address and receive data from it while the SIS TRITON-ACP(x) on the static site sends data continuosly to a dedicated IP address. The authorised user will control and monitor the data exchange on both sides. In any case, the commnuication capabilities are beyond the scope of this project. It will be assumed that NS-LAN or NU-LAN is always available at static or afloat site.

Receiving Formatted Messages via the Message Handling System on board is a separate case that can be operationally handled by means of Standard Operating Procedures.

Continuity of Dynamic Data:

Some data in TRITON requires continuity deu to its dynamic nature. Tracks are an example to frequently changing dynamic data. TRITON must handle continuity for managing the dynamic data especially at afloat sites. For example, while a static TRITON Instance is providing data to afloat instances, only the changing attributes of tracks should be send at shorter intervals whereas unchanged attributes are sent at longer intervals. Valid track list must be updated regularly to prevent ghost track accumulation at the receiver side.

[T1-R2073] *A static TRITON Instance shall have a dedicated and configurable interfaces with other static TRITON Instances to enable Multi-site Operation.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R2074] *The Static TRITON Instance on a static site having the Master Role, shall have a dedicated interface for each Deployed TRITON Instance toto enable Multi-site Operation. The interface should be able to select the appropriate mechanism for enabling network communication in low bandwidth environment (e.g. reducing the update rate).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R2075] *The TRITON Instance on a static site having the Master Role, shall have a dedicated interface for each Afloat TRITON Instance to enable Multi-site Operation. The interface should be able to select the appropriate mechanism for enabling network communication in low bandwidth environment (e.g. reducing the update rate).*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Demonstration
- Comment : The criteria for network communication in low bandwidth will be determined at CDR. BL3 and BL4 tests will be performed according to this criteria.

[T1-R2076] *The TRITON Instance on an afloat site shall have a dedicated configurable interface for a Static TRITON Instance to enable Multi-site Operation. It shall be able to receive data from a designated IP address without requiring request and acknowledgement.*

Requirement Property :
- Domain for Static : N/A

Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration
Comment : The test criteria will be determined at CDR.

[T1-R2077] *A static TRITON Instance having a System Interface Service for another static TRITON Instance shall be able to synchronise data to enable Multi-site Operation.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R2078] *TRITON shall allow the static site authorised user to control and monitor the System Interface Services for other static or afloat TRITON Instances.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

[T1-R2079] *TRITON shall allow the afloat site authorised user to control and monitor the System Interface Services for static TRITON Instances.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Test

[T1-R2080] *TRITON shall be able to send a selected set of data to a dedicated IP address without requiring request and acknowledgement. The data shall be sent with a logic which provides continuity of dynamic data as explained in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration
Comment : Details of the logic will be determined at the SRR.

[T1-R2081] *TRITON shall allow the static site authorised user to set the System Interface Service for a selected afloat TRITON Instance to send a selected set of data.*

Requirement Property :
Domain for Static : N/A
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Test

[T1-R2082] *TRITON shall allow the authorised user to dynamically add or remove System Interface Services for the selected TRITON Instances.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

***** END OF SRS *****

IFB-CO-13859-TRITON

PROVISION OF FUNCTIONAL SERVICES FOR

COMMAND AND CONTROL OF MARITIME OPERATIONS

(TRITON)

INCREMENT 1

PROJECT SERIAL 2011/0IS03081

BOOK II – PART IV SOW

ANNEX B

WORK PACKAGES

Amendment 1



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1. GENERAL INFORMATION

1.1. Relation of this Document to the SOW

1.1.1. The purpose of this annex to the TRITON Statement of Work (SOW) is to describe the scope of work in terms of Contract Work Packages, the relations between the Work Packages and how each of the Work Packages shall be implemented.

1.1.2. The Work Packages define the actual plans whereas the SOW defines the principles and standard activities.

1.1.3. For those SOW requirements that are not explicitly covered by a Work Package shall also be met by the Contractor under the control of Project Management Process.

1.1.4. The document also lists the time constraints and milestones that the Contractor shall use to build the Project Master Schedule.

1.1.5. The Work Packages include all the system life cycle processes to realise the TRITON Increment 1 Capability. The mapping of the standard system life cycle processes defined in the SOW onto the Work Packages is illustrated in Figure 1.

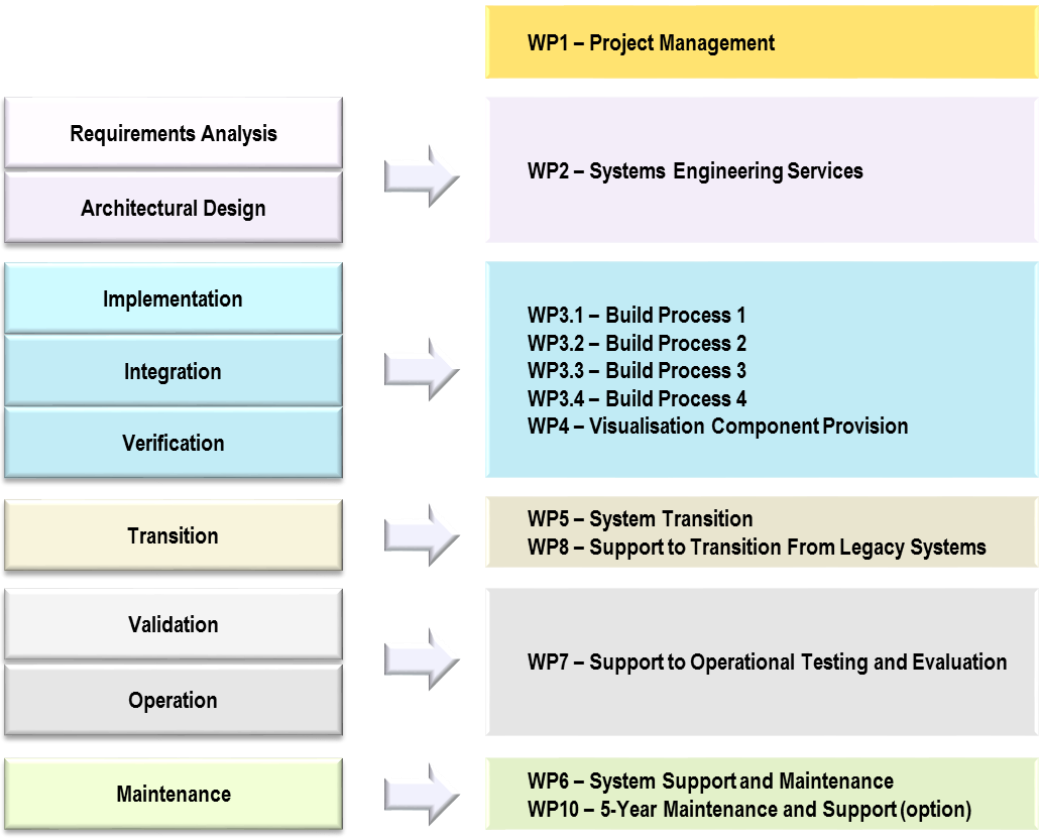


Figure 1 – Mapping the System Life Cycle Processes onto Work Packages

1.2. Work Packages

1.2.1. The Contractor shall realise the TRITON Increment 1 Capability by performing the activities defined in the Work Packages listed in Table 1-1.

Table 1-1 – List of Work Packages

Number	Work Package
WP1	Project Management
WP2	Systems Engineering Services
WP3.1	Build Process 1 (TRITON-NS Partial) as Pilot
WP3.2	Build Process 2 (TRITON-NU Full Capability)
WP3.3	Build Process 3 (TRITON-NS Full Capability)
WP3.4	Build Process 4 (TRITON ACP Capability)
WP4	Visualisation Component Provision
WP5	System Transition
WP6	System Support and Maintenance
WP7	Support to Operational Testing and Evaluation
WP8	Support to Transition from Legacy Systems
WP9	COTS Software Provision (option)
WP10	5-Year Maintenance and Support (option)
WP11	Support to Preparations for the Next Increment (option)

1.2.2. The Purchaser currently envisions a Contract Work Package Schedule for the project as shown in Figure 2.

1.2.3. The dates in this diagram shall be perceived as “no later than” dates. The Contractor can propose earlier deliveries.

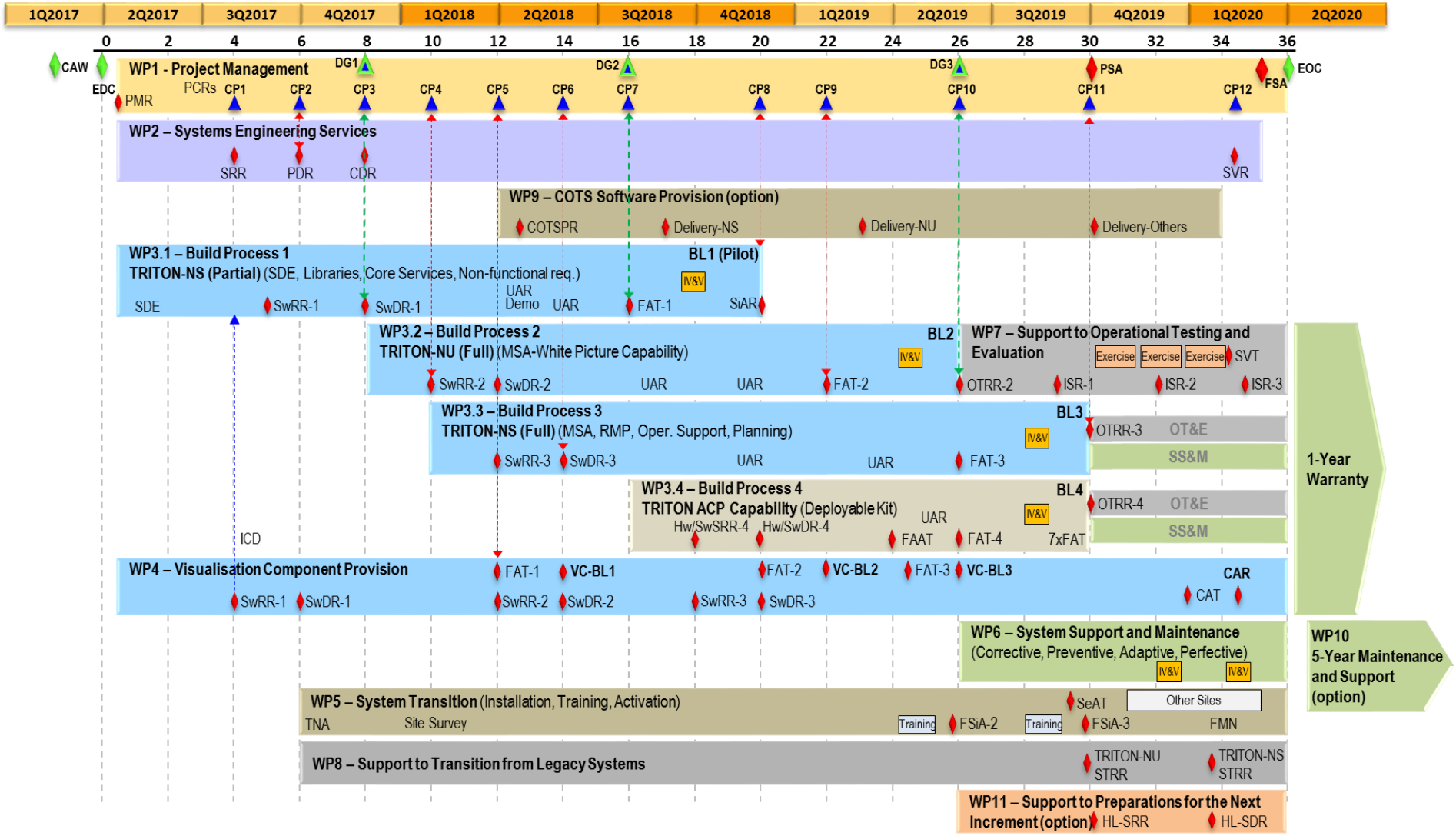


Figure 2 – Contract Work Package Schedule

1.3. Work Package Structure

1.3.1. Each Work Package defined in this document has the following structure:

- General
- Work Package Dates
- Activities
- Reviews
- Milestones (indicated as Months after Contract – MAC)
- Deliverables

1.4. Project Master Schedule

1.4.1. The Contractor shall develop the Project Master Schedule (PMS) according to this Work Package schedule. The PMS shall also include the optional Work Packages WP9, WP10 and WP11, and all Milestones and Checkpoints associated to Work Packages.

1.4.2. The End Dates of Build Processes are the deadlines set by the Purchaser. Earlier planning according to the Requirements Implementation Schedule can be proposed, and applied upon Purchaser's approval.

1.4.3. Project Milestones

1.4.3.1. Figure 2 shows the most important project milestones in a diagram. Table 1-2 gives the list of Milestones which will be monitored by the Purchaser and are usually tied to Decision Gates and payment triggers.

Table 1-2 – Project Milestones

Milestone	Description	CP	DG	WP
EDC	Effective Date of Contract			1
PMR	Project Management Review			1
PCR	Monthly – Project Checkpoint Review			1
SRR	System Requirements Review	CP1		2
PDR	Preliminary Design Review	CP2		2
CDR	Critical Design Review	CP3	DG1	2
SwRR-1	Software Requirements Review – BL1			3.1
SwDR-1	Software Design Review – BL1	CP3	DG1	3.1
SwRR-2	Software Requirements Review – BL2	CP4		3.2
SwDR-2	Software Design Review – BL2	CP5		3.2
SwRR-3	Software Requirements Review – BL3	CP5		3.3
SwDR-3	Software Design Review – BL3	CP6		3.3
Hw/SwRR	Hardware/Software Requirements Review – BL4			3.4
Hw/SwDR	Hardware/Software Design Review – BL4			3.4
TRR-1	Test Readiness Review – BL1			3.1
FAT-1	Factory Acceptance Test – BL1	CP7	DG2	3.1
SverR-1	System Verification Review – BL1			3.1

FSiA-1	Final Site Acceptance – BL1	CP8		5
TRR-2	Test Readiness Review – BL2			3.2
FAT-2	Factory Acceptance Test – BL2	CP9		3.2
SverR-2	System Verification Review – BL2			3.2
TRR-4	Test Readiness Review – BL4			3.4
FAAT	First Article Acceptance Test			3.4
FAT-4	FAT for one TDKs			3.4
7 x FAT	FAT for 7 TDKs			3.4
SQR-2	Sustainment Qualification Review – BL2			5
FSiA-2	Final Site Acceptance – BL2	CP10	DG3	5
OTTR-2	Operational Test and Readiness Review – BL2	CP10	DG3	3.2
TRR-3	Test Readiness Review – BL3			3.3
FAT-3	Factory Acceptance Test for BL3	CP10	DG3	3.3
SverR-3	System Verification Review – BL3			3.3
OTTR-3	Operational Test and Readiness Review – BL3	CP11		3.3
FSiA-3	Final Site Acceptance – BL3			5
SQR-3	Sustainment Qualification Review – BL3			5
SverR-4	System Verification Review – BL4			3.4
SeAT	Sea Acceptance Test for one TDK			5
OTTR-4	Operational Test and Readiness Review – BL4	CP11		3.4
MMR	Monthly Maintenance Review			6
ISR-1,2,3	In-Service Review			7
PSA	Provisional System Acceptance	CP11		1
TrRR	Transition Readiness Review (NU)	CP11		8
TrRR	Transition Readiness Review (NU)	CP12		8
SVR	System Validation Review	CP12		2
FMN	FMN Testing			5
FSA	Final System Acceptance			1
CCM	Contract Close-out Meeting (CCM)			
EOC	End of Contract			1
Visualisation Component				
SwRR-1	Software Requirements Review – BL1	CP1		4
SwDR-1	Software Design Review – BL1	CP2		4
WPA	Work Package Assessment	CP3	DG1	4
FAT-1	Factory Acceptance Test – BL1	CP5		4
SwRR-2	Software Requirements Review – BL2	CP5		4
SwDR-2	Software Design Review – BL2	CP6		4
VC-BL1	BL1 Delivery	CP6		4
WPA	Work Package Assessment	CP7	DG2	4
SwRR-3	Software Requirements Review – BL3	CP5		4
SwDR-3	Software Design Review – BL3	CP6		4

FAT-2	Factory Acceptance Test – BL2	CP8		4
VC-BL2	BL2 Delivery	CP9		4
FAT-3	Factory Acceptance Test – BL3			4
VC-BL3	BL3 Delivery	CP10		4
WPA	Work Package Assessment		DG3	4
CAT	Component Acceptance Test	CP12		4

2. WORK PACKAGE 1: PROJECT MANAGEMENT

2.1. General

2.1.1. The Contractor shall provide project management for the overall project and the implemented Work Packages as described in Section 3 of the SOW.

2.2. Work Package Dates

2.2.1. The Work Package1 Performance Start Date (WP PSD) shall be on Effective Date of Contract (EDC).

2.2.2. The Work Package 1 Performance End Date (WP PED) shall be the End of Contract (EOC).

2.3. Project Resources

2.3.1. Project Management Office

2.3.1.1. The Contractor shall establish and maintain a Project Management Office (PMO) as described in Subsection 3.5 of the SOW through the period of performance of this Work Package.

2.3.1.2. The Contractor shall provide the nomination of the Key Personnel as referenced in SOW, Subsection 3.5 at the WP1 PSD.

2.3.2. Project Website and Collaborative Working Environment

2.3.2.1. As specified in Subsection 3.6 of the SOW, the Contractor shall use an unclassified but managed Project Website and Collaborative Working Environment (CWE) (based on Microsoft SharePoint) on which all relevant unclassified project documentation shall be stored and shall manage and maintain it throughout the period of performance of this Work Package.

2.3.2.2. The Contractor shall review and comment on the proposed design for the Project Website and CWE not later than two (2) weeks after the WP1 PSD. This design information shall be provided by the Purchaser at WP1 PSD.

2.3.2.3. The Contractor shall populate and activate the Project Website and CWE within four (4) weeks after WP1 PSD.

2.3.2.4. The Contractor shall get Purchaser's approval of the Project Website and CWE at the Project Management Review (PMR).

2.4. Project Planning

2.4.1. Project Management Plan

2.4.1.1. As specified in SOW, Subsection 3.7, the Contractor shall establish and maintain a Project Management Plan (PMP) which shall describe how the Contractor will implement the totality of the project, including details of the project control that will be applied.

2.4.1.2. The Contractor shall provide the initial baseline version of the PMP at the Project Management Review (PMR) and maintain it throughout the period of performance of this Work Package.

2.4.2. Project Product Breakdown Structure

2.4.2.1. As specified in SOW, Subsection 3.8, the Contractor shall establish and maintain a Project Product Breakdown Structure (PPBS).

2.4.2.2. The Contractor shall provide the initial baseline version of the PPBS at the PMR and maintain it throughout the period of performance of this Work Package.

2.4.3. Project Work Breakdown Structure

2.4.3.1. As specified in SOW, Subsection 3.9, the Contractor shall establish and maintain a Project Work Breakdown Structure (PWBS).

2.4.3.2. The Contractor shall provide the initial baseline version of the PWBS at the PMR and maintain it throughout the period of performance of this Work Package.

2.4.4. Project Master Schedule

2.4.4.1. As specified in SOW, Subsection 3.10, the Contractor shall establish and maintain a Project Master Schedule (PMS) that contains all Contract~~.~~ events and milestones, including contract-related Purchaser activities and events (e.g. Purchaser reviews, IV&V testing, participating meetings and conferences). The PMS shall correlate with the PWBS and also be traceable to performance and delivery requirements of this SOW.

2.4.4.2. The Contractor shall provide the initial baseline version of the PMS at the PMR and maintain it throughout the period of performance of this Work Package.

2.4.5. Work Package Management

2.4.5.1. The Contractor shall prepare the draft Work Package Descriptions in accordance with SOW, Subsection 3.11 and this Annex of the SOW.

2.4.5.2. The Work Package Descriptions shall be reflected in the Project Work Breakdown Structure (PWBS), to be accepted at PMR.

2.5. Risk Management

2.5.1. The Contractor shall establish and maintain an overall Risk Management programme for the project throughout the period of performance of this Work Package in accordance with SOW, Subsection 3.12.

2.5.2. The Contractor shall provide the Risk Management Plan (RMP), Risk Register and Issue Register as defined in SOW, Subsection 3.12.

2.6. Quality Management

2.6.1. The Contractor shall establish, execute, and maintain an effective Quality Management Programme as specified in the SOW, Subsection 3.13 and as defined in Quality Plan (QP) throughout the period of performance of this Work Package.

2.6.2. The Contractor shall provide the Quality Plan (QP) and Quality Register as defined in SOW, Subsection 3.13.

2.7. Configuration Management

2.7.1. The Contractor shall perform Configuration Management Process as specified in SOW, Subsection 4.7.

2.7.2. The Contractor shall provide the Configuration Management Plan (CMP) to be reviewed at PMR and maintain it throughout the period of performance of this Work Package.

2.7.3. As needed to identify and request changes to the Functional, Development, or Product Baselines, the Contractor shall prepare and manage Change Requests and Deficiency Reports as specified in SOW, Paragraph 4.7.8 and 4.7.9.

2.7.4. The Contractor shall provide the initial baseline of its Configuration Status Accounting Database (CSAD) at PMR and maintain the database throughout the period of performance of this Work Package as specified in SOW, Paragraph 4.7.10.

2.7.5. The Contractor shall provide Internet read-only access to this CM tool via the Project Web-site.

2.7.6. The Contractor shall support the Functional Configuration Audit (FCA) and Physical Configuration Audit (PCA) and prepare Configuration Audit Report (CAuR) for each Baseline.

2.7.7. The Contractor shall follow the Change Management Process defined in SOW, Paragraph 4.7.7 when applicable to products (document, software or hardware).

2.7.8. The Contractor shall prepare and maintain Configuration Status Accounting System (CSAS) as described in SOW, Paragraph 4.7.10.5.

2.8. ILS Management

2.8.1. The Contractor shall plan and perform the ILS-related activities as specified in SOW, Section 5.

2.8.2. The Contractor shall prepare the Integrated Support Plan (ISP) as described in SOW, Subsection 5.2 and submit the draft at PMR, an initial version at the CDR and final version at least two (2) weeks before the SQR-2. It shall be updated at SQR-2 and SQR-3 as necessary.

2.8.3. The Contractor shall prepare and submit the In-Service Support Plan (ISSP) as described in SOW, Subsection 5.3, including the System Maintenance Plan (SMP) and Obsolescence Management Plan (OMP), at least two (2) weeks before the SQR-2. The Contractor shall update these plans at FSA as necessary.

2.8.4. The Contractor shall provide all training services specified in related Work Package in accordance with the specifications given in SOW, Subsection 5.8.

2.9. Planning of Engineering and Test Activities

2.9.1. System Development Plan

2.9.1.1. The Contractor shall plan software and hardware implementation activities and prepare a System Development Plan (SDP) and its annexes as described in SOW, Subsection 4.6.

2.9.1.2. The Contractor shall establish the SDP with combined activities in accordance with the Incremental Development with Multiple Delivery approach as described in SOW, Subsection 4.2.

2.9.1.3. The Contractor shall provide the initial version of the SDP at PMR and maintain the plan throughout the period of performance of this Work Package.

2.9.1.4. For each Build Process, the Contractor shall also plan in SDP:

- Deployment of TRITON Operational Software to the Test System
- Testing the system with the users
- Working Group Workshops.

2.9.1.5. Requirements Implementation Schedule

2.9.1.5.1. The Contractor shall establish a Requirements Implementation Schedule (RIS), as specified in SOW, Paragraph 4.6.3 as an annex to SDP.

2.9.1.6. Usability Engineering Plan

2.9.1.6.1. The Contractor shall establish a Usability Engineering Plan (UEP), as specified in SOW, Paragraph 4.6.4 as an annex to SDP.

2.9.1.6.2. In the UEP the Contractor shall plan users' involvement to the definition of the Human-Machine Interface (HMI) of the software for each Baseline.

2.9.1.6.3. The UEP shall also include the C4ISR Visualisation Component.

2.9.1.7. Security Accreditation Plan

2.9.1.7.1. The Contractor shall establish a Security Accreditation Plan (SAP), as specified in SOW, Paragraph 4.6.5 as an annex to SDP.

2.9.2. Test Management Plan

2.9.2.1. The Contractor shall prepare the Test Management Plan (TMP) as specified in SOW, Paragraph 4.12.2 and submit it at least two (2) weeks prior to the CDR, provide an updated version at TRR-1 and update thereafter as necessary.

2.9.3. Test Management Tool

2.9.3.1. The Contractor shall provide a Test Management Tool as defined in SOW, Paragraph 4.12.3.

2.9.3.2. The Contractor shall demonstrate the Test Management Tool during PMR. The full capability of the Tool shall be demonstrated at the first TRR with actual data.

2.10. Monitoring, Control and Reporting

2.10.1. Project Highlight Reports

2.10.1.1. The Contractor shall provide a monthly Project Highlight Report (PHR), as specified in SOW, Subsection 3.17.

2.10.1.2. The Contractor shall provide the first PHR four (4) weeks after WP1 PSD, and then, no later than the third business day of each month throughout the period of performance of this Work Package.

2.10.2. Periodic Status Assessment

2.10.2.1. The Contractor shall conduct the Periodic Status Assessment together with the Purchaser regarding the Checkpoints and Decision Gates as described in SOW, Subsection 3.18.

2.10.3. Lessons Log

2.10.3.1. The Contractor shall maintain the Lessons Log as specified in SOW, Paragraph 3.3.8.

2.10.3.2. The Contractor shall prepare a Lessons Report (LR) at each major milestone aligned with a Check Point.

2.10.4. Provisional System Acceptance

2.10.4.1. Provisional System Acceptance (PSA) will be based on the capabilities provided to MARCOM (see SOW, Paragraph 4.14.7).

2.10.4.2. The Contractor shall plan and conduct Provisional System Acceptance Review (PSAR), and provide the report.

2.10.5. Final System Acceptance

2.10.5.1. Final System Acceptance (FSA) occurs when the Purchaser has evaluated the whole deliverables as described in SOW, Paragraph 4.14.8.

2.10.5.2. The Contractor shall submit the Final System Acceptance Report (FSA-R) at the Contract Close-out Meeting.

2.11. Meetings

2.11.1. The Contractor shall conduct meetings and prepare their minutes in accordance with SOW, Subsection 3.15.

2.11.2. The Contractor shall participate in the Project Kick-off Meeting at the Purchaser's facility within two (2) weeks after EDC, and provide a report.

2.11.3. As required by the Purchaser the Contractor shall participate in TRITON Integrated Project Management Team (IPMT) meetings and TRITON Change Control Board (CCB) meetings.

2.11.4. The Contractor shall organise Working Group Meetings/Workshops to support engineering activities, as described in SOW, Subsection 4.4.

2.12. Contract Close-out

2.12.1. The Contractor shall perform the Contract Close-out activities as specified in SOW, Subsection 3.19 when agreed with the Purchaser.

2.12.2. The Contractor shall attend the Contract Close-out Meeting (CCM) and submit the CCM Report which marks the End of Contract.

2.13. Other Project Management Work

2.13.1. The Contractor shall perform other project-related work as defined in SOW, Subsection 3.20.

2.13.2. The Contractor shall provide Project Information Materials as defined in SOW, Paragraph 3.20.1.4, as directed by the Purchaser during the course of this Work Package.

2.13.3. The Contractor shall attend meetings and conferences together with Purchaser at least three (3) times a year at locations to be defined by the Purchaser.

2.14. Reviews

2.14.1. Project Management Review

2.14.1.1. The Contractor shall conduct Project Management Review (PMR) as specified in SOW, Paragraph 3.16.2.

2.14.2. Project Checkpoint Reviews

2.14.2.1. The Contractor shall schedule and conduct monthly Project Checkpoint Reviews (PCR) as specified in SOW, Paragraph 3.16.3 at least once every month throughout the period of performance of this Work Package.

2.14.3. Formal Reviews

2.14.3.1. The Contractor shall plan and conduct the Formal Reviews as specified in SOW, Paragraph 3.16.4.

2.15. Milestones

2.15.1. The Milestones for this Work Package are given below:

Milestone	Description	Date (MAC)
EDC	Effective Date of Contract	0
PMR	Project Management Review	1
PCR	Project Checkpoint Review	Monthly
PSA	Provisional System Acceptance	31
FSA	Final System Acceptance	36
EOC	End of Contract (Contract Close-out)	36

2.16. Checkpoints

2.16.1. The Checkpoints for the overall Contract are given below:

Checkpoint	Description	Date (MAC)
CP1	SRR	4
CP2	PDR	6
CP3	CDR, SwDR-1	8
CP4	SwRR-2	10
CP5	CDS Demonstration, SwDR-2, SwRR-3, VC-FAT-1, VC-SwRR-2	12
CP6	SwDR-2, VC-BL1, VC-SwDR-2	14
CP7	FAT-1	16
CP8	SiAR-1, VC-FAT-2, VC-SwDR-3	20

CP9	FAT-2, FAAT, VC-BL2	22
CP10	OTRR-2, FAT-3, VC-BL3	26
CP11	OTRR-3, OTRR-4	30
CP12	SVR, CAT	35

2.17. Decision Gates

2.17.1. The Project Schedule will have Contractual Phases where each phase is tied to a Decision Gate.

2.17.2. The Contract Phases are given in Table 2-1:

Table 2-1 – Contract Phases

Phase	Begin	End	Description
1	EDC	CDR	System Analysis and Design Phase
2	CDR	FAT-1	First Implementation Phase
3	FAT-1	OTRR-2	Implementation and Verification Phase
4	OTRR-2	EOC	Validation and Operation Phase

2.17.3. The Decision Gates for the overall Contract are given in Table 2-2:

Table 2-2 – Decision Gates

Decision Gate	Phase	Checkpoint	Description	Date (MAC)
1	1	3	CDR completed	8
2	2	7	FAT-1 completed.	16
3	3	10	BL2 delivered.	26
	4	12	FSA	36

2.17.4. The Contract Phases and related Decision Gates are shown on the WP1 – Project Management in the Work Package diagram given in Figure 3.

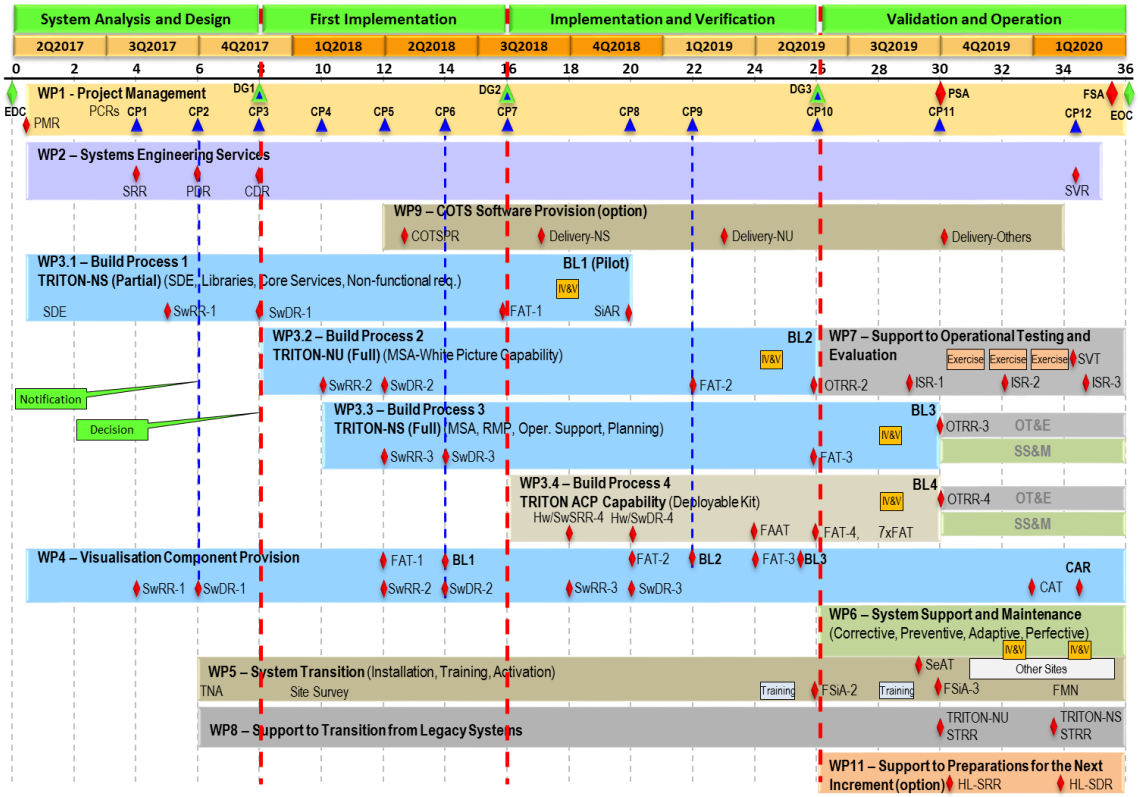


Figure 3 – Contract Phases and Decision Gates

2.17.5. Decision Gate 1

2.17.5.1. Decision Gate 1 shall be the CDR.

2.17.5.2. The default Success Criteria for Decision Gate 1 are given in Table 2-3.

Table 2-3 – Success Criteria for Decision Gate 1

Serial	Status
1	SRR status is “Passed”.
2	PDR status is “Passed”.
3	There are no unaccepted specification and design documents.
4	CDR is planned to be executed as scheduled in PMS, and it is not delayed more than thirty (30) days.
5	VC Milestones are on track.
6	CP1 and CP2 do not still contain any Major Warnings.
7	CDR status is not “Fail”.
8	Lessons Learned are captured and plans are updated.
9	The Purchaser may have sent only “one” Formal Notification to the Contractor within this Phase.

2.17.5.3. The default Fail Criteria for Decision Gate 1 are given in Table 2-3.

Table 2-4 – Fail Criteria for Decision Gate 1

Serial	Status
1	PDR status is still “Failed”.
2	CDR schedule is delayed more than thirty (30) days beyond the agreed PMS.
3	CDR status is “Fail”.
4	The Contractor does not provide sound solutions for the previously issued Major Warnings recorded in CP1 (SRR) and CP2 (PDR).
5	The Purchaser may have sent “more than one” Formal Notification to the Contractor within this Phase.

2.17.6. Decision Gate 2

2.17.6.1. Decision Gate 2 shall be the FAT-1.

2.17.6.2. The default Success Criteria for Decision Gate 2 are given in Table 2-5.

Table 2-5 – Success Criteria for Decision Gate 2

Serial	Status
1	If DG1 status was Provisional Success, all pending items have been solved, and the status has been set to Success.
2	CP3 to CP6 are completed successfully.
3	CP3 to CP6 do not still contain any Major Warnings.
4	CDS is deployed successfully and found to be satisfactory.
5	VC-BL1 is delivered successfully.
6	FAT-1 is planned to be executed as scheduled in PMS, and it is not delayed more than thirty (30) days.
7	FAT-1 status is not “Fail”.
8	Lessons Learned are captured and plans are updated.
9	The Purchaser may have sent only “one” Formal Notification to the Contractor within this Phase.

2.17.6.3. The default Fail Criteria for Decision Gate 2 is given in Table 2-6.

Table 2-6 – Fail Criteria for Decision Gate 2

Serial	Status
1	CDS delivery is delayed more than two (2) months or it is not found to be satisfactory.
2	FAT-1 is delayed more than two (2) months.
3	VC-BL1 Delivery is delayed more than two (2) months.
4	FAT-1 status is “Fail”.
5	The Contractor does not provide sound solutions for the previously issued Major Warnings recorded in earlier CPs.
6	The Purchaser may have sent “more than one” Formal Notification to the Contractor within this Phase.

2.17.7. Decision Gate 3

2.17.7.1. Decision Gate 3 shall be the OTRR-2.

2.17.7.2. The default Success Criteria for Decision Gate 3 are given in Table 2-7.

Table 2-7 – Success Criteria for Decision Gate 3

Serial	Status
1	If DG2 status was Provisional Success, all pending items have been solved, and the status has been set to Success.
2	CP7 to CP9 are completed successfully.
3	CP7 to CP9 do not still contain any Major Warnings.
4	CP8 (SiAR-1) is completed successfully.
5	CP8 (VC-FAT-2) is completed successfully.
6	CP9, VC-BL2 is delivered successfully.
7	CP10, VC-BL3 is delivered successfully.
8	CP10 (FSiA-2) is successful.
9	CP10 (OTRR-2) is planned to be executed as scheduled in PMS.
10	OTRR-2 status is not “Fail”.
11	Lessons Learned are captured and plans are updated.
12	The Purchaser may have sent only “one” Formal Notification to the Contractor within this Phase.

2.17.7.3. The default Fail Criteria for Decision Gate 3 are given in Table 2-8.

Table 2-8 – Fail Criteria for Decision Gate 3

Serial	Status
1	CP8 (SiAR-1) is delayed more than two (2) months.
2	CP9 (FAT-2) is delayed more than two (2) months.
3	CP9 (VC-BL2 Delivery) is delayed more than two (2) months.
4	VC-BL3 Delivery is delayed more than two (2) months.
5	CP10 (FSiA-2) is delayed more than two (2) months.
6	OTRR-2 status is “Fail”.
7	The Contractor does not provide sound solutions for the previously issued Major Warnings recorded in earlier CPs.
8	The Purchaser may have sent “more than one” Formal Notification to the Contractor within this Phase.

2.18. Deliverables

2.18.1. The Work Package Deliverables are given below:

- Project Management Office
- Project Website and Collaborative Working Environment (CWE)
- Project Management Plan (PMP)

- Project Product Breakdown Structure (PPBS)
  - Breakdown Structure
  - Product Descriptions
  - Product Flow Diagram
- Project Work Breakdown Structure (PWBS)
- Project Master Schedule (PMS)
- Work Packages
- Quality Plan (QP)
- Configuration Management Plan (CMP)
- Risk Management Plan (RMP)
- System Development Plan (SDP)
  - Requirements Implementation Schedule (RIS)
  - Usability Engineering Plan (UEP)
  - Security Accreditation Plan (SAP)
- Integrated Support Plan (ISP)
- In-Service Support Plan (ISSP)
  - System Maintenance Plan (SMP)
  - Obsolescence Management Plan (OMP)
- Test Management Plan (TMP)
  - Security Test and Verification Plan (STVP)
  - System Validation Plan (SVP)
- Test Management Tool (demonstration)
- Risk Register and Issue Register
- Quality Register
- Lessons Log and Lessons Learned Report (LL-R)
- Requirements Change Requests
- Change Requests, Deficiency Reports
- Configuration Status Accounting Database (CSAD)
- Project Highlight Reports (PHR)
- Project Information Materials
- Minutes of Meetings (in general)
- Project Kick-off Meeting Report
- Contract Close-out Meeting Reports (CCM-R)
- Project Management Review Report (PMR-R)
- Project Checkpoint Review Reports (PCR-R)

3. WORK PACKAGE 2: SYSTEMS ENGINEERING SERVICES

3.1. General

3.1.1. The Contractor shall provide Systems Engineering Services including system requirements analysis and system architectural design for the overall system as described in Subsection 4.7 and 4.8 of the SOW.

3.1.2. The Contractor shall implement, test, and deliver Product Baselines compliant with the "TRITON Contractual System Requirements Specification (SRS)" under the overall governance of Systems Engineering Services.

3.1.3. The Contractor shall follow the System Life Cycle Processes as defined in Subsection 4.2 of the SOW.

3.1.4. The Contractor shall follow the "Incremental Development and Multiple Deliveries Approach" as described in SOW, Subsection 4.3, where each development activity is called "Build Process" which ends with an official product delivery called "Baseline".

3.1.5. Within this Work Package, the Contractor shall perform the system-level requirements analysis and architectural design as a basis for all Build Processes.

3.1.6. The Contractor shall establish the Working Groups as specified in Subsection 4.4 of the SOW.

3.1.7. The Systems Engineering Working Group (SEWG) shall provide the necessary support for the Systems Engineering Services within this Work Package as defined in SOW, Paragraph 4.4.7.

3.2. Work Package Dates

3.2.1. The WP2 PSD shall be on PMR.

3.2.2. The WP2 PED shall be the FSA.

3.3. Activities

3.3.1. System Requirements Analysis

3.3.1.1. The Contractor shall conduct the System Requirements Analysis Process as defined in SOW, Subsection 4.8.

3.3.1.2. Requirements Management Database

3.3.1.2.1. The Contractor shall establish and maintain an effective Requirements Management Database (RMD) throughout the period of performance of this Work Package.

3.3.1.2.2. A copy of the Purchaser's Preliminary System Requirements will be handed over to the Contractor during the TRITON Project Kick-Off Meeting. The Contractor shall take over the requirements that the Purchaser RMD contains and maintain it throughout the Contract.

3.3.1.3. System Requirements Specification

3.3.1.3.1. The Contractor shall prepare the System Requirements Specification (SyRS) as described in SOW, Paragraph 4.8.3.

3.3.1.3.2. The Contractor shall conduct Reliability Engineering and document the results in the SyRS.

3.3.1.4. User Interface Specification

3.3.1.4.1. The Contractor shall prepare User Interface Specification (UIS) as described in SOW, Paragraph 4.8.4, deliver a draft at PDR, a preliminary version at CDR, and update it during the Build Processes.

3.3.1.4.2. The Contractor shall develop and provide a mock-up or low fidelity prototype of the major user interface features and include the user interface concept in the UIS.

3.3.1.5. Security Risk Assessment and Requirements Analysis

3.3.1.5.1. The Contractor shall conduct a Security Risk Assessment (SRA) as defined in SOW, Paragraph 4.8.5.

3.3.1.6. System-Specific Security Requirement Statement

3.3.1.6.1. The Contractor shall prepare System-specific Security Requirement Statement (SSRS), Community Security Requirement Statement (CSRS) and System Interconnection Security Requirement Statement (SISRS) as defined in SOW, Paragraph 4.8.6.

3.3.1.7. System Requirements Review

3.3.1.7.1. The Contractor shall plan and execute System Requirements Review (SRR) (see 3.4.1).

3.3.2. System Architectural Design

3.3.2.1. Within this Work Package, the Contractor shall conduct the System Architectural Design activities as defined in SOW, Subsection 4.9.

3.3.2.2. System Design Specification

3.3.2.2.1. The Contractor shall prepare the System Design Specification (SDS) as defined in SOW, Paragraph 4.9.2.

3.3.2.2.2. The SDS shall include a System Security Design Specification (SSDS) as an Annex.

3.3.2.2.3. As an appendix to the SDS, the Contractor shall provide a Requirements Traceability Matrix (RTM) and maintain it.

3.3.2.2.4. The Contractor shall develop and maintain TRITON Architecture Models as defined in SOW Paragraph 4.9.2.11.

3.3.2.3. Interface Control Description

3.3.2.3.1. The Contractor shall prepare TRITON Interface Control Description (ICD), describing all external TRITON interfaces. The Version 1 of the ICD shall be provided at the CDR, and then other versions shall be delivered at each SwDR of each Build Process.

3.3.2.4. System Design Reviews

3.3.2.4.1. The Contractor shall plan and execute Preliminary Design Review (PDR) and Critical Design Review (CDR) (see 3.4.2 and 3.4.3).

3.3.3. Implementation

3.3.3.1. The Contractor shall continue to perform Systems Engineering activities during the implementation of software and hardware within the Build Processes.

3.3.3.2. The Contractor shall execute a sequence of software requirements analysis, design, construction, integration, testing and deployment activities (as defined in SOW, Paragraph 4.10.2) in each Build Process to deliver a Baseline with a software version.

3.3.3.3. The Contractor shall execute a sequence of hardware requirements analysis, design, production and testing activities (as defined in SOW, Paragraph 4.10.3) to produce and deliver TRITON Deployable Kits.

3.3.3.4. The Build Processes and their objectives are given below:

- Build Process 1 will deliver BL1 TRITON-NS (Partial) as the Pilot System.
- Build Process 2 will deliver TRITON-NU (Full) for operational use.
- Build Process 3 will deliver TRITON-NS (Full) for operational use.
- Build Process 4 will deliver TRITON-ACP (Full) for operational use.
- C4ISR Visualisation Component development for TRITON and other use.

3.3.3.5. Each Build Process is expected to follow the standard Waterfall Development life cycle enabling updates to previous Baselines. A notional overview of Build Process Realisation Plan is given in Figure 4.

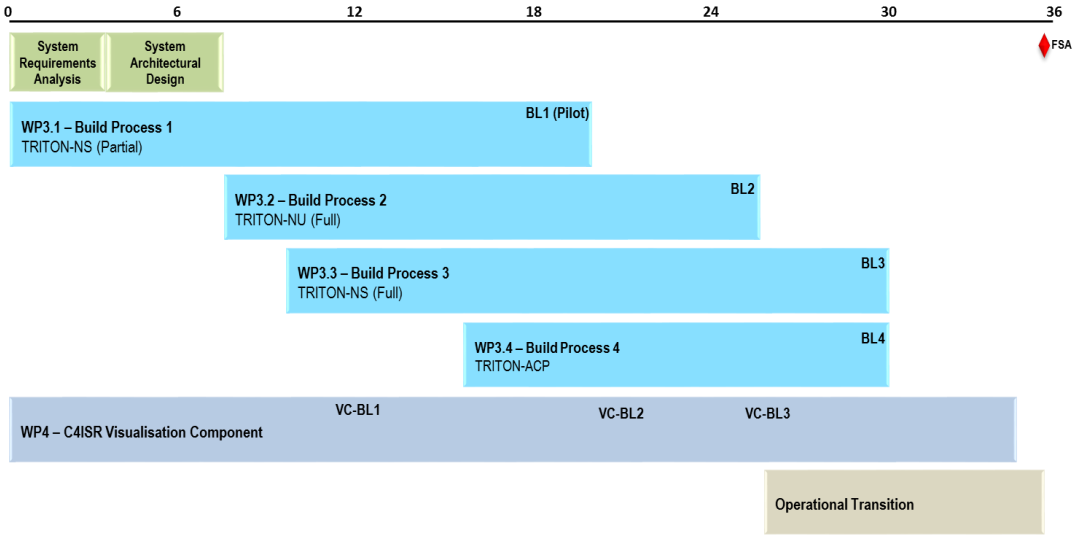


Figure 4 – Build Process Realisation Plan (Notional)

3.3.4. System Maintenance

3.3.4.1. The Contractor shall continue to provide Systems Engineering activities during the System Maintenance Process in order to coordinate maintenance activities according to the evolving requirements due to changing environment (e.g. interfaces, data formats, updates to used standards) and result of findings detected during OT&E.

3.3.5. System Validation

3.3.5.1. The Contractor shall prepare the System Validation Plan (SVP), as an Annex to TMP, as defined in SOW, Paragraph 4.13.3.

3.3.5.2. The Contractor shall prepare the initial version of the System Validation Test Procedure (SVT-P) as defined in SOW, Paragraph 4.13.4, submit it at CDR, and update it as necessary at PSA.

3.3.5.3. The Contractor shall plan ~~and execute~~ the System Validation Test (SVT), execute as defined in WP7 (Paragraph 11.3.4), and conduct the System Validation R~~r~~eview using the System Validation Test Report.

3.4. Reviews

3.4.1. System Requirements Review

3.4.1.1. The Contractor shall conduct System Requirements Review (SRR) as defined in SOW, Paragraph 4.8.8 and provide the report.

3.4.2. Preliminary Design Review

3.4.2.1. The Contractor shall conduct Preliminary Design Review (PDR) as defined in SOW, Paragraph 4.9.3 and provide the report.

3.4.3. Critical Design Review

3.4.3.1. The Contractor shall conduct Critical Design Review (SRR) as defined in SOW, Paragraph 4.8.4 and provide the report.

3.4.4. Joint Technical Reviews

3.4.4.1. The Contractor shall plan and conduct Joint Technical Reviews (JTR) as described in SOW, Subsection 4.5 and provide the JTR Reports.

3.4.5. System Validation Review

3.4.5.1. The Contractor shall plan and conduct System Validation Review (SVR) as described in SOW, Paragraph 4.~~13~~14.~~7~~6 and provide SVR Report.

3.5. Milestones

3.5.1. The Milestones for this Work Package are given below:

Milestone	Description	Date (MAC)
SRR	System Requirements Review	4
PDR	Preliminary Design Review	6
CDR	Critical Design Review	8
SVR	System Validation Review	Before 35

3.6. Deliverables

3.6.1. Work Package Deliverables are given below:

- Requirements Management Database (RMD)
- System Requirements Specification (SyRS)

- User Interface Specification (UIS) (draft)
- Security Risk Assessment Report (SRA-R)
- System-Specific Security Requirements Statement (SSRS)-Draft
- Community Security Requirements Statement (CSRS)-Draft
- System Interconnection Security Requirements Statements (SISRS)-Draft
- Preliminary Software Architectural Design (SAD)
- Preliminary Database Design Description (DDD) (draft)
- System Design Specification (SDS)
  - Requirements Traceability Matrix (RTM)
  - System Security Design Specification (SSDS)
  - Architecture Models
- System Security Design Specification (SSDS)
- Requirements Traceability Matrix (RTM)
- User Interface Mock-Up or Low Fidelity Prototype
- Interface Control Descriptions (ICDs) (external systems)
- TRITON Interface Control Description (ICD) (v1)
- System Validation Plan (SVP)
- System Validation Test Procedure (SVT-P)
- System Requirements Review Report (SRR-R)
- Preliminary Design Review Report (PDR-R)
- Critical Design Review Report (CDR-R)
- System Validation Review Report (SVR-R)
- Joint Technical Review Reports (JTR-R)
- Systems Engineering Working Group (SEWG) Minutes of Meeting

4. WORK PACKAGE 3.1: BUILD PROCESS 1 – TRITON-NS (PARTIAL)

4.1. General

4.1.1. Build Process 1 shall aim to develop and deliver TRITON-NS (Partial) on the NS Domain with the requirements given in the SyRS as BL1. This delivery shall include TRITON-NS Infrastructure Software and Operational Software.

4.1.2. BL1 delivery shall be a "Pilot System" which can be used for user evaluation purposes at the operational site. A notional capability for the Pilot System is depicted in Figure 5. The actual requirements allocation will be performed during the System Requirements Analysis.

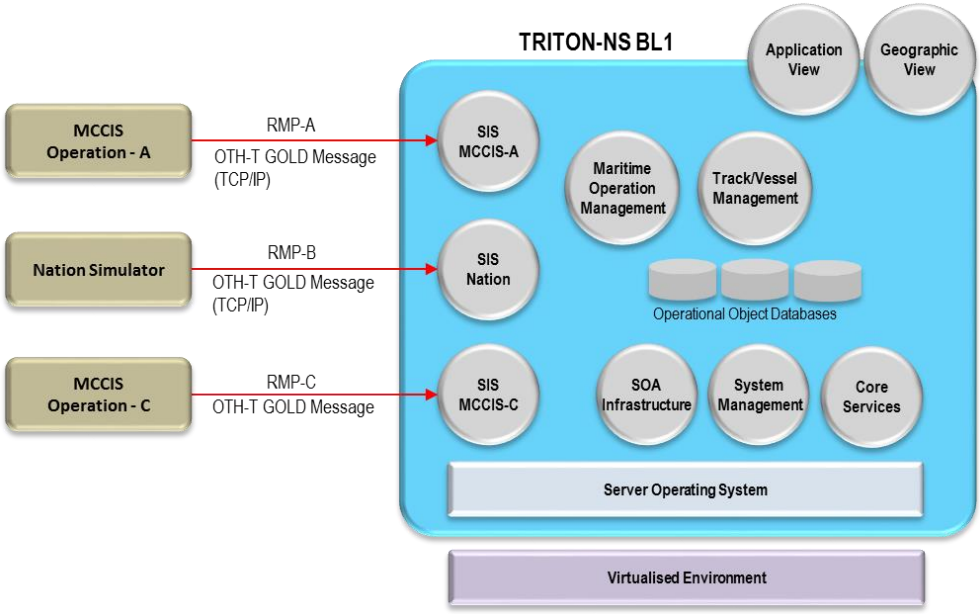


Figure 5 – TRITON-NS (Partial) Capability

4.2. Work Package Dates

4.2.1. The WP3.1 PSD shall be PMR.

4.2.2. The WP3.1 PED shall be the end of installation activities and successful completion of SiAT-1 followed by SiAR.

4.3. Activities

4.3.1. General

4.3.1.1. The Contractor shall conduct the software implementation activities as described in SOW, Paragraph 4.10.2 to implement the TRITON Operational Software Baseline 1 (BL1).

4.3.1.2. The Contractor shall establish Software Development Environment as defined in SOW, Paragraph 4.10.2.2.

4.3.1.3. The Contractor may start developing software which can be considered as independent of the system-level requirements analysis and architectural design. This software may include code libraries, system support libraries, automated test framework, formatted message parsers, database management tools, visualisation capabilities and other initial development activities which can be altered according to design decisions.

4.3.1.4. The Contractor shall build the software infrastructure and integrate it with the NATO Core Services on the NS Domain.

4.3.1.5. The Contractor shall include implementation of the non-functional requirements specified in the SyRS allocated to this Baseline.

4.3.1.6. The Implementation Working Group (IWG) shall provide the necessary technical support.

4.3.1.7. The Verification and Validation Group (VVWG) shall provide support for test events.

4.3.1.8. The SEWG shall provide governance for the system-level design decisions.

4.3.2. Software Requirements Analysis

4.3.2.1. The Contractor shall perform the software requirements analysis as defined in SOW, Paragraph 4.10.2.4.

4.3.2.2. The Contractor shall produce and maintain the Software Requirements Specification (SRS), covering only those requirements allocated to this Baseline.

4.3.2.3. The Contractor shall prepare an initial version of the User Interface Specification (UIS).

4.3.2.4. The Contractor shall prepare preliminary FAT, SIT, SSMAT and UAT Test Procedures.

4.3.3. Software Architectural and Detailed Design

4.3.3.1. The Contractor shall perform the software architectural design as defined in SOW, Paragraph 4.10.2.5.

4.3.3.2. The Contractor shall produce and maintain the Software Architecture Description (SAD).

4.3.3.3. The Contractor shall design the databases and prepare a Database Design Description (DDD) as an annex to the SAD.

4.3.3.4. The Contractor shall document the detailed design in Software Design Description (SDD).

4.3.3.5. The Contractor shall design the GUI for each software item before the construction and update the UIS during the construction.

4.3.3.6. The Contractor shall prepare TRITON Interface Control Description (ICD) (v2), describing all external TRITON interfaces.

4.3.4. Software Construction

4.3.4.1. The Contractor shall perform the software construction activities as described in SOW, Paragraph 4.10.2.7 and deliver the software.

4.3.5. Concept Demonstration System

4.3.5.1. The objective of the Concept Demonstration System (CDS) is to demonstrate the technology chosen by the Contractor to the Purchaser with basic capabilities. A sample CDS configuration is given in Figure 6.

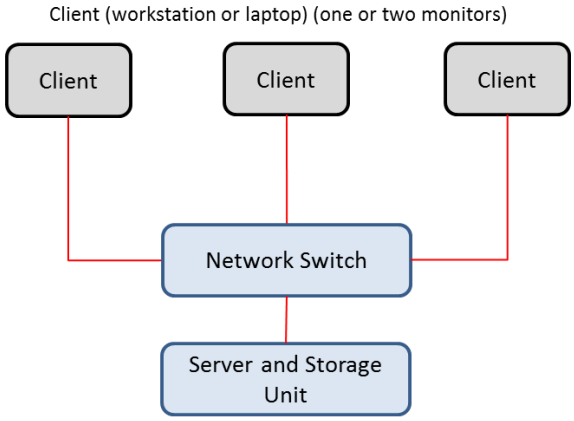


Figure 6 – Concept Demonstration System (CDS)

4.3.5.2. The CDS shall demonstrate at least the following:

- The selected technology for the infrastructure
- Running on virtualised environment
- Web-based applications running on the server
- At least three (3) concurrent users
- Database management functions
- Formatted Message parser mechanisms (for at least one message for ADatP-3 and at least one message for OTH-T GOLD)
- System Interface Service Framework
- Display symbology for Operational Objects.

4.3.5.3. The Contractor shall build the CDS, install it on the TRITON Test System at the PMIC facilities of the Purchaser and activate it.

4.3.5.4. The Contractor may update the CDS during Software Construction.

4.3.6. Software Integration and Testing

4.3.6.1. The Contractor shall produce Software Test Description (STD) for each software item in order to perform unit testing as described in SOW, Paragraph 4.10.2.7.

4.3.6.2. The Contractor shall perform the software integration and testing activities as described in SOW, Paragraph 4.10.2.8 and provide the Test Procedures and Guides for the testing activities at TRR-1.

4.3.6.3. The Contractor shall perform software qualification testing activities as described in SOW, Paragraph 4.10.2.9.

4.3.6.4. The Contractor shall perform software verification activities as described in SOW, Paragraph 4.10.2.10.

4.3.6.5. The Contractor shall perform Internal System Test (IST) and deliver Internal System Test Report (IST-R).

4.3.6.6. The Contractor shall conduct Source Code Review (SCR) and deliver Source Code Review Report (SCR-R).

4.3.6.7. The Contractor shall execute Security Test and Evaluation (ST&E) as described in SOW, Paragraph 4.12.12.2 and provide ST&E Report.

4.3.7. Software Version Description

4.3.7.1. The Contractor shall produce the Software Version Description (SVD) for this Baseline as defined in SOW, Paragraph 4.10.2.11.

4.3.7.2. The final SVD shall be submitted at IPC.

4.3.8. System Integration

4.3.8.1. The Contractor shall perform System Integration Activity as defined in SOW, Paragraph 4.11.2 in order to get prepared for the System Integration Test.

4.3.8.2. The Contractor shall provide support to the Purchaser to establish TRITON Interoperability Test Centre (TITC) at PMIC Facilities for testing Nation Interfaces on the NS Domain. The Contractor shall configure the TRITON Test System – NS for individual tests and develop the necessary test harnesses with test procedures. The Contractor shall support the Purchaser for performing tests with Nations.

4.3.9. System Verification and Validation

4.3.9.1. The Contractor shall perform software verification and validation as part of System Verification Process as defined in SOW, Subsection 4.12, and provide the documents and reports.

4.3.9.2. The Contractor shall plan and execute the following tests:

- Factory Acceptance Test (FAT)
- System Integration Test (SIT)
- System Supportability and Maintenance Acceptance Test (SSMAT)
- User Assessment Test (UAT)
- Regression Test (RegT)
- IV&V Testing (IV&V)

4.3.9.3. The Contractor shall provide reports after each test.

4.3.9.4. The Contractor shall implement a Change Process to correct any software defects detected during the tests.

4.4. Reviews

4.4.1. Software Requirements Review

4.4.1.1. The Contractor shall plan and conduct Software Requirements Review (SwRR-1), and provide the SwRR Report.

4.4.2. Software Design Review

4.4.2.1. The Contractor shall plan and conduct Software Design Review (SwDR-1), and provide the SwDR Report.

4.4.3. User Assessment Reviews

4.4.3.1. The Contractor shall support at least two (2) User Assessment Reviews (UAR) as defined in SOW, Paragraph 3.16.5.

4.4.4. Test Readiness Review

4.4.4.1. The Contractor shall plan and conduct Test Readiness Review (TRR-1) before the FAT, and provide the TRR Report.

4.4.4.2. The Contractor shall demonstrate the use of Test Management Tool with actual data.

4.4.5. IV&V Planning Conferences

4.4.5.1. The Contractor shall support the Purchaser for Initial Planning Conference (IPC) and Final Planning Conference (FPC) prior to the IV&V Testing.

4.4.5.2. IV&V CCB will participate in the IPC and FPC.

4.4.6. System Verification Review

4.4.6.1. The Contractor shall plan and conduct System Verification Review (SVerR-1) after the IV&V testing, and provide the SVerR Report.

4.5. Milestones

4.5.1. The Milestones for this Work Package are given below:

Milestone	Description	Date (MAC)
SwRR-1	Software Requirements Review – BL1	5
SwDR-1	Software Design Review – BL1	8
CDS	Demonstration with CDS	12
UAR-1.1	User Assessment Review	13
UAR-1.2	User Assessment Review	14
IST-1	Internal System Test	15
TRR-1	Test Readiness Review – BL1	16
FAT-1	Factory Acceptance Test – BL1	16
SIT-1	System Integration Test – BL1	17
SSMAT-1	System Supportability and Maintenance Acceptance Test – BL1	17
UAT-1	User Assessment Test – BL1	17
RegT	Regression Tests – BL1	18
IV&V-1	IV&V Testing – BL1	18
SVerR-1	System Verification Review – BL1	20
UAR	User Assessment Review (as a UAT)	20
Close-out	WP Close-out	20

4.6. Deliverables

4.6.1. Work Package Deliverables are given below:

- Software Requirements Specification (SRS) (v1)
- User Interface Specification (UIS) (v1)
- Software Architecture Description (SAD) (v1)
- Database Design Description (DDD) (v1)
- Software Design Description (SDD) (CI-level set, for information)
- Software Test Description (STD) (CI-level set, for information)
- TRITON Interface Control Description (ICD) (v2)
- Software Version Description (SVD) (BL1)
- Concept Demonstration System (CDS)
- Test Management Tool (with actual data)
- Internal System Test Report (IST-R) (unit tests, system tests, regression tests)
- Source Code Review Report (SCR-R)
- Security Test and Evaluation Report (ST&E-R)
- Factory Acceptance Test Report (FAT-R)
- Security Operating Procedures (SecOps)
- Security Implementation Verification Procedures (SIVP)
- System Integration Test Report (SIT-R)
- Software Installation Guide (SIG)
- System Support and Maintenance Acceptance Test Report (SSMAT-R)
- User Assessment Test Report (UAT-R)
- Regression Test Reports (RegT-R)
- Support to IV&V Testing (until pass)
- Software Version Description (SVD) (BL1)
- TRITON-NS Operational Software - BL1 (in AFPL)
- Software Requirements Review Report (SwRR-R)
- Software Design Review Report (SwDR-R)
- Configuration Audit Report (CAuR)
- Test Readiness Review Report (TRR-R)
- System Verification Review Report (SVerR-R)
- Working Group (WG) Meetings - Minutes

5. WORK PACKAGE 3.2: BUILD PROCESS 2 – TRITON-NU (FULL)

5.1. General

5.1.1. Build Process 2 shall aim to develop and deliver the full TRITON Operational Software on the NU Domain with the requirements given in the SyRS as BL2. This delivery shall include TRITON-NU Infrastructure Software and Operational Software.

5.2. Work Package Dates

5.2.1. The WP3.2 PSD shall be determined at CP3.

5.2.2. The WP3.2 PED shall be OTRR-2 (after the successful completion of SiAT-2).

5.3. Activities

5.3.1. General

5.3.1.1. The Contractor shall conduct the software implementation activities as described in SOW, Paragraph 4.10.2 to implement the TRITON Operational Software Baseline 2.

5.3.1.2. The Contractor shall build the software infrastructure and integrate it with the NATO Core Services on the NU Domain.

5.3.1.3. If the NATO Core GIS is not available on the NU Domain, the Contractor shall provide an Interim Local Geospatial Service having, as a minimum, map handling capability with an interface compliant with the Service Interface Profile that NATO Core GIS provides. The capability shall be described in the proposal and finalised at the CDR. This service can be used on TDKs if NATO Core GIS is not available.

5.3.1.4. The Contractor shall include implementation of the non-functional requirements specified in the SyRS for this Baseline.

5.3.1.5. The IWG shall provide the necessary technical support.

5.3.1.6. The VVWG shall provide support for test events.

5.3.1.7. The SEWG shall provide governance for the system-level design decisions.

5.3.2. Software Requirements Analysis

5.3.2.1. The Contractor shall perform the software requirements analysis as defined in SOW, Paragraph 4.10.2.4.

5.3.2.2. The Contractor shall update the SRS, covering the requirements allocated to this Baseline.

5.3.2.3. The Contractor shall update the User Interface Specification (UIS).

5.3.3. Software Architecture Design

5.3.3.1. The Contractor shall perform the software architectural design as defined in SOW, Paragraph 4.10.2.5.

5.3.3.2. The Contractor shall update the SAD.

5.3.3.3. The Contractor shall update the DDD as the annex to the SAD.

5.3.3.4. The Contractor shall update the SDD.

5.3.3.5. The Contractor shall design the GUI for each software item before the construction and update the UIS during the construction.

5.3.3.6. The Contractor shall prepare TRITON Interface Control Description (ICD) (v3), describing all external TRITON interfaces.

5.3.4. Software Construction

5.3.4.1. The Contractor shall perform the software construction activities as described in SOW, Paragraph 4.10.2.7.

5.3.5. Software Integration and Testing

5.3.5.1. The Contractor shall produce Software Test Description (STD) for each software item in order to perform unit testing as described in SOW, Paragraph 4.10.2.7.

5.3.5.2. The Contractor shall perform the software integration and testing activities as described in SOW, Paragraph 4.10.2.8 and provide the Test Procedures and Guides for the testing activities at TRR-2.

5.3.5.3. The Contractor shall perform software qualification testing activities as described in SOW, Paragraph 4.10.2.9.

5.3.5.4. The Contractor shall perform software verification activities as described in SOW, Paragraph 4.10.2.10.

5.3.5.5. The Contractor shall perform Internal System Test (IST) and deliver Internal System Test Report (IST-R).

5.3.5.6. The Contractor shall conduct Source Code Review (SCR) and deliver Source Code Review Report (SCR-R).

5.3.5.7. The Contractor shall execute Security Test and Evaluation (ST&E) as described in SOW, Paragraph 4.12.12.2 and provide ST&E Report.

5.3.6. Software Version Description

5.3.6.1. The Contractor shall produce the Software Version Description (SVD) for this Baseline as defined in SOW, Paragraph 4.10.2.11.

5.3.6.2. The final SVD shall be submitted at IPC.

5.3.7. System Integration

5.3.7.1. The Contractor shall perform System Integration Activity as defined in SOW, Paragraph 4.11.2 in order to get prepared for the System Integration Test.

5.3.7.2. The Contractor shall provide support to the Purchaser to establish TRITON Interoperability Test Centre (TITC) at PMIC Facilities for testing Nation Interfaces on the NU Domain. The Contractor shall configure the TRITON Test System – NU for individual tests and develop the necessary test harnesses with test procedures. The Contractor shall support the Purchaser for performing tests with Nations.

5.3.8. System Verification and Validation

5.3.8.1. The Contractor shall perform software verification and validation as part of System Verification Process as defined in SOW, Subsection 4.12, and provide the documents and reports.

5.3.8.2. The Contractor shall plan and execute the following tests:

- Factory Acceptance Test
- System Integration Test
- System Supportability and Maintenance Acceptance Test
- User Assessment Test
- Regression Test
- IV&V Testing

5.3.8.3. The Contractor shall provide reports after each test.

5.3.8.4. The Contractor shall implement a Change Process to correct any software defects detected during the tests.

5.4. Reviews

5.4.1. Software Requirements Review

5.4.1.1. The Contractor shall plan and conduct Software Requirements Review (SwRR-2), and provide the SwRR Report.

5.4.2. Software Design Review

5.4.2.1. The Contractor shall plan and conduct Software Design Review (SwDR-2), and provide the SwDR Report.

5.4.3. User Assessment Reviews

5.4.3.1. The Contractor shall support at least two (2) User Assessment Reviews (UAR) as defined in SOW, Paragraph 3.16.5.

5.4.4. Test Readiness Review

5.4.4.1. The Contractor shall plan and conduct Test Readiness Review (TRR-2) before FAT, and provide the TRR Report.

5.4.5. IV&V Planning Conferences

5.4.5.1. The Contractor shall support the Purchaser for Initial Planning Conference (IPC) and Final Planning Conference (FPC) prior to the IV&V Testing.

5.4.5.2. IV&V CCB will participate in the IPC and FPC.

5.4.6. System Verification Review

5.4.6.1. The Contractor shall plan and conduct System Verification Review (SVerR-2) after the IV&V testing, and provide the SVerR Report.

5.4.7. Operational Test Readiness Review

5.4.7.1. The Contractor shall plan and conduct Operational Test Readiness Review (OTRR), as defined in SOW, Paragraph 4.13.9, as the last activity of the Build Process to set the system to operation for BL2, and provide the OTRR Report.

5.5. Milestones

5.5.1. The Milestones for this Work Package are given below:

Milestone	Description	Date (MAC)
SwRR-2	Software Requirements Review – BL2	10
SwDR-2	Software Design Review – BL2	12
UAR-2.1	User Assessment Review	16
UAR-2.2	User Assessment Review	20
IST-2	Internal System Test	21
TRR-2	Test Readiness Review – BL2	22
FAT-2	Factory Acceptance Test – BL2	22
SIT-2	System Integration Test – BL2	23
SSMAT-2	System Supportability and Maintenance Acceptance Test – BL2	24
UAT-2	User Assessment Test – BL2	24
RegT	Regression Tests – BL2	25
IV&V-2	IV&V Testing – BL2	25
SVerR	System Verification Review – BL2	26
OTRR-2	Operational Test Readiness Review – BL2	26
Close-out	WP Close-out	26

5.6. Deliverables

5.6.1. Work Package Deliverables are given below:

- Software Requirements Specification (SRS) (v2)
- User Interface Specification (UIS) (v2)
- Software Architecture Description (SAD) (v2)
- Database Design Description (DDD) (v2)
- Software Design Description (SDD) (CI-level set, for information)
- TRITON Interface Control Description (ICD) (v3)
- Software Test Description (STD) (CI-level set, for information)
- Internal System Test Report (IST-R) (unit tests, system tests, regression tests)
- Source Code Review Report (SCR-R)
- Security Test and Evaluation Report (ST&E-R)
- Factory Acceptance Test Report (FAT-R)
- Security Operating Procedures (SecOps)
- Security Implementation Verification Procedures (SIVP)
- System Integration Test Report (SIT-R)
- System Support and Maintenance Acceptance Test Report (SSMAT-R)
- User Assessment Test Report (UAT-R)
- Regression Test Reports (RegT-R)

- Support to IV&V Testing
- Software Test Description (STD) (CI-level set, for information)
- Software Version Description (SVD) (BL2)
- TRITON-NU Operational Software - BL2 (in AFPL)
- Software Requirements Review Report (SwRR-R)
- Software Design Review Report (SwDR-R)
- Configuration Audit Report (CAuR)
- Test Readiness Review Report (TRR-R)
- System Verification Review Report (SVerR-R)
- Operational Test Readiness Review Report (OTRR-R)
- Implementation Working Group (IWG) Meetings - Minutes

6. WORK PACKAGE 3.3: BUILD PROCESS 3 – TRITON-NS (FULL)

6.1. General

6.1.1. Build Process 3 shall aim to complete the TRITON Operational Software and deliver the full capability on the NS Domain with the requirements given in the SyRS as BL3. This delivery shall include TRITON-NS Operational Software.

6.2. Work Package Dates

6.2.1. The WP3.3 PSD shall be determined at CP4.

6.2.2. The WP3.3 PSD shall be the activation date determined by the Purchaser after SwRR-2.

6.2.3. The WP3.3 PED shall be OTRR-3 (after the successful completion of SiAT-3).

6.3. Activities

6.3.1. General

6.3.1.1. The Contractor shall conduct the software implementation activities as described in SOW, Paragraph 4.10.2 to implement the TRITON Operational Software Baseline 3.

6.3.1.2. The Contractor shall include implementation of the non-functional requirements specified in the SyRS for this Baseline.

6.3.1.3. The IWG shall provide the necessary technical support.

6.3.1.4. The VVWG shall provide support for test events.

6.3.1.5. The SEWG shall provide governance for the system-level design decisions.

6.3.2. Software Requirements Analysis

6.3.2.1. The Contractor shall perform the software requirements analysis as defined in SOW, Paragraph 4.10.2.4.

6.3.2.2. The Contractor shall update the SRS, covering the requirements allocated to this Baseline.

6.3.2.3. The Contractor shall update the UIS.

6.3.3. Software Architecture Design

6.3.3.1. The Contractor shall perform the software architectural design as defined in SOW, Paragraph 4.10.2.5.

6.3.3.2. The Contractor shall update the SAD.

6.3.3.3. The Contractor shall update the DDD as the annex to the SAD.

6.3.3.4. The Contractor shall update the SDD.

6.3.3.5. The Contractor shall design the GUI for each software item before the construction and update the UIS during the construction.

6.3.3.6. The Contractor shall prepare TRITON Interface Control Description (ICD) (v4), describing all external TRITON interfaces.

6.3.4. Software Construction

6.3.4.1. The Contractor shall perform the software construction activities as described in SOW, Paragraph 4.10.2.7.

6.3.5. Software Integration and Testing

6.3.5.1. The Contractor shall produce Software Test Description (STD) for each software item in order to perform unit testing as described in SOW, Paragraph 4.10.2.7.

6.3.5.2. The Contractor shall perform the software integration and testing activities as described in SOW, Paragraph 4.10.2.8 and provide the Test Procedures and Guides for the testing activities at TRR-3.

6.3.5.3. The Contractor shall perform software qualification testing activities as described in SOW, Paragraph 4.10.2.9.

6.3.5.4. The Contractor shall perform software verification activities as described in SOW, Paragraph 4.10.2.10.

6.3.5.5. The Contractor shall perform Internal System Test (IST) and deliver Internal System Test Report (IST-R).

6.3.5.6. The Contractor shall conduct Source Code Review (SCR) and deliver Source Code Review Report (SCR-R).

6.3.5.7. The Contractor shall execute Security Test and Evaluation (ST&E) as described in SOW, Paragraph 4.12.12.2 and provide ST&E Report.

6.3.6. Software Version Description

6.3.6.1. The Contractor shall produce the Software Version Description (SVD) for this Baseline as defined in SOW, Paragraph 4.10.2.11.

6.3.7. System Integration

6.3.7.1. The Contractor shall perform System Integration Activity as defined in SOW, Paragraph 4.11.2 in order to get prepared for the System Integration Test.

6.3.7.2. The Contractor shall provide support to the Purchaser to establish TRITON Interoperability Test Centre (TITC) at PMIC Facilities for testing Nation Interfaces on the NS Domain. The Contractor shall configure the TRITON Test System – NS for individual tests and develop the necessary test harnesses with test procedures. The Contractor shall support the Purchaser for performing tests with Nations.

6.3.8. System Verification and Validation

6.3.8.1. The Contractor shall perform software verification and validation as part of System Verification Process as defined in SOW, Subsection 4.12, and provide the documents and reports.

6.3.8.2. The Contractor shall plan and execute the following tests:

- Factory Acceptance Test
- System Integration Test

- System Supportability and Maintenance Acceptance Test
- User Assessment Test
- Regression Test
- IV&V Testing

6.3.8.3. The Contractor shall provide reports after each test.

6.3.8.4. The Contractor shall implement a Change Process to correct any software defects detected during the tests.

6.4. Reviews

6.4.1. Software Requirements Review

6.4.1.1. The Contractor shall plan and conduct Software Requirements Review (SwRR-3), and provide the SwRR report.

6.4.2. Software Design Review

6.4.2.1. The Contractor shall plan and conduct Software Design Review (SwDR-3), and provide the SwDR Report.

6.4.3. User Assessment Reviews

6.4.3.1. The Contractor shall support at least two (2) User Assessment Reviews (UAR) as defined in SOW, Paragraph 3.16.5.

6.4.4. Test Readiness Review

6.4.4.1. The Contractor shall plan and conduct Test Readiness Review (TRR-3) before FAT, and provide the TRR Report.

6.4.5. IV&V Planning Conferences

6.4.5.1. The Contractor shall support the Purchaser for Initial Planning Conference (IPC) and Final Planning Conference (FPC) prior to the IV&V Testing.

6.4.5.2. IV&V CCB will participate in the IPC and FPC.

6.4.6. System Verification Review

6.4.6.1. The Contractor shall plan and conduct System Verification Review (SVerR-3) after the IV&V testing, and provide the SVerR Report.

6.4.7. Operational Test Readiness Review

6.4.7.1. The Contractor shall plan and conduct Operational Test Readiness Review (OTRR) as the last activity of the Build Process to set the system to operation for BL3, and provide the OTRR Report.

6.5. Milestones

6.5.1. The Milestones for this Work Package are given below:

Milestone	Description	Date (MAC)
SwRR-3	Software Requirements Review – BL3	10
SwDR-3	Software Design Review – BL3	14

UAR-3.1	User Assessment Review	18
UAR-3.2	User Assessment Review	22
IST-3	Internal System Tests	25
TRR-3	Test Readiness Review – BL3	26
FAT-3	Factory Acceptance Test – BL3	26
SIT-3	System Integration Test – BL3	27
SSMAT-3	System Supportability and Maintenance Acceptance Test – BL3	28
UAT-2	User Assessment Test – BL2	28
RegT	Regression Test	28
IV&V-3	IV&V Testing – BL3	29
SVerR-3	System Verification Review – BL3	30
OTRR-3	Operational Test Readiness Review – BL3	30
Close-out	WP Close-out	30

6.6. Deliverables

6.6.1. Work Package Deliverables are given below:

- Software Requirements Specification (SRS) (v3)
- User Interface Specification (UIS) (v3)
- Software Architecture Description (SAD) (v3)
- Database Design Description (DDD) (v3)
- Software Design Description (SDD) (CI-level set, for information)
- TRITON Interface Control Description (ICD) (v4)
- Software Test Description (STD) (CI-level set, for information)
- Internal System Test Report (IST-R) (unit tests, system tests, regression tests)
- Source Code Review Report (SCR-R)
- Security Test and Evaluation Report (ST&E-R)
- Factory Acceptance Test Report (FAT-R)
- Security Operating Procedures (SecOps)
- Security Implementation Verification Procedures (SIVP)
- System Integration Test Report (SIT-R)
- System Support and Maintenance Acceptance Test Report (SSMAT-R)
- User Assessment Test Report (UAT-R)
- Regression Test Reports (RegT-R)
- Support to IV&V Testing
- Software Version Description (SVD) (BL3)
- TRITON-NS Operational Software - BL3 (in AFPL)
- Software Requirements Review Report (SwRR-R)
- Software Design Review (SwDR-3)
- Configuration Audit Report (CAuR)

- Test Readiness Review Report (TRR-R)
- System Verification Review Report (SVerR-R)
- Operational Test Readiness Review Report (OTRR-R)
- Implementation Working Group (IWG) Meeting - Minutes

7. WORK PACKAGE 3.4: BUILD PROCESS 4 – TRITON-ACP CAPABILITY

7.1. General

7.1.1. Build Process 4 shall aim to provide TRITON ACP Capability with the TRITON Deployable Kits for both NS and NU Domains with the requirements given in the SyRS as BL4. This delivery shall include:

- TRITON-NS Infrastructure and Operational Software.
- TRITON-NU Infrastructure and Operational Software.
- Interim Local Geospatial Service

7.2. Work Package Dates

7.2.1. The WP3.4 PSD shall be proposed by the Contractor and approved by The Purchaser during a PCR. The initial planning will be CP7.

7.2.2. The WP3.4 PED shall be OTRR-4 after the successful completion of Sea Acceptance Test (SeAT).

7.3. Activities

7.3.1. General

7.3.1.1. The Contractor shall conduct the hardware implementation activities as described in SOW, Paragraph 4.10.3 to implement the TRITON Deployable Kits (TDK).

7.3.1.2. The Contractor shall also conduct the software implementation activities as described in SOW, Paragraph 4.10.2 to implement the TRITON Operational Software Baseline 4 to be used in TDKs.

7.3.1.3. The Contractor shall include implementation of the non-functional software requirements specified in the SyRS for this Baseline.

7.3.1.4. If the NATO Core GIS is not available for TDKs, the Contractor shall provide an Interim Local Geospatial Service having, as a minimum, map handling capability with an interface compliant with the Service Interface Profile that NATO Core GIS provides. The capability shall be described in the proposal and its specification shall be finalised at the SRR. If NATO Core GIS is not available on the NU Domain, the Interim Service to be developed for TDKs can also be used for Baseline 2 on the NU Domain.

7.3.1.5. The IWG shall provide the necessary technical support.

7.3.1.6. The VVWG shall provide support for test events.

7.3.1.7. The SEWG shall provide governance for the system-level design decisions.

7.3.2. Software Requirements Analysis

7.3.2.1. The Contractor shall perform the software requirements analysis as defined in SOW, Paragraph 4.10.2.4.

7.3.2.2. The Contractor shall update the SRS, covering the requirements allocated to this Baseline.

7.3.2.3. The Contractor shall update the UIS.

7.3.2.4. The Contractor shall determine the COTS software to be used in TDK servers and clients according to the specifications given in the SRS, and provide them with the necessary licenses upon the Purchaser's approval.

7.3.2.5. The Purchaser will provide MS Office applications for TDK Client Laptops and Workstations.

7.3.3. Hardware Requirements Analysis

7.3.3.1. The Contractor shall perform the Hardware Requirements Analysis Process as defined in SOW, Paragraph 4.10.3.2.

7.3.3.2. The Contractor shall prepare Hardware Requirements Specification (HRS).

7.3.4. Software Architectural and Detailed Design

7.3.4.1. The Contractor shall perform the software architectural and detailed design as defined in SOW, Paragraph 4.10.2.5 and 4.10.2.5.6.

7.3.4.2. The Contractor shall update the SAD.

7.3.4.3. The Contractor shall update the DDD as the annex to the SAD.

7.3.4.4. The Contractor shall update the SDD.

7.3.4.5. The Contractor shall design the GUI for each software item before the construction and update the UIS during the construction.

7.3.4.6. The Contractor shall prepare TRITON Interface Control Description (ICD) (v5), describing all external TRITON interfaces.

7.3.5. Hardware Design

7.3.5.1. The Contractor shall perform the Hardware Design Process as defined in SOW, Paragraph 4.10.3.3.

7.3.5.2. The Contractor shall design the TDKs and prepare the Hardware Design Description (HDD).

7.3.6. Software Construction

7.3.6.1. The Contractor shall perform the software construction activities as described in SOW, Paragraph 4.10.2.7.

7.3.6.2. The Contractor shall develop the following software for ACP:

- TRITON-NS Operational Software for TDK-NS
- TRITON-NU Operational Software for TDK-NU
- Interim Local Geospatial Service.

7.3.7. Hardware Production

7.3.7.1. The Contractor shall produce one (1) TDK as described in SOW, Paragraph 4.10.3.4.

7.3.7.2. The Contractor shall provide the TDK Client Workstations and Client Laptops as defined in the SRS, Paragraph 4.4.1.7.5.

7.3.7.3. The Contractor shall install and activate all servers and clients of the TDK prior to tests.

7.3.8. Software Integration and Testing

7.3.8.1. The Contractor shall produce Software Test Description (STD) for each software item in order to perform unit testing as described in SOW, Paragraph 4.10.2.7.

7.3.8.2. The Contractor shall perform the software integration and testing activities as described in SOW, Paragraph 4.10.2.8 and provide the Test Procedures and Guides for the testing activities at TRR-4.

7.3.8.3. The Contractor shall perform software qualification testing activities as described in SOW, Paragraph 4.10.2.9.

7.3.8.4. The Contractor shall perform software verification activities as described in SOW, Paragraph 4.10.2.10.

7.3.8.5. The Contractor shall perform internal software and hardware tests and deliver Internal System Test Report (IST-R).

7.3.8.6. The Contractor shall deliver Source Code Review Report (SCR-R).

7.3.8.7. The Contractor shall execute Security Test and Evaluation (ST&E) as described in SOW, Paragraph 4.12.12.2 and provide the ST&E Report.

7.3.8.8. The Contractor shall perform infrastructure and operational software installation on one TDK (Server and Clients) as defined in SOW, Paragraph 4.10.3.5.

7.3.9. Software Version Description

7.3.9.1. The Contractor shall produce the Software Version Description (SVD) for this Baseline as defined in SOW, Paragraph 4.10.2.11.

7.3.9.2. The final SVD shall be submitted at IPC.

7.3.10. Hardware Verification

7.3.10.1. The Contractor shall plan and execute the First Article Acceptance Test (FAAT) for the first HDI produced before the serial production as defined in SOW, Paragraph 4.10.3.6 and provide the FAAT Report.

7.3.10.2. FAAT shall include the TDK Clients.

7.3.11. Serial Hardware Production

7.3.11.1. The Contractor shall perform serial hardware production of HDIs according to the authorisation given by the Purchaser as defined in SOW, Paragraph 4.10.3.7.

7.3.12. System Integration

7.3.12.1. The Contractor shall perform System Integration Activity as defined in SOW, Paragraph 4.11.2 in order to get prepared for the System Integration Test.

7.3.12.2. The Contractor shall provide support to the Purchaser to establish TRITON Interoperability Test Centre (TITC) in PMIC Facilities for testing ACP Interfaces on the NS and NU Domains within System Integration Test (SIT) (see SOW, Paragraph 4.11.3).

7.3.13. System Verification and Validation

7.3.13.1. The Contractor shall perform software verification and validation as part of System Verification Process as defined in SOW, Subsection 4.12, and provide the documents and reports.

7.3.13.2. The Contractor shall execute Factory Acceptance Test (FAT) for one HDI including TRITON Operational Software BL4 as defined in SOW, Paragraph 4.10.3.8.2 and provide the FAT Report.

7.3.13.3. The Contractor shall plan and execute the following tests and provide reports:

- System Integration Test
- System Supportability and Maintenance Acceptance Test
- User Assessment Test
- Regression Test

7.3.13.4. The Contractor shall support IV&V Testing for one TDK as defined in SOW, Paragraph 4.12.12.7.26. The TDK shall be tested as a standalone "system".

7.3.13.5. The Contractor shall execute Sea Acceptance Test (SeAT) using one TDK as defined in SOW, Paragraph 4.10.3.8.3 and provide the SeAT Report.

7.3.13.6. After the serial production is completed, the Contractor shall execute a serial of Hardware Factory Acceptance Tests (Hw-FAT) for the remaining seven (7) TDKs with nominal software tests and provide the FAT Reports.

7.3.13.7. The Contractor shall implement a Change Process to correct any software defects detected during the tests.

7.3.14. Delivery

7.3.14.1. The Contractor shall deliver eight (8) TDKs as defined in SOW, Paragraph 4.10.3.9.

7.3.14.2. The location of the delivery will be determined by the Purchaser. It is expected the delivery location will be NCI Agency-The Hague or NCI Agency-Northwood (MARCOM).

7.3.14.3. The delivery date of the TDKs shall be accepted as the starting date of the Warranty Period. The Warranty period for hardware is two (2) years. The Warranty Period for the TRITON Operational Software installed on TDKs shall start at FSA, and shall be valid for one (1) year.

7.4. Reviews

7.4.1. Software and Hardware Requirements Reviews

7.4.1.1. The Contractor shall plan and conduct Software Requirements Review (SwRR-4), and provide SwRR Report.

7.4.1.2. The Contractor shall plan and conduct Hardware Requirements Review (HwRR), and provide HwRR Report.

7.4.2. Software and Hardware Design Reviews

7.4.2.1. The Contractor shall plan and conduct Software Design Review (SwDR-4), and provide SwDR Report.

7.4.2.2. The Contractor shall plan and conduct Hardware Design Review (HwDR), and provide HwDR Report.

7.4.3. User Assessment Review

7.4.3.1. The Contractor shall support at least one (1) User Assessment Review (UAR) as defined in SOW, Paragraph 3.16.5.

7.4.4. Test Readiness Review

7.4.4.1. The Contractor shall plan and conduct Test Readiness Review (TRR-4) before FAAT.

7.4.4.2. The TRR-4 shall include hardware units, their identification (i.e. models, part numbers, and serial numbers) and physical conditions.

7.4.5. IV&V Planning Conferences

7.4.5.1. The Contractor shall support the Purchaser for Initial Planning Conference (IPC) and Final Planning Conference (FPC) prior to the IV&V Testing.

7.4.5.2. IV&V CCB will participate in the IPC and FPC.

7.4.6. Production Readiness Review

7.4.6.1. The Contractor shall plan and conduct Production Readiness Review (PRR), and provide PRR Report.

7.4.7. System Verification Review

7.4.7.1. The Contractor shall plan and conduct System Verification Review (SVerR) after the IV&V Testing, and provide SVerR Report.

7.4.8. Operational Test Readiness Review

7.4.8.1. The Contractor shall plan and conduct Operational Test Readiness Review (OTRR) as the last activity of the Build Process to set the system to operation for BL4, and provide the OTRR Report.

7.5. Milestones

7.5.1. The Milestones for this Work Package are given below:

Milestone	Description	Date (MAC)
SwRR-4	Software Requirements Review – BL4	18
HwRR	Hardware Requirements Review	18
SwDR-4	Software Design Review – BL4	20
HwDR	Hardware Design Review	20
UAR	User Assessment Review	22
Hw-TRR	Hardware Test Readiness Review	23

FAAT	First Article Acceptance Test	24
PRR	Production Readiness Review	24
TRR-4	Test Readiness Review – BL4	26
FAT-4	Factory Acceptance Test (with BL4 software)	26
SSMAT-4	System Supportability and Maintenance Acceptance Test – BL4	27
RegT	Regression Tests	28
IV&V-4	IV&V Testing – BL4	29
SVerR	System Verification Review – BL4 (on one TDK)	29
FATs	Factory Acceptance Tests for other 7 TDKs	28-30
SeAT	Sea Acceptance Test	30
OTRR-4	Operational Test Readiness Review	30
Close-out	WP Close-out	30

7.6. Deliverables

7.6.1. Work Package Deliverables are given below:

- Software Requirements Specification (SRS) (v3)
- User Interface Specification (UIS) (v3)
- Software Architecture Description (SAD) (v3)
- Database Design Description (DDD) (v3)
- Software Design Description (SDD) (CI-level set, for information)
- TRITON Interface Control Description (ICD) (v5)
- Software Test Description (STD) (CI-level set, for information)
- Internal System Test Reports (unit tests, system tests, regression tests)
- Source Code Review Report (SCR-R)
- Security Test and Evaluation Report (ST&E-R)
- First Article Acceptance Test Report (FAAT-R)
- Security Operating Procedures (SecOps)
- Security Implementation Verification Procedures (SIVP)
- System Integration Test Report (SIT)
- TDK Factory Acceptance Test Report (FAT-R)
  - for one TDK
  - for seven TDKs
- Sea Acceptance Test Report (SeAT-R)
- System Support and Maintenance Acceptance Test Report (SSMAT-R)
- Support to IV&V Testing
- Software Version Description (SVD) (BL4)
- Software
  - TRITON-NS Infrastructure and Operational Software - BL4 (in AFPL)
  - TRITON-NU Infrastructure and Operational Software - BL4 (in AFPL)

  - Interim Local Geospatial Service
- Hardware
  - Eight (8) sets of TRITON Deployable Kits (each including one NS and one NU unit)
- Software Requirements Review Report (SwRR-R)
- Hardware Requirements Review Report (HwRR-R)
- Software Design Review Report (SwDR-R)
- Hardware Design Review Report (HwDR-R)
- Configuration Audit Report (CAuR)
- Production Readiness Review Report (PRR-R)
- Test Readiness Review Report (TRR-R)
- System Verification Review Report (SVerR-R)
- Operational Test Readiness Review Report (OTRR-R)
- Implementation Working Group (IWG) Meeting Reports

8. WORK PACKAGE 4: VISUALISATION COMPONENT PROVISION

8.1. General

8.1.1. The C4ISR Visualisation Component (VC) shall be implemented within this Work Package.

8.1.2. The Contractor shall include implementation of the non-functional requirements specified in the SyRS for the initial Baseline of the VC.

8.2. Work Package Dates

8.2.1. The WP4 PSD shall be PMR.

8.2.2. The WP4 PED shall be the successful completion of Component Acceptance Test (CAT).

8.3. Activities

8.3.1. General

8.3.1.1. The Contractor shall conduct the software implementation activities as described in SOW, Paragraph 4.10.2 to implement the VC.

8.3.1.2. Visualisation Component Working Group (VCWG) shall provide technical support to the implementation activities.

8.3.1.3. The SEWG shall provide governance for the system-level design decisions.

8.3.1.4. The VVWG shall provide support for test events.

8.3.1.5. In case the VC is not available at the time of early TRITON Baseline deliveries, the Contractor shall provide an interim Visualisation Capability (for the Geospatial View). This capability shall be replaced when the actual VC becomes functional.

8.3.1.6. The Contractor shall deliver C4ISR Visualisation Component as a standalone software package.

8.3.1.7. The Contractor shall deliver Reusable User Interface (UI) Components as defined in the SRS, allowing to be used in development of the Application View. The UI Components shall be documented in the VC ICD and delivered as reusable software elements.

8.3.1.8. The Contractor shall deliver the Symbology Service as defined in the SRS.

8.3.2. Incremental Development

8.3.2.1. The Contractor shall apply Incremental Development and Multiple Deliveries approach for the VC.

8.3.2.2. The Contractor shall plan three (3) Baseline Deliveries within the Performance Dates of the Work Package. Each Baseline shall have its own software life cycle as described below.

8.3.3. Software Requirements Analysis

8.3.3.1. The Contractor shall perform the software requirements analysis as defined in SOW, Paragraph 4.10.2.4.

8.3.3.2. The Contractor shall prepare a Software Requirements Specification (SRS) covering only the requirements allocated to the VC.

8.3.3.3. The Contractor shall prepare the VC FAT Test Procedures to be used at each FAT. The preliminary FAT Procedures shall be made available at each VC SwRR and delivered at each TRR.

8.3.3.4. The Contractor shall prepare the Component Acceptance Test (CAT) Procedure at VC-SwRR-3.

8.3.3.5. The Contractor shall plan and execute VC Software Requirements Review (VC-SwRR) for each Baseline, namely SwRR-1, 2 and 3.

8.3.4. Software Architectural and Detailed Design

8.3.4.1. The Contractor shall perform the software architectural and detailed design as defined in SOW, Paragraph 4.10.2.5 / 6.

8.3.4.2. The Contractor shall prepare an SAD at the first Baseline and update it thereafter.

8.3.4.3. The Contractor shall prepare an SDD at the first Baseline and update it thereafter.

8.3.4.4. The Contractor shall prepare a UIS at the first Baseline and update it thereafter.

8.3.4.5. The Contractor shall plan and execute VC Software Design Review (VC-SwDR) for each Baseline, namely SwDR-1, 2 and 3.

8.3.4.6. VC Interface Control Description

8.3.4.6.1. The VC Interface Control Description (VC ICD) shall include external interfaces of the VC including the Symbology Service.

8.3.4.6.2. The Contractor shall prepare the initial VC ICD and make it available during the VC-SwDR-1. After agreeing on the initial version, the VC ICD shall be made available to the TRITON Build Processes.

8.3.4.6.3. The VC ICD shall be updated at VC-SwDR-2 and 3 thereafter.

8.3.5. Software Construction

8.3.5.1. The Contractor shall perform the software construction activities as described in SOW, Paragraph 4.10.2.7.

8.3.5.2. The Contractor shall develop and deliver Reusable Graphical Components as stated in the Contractual SRS. When commercial components are intended to be used the Purchaser’s approval shall be requested.

8.3.6. Software Testing

8.3.6.1. The Contractor shall produce Software Test Description (STD) for the VC as a standalone component as described in SOW, Paragraph 4.10.2.7.

8.3.6.2. The Contractor shall deliver Source Code Review Report (SCR-R) at VC-TRR-2. If necessary, another review shall be conducted and the SCR-R shall be delivered at VC-TRR-3.

8.3.6.3. The Contractor shall plan and execute Test Readiness Review (TRR) for each Baseline, namely TRR-1, 2 and 3, and provide the TRR Report.

8.3.6.4. The Contractor shall execute a FAT for each Baseline using the FAT Procedure and provide the FAT Report.

8.3.6.5. The Contractor shall prepare Software Installation Guide (SIG) for the VC and its sub-components.

8.3.7. Software Version Description

8.3.7.1. The Contractor shall produce the Software Version Description (SVD) for each Baseline as defined in SOW, Paragraph 4.10.2.11 and submit them at each VC-TRR.

8.3.8. Component Acceptance Test

8.3.8.1. The Contractor shall plan and execute Component Acceptance Test (CAT) at the end of the implementation process. The CAT shall cover stand-alone functionality, supportability, sustainment and maintenance aspects of the component.

8.3.8.2. The Contractor shall prepare CAT Procedure and submit it to the Purchaser at VC-TRR-3.

8.3.8.3. The Contractor shall provide the CAT Report (CAT-R) within three (3) days after the test event.

8.3.9. Software Maintenance

8.3.9.1. The Contractor shall maintain the VC software until FSA as described in SOW, Paragraph 5.4.3.

8.4. Reviews

8.4.1. Software Requirements Review

8.4.1.1. The Contractor shall plan and conduct VC Software Requirements Review (VC-SwRR) for each Baseline, and provide the VC-SwRR Report.

8.4.2. Software Design Review

8.4.2.1. The Contractor shall plan and conduct VC Software Design Review (VC-SwDR) for each Baseline, and provide the VC-SwDR Report.

8.4.3. Test Readiness Review

8.4.3.1. The Contractor shall plan and conduct VC Test Readiness Review (VC-TRR) before each FAT, and provide the VC-TRR Report.

8.4.4. Component Acceptance Review

8.4.4.1. The Contractor shall plan and conduct Component Acceptance Review (CAR) after the CAT.

8.4.4.2. The CAR shall include the assessment of the component, including the software transition.

8.4.4.3. The Contractor shall provide the CAR Report within three (3) days after the review.

8.5. Milestones

8.5.1. The Milestones for this Work Package are given below:

Milestone	Description	Date (MAC)
VC-SwRR-1	Software Requirements Review – BL1	4
VC-SwDR-1	Software Design Review – BL1	6
ICD	Initial ICD	6
UI Comp	Initial User Interface Components	8
VC-TRR-1	Test Readiness Review – BL1	12
VC-FAT-1	Factory Acceptance Test – BL1	12
VC-BL1	Baseline 1 Delivery	14
VC-SwRR-2	Software Requirements Review – BL2	12
VC-SwDR-2	Software Design Review – BL2	14
VC-TRR-2	Test Readiness Review – BL2	20
VC-FAT-2	Factory Acceptance Test – BL2	20
VC-BL2	Baseline 1 Delivery	22
VC-SwRR-3	Software Requirements Review – BL3	18
VC-SwDR-3	Software Design Review – BL3	20
VC-TRR-3	Test Readiness Review – BL3	24
VC-FAT-3	Factory Acceptance Test – BL3	25
VC-BL3	Baseline 1 Delivery	26
VC-TRR	(Component) Test Readiness Review	33
CAT	Component Acceptance Test	34
CAR	Component Acceptance Review	34
Close-out	WP Close-out	35

8.6. Deliverables

8.6.1. Work Package Deliverables are given below:

- VC Software Requirements Specification (SRS) (for each BL)
- VC Software Architecture Description (SAD) (for each BL)
- VC Software Design Description (SDD) (for each BL)
- VC User Interface Specification (UIS) (for each BL)
- VC Interface Control Description (ICD) (a version at each SwDR)
- VC Software Requirements Review Reports (SwRR-R) (for each BL)
- VC Software Design Review Reports (SwDR-R) (for each BL)
- Test Readiness Review Reports (TRR-R) (for each BL)
- Delivery of interim VC
- Initial Reusable User Interface Component Set (with guidance)
- VC Test Procedures (for each BL)
- VC Source Code Review Report (SCR-R)

- VC Test Readiness Review Report (TRR-R) (for each BL)
- VC Factory Acceptance Test Report (FAT-R) (for each BL)
- VC Software Installation Guide (SIG) (for each BL)
- VC Software Version Description (SVD) (for each BL)
- Component Acceptance Test Report (CAT-R)
- Component Acceptance Review Report (CAR-R)
- Visualisation Component Working Group (VCWG) Meetings - Minutes
- C4ISR Visualisation Component – VC-BL1
- C4ISR Visualisation Component – VC-BL2
- C4ISR Visualisation Component – VC-BL3
- Final Reusable User Interface Component Set (with guidance)
- Symbology Service (together with an ICD)

9. WORK PACKAGE 5: SYSTEM TRANSITION

9.1. General

9.1.1. The Contractor shall plan and execute the System Transition Process as described in SOW, Subsection 4.13, for the TRITON Baselines as indicated in the related Work Packages.

9.1.2. Within this Work Package the Contractor shall:

- Plan installation activities
- Perform site surveys
- Install the system at the Authorised Locations
- Activate the system at the Organizational Nodes
- Provide initial training
- Support provision of training.

9.1.3. The Contractor shall prepare the System Transition Plan (STrP) as described in SOW, Paragraph 4.13.2, and deliver the draft to the Purchaser at CDR and submit the updated version at least thirty (30) days before the TRR-2.

9.1.4. The Contractor shall perform the training-related activities as defined in SOW, Paragraph 4.13.7 and Subsection 5.8.

9.1.5. As Baselines become ready in each Build Process, the Contractor shall install and activate TRITON PBL (NS and NU) at the Authorised Locations.

9.1.6. The System Transition Working Group (STWG) shall provide the necessary technical support to the System Transition activities.

9.2. Work Package Dates

9.2.1. The WP5 PSD shall be CDR.

9.2.2. The WP5 PED shall be FSA.

9.3. Activities

9.3.1. Site Surveys

9.3.1.1. The Contractor shall perform the Site Surveys as defined in SOW, Paragraph 4.13.3 for the Authorised Locations listed in Table 9-1.

Table 9-1 – Authorised Locations for Site Survey

Serial	Location	Survey Date	Date (MAC)
1	Data Centre 1 – SHAPE, Mons	After the CDR	8-10
2	Enhanced Node – MARCOM	After the CDR	8-10
3	Data Centre 1 – SHAPE, Mons	At least one (1) month prior to the installation.	28-30

4	Data Centre 2 – JFC Naples, Lago Patria	At least one (1) month prior to the installation.	29-30
5	Data Centre 3 – Brussels	At least one (1) month prior to the installation.	33-34
6	DCIS (locations to be defined)	At least one (1) month prior to the installation.	33-34

9.3.1.2. The Contractor shall conduct the first Site Survey at the Data Centre and the second at MARCOM, including the survey of NATO Communication Infrastructure between MARCOM and Enterprise Data Centres.

9.3.1.3. The Contractor shall perform other Site Surveys at the Data Centres and DCIS (location to be confirmed).

9.3.1.4. The Purchaser will have the right to change the location of the Site Survey and inform the Contractor one month prior to the event.

9.3.2. Site Survey Reports

9.3.2.1. The Contractor shall prepare a Site Survey Report (SS-R) for each site.

9.3.2.2. The Contractor shall deliver the SS-R to the Purchaser no later than one (1) week after the survey.

9.3.2.3. The Purchaser will decide whether to activate the Optional Package for COTS Software Provision (WP9) in accordance with the SS-R for the first survey.

9.3.2.4. The Purchaser will then decide on which site TRITON will be installed.

9.3.2.5. The Contractor shall update the STrP according to the final installation plan.

9.3.3. Site Preparation

9.3.3.1. The Contractor shall perform the Site Preparation as defined in SOW, Paragraph 4.13.5 after SQR at each site.

9.3.4. Static Site Installation

9.3.4.1. The Contractor shall perform the Site Installation activities as defined in SOW, Paragraph 4.13.6. If any additional COTS software products and licenses are needed, the Purchaser will activate the optional Work Package (WP9) of this Contract. The Contractor shall provide the necessary services and support required to install, configure and activate the additional COTS software products. This support includes original manufacturer's on-site support if necessary.

9.3.4.2. The Contractor shall perform the Pre-Installation Check (PIC) and Site Software Installation activities as defined in SOW, Paragraph 4.13.6.1. The type of the Installation Site shall be taken into account for planning the activities.

9.3.4.3. The Contractor shall install TRITON primarily at the following Enterprise Data Centres (DC) as the main Authorised Locations:

- Data Centre 1 – SHAPE, Mons (DC-1)
- Data Centre 2 – JFC Naples, Lago Patria (DC-2)
- Data Centre 3 – NATO HQ, Brussels (DC-3)

9.3.4.4. According to the Site Survey, if the Purchaser decides to install an instance of TRITON at MARCOM instead of DC-1, then the Contractor shall install TRITON on the Enhanced Node at MARCOM. Subsequent installations shall be performed on DC-1 and DC-2 upon the Purchaser's decision. The Purchaser will decide on the mode of an installation (Active, Hot-standby, Warm-standby, Cold-standby) according to the operational needs.

9.3.4.5. The final situation after all installations are complete is illustrated in Figure 7.

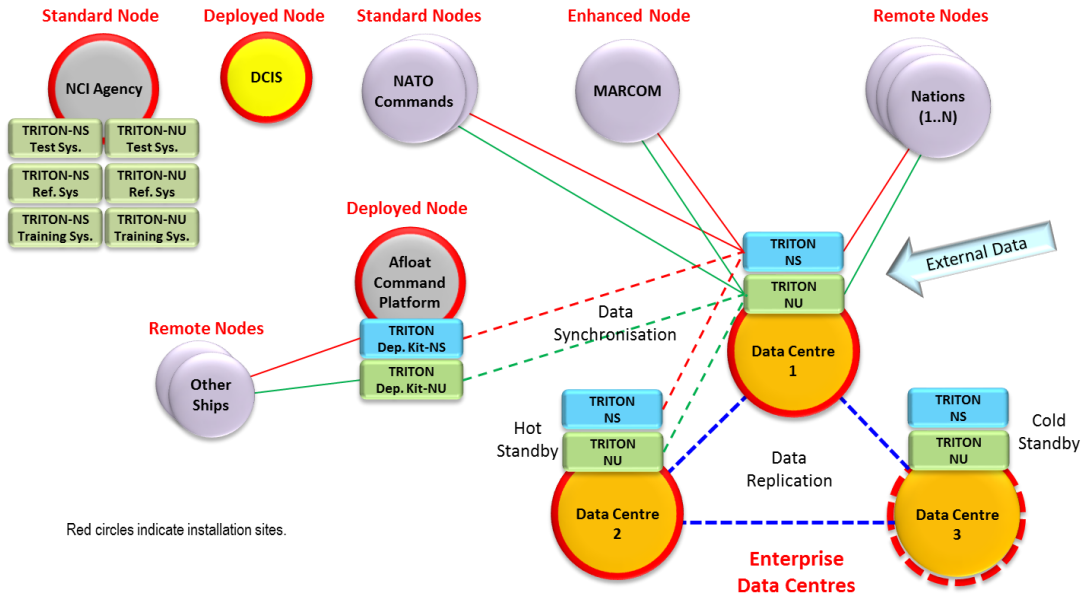


Figure 7 – TRITON Installations

9.3.4.6. If a TRITON installation has already been done for a Baseline (e.g. BL3 delivery), a remote upgrade for the Operational Software shall be applied.

9.3.4.7. Establishing TRITON Support Systems

9.3.4.7.1. The Contractor shall establish the TRITON Support Systems at the locations indicated in Table 9-2. The details of Support Systems Locations are explained in SOW, Paragraph 1.4.3.7:

Table 9-2 – TRITON Support Systems

Support System	Operational Software	Primary Location
Test System	TRITON-NS	Test Node Location
	TRITON-NU	Test Node Location
Reference System	TRITON-NS	Reference Node Location
	TRITON-NU	Reference Node Location
Training System	TRITON-NS	Individual Training Node Location
	TRITON-NU	Individual Training Node Location
	TRITON-NS	Collective Training Node Location
	TRITON-NU	Collective Training Node Location

9.3.4.7.2. The Test Systems shall be established after SwDR-1 and SwDR-2 for BL1 and BL2 respectively. They will be used for design validation during software construction process and User Assessment Reviews/Tests. The full capability of the Test Systems shall be available at TRRs.

9.3.4.7.3. The Purchaser will provide the initial guidance to prepare the test data on the Test Systems. The actual test data shall be prepared by the Contractor to cover all test cases.

9.3.4.7.4. The Test Systems will be also used as TRITON Interoperability Test Centre (TITC) at PMIC to support testing Nation Interfaces with each Nation.

9.3.4.7.5. The Training System locations will be determined by the Purchaser at the time of deployment.

9.3.4.7.6. The technical requirements for the Support Systems are given in SRS, Subsection 4.5.

9.3.4.7.7. The Contractor shall update the infrastructure and operational software for the Support Systems as necessary until FSA.

9.3.4.8. The Contractor shall perform the software installation activities for Product Baseline (PBL), Operational Baseline (OBL), Support Systems and TDKs as listed in Table 9-3:

Table 9-3 – Installation Activities

Product	BL	Location	Activity	Date
TRITON-NS Test System	BL1	Test Node Location	Full installation	After SwDR-1
TRITON-NS Reference System	BL1	Reference Node Location	Full installation	After BL1 IV&V
TRITON-NS (pilot) PBL	BL1	DC-1 or MARCOM	Full installation	After BL1 IV&V
TRITON-NU Test System	BL2	Test Node Location	Full installation	After BL2 IV&V
TRITON-NU Reference System	BL2	Reference Node Location	Full installation	After BL2 IV&V
TRITON-NU Training System	BL2	Training Node Location	Full installation	After BL2 IV&V
TRITON-NU OBL	BL2	DC-1 or MARCOM	Full installation	After BL2 IV&V
TRITON-NS Test System	BL3	Test Node Location	Upgrade	After BL3 IV&V
TRITON-NS Reference System	BL3	Reference Node Location	Upgrade	After BL3 IV&V
TRITON-NS Training System	BL3	Training Node Location	Full Installation	After BL3 IV&V
TRITON-NS OBL	BL3	DC-1 or MARCOM	Upgrade	After BL3 IV&V

TDK-NS OBL	BL4	Test Node Location	Full installation	After BL4 IV&V
TDK-NU OBL	BL4	Test Node Location	Full installation	After BL4 IV&V
TRITON-NS OBL	BL3	DC-2	Full installation	After PSA
TRITON-NU OBL	BL3	DC-2	Full installation	After PSA
TRITON-NS OBL	BL3	DC-3 (if not MARCOM)	Full installation	After PSA
TRITON-NU OBL	BL3	DC-3 (if not MARCOM)	Full installation	After PSA
TRITON-NS OBL	BL3	DCIS Location	Full installation	After PSA
TRITON-NS OBL	BL3	DCIS Location	Full installation	After PSA
TRITON-NS OBL	BL3	DCIS Location	Full installation	After PSA
TRITON-NS OBL	BL3	DCIS Location	Full installation	After PSA
TRITON-NS OBL	New Rel.	DC-1 or MARCOM	Upgrade	During OT&E
TRITON-NU OBL	New Rel.	DC-1 or MARCOM	Upgrade	During OT&E
TRITON-NS OBL	New Rel.	DC-2	Upgrade	During OT&E
TRITON-NU OBL	New Rel.	DC-2	Upgrade	During OT&E
TRITON-NS OBL	New Rel.	DC-3 (if not MARCOM)	Upgrade	During OT&E
TRITON-NU OBL	New Rel.	DC-3 (if not MARCOM)	Upgrade	During OT&E
TDK-NS OBL	New Rel.	Test Node Location	Upgrade	End of OT&E
TDK-NU OBL	New Rel.	Test Node Location	Upgrade	End of OT&E
TRITON-NS Test System	New Rel.	Test Node Location	Upgrade	End of OT&E
TRITON-NS Reference System	New Rel.	Reference Node Location	Upgrade	End of OT&E
TRITON-NS Training System	New Rel.	Training Node Location	Upgrade	End of OT&E
TRITON-NU Test System	New Rel.	Test Node Location	Upgrade	End of OT&E

TRITON-NU Reference System	New Rel.	Reference Node Location	Upgrade	End of OT&E
TRITON-NU Training System	New Rel.	Training Node Location	Upgrade	End of OT&E

9.3.5. DCIS Installation

9.3.5.1. The Contractor shall perform installation and activation activities for four (4) Deployable CIS (DCIS) at locations which require final confirmation. The DCIS installation sites are assumed to be in Europe.

9.3.5.2. The Contractor shall upgrade the Operational Software and the infrastructure (if any patch is available) of the Deployable Systems after each new Baseline, and after each new software release.

9.3.5.3. The Contractor shall install "TRITON-NS Configuration" on a virtualised environment provided by the DCIS infrastructure (named as DragonFly).

9.3.5.4. The Contractor shall execute SiAT for the installation at DCIS, plan and conduct one SiAR when all installation activities are completed and provide the report.

9.3.6. Ship Installation

9.3.6.1. The Contractor shall install one TRITON Deployable Kit on board a selected ship at a port as defined in SOW, Paragraph 4.13.6.3, integrate it with the allowed ship systems and perform Sea Acceptance Test (SeAT).

9.3.6.2. The Purchaser will coordinate the ship, the port and the date, and inform the Contractor at least one (1) month prior to the installation.

9.3.7. Physical Configuration Audit

9.3.7.1. The Contractor shall perform Physical Configuration Audit (PCA) as defined in SOW, Paragraph 4.13.6.4 for each Baseline at the designated Installation Sites and provide PCA Reports.

9.3.8. Static Site Activation

9.3.8.1. The Contractor shall perform Site Activation as defined in SOW, Paragraph 4.13.6.6 for each Baseline at the designated Installation Sites.

9.3.8.2. The Contractor shall execute the Site Activation Test (SiAT) as defined in SOW, Paragraph 4.13.6.8 for each Baseline at each Static Installation Site, and provide the reports.

9.3.8.3. Unless otherwise stated by the Purchaser, Site Activation will be performed at the Installation Site and MARCOM concurrently.

9.3.9. Organizational Node Activation

9.3.9.1. The Contractor shall execute the On-site User Assessment Test (On-site UAT) as defined in SOW, Paragraph 4.13.6.7.8 for each Baseline at MARCOM until PSA, and provide the UAT Report. MARCOM will be the only Organizational Node on which all Baselines are activated until PSA (TRITON-NS and NU).

9.3.9.2. The Contractor shall perform Organizational Node Activation as defined in SOW, Paragraph 4.13.6.7 at the following Authorised Locations (TRITON-NS):

- SHAPE – Mons
- JFC – Naples
- JFC – Brunssum
- AIRCOM – Ramstein

9.3.9.3. Organizational Node Activation shall include provision of the planned Training Courses and On-the-Job Training.

9.3.9.4. The Contractor shall plan and execute Organizational Node Acceptance Review (ONAR) after the activities are completed.

9.3.10. Training Need Analysis

9.3.10.1. The Contractor shall perform Training Need Analysis (TNA) as defined in SOW, Paragraph 5.8.2 and provide the TNA Report.

9.3.11. Training Courses

9.3.11.1. The Contractor shall provide the Training Courses for each Baseline of the TRITON Capability as specified in SOW, Paragraph 5.8.10.

9.3.11.2. The Contractor shall provide the Training Courses listed in Table 9-4 as a minimum.

Table 9-4 – Training Courses to be provided

Course Name	Audience	Location	Date
TRITON-NS System Administrator Training	System Administrators	DC-1 or MARCOM	After BL1 installation
TRITON-NS Operator Training	MARCOM MOC Operators	MARCOM	After BL1 installation
TRITON-NS System Support Training	NCI Agency C2 Service Line; MARCOM Support Staff	MARCOM or NCIA-TH	After BL1 installation
TRITON-NS System Maintenance Training	NCI Agency C2 Service Line	NCIA-TH	After BL1 installation
TRITON-NU System Administrator Training	System Administrators	DC-1 or MARCOM	After BL2 installation
TRITON-NU Operator Training	MARCOM MOC and NSC Operators	MARCOM	After BL2 installation
TRITON-NU System Support Training	NCI Agency C2 Service Line; MARCOM Support Staff	MARCOM or NCIA-TH	After BL2 installation
TRITON-NU System Maintenance Training	NCI Agency C2 Service Line	NCIA-TH	After BL2~~3~~ installation
TRITON-NS System Administrator Training	System Administrators	DC-1 or MARCOM	After BL3 installation
TRITON-NS Operator Training	MARCOM MOC Operators	MARCOM	After BL3 installation

TRITON-NS System Support Training	NCI Agency C2 Service Line; MARCOM Support Staff	MARCOM or NCIA-TH	After BL3 installation
TRITON-NS System Maintenance Training	NCI Agency C2 Service Line	NCIA-TH	After BL3 installation
TDK Maintenance Training	NCI Agency C2 Service Line; MARCOM Support Staff	NCIA-TH	After the final HW-FAT
TDK User Training	National Representatives (ship crew)	NCIA-TH	After OTRR-4
TRITON-NS and NU Nations Training	National Representatives (HQ staff)	NCIA-TH	After PSA
Trainer Training	NCI Agency Trainers	NCIA-TH	After PSA
Software Maintenance Training (see 9.3.14)	NCI Agency C2 Service Line	NCIA-TH	Before FSA

9.3.11.3. The Contractor shall support the NCI Agency Trainers for providing the Training Courses listed in Table 9-5 as a minimum.

Table 9-5 – Training Courses to be supported

Training Name	Audience	Location	Date
TRITON-NS System Administrator Training	System Administrators	DC-1	After BL3 installation
TRITON-NS System Support Training	CSU Staff	DC-1	After BL3 installation
TRITON-NS System Administrator Training	System Administrators	DC-2	After BL3 installation
TRITON-NS System Support Training	CSU Staff	DC-2	After BL3 installation
TRITON-NS System Administrator Training	System Administrators	DC-3	After BL3 installation
TRITON-NS System Support Training	CSU Staff	DC-3	After BL3 installation
TRITON-NS User Training	HQ staff	SHAPE	After PSA
TRITON-NS User Training	HQ staff	JFC-Naples	After PSA
TRITON-NS User Training	HQ staff	JFC-Brunssum	After PSA
TRITON-NS User Training	HQ staff	AIRCOM	After PSA
TRITON-NS User Training	NATO Command Structure Staff	NCIA-TH	Before the first planned exercise

TRITON-NS Operator Training	HQ Staff	MARCOM	Before the first planned exercise
TRITON-NS Operator Training	HQ Staff	MARCOM	Before the second planned exercise
TRITON-NS Operator Training	HQ Staff	MARCOM	Before the third planned exercise

9.3.11.4. The Contractor shall provide the Computer-Based Training (CBT) capability, hard copy and electronic copy of the Training Materials to each trainee one week before the training event.

9.3.11.5. The Contractor shall provide Test Crew Training for the Purchaser's test staff as defined in SOW, Paragraph 5.8.8.

9.3.11.6. The Contractor shall collect the feedback from each course participant on the quality of the provided courses and used Training Materials, develop the Training Course Report (SOW, Paragraph 5.8.12) and submit to the Purchaser within one week after the training.

9.3.11.7. The Contractor shall update the Training Materials based on the collected feedback information. The changes have to be authorised by the Purchaser.

9.3.12. Site Acceptance

9.3.12.1. The Contractor shall perform Site Acceptance process including the following and provide the reports:

- Provisional Site Acceptance (PSiA) and Observation Sheet
- Technical Transfer Meeting
- Final Site Acceptance (FSiA) and Site Acceptance documents
- System Statement of Conformance (SSC)
- Site Acceptance Review (SiAR) and its report

9.3.12.2. The Installation Sites that are subject to assessment in the scope of FSiA are listed in Table 9-6.

Table 9-6 – Sites subject to Final Site Acceptance

Serial	Location	System to be Installed
1	NCI Agency The Hague	TRITON-NS Test System, BL1 TRITON-NU Test System, BL2
2	NCI Agency The Hague	TDK-NS, BL4 on TRITON-NS Test System TDK-NU, BL4 on TRITON-NU Test System
3	NCI Agency The Hague or Mons	TRITON-NS Reference System, BL1 TRITON-NU Reference System, BL2
4	DC-1 or MARCOM (if indicated by Purchaser)	TRITON-NS PBL, BL1 TRITON-NU OBL, BL2 TRITON-NS OBL, BL3
5	DC-1	TRITON-NS Training System (on NS) TRITON-NU Training System (on NU)
6	DC-2	TRITON-NU, BL2 (on NU) TRITON-NS, BL3 (on NS)

7	DC-3	TRITON-NU, BL2 (on NU) TRITON-NS, BL3 (on NS)
8	DCIS Sites (Location to be defined)	4 x TRITON-NS, BL3 (on MS)

9.3.13. System-level Testing

9.3.13.1. Multi-Site Operation Test

9.3.13.1.1. The Contractor shall plan and conduct Multi-Site Operation Test (MSOT) as defined in SOW, Paragraph 4.13.11.

9.3.13.1.2. MSOT shall be planned after all installations are completed.

9.3.13.1.3. The Contractor shall provide the Test Procedures before the MSOT and prepare a report after the test.

9.3.13.2. Support to Federated Mission Network Testing

9.3.13.2.1. The Contractor shall provide support to Federated Mission Network (FMN) Testing as described in SOW, Paragraph 4.13.12.

9.3.13.2.2. The tests shall be executed in two steps: Initial and Final. The total level of effort expected for supporting this activity shall be no less than twenty (20) man-days for each step. Man-days can be transferred between the test events upon Purchaser's approval.

9.3.14. Release Management

9.3.14.1. During the three-level support activities, the Contractor shall perform software upgrades and conduct Release Management as described in SOW, Paragraph 5.6.6.

9.3.14.2. Software upgrades (i.e. minor releases, patches) may be performed remotely. Major releases may require on-site support such as updating documentation and on-the-job training.

9.3.14.3. The Contractor shall deliver the Release and Deployment Plan (RDP) at SQR-2 and update as necessary thereafter.

9.3.15. Software Transition

9.3.15.1. The Contractor shall prepare and deliver the Software Transition Plan (SwTrP) as defined in SOW, Paragraph 4.17.2 at SwTrRR.

9.3.15.2. The Contractor shall provide the source code and documentation for the delivered TRITON software. An initial copy shall be provided at SwTrRR and updated thereafter. The final version of RMD shall also be delivered as a DOORS module.

9.3.15.3. The Contractor shall perform the software transition activities as defined in SOW, Software Transition Process (Subsection 4.17) for the following:

- TRITON Operational Software – NS
- TRITON Operational Software – NU
- TRITON Deployable Kit Operational Software – NS
- TRITON Deployable Kit Operational Software – NU

- TRITON Test System Software – NS
- TRITON Test System Software – NU
- TRITON Reference System Software – NS
- TRITON Reference System Software – NU
- TRITON Training System Software – NS
- TRITON Training System Software – NU
- C4ISR Visualisation Component
  - Component Software for Server and Client
  - Reusable User Interface Components
  - Symbology Service

9.3.15.4. The Contractor shall provide the Software Maintenance Training, as defined in SOW, Paragraph 5.8.14, to the NCI Agency C2 Service Line staff or representatives of the Purchaser at the NCI Agency The Hague premises.

9.3.15.5. The Contractor shall prepare Computer Programming Manual (CPM) and make the software source code available for the Software Maintenance Training.

9.3.15.6. The Contractor shall plan and conduct Software Transition Validation Test (SwTrVT) and provide the SwTrVT Report.

9.3.16. System Rolling-out

9.3.16.1. The Contractor shall complete installation and activation of TRITON Operational Software at the Authorised Locations until FSA.

9.3.16.2. The Contractor shall provide the Training Courses as described in the Training Plan (TP).

9.4. Reviews

9.4.1. Training Readiness Review

9.4.1.1. The Contractor shall plan and conduct Training Readiness Review (TrRR) as defined in SOW, Paragraph 5.8.5, and provide the report.

9.4.1.2. The Contractor shall execute TrRR for each Baseline.

9.4.2. Sustainment Qualification Review

9.4.2.1. The Contractor shall plan and conduct Sustainment Qualification Review (SQR) as defined in SOW, Paragraph 4.13.4, and provide the report.

9.4.2.2. The Contractor shall provide the Software Distribution List (SWDL).

9.4.2.3. The Contractor shall conduct SQR for each Site Installation.

9.4.3. Physical Configuration Audit

9.4.3.1. The Contractor shall plan and conduct Physical Configuration Audit (PCA) at the Installation Site as defined in SOW, Paragraph 4.13.6.6, and provide the report.

9.4.4. Site Acceptance Review

9.4.4.1. The Contractor shall plan and conduct Site Acceptance Review (SiAR) for each installation site as defined in SOW, Paragraph 4.13.9.2, and provide the report.

9.4.4.2. The Contractor shall provide the Key Performance Indicators for deployment and the final (if modified) Software Distribution List (SWDL) (see SOW, Paragraph 4.13.6.11/12).

9.4.4.3. The Contractor shall conduct SiAR during each new Site Installation and major upgrade.

9.4.5. Organizational Node Activation Review

9.4.5.1. The Contractor shall plan and conduct Organizational Node Acceptance Review (ONAR) as defined in SOW, Paragraph 4.13.6.7 and provide the report.

9.4.6. Software Transition Readiness Review

9.4.6.1. The Contractor shall plan and conduct a Software Transition Readiness Review (SwTrRR) as defined in SOW, Paragraph 4.17.4, and provide the report.

9.4.6.2. The Contractor shall deliver the Software Transition Readiness Review Report (SwTrRR-R).

9.4.7. Software Transition Validation Review

9.4.7.1. The Contractor shall plan and conduct a Software Transition Validation Review (SwTrVR) as defined in SOW, Paragraph 4.17.7, and provide the report.

9.4.7.2. The Contractor shall deliver the Software Transition Validation Review Report (SwTrVR-R).

9.5. Milestones

9.5.1. The Milestones for this Work Package are given below:

Milestone	Description	Date (MAC)
TNA	Training Needs Analysis	1
TRR-1	IV&V TRR – BL1	i.a.w. WP3.1
SQR-1	Sustainment Qualification Review – BL1	
TrRR-1	Training Readiness Review – BL1	
SiAT-1	Site Activation Test – BL1	
On-site UAT	On-site User Assessment Test – BL1	
SiAR-1	Site Acceptance Review – BL1	
TRR-2	IV&V TRR – BL2	i.a.w. WP3.2
SQR-2	Sustainment Qualification Review – BL2	
TrRR-2	Training Readiness Review – BL2	
SiAT-2	Site Activation Test – BL2	
On-site UAT	On-site User Assessment Test – BL2	
SiAR-2	Site Acceptance Review – BL2	
TRR-3	IV&V TRR – BL3	i.a.w. WP3.3
SQR-3	Sustainment Qualification Review – BL3	
TrRR-3	Training Readiness Review – BL3	

SiAT-3	Site Activation Test – BL3	
On-site UAT	On-site User Assessment Test – BL3	
SiAR-3	Site Acceptance Review – BL3	
TRR-4	IV&V TRR – BL4	i.a.w. WP3.4
FMN-1	FMN Testing - Initial	32
FMN-2	FMN Testing - Final	35
SwTrRR	Software Transition Readiness Review	i.a.w. the SwTrP (before FSA)
SwTrVT	Software Transition Validation Test	
SwTrVR	Software Transition Validation Review	
ONAR	At each Organizational Node	until FSA

9.6. Deliverables

9.6.1. Work Package Deliverables are given below:

- Training Needs Analysis Report (TNA-R)
- Site Survey Reports
- Pre-Installation Check (PIC) Procedure
- On-site User Assessment Test (UAT) Procedure
- System Transition Plan (STrP)
- Software Transition Plan (SwTrP)
- Release and Deployment Plan (RDP)
- Training Plan (TrP)
- Configuration Audit Report (CAR)
- Sustainment Qualification Review Report (SQR-R) (for each installation)
- Site Acceptance Review Report (SiAR-R) (for each installation)
- Organizational Node Activation Review Report (ONAR-R) (for each ONAR)
- Training Materials
  - Student and Instructor Manuals
  - Computer-Based Training (CBT) for BL2, 3 and 4)
- Training Courses
- Training Course Evaluation Reports (TCER)
- TRITON Test Systems – NS, NU
- TRITON Reference Systems – NS, NU
- TRITON Training Systems – NS, NU
- TDKs available with the latest software release (NS and NU)
- Multi-Site Operation Test Report (MSOT-R)
- Support to FMN Initial Testing
- Support to FMN Final Testing
- Software Source Code and documentation
- Computer Programming Manual (CPM)

- Software Transition Readiness Review Report (SwTrRR-R)
- Software Maintenance Training
- Software Transition Validation Test Report (SwTrVT-R)
- Software Transition Validation Review Report (SwTrVR-R)
- System Transition Working Group (STWG) Meetings - Minutes

10. WORK PACKAGE 6: SYSTEM SUPPORT AND MAINTENANCE

10.1. General

10.1.1. Within this Work Package the Contractor shall provide operational support and system maintenance to the delivered software and hardware until FSA.

10.1.2. The SEWG will provide support to identify the maintenance needs and analyse the impact of changes.

10.1.3. The Operation and Support Working Group (OSWG) shall provide the necessary technical support to the System Maintenance activities.

10.1.4. This WP shall be applicable to Baseline 2, 3, and 4.

10.2. Work Package Dates

10.2.1. The WP5 PSD shall be OTRR-2 (end of Build Process 2).

10.2.2. The WP5 PED shall be FSA.

10.3. Activities

10.3.1. Operational (on-site) Support

10.3.1.1. The Contractor shall provide Operational Support as described in SOW, Subsection 4.15 System Operation Process, 4.15.4 On-Site Support.

10.3.1.2. The Contractor shall provide On-Site Support as defined in SOW, Paragraph 4.15.4 at the NCI Agency The Hague unless otherwise agreed.

10.3.1.3. The Purchaser's on-site representative will assign and monitor progress on specific tasks within the scope of this Contract and this Work Package.

10.3.1.4. The Contractor shall ensure the designated individuals are available to begin working at the Purchaser's facility within one (1) week of the OTRR-2. The exact date will be agreed with the Purchaser.

10.3.1.5. The Contractor shall provide at least one-hundred-and-fifty (150) man-days of On-Site Support starting from the agreed date until FSA.

10.3.1.6. These individuals shall work at least eight (8) hours per working day within the normal working hours at the Purchaser's facility.

10.3.1.7. The Contractor shall ensure that their On-Site Support staff maintains regular communications with the Contractor's Technical Lead.

10.3.2. Experimentation, Exercise and Prototyping Support

10.3.2.1. The Contractor shall provide support to the Purchaser for experimentation, exercising and prototyping as defined in SOW, Paragraph 4.16.4.

10.3.2.2. This support shall be no less than fifty (50) man-days of software development and support effort.

10.3.2.3. The Contractor shall maintain the effort used and remaining during the course of this Work Package and present it to the Purchaser during PCRs.

10.3.3. System Support and Maintenance

10.3.3.1. The Contractor shall provide three-level System Support as described in SOW, Subsection 5.6, 5.7, and 5.8.

10.3.3.2. The Contractor shall conduct the maintenance activities as described in SOW, Subsection 4.16 System Maintenance Process.

10.3.3.3. The Contractor shall prepare and maintain the System Maintenance Documentation as defined in SOW, Paragraph 4.16.2 throughout this Work Package. The Contractor shall also update any formal documentation produced before, but need to be modified due to changes (e.g. Design Descriptions, Test Descriptions, Training Material, TRITON ICD).

10.3.3.4. The Contractor shall apply the Release Management Process (SOW, Paragraph 5.6.6.2.2), including IV&V Testing for each Maintenance Release to be deployed.

10.3.3.5. The Contractor shall provide at least one-hundred (100) man-days of engineering support for adaptive and perfective software maintenance defined in SOW, Paragraph 5.4.3. The Contractor shall maintain the effort used and remaining during the course of this Work Package and present it to the Purchaser during PCRs.

10.3.3.6. The Contractor shall evaluate the results of In-Service Reviews and plan the maintenance activities accordingly after the precedence of activities are determined by the Purchaser.

10.4. Reviews

10.4.1. Monthly Maintenance Review

10.4.1.1. The Contractor shall conduct Monthly Maintenance Review (MMR) as defined in SOW, Paragraph 4.16.3 and provide the MMR Reports.

10.4.2. IV&V Planning Conferences

10.4.2.1. The Contractor shall support the Purchaser for Initial Planning Conference (IPC) and Final Planning Conference (FPC) prior to the IV&V Testing of new releases.

10.4.2.2. IV&V CCB will participate in the IPC and FPC.

10.4.3. System Verification Review

10.4.3.1. The Contractor shall plan and conduct System Verification Review (SVerR) after the IV&V testing, and provide the SVerR Report for each new release.

10.5. Milestones

10.5.1. The Milestones for this Work Package are given below:

Milestone	Description	Date
MMR	Monthly Maintenance Review	PSD to PED

10.6. Deliverables

10.6.1. Work Package Deliverables are given below:

- Software Distribution List (SWDL)
- System Maintenance Documentation
- Monthly Maintenance Review Report (MMR-R)
- System Verification Review Report (SVerR-R)
- Operation and Support Working Group (OSWG) Meetings - Minutes
- Engineering Support

11. WORK PACKAGE 7: SUPPORT TO OPERATIONAL TESTING AND EVALUATION

11.1. General

11.1.1. Within this Work Package the Contractor shall provide support during the operation of the system.

11.1.2. This WP shall be applicable to Baseline 2, 3, and 4.

11.1.3. The Contractor shall provide technical and CIS support at the installation sites.

11.1.4. The SEWG shall provide governance for the system-level design decisions.

11.1.5. The OSWG shall provide the necessary technical support to the OT&E activities.

11.1.6. The VVWG shall provide support for test events.

11.2. Work Package Dates

11.2.1. The WP7 PSD shall be OTRR-2 for BL2, OTRR-3 for BL3 and OTRR-4 for BL4.

11.2.2. The WP7 PED shall be the FSA.

11.3. Activities

11.3.1. The Contractor shall conduct the activities as described in SOW, Subsection 4.13 System Validation Process and Subsection 4.14 System Operation Process.

11.3.2. Operating Support

11.3.2.1. The Contractor shall support the Purchaser with development and establishment of Standard Operating Procedures (SOPs) for using TRITON as defined in SOW, Paragraph 4.15.2.

11.3.2.2. The total level of effort expected for support to SOP development shall be no less than forty (40) man-days.

11.3.3. Exercise Support

11.3.3.1. The Contractor shall provide support to MARCOM users, as explained in SOW, Paragraph 4.15.3, during at least three (3) exercises that MARCOM will participate in (One of them will be CWIX).

11.3.3.2. The total level of effort expected for participating in the three exercises shall be no less than twenty (20) man-days for a period of ten (10) days for each exercise (60 man-days in total) (travel excluded). Man-days can be transferred between the exercises upon Purchaser's approval.

11.3.3.3. These individuals shall work at least eight (8) hours per working day within the normal business hours at the Purchaser's facility or at the exercise venue.

11.3.3.4. The Contractor shall provide support to Collective Training by setting up and configuring the system

11.3.3.5. The Contractor shall collect user feedback during exercises and In-Service Reviews.

11.3.4. System Validation Test

11.3.4.1. The Contractor shall ~~plan and~~ execute the System Validation Test (SVT) as defined in SOW, Paragraph 4.14.4, and provide the SVT Report.

11.4. Reviews

11.4.1. In-Service Review

11.4.1.1. The Contractor shall conduct monthly In-Service Reviews (ISR) as defined in SOW, Paragraph 4.15.5.

11.4.1.2. There will be one ISR quarterly and after each exercise.

11.5. Milestones

11.5.1. The Milestones for this Work Package are given below:

Milestone	Description	Date (MAC)
ISR	In-Service Reviews	Quarterly
SVT	System Validation Test	Before 35

11.6. Deliverables

11.6.1. Work Package Deliverables are given below:

- System Validation Test Report (SVT-R)
- In-Service Review Report (ISR-R)
- Operating and Exercise Support
  - Support to development of Standard Operating Procedures
  - Support to MARCOM Users during three exercises
- Testing
  - Support to System Validation Test (SVT)

12. WORK PACKAGE 8: SUPPORT TO TRANSITION FROM LEGACY SYSTEMS

12.1. General

12.1.1. The existing systems, MCCIS and MSA/BRITE, used in Maritime User Community will be replaced with the TRITON Capability in time. The Purchaser will prepare a Transition Plan for replacement. The plan will also include the National use of the legacy systems.

12.1.2. The Contractor shall provide support to update the Transition Plan according to the recent state of the systems and accumulated data.

12.1.3. The System Transition Working Group (STWG) shall provide support for transition activities.

12.1.4. The Contractor shall provide engineering support to data migration.

12.2. Work Package Dates

12.2.1. The WP8 PSD shall be the PDR (approx. 6 MAC)

12.2.2. The WP8 PED shall be the FSA.

12.3. Activities

12.3.1. Support

12.3.1.1. The Contractor shall provide technical and CIS support for transition from MSA/BRITE to TRITON-NU.

12.3.1.2. The Contractor shall provide technical and CIS support for transition from MCCIS to TRITON-NS.

12.3.1.3. The total level of effort for this activity will be as follows:

- At least forty (40) man-day for period between PSD and FAT-2 (approx. 16 months).
- At least forty (40) man-day for the period between FAT-2 and TrRR for TRITON-NU (approx. 8 months)
- At least forty (40) man-day for the period between FAT-3 and TrRR for TRITON-NS (approx. 8 months).

12.3.2. Data Migration

12.3.2.1. The Contractor shall provide engineering support to the data migration process.

12.3.2.2. The Contractor shall develop tools and procedures for easy and reliable transfer of existing data accumulated in MCCIS and MSA/BRITE into TRITON. Examples to this data are given below:

- Historical track data
- Historical AIS data
- Historical WSM/PMI data

- Formatted Messages

12.3.2.3. The Contractor shall deliver the Migration Tools for MSA/BRITE no later than TRR-2.

12.3.2.4. The Contractor shall deliver the Migration Tools for MCCIS no later than TRR-3.

12.3.3. Nations Interoperability Testing

12.3.3.1. The Contractor shall develop TRITON Simulators (for NS and NU), as defined in the SRS, to enable Nations to test their own interfacing software at their own premises prior to integration.

12.3.3.2. TRITON Simulators shall be delivered at TRR-1, 2, 3.

12.3.3.3. During System Installation and Activation for Baselines 2 and 3, Nation interfaces shall be tested at the TRITON Interoperability Test Centre (ITC) (at PMIC). The Purchaser will coordinate the testing activities with Nations during the SITs. The Contractor shall provide technical support to these integration and test activity.

12.4. Reviews

12.4.1. System Transition Readiness Review

12.4.1.1. The Contractor shall plan and conduct System Transition Readiness Review (STRR)-NU for reviewing the transition process from MSA/BRITE to TRITON-NU including the following:

- Commercial service transition
- Migration of data

12.4.1.2. The Contractor shall plan and conduct STRR-NS for reviewing the transition process from MCCIS to TRITON-NS including the following:

- MCCIS Servers at MARCOM
- Migration of operational data stored at MARCOM
- MCCIS used on board ships and National Headquarters

12.4.1.3. The Contractor shall provide the STRR Reports after the reviews.

12.5. Milestones

12.5.1. The Milestones for this Work Package are given below:

Milestone	Description	Date (MAC)
Tools	Delivery of Migration Tools for MSA/BRITE	20
Tools	Delivery of Migration Tools for MCCIS	26
STRR-NU	TRITON-NU is fully functional	30
	MSA/BRITE service cut-off	30
STRR-NS	TRITON-NS is fully functional	33
	MARCOM MCCIS service suspended (to be decided by the Purchaser)	35

12.6. Deliverables

12.6.1. Work Package Deliverables are given below:

- Support to Transition
- Data Migration
  - Support to Data Migration
  - Data Migration Tools and Migration Procedures
- TRITON Simulators (for NS and NU)
- Support to Nations Interoperability Testing
- System Transition Readiness Review - NU Report (STRR-R)
- System Transition Readiness Review - NS Report (STRR-R)

13. WORK PACKAGE 9: COTS SOFTWARE PROVISION (OPTION)

13.1. General

13.1.1. This Work Package is a Contract Option. Its requirements will be applicable only if it is activated.

13.1.2. The Purchaser will decide if any additional COTS software and licenses (COTS Products) are needed to operate TRITON on the Authorised Locations. In case other Installation Locations are authorised, and additional COTS software and licenses are needed, then the Purchaser will use this package as a contingency resource. The Purchaser's existing enterprise agreements for the COTS Products will be used to the extent possible.

13.1.3. The Work Package can be activated by the Purchaser according to the Site Survey or any time until SVT.

13.1.4. The Contractor shall perform requirements analysis after the Site Survey and prepare the final COTS Products List.

13.1.5. The Contractor shall provide support for the procurement and delivery of the COTS Products to the location indicated by the Purchaser.

13.1.6. The package shall be closed after the all authorised locations are activated successfully and system is validated.

13.2. Work Package Dates

13.2.1. The WP9 PSD shall be declared by the Purchaser according to the Site Survey Report (approximately 12 MAC). The Purchaser will have the right to activate it any time before the System Validation Test (SVT).

13.2.2. The WP9 PED shall be the SVT (34-35 MAC).

13.3. Activities

13.3.1. COTS Products Requirements Analysis

13.3.1.1. Upon activation of the Work Package, the Contractor shall perform COTS Products Requirements Analysis considering the Purchaser's input, Site Survey Report and the technical specifications given in SRS (Subsection 5.4 Computer Resource Requirements), and determine the detailed definitions of COTS Products with the latest but approved versions to operate TRITON properly on the indicated network environment.

13.3.1.2. The Contractor may propose using the Purchaser's Enterprise Agreement for procuring Microsoft products.

13.3.1.3. The Contractor shall prepare the COTS Products List for two (2) installations, each supporting at least one hundred (100) users, and include the following:

- Virtualised Environment (for only processing)
- Operating System
- Database Management System/Server

- Web Server Software
- Virus Scan Software (Server)
- Backup Software
- Compression Software.

13.3.1.4. The Purchaser will decide on the final specification of the COTS Products during the COTS Products Review.

13.3.1.5. The Contractor shall propose a procurement, delivery and installation plan for the COTS Products to be used on the NS or NU Domains.

13.3.1.6. The Purchaser will decide on which site the COTS Products shall be delivered and installed, and when.

13.3.2. Procurement and Delivery

13.3.2.1. The Contractor shall provide support for the procurement of the approved COTS Products for one of the following locations:

- First Installation Location on which Baseline 1 and 2 will be installed (Data Centre – 1 or MARCOM)
- Other Installation Locations to be decided for Baseline 2 and 3 (assumed to be in Europe)

13.3.2.2. The Contractor shall deliver the COTS Products prior to SQR for that site.

13.3.2.3. The Contractor shall follow the delivery procedures defined in SOW Section 5 ILS.

13.3.2.4. If the software products are also required for development and testing, the delivery location will be the Contractor's premises.

13.4. Reviews

13.4.1. COTS Products Review

13.4.1.1. The Contractor shall plan and conduct COTS Products Review (COTSPR) to finalise the proposed COTS Products List.

13.4.1.2. The Contractor shall prepare the COTSPR Report (COTSPR-R) which shall include the agreed COTS Products List.

13.4.1.3. The Contractor shall submit the COTSPR-R to the Purchaser within three (3) days after the COTSPR.

13.5. Milestones

13.5.1. The Milestones for this Work Package are given below:

Milestone	Description	Date (MAC)
COTSPR	COTS Products Review	13
Delivery	COTS Products	SQR of the site
Close-out	WP Close-out	Before FSA

13.6. Deliverables

13.6.1. Work Package Deliverables are given below:

- COTS Products Review Report (COTSPR-R)
  - COTS Products List
- Support for the Procurement and Delivery of the COTS Products
- COTS Products as defined in the approved COTS Products List

14. WORK PACKAGE 10: 5-YEAR MAINTENANCE AND SUPPORT (OPTION)

14.1. General

14.1.1. This Work Package is optional. Its requirements will be applicable only if it is activated.

14.1.2. The Contractor shall provide Maintenance and Support as defined in the SOW, Section 5 during the performance of this Work Package.

14.1.3. The Maintenance and Support shall cover the TRITON Operational Software, including the C4ISR Visualisation Component, installed on both static sites and TDKs.

14.2. Work Package Dates

14.2.1. The WP10 PSD shall be the end of Warranty Period for the Operational Software, unless the Purchaser asks for another date, earlier or later. If the PSD starts earlier than the end date of the Warranty Period for the Operational Software, the change process activities shall be mutually agreed considering if the scope of a change is to be handled under the Warranty clauses.

14.2.2. The WP10 PED shall be one (1) year after the PSD with an option of yearly extensions up to five (5) years.

14.2.3. The Purchaser will inform the Contractor in written to extend the validity of the Maintenance and Support Package for another year at least two (2) months prior to the PED.

14.3. Activities

14.3.1. Management

14.3.1.1. The Contractor shall maintain Project Management team to execute the Maintenance and Support Package.

14.3.1.2. The Contractor shall define in the In-Service Support Plan the management activities stated in SOW Section 3 and applicable to Maintenance and Support.

14.3.1.3. The Contractor shall prepare monthly Project Highlight Reports as defined in SOW Subsection 3.17.

14.3.1.4. The Contractor shall update the In-Service Support Plan (ISSP), as described in SOW, Paragraph 5.11.2, which includes the System Maintenance Plan (SMP).

14.3.2. Maintenance and Support

14.3.2.1. The Contractor shall provide corrective and preventive software maintenance for the TRITON Operational Software including the C4ISR Visualisation Component as defined in the SOW, Paragraph 5.4.3.

14.3.2.2. The Contractor shall provide the average level of effort for the maintenance TRITON Operational Software (except the C4ISR Visualisation Component) as given below:

Type of Maintenance	Labour Type	Labour Amount (man-day)
Corrective Maintenance	Software Developer	As needed
Preventive Maintenance	Software Developer	As needed
Adaptive Maintenance	Software Developer	100
Perfective Maintenance	Software Developer	200

14.3.2.3. The Contractor shall provide the average level of effort for the maintenance of only the C4ISR Visualisation Component as given below:

Type of Maintenance	Labour Type	Labour Amount (man-day)
Corrective Maintenance	Software Developer	As needed
Preventive Maintenance	Software Developer	As needed
Adaptive Maintenance	Software Developer	50
Perfective Maintenance	Software Developer	100

14.3.2.4. The Contractor shall provide Third Level Support for the TRITON Operational Software as defined in the SOW, Paragraph 5.7.4.

14.3.2.5. The Contractor shall maintain the effort used and remaining during the course of this Work Package, update the Maintenance Records and present them to the Purchaser during QMRs.

14.3.3. Testing and Assurance

14.3.3.1. The Contractor shall provide technical support during the IV&V Testing for the new release.

14.3.3.2. The Contractor shall maintain Maintenance Records which shall also include the type of amount of labour used for each maintenance activity and the remaining allocated resources.

14.3.3.3. The Contractor shall update the System Documents if they affected by any maintenance activity.

14.3.4. Training

14.3.4.1. The Contractor shall provide training for any improvements in functionality or changes in the user interface.

14.3.4.2. The Contractor shall provide the following Training Courses in one calendar year to cover any changes made during maintenance:

- At least two (2) days of User Training
- At least one (1) day of System Administrator Training
- At least one (1) day of System Support Training.

14.3.4.3. The Contractor shall update the Training Material to reflect any changes made during the software maintenance.

14.4. Reviews

14.4.1. Quarterly Maintenance Review

14.4.1.1. The Contractor shall conduct Quarterly Maintenance Review (QMR) and include review of Maintenance Accounting Records.

14.4.1.2. The Contractor shall provide QMR Report after the review.

14.5. Milestones

14.5.1. The Milestones for this Work Package are given below:

Milestone	Description	Date (Months after PSD)
1	Yearly Package Activation	0
2	Yearly Package Closure	12

14.6. Checkpoints

14.6.1. The Checkpoints for this Work Package are given below:

Checkpoint	Description	Date (Months after PSD)
1	QMR-1	3
2	QMR-2	6
3	QMR-3	9
4	QMR-4	12

14.7. Deliverables

14.7.1. Work Package Deliverables for Year-1 are given below:

- Project Management
- Updated In-Service Support Plan (ISSP)
- Quarterly Maintenance Review Reports (QMR-R)
- Maintenance and Support
  - Software Maintenance
  - Third Level Support
- Support to Testing and Assurance
  - Support to IV&V Testing
  - Updated Maintenance Records
- Training
  - Updated Training Material
  - Training Courses

Year-2 to Year-5 have the same deliverables.

15. WORK PACKAGE 11: SUPPORT TO PREPARATIONS FOR THE NEXT INCREMENT (OPTION)

15.1. General

15.1.1. This Work Package is optional. Its requirements will be applicable only if it is activated.

15.1.2. The Contractor shall perform system requirements analysis and high-level system design for TRITON Increment 2.

15.1.3. The Contractor shall reflect this schedule in the Project Management Plan and Project Master Schedule.

15.1.4. The Contractor shall provide final versions of the WP deliverables by the end of the WP.

15.2. Work Package Dates

15.2.1. The WP11 PSD shall be determined by the Purchaser.

15.2.2. The WP1~~0~~1 PED shall be ten (10) months after the PSD.

15.3. Activities

15.3.1. System Requirements Analysis

15.3.1.1. The Contractor shall perform requirement analysis for implementation of TRITON Increment 2, following the process described in Subsection 4.4 of the SOW and, as a result of the analysis, propose changes to the SyRS.

15.3.1.2. The Contractor shall incorporate purchaser-provided requirements into the analysis of TRITON Increment 2 requirements.

15.3.1.3. The requirements analysis shall be in sufficient detail to support accurate pricing of implementing Work Packages.

15.3.1.4. The Contractor shall follow the Change Management Process defined in SOW, Paragraph 4.7.7 when applicable to the SyRS.

15.3.1.5. The Contractor shall prepare the draft System Requirements Specification (SyRS) which includes the functional requirements, information exchange requirements, interfaces and any other system-specific requirements that are not covered during Increment 1.

15.3.1.6. Security Risk Assessment Report

15.3.1.6.1. The Contractor shall perform Security Risk Assessment (SRA) on the Increment 2 scope and provide a report on its findings.

15.3.1.7. High-Level System Requirements Review

15.3.1.7.1. The Contractor shall conduct a High-Level Systems Requirements Review (HL-SRR) for Increment 2.

15.3.2. System Design

15.3.2.1. High-Level System Design

15.3.2.1.1. Based on the approved SRS changes to Increment 2 scope, the Contractor shall perform design for the TRITON Increment 2 capability in sufficient detail to support accurate pricing of implementing Work Packages.

15.3.2.1.2. In the scope of this Work Package the Contractor shall limit design activities to high-level design, as specified in Section 4 of the SOW.

15.3.2.1.3. The Contractor shall describe Increment 2 design in the System Design Specification (SDS).

15.3.2.1.4. The SDS shall identify all changes to external interfaces as required to implement Increment 2 scope.

15.3.2.2. High-Level System Design Review

15.3.2.2.1. The Contractor shall conduct a High-Level System Design Review (HL-SDR) for Increment 2.

15.3.3. Planning

15.3.3.1. The Contractor shall plan Increment 2 activities in coordination with the Purchaser. The information, as described below, shall be provided to the Purchaser as valid commercial offer for implementation of the Increment 2 by the Contractor, valid for a period of twelve (12) months after the submission.

15.3.3.2. Draft Project Product Breakdown Structure

15.3.3.2.1. The Contractor shall plan Project Product Breakdown Structure (PPBS) for Increment 2 and describe that in a draft PPBS document, as specified in Section 3 of the SOW.

15.3.3.3. Draft Project Work Breakdown Structure

15.3.3.3.1. The Contractor shall plan Project Work Breakdown Structure (PWBS) for Increment 2 and describe that in a draft PWBS document, as specified in Section 3 of the SOW.

15.3.3.4. Draft Work Packages with Cost Estimates

15.3.3.4.1. The Contractor shall draft Increment 2 Work Packages. The Work Packages shall correspond to the Project Work Breakdown Structure (PWBS).

15.3.3.4.2. The Contractor shall plan implementation of the TRITON Increment 2 using the guidance as provided for Increment 1 in the Section 4 of the SOW.

15.3.3.4.3. The Contractor shall define cost estimates required to implement each Work Package and provide summary of those with possible pricing options.

15.3.3.5. Draft Project Master Schedule

15.3.3.5.1. The Contractor shall propose draft Project Master Schedule (PMS) for implementation of TRITON Increment 2.

15.3.3.5.2. The level of detail of PMS shall allow the Purchaser to estimate time constraints required to implement Increment 2 Work Packages.

15.3.4. Engineering Support

15.3.4.1. The Contractor shall provide Engineering Support for the preparations for the next Increment.

15.3.4.2. The Contractor shall provide inputs to cost estimates and Work Packages which shall cover the following:

- Background (introducing what was achieved through Increment 1).
- Reviewing operational requirements for Increment 2
- Implementation proposal for the specific capabilities of Increment 2
- Interdependencies (e.g. with Core Services)
- Risk management information, including a revised Risk Register
- Schedule for the Increment 2
- Resource estimate (i.e. complete cost estimate for the Contractor effort for Increment 2 and identification of key Purchaser activities)
- Detailed cost breakdown by contract line item using labour rates as defined in the Contract.
- Draft Work Packages required to implement Increment 2
- Draft updates to the PWBS and PMS based on the draft Work Package changes
- Draft changes to the SOW, if required, based on the draft Work Package changes

15.3.4.3. The Contractor shall provide at least one-hundred (100) man-days of Engineering Support within the Work Package performance.

15.4. Reviews

15.4.1. High-Level System Requirements Review

15.4.1.1. The Contractor shall plan and conduct a High-Level Systems Requirements Review (HL-SRR) at the Purchaser's facility to determine the FBL and present his proposed changes to the FBL for Increment 2.

15.4.1.2. The Contractor shall conduct the HL-SRR not later than four (4) months after the WP PSD and provide a report.

15.4.2. High-Level System Design Review

15.4.2.1. The Contractor shall plan and conduct a High-Level System Design Review (HL-SDR) at the Purchaser's facility to review the system architectural design and software architecture design for Increment 2.

15.4.2.2. At this review, the Contractor shall present its high-level system design, including major software and hardware components.

15.4.2.3. The Contractor shall conduct the HL-SDR not later than ~~six~~ eight (~~6~~8) months after the WP PSD and provide a report.

15.4.3. Final Assessment Review

15.4.3.1. The Contractor shall plan and conduct a Final Assessment Review (FAR) at the Purchaser's facility to review the status of preparations and finalise the prepared documents.

15.4.3.2. The Contractor shall present a preliminary Project Product Breakdown Structure, Project Work Breakdown Structure and Project Schedule during the FAR.

15.4.3.3. The Contractor shall also present cost estimate based on draft Work Packages.

15.4.3.4. The Purchaser will evaluate the products for preparation of Increment 2.

15.4.3.5. The Contractor shall prepare the FAR Report within three (3) days after the FAR.

15.5. Milestones

15.5.1. The Milestones for this Work Package are given below:

Milestone	Description	Date (MAC)
1	High-level System Requirements Review (SRR)	~~26~~30
2	High-level System Design Review (SDR)	3~~0~~4
3	Final Assessment Review (FAR)	3~~4~~5
4	Package Closure	35-36

15.6. Deliverables

15.6.1. Work Package Deliverables are given below:

- System Requirements Specification (SyRS) (draft)
- Security Risk Assessment Report (SRA-R)
- System Design Specification (SDS) (draft)
- Draft Project Product Breakdown Structure (PPBS)
- Draft Project Work Breakdown Structure (PWBS)
- Draft Work Packages with Cost Estimates
- Draft Project Master Schedule (PMS)
- High-level System Requirements Review Report (SRR-R)
- High-level System Design Review Report (SDR-R)
- Final Assessment Review Report (FAR-R)

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PROVISION OF FUNCTIONAL SERVICES FOR
COMMAND AND CONTROL OF MARITIME OPERATIONS
(TRITON)
INCREMENT 1

PROJECT SERIAL 2011/0IS03081

BOOK II - PART IV SOW ANNEX C

REQUIREMENTS IMPLEMENTATION SCHEDULE (RIS)

Amendment 2

INSTRUCTIONS

The requirements are given in the SRS, Annex A to the SOW, with descriptions and full properties. The list in this Annex is an extraction of requirements from the DOORS Module.
The Object Number column contains the numbers given to each object in DOORS.
The Requirement Number column contains the unique number for a requirement together with prefix "T1", which indicates "TRITON Increment 1".
The Heading / Requirement column contains the Headings in DOORS, and the requirement.
The Default Baseline column indicates to which Baseline the requirement is initially allocated to in the SRS.
The columns under "Availability of TRITON Functions" indicates the capability level prioritisation of requirements of Maritime Functions, showing when it is going to be available.
The columns under "Availability of VC Functions" indicates the capability level prioritisation of requirements for the Visualisation Component, showing when it is going to be available.
The Remarks may include any explanation.

The Bidders should fill in the requirements, by putting an 'X' in which Baseline the requirement can be implemented. The Headings will be skipped.

An 'X' in the column "Available at Bidding" indicates that the requirement is already covered by an existing product/component at the time of Bidding. This will have to be verified through the Technical Demonstration to be held during Bidding.

An 'X' in the column "Available at BL1" indicates that the requirement will be met as part of the BL1 Delivery and will be subject to Pilot Acceptance.

An 'X' in the column "Available at BL2, BL3 or BL4" indicates that the requirement will be met as part of the BL2, BL3 or BL4 Delivery and will be subject to System Acceptance.

An 'X' in the column "Available at VC-BL 1, VC-BL 2 or VC-BL 3" indicates that the requirement for the C4ISR Visualisation Component will be met as part of the VC-BL 1, VC-BL 2 or VC-BL 3 Delivery.

An 'X' in the column "Not Implemented" indicates that the Bidder is declaring that the proposed solution will not cover this requirement. Short explanation should be entered in the Remarks field, but the Bidder should also include, as part of the Bid, any changes they are proposing to the requirements, including a proposal that a requirement is not to be implemented.

It should be noted that not implementing some of the requirements will have an impact on the Technical Evaluation of the Bid and may result in lower scores for the Bidder.

Abbreviations:

BT : Bidding Time
CDS : Concept Demonstration System
NI : Not Implemented
VC : C4ISR Visualisation Component

TRITON REQUIREMENTS

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
4		**FUNCTIONAL REQUIREMENTS**													
4.1		**Required States and Modes**													
4.1.1		**Operational Modes**													
4.1.1.1		**Servers and Clients**													
4.1.1.2		**Mode Definitions**													
4.1.1.3		**Mode Settings**													
4.1.1.3.0-1.0-1	[T1-R001]	TRITON shall have Operational Modes, as described in the Description, which define its purpose of operational use.	BL 1												
4.1.1.3.0-1.0-2	[T1-R002]	TRITON shall allow the authorised user to set the Operational Mode during the system initialisation and change it during the operation.	BL 1												
4.1.1.3.0-1.0-3	[T1-R003]	TRITON shall perform an internal check to determine if all the necessary services and interfaces are available for Standalone operation if it is initialised in Standalone Mode, and then sets its Operational State accordingly.	BL 4												
4.1.2		**Operational States**													
4.1.2.1		**Server States**													
4.1.2.1.1		**State Definitions**													
4.1.2.1.2		**State Transitions**													
4.1.2.1.2.0-1.0-1	[T1-R004]	TRITON shall monitor the system functions and interfaces that are specified in the System Configuration Settings as "critical" for operational state change.	BL 1												
4.1.2.1.2.0-1.0-2	[T1-R005]	TRITON shall allow the authorised user to modify the causes for Operational State changes in the System Configuration Settings.	BL 1												
4.1.2.1.2.0-1.0-3	[T1-R006]	TRITON shall allow the authorised user to set the Operational State to Operational or Maintenance when the system is turned on. The default shall be Operational.	BL 1												
4.1.2.1.2.0-1.0-4	[T1-R007]	TRITON shall allow the authorised user to change the Operational State manually with a notification to all users.	BL 1												
4.1.2.1.2.0-1.0-5	[T1-R008]	TRITON shall change its state automatically from "Operational" to "Degraded" when the functions or interfaces specified in the System Configuration Settings are not available for a configurable maximum allowed time.	BL 1												
4.1.2.1.2.0-1.0-6	[T1-R009]	TRITON shall change its state automatically from Degraded to Operational when all the functions and interfaces specified in the System Configuration Settings are available for a configurable minimum allowed time.	BL 1												
4.1.2.1.2.0-1.0-7	[T1-R010]	TRITON shall switch to "Shutdown" state when an administrative command is issued by either an authorised user or the TRITON System Technical Management Function.	BL 1												
4.1.2.1.2.0-1.0-8	[T1-R011]	TRITON shall notify all Clients when the Server enters in the Shutdown state after a configurable time period (e.g. "The system is shutting down in 5 minutes").	BL 1												
4.1.2.1.2.0-1.0-9	[T1-R012]	TRITON shall notify the authorised user if it detects connection failure to the specified TRITON Server for more than five (5) minutes while it is operating in Normal Mode, then automatically change its mode to Standalone Mode after waiting for configurable count-down period for the authorised user input.	BL 4												
4.1.2.1.2.0-1.0-10	[T1-R013]	TRITON Deployable Kit shall utilise its own infrastructure to support the operational software in Standalone Mode.	BL 4												
4.1.2.2		**Client States**													
4.1.2.2.1		**State Definitions**													
4.1.2.2.2		**State Transitions**													
4.1.2.2.2.0-1.0-1	[T1-R014]	TRITON AppView shall be available to all users if the standard NATO CIS Infrastructure and a workstation with a browser is available.	BL 1												
4.1.2.2.2.0-1.0-2	[T1-R015]	TRITON AppView shall be able to connect to a selected TRITON Server.	BL 1												
4.1.2.2.2.0-1.0-3	[T1-R016]	TRITON AppView shall switch to "Connected" state if it ests connected to the selected TRITON Server.	BL 1												
4.1.2.2.2.0-1.0-4	[T1-R017]	TRITON AppView shall allow the user to launch GeoView when it is in "Connected" state.	BL 1												
4.1.2.2.2.0-1.0-5	[T1-R018]	TRITON AppView shall switch to "Disconnected" state if it loses its connection to the selected TRITON Server.	BL 1												
4.1.2.2.2.0-1.0-6	[T1-R019]	TRITON AppView shall be able to detect network connection failure and automatically reconnect to the selected TRITON Server if the network connectivity is re-established within a configurable time period.	BL 1												
4.1.2.2.2.0-1.0-7	[T1-R020]	TRITON AppView shall notify the user if it loses its connection to the selected TRITON Server, keep displaying the available operational data and shall not accept any operational function command.	BL 1												
4.1.2.2.2.0-1.0-8	[T1-R021]	TRITON AppView shall terminate with an Exit Command from the user with confirmation. If GeoView has been launched, it shall be terminated when the AppView is terminated.	BL 1												
4.2		**TRITON Functional Service Requirements**													
4.2.1		**Maritime Operational Objects**													
4.2.2		**Maritime Operation Management**													
4.2.2.0-5.0-1	[T1-R022]	TRITON shall maintain a list of Maritime Operations.	BL 1												
4.2.2.0-5.0-2	[T1-R023]	TRITON shall allow the authorised user to manage (create, modify, delete, import) the Maritime Operations List.	BL 1												
4.2.2.0-5.0-3	[T1-R024]	TRITON shall allow the authorised user to import Maritime Operation information from a selected TRITON Server of a selected installation.	BL 1												
4.2.2.0-5.0-4	[T1-R025]	TRITON shall allow the authorised user to manage the databases in the Global Operational Store.	BL 1												
4.2.2.0-5.0-5	[T1-R026]	TRITON shall allow the authorised user to manage (create, backup, restore, delete, import, export) the Operation-Specific Store. The user shall be able to import whole or part of previously exported Maritime Operational Object Databases into the internal databases of a Maritime Operation.	BL 1												
4.2.2.0-5.0-6	[T1-R027]	TRITON shall allow the authorised user of a Maritime Operation to manage the users in that Maritime Operation.	BL 1												
4.2.2.0-5.0-7	[T1-R028]	TRITON shall control and direct the flow of information coming from external data sources to a Maritime Operation.	BL 1												
4.2.2.0-5.0-8	[T1-R029]	TRITON shall control and direct the flow of information to external systems/services within a Maritime Operation.	BL 1												
4.2.2.0-5.0-9	[T1-R030]	TRITON shall allow the authorised user of a Maritime Operation to manage the flow of information to/from external data sources.	BL 1												
4.2.2.0-5.0-10	[T1-R031]	TRITON shall allow the authorised user of a Maritime Operation to manage the sharing of data with other Maritime Operations accordine to the securitv classification and releasabilitv labels.	BL 1												
4.2.2.0-5.0-11	[T1-R032]	TRITON shall allow the authorised user of a Maritime Operation to make use of the shared data by other Maritime Operations according to the security classification and releasability labels.	BL 1												
4.2.2.0-5.0-12	[T1-R033]	TRITON shall allow the authorised user of a Maritime Operation to manage the configuration settings applicable to information processing.	BL 1												
4.2.3		**Maritime Situational Awareness**													
4.2.3.1		**Maritime Vessel Management**													
4.2.3.1.1		**Vessel Definition**													
4.2.3.1.2		**Vessel Database Manaement**													
4.2.3.1.2.0-1.0-1	[T1-R034]	TRITON shall maintain a Vessel Database to store all Vessels in the world in all types and sizes as recognised by NATO.	BL 1												
4.2.3.1.2.0-1.0-2	[T1-R035]	TRITON shall use an optimised database structure for storing only the relevant data for relevant attributes for particular types of Vessels (for example, weapons data will be stored for only combatants).	BL 1												
4.2.3.1.2.0-1.0-3	[T1-R036]	TRITON shall allow the authorised user to manage (add, modify, remove, import, export, backup) the Vessel Database in each Maritime Operation scope. The user shall be able to export or import whole or part of the database.	BL 1												
4.2.3.1.2.0-1.0-4	[T1-R037]	TRITON shall be able to store the attribute changes made by the authorised in the Vessel Database user for at least ninety (90) days.	BL 1												
4.2.3.1.2.0-1.0-5	[T1-R038]	TRITON shall be able to store Kinematics History, Journey History, Activity History and Event History for each Vessel for a period of time set in the confiauration parameter Historv Period.	BL 1												
4.2.3.1.2.0-1.0-6	[T1-R039]	TRITON shall allow the authorised user to set the configuration parameter "History Period" which is used for determining the period of history to be stored in the Vessel Database.	BL 1												
4.2.3.1.2.0-1.0-7	[T1-R040]	TRITON shall notify the authorised user about the Vessels if their History Period is reached with an option of time extension.	BL 1												
4.2.3.1.2.0-1.0-8	[T1-R041]	TRITON shall allow the authorised user to set the configuration parameter "Vessel History Distance" for each vessel type in order to determine the interval for updating the vessel positions in the Vessel Database.	BL 1												
4.2.3.1.3		**Vessel Number Management**													
4.2.3.1.3.0-1.0-1	[T1-R042]	TRITON shall use unique decimal numbers to identifv vessels at user level.	BL 1												
4.2.3.1.3.0-1.0-2	[T1-R043]	TRITON shall allow the authorised user to allocate TVN pool for the entire system and each Maritime Operation by defining the first and last vessel numbers.	BL 1												
4.2.3.1.3.0-1.0-3	[T1-R044]	TRITON shall assign a unique TVN to each new vessel added into the Vessel Database.	BL 1												
4.2.3.1.4		**Vessel Identity Management**													
4.2.3.1.4.0-1.0-1	[T1-R045]	TRITON shall assign FRIEND as the default Standard Identity to all alliance combatant vessels in the Vessel Database and NEUTRAL to all other vessels on the NS Domain.	BL 1												
4.2.3.1.4.0-1.0-2	[T1-R046]	TRITON shall assign NEUTRAL as the default Standard Identity to all vessels including the alliance combatant vessels in the Vessel Database on the NU Domain.	BL 1												
4.2.3.1.4.0-1.0-3	[T1-R047]	TRITON shall allow the authorised user to assign a new Standard Identity according to [STANAG 1241] to selected vessels in the Vessel Database.	BL 1												
4.2.3.1.5		**Vessel Management**													
4.2.3.1.5.0-1.0-1	[T1-R048]	TRITON shall allow the authorised user to import data from recognised Maritime Datasets into the Vessel Database.	BL 1												
4.2.3.1.5.0-1.0-2	[T1-R049]	TRITON shall check the key attributes of Vessel Data during the import process from a selected Maritime Datasets into the Vessel Database and prevent any duplications with notification.	BL 1												
4.2.3.1.5.0-1.0-3	[T1-R050]	TRITON shall be able to use a Vessel Data Import Tool to import data from a selected Maritime Datasets into a file in Recognised Import File Format.	BL 1												
4.2.3.1.5.0-1.0-4	[T1-R051]	TRITON shall allow the authorised user to be able to export data from the Vessel Database according to a given selection criteria into a user-specified file in Recognised Export File Format.	BL 1												
4.2.3.1.5.0-1.0-5	[T1-R052]	TRITON shall be able to share the Vessels in the Vessel Database among multiple Maritime Operations if they are labelled accordingly in their Releasable Maritime Operations attribute.	BL 1												
4.2.3.1.6		**Vessel List Management**													
4.2.3.1.6.0-1.0-1	[T1-R053]	TRITON shall maintain Vessel Lists to store CCOI/COI/VOCI and Custom Lists as defined in the Description.	BL 3												
4.2.3.1.6.0-1.0-2	[T1-R054]	TRITON shall allow the authorised user to manage (create, modify, delete, import, export) the Vessel Lists.	BL 3												
4.2.3.1.6.0-1.0-3	[T1-R055]	TRITON shall allow the authorised user to define the default identities to be assigned to CCOI and COI vessels.	BL 3												
4.2.3.1.6.0-1.0-4	[T1-R056]	TRITON shall automatically assign the default identities to CCOI and COI vessels when the Vessel List is created.	BL 3												
4.2.3.1.6.0-1.0-5	[T1-R057]	TRITON shall allow the user to display the Vessels in the selected Vessel List in sortable tabular form with an option to indicate it on the GeoView.	BL 3												
4.2.3.1.6.0-1.0-6	[T1-R058]	TRITON shall allow the user to display the positions of the Vessels of the selected Vessel List on the GeoView based on user-selected criteria (e.g. type, date, country, area).	BL 3												
4.2.3.1.6.0-1.0-7	[T1-R059]	TRITON shall allow the authorised user to export selected Vessel Lists into a file in Recognised Output File Format and import Vessel Lists from a given file in Recognised Input File Format.	BL 3												
4.2.3.1.6.0-1.0-8	[T1-R060]	TRITON shall allow the authorised user to select a Vessel List and generate a Formatted Message (e.g. OTH-T GOLD CONTACT REPORT or ADatP-3 MARINTREP).	BL 3												
4.2.3.2		**Maritime Track Management**													
4.2.3.2.1		**Track Definition**													
4.2.3.2.2		**Track Database Management**													
4.2.3.2.2.0-1.0-1	[T1-R061]	TRITON shall maintain a Track Database to store all tracks within the Environment of a Maritime Operation with a standard "Track Data" representation as given in the Description of the Track Definition.	BL 1												
4.2.3.2.2.0-1.0-2	[T1-R062]	TRITON shall use a Track Database structure optimised to store only the relevant data for relevant attributes for particular types of vessels (for example, weapon information will be stored for only combatants).	BL 1												
4.2.3.2.2.0-1.0-3	[T1-R063]	TRITON shall allow the authorised user to set the configuration parameter Track History Distance for each vessel type in order to determine the interval for storing the Kinematics History in the Track Database. The details are given in the Description.	BL 1												
4.2.3.2.2.0-1.0-4	[T1-R064]	TRITON shall allow the authorised user to purge the Track Database (delete all tracks) after confirmation.	BL 1												
4.2.3.2.2.0-1.0-5	[T1-R065]	TRITON shall be able to share the Track Data among multiple Maritime Operations if they are labelled accordingly in their Releasable Maritime Operations attribute.	BL 1												
4.2.3.2.3		**Track Source Management**													
4.2.3.2.3.0-1.0-1	[T1-R066]	TRITON shall identify each track source uniquely (i.e. maintaining a Source ID). A System Interface Service (SIS) shall be used for each external source where each individual track source is identified with a Source ID.	BL 1												
4.2.3.2.3.0-1.0-2	[T1-R067]	TRITON shall allow the authorised user to configure track sources dynamically (add, modify, remove) without re-starting the whole Application.	BL 1												
4.2.3.2.3.0-1.0-3	[T1-R068]	TRITON shall assign the Releasable Maritime Operations label to a track source as received from the Maritime Operation Manager.	BL 1												
4.2.3.2.3.0-1.0-4	[T1-R069]	TRITON shall allow the authorised user to control (allow or prohibit) input of tracks from a selected source into a Maritime Operation.	BL 1												
4.2.3.2.3.0-1.0-5	[T1-R070]	TRITON shall be able to process all tracks received from a track source by taking the performance issues into consideration. Depending on the load, scalable services, pre-filtering, configurable update rates can be used.	BL 1												
4.2.3.2.3.0-1.0-6	[T1-R071]	TRITON shall assign the source identification to each track when it is received for the first time and maintain it thereafter.	BL 1												
4.2.3.2.3.0-1.0-7	[T1-R072]	TRITON shall maintain a Confidence Level Table, for each Maritime Operation, to be used as the default for track sources.	BL 1												
4.2.3.2.3.0-1.0-8	[T1-R073]	TRITON shall allow the authorised user to modify the Confidence Level Table, while the system is operating.	BL 1												
4.2.3.2.4		**Track Number Management**													
4.2.3.2.4.0-1.0-1	[T1-R074]	TRITON shall use unique decimal numbers to identify tracks at user level.	BL 1												
4.2.3.2.4.0-1.0-2	[T1-R075]	TRITON shall allow the authorised user to allocate TTN pool for the entire system and each Maritime Operation by defining the first and last track numbers.	BL 1												
4.2.3.2.4.0-1.0-3	[T1-R076]	TRITON shall assign a unique TTN to each new track received from external sources or initiated internally.	BL 1												
4.2.3.2.5		**Track Identity Management**													
4.2.3.2.5.0-1.0-1	[T1-R077]	TRITON shall use Standard Identities as defined in STANAG 1241 for tracks on the NS Domain.	BL 1												
4.2.3.2.5.0-1.0-2	[T1-R078]	TRITON shall restrict the user to assign SUSPECT and HOSTILE as Standard Identities to any track or vessel on the NU Domain.	BL 1												
4.2.3.2.5.0-1.0-3	[T1-R079]	TRITON shall restrict Standard Identity change for automatic tracks if the authorised user has already made a change on it.	BL 1												
4.2.3.2.5.0-1.0-4	[T1-R080]	TRITON shall automatically assign the Standard Identity FRIEND to a received track if it doesn't have a Standard Identity but its Ship Designator is combatant and its country is one of the NATO Nations as indicated in the NATO Standard Country Code Table.	BL 1												
4.2.3.2.5.0-1.0-5	[T1-R081]	TRITON shall allow the authorised user to assign a new Standard Identity to a received track with Ship Designator non-combatant.	BL 1												
4.2.3.2.5.0-1.0-6	[T1-R082]	TRITON shall compare the names in the Identity Set when a new positive identity (country and vessel name) is entered by a user for an existing track and notify the user if another track with the same name already exists.	BL 1												
4.2.3.2.5.0-1.0-7	[T1-R083]	TRITON shall use the associated Vessel name if the reported names for correlated tracks are differing.	BL 1												
4.2.3.2.5.0-1.0-8	[T1-R084]	TRITON shall allow the authorised user to assign Exercise Indicator and Exercise Identity to a track.	BL 1												
4.2.3.2.5.0-1.0-9	[T1-R085]	TRITON shall be able to process a received track with its Exercise Identity if its Exercise Indicator is set by the originator.	BL 1												
4.2.3.2.6		**Track Life Cycle Management**													

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
4.2.3.2.6.0-1.0-1	[T1-R086]	TRITON shall perform automatic and manual track life cycle management including creation, update and deletion.	BL 1												
4.2.3.2.6.0-1.0-2	[T1-R087]	TRITON shall automatically update automatic or manual tracks when new data report is received.	BL 1												
4.2.3.2.6.0-1.0-3	[T1-R088]	TRITON shall allow the authorised user to set the Lost Track Duration for automatic tracks between 30 (thirty) seconds and ten (10) minutes depending on the type of its source and speed.	BL 1												
4.2.3.2.6.0-1.0-4	[T1-R089]	TRITON shall declare an automatic track as Lost if it is not updated by its source more than the Lost Track Duration.	BL 1												
4.2.3.2.6.0-1.0-5	[T1-R090]	TRITON shall maintain the Lost tracks for the time period set by the authorised user a system configuration parameter after the user acknowledges the lost track indication.	BL 1												
4.2.3.2.6.0-1.0-6	[T1-R091]	TRITON shall allow the authorised user to set the Maximum Time Late for manual tracks up to thirty-six (36) hours with one minute intervals.	BL 1												
4.2.3.2.6.0-1.0-7	[T1-R092]	TRITON shall declare the manual track as Expired and notify to user about deletion of the track if the Maximum Time Late duration is exceeded.	BL 1												
4.2.3.2.6.0-1.0-8	[T1-R093]	TRITON shall indicate (such as blinking or faded track symbol) Lost tracks and Expired tracks on the GeoView until they are deleted.	BL 1												
4.2.3.2.6.0-1.0-9	[T1-R094]	TRITON shall continue maintaining automatic, correlated track until at least two tracks are left. If one more track is deleted, then the correlated track shall become normal track.	BL 1												
4.2.3.2.6.0-1.0-10	[T1-R095]	TRITON shall stop disolavine an associated track when it is deleted.	BL 1												
4.2.3.2.7		**Track Initiation, Update and Deletion**													
4.2.3.2.7.0-1.0-1	[T1-R096]	TRITON shall initiate an automatic track in the Track Database when it is received for the first time from a Track Source. The process is explained in the Description.	BL 1												
4.2.3.2.7.0-1.0-2	[T1-R097]	TRITON shall allow the authorised user to initiate a manual track with default attributes (and source as the user) at a given geographical position or at the pointed position on the GeoView. The user shall fill in Track Report and submit. The process is explained in the Description.	BL 1												
4.2.3.2.7.0-1.0-3	[T1-R098]	TRITON shall allow the authorised user to manually update any attribute of a manual track. A notification shall be issued to the user if that attribute has already been changed by another authorised user.	BL 1												
4.2.3.2.7.0-1.0-4	[T1-R099]	TRITON shall automatically update the attributes of an automatic track (e.g. AIS, LRIT) when they are changed by its source. TRITON shall check the non-kinematic attributes of an automatic track when a new track update is received. The updated attribute shall be applied to the Track Data only if it is not manually overridden by the authorised user.	BL 1												
4.2.3.2.7.0-1.0-5	[T1-R100]	TRITON shall automatically update the kinematic attributes of an automatic track (e.g. AIS, LRIT) when they are changed by its source. The update rate shall be set inside the relevant System Interface Service.	BL 1												
4.2.3.2.7.0-1.0-6	[T1-R101]	TRITON shall resolve destination name into geographical position using the Destination Resolution Function when a new AIS track is created.	BL 1												
4.2.3.2.7.0-1.0-7	[T1-R102]	TRITON shall allow the authorised user to dead reckon a track or a vessel to the current time or a given time with its last known course and speed with an option of leaving at the new position or returning to the original position.	BL 1												
4.2.3.2.7.0-1.0-8	[T1-R103]	TRITON shall allow the user to dead reckon (DR) a track or a vessel to the current time or a given time with its last known course and speed without leaving it at the new position.	BL 1												
4.2.3.2.7.0-1.0-9	[T1-R104]	TRITON shall use Rhumb Line DR calculation of tracks or vessels for ranges up to sixty (60) Nautical Miles and Great Circle projection for longer ranges.	BL 1												
4.2.3.2.7.0-1.0-10	[T1-R105]	TRITON shall dead reckon a track for the amount of time given by the user. The range shall be ten (10) minutes to eight (8) hours.	BL 1												
4.2.3.2.7.0-1.0-11	[T1-R106]	TRITON shall automatically delete a manual track after Maximum Time Late has passed from its last update time.	BL 1												
4.2.3.2.7.0-1.0-12	[T1-R107]	TRITON shall automatically delete an automatic track when it is deleted by its source (e.g. track is dropped in TDL or Nation feed explicitly drops it from its feed).	BL 1												
4.2.3.2.7.0-1.0-13	[T1-R108]	TRITON shall allow the authorised user to delete a manually-initiated track. A notification shall be issued if the track has one or more user-overridden attributes or it is associated to a Vessel.	BL 1												
4.2.3.2.7.0-1.0-14	[T1-R109]	TRITON shall allow the authorised user to delete an automatic track. A notification shall be issued to indicate that the automatic track is being deleted, and a new track may be initiated at the next update.	BL 1												
4.2.3.2.7.0-1.0-15	[T1-R110]	TRITON shall allow the user to slave a Reference Point or an Area to a track on a true or relative bearing and to assign independent course and speed.	BL 1												
4.2.3.2.7.0-1.0-16	[T1-R111]	TRITON shall compute and use the Track Position Update Interval at each update process by using the Track History Distance given for the type of the vessel in the System Operational Parameters.	BL 1												
4.2.3.2.7.0-1.0-17	[T1-R112]	TRITON shall store the track positions in the Kinematic History of each track in the Track Database using the position and speed of the track at intervals indicated by the Track Kinematic History Update Interval.	BL 1												
4.2.3.2.7.0-1.0-18	[T1-R113]	TRITON shall keep the Kinematic History of a track for a duration of Maximum Time Late. After the time has elapsed, the last data position shall be dropped.	BL 1												
4.2.3.2.7.0-1.0-19	[T1-R114]	TRITON shall be able to display Kinematic History of a selected track for a user-selected period of time on the GeoView.	BL 1												
4.2.3.2.7.0-1.0-20	[T1-R115]	TRITON shall delete all data including its Kinematic History when a track is deleted by either an authorised user or the source of that track with a notification if the track has user-overridden attributes or not associated.	BL 1												
4.2.3.2.8		**Track Correlation**													
4.2.3.2.8.0-2.0-1	[T1-R116]	TRITON shall automatically correlate a new track with an existing track if the configurable conditions of the Correlation Criteria are satisfied.	BL 1												
4.2.3.2.8.0-2.0-2	[T1-R117]	TRITON shall automatically correlate a new track with an existing track and notify the authorised user if one or more of the authorised user-selected conditions of the Correlation Criteria are not being satisfied.	BL 1												
4.2.3.2.8.0-2.0-3	[T1-R118]	TRITON shall automatically decorrelate the previously correlated tracks if the Decorrelation Criteria is satisfied.	BL 1												
4.2.3.2.8.0-2.0-4	[T1-R119]	TRITON shall update each track under a manually correlated track even though their attributes do not match.	BL 1												
4.2.3.2.8.0-2.0-5	[T1-R120]	TRITON shall allow the authorised user to manually correlate two tracks if automatic correlation is not successful.	BL 1												
4.2.3.2.8.0-2.0-6	[T1-R121]	TRITON shall allow the authorised user to modify the Correlation and Decorrelation Criteria in the System Operational Parameters.	BL 1												
4.2.3.2.8.0-2.0-7	[T1-R122]	TRITON shall not allow simulated tracks to be correlated with live tracks.	BL 1												
4.2.3.2.8.0-2.0-8	[T1-R123]	TRITON shall use extrapolated positions of tracks for correlation and decorrelation checks as explained in the Description.	BL 1												
4.2.3.2.8.0-2.0-9	[T1-R124]	TRITON shall keep one track if that track is correlated with another track, and display only the correlated track.	BL 1												
4.2.3.2.8.0-2.0-10	[T1-R125]	TRITON shall use the highest Confidence Level of the correlating tracks to determine the Confidence Level of the correlated track.	BL 1												
4.2.3.2.8.0-2.0-11	[T1-R126]	TRITON shall use the most recent kinematics information of the correlating tracks to set the kinematics of the correlated track (as explained in the Description).	BL 1												
4.2.3.2.8.0-2.0-12	[T1-R127]	TRITON shall treat a decorrelated track as a new track, and process it if its last time of update is not older than the Maximum Time Late. If it is older, then the decorrelated track shall be deleted automatically.	BL 1												
4.2.3.2.8.0-2.0-13	[T1-R128]	TRITON shall display correlated tracks with an indication in the GeoView (e.g. a small dot on the symbol).	BL 1												
4.2.3.2.8.0-2.0-14	[T1-R129]	TRITON shall allow the user to view the detailed track information for each track under the correlated track.	BL 1												
4.2.3.2.8.0-2.0-15	[T1-R130]	TRITON shall update each track under an automatically correlated track if their key attributes are not changed.	BL 1												
4.2.3.2.8.0-2.0-16	[T1-R131]	TRITON "should" be scalable for processing high number of tracks (e.g. over 100,000) with high update rates (e.g. less than 30 seconds) and handle correlation.	BL 1												
4.2.3.2.8.0-2.0-17	[T1-R132]	TRITON shall be able to correlate a new track with an existing track in less than five (5) seconds within ten thousand (10,000) tracks.	BL 1												
4.2.3.2.9		**Track and Vessel Association**													
4.2.3.2.9.0-1.0-1	[T1-R133]	TRITON shall allow the authorised user to change the Association and Disassociation Criteria in the System Operational Parameters	BL 1												
4.2.3.2.9.0-1.0-2	[T1-R134]	TRITON shall automatically associate an automatic Live Track with an existing vessel in the Vessel Database if the Association Criteria is satisfied.	BL 1												
4.2.3.2.9.0-1.0-3	[T1-R135]	TRITON shall allow the authorised user to manually associate an automatic or manual Live Tracks with a Vessel even though some of the attributes of a reported Track do not match to the Vessel's.	BL 1												
4.2.3.2.9.0-1.0-4	[T1-R136]	TRITON shall display associated Tracks and their augmented information with an indication on the GeoView.	BL 1												
4.2.3.2.9.0-1.0-5	[T1-R137]	TRITON shall display the TTN of the Track if it is associated to a Vessel.	BL 1												
4.2.3.2.9.0-1.0-6	[T1-R138]	TRITON shall notify the authorised user with an indication to the Track if its automatic association check fails.	BL 1												
4.2.3.2.9.0-1.0-7	[T1-R139]	TRITON shall notify the authorised user about disassociation of an associated automatic Live Track and a Vessel if one of the Disassociation Criteria is met.	BL 1												
4.2.3.2.9.0-1.0-8	[T1-R140]	TRITON shall automatically update Kinematic History, Journey History and Activity History information of a Vessel in the Vessel Database if the Vessel is associated to a Track. The kinematics information with the most recent time of update shall be used to update the Vessel kinematics.	BL 1												
4.2.3.2.9.0-1.0-9	[T1-R141]	TRITON shall compute and use the Vessel Position Update Interval at each update process by using the Vessel History Distance given for the type of the Vessel in the System Operational Parameters.	BL 1												
4.2.3.2.9.0-1.0-10	[T1-R142]	TRITON shall update the Vessel positions in the Vessel Database using the position and speed of the associated Track at intervals indicated by the Vessel Position Update Interval.	BL 1												
4.2.3.2.10		**Simulated Track Handling**													
4.2.3.2.10.0-1.0-1	[T1-R143]	TRITON shall be able to process Simulated Tracks generated by its own simulators.	BL 1												
4.2.3.2.10.0-1.0-2	[T1-R144]	TRITON shall create a Simulated Track when a simulated link track is received from a TDL via NIRIS.	BL 1												
4.2.3.2.10.0-1.0-3	[T1-R145]	TRITON shall display Simulated Tracks as readily distinguishable from Live Tracks.	BL 1												
4.2.3.2.10.0-1.0-4	[T1-R146]	TRITON shall prevent correlation of Simulated Tracks with Live Tracks and association with Vessels.	BL 1												
4.2.3.2.11		**Track Interface Handling**													
4.2.3.2.11.0-1.0-1	[T1-R147]	TRITON shall handle track information received from external sources using standard interfaces and convert different track feeds and reports into standard. internal track representation using the TRTION Track Specification (NS or NLI).	BL 1												
4.2.3.2.11.0-1.0-2	[T1-R148]	TRITON shall use configurable update rate for internal processing in each System Interface Services (SIS) which receives tracks from external sources.	BL 1												
4.2.3.2.11.0-1.0-3	[T1-R149]	TRITON shall allow the authorised user to control the internal update rate of the tracks that are received from a particular external source.	BL 1												
4.2.3.2.11.0-1.0-4	[T1-R150]	TRITON shall automatically maximise the internal update rate of the tracks assigned to the Status Board for close monitoring purposes by any user.	BL 1												
4.2.3.2.11.0-1.0-5	[T1-R151]	TRITON shall automatically maximise the internal update rate of a track if it is requested by a user in the Object Information Display (see GeoView).	BL 1												
4.2.3.2.11.0-1.0-6	[T1-R152]	TRITON shall update internal tracks when at least one attribute of a track is changed by its source.	BL 1												
4.2.3.2.11.0-1.0-7	[T1-R153]	TRITON shall use separate source identification for each SIS acting as a track source (e.g. NIRIS Interface, Formatted Message Interface, MCCIS Interface, AIS Data Source Interface).	BL 1												
4.2.3.2.11.0-1.0-8	[T1-R154]	TRITON shall allow the authorised user to exchange track data between Maritime Operations according to their releasability attribute.	BL 1												
4.2.3.2.11.0-1.0-9	[T1-R155]	TRITON shall manage Own Ship as a track and make it available for the GeoView to be displayed as Own Position.	BL 4												
4.2.3.2.11.0-1.0-10	[T1-R156]	TRITON shall allow the user to set a track as Own Ship on the GeoView.	BL 4												
4.2.3.2.11.0-1.0-11	[T1-R157]	TRITON shall maintain Own Ship Data for the Deployable Kits.	BL 4												
4.2.3.2.11.0-1.0-12	[T1-R158]	TRITON shall allow the authorised user to manually update Own Ship Data for the Deolovable Kits.	BL 4												
4.2.3.2.11.0-1.0-13	[T1-R159]	TRITON shall allow the authorised user to create an Own Ship Report to provide reports for any afloat platform.	BL 4												
4.2.3.2.11.0-1.0-14	[T1-R160]	TRITON shall process Own Ship Reports created by the authorised users on board afloat platforms and initiate manual tracks with the highest Confidence Level.	BL 4												
4.2.3.3		**Maritime Reference Object Management**													
4.2.3.3.1		**Reference Object Definition**													
4.2.3.3.2		**Reference Object Database Management**													
4.2.3.3.2.0-1.0-1	[T1-R161]	TRITON shall maintain a Reference Object Database to store all types of Reference Objects within the Environment of a Maritime Operation with a standard Reference Object Data representation.	BL 1												
4.2.3.3.2.0-1.0-2	[T1-R162]	TRITON shall allow the authorised user to manage (add, modify, remove, import, export) the Reference Object Database.	BL 1												
4.2.3.3.2.0-1.0-3	[T1-R163]	TRITON shall be able to share the Reference Object Data among multiple Maritime Operations if they are labelled accordingly in their Releasable Maritime Operations attribute.	BL 1												
4.2.3.3.3		**Reference Object Number Management**													
4.2.3.3.3.0-1.0-1	[T1-R164]	TRITON shall use unique decimal numbers (TRN) to identify Reference Objects at user level.	BL 1												
4.2.3.3.3.0-1.0-2	[T1-R165]	TRITON shall allow the authorised user to allocate TRN pool for the entire system and each Maritime Operation by defining the first and last Reference Object numbers.	BL 1												
4.2.3.3.3.0-1.0-3	[T1-R166]	TRITON shall assign a unique TRN to each new Reference Object received from external sources or created internally.	BL 1												
4.2.3.3.4		**Reference Object Life Cycle Management**													
4.2.3.3.4.0-1.0-1	[T1-R167]	TRITON shall perform automatic and manual Reference Object life cycle management.	BL 1												
4.2.3.3.4.0-1.0-2	[T1-R168]	TRITON shall maintain the Reference Objects starting from their creation time for a period specified in the Time Validity.	BL 1												
4.2.3.3.4.0-1.0-3	[T1-R169]	TRITON shall be able to create appropriate Reference Objects if Special Points, Lines and Areas are received from an external source such as TDL over NIRIS or Formatted Message over MHS.	BL 1												
4.2.3.3.4.0-1.0-4	[T1-R170]	TRITON shall delete a Reference Object according to the criteria associated to the type of the object (e.g. Missile Impact Point can be deleted after its impact time exceeded).	BL 1												
4.2.3.3.4.0-1.0-5	[T1-R171]	TRITON shall provide a Time Validity value for Reference Objects for controlling its presence automatically in addition to user deletion. Objects having "Permanent" Time Validity shall not be deleted automatically.	BL 1												
4.2.3.3.4.0-1.0-6	[T1-R172]	TRITON shall notify the user at least ten (10) minutes before the Time Validity of a Reference Object expires.	BL 1												
4.2.3.3.5		**Reference Object Creation, Update and Deletion**													
4.2.3.3.5.0-1.0-1	[T1-R173]	TRITON shall allow the user to manage (create, modify, delete) the Reference Objects in each Maritime Operation.	BL 1												
4.2.3.3.5.0-1.0-2	[T1-R174]	TRITON shall allow the user to create a Reference Point, a Line or an Area by using the C2 Drawing facilities of the GeoView.	BL 1												
4.2.3.3.5.0-1.0-3	[T1-R175]	TRITON shall update attributes of a Reference Object automatically if it is received from an external source.	BL 1												
4.2.3.3.5.0-1.0-4	[T1-R176]	TRITON shall allow the authorised user to dead reckon a Reference Object to the current time or a given time with its last known course and speed with an option of leaving at the new position or returning to the original position.	BL 1												
4.2.3.3.5.0-1.0-5	[T1-R177]	TRITON shall allow the user to dead reckon a Reference Object to the current time or a given time with its last known course and speed without leaving it at the new position.	BL 1												
4.2.3.3.5.0-1.0-6	[T1-R178]	TRITON shall allow the user to dead reckon the position of a Reference Object if it has a course and speed value.	BL 1												
4.2.3.3.5.0-1.0-7	[T1-R179]	TRITON shall use Rhumb Line dead reckoning calculation of Reference Objects for ranges up to sixty (60) Nautical Miles and Great Circle projection for longer ranges.	BL 1												
4.2.3.3.5.0-1.0-8	[T1-R180]	TRITON shall dead reckon a Reference Object for the amount of time given by the user. The range shall be ten (10) minutes to eight (8) hours.	BL 1												
4.2.3.3.5.0-1.0-9	[T1-R181]	TRITON shall delete a Reference Object automatically if its external source drops it.	BL 1												
4.2.3.3.5.0-1.0-10	[T1-R182]	TRITON shall provide the user with the capability to initiate Lines and multipoint Areas containing at least fifty (50) segments. The C2 Areas of the GeoView shall be used to visualise the Areas.	BL 1												
4.2.3.3.5.0-1.0-11	[T1-R183]	TRITON shall allow the user to assign independent course and speed to a Reference Object.	BL 1												
4.2.3.3.5.0-1.0-12	[T1-R184]	TRITON shall allow the authorised user to exchange Reference Objects between Maritime Operations according to their releasability attribute.	BL 1												
4.2.3.3.6		**Reference Object Association**													

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
4.2.3.3.6.0-1.0-1	[T1-R185]	TRITON shall allow the user to slave a Reference Object to an indicated Track.	BL 2												
4.2.3.3.6.0-1.0-2	[T1-R186]	TRITON shall associate a Reference Object to a Track if the Reference Object Association Criteria is not conflicting.	BL 2												
4.2.3.3.6.0-1.0-3	[T1-R187]	TRITON shall notify the user if the indicated Reference Object cannot be associated with the indicated Track.	BL 2												
4.2.3.3.6.0-1.0-4	[T1-R188]	TRITON shall allow the user to indicate the reference point of the Reference Object for aligning its position to the slaved Track.	BL 2												
4.2.3.3.6.0-1.0-5	[T1-R189]	TRITON shall cancel slaving if either the associated Track or the Reference Object is deleted.	BL 2												
4.2.3.3.6.0-1.0-6	[T1-R190]	TRITON shall keep a slaved Reference Object at its last position if the Track associated to it has been deleted.	BL 2												
4.2.3.4		**Maritime Picture Management**													
4.2.3.4.1		**Operational Display**													
4.2.3.4.1.1		**Picture Display**													
4.2.3.4.1.1.0-2.0-1	[T1-R191]	TRITON shall display Maritime Operational Objects in the GeoView with a symbology set selected by the user in Layers.	BL 1												
4.2.3.4.1.1.0-2.0-2	[T1-R192]	TRITON shall allow the user to set a Time Window and Update Rate for Picture Display.	BL 1												
4.2.3.4.1.1.0-2.0-3	[T1-R193]	TRITON shall allow the user to display the last known positions of Maritime Operational Objects based on the user-selected duration in the GeoView, within the current extent (only those Objects within the GeoView Spatial Extent shall be retrieved).	BL 1												
4.2.3.4.1.1.0-2.0-4	[T1-R194]	TRITON shall provide and update only those Maritime Operational Objects which are inside the Spatial Extent of each GeoView. Only those Objects having the last update time within the given Time Window shall be displayed and updated.	BL 1												
4.2.3.4.1.1.0-2.0-5	[T1-R195]	TRITON shall adjust the Update Rate for tracks to be displayed according to the Spatial Extent scale of the GeoView.	BL 1												
4.2.3.4.1.1.0-2.0-6	[T1-R196]	TRITON shall allow the user to display historical positions of Maritime Operational Objects within a given date-time period and with given time intervals, in sortable tabular format in the AppView with an option to display them in the GeoView.	BL 1												
4.2.3.4.1.1.0-2.0-7	[T1-R197]	TRITON shall display in AppView and GeoView, the number of Maritime Operational Objects currently displayed in the GeoView, in the Area of Interest, and the Total Number of Objects in the selected Time Window. This information may be displayed with respect to the Layers.	BL 1												
4.2.3.4.1.1.0-2.0-8	[T1-R198]	TRITON shall group the Maritime Operational Objects if the number of Objects to be displayed in a GeoView is greater than the "Maximum Number of Object to Display" setting.	BL 1												
4.2.3.4.1.1.0-2.0-9	[T1-R199]	TRITON shall be able to display the picture with the given Time Window, Update Rate and Spatial Extent within ten (10) seconds after the user request. TRITON AppView shall notify the user if the available bandwidth is not sufficient to receive the full requested picture from the server.	BL 4												
4.2.3.4.1.1.0-2.0-10	[T1-R200]	TRITON shall notify the user if preparing and displaying the requested history information will take longer than fifteen (15) seconds.	BL 1												
4.2.3.4.1.1.0-2.0-11	[T1-R201]	TRITON shall display associated and unassociated tracks from Track Database and unassociated vessels from Vessel Database when users issue viewing request with a Time Window.	BL 1												
4.2.3.4.1.1.0-2.0-12	[T1-R202]	TRITON shall use TTN of the track in the Object Label if the Track is associated to a Vessel and TVN of the Vessel if no Track is associated.	BL 1												
4.2.3.4.1.1.0-2.0-13	[T1-R203]	TRITON shall display TTN, TVN and TRN in a distinguishable format (e.g. a letter indication such as T, V, R in front of the numbers) on the Object Label while displaying it on the GeoView.	BL 1												
4.2.3.4.1.1.0-2.0-14	[T1-R204]	TRITON shall allow the authorised user to set Own Ship when it is deployed on an ACP.	BL 4												
4.2.3.4.1.2		**Object Display Control**													
4.2.3.4.1.2.0-1.0-1	[T1-R205]	TRITON shall provide the user with the control of displaying Operational Objects in the GeoView.	BL 1												
4.2.3.4.1.2.0-1.0-2	[T1-R206]	TRITON shall allow the user to manage (create, save, modify, delete) Display Criteria and Display Options as given in the Description. The Ribbon Bar of the AppView may be used to activate or de-activate them.	BL 1												
4.2.3.4.1.2.0-1.0-3	[T1-R207]	TRITON shall filter the Maritime Operational Objects according to the selected Display Criteria and selected Display Option. This data shall be passed to the GeoView over the AppView using NMAPI.	BL 1												
4.2.3.4.1.2.0-1.0-4	[T1-R208]	TRITON shall allow the authorised user to adjust configuration parameters related to display options.	BL 1												
4.2.3.4.1.3		**Operational Information Display**													
4.2.3.4.1.3.0-1.0-1	[T1-R209]	TRITON shall be able to present Operational Information on the AppView using both dedicated panels and dialog boxes.	BL 1												
4.2.3.4.1.3.0-1.0-2	[T1-R210]	TRITON shall display the detailed information for a selected Maritime Operational Object in a pop-up window called "Object Information Box" on the View from which it is requested.	BL 1												
4.2.3.4.2		**Maritime Operational Picture Management**													
4.2.3.4.2.0-1.0-1	[T1-R211]	TRITON shall build the MOP as a collection of all available Maritime Operational Objects on the NS Domain.	BL 1												
4.2.3.4.2.0-1.0-2	[T1-R212]	TRITON shall be able to display the MOP in the GeoView as a Layer.	BL 1												
4.2.3.4.2.0-1.0-3	[T1-R213]	TRITON shall allow the authorised user to modify the assigned Standard Identities for all types of Maritime Operational Objects in the MOP.	BL 1												
4.2.3.4.3		**Military Picture Management**													
4.2.3.4.3.0-1.0-1	[T1-R214]	TRITON shall be able to filter the Military Picture as a separately controllable collection of information according to the Standard Identities and display them as a layers on the GeoView.	BL 1												
4.2.3.4.3.0-1.0-2	[T1-R215]	TRITON shall allow the authorised user to select Maritime Operational Objects as the Military Picture by using a filter on Standard Identity.	BL 1												
4.2.3.4.3.0-1.0-3	[T1-R216]	TRITON shall be able to display the Military Picture in the GeoView as a Layer.	BL 1												
4.2.3.4.4		**White Picture Management**													
4.2.3.4.4.1		**White Picture Compilation**													
4.2.3.4.4.1.0-1.0-1	[T1-R217]	TRITON shall maintain the WP as a separately controllable and displayable collection of information on the NU and NS Domain.	BL 2												
4.2.3.4.4.1.0-1.0-2	[T1-R218]	TRITON shall be able to build the WP according to the settings of the Maritime Operation on the NU Domain.	BL 2												
4.2.3.4.4.1.0-1.0-3	[T1-R219]	TRITON shall maintain a list WP Regions for each Maritime Operation on the NU Domain.	BL 2												
4.2.3.4.4.1.0-1.0-4	[T1-R220]	TRITON shall be able to process received track information from external sources on the NU Domain, update the Track Database and the Vessel Database on the NU Domain.	BL 2												
4.2.3.4.4.1.0-1.0-5	[T1-R221]	TRITON shall maintain the WP on the NS Domain with the WP information received from the NU Domain and the information received from NATO assets operating on the NS Domain.	BL 3												
4.2.3.4.4.1.0-1.0-6	[T1-R222]	TRITON shall be able to display the White Picture in the GeoView as a Layer.	BL 2												
4.2.3.4.4.2		**White Picture Transfer**													
4.2.3.4.4.2.0-2	[T1-R223]	TRITON shall transfer the WP information from the NU Domain to the NS Domain automatically.	BL 2												
4.2.3.4.4.2.0-3	[T1-R224]	TRITON shall allow the authorised user to control and monitor the automated data transfer from the NU Domain to the NS Domain.	BL 2												
4.2.3.4.4.2.0-4	[T1-R225]	TRITON shall allow the authorised user to set the transfer parameters from the NU Domain to the NS Domain.	BL 2												
4.2.3.4.4.2.0-5	[T1-R226]	TRITON shall pass the WP information to the NS Domain over the IEG-Data Diode.	BL 2												
4.2.3.4.4.2.0-6	[T1-R227]	TRITON shall be able to receive WP information from the NU Domain via the Data Diode and process the track information automatically.	BL 3												
4.2.3.4.4.2.0-7	[T1-R228]	TRITON shall allow the authorised user to transfer files having exported WP information from the NU Domain to the NS Domain over the Data Diode.	BL 2												
4.2.3.4.4.2.0-8	[T1-R229]	TRITON shall allow the authorised user to receive data files from the NU Domain and import them on the NS Domain.	BL 3												
4.2.3.4.4.3		**White Picture Sharing**													
4.2.3.4.4.3.0-1.0-1	[T1-R230]	TRITON shall make the NATO WP available to external systems through Web Services (e.g. WP Service).	BL 2												
4.2.3.4.4.3.0-1.0-2	[T1-R231]	TRITON shall allow the authorised user to control and monitor the dissemination of WP information according to the Releasability Label over Maritime Operations and the RMP Regions.	BL 2												
4.2.3.4.5		**Recognised Maritime Picture Management**													
4.2.3.4.5.1		**RMP Building**													
4.2.3.4.5.1.0-1.0-1	[T1-R232]	TRITON shall maintain a list RMP Regions for each Maritime Operation.	BL 3												
4.2.3.4.5.1.0-1.0-2	[T1-R233]	TRITON shall use the recognised Tracks in the Track Database and the Vessels with last known positions in the Vessel Database on the NS Domain to build the RMP by using the RMP Filter Criteria.	BL 3												
4.2.3.4.5.1.0-1.0-3	[T1-R234]	TRITON shall automatically designate tracks with classification of Combatant to the Military Picture of the global RMP.	BL 3												
4.2.3.4.5.1.0-1.0-4	[T1-R235]	TRITON shall automatically designate the Vessel Lists according to the default Picture of the global RMP.	BL 3												
4.2.3.4.5.1.0-1.0-5	[T1-R236]	TRITON shall allow the authorised user to designate Maritime Operational Objects to be included in the RMP according to their RMP designation information within the Current Maritime Operation.	BL 3												
4.2.3.4.5.1.0-1.0-6	[T1-R237]	TRITON shall allow the authorised user to designate a selected Vessel List to be included in the RMP of the Current Maritime Operation or excluded.	BL 3												
4.2.3.4.5.1.0-1.0-7	[T1-R238]	TRITON shall not allow the user to designate Simulated Tracks and Exercise Tracks into the RMP if the Maritime Operation is not of type Exercise.	BL 3												
4.2.3.4.5.1.0-1.0-8	[T1-R239]	TRITON shall be able to display the RMP in the GeoView as a Layer.	BL 3												
4.2.3.4.5.2		**RMP Control and Sharing**													
4.2.3.4.5.2.0-1.0-1	[T1-R240]	TRITON shall make the RMP available over the RMP Service for external access.	BL 3												
4.2.3.4.5.2.0-1.0-2	[T1-R241]	TRITON shall make the RMP available over the Nation Interface for each Nation.	BL 3												
4.2.3.4.5.2.0-1.0-3	[T1-R242]	TRITON shall make the RMP available over the ACP Interface for the platform on which the Deployable Kit is installed.	BL 4												
4.2.3.4.5.2.0-1.0-4	[T1-R243]	TRITON shall allow the authorised user to generate a selected Formatted Message after selecting the tracks on the GeoView or from a Search Result.	BL 3												
4.2.3.4.5.2.0-1.0-5	[T1-R244]	TRITON shall be able to generate RMPSITSUM message based on user-selected Tracks and Reference Objects.	BL 3												
4.2.3.4.5.2.0-1.0-6	[T1-R245]	TRITON shall be able to generate NAVSITSUM message based on user-selected Tracks filtered for correct identity.	BL 3												
4.2.3.4.5.2.0-1.0-7	[T1-R246]	TRITON shall be able to generate NAVSITREP message based on user-selected Tracks filtered for correct identity.	BL 3												
4.2.3.4.5.2.0-1.0-8	[T1-R247]	TRITON shall be able to generate MARINTSUM message based on user-selected Tracks filtered for correct identity.	BL 3												
4.2.3.4.5.2.0-1.0-9	[T1-R248]	TRITON shall be able to generate MARINTREP message based on user-selected Tracks filtered for correct identity.	BL 3												
4.2.3.4.5.2.0-1.0-10	[T1-R249]	TRITON shall be able to generate NAVPOSREP message based on user-selected Tracks filtered for correct identity.	BL 3												
4.2.3.4.5.2.0-1.0-11	[T1-R250]	TRITON shall be able to generate OTH-T GOLD CONTACT REPORT message based on user-selected Tracks.	BL 3												
4.2.3.4.5.2.0-1.0-12	[T1-R251]	TRITON shall be able to generate OTH-T GOLD ENHANCED CONTACT REPORT message based on user-selected Tracks.	BL 3												
4.2.3.4.5.2.0-1.0-13	[T1-R252]	TRITON shall be able to generate OTH-T GOLD OVERLAY-2 message based on user-selected Reference Objects.	BL 3												
4.2.3.4.5.2.0-1.0-14	[T1-R253]	TRITON shall be able to generate OTH-T GOLD OVERLAY-3 message based on user-selected Reference Objects.	BL 3												
4.2.3.4.5.2.0-1.0-15	[T1-R254]	TRITON shall be able to send the generated Formatted Messages containing the RMP or its Regions to the selected destination addresses at a selected Dissemination Rate.	BL 3												
4.2.3.4.5.2.0-1.0-16	[T1-R255]	TRITON shall allow the authorised user to select the destination system/service and send the RMP using NVG format [NVG].	BL 3												
4.2.3.4.5.2.0-1.0-17	[T1-R256]	TRITON shall be able to export the RMP into Recognised Output File Format.	BL 3												
4.2.3.4.5.2.0-1.0-18	[T1-R257]	TRITON shall allow the authorised user to select the RMP component and export into a file in Recognised Output File Format.	BL 3												
4.2.3.4.6		**Operational Object Search**													
4.2.3.4.6.0-1.0-1	[T1-R258]	TRITON shall provide an Operational Object Search Capability compliant to Open Search [OpenSearch].	BL 1												
4.2.3.4.6.0-1.0-2	[T1-R259]	TRITON shall allow the user to manage (create, modify, delete, export, import) Search Filters to be saved in the Workspace and reuse an existing one to issue a new search.	BL 1												
4.2.3.4.6.0-1.0-3	[T1-R260]	TRITON shall allow the users to search for Maritime Operational Objects stored in the databases using queries based on the given Quick Search Criteria or Detailed Search Criteria, as given in the Description. Both search criteria shall handle Vessel Name exceptions by displaying the closest the matches.	BL 1												
4.2.3.4.6.0-1.0-4	[T1-R261]	TRITON shall display the search results in sortable tabular format with a capability of finding one or more Maritime Operational Objects and displaying them on the GeoView. If the Objects are included in the current Spatial Extent, they shall be highlighted, if not, user confirmation shall be requested to move the Extent to cover the last known position of the Objects.	BL 1												
4.2.3.4.6.0-1.0-5	[T1-R262]	TRITON shall display the closest ten (10) results of a search with an option to extend the number of results if a given name does not exactly match with any of the records in the databases.	BL 1												
4.2.3.4.6.0-1.0-6	[T1-R263]	TRITON shall be able to display augmented information from the Vessel Database if the searched tracks are associated.	BL 1												
4.2.3.4.6.0-1.0-7	[T1-R264]	TRITON shall allow the user to access the Object Search function in the context of a User Application.	BL 1												
4.2.3.4.7		**Operational Object Animation**													
4.2.3.4.7.0-1.0-1	[T1-R265]	TRITON shall be able to animate the selected Maritime Operational Objects on the GeoView.	BL 2												
4.2.3.4.7.0-1.0-2	[T1-R266]	TRITON shall allow the user to select the Maritime Operational Objects, time period and the speed of animation.	BL 2												
4.2.3.4.8		**NATO Common Operational Picture Handling**													
4.2.3.4.8.0-1.0-1	[T1-R267]	TRITON shall receive RAP and RGP and display them on separate layers in the GeoView.	BL 3												
4.2.3.4.8.0-1.0-2	[T1-R268]	TRITON shall allow the authorised user to control and monitor the NCOP Interface.	BL 3												
4.2.3.5		**Maritime Information Management**													
4.2.3.5.1		**Reference Data Source Management**													
4.2.3.5.1.1		**Maritime Datasets**													
4.2.3.5.1.1.0-1.0-1	[T1-R269]	TRITON shall maintain a list of Network Locations to access the information related to off-line Maritime Datasets.	BL 2												
4.2.3.5.1.1.0-1.0-2	[T1-R270]	TRITON shall maintain a list of Web Sites to access the information related to Maritime Datasets on-line.	BL 2												
4.2.3.5.1.1.0-1.0-3	[T1-R271]	TRITON shall allow the authorised user to manage (create, modify, delete) the List of Web Sites and Network Locations having Maritime Datasets.	BL 2												
4.2.3.5.1.1.0-1.0-4	[T1-R272]	TRITON shall allow the user to access the on-line Maritime Datasets on the specified Web Sites with a search capability.	BL 2												
4.2.3.5.1.1.0-1.0-5	[T1-R273]	TRITON shall allow the user to access the off-line Maritime Datasets on the specified Network Location with a search capability.	BL 2												
4.2.3.5.1.1.0-1.0-6	[T1-R274]	TRITON shall be able to use the search capability provided by the on-line Maritime Datasets.	BL 2												
4.2.3.5.1.1.0-1.0-7	[T1-R275]	TRITON shall be able to download a specified Maritime Dataset at configurable intervals from indicated addresses into local Network Location. The authorised user shall be notified about the beginning and end of update process.	BL 2												
4.2.3.5.1.2		**Person of Maritime Interest List**													
4.2.3.5.1.2.0-1.0-1	[T1-R276]	TRITON shall maintain a list for Person of Maritime Interest for each Maritime Operation with a search capability.	BL 3												
4.2.3.5.1.2.0-1.0-2	[T1-R277]	TRITON shall allow the authorised user to manage (create, modify, delete) the Person of Maritime Interest List.	BL 3												
4.2.3.5.1.2.0-1.0-3	[T1-R278]	TRITON shall allow the authorised user to manually combine the information received from external sources with the existing ones in the Person of Maritime List if the user-selected attributes of Person Data match.	BL 3												
4.2.3.5.1.2.0-1.0-4	[T1-R279]	TRITON shall allow the authorised user to display the vessel on the GeoView if the person is embarked on a vessel.	BL 3												
4.2.3.5.1.2.0-1.0-5	[T1-R280]	TRITON shall allow the authorised user to add a file holding the list of passengers on board a vessel.	BL 3												
4.2.3.5.1.2.0-1.0-6	[T1-R281]	TRITON shall allow the authorised user to filter and export the Person of Maritime Interest List in a user-specified file in Recognised Export File Format.	BL 3												
4.2.3.5.1.3		**Lloyd's Maritime Intelligence Unit**													
4.2.3.5.1.3.0-1.0-1	[T1-R282]	TRITON shall maintain a list of Lloyd's MIU Data.	BL 2												
4.2.3.5.1.3.0-1.0-2	[T1-R283]	TRITON shall allow the user to manage (create, modify, delete) the Lloyd's MIU List.	BL 2												
4.2.3.5.1.3.0-1.0-3	[T1-R284]	TRITON shall be able to import Lloyd's MIU data from an indicated file into the Lloyd's MIU List.	BL 2												
4.2.3.5.1.3.0-1.0-4	[T1-R285]	TRITON shall allow the authorised user to access on-line Lloyd's MIU dataset and import the datasets into the local list.	BL 2												
4.2.3.5.1.3.0-1.0-5	[T1-R286]	TRITON shall allow the authorised user to import Lloyd's MIU dataset from a file into the local list.	BL 2												
4.2.3.5.1.3.0-1.0-6	[T1-R287]	TRITON shall allow the authorised user to export the selected Lloyd's MIU Data into a file in Recognised Export File Format.	BL 2												
4.2.3.5.1.3.0-1.0-7	[T1-R288]	TRITON shall allow the user to display Lloyd's MIU List in sortable tabular form with search and filter capabilities.	BL 2												

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
4.2.3.5.1.4		**Detention List**													
4.2.3.5.1.4.0-1.0-1	[T1-R289]	TRITON shall maintain a list of Web Sites to scrape to access information related to MOU Detention Lists.	BL 2												
4.2.3.5.1.4.0-1.0-2	[T1-R290]	TRITON shall allow the authorised user to manage (create, modify, delete) the List of Web Sites having MOU Detention Lists.	BL 2												
4.2.3.5.1.4.0-1.0-3	[T1-R291]	TRITON shall maintain a list of MOU Detention List to locally store information on banned and detained vessels for each Maritime Operation.	BL 2												
4.2.3.5.1.4.0-1.0-4	[T1-R292]	TRITON shall allow the authorised user to manage (create, modify, delete) the local MOU Detention List.	BL 2												
4.2.3.5.1.4.0-1.0-5	[T1-R293]	TRITON shall allow the authorised user to export filtered Detention Lists into a file in Recognised Export File Format.	BL 2												
4.2.3.5.1.4.0-1.0-6	[T1-R294]	TRITON shall allow the authorised user to import data from a file in Recognised Import File Format into a local Detention List.	BL 2												
4.2.3.5.1.4.0-1.0-7	[T1-R295]	TRITON shall allow the authorised user to be able to combine the MOU Detention Lists received from different sources by using the Detention List Correlation Criteria.	BL 2												
4.2.3.5.1.4.0-1.0-8	[T1-R296]	TRITON shall allow the authorised user set the rules for the Detention List Correlation Criteria for combining MOU Detention Lists received from different sources.	BL 2												
4.2.3.5.1.4.0-1.0-9	[T1-R297]	TRITON shall allow the authorised user to search for specific vessel(s) through the Detention Lists over selected Web Sites and display the result in sortable tabular format.	BL 2												
4.2.3.5.1.4.0-1.0-10	[T1-R298]	TRITON shall associate vessels in any of the Detention Lists in the local MOU Detention List with the vessels in Vessel Database.	BL 2												
4.2.3.5.1.4.0-1.0-11	[T1-R299]	TRITON shall allow the authorised user to search for a vessel in the local MOU Detention Lists, display the details of the recording and the associated vessel in the Vessel Database with an option to display its position on the GeoView.	BL 2												
4.2.3.5.1.4.0-1.0-12	[T1-R300]	TRITON shall allow the authorised user to display the local MOU Detention Lists in sortable tabular form with an option to display the position of the selected vessel.	BL 2												
4.2.3.5.1.5		**Merchant Ships Characteristics**													
4.2.3.5.1.5.0-1.0-1	[T1-R301]	TRITON shall maintain a list of Web Sites to scrape to access information related to Merchant Ship Characteristics.	BL 2												
4.2.3.5.1.5.0-1.0-2	[T1-R302]	TRITON shall allow the authorised user to manage (create, modify, delete) the List of Web Sites having Merchant Ship Characteristics.	BL 2												
4.2.3.5.1.5.0-1.0-3	[T1-R303]	TRITON shall allow the user to access the Merchant Ship Characteristics dataset on the specified sites.	BL 2												
4.2.3.5.1.5.0-1.0-4	[T1-R304]	TRITON shall allow the authorised user to manually update the Vessel Database by using the Merchant Ship Characteristics reference dataset.	BL 2												
4.2.3.5.1.6		**World Port Index**													
4.2.3.5.1.6.0-1.0-1	[T1-R305]	TRITON shall maintain an internal World Port Database to store the world-wide port information.	BL 2												
4.2.3.5.1.6.0-1.0-2	[T1-R306]	TRITON shall maintain a list of Naval Bases in the World Port Database based on country.	BL 3												
4.2.3.5.1.6.0-1.0-3	[T1-R307]	TRITON shall allow the authorised user to manage (create, modify, delete) the internal World Port Database.	BL 2												
4.2.3.5.1.6.0-1.0-4	[T1-R308]	TRITON shall be able to import World Port dataset from a selected online source.	BL 2												
4.2.3.5.1.6.0-1.0-5	[T1-R309]	TRITON shall allow the authorised user to manually import data from the World Port data published by U.S. National Geospatial-Intelligence Agency (NGA) into World Port Database.	BL 2												
4.2.3.5.1.6.0-1.0-6	[T1-R310]	TRITON shall allow the authorised user to import data from an external file in Recognised Import File Format to build the internal World Port Database.	BL 3												
4.2.3.5.1.6.0-1.0-7	[T1-R311]	TRITON shall allow the authorised user to export the internal database into a file in Recognised Export File Format.	BL 2												
4.2.3.5.1.6.0-1.0-8	[T1-R312]	TRITON shall use internal or external World Port data to support Destination Resolution process for AIS tracks.	BL 2												
4.2.3.5.1.6.0-1.0-9	[T1-R313]	TRITON shall allow the user to search for port(s) on either internal database or on-line database and display them as Reference Points on a Layer in the GeoView.	BL 2												
4.2.3.5.1.6.0-1.0-10	[T1-R314]	TRITON shall be able to store classified information about Naval Bases in the World Port Database.	BL 3												
4.2.3.5.1.6.0-1.0-11	[T1-R315]	TRITON shall allow the user to display the selected Ports or Naval Bases on the GeoView in a Layer.	BL 2												
4.2.3.5.1.6.0-1.0-12	[T1-R316]	TRITON shall be able to use a World Port Data Service if the available GIS Server can provide (e.g. WFS, Gazetteer Service).	BL 3												
4.2.3.5.1.7		**Shipping Route Networks**													
4.2.3.5.1.7.0-1.0-1	[T1-R317]	TRITON shall maintain a list of Shipping Route Networks to store Route Networks.	BL 2												
4.2.3.5.1.7.0-1.0-2	[T1-R318]	TRITON shall allow the authorised user to manage (create, modify, delete, import, export) the Route Networks in the Shipping Route Networks List.	BL 2												
4.2.3.5.1.7.0-1.0-3	[T1-R319]	TRITON shall allow the authorised user to import Shipping Route Networks from a file in Recognised Import File Format.	BL 2												
4.2.3.5.1.7.0-1.0-4	[T1-R320]	TRITON shall allow the authorised user to export Shipping Route Networks to a file in Recognised Export File Format.	BL 2												
4.2.3.5.1.7.0-1.0-5	[T1-R321]	TRITON shall allow the authorised user to create a new Route Network by defining nodes (ports) and legs by either entering the position data for nodes manually or pointing the positions of nodes on the GeoView.	BL 2												
4.2.3.5.1.7.0-1.0-6	[T1-R322]	TRITON shall allow the authorised user to perform statistics analysis of the followed routes at sea during a defined period in a defined area.	BL 2												
4.2.3.5.1.7.0-1.0-7	[T1-R323]	TRITON shall allow the authorised user to check the validity of the current Shipping Route Networks by visually comparing the result of statistical analysis and the existing network.	BL 2												
4.2.3.5.1.7.0-1.0-8	[T1-R324]	TRITON shall allow the authorised user to search for summary statistics for selected routes in a Shipping Route Network given in Recognised Import File Format.	BL 2												
4.2.3.5.1.7.0-1.0-9	[T1-R325]	TRITON shall be able to display a Shipping Route Network on the GeoView in a Layer.	BL 2												
4.2.3.5.1.7.0-1.0-10	[T1-R326]	TRITON shall allow the user to display the selected Shipping Route Networks to be displayed on the GeoView.	BL 2												
4.2.3.5.1.8		**Internet Searching**													
4.2.3.5.1.8.0-1.0-1	[T1-R327]	TRITON shall maintain a list of Recognised Web Sites and a list of Search Queries to be used for searching for information on the Internet.	BL 2												
4.2.3.5.1.8.0-1.0-2	[T1-R328]	TRITON shall allow the user to manage (create, modify, delete) the List of Recognised Web Sites to be used for Internet Searching.	BL 2												
4.2.3.5.1.8.0-1.0-3	[T1-R329]	TRITON shall allow the user to define a Search Query, including free text, to perform a search over external reference databases on the selected Recognised Web Sites.	BL 2												
4.2.3.5.1.8.0-1.0-4	[T1-R330]	TRITON shall allow the user to manage (create, modify, delete) the List of Search Queries and issue a new search by using an existing Search Query.	BL 2												
4.2.3.5.1.8.0-1.0-5	[T1-R331]	TRITON shall be able to use the search capability provided by the reference databases (e.g. Web services).	BL 2												
4.2.3.5.1.8.0-1.0-6	[T1-R332]	TRITON shall display the Internet Search results in sortable tabular format.	BL 2												
4.2.3.5.1.9		**Handling Country Codes**													
4.2.3.5.1.9.0-1.0-1	[T1-R333]	TRITON shall maintain a "NATO Standard Country Codes Table" compliant to [STANAG 1059].	BL 1												
4.2.3.5.1.9.0-1.0-2	[T1-R334]	TRITON shall allow the authorised user to manage (modify, import, export) the NATO Standard Country Codes Table.	BL 1												
4.2.3.5.1.9.0-1.0-3	[T1-R335]	TRITON shall maintain a "MMSI-Flag Mapping Table" compliant to the IMO Country Codes.	BL 2												
4.2.3.5.1.9.0-1.0-4	[T1-R336]	TRITON shall allow the authorised user to manage (modify, import, export) the MMSI-Flag Mapping Table.	BL 2												
4.2.3.5.1.9.0-1.0-5	[T1-R337]	TRITON shall allow the authorised user to import the MMSI-Flag Mapping Table and the NATO Standard Country Codes Table from a file in Recognised Import File Format.	BL 2												
4.2.3.5.1.9.0-1.0-6	[T1-R338]	TRITON shall allow the authorised user to export the MMSI-Flag Mapping Table and the NATO Standard Country Codes Table to a file in Recognised Export File Format.	BL 2												
4.2.3.5.1.9.0-1.0-7	[T1-R339]	TRITON shall automatically derive the Flag of an AIS track based on its MMSI Number using the MMSI-Flag Mapping Table.	BL 2												
4.2.3.5.1.9.0-1.0-8	[T1-R340]	TRITON shall be able to derive the Flag for a user-selected track from its Country Code using the NATO Standard Country Codes Table.	BL 1												
4.2.3.5.1.9.0-1.0-9	[T1-R341]	TRITON shall display the Flag of a track or vessel indicating its reference source as STANAG 1059 or IMO (for the countries that are not covered by STANAG 1059). The flag icon can be displayed together with the object symbol, and the detailed object information shall provide the descriptive information.	BL 2												
4.2.3.5.1.9.0-1.0-10	[T1-R342]	TRITON shall automatically assign FRIEND as the Standard Identity for an AIS track if its derived Flag is a NATO Nation.	BL 2												
4.2.3.5.2		**Order of Battle Information Management**													
4.2.3.5.2.0-1.0-1	[T1-R343]	TRITON shall maintain an ORBAT Database for each Maritime Operation.	BL 3												
4.2.3.5.2.0-1.0-2	[T1-R344]	TRITON shall allow the authorised user to manage (create, modify, delete) the ORBAT Database.	BL 3												
4.2.3.5.2.0-1.0-3	[T1-R345]	TRITON shall be able to receive Enemy ORBAT information from INTEL-FS and update the ORBAT Database after the authorised user's approval.	BL 3												
4.2.3.5.2.0-1.0-4	[T1-R346]	TRITON shall allow the authorised user to associate maritime vessels contained in the ORBAT Database with the Vessels in the Vessel Database.	BL 3												
4.2.3.5.2.0-1.0-5	[T1-R347]	TRITON shall be able to display the ORBAT information in a tree-like structure in AppView as selected by the user (e.g. Enemy ORBAT - Maritime).	BL 3												
4.2.3.5.2.0-1.0-6	[T1-R348]	TRITON shall allow the user to display the selected ORBAT elements at their last known positions in the GeoView (on a Layer) if they are associated with Vessels in the Vessel Database.	BL 3												
4.2.3.5.3		**Environmental Information Management**													
4.2.3.5.3.0-1.0-1	[T1-R349]	TRITON shall be able to receive the Environmental Information and display it in the GeoView as Layers with the symbology defined in [APP-6].	BL 3												
4.2.3.5.3.0-1.0-2	[T1-R350]	TRITON shall be able to import Environmental Information from a file in Recognised Import File Format and display it in the GeoView as Layers with the symbology defined in [APP-6].	BL 3												
4.2.3.5.4		**CBRN Defence Information Management**													
4.2.3.5.4.0-1.0-1	[T1-R351]	TRITON shall be able to receive CBRN Information and display it on a Layer in the GeoView with the symbology defined in [APP-6].	BL 3												
4.2.3.5.4.0-1.0-2	[T1-R352]	TRITON shall be able to import CBRN Information from a file in Recognised Import File Format and display it in the GeoView as Layers with the symbology defined in [APP-6].	BL 3												
4.2.3.5.5		**Intelligence Information Management**													
4.2.3.5.5.0-1.0-1	[T1-R353]	TRITON shall allow the user to request Intelligence Information given in the Description from INTEL-FS, and display the received information in text or sortable tabular form in the AppView.	BL 3												
4.2.3.5.5.0-1.0-2	[T1-R354]	TRITON shall be able to receive the Enemy ORBAT Data from INTEL-FS and update the ORBAT Database after the authorised user's approval.	BL 3												
4.2.3.5.5.0-1.0-3	[T1-R355]	TRITON shall be able to receive Area Information from INTEL-FS, and store it in the Reference Object Database as an Area after the authorised user's approval.	BL 3												
4.2.3.5.5.0-1.0-4	[T1-R356]	TRITON shall allow the authorised user to prepare a query regarding a maritime vessel, send it to INTEL-FS, and display the returned result in the AppView. If the INTEL-FS interface is not available. the user shall be notified.	BL 3												
4.2.4		**Maritime Operational Support**													
4.2.4.1		**Maritime Alerts Management**													
4.2.4.1.1		**Operational Alerts**													
4.2.4.1.1.1		**Area Alerts**													
4.2.4.1.1.1.0-1.0-1	[T1-R357]	TRITON shall allow the authorised user to define an Inclusive Area which raises an Alert when a track fulfilling the user-defined filter exits the Area, and passes through the Tolerance Distance.	BL 2												
4.2.4.1.1.1.0-1.0-2	[T1-R358]	TRITON shall allow the authorised user to define an Exclusive Area which raises an Alert when a track fulfilling the user-defined filter enters the Area. and passes through the Tolerance Distance.	BL 2												
4.2.4.1.1.1.0-1.0-3	[T1-R359]	TRITON shall monitor Exclusive and Inclusive Areas within each Maritime Operation independently and concurrently.	BL 2												
4.2.4.1.1.1.0-1.0-4	[T1-R360]	TRITON shall notify the authorised user with an Alert when an active Exclusive/Inclusive Area filter is satisfied.	BL 2												
4.2.4.1.1.1.0-1.0-5	[T1-R361]	TRITON shall not issue an Alert for those tracks that are already inside or outside the defined Exclusive/Inclusive Area when the Area is created.	BL 2												
4.2.4.1.1.1.0-1.0-6	[T1-R362]	TRITON shall monitor the Exclusive/Inclusive Areas with checks at Intervals set by the user.	BL 2												
4.2.4.1.1.1.0-1.0-7	[T1-R363]	TRITON shall monitor the Grouped Areas (Exclusive or Inclusive) as one single Area.	BL 2												
4.2.4.1.1.1.0-1.0-8	[T1-R364]	TRITON shall be able to display the Exclusive/Inclusive Areas in the GeoView Layers.	BL 3												
4.2.4.1.1.2		**Time-Late Alerts**													
4.2.4.1.1.2.0-1.0-1	[T1-R365]	TRITON shall monitor all tracks and issue Time-Late Alerts if the specified Time-Late duration for a track has elapsed.	BL 3												
4.2.4.1.1.2.0-1.0-2	[T1-R366]	TRITON shall allow the authorised users to create Time-Late Alerts for automatic or manual tracks.	BL 3												
4.2.4.1.1.2.0-1.0-3	[T1-R367]	TRITON shall allow the authorised user to set Time-Late value up to thirty-six (36) hours in steps of one (1) minute for a selected track.	BL 3												
4.2.4.1.1.3		**Maritime Anomaly Alerts**													
4.2.4.1.2		**Manual Alerts**													
4.2.4.1.2.0-1.0-1	[T1-R368]	TRITON shall allow the user to issue a Manual Alert by manually entering the type, explanation, track/vessel identification, area, position and the User Group to be notified.	BL 3												
4.2.4.1.2.0-1.0-2	[T1-R369]	TRITON shall allow the authorised user to issue a Manual Alert by selecting Maritime Operational Objects on the GeoView or by using the Search function.	BL 3												
4.2.4.1.2.0-1.0-3	[T1-R370]	TRITON shall allow the user to issue a Manual Alert by using Alert Templates as defined in the Description.	BL 3												
4.2.4.1.2.0-1.0-4	[T1-R371]	TRITON shall allow the authorised user to manage (create, modify, delete) the Alert Templates.	BL 3												
4.2.4.1.2.0-1.0-5	[T1-R372]	TRITON shall be able to disseminate a Manual Alert to the users of the specified User Group.	BL 3												
4.2.4.2		**Maritime Decision Support**													
4.2.4.2.1		**Track Statistics**													
4.2.4.2.1.0-1.0-1	[T1-R373]	TRITON shall provide the user with a capability to display Track Statistical Information as given in the Description.	BL 3												
4.2.4.2.1.0-1.0-2	[T1-R374]	TRITON shall compute Time-Late statistics for all or selected tracks in the Track Database in a given time window. The results shall be displayed in tabular format or graphs (if applicable).	BL 3												
4.2.4.2.1.0-1.0-3	[T1-R375]	TRITON shall display number of tracks according to their types, source, correlation and association status in a selected graph form (e.g. a bar chart of track types in a region).	BL 3												
4.2.4.2.1.0-1.0-4	[T1-R376]	TRITON shall allow the user to select tracks either using the pointing device or issuing a query on the Track Database and initiate statistics calculation.	BL 3												
4.2.4.2.2		**Furthest on Circle**													
4.2.4.2.2.0-1.0-1	[T1-R377]	TRITON shall be able to initiate a FOC at an indicated position and update it automatically.	BL 3												
4.2.4.2.2.0-1.0-2	[T1-R378]	TRITON shall be able to handle independent FOCs in each Maritime Operation.	BL 3												
4.2.4.2.2.0-1.0-3	[T1-R379]	TRITON shall allow the user to initiate a FOC at an indicated point on the GeoView or manual input or getting the last updated position of a track indicated by the user with either the pointing device or track ID.	BL 3												
4.2.4.2.2.0-1.0-4	[T1-R380]	TRITON shall use the last known speed for calculating the radius of the FOC and last known course and for calculating the possible location with given anticipated course change. The visualisation on the GeoView shall be updated automatically.	BL 3												
4.2.4.2.2.0-1.0-5	[T1-R381]	TRITON shall update the FOC at intervals defined in the Configuration Settings. The default shall be sixty (60) seconds.	BL 3												
4.2.4.2.2.0-1.0-6	[T1-R382]	TRITON shall display the FOC in the GeoView as an Application-based C2 Area.	BL 3												
4.2.4.2.2.0-1.0-7	[T1-R383]	TRITON shall keep a FOC active for the amount of time set by the user. The time range shall be ten (10) minutes to eight (8) hours with an option to extend when the user informed about automatic deletion.	BL 3												
4.2.4.2.3		**Status Board**													
4.2.4.2.3.0-1.0-1	[T1-R384]	TRITON shall maintain a Status Board for each user in each Maritime Operation.	BL 3												
4.2.4.2.3.0-1.0-2	[T1-R385]	TRITON Status Board shall be able display the changing information of selected Maritime Operational Objects in sortable tabular format.	BL 3												
4.2.4.2.3.0-1.0-3	[T1-R386]	TRITON shall allow the user to manage (create, modify, delete) Maritime Operational Objects for the Status Board and select the attributes to be displayed with respect to object types.	BL 3												
4.2.4.2.3.0-1.0-4	[T1-R387]	TRITON shall be able to display at least twenty (20) Maritime Operational Objects in a Status Board for each user.	BL 3												

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
4.2.4.2.3.0-1.0-5	[T1-R388]	TRITON shall keep the Status Board active until the user terminates it.	BL 3												
4.2.4.3		**Maritime Analysis Management**													
4.2.4.3.1		**Track Information Analysis**													
4.2.4.3.1.1		**Destination Validation**													
4.2.4.3.1.1.0-1.0-1	[T1-R389]	TRITON shall be able to validate the destination of a selected track by comparing the reported destination with the available locations in the World Port Index database, GeoNames geographical database or Gazetteer Service.	BL 2												
4.2.4.3.1.1.0-1.0-2	[T1-R390]	TRITON shall use an internal or external World Port Index Database to resolve destination.	BL 2												
4.2.4.3.1.1.0-1.0-3	[T1-R391]	TRITON shall be able to use Web services from GeoNames to resolve destination.	BL 2												
4.2.4.3.1.1.0-1.0-4	[T1-R392]	TRITON shall be able to use Gazetteer Service of the GIS Server to resolve destination if the service is available.	BL 2												
4.2.4.3.1.1.0-1.0-5	[T1-R393]	TRITON shall allow the authorised user to select the data source and validate the destination of a selected track manually in case more than one result are returned.	BL 2												
4.2.4.3.1.2		**Shipping Route Validation**													
4.2.4.3.1.2.0-1.0-1	[T1-R394]	TRITON shall derive the shortest usual path from the position of a selected vessel to its resolved destination using the selected Shipping Route.	BL 2												
4.2.4.3.1.2.0-1.0-2	[T1-R395]	TRITON shall allow the authorised user to perform Shipping Route Validation for a selected track.	BL 2												
4.2.4.3.1.3		**Vessel Identity Validation**													
4.2.4.3.1.3.0-1.0-1	[T1-R396]	TRITON shall perform Vessel Identity Validation process on a selected track using first the Vessel Database. If the track cannot be validated with the Vessel Database, then TRITON shall use the external reference databases, given in the Description, as indicated by the authorised user.	BL 2												
4.2.4.3.1.3.0-1.0-2	[T1-R397]	TRITON shall allow the authorised user to add on-line or off-line reference databases to be included during the Vessel Identity Validation process.	BL 2												
4.2.4.3.1.3.0-1.0-3	[T1-R398]	TRITON shall inform the authorised user about the result of the Vessel Identity Validation process.	BL 2												
4.2.4.3.1.4		**Maritime Pattern of Life Analysis**													
4.2.4.3.1.4.0-1.0-1	[T1-R399]	TRITON shall maintain a list of Maritime Pattern of Life Areas to assist analysis.	BL 2												
4.2.4.3.1.4.0-1.0-2	[T1-R400]	TRITON shall allow the authorised user to manage (create, modify, delete, export, import) the List of Maritime Pattern of Life Areas.	BL 2												
4.2.4.3.1.4.0-1.0-3	[T1-R401]	TRITON shall allow the authorised user to add descriptive annotations to a Maritime Pattern of Life Area.	BL 2												
4.2.4.3.1.4.0-1.0-4	[T1-R402]	TRITON shall allow the user to display the selected Maritime Pattern of Life Areas on the GeoView as a Layer.	BL 2												
4.2.4.3.2		**Maritime Incident Recording**													
4.2.4.3.2.0-1.0-1	[T1-R403]	TRITON shall be capable of exchanging information with JOCWatch using JOCWatch OIR Service as defined in [JOCWatch WSS].	BL 3												
4.2.4.3.2.0-1.0-2	[T1-R404]	TRITON shall be capable of importing EVENTEXPLOITREP XML schema from JOCWatch as defined in [JOCWatch WSS].	BL 3												
4.2.4.3.2.0-1.0-3	[T1-R405]	TRITON shall allow the authorised user to manage (create, modify, import, export, delete) the Maritime Incidents (given in the Description) via JOCWatch.	BL 3												
4.2.4.3.2.0-1.0-4	[T1-R406]	TRITON shall provide a search capability over the Incident Recordings in JOCWatch.	BL 3												
4.2.4.3.2.0-1.0-5	[T1-R407]	TRITON shall automatically associate, upon initiation by the authorised user, a Maritime Incident to one or more vessels in the Vessel Database if the vessel identification is indicated in the incident.	BL 3												
4.2.4.3.3		**Maritime Anomaly Detection**													
4.2.4.3.3.1		**Rendezvous Detection**													
4.2.4.3.3.1.0-1.0-1	[T1-R408]	TRITON shall maintain a list of Rendezvous Detection Areas for each Maritime Operation.	BL 2												
4.2.4.3.3.1.0-1.0-2	[T1-R409]	TRITON shall allow the authorised user to manage (create, modify, delete) the Rendezvous Detection Area List and the processes initiated by users.	BL 2												
4.2.4.3.3.1.0-1.0-3	[T1-R410]	TRITON shall be able to handle at least one-hundred (100) Rendezvous Detection Areas simultaneously in global scope.	BL 2												
4.2.4.3.3.1.0-1.0-4	[T1-R411]	TRITON shall be able to process at least one-thousand (1000) tracks in a Rendezvous Detection Area.	BL 2												
4.2.4.3.3.1.0-1.0-5	[T1-R412]	TRITON shall allow the authorised user to set the values used for the Rendezvous Detection Criteria and detection process (i.e. Area definition. distance. speed. periodicity).	BL 2												
4.2.4.3.3.1.0-1.0-6	[T1-R413]	TRITON shall apply Rendezvous Detection Criteria, as given in the Description, to all ships within the designated area periodically or manually.	BL 2												
4.2.4.3.3.1.0-1.0-7	[T1-R414]	TRITON shall notify the authorised user if the current number of Rendezvous Detection Areas with given intervals cannot be processed with the current processing load.	BL 2												
4.2.4.3.3.1.0-1.0-8	[T1-R415]	TRITON shall inform the authorised user about the status of the current Rendezvous Detection processes and issue notification in case the Rendezvous Detection Criteria matches.	BL 2												
4.2.4.3.3.1.0-1.0-9	[T1-R416]	TRITON shall display the result of selected Rendezvous Detection process in sortable tabular form with a capability of indicating the selected the track(s) in the GeoView.	BL 2												
4.2.4.3.3.2		**Positional Anomaly Detection**													
4.2.4.3.3.2.0-1.0-1	[T1-R417]	TRITON shall maintain a list of Positional Anomaly Detection Areas for each Maritime Operation.	BL 2												
4.2.4.3.3.2.0-1.0-2	[T1-R418]	TRITON shall allow the authorised user to manage (create, modify, delete) the Positional Anomaly Detection Area List and the processes initiated by the users.	BL 2												
4.2.4.3.3.2.0-1.0-3	[T1-R419]	TRITON shall be able to handle at least one-hundred (100) Positional Anomaly Detection Areas simultaneously in global scope.	BL 2												
4.2.4.3.3.2.0-1.0-4	[T1-R420]	TRITON shall be able to handle at least ten (10) Usual Areas for each Positional Anomaly Detection Area, which are excluded in checks.	BL 2												
4.2.4.3.3.2.0-1.0-5	[T1-R421]	TRITON shall be able to process at least one-thousand (1000) tracks in a Positional Anomaly Detection Area in less than ten (10) seconds.	BL 2												
4.2.4.3.3.2.0-1.0-6	[T1-R422]	TRITON shall allow the authorised user to configure the Positional Anomaly Detection Criteria and detection process (i.e. Area definitions, speed, intervals).	BL 2												
4.2.4.3.3.2.0-1.0-7	[T1-R423]	TRITON shall apply Positional Anomaly Detection Criteria, given in the Description, to all tracks and vessels within the designated area periodically at given intervals or when manually initiated by the user.	BL 2												
4.2.4.3.3.2.0-1.0-8	[T1-R424]	TRITON shall notify the authorised user if the current number of Positional Anomaly Detection Areas with given intervals cannot be processed with the current processing load.	BL 2												
4.2.4.3.3.2.0-1.0-9	[T1-R425]	TRITON shall inform the authorised user about the status of the current Positional Anomaly Detection process and issue notification in case the Positional Anomaly Detection Criteria matches.	BL 2												
4.2.4.3.3.2.0-1.0-10	[T1-R426]	TRITON shall display the result of the Positional Anomaly Detection process in AppView, in sortable tabular form, with a capability of indicating the selected the track(s) on the GeoView.	BL 2												
4.2.4.3.3.3		**Destination Anomaly Detection**													
4.2.4.3.3.3.0-1.0-1	[T1-R427]	TRITON shall perform Destination Anomaly Detection process for a selected track using the Destination Anomaly Detection Criteria given in the Description.	BL 2												
4.2.4.3.3.3.0-1.0-2	[T1-R428]	TRITON shall allow the authorised user to initiate Destination Anomaly Detection process for a selected track and display the result.	BL 2												
4.2.4.3.3.4		**Estimated Time of Arrival Anomaly Detection**													
4.2.4.3.3.4.0-1.0-1	[T1-R429]	TRITON shall calculate ETA of a selected track using its present speed and its resolved destination if the range is within the user-selected limits.	BL 2												
4.2.4.3.3.4.0-1.0-2	[T1-R430]	TRITON shall allow the authorised user to select a track, define the minimum and maximum limits for speed, minimum and maximum limits for range and initiate the ETA verification.	BL 2												
4.2.4.3.3.4.0-1.0-3	[T1-R431]	TRITON shall notify the user if the calculated speed is smaller than the minimum limit or greater than the maximum limit.	BL 2												
4.2.4.3.3.4.0-1.0-4	[T1-R432]	TRITON shall resolve the destination of the selected track prior to ETA calculation and notify the user if the destination is not resolved.	BL 2												
4.2.4.3.3.5		**Historical Anomaly Detection**													
4.2.4.3.3.5.0-1.0-1	[T1-R433]	TRITON shall be able to monitor and detect positional dislocation of vessels assigned to a particular Shipping Route based on user-defined Historical Anomaly Detection Rules.	BL 2												
4.2.4.3.3.5.0-1.0-2	[T1-R434]	TRITON shall allow the authorised user to define a Shipping Route with a range and set the Historical Anomaly Detection Rules given in the Description.	BL 2												
4.2.4.3.3.5.0-1.0-3	[T1-R435]	TRITON shall perform Historical Anomaly Detection as initiated by the users and notify the initiating user about the status of process.	BL 2												
4.2.4.3.3.6		**Kinematic Anomaly Detection**													
4.2.4.3.3.6.0-1.0-1	[T1-R436]	TRITON shall be able to detect course and speed changes based on user-defined rules for tracks that are in a given Area.	BL 2												
4.2.4.3.3.6.0-1.0-2	[T1-R437]	TRITON shall allow the authorised user to define an Area and rules for kinematic anomaly detection for those tracks entering that Area.	BL 2												
4.2.4.3.3.6.0-1.0-3	[T1-R438]	TRITON shall perform Kinematic Anomaly Detection as initiated by the users and notify the initiating user about the status of process.	BL 2												
4.2.4.4		**Geospatial Drawing Management**													
4.2.4.4.1		**C2 Drawing Handling**													
4.2.4.4.1.0-1.0-1	[T1-R439]	TRITON shall maintain a list of C2 Drawings for each Maritime Operation.	BL 1												
4.2.4.4.1.0-1.0-2	[T1-R440]	TRITON shall allow the user to manage (create, modify, delete, activate/deactivate) the C2 Drawing List.	BL 1												
4.2.4.4.1.0-1.0-3	[T1-R441]	TRITON shall allow the user to use the GeoView Drawing capability for creating C2 Drawings.	BL 1												
4.2.4.4.1.0-1.0-4	[T1-R442]	TRITON shall allow the user to set attributes (properties) of a C2 Drawing.	BL 1												
4.2.4.4.1.0-1.0-5	[T1-R443]	TRITON shall activate or deactivate a C2 Drawing according to its DTG settings.	BL 1												
4.2.4.4.1.0-1.0-6	[T1-R444]	TRITON shall allow the user to activate or deactivate a C2 Drawing.	BL 1												
4.2.4.4.1.0-1.0-7	[T1-R445]	TRITON shall display an active C2 Drawing in the GeoView on a user-specified Layer.	BL 1												
4.2.4.4.1.0-1.0-8	[T1-R446]	TRITON shall notify the authorised user fifteen (15) minutes before a C2 Drawing is automatically deleted if it has DTG of Deletion.	BL 1												
4.2.4.4.2		**C2 Area Handling**													
4.2.4.4.2.1		**User-based C2 Area Handling**													
4.2.4.4.2.1.0-1.0-1	[T1-R447]	TRITON shall maintain a list of User-based C2 Area Templates.	BL 2												
4.2.4.4.2.1.0-1.0-2	[T1-R448]	TRITON shall allow the authorised user to manage (create, modify, delete) the User-based C2 Area Template List supported by the GeoView.	BL 2												
4.2.4.4.2.1.0-1.0-3	[T1-R449]	TRITON shall maintain a list of User-based C2 Areas for each Maritime Operation.	BL 2												
4.2.4.4.2.1.0-1.0-4	[T1-R450]	TRITON shall allow the authorised user to manage (create, modify, delete, activate/deactivate) the User-based C2 Areas List.	BL 2												
4.2.4.4.2.1.0-1.0-5	[T1-R451]	TRITON shall allow the user to create a User-based C2 Area from the available Area Templates and set its attributes (properties).	BL 2												
4.2.4.4.2.1.0-1.0-6	[T1-R452]	TRITON shall display a User-based C2 Area on the GeoView on a user-specified Layer when activated by the user.	BL 2												
4.2.4.4.2.1.0-1.0-7	[T1-R453]	TRITON shall notify the authorised user fifteen (15) minutes before a User-based C2 Area is automatically deleted if it has DTG of Deletion.	BL 2												
4.2.4.4.2.1.0-1.0-8	[T1-R454]	TRITON shall implement Templates for the User-based C2 Areas given in the Description.	BL 2												
4.2.4.4.2.2		**Application-based C2 Area Handling**													
4.2.4.4.2.2.0-1.0-1	[T1-R455]	TRITON shall maintain a list of Application-based C2 Area Templates.	BL 2												
4.2.4.4.2.2.0-1.0-2	[T1-R456]	TRITON shall allow the authorised user to manage (create, modify, delete) the Application-based C2 Area Template List.	BL 2												
4.2.4.4.2.2.0-1.0-3	[T1-R457]	TRITON shall maintain a list of Application-based C2 Areas for each Maritime Operation.	BL 2												
4.2.4.4.2.2.0-1.0-4	[T1-R458]	TRITON shall be able to manage (create, update, activate/deactivate, delete) an Application-based C2 Drawing automatically.	BL 2												
4.2.4.4.2.2.0-1.0-5	[T1-R459]	TRITON shall display an Application-based C2 Drawing in the GeoView on a user-specified Layer when activated automatically.	BL 2												
4.2.4.4.2.2.0-1.0-6	[T1-R460]	TRITON shall implement Templates for the Application-based C2 Areas given in the Description.	BL 2												
4.2.4.5		**Tools**													
4.2.4.5.1		**Unit Converter**													
4.2.4.5.1.0-1.0-1	[T1-R461]	TRITON shall provide a Unit Converter application supported by a conversion service, which shall be made available to internal and external use.	BL 3												
4.2.4.5.1.0-1.0-2	[T1-R462]	TRITON Unit Converter shall provide the Conversion Functions conversion of nautical measurement, speed, weight/mass, area, volume. temperature and density/pressure values.	BL 3												
4.2.4.5.1.0-1.0-3	[T1-R463]	TRITON shall allow the user to activate the Unit Converter and perform conversions for the given values between selected units.	BL 3												
4.2.4.5.2		**Coordinate Converter**													
4.2.4.5.2.0-1.0-1	[T1-R464]	TRITON shall be able to convert position data from/to any of the Latitude/Longitude, Geodetic Datum, UTM, CGRS and MGRS values.	BL 3												
4.2.4.5.2.0-1.0-2	[T1-R465]	TRITON shall allow the user to enter a geographical position in one coordinate system to convert it into a selected coordinate system. A conversion service, available to internal and external use should be used (it may be combined with the unit converter).	BL 3												
4.2.4.5.3		**Logbook**													
4.2.4.5.3.0-1.0-1	[T1-R466]	TRITON shall maintain a Logbook for each Maritime Operation.	BL 2												
4.2.4.5.3.0-1.0-2	[T1-R467]	TRITON shall allow the authorised user to configure the Logbook Action List.	BL 2												
4.2.4.5.3.0-1.0-3	[T1-R468]	TRITON shall create and start a Logbook automatically when a new Maritime Operation is created.	BL 2												
4.2.4.5.3.0-1.0-4	[T1-R469]	TRITON shall allow the authorised user to explicitly stop logging data into the Logbook and start again.	BL 2												
4.2.4.5.3.0-1.0-5	[T1-R470]	TRITON shall allow the authorised user to make an entry in free text into the Logbook.	BL 2												
4.2.4.5.3.0-1.0-6	[T1-R471]	TRITON shall allow the user to view the Logbook in sortable tabular format with a search capability.	BL 2												
4.2.4.5.3.0-1.0-7	[T1-R472]	TRITON shall log an event into the Logbook with the current user, description and timestamp.	BL 2												
4.2.4.5.3.0-1.0-8	[T1-R473]	TRITON shall allow the authorised user export the Logbook in Recognised Output File Format.	BL 2												
4.2.4.5.3.0-1.0-9	[T1-R474]	TRITON shall archive the Logbook after a period of time as configured by the authorised user. By default the Logbook shall be archived after thirty (30) days of Logging Period. If logging activity reaches the limit of the default log file size before the Logging Period is completed, TRITON shall create another Logbook file and continue logging.	BL 1												
4.2.5		**Maritime Operational Planning and Execution**													
4.2.5.1		**Maritime Task Organization Management**													
4.2.5.1.0-2.0-1	[T1-R475]	TRITON shall maintain a list of Maritime Task Organization with attributes as given in the Description for each identified Maritime Operation.	BL 3												
4.2.5.1.0-2.0-2	[T1-R476]	TRITON shall allow the authorised user to manage (create, modify, save, delete, import, export) the Maritime Task Organization List.	BL 3												
4.2.5.1.0-2.0-3	[T1-R477]	TRITON shall display Maritime Task Organizations in a tree-like structure in the AppView, starting from Maritime Operation down to Task Elements with an option to expand at each level.	BL 3												
4.2.5.1.0-2.0-4	[T1-R478]	TRITON shall allow the user to view the selected units of a Maritime Task Organization in the GeoView.	BL 3												
4.2.5.2		**Area of Interest Management**													
4.2.5.2.0-1.0-1	[T1-R479]	TRITON shall maintain a list of Areas of Interest (AOI) for each Maritime Operation.	BL 3												
4.2.5.2.0-1.0-2	[T1-R480]	TRITON shall allow the authorised user to manage (create, modify, delete) the AOI List.	BL 3												
4.2.5.2.0-1.0-3	[T1-R481]	TRITON shall allow the authorised user to create a static AOI with a point of reference at an indicated geographic location.	BL 3												
4.2.5.2.0-1.0-4	[T1-R482]	TRITON shall allow the authorised user to slave an AOI to a vessel at its point of reference.	BL 3												

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
4.2.5.2.0-1.0-5	[T1-R483]	TRITON shall allow the authorised user to create an AOI by either entering location values or drawing as an Area and display it on the GeoView as a laver.	BL 3												
4.2.5.2.0-1.0-6	[T1-R484]	TRITON shall allow the authorised user to associate an AOI to a group. element or unit in an Maritime Task Organization.	BL 3												
4.2.5.3		**Rules of Engagement Management**													
4.2.5.3.0-1.0-1	[T1-R485]	TRITON shall maintain an ROE List for each Maritime Operation	BL 3												
4.2.5.3.0-1.0-2	[T1-R486]	TRITON shall allow the authorised user to manage (create, modify, delete) the ROE List.	BL 3												
4.2.5.3.0-1.0-3	[T1-R487]	TRITON shall be able to build the ROE List from a received ROEAUTH Message.	BL 3												
4.2.5.3.0-1.0-4	[T1-R488]	TRITON shall allow the user to display the ROE Profile.	BL 3												
4.2.5.3.0-1.0-5	[T1-R489]	TRITON shall maintain an ROE Request List for each Maritime Operation.	BL 3												
4.2.5.3.0-1.0-6	[T1-R490]	TRITON shall allow the authorised user to process the requests in the ROE Request List.	BL 3												
4.2.5.3.0-1.0-7	[T1-R491]	TRITON shall allow the authorised user to issue ROE Request to be processed by the higher command. Each Request will automatically enter into the ROE Request List.	BL 3												
4.2.5.3.0-1.0-8	[T1-R492]	TRITON shall be able to generate ROEREQ Message to assist the users of subordinate commands to prepare the message.	BL 3												
4.2.5.3.0-1.0-9	[T1-R493]	TRITON shall be able to generate ROEIMPL Message based on the selected ROEs in the ROE List to distribute them to subordinate commands.	BL 3												
4.2.5.3.0-1.0-10	[T1-R494]	TRITON shall allow the authorised user to set the ROE Status (implementation or cancellation) and notify the authorised users of the subordinate commands.	BL 3												
4.2.5.3.0-1.0-11	[T1-R495]	TRITON shall be able to send the ROEREQ and ROEIMPL Messages to MHS for distribution.	BL 3												
4.2.5.4		**Maritime Planning Aids**													
4.2.5.4.1		**Disposition Management**													
4.2.5.4.1.0-1.0-1	[T1-R496]	TRITON shall maintain a list of Dispositions for each Maritime Operation.	BL 3												
4.2.5.4.1.0-1.0-2	[T1-R497]	TRITON shall allow the authorised user to manage (create, modify, delete) the Disposition List.	BL 3												
4.2.5.4.1.0-1.0-3	[T1-R498]	TRITON shall allow the authorised user to set visibility, Security Classification and Releasability Label of Dispositions.	BL 3												
4.2.5.4.1.0-1.0-4	[T1-R499]	TRITON shall display Dispositions in the GeoView as a Layer with user-selected label options.	BL 3												
4.2.5.4.1.1		**Disposition Four Whiskey**													
4.2.5.4.1.1.0-1.0-1	[T1-R500]	TRITON shall maintain a list of Disposition 4W for each Maritime Operation.	BL 3												
4.2.5.4.1.1.0-1.0-2	[T1-R501]	TRITON shall allow the authorised user to manage (create. modify. delete) Disposition 4W List.	BL 3												
4.2.5.4.1.1.0-1.0-3	[T1-R502]	TRITON shall have Disposition 4W Editor.	BL 3												
4.2.5.4.1.1.0-1.0-4	[T1-R503]	TRITON shall allow the authorised user to generate Disposition 4W i.a.w. ATP-01 on a pointer position or on a selected track with given attributes.	BL 3												
4.2.5.4.1.1.0-1.0-5	[T1-R504]	TRITON shall allow the authorised user to select the Disposition 4W grid boxes by either using the pointing device or manually entering the their identification.	BL 3												
4.2.5.4.1.1.0-1.0-6	[T1-R505]	TRITON shall allow the authorised user set visibility and status of Disposition 4W.	BL 3												
4.2.5.4.1.1.0-1.0-7	[T1-R506]	TRITON shall be able to display the Disposition 4W in the GeoView as a Layer.	BL 3												
4.2.5.4.2		**Position and Intended Movement**													
4.2.5.4.2.0-1.0-1	[T1-R507]	TRITON shall maintain a list of Position and Intended Movement (PIM) Routes for each Maritime Operation.	BL 3												
4.2.5.4.2.0-1.0-2	[T1-R508]	TRITON shall allow the authorised user to manage (create. modify. delete) the PIM Route List.	BL 3												
4.2.5.4.2.0-1.0-3	[T1-R509]	TRITON shall allow the authorised user to create a PIM Route in Speed-oriented Mode by entering the constant speed and creating the Waypoints. TRITON shall calculate the DTG of each Waypoint automatically.	BL 3												
4.2.5.4.2.0-1.0-4	[T1-R510]	TRITON shall allow the authorised user to create a PIM Route in Time-oriented Mode by entering the DTG of the Waypoints. TRITON shall calculate the speed to be used at each Leg automatically.	BL 3												
4.2.5.4.2.0-1.0-5	[T1-R511]	TRITON shall allow the authorised user to create a PIM Route in the GeoView, indicating the start position and Waypoints.	BL 3												
4.2.5.4.2.0-1.0-6	[T1-R512]	TRITON shall be able to display the selected PIM Routes as a Layer in the GeoView according to their visibility settings.	BL 3												
4.2.5.4.3		**Q-Route Management**													
4.2.5.4.3.0-1.0-1	[T1-R513]	TRITON shall maintain a list of Q-Routes for each Maritime Operation.	BL 3												
4.2.5.4.3.0-1.0-2	[T1-R514]	TRITON shall allow the authorised user to manage (create, modify, delete, export, import) the Q-Route List.	BL 3												
4.2.5.4.3.0-1.0-3	[T1-R515]	TRITON shall allow the authorised user to create a Q-Route by entering attribute values manually.	BL 3												
4.2.5.4.3.0-1.0-4	[T1-R516]	TRITON shall allow the authorised user to create a Q-Route by using the Geospatial Drawings and entering the values for the attributes.	BL 3												
4.2.5.4.3.0-1.0-5	[T1-R517]	TRITON shall display Q-Routes in Layers in the GeoView according to their visibility settings.	BL 3												
4.2.5.4.4		**Navigational Area Management**													
4.2.5.4.4.0-1.0-1	[T1-R518]	TRITON shall maintain a list of Navigational Areas for each Maritime Operation.	BL 2												
4.2.5.4.4.0-1.0-2	[T1-R519]	TRITON shall allow the authorised user to manage (create. modify. delete. export. import) the Navigational Area List.	BL 2												
4.2.5.4.4.0-1.0-3	[T1-R520]	TRITON shall allow the authorised user to create a Navigational Area using the Reference Object-Area.	BL 2												
4.2.5.4.4.0-1.0-4	[T1-R521]	TRITON shall allow the user to display selected Navigational Areas in the GeoView.	BL 2												
4.2.5.5		**Subsurface Mission Space Management**													
4.2.5.5.1		**WSM/PMI Area Definition**													
4.2.5.5.1.0-1.0-1	[T1-R522]	TRITON shall maintain a WSM/PMI Database to keep WSM/PMI Areas and tracks (routes) for supporting both WSM and PMI Functions.	BL 3												
4.2.5.5.1.0-1.0-2	[T1-R523]	TRITON shall allow the authorised user to set Visibility, Security Classification, Releasability Label of WSM/PMI Areas and modify their drawing attributes (drawing colour. fill colour. transparency).	BL 3												
4.2.5.5.1.0-1.0-3	[T1-R524]	TRITON shall be able to display the WSM/PMI Areas and Moving Havens in the GeoView.	BL 3												
4.2.5.5.1.0-1.0-4	[T1-R525]	TRITON shall be able to display all WSM/PMI Areas in sortable tabular format in the AppView.	BL 3												
4.2.5.5.1.0-1.0-5	[T1-R526]	TRITON shall allow the authorised user to filter the tabular format of the WSM/PMI Areas displayed in the AppView with an option to display the selected ones in the GeoView.	BL 3												
4.2.5.5.1.0-1.0-6	[T1-R527]	TRITON shall allow the user to select the WSM/PMI Areas to display them in the GeoView.	BL 3												
4.2.5.5.2		**Interference Check**													
4.2.5.5.2.0-1.0-1	[T1-R528]	TRITON shall be able to perform Interference Check according to the Interference Check Criteria (as given in the Description) for overlapping WSP/PMI Areas and tracks assigned to different units under consideration of depth separation.	BL 3												
4.2.5.5.2.0-1.0-2	[T1-R529]	TRITON shall allow the authorised user to set a time and a horizontal distance value which is added to each direction of all WSM/PMI Areas before checking for overlap.	BL 3												
4.2.5.5.2.0-1.0-3	[T1-R530]	TRITON shall notify the authorised user if there is an interference with other areas when the user creates a new area and initiates a check process.	BL 3												
4.2.5.5.2.0-1.0-4	[T1-R531]	TRITON shall allow the authorised user to calculate the vertical separation based on ATP-18(G)(NAVY) Para. 0226 (NU).	BL 3												
4.2.5.5.2.0-1.0-5	[T1-R532]	TRITON shall allow the authorised user to exclude specific WSM/PMI Areas from Interference Checks for specified units.	BL 3												
4.2.5.5.2.0-1.0-6	[T1-R533]	TRITON shall display all WSP/PMI Area interferences in sortable tabular format in the AppView.	BL 3												
4.2.5.5.2.0-1.0-7	[T1-R534]	TRITON shall be able to animate a selected WSM/PMI Area and Moving Haven starting from a given position, time, duration and update rate. Forward or backward animation shall be possible. The animation capability of the GeoView (Animating C4ISR Objects) shall be used.	BL 3												
4.2.5.5.2.0-1.0-8	[T1-R535]	TRITON shall allow the authorised user to initiate an animation for a selected WSM/PMI Area and Moving Haven by setting the starting position, time, duration of animation and interval for position update with at least one (1) minute steps.	BL 3												
4.2.5.5.2.0-1.0-9	[T1-R536]	TRITON shall allow the authorised user to pause the animation, modify the WSM/PMI Area and Moving Haven and resume the animation. The Timeline of the GeoView may be used to control the animation.	BL 3												
4.2.5.5.2.0-1.0-10	[T1-R537]	TRITON shall allow the authorised user to set the start time of the WSM/PMI animation to the beginning of a selected interference.	BL 3												
4.2.5.5.2.0-1.0-11	[T1-R538]	TRITON shall be able to generate SUBNOTE and SUBNOTE CHANGE messages based on user-selected Moving Havens. The user shall be able to send these messages to the Message Handling System.	BL 3												
4.2.5.5.3		**Prevention of Mutual Interference**													
4.2.5.5.3.0-1.0-1	[T1-R539]	TRITON shall allow the authorised user to manage (create, modify, delete) the PMI Areas in the WSM/PMI Database.	BL 3												
4.2.5.5.3.0-1.0-2	[T1-R540]	TRITON shall be able to generate PMI Areas as a Formatted Message.	BL 3												
4.2.5.5.3.0-1.0-3	[T1-R541]	TRITON shall allow the authorised user to generate SUBDANGER and UW OBJECT NOTE Messages. The user shall be able to send these messages to the Message Handling System.	BL 3												
4.2.5.5.4		**Water Space Management**													
4.2.5.5.4.0-1.0-1	[T1-R542]	TRITON shall allow the authorised user to manage (create, modify, delete) the WSM Areas in the WSM/PMI Database.	BL 3												
4.2.5.5.4.0-1.0-2	[T1-R543]	TRITON shall maintain a list of WSM Requests.	BL 3												
4.2.5.5.4.0-1.0-3	[T1-R544]	TRITON shall allow the authorised user to manage (create, modify, delete) the WSM Request List.	BL 3												
4.2.5.5.4.0-1.0-4	[T1-R545]	TRITON shall allow the authorised user to create a WSM Request in the WSM Request List when a WSM REQ message is received.	BL 3												
4.2.5.5.4.0-1.0-5	[T1-R546]	TRITON shall be able to generate BARNSTORM, WSM ALLOCSTAT, SUBTASK and SUBNOI messages based on user-selected WSM Areas. The user shall be able to send these messages to the Message Handling System.	BL 3												
4.2.6		**Maritime Messaging and Communication**													
4.2.6.1		**Message Database Management**													
4.2.6.1.0-1.0-1	[T1-R547]	TRITON shall maintain a Message Database to store incoming and outgoing messages.	BL 3												
4.2.6.1.0-1.0-2	[T1-R548]	TRITON shall allow the authorised user to manage (add, edit, delete) the Message Database.	BL 3												
4.2.6.1.0-1.0-3	[T1-R549]	TRITON shall allow the user to search for a message according to given set of attributes, display the results in sortable tabular format and display the content of a selected message in the AppView.	BL 3												
4.2.6.1.0-1.0-4	[T1-R550]	TRITON shall allow the authorised user to archive Message Database and import archived data when needed.	BL 3												
4.2.6.1.0-1.0-5	[T1-R551]	TRITON shall provide a Message Editor with configurable default fields. The Message Editor shall have basic text editing functions to allow the user to type messages and save them.	BL 3												
4.2.6.2		**Receiving Messages**													
4.2.6.2.0-1.0-1	[T1-R552]	TRITON shall be able to receive ADatP-3 Formatted Messages from external systems via System Interface Services.	BL 1												
4.2.6.2.0-1.0-2	[T1-R553]	TRITON shall be able to receive OTH-T GOLD messages from external systems via System Interface Services.	BL 1												
4.2.6.2.0-1.0-3	[T1-R554]	TRITON shall validate received ADatP-3 Formatted Messages and notify the authorised user if a Formatted Message is not validated.	BL 3												
4.2.6.2.0-1.0-4	[T1-R555]	TRITON shall allow the authorised user to set criteria to exclude messages from parsing.	BL 3												
4.2.6.2.0-1.0-5	[T1-R556]	TRITON shall store unrecognised messages for editing and reparsing.	BL 3												
4.2.6.2.0-1.0-6	[T1-R557]	TRITON shall provide adequate documentation (e.g. Software Requirements Specification and Software Design Description) for the mappings and transformations between the supported message types and the associated Maritime Information Entity. An adequate specification is one that enables a programmer or user to understand the data transformation and validate its correctness.	BL 3												
4.2.6.3		**Sending Messages**													
4.2.6.3.0-1.0-1	[T1-R558]	TRITON shall be able to send prepared messages to selected e-mail addresses via SMTP.	BL 3												
4.2.6.3.0-1.0-2	[T1-R559]	TRITON shall be able to export the prepared messages as text files.	BL 3												
4.2.6.4		**Handling ADatP-3 Messages**													
4.2.6.4.1		**Processing ADatP-3 Formatted Messages**													
4.2.6.4.1.0-1.0-1	[T1-R560]	TRITON shall be able to process NAVSITSUM message, extract the track reports from the message and either create new Tracks or update the existing Tracks.	BL 3												
4.2.6.4.1.0-1.0-2	[T1-R561]	TRITON shall be able to process NAVSITREP message, extract the track report from the message and either create a new Track or update the existing Track.	BL 3												
4.2.6.4.1.0-1.0-3	[T1-R562]	TRITON shall be able to process MARINTSUM message, extract the contact report from the message and either create new Tracks or update the existing Tracks.	BL 3												
4.2.6.4.1.0-1.0-4	[T1-R563]	TRITON shall be able to process MARINTREP message, extract the contact report from the message and either create a new Track or update the existing Track.	BL 3												
4.2.6.4.1.0-1.0-5	[T1-R564]	TRITON shall be able to process RMPSITSUM message, extract the track report or the Reference Object data from the message and then either create new Tracks and Reference Objects or update the existing ones.	BL 3												
4.2.6.4.1.0-1.0-6	[T1-R565]	TRITON shall be able to process NAVPOSREP message, extract the track report from the message and either create new Tracks or update the existing Tracks.	BL 3												
4.2.6.4.1.0-1.0-7	[T1-R566]	TRITON shall be able to process LOCATOR message, extract the track report from the message and either create new Tracks or update the existing Tracks.	BL 3												
4.2.6.4.1.0-1.0-8	[T1-R567]	TRITON shall be able to process PURPLE message, and display PURPLE area/route as a C2 Area drawing with the provided track information.	BL 3												
4.2.6.4.1.0-1.0-9	[T1-R568]	TRITON shall be able to process OPSTAT UNIT message, extract the unit report from the message and either create a new friendly Track or update the existing friendly Track. If the unit is in the Maritime Task Organization, it shall be updated accordingly.	BL 3												
4.2.6.4.1.0-1.0-10	[T1-R569]	TRITON shall be able to process SUBNOTE and SUBNOTE CHANGE messages, extract the PMI Moving Haven from the message and create the requested Moving Haven entry in the WSM/PMI Database.	BL 3												
4.2.6.4.1.0-1.0-11	[T1-R570]	TRITON shall be able to process SUBNOTE REQ and SUBNOTE CHANGE REQ messages, extract the PMI Moving Haven from the message and create the requested Moving Haven entry in the WSM/PMI Database.	BL 3												
4.2.6.4.1.0-1.0-12	[T1-R571]	TRITON shall be able to process BARNSTORM, WSM ALLOCSTAT, SUBDANGER, SUBNOI and UW OBJECT NOTE messages, extract the WSM/PMI Areas and create a WSM/PMI Area in the WSM/PMI Database if not exists already.	BL 3												
4.2.6.4.1.0-1.0-13	[T1-R572]	TRITON shall be able to process WSM REQ message, extract the WSM Area from the message and create the requested WSM Area in the WSM/PMI Database.	BL 3												
4.2.6.4.1.0-1.0-14	[T1-R573]	TRITON shall be able to process ROEREQ message, extract the ROE information from the message and update the ROE Request List (see ROE Management).	BL 3												
4.2.6.4.1.0-1.0-15	[T1-R574]	TRITON shall be able to process ROEAUTH message, extract the ROE information from the message and update the ROE List.	BL 3												
4.2.6.4.1.0-1.0-16	[T1-R575]	TRITON shall be able to process ROEIMPL message, extract the ROE information from the message and update the ROE List.	BL 3												
4.2.6.4.1.0-1.0-17	[T1-R576]	TRITON shall allow the authorised user to process a selected ADatP-3 Formatted Message text file as an input for parsing.	BL 3												
4.2.6.4.1.0-1.0-18	[T1-R577]	TRITON should have a reolaceable module that handles the parsing of Formatted Messages.	BL 3												
4.2.6.4.2		**Generating ADatP-3 Messages**													
4.2.6.4.2.0-1.0-1	[T1-R578]	TRITON shall be able to generate ADatP-3 Formatted Messages and allow the authorised user to edit the message.	BL 3												
4.2.6.4.2.0-1.0-2	[T1-R579]	TRITON shall allow the authorised user to change the configuration of the fields of the message format.	BL 3												
4.2.6.4.2.0-1.0-3	[T1-R580]	TRITON shall be able to get semi-static parameters for ADatP-3 Formatted Messages from the System Operational Parameters.	BL 3												
4.2.6.4.2.0-1.0-4	[T1-R581]	TRITON should have a replaceable module that handles the generation of Formatted Messages.	BL 3												
4.2.6.5		**Handling OTH-T GOLD Messages**													
4.2.6.5.1		**Processing OTH-T GOLD Messages**													
4.2.6.5.1.0-1.0-1	[T1-R582]	TRITON shall be able to process OTH-T GOLD CONTACT REPORT message, extract the track report from the message and either create a new Track or update the existing Track.	BL 1												

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
4.2.6.5.1.0-1.0-2	[T1-R583]	TRITON shall be able to process OTH-T GOLD ENHANCED CONTACT REPORT message, extract the track report from the message and either create a new Track or uodate the existina Track.	BL 1												
4.2.6.5.1.0-1.0-3	[T1-R584]	TRITON shall be able to process OTH-T GOLD OVERLAY-2 message, extract the information describing the graphics from the message and either create a new Reference Object (Reference Point, Line, Area) or update the existing one.	BL 3												
4.2.6.5.1.0-1.0-4	[T1-R585]	TRITON shall be able to process OTH-T GOLD OVERLAY-3 message, extract the information describing the graphics from the message and either create a new Reference Object (Reference Point, Line, Area) or update the existing one.	BL 3												
4.2.6.5.1.0-1.0-5	[T1-R586]	TRITON shall be able to process OTH-T GOLD PIMTRACK message, extract the included PIM track and create the PIM Route.	BL 3												
4.2.6.5.1.0-1.0-6	[T1-R587]	TRITON shall allow the authorised user to process a selected OTH-T GOLD Message text file as an input for parsing.	BL 1												
4.2.6.5.1.0-1.0-7	[T1-R588]	TRITON shall use the NATO Standard Country Codes Table to map the country codes to country names.	BL 1												
4.2.6.5.2		**Generatine OTH-T GOLD Messaaes**													
4.2.6.5.2.0-1.0-1	[T1-R589]	TRITON shall be able to generate OTH-T GOLD Messages from the Picture Management Function and allow the authorised user to edit the message before sending.	BL 3												
4.2.6.6		**Handling Format Alfa Messages**													
4.2.6.6.1		**Processing Format Alfa Messages**													
4.2.6.6.1.0-1.0-1	[T1-R590]	TRITON shall be able to process Format Alfa message, retrieve the track information.	BL 2												
4.2.6.6.1.0-1.0-2	[T1-R591]	TRITON shall allow the authorised user to manually enter Format Alfa message text into the Format Alfa Parser for processing.	BL 2												
4.2.6.6.1.0-1.0-3	[T1-R592]	TRITON shall allow the authorised user to either create a new track with the received information or update the existing track.	BL 2												
4.2.6.6.1.0-1.0-4	[T1-R593]	TRITON shall be able to tag the associated Vessel in the Vessel Database reported by Format Alfa for its contribution with a DTG.	BL 2												
4.2.6.6.1.0-1.0-5	[T1-R594]	TRITON shall allow the authorised user to store and manage Format Alfa messages in the Message Database.	BL 2												
4.2.7		**System Management**													
4.2.7.1		**User Management**													
4.2.7.1.1		**User Groups**													
4.2.7.1.2		**User Roles**													
4.2.7.1.3		**Users**													
4.2.7.1.4		**Privileges and Access Rights**													
4.2.7.1.4.0-1.0-1	[T1-R595]	Each user of TRITON shall be assigned Access Rights based on TRITON Roles, the privileges within that Role, and the Organization of the user. A User can be assigned one or more TRITON Roles in one or more organizations.	BL 1												
4.2.7.1.4.0-1.0-2	[T1-R596]	TRITON shall provide privileged TRITON accounts (e.g. system and security administrator accounts).	BL 1												
4.2.7.1.4.0-1.0-3	[T1-R597]	TRITON shall provide for the authorised user a set of access rights (data and applications) such that these rights can be maintained.	BL 1												
4.2.7.1.4.0-1.0-4	[T1-R598]	If a user has more than one Basic Role, the user shall have the privileges for all the Basic Roles.	BL 1												
4.2.7.1.4.0-1.0-5	[T1-R599]	TRITON shall allow the authorised user with administration privileges to set roles and permissions for a user.	BL 1												
4.2.7.1.4.0-1.0-6	[T1-R600]	TRITON shall allow only the authorised user with administration privileges to operate TRITON System Management Functionality and TRITON System Maintenance Functionality with appropriate operating system rights.	BL 1												
4.2.7.1.4.0-1.0-7	[T1-R601]	TRITON shall allow a user to have the same or different Basic Roles for different simultaneous instances of TRITON.	BL 1												
4.2.7.1.4.0-1.0-8	[T1-R602]	TRITON access controls shall ensure that users cannot access functions or Maritime Information Entities beyond those needed to execute their role.	BL 1												
4.2.7.1.4.0-1.0-9	[T1-R603]	TRITON shall allow the authorised user with administration privileges to manage (create, modify, delete) User Groups, Subgroups, User Accounts, User Roles, password details, and assign User Roles to User Accounts and manage general access privileges of individual User Accounts.	BL 1												
4.2.7.1.4.0-1.0-10	[T1-R604]	TRITON shall allow the authorised user to define unique User Groups and Subgroups within a User Group and then unique User Roles within a User Group or Subgroup.	BL 1												
4.2.7.1.4.0-1.0-11	[T1-R605]	TRITON shall maintain a Function Table having a list of functions with Access Rights given in the Description.	BL 1												
4.2.7.1.4.0-1.0-12	[T1-R606]	TRITON shall allow the authorised user with administration privileges to define privileges in the Function Table for User Groups and User Roles.	BL 1												
4.2.7.1.4.0-1.0-13	[T1-R607]	TRITON shall be able to inherit access privileges from User Groups or subgroups down to User Roles.	BL 1												
4.2.7.1.4.0-1.0-14	[T1-R608]	TRITON shall automatically change user privileges according to a predefined Function Table when the Operational State of the Server changes.	BL 3												
4.2.7.1.4.0-1.0-15	[T1-R609]	TRITON shall define sessions which provides authorisation along with authentication for each user that logs in to a Maritime Operation.	BL 1												
4.2.7.1.4.0-1.0-16	[T1-R610]	TRITON shall integrate with existing users management systems from the Bi-SC AIS: Windows Active Directory and NATO Enterprise Directory Service.	BL 1												
4.2.7.1.5		**Identity and Session Handling**													
4.2.7.1.5.0-1.0-1	[T1-R611]	TRITON shall support Single-Sign-On (SSO).	BL 1												
4.2.7.1.5.0-1.0-2	[T1-R612]	TRITON shall allow the user to log out anytime and during any process.	BL 1												
4.2.7.1.5.0-1.0-3	[T1-R613]	TRITON shall automatically log out an inactive user after a defined timeout. This timeout value shall be included in the system configuration settings.	BL 1												
4.2.7.1.5.0-1.0-4	[T1-R614]	TRITON shall allow the user (with the same User ID) to access the same information and functionality from any workstation on the network (i.e. "roving user" functionality). This capability shall not depend on the availability of the Windows Active Directory.	BL 1												
4.2.7.1.5.0-1.0-5	[T1-R615]	TRITON shall be able to apply Role-based Access Control Guidelines given in the Description.	BL 1												
4.2.7.1.5.0-1.0-6	[T1-R616]	TRITON shall assign the predefined Roles to a user after the user's authentication and authorisation is completed.	BL 1												
4.2.7.1.5.0-1.0-7	[T1-R617]	TRITON shall automatically login a user who is authenticated by Windows Active Directory or the operating system.	BL 1												
4.2.7.1.5.0-1.0-8	[T1-R618]	If an enterprise-level authentication is not available, TRITON shall implement an authentication service that requires the user to provide a valid User ID and password.	BL 1												
4.2.7.1.5.0-1.0-9	[T1-R619]	For users accessing TRITON from networks which would not allow an instance of TRITON to authenticate the user, TRITON shall implement an authentication service that requires the user to provide a valid User ID and password.	BL 1												
4.2.7.1.5.0-1.0-10	[T1-R620]	TRITON shall not store user login and password details locally while in the Normal Mode of operation. TRITON shall be configurable to use either the enterprise-level authentication services or the TRITON authentication service (appropriate for the Standalone Mode of operation), but not both simultaneously.	BL 1												
4.2.7.1.5.0-1.0-11	[T1-R621]	The interval for password change in TRITON shall be selectable.	BL 1												
4.2.7.1.5.0-1.0-12	[T1-R622]	TRITON shall allow the authenticated users to manage their password and their user profile (e.g. e-mail address, unit) information.	BL 1												
4.2.7.1.5.0-1.0-13	[T1-R623]	TRITON shall provide help text to support the login process together with links to recover lost password and login details.	BL 1												
4.2.7.1.5.0-1.0-14	[T1-R624]	TRITON shall limit the feedback of information during authentication to prevent users gaining knowledge of the authentication process.	BL 1												
4.2.7.1.5.0-1.0-15	[T1-R625]	If an authenticated user is a member of more than one Organization (i.e. Organizational Node), the user shall be prompted to select the Organization to be used during that session.	BL 1												
4.2.7.1.5.0-1.0-16	[T1-R626]	TRITON shall display only the information allowed for a particular user according to the viewing permissions assigned to that user.	BL 1												
4.2.7.1.5.0-1.0-17	[T1-R627]	TRITON shall automatically verify entries into TRITON Repository to ensure the user is authorised to effect such changes.	BL 1												
4.2.7.1.5.0-1.0-18	[T1-R628]	TRITON shall display only those functions enabled for a particular user according to the execution permissions assigned to that user and provide access to them.	BL 1												
4.2.7.1.6		**Workspaces**													
4.2.7.1.6.0-1.0-1	[T1-R629]	TRITON shall provide a configurable Workspace as defined in the Description for each user who is assigned to a User Role.	BL 1												
4.2.7.1.6.0-1.0-2	[T1-R630]	TRITON shall allow the authorised user to manage (create, modify, delete, export, import) the Workspaces.	BL 1												
4.2.7.1.6.0-1.0-3	[T1-R631]	TRITON shall automatically delete the allocated Workspace associated to a user when the user is de-assigned from a User Role by the authorised user.	BL 1												
4.2.7.1.6.0-1.0-4	[T1-R632]	TRITON shall allow the user to manage (import, modify, save) his or her own Workspace including the User Settings for both AppView and GeoView.	BL 1												
4.2.7.1.6.0-1.0-5	[T1-R633]	TRITON shall apply the User Settings for both AppView and GeoView at their start-up and manage them as the user applies any modification.	BL 1												
4.2.7.2		**System Technical Management**													
4.2.7.2.1		**System Administration**													
4.2.7.2.1.0-1.0-1	[T1-R634]	TRITON shall provide the authorised user with administration privileges to manage all access privileges.	BL 1												
4.2.7.2.1.0-1.0-2	[T1-R635]	TRITON shall allow the authorised user to manage (create, copy, modify, delete) Users, Roles and User Groups.	BL 1												
4.2.7.2.2		**System Configuration Management**													
4.2.7.2.2.1		**System Configuration Settings**													
4.2.7.2.2.1.0-1.0-1	[T1-R636]	TRITON shall be able to adiust itself accordina to its Confiaurable Svstem Settinas when thev are chanaed.	BL 1												
4.2.7.2.2.1.0-1.0-2	[T1-R637]	TRITON shall configure itself at start-up according to the Static Configuration Settings which shall be provided during system installation.	BL 1												
4.2.7.2.2.1.0-1.0-3	[T1-R638]	TRITON shall allow the authorised user to manage (import, modify, save, export) the Static Configuration Settings.	BL 1												
4.2.7.2.2.1.0-1.0-4	[T1-R639]	TRITON shall be able to configure itself at run-time according to the Dynamic Configuration Settings which shall be modified at run-time.	BL 1												
4.2.7.2.2.1.0-1.0-5	[T1-R640]	TRITON shall allow the authorised user to manage (import, modify, save, export) the Dynamic Configuration Settings.	BL 1												
4.2.7.2.2.2		**System Operational Parameters**													
4.2.7.2.2.2.0-1.0-1	[T1-R641]	TRITON shall be able to adjust and fine-tune the behaviour of its functions according to its System Operational Parameters.	BL 1												
4.2.7.2.2.2.0-1.0-2	[T1-R642]	TRITON shall be able to use the System Operational Parameters to adjust the behaviour of its functions at run-time.	BL 1												
4.2.7.2.2.2.0-1.0-3	[T1-R643]	TRITON shall allow the authorised user to manage (import, modify, save, export) the System Operational Parameters.	BL 1												
4.2.7.2.3		**System Interface Management**													
4.2.7.2.3.1		**System Interface Service Framework**													
4.2.7.2.3.1.0-2.0-1	[T1-R644]	TRITON shall use a dedicated System Interface Service (SIS) for each identified external interface.	BL 1												
4.2.7.2.3.1.0-2.0-2	[T1-R645]	TRITON shall use a standard internal structure for each SIS.	BL 1												
4.2.7.2.3.1.0-2.0-3	[T1-R646]	TRITON shall use a standard status reporting and error handling functionality for each SIS.	BL 1												
4.2.7.2.3.1.0-2.0-4	[T1-R647]	TRITON shall process incoming data according to the interface specification and convert this data into internal data representation.	BL 1												
4.2.7.2.3.1.0-2.0-5	[T1-R648]	TRITON shall be able to provide Web Service capability via a SIS.	BL 1												
4.2.7.2.3.1.0-2.0-6	[T1-R649]	TRITON shall automatically establish a dedicated connection to the external communication channel when it becomes available.	BL 1												
4.2.7.2.3.1.0-2.0-7	[T1-R650]	TRITON shall be able to re-establish the connection to the external communication channel in case the connection is lost.	BL 1												
4.2.7.2.3.1.0-2.0-8	[T1-R651]	TRITON shall convert internal data representation into external representation according to the interface specification and send the data through the physical communication channel.	BL 1												
4.2.7.2.3.1.0-2.0-9	[T1-R652]	TRITON shall provide data loaaina capability for each SIS to be enabled and disabled by the authorised user.	BL 1												
4.2.7.2.3.2		**System Interface Control**													
4.2.7.2.3.2.0-1.0-1	[T1-R653]	TRITON shall provide the user with the information (connectivity status, interface-specific information such as data rate) related to the status of each interface.	BL 1												
4.2.7.2.3.2.0-1.0-2	[T1-R654]	TRITON shall provide the authorised user to control (start, stop, change mode) individual SIS.	BL 1												
4.2.7.2.3.2.0-1.0-3	[T1-R655]	TRITON shall allow the authorised user to manually allocate the selected SIS onto separate physical or virtual CPUs for load balancing purposes.	BL 1												
4.2.7.2.4		**System Technical Status Management**													
4.2.7.2.4.1		**Technical Status Monitorina**													
4.2.7.2.4.1.0-1.0-1	[T1-R656]	TRITON shall display the status of each component and external interface in both sortable tabular form and graphical form using tree-like representation (i.e. a Dashboard).	BL 1												
4.2.7.2.4.1.0-1.0-2	[T1-R657]	TRITON shall allow the user to view the detailed status of a selected external interface.	BL 1												
4.2.7.2.4.1.0-1.0-3	[T1-R658]	TRITON shall provide the authorised user with a configurable table of functions to compute the KPI.	BL 1												
4.2.7.2.4.1.0-1.0-4	[T1-R659]	TRITON shall calculate its instantaneous KPIs based on status of its services, display the KPI and update it at intervals set by the authorised user.	BL 1												
4.2.7.2.4.1.0-1.0-5	[T1-R660]	TRITON shall provide the status of its functionality to SMC Services including its KPI.	BL 1												
4.2.7.2.4.2		**System Mode Management**													
4.2.7.2.4.2.0-1.0-1	[T1-R661]	TRITON shall manaae its Ooerational Mode automaticallv and allow the authorised user to chanae it manuallv.	BL 1												
4.2.7.2.5		**System Error Reporting**													
4.2.7.2.5.0-1.0-1	[T1-R662]	TRITON shall have an error collecting, error logging and reporting mechanism.	BL 1												
4.2.7.2.5.0-1.0-2	[T1-R663]	TRITON shall allow the authorised user to access the error logs to examine the traces.	BL 1												
4.2.7.2.5.0-1.0-3	[T1-R664]	TRITON shall allow the authorised user to manage (archive, delete) the error logs.	BL 1												
4.2.7.2.5.0-1.0-4	[T1-R665]	TRITON shall report the errors to the SMC Services according to their severity levels and notify the authorised user.	BL 1												
4.2.7.2.6		**Client Monitoring and Control**													
4.2.7.2.6.0-1.0-1	[T1-R666]	TRITON shall monitor the Clients connected to the TRITON Server.	BL 1												
4.2.7.2.6.0-1.0-2	[T1-R667]	TRITON shall display the status of the connected Clients in both sortable tabular form and graphical form using tree-like reoresentation.	BL 1												
4.2.7.2.6.0-1.0-3	[T1-R668]	TRITON shall allow the authorised user to view the detailed status of a selected Client.	BL 1												
4.2.7.2.6.0-1.0-4	[T1-R669]	TRITON shall allow the authorised user to control (including force logout) the session of a selected Client.	BL 1												
4.2.7.2.7		**Multi-Site Operation Management**													
4.2.7.2.7.1		**Redundancy Management**													
4.2.7.2.7.1.0-1.0-1	[T1-R670]	TRITON shall implement a Redundancy Management using master-slave mechanism and redundancy methods as defined in the Description. COTS solutions may be used upon Purchaser approval.	BL 3												
4.2.7.2.7.1.0-1.0-2	[T1-R671]	TRITON shall allow the authorised user to configure instances of TRITON for Redundancy Management.	BL 3												
4.2.7.2.7.1.0-1.0-3	[T1-R672]	TRITON shall allow the authorised user to control and monitor the Redundancy Management.	BL 3												
4.2.7.2.7.1.0-1.0-4	[T1-R673]	In case the Active TRITON Instance fails, the Hot Standby Instance shall automatically take over and become operational within sixty (60) seconds.	BL 3												
4.2.7.2.7.1.0-1.0-5	[T1-R674]	In case the Active TRITON Instance fails and the Hot Standby Instance is not available, the Warm Standby Instance shall become operational within fifteen (15) minutes after the manual initiation by the authorised user.	BL 3												
4.2.7.2.7.1.0-1.0-6	[T1-R675]	In case the Active, Hot Standby and Warm Standby TRITON Instances fail, the Cold Standby Instance shall become operational within two (2) hours after the manual initiation.	BL 3												
4.2.7.2.7.2		**Data Replication**													
4.2.7.2.7.2.0-1.0-1	[T1-R676]	TRITON shall support Data Replication to ensure complete, accurate, timely, confidential and consistent data coherence between instances. Data Centre Infrastructure shall be utilised to achieve resilience.	BL 3												
4.2.7.2.7.2.0-1.0-2	[T1-R677]	TRITON shall allow the authorised user to configure Data Replication rules over selected data (e.g. critical, non-critical).	BL 3												

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
4.2.7.2.7.2.0-1.0-3	[T1-R678]	The maximum allowed latency for a set of selected synchronised data shall not exceed one (1) minute for static instances and three (3) minutes for afloat instances.	BL 3												
4.2.7.2.7.2.0-1.0-4	[T1-R679]	TRITON shall be able to replicate new data entry on the Active Instance database on the other Instances' databases based on the rules set by the authorised user.	BL 3												
4.2.7.2.7.2.0-1.0-5	[T1-R680]	TRITON shall be able to replicate new data instances that are marked as "Critical" no later than ten (10) second plus the average network latency of the infrastructure.	BL 3												
4.2.7.2.7.2.0-1.0-6	[T1-R681]	TRITON "will" be able to use Universally Unique Identifier (UUID) ISO/IEC 9834) for Database Replication.	BL 3												
4.2.7.2.7.2.0-1.0-7	[T1-R682]	TRITON shall allow the authorised user to manage (configure, monitor, control) Data Replication Process for all TRITON instances.	BL 3												
4.2.7.2.7.2.0-1.0-8	[T1-R683]	TRITON Deployable Kits shall be able to replicate their databases on a selected TRITON Server if the full connectivity exists.	BL 4												
4.2.7.2.7.3		**Data Synchronisation**													
4.2.7.2.7.3.0-1.0-1	[T1-R684]	TRITON shall support Data Synchronisation Process defined in the Description to synchronise its internal databases with the selected TRITON Server. The functionality over the data shall be preserved.	BL 3												
4.2.7.2.7.3.0-1.0-2	[T1-R685]	TRITON shall allow the authorised user manage (configure. monitor. control) the Data Synchronisation Process.	BL 3												
4.2.7.2.7.3.0-1.0-3	[T1-R686]	TRITON shall notify the authorised user when any inconsistency is detected during synchronisation process.	BL 3												
4.2.7.2.7.3.0-1.0-4	[T1-R687]	TRITON "will" be able to use Universally Unique Identifier (UUID) [ISO/IEC 9834] for Database Synchronisation.	BL 3												
4.2.7.2.7.3.0-1.0-5	[T1-R688]	TRITON Deployable Kit shall be able to synchronise itself with the selected TRITON Server based on the Area of Interest set by the authorised user and the available bandwidth.	BL 4												
4.2.7.3		**Data Management**													
4.2.7.3.1		**Data Import and Export**													
4.2.7.3.1.0-1.0-1	[T1-R689]	TRITON shall be able to import data from a user-selected file in one of the Recognised Import File Formats according to the settings of a function.	BL 1												
4.2.7.3.1.0-1.0-2	[T1-R690]	TRITON shall be able to export data to a user-specified file in one of the Recognised Export File Formats according to the settings of a function.	BL 1												
4.2.7.3.1.0-1.0-3	[T1-R691]	TRITON shall be able to use the operating system file management to indicate the path or location of the file to be imported or exported.	BL 1												
4.2.7.3.2		**Databases**													
4.2.7.3.2.1		**Database Management**													
4.2.7.3.2.1.0-1.0-1	[T1-R692]	TRITON shall utilise a Database Management System (DBMS) to manage all internal data storage.	BL 1												
4.2.7.3.2.1.0-1.0-2	[T1-R693]	Each TRITON instance shall have its own DBMS, compatible with the NATO Infrastructure as explained in the Desription.	BL 1												
4.2.7.3.2.1.0-1.0-3	[T1-R694]	TRITON shall use only one database schema in a multiple user context (e.g. Live, Exercise, Training) during the execution and display which database is in use.	BL 1												
4.2.7.3.2.1.0-1.0-4	[T1-R695]	TRITON shall provide the authorised user with database management, administration, monitoring capability allowing access to all historical data.	BL 1												
4.2.7.3.2.1.0-1.0-5	[T1-R696]	TRITON shall provide auditing, audit trail with change recording, and activity logging mechanism with timestamps for al database activities.	BL 1												
4.2.7.3.2.1.0-1.0-6	[T1-R697]	TRITON databases shall be able to support complex queries as explained in the Description.	BL 1												
4.2.7.3.2.1.0-1.0-7	[T1-R698]	TRITON shall have "full-text search" capability of database in order to speed up free-text search in the database.	BL 1												
4.2.7.3.2.1.0-1.0-8	[T1-R699]	TRITON shall allow the authorised user to perform database backup and archiving manually. The backup and archive shall be full, incremental backups and archives of data to a selected static network location and onto user-indicated transportable media.	BL 1												
4.2.7.3.2.1.0-1.0-9	[T1-R700]	TRITON database shall support recovery facilities from backup and archive data (see Archiving).	BL 1												
4.2.7.3.2.2		**Database Import and Export**													
4.2.7.3.2.2.0-1.0-1	[T1-R701]	TRITON shall be able to import data from legacy system (MCCIS and/or MSA/BRITE) databases without loss. On-line or off-line data migration tools shall be used to convert the existing data into the format recognised by TRITON databases.	BL 3												
4.2.7.3.2.2.0-1.0-2	[T1-R702]	TRITON shall perform mapping while importing data from legacy system databases.	BL 3												
4.2.7.3.2.2.0-1.0-3	[T1-R703]	TRITON shall be able to import data from previously exported own database.	BL 3												
4.2.7.3.2.2.0-1.0-4	[T1-R704]	TRITON shall assign default values during mapping of data from legacy systems to current system, if the values do not exist.	BL 3												
4.2.7.3.2.2.0-1.0-5	[T1-R705]	TRITON shall notify the authorised user when imported data requires overrides.	BL 3												
4.2.7.3.2.2.0-1.0-6	[T1-R706]	TRITON shall be able to export all or a portion of its databases together with their metadata.	BL 3												
4.2.7.3.2.2.0-1.0-7	[T1-R707]	TRITON shall allow the authorised user to select the set of entities to be exported based on at least Complete Database, Subset, Selected Entity Types and Specified Date.	BL 3												
4.2.7.3.2.2.0-1.0-8	[T1-R708]	TRITON shall protect its database integrity during exporting.	BL 3												
4.2.7.3.2.3		**Archiving**													
4.2.7.3.2.3.0-1.0-1	[T1-R709]	TRITON shall provide complete archiving capability according to [AC/324-D(2014)0008].	BL 3												
4.2.7.3.2.3.0-1.0-2	[T1-R710]	TRITON shall provide a selective archiving capability for selected databases for a selected time period in a Maritime Operation.	BL 3												
4.2.7.3.2.3.0-1.0-3	[T1-R711]	TRITON shall protect Operational Records defined in the Description against unauthorised access and alteration.	BL 3												
4.2.7.3.2.3.0-1.0-4	[T1-R712]	TRITON shall uniquely identify archives for long term preservation.	BL 3												
4.2.7.3.2.3.0-1.0-5	[T1-R713]	TRITON shall allow the authorised user to initiate archiving into selected storage media.	BL 3												
4.2.7.3.2.3.0-1.0-6	[T1-R714]	TRITON shall allow the authorised user to import the entire or selected parts of archived data into a selected Maritime Operation or into a new Maritime Operation.	BL 3												
4.2.7.3.2.3.0-1.0-7	[T1-R715]	TRITON shall perform archiving after removing any encryption or password protection.	BL 3												
4.2.7.3.2.4		**Backup**													
4.2.7.3.2.4.0-1.0-1	[T1-R716]	TRITON shall permit full, partial and incremental backup of both the TRITON Databases. TRITON shall be able restore the system to its exact state at the point of any full/partial backup.	BL 3												
4.2.7.3.2.4.0-1.0-2	[T1-R717]	TRITON shall be able to make a full backup of all or selected data automatically at a configurable frequency (e.g. every 24 hours).	BL 3												
4.2.7.3.2.4.0-1.0-3	[T1-R718]	TRITON shall allow the authorised user to perform full and incremental backups of all databases and software itself without impacting the system availability.	BL 3												
4.2.7.3.2.4.0-1.0-4	[T1-R719]	TRITON shall allow the authorised user to take the image of the system and restore a system from an existing image.	BL 3												
4.2.7.3.3		**Off-line Reference Data Management**													
4.2.7.3.3.0-1.0-1	[T1-R720]	TRITON shall allow the authorised user to check external on-line Reference Data Sources from recognised Web sites or off-line Reference Data Sources at indicated Network Locations and import data into local Reference Data Sources.	BL 2												
4.2.7.3.3.0-1.0-2	[T1-R721]	TRITON shall have a Vessel Data Import Capability to be used for importing data from Maritime Datasets into Recognised Import File Format.	BL 2												
4.2.7.3.3.0-1.0-3	[T1-R722]	TRITON shall allow the user to access the off-line Reference Databases with search and list capability.	BL 2												
4.2.7.3.4		**Own Ship Data Management**													
4.2.7.3.4.0-1.0-1	[T1-R723]	TRITON shall maintain Own Ship Data.	BL 4												
4.2.7.3.4.0-1.0-2	[T1-R724]	TRITON shall allow the authorised user to modify Own Ship Data manually.	BL 4												
4.2.7.3.4.0-1.0-3	[T1-R725]	TRITON shall be able to receive Own Ship Data from external sources automatically according to TRITON Own Ship Data Specification.	BL 4												
4.2.7.3.4.0-1.0-4	[T1-R726]	TRITON shall make Own Ship Data available for internal processing.	BL 4												
4.2.8		**Maritime Training and Exercise**													
4.2.8.1		**Training**													
4.2.8.1.0-1.0-1	[T1-R727]	TRITON shall provide training capability using Simulated Tracks while operating in Normal or Standalone Mode.	BL 3												
4.2.8.1.0-1.0-2	[T1-R728]	TRITON shall provide training capability to trainees with available external system simulators while operating in Training Mode (only for the Training System in the Training Environment).	BL 3												
4.2.8.1.0-1.0-3	[T1-R729]	TRITON Training Environment shall have a Training Manager with scenario development and generation capability. This capability shall be able to run user-defined scenarios using user-defined dates and time, and save the scenarios for reviewing purposes.	BL 3												
4.2.8.1.0-1.0-4	[T1-R730]	TRITON Training Environment shall maintain a Training Database with the Training Data as defined in the Description.	BL 3												
4.2.8.1.0-1.0-5	[T1-R731]	TRITON Training Environment shall have a Ground Truth as a simulation engine to generate Simulated Object Data according to the scenario and user commands. The Simulated Object Data shall be made available to Simulators to generate actual information. coordinated in the same time and space domain.	BL 3												
4.2.8.1.0-1.0-6	[T1-R732]	TRITON shall allow the authorised user to manage (define, configure, start, stop) the Training Environment.	BL 3												
4.2.8.2		**Data Source Simulation**													
4.2.8.2.0-1		TRITON will be able to simulate external data sources for training or exercise purposes.													
4.2.8.2.1		**Track Simulation**													
4.2.8.2.1.0-1.0-1	[T1-R733]	TRITON shall be able to use Track Simulators running either with standalone control or integrated with the Training Environment.	BL 3												
4.2.8.2.1.0-1.0-2	[T1-R734]	TRITON shall be able to run multiple instances of Track Simulator provided that each instance has a separate source identification.	BL 3												
4.2.8.2.1.0-1.0-3	[T1-R735]	TRITON shall allow the authorised user to configure the Track Simulators as the replacement of actual sources and control their status.	BL 3												
4.2.8.2.1.0-1.0-4	[T1-R736]	TRITON Track Simulator shall detect the operational mode of the TRITON Server and generate Live Tracks if the mode is Training and generate Simulated Tracks for other modes.	BL 3												
4.2.8.2.1.0-1.0-5	[T1-R737]	TRITON Track Simulator shall allow the user to assign values to track attributes (identity, classification, initial position, course, speed, etc.) in a configurable table.	BL 3												
4.2.8.2.1.0-1.0-6	[T1-R738]	TRITON Track Simulator shall allow the user to set the update rate and edit the track attribute values while the simulator is running.	BL 3												
4.2.8.2.1.0-1.0-7	[T1-R739]	TRITON Track Simulator shall allow the user to set an area that the tracks will be created either at default or random positions with the same or random course and speed.	BL 3												
4.2.8.2.1.0-1.0-8	[T1-R740]	TRITON Track Simulator shall allow the authorised user to select a source and then manually initiate a Simulated Track at an indicated position on the GeoView when TRITON is in Normal Mode.	BL 3												
4.2.8.2.1.0-1.0-9	[T1-R741]	TRITON Track Simulator shall be able to receive Simulated Object Data from the Ground Truth and generate the Track Data when it is used in Trainine Environment.	BL 3												
4.2.8.2.2		**Nation RMP Stream Simulation**													
4.2.8.2.2.0-1.0-1	[T1-R742]	TRITON Track Simulator shall have a Nation RMP Stream Simulation capability which provides tracks as a stream on TCP/UDP/IP.	BL 3												
4.2.8.2.2.0-1.0-2	[T1-R743]	TRITON Track Simulator shall be able to manage (initiate, update, drop) Nation RMP tracks with the source of the stream set as a Nation.	BL 3												
4.2.8.2.2.0-1.0-3	[T1-R744]	TRITON Track Simulator shall be able to generate and update at least five-thousand (5000) tracks if it is simulating the Nation RMP as a track stream.	BL 3												
4.2.8.2.3		**Nation RMP Reoort Simulation**													
4.2.8.2.3.0-1.0-1	[T1-R745]	TRITON Track Simulator shall have a Nation RMP Report Simulation capability which provides tracks in OTH-T GOLD Formatted Messages.	BL 3												
4.2.8.2.3.0-1.0-2	[T1-R746]	TRITON Track Simulator shall be able to manage (initiate, update, drop) Nation RMP tracks with the source of the report set as a Nation.	BL 3												
4.2.8.2.3.0-1.0-3	[T1-R747]	TRITON Track Simulator shall be able to generate at least one-hundred (100) tracks into OTH-T GOLD messages and send them to the relevant Nation Interface of TRITON if it is simulating the Nation RMP as track reports.	BL 3												
4.2.8.2.4		**Nation WP Stream Simulation**													
4.2.8.2.4.0-1.0-1	[T1-R748]	TRITON Track Simulator shall have a Nation WP Stream Simulation capability which provides tracks as a stream on TCP/UDP/IP.	BL 2												
4.2.8.2.4.0-1.0-2	[T1-R749]	TRITON Track Simulator shall be able to manage (initiate, update) Nation WP tracks with the source of the stream set as a Nation.	BL 2												
4.2.8.2.4.0-1.0-3	[T1-R750]	TRITON Track Simulator shall be able to generate and update at least five-thousand (5000) tracks if it is simulating the Nation WP as a track stream.	BL 2												
4.2.8.2.5		**AIS Data Source Simulation**													
4.2.8.2.5.0-1.0-1	[T1-R751]	TRITON Track Simulator shall have a AIS Data Source Simulation capability which provides AIS tracks as a stream compliant to the AIS Specification.	BL 2												
4.2.8.2.5.0-1.0-2	[T1-R752]	TRITON Track Simulator shall be able to manage (initiate, update) AIS tracks with the source of the stream set as an AIS data source name.	BL 2												
4.2.8.2.5.0-1.0-3	[T1-R753]	TRITON Track Simulator shall be able to generate and update at least five-thousand (5000) AIS tracks if it is simulating an AIS data source.	BL 2												
4.2.8.2.6		**ACP Stream Simulation**													
4.2.8.2.6.0-1.0-1	[T1-R754]	TRITON Track Simulator shall have an ACP Stream Simulation capability which provides tracks as a stream on TCP/UDP/IP.	BL 4												
4.2.8.2.6.0-1.0-2	[T1-R755]	TRITON Track Simulator shall be able to manage (initiate, update, drop) ACP tracks with the source of the stream set as the Unit Name of the ACP.	BL 4												
4.2.8.2.6.0-1.0-3	[T1-R756]	TRITON Track Simulator shall be able to generate and update at least one-thousand (1000) tracks if it is simulating the ACP as a track stream.	BL 4												
4.2.8.3		**Interface Simulation**													
4.2.8.3.1		**System Interface Simulator**													
4.2.8.3.1.0-1.0-1	[T1-R757]	In case external systems or services are not available, System Interface Simulators "will" be developed and used for testing TRITON interfaces in the Test Environment. For example, if ENV-FS is not available at the time of testing, a simple interface simulator for ENV-FS will be used.	BL 1												
4.2.8.3.2		**TRITON Simulator**													
4.2.8.3.2.0-1.0-1	[T1-R758]	TRITON-NS Simulator shall emulate TRITON-NS External Interfaces (e.g. RMP Service, ICI Service).	BL 3												
4.2.8.3.2.0-1.0-2	[T1-R759]	TRITON-NU Simulator shall emulate TRITON-NU External Interfaces (e.g. WP Service. ICI Service).	BL 2												
4.2.8.3.2.0-1.0-3	[T1-R760]	TDK-NS Simulator shall emulate TDK-NS (e.g. ACP Interface - NS).	BL 4												
4.2.8.3.2.0-1.0-4	[T1-R761]	TDK-NU Simulator shall emulate TDK-NU (e.g. ACP Interface - NU).	BL 4												
4.2.8.4		**Exercise**													
4.2.8.4.0-1.0-1	[T1-R762]	TRITON shall provide exercise management capability via Maritime Operations while operating in Normal or Standalone Mode.	BL 3												
4.2.8.4.0-1.0-2	[T1-R763]	TRITON shall utilise a Maritime Operation of type Exercise to conduct an exercise in fully synthetic, fully live or combined environment.	BL 3												
4.2.8.4.0-1.0-3	[T1-R764]	TRITON shall allow the authorised user to build a separate Vessel Database in a Maritime Operation for exercise purposes by imoortine selected Vessels from a selected Maritime Operation.	BL 3												
4.2.9		**System Infrastructure**													
4.2.9.1		**Service Oriented Architecture Platform**													
4.2.9.1.0-3.0-1	[T1-R765]	TRITON shall be able to use Web services compliant with WS-I Basic Profile Specifications using XML Schemas.	BL 1												
4.2.9.1.0-3.0-2	[T1-R766]	TRITON should be able to use SPARQL Protocol and RDF Query Language Web services and ontologies.	BL 1												

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
4.2.9.1.0-3.0-3	[T1-R767]	TRITON shall conform to the Reference Model for Service Oriented Architecture by OASIS (SOA-RM). As such, TRITON shall: Have entities that can be identified as services defined by the Reference Model. Show how visibility is established between service providers and consumers. Show how interaction is mediated. Show how the effect of using services is understood. Have descriptions associated with services. Show the execution context required to support interaction. Show how policies are handled and how contracts shall be able to be modelled and enforced.	BL 1												
4.2.9.1.0-3.0-4	[T1-R768]	TRITON SOA Platform shall isolate transformation, message routing and publish-subscribe, Business Process Execution Language (BPEL)-kind of SOA-related activities onto a Service Layer. The design shall allow future replacement of the Service Layer tasks with an external Message Oriented Middleware Services.	BL 1												
4.2.9.1.0-3.0-5	[T1-R769]	TRITON SOA Platform shall use HTTP as the transport protocol for information without "need-to-know" caveats between all service providers and consumers (unsecured HTTP traffic). HTTPS shall be used as the transport protocol between all service providers and consumers to ensure confidentiality requirements (secured HTTP traffic).	BL 1												
4.2.9.1.0-3.0-6	[T1-R770]	TRITON SOA Platform design shall comply with the standards given in the Descriptions. Any deviation of the proposed solution from the compliance of these standards shall be documented in detail with its justification.	BL 1												
4.2.9.1.0-3.0-7	[T1-R771]	TRITON SOA Platform design shall comply with the Service Interface Profiles given in [NCIA-06.02.01 to 10].	BL 1												
4.2.9.2		**Message Oriented Middleware**													
4.2.9.2.0-1.0-1	[T1-R772]	TRITON Middleware shall be compatible with the Service Interface Profiles given in [NCIA-06.02.08], [NCIA-06.02.09], [NCIA-06.02.10].	BL 1												
4.2.9.2.0-1.0-2	[T1-R773]	TRITON Middleware should provide for any TRITON service to subscribe to hierarchical topics and receive publications over the Middleware.	BL 1												
4.2.9.2.0-1.0-3	[T1-R774]	TRITON Middleware should provide for consumer services to subscribe to Maritime Information Entities using the topic syntax.	BL 1												
4.2.9.2.0-1.0-4	[T1-R775]	TRITON Middleware should use event-driven mechanisms compliant with OASIS WS-Notifications protocols to consume event driven, time sensitive and critical Web Services of other systems.	BL 1												
4.2.9.2.0-1.0-5	[T1-R776]	TRITON Middleware should allow consumers to initiate and manage subscriptions.	BL 1												
4.2.9.2.0-1.0-6	[T1-R777]	TRITON Middleware should provide for a publication manager to manage all publications from its services.	BL 1												
4.2.9.2.0-1.0-7	[T1-R778]	TRITON Middleware should allow subscribers to manage their subscription.	BL 1												
4.2.9.2.0-1.0-8	[T1-R779]	TRITON Middleware should publish each element of the Maritime Information Entities by creating a hierarchical topics structure.	BL 1												
4.2.9.2.0-1.0-9	[T1-R780]	TRITON Middleware should publish each element of the Maritime Information Entities by initiating a message delivery corresponding to the topic.	BL 1												
4.2.9.2.0-1.0-10	[T1-R781]	TRITON Middleware should publish each element of the Maritime Information Entities with an appropriate filtering syntax to allow consumers to subscribe to a subset of those Entities.	BL 1												
4.2.9.2.0-1.0-11	[T1-R782]	TRITON Middleware should allow consumers to subscribe to Maritime Information Entities using the topic and filtering syntax.	BL 1												
4.2.9.2.0-1.0-12	[T1-R783]	TRITON Middleware should provide for subscriptions to be either infinite (i.e. a subscription remains in force until it is cancelled) or subscriptions with predefined termination time, which automatically expire (i.e. the consumer is only a subscriber for a certain amount of time).	BL 1												
4.2.9.2.0-1.0-13	[T1-R784]	TRITON Middleware should provide synchronisation capability to consumers with Core Data Store for a given time period using a synchronisation interface.	BL 1												
4.2.9.3		**Core Enterprise Services**													
4.2.9.4		**TRITON Clients**													
4.2.9.4.1		**Human-Machine Interface**													
4.2.9.4.1.0-1.0-1	[T1-R785]	TRITON Client shall provide the HMI as Web-based applications on a Standard NATO Bi-SC AIS Workstation.	BL 1												
4.2.9.4.1.0-1.0-2	[T1-R786]	TRITON HMI shall handle user inputs from keyboard and the available pointing device and provide output to available displays (monitors).	BL 1												
4.2.9.4.2		**Web Browser Standards**													
4.2.9.4.2.0-1.0-1	[T1-R787]	TRITON Client shall support the standards given in the Description for implementing the Web-based applications.	BL 1												
4.2.9.4.3		**Visualisation**													
4.2.9.4.4		**Application View**													
4.2.9.4.4.0-2.0-1	[T1-R788]	TRITON shall have an Application View (AppView) which provides the HMI for User Applications per user.	BL 1												
4.2.9.4.4.0-2.0-2	[T1-R789]	TRITON AppView shall be able to launch GeoView when the user wants to display geospatial data.	BL 1												
4.2.9.4.4.0-2.0-3	[T1-R790]	TRITON AppView shall close the GeoView when the user terminates the AppView.	BL 1												
4.2.9.4.4.0-2.0-4	[T1-R791]	TRITON AppView and GeoView shall interact with each other over the NATO Map API (NMAPI) as defined in the VC ICD.	BL 1												
4.2.9.4.4.0-2.0-5	[T1-R792]	TRITON AppView shall have the general layout as given in the Description.	BL 1												
4.2.9.4.4.0-2.0-6	[T1-R793]	TRITON AppView shall have a Title Bar to provide the user with the Functional Service Name and the current classification level. The Title Bar Component from the VC shall be used.	BL 1												
4.2.9.4.4.0-2.0-7	[T1-R794]	TRITON AppView shall have a Ribbon Bar as a series of tabs below the Menu Bar to provide the user with easy access to AppView functions. The Ribbon Bar Comoonent from the VC shall be used.	BL 1												
4.2.9.4.4.0-2.0-8	[T1-R795]	TRITON AppView shall allow the user to select a User Application to activate or deactivate.	BL 1												
4.2.9.4.4.0-2.0-9	[T1-R796]	TRITON AppView shall have an Application Menu to provide the user with actions associated to User Applications.	BL 1												
4.2.9.4.4.0-2.0-10	[T1-R797]	TRITON AppView shall display Application Information in tabular form inside Application Panel and Information Panel.	BL 1												
4.2.9.4.4.0-2.0-11	[T1-R798]	TRITON AppView shall have a Status Panel to display the connection status and the current TRITON Mode of Operation. The Status Panel Component from the VC shall be used.	BL 1												
4.2.9.4.4.0-2.0-12	[T1-R799]	TRITON AppView shall have a Time Panel which displays the current date and time in configurable zones. The Time Panel Component from the VC shall be used.	BL 1												
4.2.9.4.4.0-2.0-13	[T1-R800]	TRITON AppView shall have a Notification Panel to display errors and warnings. The Notification Panel Component from the VC shall be used.	BL 1												
4.2.9.4.5		**Geospatial View**													
4.2.9.4.5.0-1.0-1	[T1-R801]	TRITON Client shall have a Geospatial View (GeoView) integrated with the Application View (AppView) running on a standard Client Workstation.	BL 1												
4.2.9.4.5.0-1.0-2	[T1-R802]	TRITON shall only use the C4ISR Visualisation Component as the GeoView.	BL 1												
4.2.9.4.5.0-1.0-3	[T1-R803]	TRITON GeoView shall be able to display maps, Maritime Operational Objects, external graphical information and images in Layers.	BL 1												
4.2.9.5		**User Support**													
4.2.9.5.1		**On-line Helo**													
4.2.9.5.1.0-1.0-1	[T1-R804]	TRITON shall support On-line Help describing all functionality of the TRITON capability by using Contents, Index and associated Search.	BL 2												
4.2.9.5.1.0-1.0-2	[T1-R805]	The TRITON On-line Help shall translate every use case and scenario into a browsing sequence. Every browsing sequence shall be structured according to the user workflow.	BL 2												
4.2.9.5.1.0-1.0-3	[T1-R806]	TRITON shall allow the user to be able to access Help Function at any stage of execution of a function.	BL 1												
4.2.9.5.1.0-1.0-4	[T1-R807]	TRITON On-line Help shall describe each TRITON function, the interrelationships between and the logical sequence of functions.	BL 1												
4.2.9.5.1.0-1.0-5	[T1-R808]	TRITON On-line Help shall explain all menu items, dialog windows, data entry and query fields implemented in the TRITON Product Baseline.	BL 2												
4.2.9.5.1.0-1.0-6	[T1-R809]	TRITON On-line Help shall include a glossary providing definitions of all terms and acronyms implemented in the TRITON Product Baseline.	BL 2												
4.2.9.5.1.0-1.0-7	[T1-R810]	All definitions in the TRITON glossary shall be available in roll-over, pop-up windows linked to every appearance in On-line Help of the corresponding term or acronym.	BL 2												
4.2.9.5.1.0-1.0-8	[T1-R811]	In TRITON, each dialogue, menu item, toolbar item, function, field or button (each item on the screen) shall have an On-line Help option. This shall be clearly visible, but not intrusive.	BL 2												
4.2.9.5.1.0-1.0-9	[T1-R812]	TRITON On-line Help shall provide meaningful advice and hints to users appropriate to the actions they are trying to take.	BL 2												
4.2.9.5.1.0-1.0-10	[T1-R813]	TRITON On-line Helo shall be concise. compact and clear to the user.	BL 2												
4.2.9.5.1.0-1.0-11	[T1-R814]	TRITON On-line Help shall include screenshots of TRITON HMI. The screenshots shall be provided in a suitable lightweight format (e.g. GIF, PNG) approved by the Purchaser.	BL 2												
4.2.9.5.1.0-1.0-12	[T1-R815]	Pictures in the TRITON On-line Help showing more than five (5) GUI elements/controls shall have a clickable image map describing each element.	BL 2												
4.2.9.5.1.0-1.0-13	[T1-R816]	If the TRITON On-line Help topic requires a large picture that does not fit on a normal page, a reduced copy shall be additionally included on the Help page that will expand to its full size on user request.	BL 2												
4.2.9.5.1.0-1.0-14	[T1-R817]	TRITON On-line Help shall be context-sensitive (i.e. based on a specific point in the state of the software and providing help for the situation that is associated with that state on action beine performed).	BL 2												
4.2.9.5.1.0-1.0-15	[T1-R818]	The Security Classification of any example data that is displayed in TRITON On-line Help shall not be higher than NATO UNCLASSIFIED.	BL 2												
4.2.9.5.1.0-1.0-16	[T1-R819]	TRITON On-line Help context-sensitive GUI elements shall be linked to the relevant User Manual topics.	BL 2												
4.2.9.5.1.0-1.0-17	[T1-R820]	In TRITON, all source code elements shall be configured to link the GUI elements to their context-sensitive topics.	BL 2												
4.2.9.5.1.0-1.0-18	[T1-R821]	TRITON On-line Help shall provide access to interactive training to guide users through procedures and functions.	BL 2												
4.2.9.5.1.0-1.0-19	[T1-R822]	The TRITON On-line Help shall be given by a small pop-up screen or infotip screen. This screen shall appear quickly and be very easy to hide, for instance clicking anywhere within it.	BL 2												
4.2.9.5.1.0-1.0-20	[T1-R823]	TRITON On-line Help shall open a dedicated Web page when the user requests access to the full content of the On-line Help. The On-line Helo shall not be preventina the user to access TRITON functions.	BL 2												
4.2.9.5.1.0-1.0-21	[T1-R824]	TRITON shall allow the user to hide the On-line Help screen just by clicking anywhere else, or there shall be another single action hiding mechanism.	BL 2												
4.2.9.5.1.0-1.0-22	[T1-R825]	TRITON On-line Help shall include a searchable Index that allows the user to locate keywords or phrases (identified by enclosure within double-quotation marks) in the User Manual.	BL 2												
4.2.9.5.1.0-1.0-23	[T1-R826]	TRITON shall support search queries for finding help items in the On-line Help.	BL 2												
4.2.9.5.1.0-1.0-24	[T1-R827]	TRITON shall be able to display search query results for finding help items in the On-line Help in a list. TRITON shall display the help item when the user selects a query result in this list.	BL 2												
4.2.9.5.2		**Computer-Based Training**													
4.2.9.5.2.0-1.0-1	[T1-R828]	TRITON shall provide a Computer-Based Trainina (CBT) capability for both TRITON-NS and TRITON-NU.	BL 3												
4.2.9.5.2.0-1.0-2	[T1-R829]	TRITON CBT shall provide interactive training by defining and explaining the key concepts and terminology of the TRITON features and functions.	BL 3												
4.2.9.5.2.0-1.0-3	[T1-R830]	TRITON CBT shall complement the TRITON On-line Help function by defining and explaining key concepts and terminology of the TRITON operational process incorporated into TRITON features and functions.	BL 3												
4.2.9.5.2.0-1.0-4	[T1-R831]	TRITON CBT packages shall be capable of conducting on-site, in-house initial and sustainment training of staff users.	BL 3												
4.2.9.5.2.0-1.0-5	[T1-R832]	TRITON CBT shall include training functionality within and between each component to maintain user proficiency in TRITON.	BL 3												
4.2.9.5.2.0-1.0-6	[T1-R833]	TRITON CBT content package shall be compliant to Sharable Content Object Reference Model (SCORM) Edition 2004 or newer.	BL 3												
4.2.9.5.2.0-1.0-7	[T1-R834]	TRITON CBT shall be integrated with TRITON On-line Help so that the users can switch back and forth between On-Line Help and the CBT without losing the navigation history.	BL 3												
4.2.9.5.2.0-1.0-8	[T1-R835]	TRITON CBT shall be accessible from the On-line Help that is available in each User Application and shall allow the user to select the relevant chapter/paragraph of the CBT.	BL 3												
4.2.9.5.2.0-1.0-9	[T1-R836]	TRITON CBT shall be accessible on any Bi-SC AIS workstation.	BL 3												
4.2.9.5.2.0-1.0-10	[T1-R837]	The TRITON CBT shall provide links to applicable keywords in the TRITON On-line Help function.	BL 3												
4.2.9.5.2.0-1.0-11	[T1-R838]	TRITON CBT shall provide lessons for a subject or group of related subjects for at least three (3) hours.	BL 3												
4.2.9.5.2.0-1.0-12	[T1-R839]	TRITON CBT shall use the same general appearance of the GUI as the TRITON Functional Services itself.	BL 3												
4.2.9.5.2.0-1.0-13	[T1-R840]	TRITON shall establish a workflow to guide the users to the CBT feature and run the training program and record the results.	BL 3												
4.2.9.5.2.0-1.0-14	[T1-R841]	TRITON CBT shall be limited to the allocated functions to the user positions and roles and the applicable security restrictions.	BL 3												
4.2.9.5.2.0-1.0-15	[T1-R842]	TRITON CBT shall share the access rights given for TRITON Functional Services and these access rights shall be managed from the same User Management function.	BL 3												
4.2.9.5.2.0-1.0-16	[T1-R843]	TRITON CBT "should" be easy to maintain without having to apply all HMI modifications.	BL 3												
4.2.9.5.3		**On-line Tutorials**													
4.2.9.5.3.0-1.0-1	[T1-R844]	TRITON shall have On-line Tutorials integrated with TRITON On-line Helo.	BL 3												
4.2.9.5.3.0-1.0-2	[T1-R845]	TRITON On-line Tutorials shall be accessible from the TRITON Clients.	BL 3												
4.2.9.5.3.0-1.0-3	[T1-R846]	TRITON shall adhere to the Microsoft standard GUI methods for accessing on-line documentation resources.	BL 1												
4.2.9.5.3.0-1.0-4	[T1-R847]	TRITON On-line Tutorials shall be integrated with TRITON On-line Help so that the users can switch back and forth between On-Line Help and the On-line Tutorial without losing the navigation history.	BL 3												
4.2.9.5.4		**Frequently Asked Questions**													
4.2.9.5.4.0-1.0-1	[T1-R848]	TRITON shall maintain a list of Frequently Asked Questions (FAQ).	BL 2												
4.2.9.5.4.0-1.0-2	[T1-R849]	TRITON FAQ shall be integrated with On-line Help functionality.	BL 2												
4.2.9.5.4.0-1.0-3	[T1-R850]	TRITON shall allow the authorised user to maintain (add. modifv. delete) questions in the TRITON FAQ List.	BL 2												
4.2.9.5.4.0-1.0-4	[T1-R851]	TRITON shall allow the user to perform search in the TRITON FAQ List and displav the results in sortable tabular form.	BL 2												
4.2.9.5.4.0-1.0-5	[T1-R852]	TRITON shall allow the user to ask questions to the NCI Agency Service Desk in electronic form by using the TRITON FAQ.	BL 2												
4.2.9.5.4.0-1.0-6	[T1-R853]	TRITON shall support answering the user questions by sending back existing or newly-added FAQ entries.	BL 2												
4.2.9.5.5		**Printing**													
4.2.9.5.5.0-1.0-1	[T1-R854]	TRITON shall support printing to local and network printers including printing into a file in Portable Document Format (PDF).	BL 2												
4.2.9.5.5.0-1.0-2	[T1-R855]	TRITON shall ensure that the application maintains stability when printing if no printer is installed.	BL 2												
4.2.9.5.5.0-1.0-3	[T1-R856]	TRITON shall be able to print user-selected Information Products and screenshot to the resolutions supported by the printer or output device.	BL 2												
4.2.9.5.5.0-1.0-4	[T1-R857]	TRITON shall support printing documents that contain, text in various sizes, styles and colours using TrueType and Postscript fonts.	BL 2												
4.2.9.5.5.0-1.0-5	[T1-R858]	TRITON shall support printing to printers with Long File Names (e.g. printer names include all legal Long File Name characters and are at least 128 characters long).	BL 2												
4.2.9.5.5.0-1.0-6	[T1-R859]	TRITON shall support printing of landscape, portrait and all other supported paper sizes and layouts.	BL 2												
4.2.9.5.5.0-1.0-7	[T1-R860]	TRITON shall allow the user to preview (Print Preview) a TRITON print product before it is printed.	BL 2												
4.2.9.5.5.0-1.0-8	[T1-R861]	The VC Print Preview shall displav the print content to the user with the selected printer settinas.	BL 2												
4.2.9.6		**User Notification Management**													
4.2.9.6.1		**Warnings**													
4.2.9.6.1.0-1.0-1	[T1-R862]	TRITON shall issue a critical warning when a predefined event that effects the system operations occurs.	BL 1												
4.2.9.6.1.0-1.0-2	[T1-R863]	TRITON shall use modal popup window with acknowledge option for critical warnings to notify the authorised user.	BL 1												

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
4.2.9.6.1.0-1.0-3	[T1-R864]	TRITON shall allow the authorised user to acknowledge a critical warning with a popup window.	BL 1												
4.2.9.6.1.0-1.0-4	[T1-R865]	TRITON shall remove a critical warning when the authorised user acknowledges it.	BL 1												
4.2.9.6.1.0-1.0-5	[T1-R866]	TRITON shall postpone a critical warning if the authorised user snoozes it.	BL 1												
4.2.9.6.1.0-1.0-6	[T1-R867]	TRITON shall issue a non-critical warning of a predefined type when a predefined event that needs to be escalated to user occurs.	BL 1												
4.2.9.6.1.0-1.0-7	[T1-R868]	TRITON shall provide the authorised user with a listing of non-critical warnings with filtering on warning types.	BL 1												
4.2.9.6.1.0-1.0-8	[T1-R869]	TRITON shall allow the authorised user to cancel non-critical warnings.	BL 1												
4.2.9.6.1.0-1.0-9	[T1-R870]	TRITON shall automatically remove non-critical warnings when the state of the originating component changes.	BL 1												
4.2.9.6.1.0-1.0-10	[T1-R871]	TRITON shall use unique identification numbers for each event requiring notification and provide a brief explanation for the cause of the warning and the guidance to recover.	BL 1												
4.2.9.6.2		**Alerts**													
4.2.9.6.2.0-1.0-1	[T1-R872]	TRITON shall maintain an Alert List for each authorised user.	BL 1												
4.2.9.6.2.0-1.0-2	[T1-R873]	TRITON shall allow the authorised user to manage (create, modify, delete, set, cancel) the Alert List.	BL 1												
4.2.9.6.2.0-1.0-3	[T1-R874]	TRITON shall allow the user to set an Alert for a recognised event.	BL 1												
4.2.9.6.2.0-1.0-4	[T1-R875]	TRITON shall allow the authorised user to view the Alert List in sortable tabular format.	BL 1												
4.2.9.6.2.0-1.0-5	[T1-R876]	TRITON shall use modeless popup window with acknowledge option for notifying users.	BL 1												
4.3		**C4ISR Visualisation Component Requirements**													
4.3.1		**General Architecture**													
4.3.1.1		**TRITON Architecture**													
4.3.1.2		**Operational Modes**													
4.3.1.2.1		**Integrated Mode**													
4.3.1.2.1.0-1.0-1	[T1-R877]	The VC GeoView (the Client-side of the VC) shall have Connected and Disconnected States in the Integrated Mode of operation.	VC-BL 1												
4.3.1.2.1.0-1.0-2	[T1-R878]	The VC GeoView shall be fully operational when it is in Connected State.	VC-BL 1												
4.3.1.2.1.0-1.0-3	[T1-R879]	The VC GeoView shall be able to store the visible C4ISR Objects and relevant geospatial information (received from the GIS Server) in a local cache to be used when it is switched to Disconnected State.	VC-BL 3												
4.3.1.2.1.0-1.0-4	[T1-R880]	The VC GeoView shall be able to continue to display the cached C4ISR Objects and their relevant geospatial information when it is in Disconnected State. The C4ISR Objects being displayed shall be deleted after a configurable time period with a notification to the user.	VC-BL 3												
4.3.1.2.1.0-1.0-5	[T1-R881]	The VC GeoView shall display the connectivity status and notify the user in case its connection to the VC Server is lost more than a configurable time period. The default time period to switch to Disconnected State shall be thirty (30) seconds.	VC-BL 1												
4.3.1.2.1.0-1.0-6	[T1-R882]	The VC GeoView shall be able to display, as a minimum, a Topographic Base Map covering the entire Earth surface when a higher scale map is not available.	VC-BL 1												
4.3.1.2.1.0-1.0-7	[T1-R883]	The VC GeoView shall be able to switch to Connected State automatically when the connection is restored.	VC-BL 1												
4.3.1.2.1.0-1.0-8	[T1-R884]	The VC GeoView shall be terminated when the user closes the browser or explicitly exits from the GeoView with confirmation. The GeoView external connections shall be reset at termination.	VC-BL 1												
4.3.1.2.1.0-1.0-9	[T1-R885]	The VC GeoView shall be terminated automatically when AppView is terminated.	VC-BL 1												
4.3.1.2.1.0-1.0-10	[T1-R886]	The VC Viewer Server shall manage connections of GeoViews and handle the disconnected and terminated GeoViews.	VC-BL 1												
4.3.1.2.2		**Standalone Mode**													
4.3.1.2.2.0-1.0-1	[T1-R887]	The VC shall be able to run as a standalone application in Standalone Mode when it is packed as a component, deployed and configured. This type of operational use shall be limited to displaying the Geo-information provided by the GIS Server.	VC-BL 2												
4.3.1.2.2.0-1.0-2	[T1-R888]	The VC shall be able to integrate NATO Core Services as required when it is deployed as standalone application.	VC-BL 2												
4.3.2		**C4ISR Visualisation Component Elements**													
4.3.2.1		**Symbology Service**													
4.3.2.1.0-1.0-1	[T1-R889]	The VC shall have a Symbology Service as a Web service to provide standard symbol set to be used in the GeoView and AppView. In order to improve network efficiency, default and most used symbol sets will be transferred to the Client side during initialisation.	VC-BL 1												
4.3.2.1.0-1.0-2	[T1-R890]	The VC Symbology Service shall maintain a Portrayal Catalogue.	VC-BL 1												
4.3.2.1.0-1.0-3	[T1-R891]	The VC Symbology Service Portrayal Catalogue shall support the standards given in the Description. It shall include labels, annotations and the publication of those definitions. It "should" include Civil-Military Cooperation (CIMIC) symbology set as defined in [AM-86-1-1].	VC-BL 1												
4.3.2.1.0-1.0-4	[T1-R892]	The VC shall allow the authorised user to configure the Symbology Service. For example, the most used symbols can be defined with respect to the Functional Service.	VC-BL 1												
4.3.2.1.0-1.0-5	[T1-R893]	The VC Symbology Service shall enable all GeoViews and AppViews to apply the supported symbol sets to features and C4ISR Objects in an automated fashion.	VC-BL 1												
4.3.2.1.0-1.0-6	[T1-R894]	The VC Symbology Service shall have mechanisms to improve network efficiency (e.g. providing a subset of the default and most used symbols during the initialisation, caching the used symbols).The caching of Sprite Sheets and tile maps shall also be supported by consumers and proxy services.	VC-BL 1												
4.3.2.1.0-1.0-7	[T1-R895]	The VC Symbology Service shall be able to provide one or more symbols upon request.	VC-BL 1												
4.3.2.1.0-1.0-8	[T1-R896]	The VC Symbology Service shall provide the means to retrieve a Sprite Sheet, as defined in the Description, as a single image containing all the point symbols for a given symbology standard.	VC-BL 1												
4.3.2.1.0-1.0-9	[T1-R897]	The VC Symbology Service shall provide the means to specify the general size of symbols provided in a Sprite Sheet.	VC-BL 1												
4.3.2.1.0-1.0-10	[T1-R898]	The VC Symbology Service shall provide the means to retrieve a tile map applicable to a Sprite Sheet for a given symbology standard.	VC-BL 1												
4.3.2.1.0-1.0-11	[T1-R899]	The VC Symbology Service shall be able to provide country flags, as icons, indexed by the NATO Standard Country Codes Table. The table shall be configured by the authorised user.	VC-BL 1												
4.3.2.1.0-1.0-12	[T1-R900]	The VC Symbology Service shall provide the means to add user-defined symbols to the Portrayal Catalogue.	VC-BL 2												
4.3.2.1.0-1.0-13	[T1-R901]	The VC Symbology Service shall provide the means to add new Symbol Sets to the Portrayal Catalogue.	VC-BL 1												
4.3.2.1.0-1.0-14	[T1-R902]	The VC Symbology Service shall provide the means to retrieve metadata for a single symbol, including the semantic meaning of the symbol.	VC-BL 1												
4.3.2.1.0-1.0-15	[T1-R903]	The VC Symbology Service shall provide the means to retrieve metadata for the configured symbol sets and individual symbols, sufficient to support data driven UI components for finding and selecting symbology.	VC-BL 2												
4.3.2.1.0-1.0-16	[T1-R904]	The VC Symbology Service shall have Service Interface Profile documented in the VC ICD.	VC-BL 2												
4.3.2.2		**Viewer Server**													
4.3.2.2.0-1.0-1	[T1-R905]	The VC Viewer Server shall provide the Application Server functionality.	VC-BL 1												
4.3.2.2.0-1.0-2	[T1-R906]	The VC shall store the internal Configuration Settings given in the Description inside the Viewer Server.	VC-BL 1												
4.3.2.2.0-1.0-3	[T1-R907]	The VC shall allow the authorised user to manage the Configuration Settings.	VC-BL 1												
4.3.2.3		**GeoView**													
4.3.2.3.0-2.0-1	[T1-R908]	The VC Visualisation Framework shall implement the visualisation capability as a browser-based application.	VC-BL 1												
4.3.2.3.0-2.0-2	[T1-R909]	The VC shall provide a suit of re-usable software modules as "Re-usable UI Components".	VC-BL 1												
4.3.2.3.0-2.0-3	[T1-R910]	The VC Reusable UI Components shall have independent functionality which can be integrated into the application in which they are required.	VC-BL 1												
4.3.2.3.0-2.0-4	[T1-R911]	The VC Reusable UI Components shall have API documented in the VC ICD.	VC-BL 1												
4.3.2.3.0-2.0-5	[T1-R912]	The VC shall validate all data according to predefined syntax, structure, completeness and validity, types and limits received from external interfaces prior to processing.	VC-BL 1												
4.3.2.3.0-2.0-6	[T1-R913]	The VC shall manage the display-related events sent by the AppView to geospatially locate C4ISR Objects and to display them on the map using the Portrayal Rules.	VC-BL 1												
4.3.2.3.0-2.0-7	[T1-R914]	The VC GIS Library shall implement the Web services to interact with the NATO Core GIS.	VC-BL 1												
4.3.2.4		**GeoView User Interface Components**													
4.3.2.4.1		**Header**													
4.3.2.4.1.1		**Title Bar**													
4.3.2.4.1.1.0-1.0-1	[T1-R915]	The VC GeoView shall have a Title Bar to display the Functional Service Application Name and coloured label containing the environment classification (a.k.a. security policy, classification and release caveats).	VC-BL 1												
4.3.2.4.1.1.0-1.0-2	[T1-R916]	The VC GeoView Title Bar shall allow the user to control (minimise, maximise, close) the window associated with the Title Bar.	VC-BL 1												
4.3.2.4.1.2		**Ribbon Bar**													
4.3.2.4.1.2.0-1.0-1	[T1-R917]	The VC GeoView shall have a Ribbon Bar as a series of tabs to provide the user with easy access to all GeoView functions and control (show, hide) the Graphical Components.	VC-BL 1												
4.3.2.4.1.2.0-1.0-2	[T1-R918]	The VC GeoView Ribbon Bar shall display the currently logged-in user's name and the selected Operation Name.	VC-BL 1												
4.3.2.4.1.2.0-1.0-3	[T1-R919]	The VC GeoView Ribbon Bar shall have Quick Access Buttons (e.g. On-line Help).	VC-BL 1												
4.3.2.4.1.2.0-1.0-4	[T1-R920]	The VC GeoView Ribbon Bar shall be configurable to show/hide tabs, panels, buttons and fields as required.	VC-BL 1												
4.3.2.4.1.2.0-1.0-5	[T1-R921]	The VC GeoView Ribbon Bar shall be configurable to add new ribbon components (buttons, tabs, panels, fields, combo-lists, etc.) as required.	VC-BL 1												
4.3.2.4.2		**Map Panel**													
4.3.2.4.2.1		**Main Map**													
4.3.2.4.2.1.0-1.0-1	[T1-R922]	The VC GeoView shall have a Map Panel to visualise user-selected maps, features and C4ISR Objects.	VC-BL 1												
4.3.2.4.2.1.0-1.0-2	[T1-R923]	The VC GeoView shall display a Base Map inside the Map Panel as generated by the selected GIS Server.	VC-BL 1												
4.3.2.4.2.1.0-1.0-3	[T1-R924]	The VC GeoView Map Panel shall display the Map Legend when enabled by the user.	VC-BL 1												
4.3.2.4.2.1.0-1.0-4	[T1-R925]	The VC GeoView Map Panel shall display restrictions for the visualized data, including copyright, limited distribution and releasability.	VC-BL 1												
4.3.2.4.2.1.0-1.0-5	[T1-R926]	The VC GeoView Map Panel shall provide the means to visualise map, feature and C4ISR Object data as a set of Layers.	VC-BL 1												
4.3.2.4.2.1.0-1.0-6	[T1-R927]	The VC GeoView Map Panel shall provide the means to re-order the Layers to achieve the desired visualisation.	VC-BL 1												
4.3.2.4.2.1.0-1.0-7	[T1-R928]	The VC GeoView Map Panel shall be able to display multiple Layers allowing the user to switch between them (swipe) temporarily.	VC-BL 3												
4.3.2.4.2.2		**Overview Map**													
4.3.2.4.2.2.0-1.0-1	[T1-R929]	The VC GeoView shall display a configurable Overview Map inside the Map Panel, which shows the Base Map at a smaller scale indicating the current visible section with a rectangle. The rectangle shall indicate the extent of the Base Map in a user configurable ratio.	VC-BL 1												
4.3.2.4.2.2.0-1.0-2	[T1-R930]	The VC GeoView shall allow the user to navigate through the Base Map by dragging and resizing the rectangle in the Overview Map.	VC-BL 1												
4.3.2.4.2.2.0-1.0-3	[T1-R931]	The VC GeoView shall align navigation of the Overview Map with the Map Panel Navigation Functions and the selected Base Map projection.	VC-BL 1												
4.3.2.4.2.2.0-1.0-4	[T1-R932]	The VC GeoView shall allow the user to enable/disable and change the location of the Overview Map.	VC-BL 1												
4.3.2.4.2.3		**Scale Bar**													
4.3.2.4.2.3.0-1.0-1	[T1-R933]	The VC GeoView shall have a Scale Bar which displays the Scale Ratio and distances at this scale with one or two measurement units as defined by the user preferences.	VC-BL 1												
4.3.2.4.2.3.0-1.0-2	[T1-R934]	The VC GeoView Scale Bar shall label the distances with the selected unit. Adequate units to keep the numbers in a reasonable range between 1 and 1000 should be used.	VC-BL 1												
4.3.2.4.2.3.0-1.0-3	[T1-R935]	The VC GeoView Scale Bar shall automatically be updated when the scale of the Map Panel is changed, i.e. with each zoom in or zoom out.	VC-BL 1												
4.3.2.4.2.3.0-1.0-4	[T1-R936]	The VC GeoView shall allow the user to enable/disable and change the location of the Scale Bar.	VC-BL 1												
4.3.2.4.2.4		**Displaying Maps**													
4.3.2.4.2.4.0-1.0-1	[T1-R937]	The VC shall allow the user to select the Base Map from the Map Catalogue provided by the GIS Server.	VC-BL 1												
4.3.2.4.2.4.0-1.0-2	[T1-R938]	The VC Map Panel shall be able to use a WMS [OGC WMS] to get the maps. The VC shall support WMS Versions 1.0.0, 1.1.0, 1.1.1 and 1.3.0 as defined in ICore GIS SIP1.	VC-BL 1												
4.3.2.4.2.4.0-1.0-3	[T1-R939]	The VC GeoView shall be able to display received maps in JPEG or PNG (with transparency). GIF and JPEG2K "should" be supported.	VC-BL 1												
4.3.2.4.2.4.0-1.0-4	[T1-R940]	The VC Map Panel shall be able to use a WMTS [OGC WMTS] to get the map tiles. The VC shall support WMTS Version 1.0.0.	VC-BL 1												
4.3.2.4.2.4.0-1.0-5	[T1-R941]	The VC Map Panel shall display the Base Map received via a WMS. If the WMS is not used as a Base Map, the background of the WMS Layer shall be displayed as transparent.	VC-BL 1												
4.3.2.4.2.4.0-1.0-6	[T1-R942]	The VC shall be able to add a WMS and WMTS to the Layer Manager.	VC-BL 1												
4.3.2.4.2.4.0-1.0-7	[T1-R943]	The VC shall be able to use Geospatial Web Map Services as defined in [Core GIS SIP]. The VC shall also be able to use other Geospatial Services like Gazetteer and Web Processing Services as provided by the GIS Server.	VC-BL 1												
4.3.2.4.2.4.0-1.0-8	[T1-R944]	The VC Map Panel shall use WGS84 as the default datum.	VC-BL 1												
4.3.2.4.2.4.0-1.0-9	[T1-R945]	The VC Map Panel shall be able to display a selected map within ten (10) seconds on a Client running on a Standard Workstation on a standard NATO Static Site Network.	VC-BL 1												
4.3.2.4.2.5		**Displaying Map Labels**													
4.3.2.4.2.5.0-1.0-1	[T1-R946]	The VC GeoView Map Panel shall be able to display Map Label Text as provided by WFS, Shape File, Drawing Layers or C2 Layers.	VC-BL 1												
4.3.2.4.2.5.0-1.0-2	[T1-R947]	The VC GeoView Map Panel shall display or hide Map Labels according to the Label Settings of a Layer.	VC-BL 1												
4.3.2.4.2.5.0-1.0-3	[T1-R948]	The VC GeoView shall allow the user to configure Map Label, fonts (True Type Fonts, Open Type Fonts, PostScript Fonts) and position through the Map Label Settings.	VC-BL 1												
4.3.2.4.2.5.0-1.0-4	[T1-R949]	The VC Map Panel shall de-conflict overlapping Map Labels at the time of map creation.	VC-BL 1												
4.3.2.4.2.6		**Coordinate Reference Systems**													
4.3.2.4.2.6.0-1.0-1	[T1-R950]	The VC GeoView Map Panel shall support the Coordinate Reference Systems given in the Description.	VC-BL 1												
4.3.2.4.2.6.0-1.0-2	[T1-R951]	The VC GeoView shall allow the user to select a Coordinate Reference System to be used in the display of locations.	VC-BL 1												
4.3.2.4.2.6.0-1.0-3	[T1-R952]	The VC GeoView shall allow the user to select a Coordinate Reference System to be used for the input of locations.	VC-BL 1												
4.3.2.4.2.7		**Map Projection**													
4.3.2.4.2.7.0-1.0-1	[T1-R953]	The VC GeoView Map Panel shall support the Map Projections given in the Description.	VC-BL 1												
4.3.2.4.2.7.0-1.0-2	[T1-R954]	The VC GeoView shall allow the user to select the desired Projection from a list of supported Map Projections.	VC-BL 1												
4.3.2.4.2.8		**Map Scaling**													
4.3.2.4.2.8.0-1.0-1	[T1-R955]	The VC GeoView shall adjust the View Scale of the Map Panel according to the user selected View Scale. Any used Web services shall also be scaled accordingly.	VC-BL 1												
4.3.2.4.2.8.0-1.0-2	[T1-R956]	The VC GeoView Map Panel shall ensure that the expansion process during scaling occurs non-disruptively so that no outages are required, no reconfiguration of the existing storage is needed, and the user can continue working during scaling.	VC-BL 1												
4.3.2.4.2.8.0-1.0-3	[T1-R957]	The VC GeoView Map Panel shall compute the Cluster Distance of symbols in correlation with changing the View Scale and apply automatically.	VC-BL 1												
4.3.2.4.2.8.0-1.0-4	[T1-R958]	The VC GeoView shall allow the user to set the current View Scale of the Map Panel by selecting a Fixed View Scale with from a configurable list (the default values are given in the Description) on the Ribbon Bar, by entering a scale value manually or by using the View Scale Bar.	VC-BL 1												
4.3.2.4.2.8.0-1.0-5	[T1-R959]	The VC GeoView Map Panel shall apply de-cluttering of labels for every View Scale change if enabled by the user.	VC-BL 1												
4.3.2.4.2.8.0-1.0-6	[T1-R960]	The VC GeoView shall display the current View Scale of the Map Panel.	VC-BL 1												
4.3.2.4.2.9		**Grid Network**													

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
4.3.2.4.2.9.0-1.0-1	[T1-R961]	The VC GeoView Map Panel shall support displaying the Grid Reference Systems given in the Description.	VC-BL 1												
4.3.2.4.2.9.0-1.0-2	[T1-R962]	The VC GeoView Map Panel shall comply with STANAG 2211 and [Bi-SC 80-4] for geodetic datum, Map Projections and Grid References.	VC-BL 1												
4.3.2.4.2.9.0-1.0-3	[T1-R963]	The VC GeoView Map Panel shall display a Grid Reference System when received from the AppView according to the parameters given in the Description.	VC-BL 1												
4.3.2.4.2.9.0-1.0-4	[T1-R964]	The VC GeoView shall allow the user to show, hide, and configure the graticule ticks, lines and their colour for each Grid Reference System.	VC-BL 1												
4.3.2.4.2.9.0-1.0-5	[T1-R965]	The VC GeoView shall allow the user to show or hide the grid lines and show or hide the grid labels.	VC-BL 1												
4.3.2.4.2.9.0-1.0-6	[T1-R966]	The VC GeoView Map Panel shall use the Grid Line Calculation as explained in the Description to compute the number of grid lines to be displayed.	VC-BL 1												
4.3.2.4.2.10		**Navigational Controls**													
4.3.2.4.2.10.1		**Navigation Icons**													
4.3.2.4.2.10.1.0-1.0-1	[T1-R967]	The VC Map Panel shall have Navigation Icons for panning over the map and changing the View Scale.	VC-BL 1												
4.3.2.4.2.10.1.0-1.0-2	[T1-R968]	The VC Navigation Panel shall allow the user to pan and to change the View Scale through interaction with the Panning and View Scale icons.	VC-BL 1												
4.3.2.4.2.10.2		**Cursor**													
4.3.2.4.2.10.2.0-1.0-1	[T1-R969]	The VC GeoView shall allow the user to move the cursor with the available pointing device.	VC-BL 1												
4.3.2.4.2.10.2.0-1.0-2	[T1-R970]	The VC GeoView shall allow the user to pick a geospatial position by clicking on the Map Panel. This information can further be used for processing (e.g. copy to clipboard).	VC-BL 1												
4.3.2.4.2.10.3		**Pan**													
4.3.2.4.2.10.3.0-1.0-1	[T1-R971]	The VC GeoView shall pan the Map Panel according to the user control.	VC-BL 1												
4.3.2.4.2.10.3.0-1.0-2	[T1-R972]	The VC GeoView shall allow the user to pan the Map Panel with the pointing device (click and drag).	VC-BL 1												
4.3.2.4.2.10.3.0-1.0-3	[T1-R973]	The VC GeoView shall allow the user to pan the Map Panel by pressing the Navigation Icons.	VC-BL 1												
4.3.2.4.2.10.3.0-1.0-4	[T1-R974]	The VC GeoView shall allow the user to pan the Map Panel by using keyboard arrow keys.	VC-BL 1												
4.3.2.4.2.10.3.0-1.0-5	[T1-R975]	The VC GeoView shall allow the user to pan the Map Panel by using multi-touch gestures (i.e. drag) when a touch-screen device is used.	VC-BL 3												
4.3.2.4.2.10.4		**Centre**													
4.3.2.4.2.10.4.0-1.0-1	[T1-R976]	The VC GeoView shall take the centre of the Map Panel to a position indicated by the user.	VC-BL 1												
4.3.2.4.2.10.4.0-1.0-2	[T1-R977]	The VC GeoView shall allow the user to take the selected position as the centre of the Map Panel.	VC-BL 1												
4.3.2.4.2.10.4.0-1.0-3	[T1-R978]	The VC GeoView shall allow the user to enter a geographic position as the centre of the Map Panel.	VC-BL 1												
4.3.2.4.2.10.4.0-1.0-4	[T1-R979]	The VC GeoView shall allow the user to use Own Position as the centre of the Map Panel with an option to follow. If that option is selected, the Map Panel centre shall follow the Object as it changes its position.	VC-BL 1												
4.3.2.4.2.10.4.0-1.0-5	[T1-R980]	The VC GeoView shall allow the user to use Ribbon Bar or keyboard Function key to invoke the Centre Function.	VC-BL 1												
4.3.2.4.2.10.4.0-1.0-6	[T1-R981]	The VC GeoView shall allow the user to select a C4ISR Object as the centre of the Map Panel with an option to follow the Object. If that option is selected, the Map Panel centre shall follow the Object as it changes its position.	VC-BL 1												
4.3.2.4.2.10.5		**Select**													
4.3.2.4.2.10.5.0-1.0-1	[T1-R982]	The VC GeoView shall be able to apply a function to one or more selected Objects.	VC-BL 1												
4.3.2.4.2.10.5.0-1.0-2	[T1-R983]	The VC GeoView shall highlight the selected Objects or map features with a user-configurable indication mark.	VC-BL 1												
4.3.2.4.2.10.5.0-1.0-3	[T1-R984]	The VC GeoView shall allow the user to select one or more Objects or map features on the Map Panel.	VC-BL 1												
4.3.2.4.2.10.5.0-1.0-4	[T1-R985]	The VC GeoView shall allow the user to use a key-button combination (e.g. Control + Click) or a circle or a polygon to select more than one Object.	VC-BL 1												
4.3.2.4.2.10.5.0-1.0-5	[T1-R986]	The VC GeoView shall provide a manageable list for multi-selection of Objects. The user shall be able to add more Objects to the selection list or remove Objects from the list.	VC-BL 1												
4.3.2.4.2.10.6.0-1.0-1	[T1-R987]	The VC GeoView shall change the Map Panel Viewing Scale as the user zooms in or out.	VC-BL 1												
4.3.2.4.2.10.6.0-1.0-2	[T1-R988]	The VC GeoView shall allow the user to control the zoom level of the Map Panel by using one of the Zoom Control Actions given in the Description.	VC-BL 1												
4.3.2.4.2.10.6.0-1.0-3	[T1-R989]	The VC GeoView shall allow the user to control the zoom of the Map Panel through multi-touch gestures (i.e. pinch-to-zoom) when a touch-screen device is used.	VC-BL 3												
4.3.2.4.2.10.7		**Context-sensitive Menus**													
4.3.2.4.2.10.7.0-1.0-1	[T1-R990]	The VC GeoView shall display Context-sensitive Menus when the right button of the pointing device is pressed. The content of the menu shall be determined according to the area of the component in which the cursor is positioned.	VC-BL 1												
4.3.2.4.2.10.7.0-1.0-2	[T1-R991]	The VC GeoView Context-sensitive Menus shall activate the selected function.	VC-BL 1												
4.3.2.4.2.10.7.0-1.0-3	[T1-R992]	The VC GeoView Context-sensitive Menus shall be configurable to allow the addition of menu items, including sub-menus.	VC-BL 1												
4.3.2.4.2.10.7.0-1.0-4	[T1-R993]	The VC GeoView Context-sensitive Menus shall be configurable to allow the enabling or disabling of menu items.	VC-BL 1												
4.3.2.4.2.10.7.0-1.0-5	[T1-R994]	The VC GeoView Context-sensitive Menus shall be configurable to allow the hiding or showing of menu items.	VC-BL 1												
4.3.2.4.2.10.7.0-1.0-6	[T1-R995]	The VC GeoView Context-sensitive Menus shall be configurable to allow the association with a shortcut keystroke with a menu item.	VC-BL 1												
4.3.2.4.2.10.8.0-1.0-1	[T1-R996]	The VC GeoView shall be able to mark an entered Goto location if it is in the current Spatial Extent; if not the location will be brought to the centre of the Map Panel (panning).	VC-BL 1												
4.3.2.4.2.10.8.0-1.0-2	[T1-R997]	The VC GeoView shall allow the user to enter a position of a location to be marked when the Goto Function is invoked.	VC-BL 1												
4.3.2.4.2.10.8.0-1.0-3	[T1-R998]	The VC GeoView shall allow the user to convert the entered value(s) from one Coordinate System to another.	VC-BL 3												
4.3.2.4.2.10.9		**Bookmarks**													
4.3.2.4.2.10.9.0-1.0-1	[T1-R999]	The VC GeoView shall be able to save the current view of the GeoView as a Bookmark.	VC-BL 3												
4.3.2.4.2.10.9.0-1.0-2	[T1-R1000]	The VC GeoView shall maintain a list of Bookmarks per user, accessible from the Ribbon Bar.	VC-BL 1												
4.3.2.4.2.10.9.0-1.0-3	[T1-R1001]	The VC GeoView shall allow the user to manage (add, retrieve, modify, delete) the Bookmark List.	VC-BL 1												
4.3.2.4.2.10.9.0-1.0-4	[T1-R1002]	The VC GeoView shall apply the settings of the selected Bookmark to the GeoView.	VC-BL 1												
4.3.2.4.3		**Control Panel**													
4.3.2.4.3.1		**C2 Pane**													
4.3.2.4.3.1.0-1.0-1	[T1-R1003]	The VC GeoView shall have a C2 Pane to control the display of C4ISR Objects in Layers of the Map Panel.	VC-BL 1												
4.3.2.4.3.1.0-1.0-2	[T1-R1004]	The VC GeoView shall allow the user to configure the C2 Pane content.	VC-BL 1												
4.3.2.4.3.1.0-1.0-3	[T1-R1005]	The VC GeoView C2 Pane shall allow the user to group C4ISR Objects according to a common attribute (e.g. Country, Type) by applying a filter.	VC-BL 1												
4.3.2.4.3.1.0-1.0-4	[T1-R1006]	The VC GeoView C2 Pane shall display the content in a tree structure with at least eight (8) levels.	VC-BL 1												
4.3.2.4.3.1.0-1.0-5	[T1-R1007]	The VC GeoView C2 Pane shall allow the user to navigate within the tree structure by expanding and collapsing.	VC-BL 1												
4.3.2.4.3.1.0-1.0-6	[T1-R1008]	The VC GeoView C2 Pane shall allow the user to make multiple selections of C4ISR Objects or feature types in the tree structure.	VC-BL 1												
4.3.2.4.3.2		**Layer Control Pane**													
4.3.2.4.3.2.0-2.0-1	[T1-R1009]	The VC GeoView shall be able to display C4ISR Objects and map features on separate Layers.	VC-BL 1												
4.3.2.4.3.2.0-2.0-2	[T1-R1010]	The VC GeoView shall maintain a list of Layers where each Layer is controlled by its own Display Settings.	VC-BL 1												
4.3.2.4.3.2.0-2.0-3	[T1-R1011]	The VC GeoView shall have a Layer Manager to control receiving data from an Application and displaying it on the specified Layer according to Layer Display Settings.	VC-BL 1												
4.3.2.4.3.2.0-2.0-4	[T1-R1012]	The VC GeoView Layer Control Pane shall allow the user to manage (add, modify, remove, configure) the Layers and Web services	VC-BL 1												
4.3.2.4.3.2.0-2.0-5	[T1-R1013]	The VC GeoView Layer Control Pane shall allow the user to configure the Layer Display Settings for each Layer as given in the Description.	VC-BL 1												
4.3.2.4.3.2.0-2.0-6	[T1-R1014]	The VC GeoView Layer Control Pane shall allow the authorised user to restrict general user access to certain Layers which are displayed on the Map Panel.	VC-BL 1												
4.3.2.4.3.2.0-2.0-7	[T1-R1015]	The VC GeoView Layer Control Pane shall allow the user to zoom to (or Goto) a selected feature. The scale of this zoom shall be customizable in the User Settings. The selection of the feature shall be possible either by a simple query or by identifying the feature or location by clicking at a location on the map.	VC-BL 1												
4.3.2.4.3.2.0-2.0-8	[T1-R1016]	The VC GeoView Layer Control Pane shall allow the user to set the Map Panel view to "fit to the full spatial extent" covering all features of a particular Layer.	VC-BL 1												
4.3.2.4.3.2.0-2.0-9	[T1-R1017]	The VC GeoView Layer Control Pane shall allow the user to temporarily switch off (flicker) a Layer to see what is underneath without having to hide it.	VC-BL 3												
4.3.2.4.3.2.0-2.0-10	[T1-R1018]	The VC GeoView Layer Control Panel shall allow the user to temporarily move a Layer onto another Layer (swipe). When the swipe function is invoked, the Map Panel shall display two Layers with a line to control the swiping to left or right.	VC-BL 3												
4.3.2.4.3.2.0-2.0-11	[T1-R1019]	The VC GeoView Layer Control Panel shall display brief information about the metadata of each layer or service while hovering the cursor on it.	VC-BL 2												
4.3.2.4.3.3		**Placemarks Pane**													
4.3.2.4.3.3.0-1.0-1	[T1-R1020]	The VC GeoView shall maintain a Placemark List.	VC-BL 1												
4.3.2.4.3.3.0-1.0-2	[T1-R1021]	The VC GeoView shall allow the user to manage (add, delete, modify, search, set visibility, show, hide) the Placemark List.	VC-BL 1												
4.3.2.4.3.3.0-1.0-3	[T1-R1022]	The VC GeoView shall allow the user to export the selected Placemarks in the Placemark List to an exported Placemark file in KML/KMZ format.	VC-BL 2												
4.3.2.4.3.3.0-1.0-4	[T1-R1023]	The VC GeoView shall allow the user to import Placemarks from a exported Placemark file in KML/KMZ format.	VC-BL 2												
4.3.2.4.3.3.0-1.0-5	[T1-R1024]	The VC GeoView shall allow the user to select a Placemark and invoke the Goto Function to mark the location on the Map Panel.	VC-BL 1												
4.3.2.4.3.4		**Timeline Panel**													
4.3.2.4.3.4.0-1.0-1	[T1-R1025]	The VC GeoView shall have a Timeline Panel which controls the replaying a given set of geospatial data as explained in the Description.	VC-BL 2												
4.3.2.4.3.4.0-1.0-2	[T1-R1026]	The VC GeoView Timeline Panel shall allow the user to pick the date and time of the replay period.	VC-BL 2												
4.3.2.4.3.4.0-1.0-3	[T1-R1027]	The VC GeoView Timeline Panel shall appear automatically when an animation is activated by the Geo Player.	VC-BL 2												
4.3.2.4.4		**Footer**													
4.3.2.4.4.1		**Status Panel**													
4.3.2.4.4.1.0-1.0-1	[T1-R1028]	The VC GeoView shall have a Status Panel for displaying the status information given in the Description.	VC-BL 1												
4.3.2.4.4.1.0-1.0-2	[T1-R1029]	The VC GeoView Status Panel shall be able to display status information as received from the VC or AppView.	VC-BL 1												
4.3.2.4.4.2		**Time Panel**													
4.3.2.4.4.2.0-1.0-1	[T1-R1030]	The VC GeoView shall have a Time Panel to display the current date and time in decimal units.	VC-BL 1												
4.3.2.4.4.2.0-1.0-2	[T1-R1031]	The VC GeoView Time Panel shall display the current time in local time zone, operational theatre time zone or UTC.	VC-BL 1												
4.3.2.4.4.2.0-1.0-3	[T1-R1032]	The VC GeoView Time Panel shall allow the user to select the time zone. The default shall be UTC.	VC-BL 1												
4.3.2.4.4.2.0-1.0-4	[T1-R1033]	The VC GeoView Time Panel shall allow the user to select the format for the display of the date time.	VC-BL 1												
4.3.2.4.4.3		**Notification Panel**													
4.3.2.4.4.3.0-1.0-1	[T1-R1034]	The VC GeoView shall have a Notification Panel to display non-critical errors or warnings.	VC-BL 1												
4.3.2.4.4.3.0-1.0-2	[T1-R1035]	The VC GeoView Notification Panel shall be able to display error or warning messages sent by the VC or Application.	VC-BL 1												
4.3.2.4.4.4		**Coordinate Panel**													
4.3.2.4.4.4.0-1.0-1	[T1-R1036]	The VC GeoView shall have a Coordinate Panel to display the position information of the cursor position.	VC-BL 1												
4.3.2.4.4.4.0-1.0-2	[T1-R1037]	The VC GeoView shall display the elevation/depth and slope information based on the cursor position on the Coordinate Panel.	VC-BL 1												
4.3.2.4.4.4.0-1.0-3	[T1-R1038]	The VC GeoView shall use Web Services provided by the GIS Server to get the elevation/depth and slope information of an indicated position.	VC-BL 1												
4.3.2.4.4.4.0-1.0-4	[T1-R1039]	The VC GeoView shall allow the user to enable/disable the displaying of elevation/depth and slope information.	VC-BL 1												
4.3.2.4.4.4.0-1.0-5	[T1-R1040]	The VC GeoView shall allow the user to configure the Settings of the Coordinate Panel.	VC-BL 1												
4.3.2.4.4.5		**Symbol Selector**													
4.3.2.4.4.5.0-1.0-1	[T1-R1041]	The VC GeoView shall provide a Symbol Selector.	VC-BL 3												
4.3.2.4.4.5.0-1.0-2	[T1-R1042]	The VC GeoView Symbol Selector shall allow the user to choose a symbol from those provided by the Symbology Service.	VC-BL 3												
4.3.2.4.4.5.0-1.0-3	[T1-R1043]	The VC GeoView Symbol Selector shall support all symbology standards available through the Symbology Service.	VC-BL 3												
4.3.2.4.4.5.0-1.0-4	[T1-R1044]	The VC GeoView Symbol Selector shall support all point, line, area and multi-point based symbology provided by the Symbology Service.	VC-BL 3												
4.3.2.4.4.5.0-1.0-5	[T1-R1045]	The VC GeoView Symbology Selector shall utilise the Symbology Service for the rendering of the symbols.	VC-BL 3												
4.3.2.4.4.5.0-1.0-6	[T1-R1046]	The VC GeoView Symbol Selector shall consume the Symbology Service metadata for the purpose of presenting the available symbology to the user.	VC-BL 3												
4.3.2.4.4.5.0-1.0-7	[T1-R1047]	The VC GeoView Symbol Selector shall display the symbol and metadata associated with a selected C4ISR Object or C2 Drawing.	VC-BL 3												
4.3.2.4.4.5.0-1.0-8	[T1-R1048]	The VC GeoView Symbol Selector shall provide the means to display the Symbology Service metadata in a tree format.	VC-BL 3												
4.3.2.4.4.5.0-1.0-9	[T1-R1049]	The VC GeoView Symbol Selector shall provide the means to search for a symbol and display the results in a tree format.	VC-BL 3												
4.3.3		**User Interface Layout**													
4.3.4		**Handling Geospatial Objects**													
4.3.4.1		**Displaying C4ISR Objects**													
4.3.4.1.1		**Object Display**													

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
4.3.4.1.1.0-1.0-1	[T1-R1050]	The VC GeoView shall request C4ISR Objects from the AppView to display on the Map Panel with their geospatial information. The request filter shall be derived from the current Map Extent.	VC-BL 1												
4.3.4.1.1.0-1.0-2	[T1-R1051]	The VC GeoView shall update the positions of the displayed C4ISR Objects when they are updated by the AppView.	VC-BL 1												
4.3.4.1.1.0-1.0-3	[T1-R1052]	The VC GeoView shall be able to extrapolate positions of the displayed C4ISR Objects to current time using the last known kinematics when the user wants to view the Current Status as defined in the Description.	VC-BL 1												
4.3.4.1.1.0-1.0-4	[T1-R1053]	The VC GeoView shall be able to extrapolate the positions of all visible C4ISR Objects when the user wants to view the Current Status, and display the Objects at their future positions as defined in the Description for a configurable amount of time.	VC-BL 1												
4.3.4.1.1.0-1.0-5	[T1-R1054]	The VC GeoView shall use the last known kinematics of C4ISR Objects for extrapolation to current time. If the movement vectors of an Object are not available at the last position update, then the VC shall derive movement vectors from the historical positions available within the last six (6) hours. If no historical position is available, then the Object will not be extrapolated to future position and displayed with faded symbol.	VC-BL 1												
4.3.4.1.1.0-1.0-6	[T1-R1055]	The VC GeoView shall be able to extrapolate the positions of all visible C4ISR Objects when the user wants to view the Current Status, and display the Objects at their future positions as defined in the Description for a configurable amount of time or until the user cancels.	VC-BL 1												
4.3.4.1.1.0-1.0-7	[T1-R1056]	The VC GeoView shall allow the user to view the Current Status as defined in the Description.	VC-BL 1												
4.3.4.1.1.0-1.0-8	[T1-R1057]	The VC GeoView shall allow the user to set duration to view the Current Status. The duration shall be configurable between five (5) seconds to one minute.	VC-BL 1												
4.3.4.1.2		**Symbology**													
4.3.4.1.2.0-1.0-1	[T1-R1058]	The VC GeoView shall display the C4ISR Objects on the Map Panel using the symbology standards supported by the Symbology Service.	VC-BL 1												
4.3.4.1.2.0-1.0-2	[T1-R1059]	The VC GeoView shall allow the authorised user to manage (publish, update, delete) symbols and associated rules from the Portrayal Catalogue of the Symbology Service.	VC-BL 1												
4.3.4.1.2.0-1.0-3	[T1-R1060]	The VC GeoView shall allow the user to select a Symbol Set from the list of available sets provided by the Symbology Service and set it as a personal default.	VC-BL 1												
4.3.4.1.2.0-1.0-4	[T1-R1061]	The VC GeoView Map Panel shall apply the selected symbol set to all objects and features automatically.	VC-BL 1												
4.3.4.1.2.0-1.0-5	[T1-R1062]	The VC GeoView Map Panel shall be able to display symbols with faded colours when such a feature is functionally required. For example, when all Objects are extrapolated to future positions, those Objects not suitable for extrapolation will be displayed with faded symbols temporarily.	VC-BL 1												
4.3.4.1.2.0-1.0-6	[T1-R1063]	The VC GeoView Map Panel shall display the Speed Leader or Direction & Movement [APP-6] of a moving Object if enabled.	VC-BL 1												
4.3.4.1.2.0-1.0-7	[T1-R1064]	The VC shall use the mechanisms provided by the Symbology Service to improve network efficiency (e.g. receiving only a subset of the default and most used symbols during the initialisation, caching the used symbols and Sprite Sheets (see Symbology Service)).	VC-BL 1												
4.3.4.1.3		**Object Labels**													
4.3.4.1.3.0-1.0-1	[T1-R1065]	The VC GeoView shall display Object Labels as a configurable text box at a user-selected position with respect to the symbol.	VC-BL 1												
4.3.4.1.3.0-1.0-2	[T1-R1066]	The VC GeoView shall receive data to be displayed on Object Labels from the Application.	VC-BL 1												
4.3.4.1.3.0-1.0-3	[T1-R1067]	The VC GeoView shall support the Object Label fonts given in the Description.	VC-BL 1												
4.3.4.1.3.0-1.0-4	[T1-R1068]	The VC GeoView shall allow the authorised user to configure the general structure and size of the Object Labels.	VC-BL 1												
4.3.4.1.3.0-1.0-5	[T1-R1069]	The VC GeoView shall allow the user to configure the appearance (lines to be displayed, background colour, text type/size and colour) of the Object Labels.	VC-BL 1												
4.3.4.1.3.0-1.0-6	[T1-R1070]	The VC GeoView shall allow the user to re-position Object Labels by selecting, dragging and dropping at any position of the Map Panel.	VC-BL 1												
4.3.4.1.4		**Clustering**													
4.3.4.1.4.0-1.0-1	[T1-R1071]	The VC GeoView shall allow the user to enable/disable Clustering for a selected Layer.	VC-BL 1												
4.3.4.1.4.0-1.0-2	[T1-R1072]	The VC GeoView shall allow the user to configure Clustering settings which includes at least the clustering distance, scale, number of allowable objects in one rectangle and excluded features.	VC-BL 1												
4.3.4.1.4.0-1.0-3	[T1-R1073]	The VC GeoView shall automatically cluster overlapping point symbols displayed on the Map Panel according to the user settings when Clustering is enabled.	VC-BL 1												
4.3.4.1.4.0-1.0-4	[T1-R1074]	The VC GeoView shall provide an option to exclude an Object from clustering.	VC-BL 1												
4.3.4.1.4.0-1.0-5	[T1-R1075]	The VC GeoView Map Panel shall re-cluster symbols when the content of the layer is changed.	VC-BL 1												
4.3.4.1.5		**Object Grouping**													
4.3.4.1.5.0-1.0-1	[T1-R1076]	The VC GeoView shall display a group of Objects with a combined symbol at the geometric centre of the group. A single Object Label shall be used which includes the text of the individual Object Labels.	VC-BL 2												
4.3.4.1.5.0-1.0-2	[T1-R1077]	The VC GeoView shall display the grouped Objects when Clustering is enabled.	VC-BL 2												
4.3.4.1.5.0-1.0-3	[T1-R1078]	The VC GeoView shall allow the user manage Object Grouping (e.g. selecting logically-related objects (e.g. tracks, areas), assigning a label and an annotation).	VC-BL 2												
4.3.4.1.5.0-1.0-4	[T1-R1079]	The VC GeoView shall update the centre of the object group when the object positions are updated.	VC-BL 2												
4.3.4.1.5.0-1.0-5	[T1-R1080]	The VC GeoView shall rearrange grouping if an object is deleted and disable grouping automatically when only one object remains.	VC-BL 2												
4.3.4.1.6		**Object History**													
4.3.4.1.6.0-1.0-1	[T1-R1081]	The VC GeoView shall be able to display historical positions of moving C4ISR Objects on the Map Panel when enabled.	VC-BL 2												
4.3.4.1.6.0-1.0-2	[T1-R1082]	The VC GeoView shall allow the user to configure historical position settings including duration and intervals for a set of selected C4ISR Objects.	VC-BL 2												
4.3.4.1.6.0-1.0-3	[T1-R1083]	The VC GeoView shall display the History Tail (the last positions within a configurable time) for all moving Objects for their last known positions. The number of positions shall be user configurable in the Display Settings.	VC-BL 2												
4.3.4.1.7		**Label De-confliction**													
4.3.4.1.7.0-1.0-1	[T1-R1084]	The VC GeoView shall be able to declutter Object Labels according to their position, number of visible objects and the available space in the current view.	VC-BL 1												
4.3.4.1.7.0-1.0-2	[T1-R1085]	The VC GeoView shall allow the user to enable/disable Label De-confliction for a selected layer.	VC-BL 1												
4.3.4.1.7.0-1.0-3	[T1-R1086]	The VC GeoView shall de-conflict the Object Labels and Map Labels automatically if the function is enabled for a selected layer.	VC-BL 1												
4.3.4.1.7.0-1.0-4	[T1-R1087]	The VC GeoView shall de-conflict the labels automatically when the Map Scale, position of objects, the number of visible objects in the layer or content, font and size of the labels are changed.	VC-BL 1												
4.3.4.1.7.0-1.0-5	[T1-R1088]	The VC GeoView shall allow the user to change the label locations manually if the function is not enabled.	VC-BL 1												
4.3.4.1.7.0-1.0-6	[T1-R1089]	The VC GeoView shall, when re-applying the declutter function, strive to keep the majority of the label locations constant. The intent is to avoid most labels jumping to a new location with each application of the declutter function.	VC-BL 1												
4.3.4.1.8		**Tinting**													
4.3.4.1.8.0-1.0-1	[T1-R1090]	The VC GeoView shall be able to apply tinting of symbols and labels as set by the user for each Layer.	VC-BL 1												
4.3.4.1.8.0-1.0-2	[T1-R1091]	The VC GeoView shall allow the user to change the attributes of the symbols and labels given in the Description.	VC-BL 1												
4.3.4.1.8.0-1.0-3	[T1-R1092]	The VC GeoView shall be able to generate default groups like "grouping by equal interval" and "grouping by unique value tinting".	VC-BL 1												
4.3.4.1.9		**Object Information Display**													
4.3.4.1.9.0-1.0-1	[T1-R1093]	The VC GeoView shall display the Simple Information, given in the Description, for a selected C4ISR Object, as a Tooltip when the cursor is hovered on its symbol.	VC-BL 1												
4.3.4.1.9.0-1.0-2	[T1-R1094]	The VC GeoView shall display an Object Information Box as a flyout when the user selects a symbol. The Box can be docked on the GeoView.	VC-BL 1												
4.3.4.1.9.0-1.0-3	[T1-R1095]	The VC GeoView shall allow the user to activate an Object Information Box as a flyout by either double-clicking on a symbol or selecting from the Context-sensitive Menu or pressing an Function Key.	VC-BL 1												
4.3.4.1.9.0-1.0-4	[T1-R1096]	The VC GeoView shall be able to display a configurable number of separate Object Information Boxes simultaneously with indications (e.g. lines to the symbols) to the related Objects.	VC-BL 1												
4.3.4.1.9.0-1.0-5	[T1-R1097]	The VC GeoView shall configure the content of the Object Information Box as defined by the AppView according to the type of the selected C4ISR Object.	VC-BL 1												
4.3.4.1.9.0-1.0-6	[T1-R1098]	The VC GeoView shall display the Default Information, given in the Description, in an Object Information Box when a C4ISR Object is selected.	VC-BL 1												
4.3.4.1.9.0-1.0-7	[T1-R1099]	The VC GeoView shall display the Detailed Information, given in the Description, in the Object Information Box when detailed information for the C4ISR Object is requested by the user.	VC-BL 1												
4.3.4.1.9.0-1.0-8	[T1-R1100]	The VC GeoView shall be able to retrieve the augmented information from the AppView and display it in the Object Information Box as defined by the AppView.	VC-BL 1												
4.3.4.1.9.0-1.0-9	[T1-R1101]	The VC GeoView shall allow the user to adjust the update rate of a C4ISR Object being displayed in the Object Information Box. When the user quits the Box. the update rate shall be reset to its configured parameter.	VC-BL 1												
4.3.4.1.10		**Tooltips**													
4.3.4.1.10.0-1.0-1	[T1-R1102]	The VC shall display a Tooltip for a C4ISR Object or a Map Feature when the cursor is hovered on its symbol for more than five-hundred (500) milliseconds. The Tooltip shall be removed when the cursor is moved away or when a duration given in the Configuration Settings has elapsed. The default shall be five (5) seconds.	VC-BL 1												
4.3.4.1.10.0-1.0-2	[T1-R1103]	The VC GeoView shall allow the user to configure Tooltip text format (e.g. font, size, colour) as part of the User Settings.	VC-BL 1												
4.3.4.1.10.0-1.0-3	[T1-R1104]	The VC GeoView shall allow the user to configure Tooltip text as part of the related Object attributes. Same structure as Object Labels shall be used for Tooltips.	VC-BL 1												
4.3.4.2		**Managing Spatial Extent**													
4.3.4.2.0-1.0-1	[T1-R1105]	The VC GeoView shall manage the Spatial Extent by zooming in or out and by drawing an extent rectangle.	VC-BL 1												
4.3.4.2.0-1.0-2	[T1-R1106]	The VC GeoView shall send the calculated rectangular coverage area to the AppView via NMAPI and shall render the returned features and C4ISR Objects.	VC-BL 1												
4.3.4.2.0-1.0-3	[T1-R1107]	The VC GeoView shall allow the user to set the Spatial Extent Mode with an area selection.	VC-BL 1												
4.3.4.2.0-1.0-4	[T1-R1108]	The VC GeoView shall adjust the Spatial Extent according to the request defined by the AppView for displaying selected C4ISR Objects.	VC-BL 1												
4.3.4.2.0-1.0-5	[T1-R1109]	The VC GeoView shall be able to update the default data of the C4ISR Objects in the current Spatial Extent with a rate of at least one-thousand (1000) Objects per minute for a Client running on a Standard Workstation on a standard NATO Static Site Network.	VC-BL 1												
4.3.4.3		**Displaying Geo-Information**													
4.3.4.3.0-1.0-1	[T1-R1110]	The VC GeoView shall be able to display Geo-information given in the Description.	VC-BL 1												
4.3.4.3.0-1.0-2	[T1-R1111]	The VC GeoView shall be able to display Application-specific features provided by the NMAPI.	VC-BL 1												
4.3.4.3.0-1.0-3	[T1-R1112]	The VC GeoView shall be able to interrogate the GIS Server for OGC compliant Web Services, list the available Services and display the selected services as Layers.	VC-BL 1												
4.3.4.3.0-1.0-4	[T1-R1113]	The VC GeoView shall allow the user to select the Web Services for displaying as Layers.	VC-BL 1												
4.3.4.3.0-1.0-5	[T1-R1114]	The VC GeoView shall display attribute data associated with the displayed Geo-features and AppView-features.	VC-BL 1												
4.3.4.3.0-1.0-6	[T1-R1115]	The VC GeoView shall be able to apply filter to the Geo-information features based on attribute data.	VC-BL 1												
4.3.4.3.0-1.0-7	[T1-R1116]	The VC GeoView shall display Geo-information according to the current Projection and Coordinate System.	VC-BL 1												
4.3.4.4		**Displaying KML and KMZ**													
4.3.4.4.0-1.0-1	[T1-R1117]	The VC GeoView shall be able to display data given in KML/KMZ format in a Layer of the Map Panel with their descriptions and tags.	VC-BL 1												
4.3.4.4.0-1.0-2	[T1-R1118]	The VC GeoView shall be able to add a KML/KMZ Layer to the Control Panel.	VC-BL 1												
4.3.4.4.0-1.0-3	[T1-R1119]	The VC GeoView Map Panel shall be able to process a file in KML/KMZ format indicated by the user.	VC-BL 1												
4.3.4.4.0-1.0-4	[T1-R1120]	The VC GeoView shall allow the user to select a KML/KMZ file or a drag the file and drop it over the Map Panel to display the content. If the file format is incorrect the user shall be notified.	VC-BL 1												
4.3.4.4.0-1.0-5	[T1-R1121]	The VC GeoView shall be able to export the contents of a Layer to a KML/KMZ file as indicated by the user.	VC-BL 1												
4.3.4.5		**Displaying NVG**													
4.3.4.5.0-1.0-1	[T1-R1122]	The VC GeoView shall be able to display NVG data in Layers of the Map Panel indicated by the Application. The Layer Manager shall control the flow of data.	VC-BL 1												
4.3.4.5.0-1.0-2	[T1-R1123]	The VC GeoView shall be able to display description and tag of NVG data as detail.	VC-BL 1												
4.3.4.5.0-1.0-3	[T1-R1124]	The VC GeoView shall be able to add a NVG Layer to the Control Panel.	VC-BL 1												
4.3.4.5.0-1.0-4	[T1-R1125]	The VC GeoView shall allow the user to select a file having NVG data or a drag the file and drop it over the Map Panel to display the content. If the file format is incorrect the user shall be notified.	VC-BL 1												
4.3.4.5.0-1.0-5	[T1-R1126]	The VC GeoView shall be able to process a file having NVG data indicated by the user.	VC-BL 1												
4.3.4.5.0-1.0-6	[T1-R1127]	The VC GeoView shall be able to export the contents of a Layer to a NVG file as indicated by the user.	VC-BL 1												
4.3.4.6		**Displaying Media**													
4.3.4.6.0-1.0-1	[T1-R1128]	The VC GeoView shall have an Image Viewer to display image files in Recognised Graphics File Format.	VC-BL 2												
4.3.4.6.0-1.0-2	[T1-R1129]	The VC GeoView Image Viewer shall allow the user to manage (open, resize, adjust colour and brightness, save) image files.	VC-BL 2												
4.3.4.6.0-1.0-3	[T1-R1130]	The VC GeoView shall be able to display images related to C4ISR Objects in the Object Information Box of that object.	VC-BL 2												
4.3.4.6.0-1.0-4	[T1-R1131]	The VC GeoView shall have a Media Player to display video allowing the user to control the replay.	VC-BL 2												
4.3.4.6.0-1.0-5	[T1-R1132]	The VC GeoView shall be able to display the content of a GeoTIFF file which is processed by the GIS Server and served as WMS.	VC-BL 2												
4.3.4.6.0-1.0-6	[T1-R1133]	The VC GeoView shall allow the user to manage (load, edit geodetic information, adjust colour, save, send to GIS Server) GeoTIFF files and have them displayed on the Map Panel.	VC-BL 2												
4.3.4.7		**Animating C4ISR Objects**													
4.3.4.7.0-1.0-1	[T1-R1134]	The VC GeoView shall have a Geo Player which can animate a given set of C4ISR Objects with geospatial, date and time data. The data set shall be received from the AppView.	VC-BL 3												
4.3.4.7.0-1.0-2	[T1-R1135]	The VC Geo Player shall perform the object animation on a separate layer of the Map Panel.	VC-BL 3												
4.3.4.7.0-1.0-3	[T1-R1136]	The VC Geo Player shall be controlled by the Timeline Panel.	VC-BL 3												
4.3.5		**Handling Geospatial Drawings**													
4.3.5.0-1		Geospatial Drawings (Geo-drawings) are graphical drawing objects, with geometry and other properties which can be managed by users or applications. These Geo-drawings can be processed by AppView. Users can create Geo-drawings and digitize their geometry using drawing primitives, assign values to their attributes, save them and retrieve them for displaying in a Layer. The VC GeoView will be able to handle the following types of Geo-drawings:													
4.3.5.1		**C2 Drawings**													
4.3.5.1.1		**C2 Drawing Primitives**													
4.3.5.1.1.0-1.0-1	[T1-R1137]	The VC GeoView shall support a drawing capability on the Map Panel by using a Drawing Palette and the pointing device.	VC-BL 1												
4.3.5.1.1.0-1.0-2	[T1-R1138]	The VC GeoView shall allow the user to create a C2 Drawing on the Map Panel using the Drawing Palette and the pointing device.	VC-BL 1												
4.3.5.1.1.0-1.0-3	[T1-R1139]	The VC GeoView shall allow the user to associate symbology with individual Drawing Primitives in the C2 Drawing.	VC-BL 1												
4.3.5.1.1.0-1.0-4	[T1-R1140]	The VC GeoView shall allow the user to undo and redo for the drawing actions while creating a C2 Drawing using the Primitives and the pointing device.	VC-BL 1												
4.3.5.1.1.0-1.0-5	[T1-R1141]	The VC GeoView shall allow the user to associate descriptive text (annotation) with each Drawing Primitive.	VC-BL 1												

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
4.3.5.1.1.0-1.0-6	[T1-R1142]	The VC GeoView shall allow the user to create Complex Drawings by combining Drawing Primitives from the Drawing Palette.	VC-BL 2												
4.3.5.1.1.0-1.0-7	[T1-R1143]	The VC GeoView shall allow the user to create a composite Drawing Primitive composed of multiple Drawing Primitives. The composite Drawing Primitive indicates that all contained Drawing Primitives are treated as a single representation of the concept being expressed.	VC-BL 2												
4.3.5.1.1.0-1.0-8	[T1-R1144]	The VC GeoView shall allow the user to associate metadata with each Drawing Primitive.	VC-BL 1												
4.3.5.1.1.0-1.0-9	[T1-R1145]	The VC GeoView shall allow exclusion areas to be specified on all area based Drawing Primitives.	VC-BL 1												
4.3.5.1.1.0-1.0-10	[T1-R1146]	The VC GeoView shall allow Min and Max Altitude to be specified on all area based Drawing Primitives.	VC-BL 2												
4.3.5.1.2		**C2 Drawing Properties**													
4.3.5.1.2.0-1.0-1	[T1-R1147]	The VC GeoView shall maintain a list of Properties for each C2 Drawing as given in the Description.	VC-BL 1												
4.3.5.1.2.0-1.0-2	[T1-R1148]	The VC GeoView shall allow the user to assign values to the C2 Drawing Properties.	VC-BL 1												
4.3.5.1.2.0-1.0-3	[T1-R1149]	The VC GeoView shall allow the user to modify a C2 Drawing by changing its Properties.	VC-BL 1												
4.3.5.1.3		**Handling C2 Drawings**													
4.3.5.1.3.0-1.0-1	[T1-R1150]	The VC GeoView shall allow the user to manage (create, modify, delete) the C2 Drawings.	VC-BL 2												
4.3.5.1.3.0-1.0-2	[T1-R1151]	The VC GeoView shall allow the user to select an Editable Layer as an active Drawing Layer. Only the selected Drawing Layer shall be used for creating a new C2 Drawing.	VC-BL 2												
4.3.5.1.3.0-1.0-3	[T1-R1152]	The VC GeoView shall be able to send the Metadata of a C2 Drawing to the AppView, using the NMAPI, for further management and processing.	VC-BL 2												
4.3.5.1.3.0-1.0-4	[T1-R1153]	The VC GeoView shall be able to receive the Metadata of a C2 Drawing, from the AppView, using the NMAPI, and display it on the indicated Layer of the Map Panel according to the current Map Projection.	VC-BL 2												
4.3.5.1.3.0-1.0-5	[T1-R1154]	The VC GeoView shall allow the user export a selected C2 Drawing into a file of type SVG, NVG, KML or KMZ.	VC-BL 2												
4.3.5.1.3.0-1.0-6	[T1-R1155]	The VC GeoView shall allow the user import a previously exported C2 Drawing from a file, in SVG, NVG, KML or KMZ format, and display it on the Map Panel according to its Properties.	VC-BL 2												
4.3.5.2		**C2 Areas**													
4.3.5.2.1		**C2 Area Templates**													
4.3.5.2.1.0-1.0-1	[T1-R1156]	The VC GeoView shall be able to generate C2 Areas from predefined Templates.	VC-BL 2												
4.3.5.2.1.0-1.0-2	[T1-R1157]	The VC GeoView shall provide a Template Editor to build C2 Area Templates.	VC-BL 2												
4.3.5.2.1.0-1.0-3	[T1-R1158]	The VC GeoView shall allow the authorised user to manage (create, edit, save, delete) the C2 Area Templates.	VC-BL 2												
4.3.5.2.2		**User-based C2 Areas**													
4.3.5.2.2.0-1.0-1	[T1-R1159]	The VC GeoView shall implement the Default User-based C2 Area Templates given in the Description for TRITON Increment 1.	VC-BL 2												
4.3.5.2.2.0-1.0-2	[T1-R1160]	The VC GeoView shall be able to create a User-based C2 Area from a Template and display it on the indicated Layer of the Map Panel.	VC-BL 2												
4.3.5.2.2.0-1.0-3	[T1-R1161]	The VC GeoView shall allow the user to create a User-based C2 Area using a Template.	VC-BL 2												
4.3.5.2.2.0-1.0-4	[T1-R1162]	The VC GeoView shall be able to receive the Metadata of a User-based C2 Area, from the AppView using NMAPI, and display it on the indicated Layer of the Map Panel.	VC-BL 2												
4.3.5.2.2.0-1.0-5	[T1-R1163]	The VC GeoView shall be able to update a User-based C2 Area automatically when its Metadata is modified by the user or AppView.	VC-BL 2												
4.3.5.2.3		**Application-based C2 Areas**													
4.3.5.2.3.0-1.0-1	[T1-R1164]	The VC GeoView shall implement the Default Application-based C2 Area Templates given in the Description.	VC-BL 2												
4.3.5.2.3.0-1.0-2	[T1-R1165]	The VC GeoView shall be able to receive the Metadata of an Application-based C2 Area, from the AppView using NMAPI, and display it on the indicated Layer of the Map Panel.	VC-BL 2												
4.3.5.2.3.0-1.0-3	[T1-R1166]	The VC GeoView shall be able to update an Application-based C2 Area automatically when its Metadata is updated by the AppView over the NMAPI.	VC-BL 2												
4.3.5.2.4		**Displaying C2 Areas**													
4.3.6		**Handling Geospatial Information**													
4.3.6.1		**Gazetteer**													
4.3.6.1.0-1.0-1	[T1-R1167]	The VC GeoView shall be able to use the Gazetteer Service of the NATO Core GIS.	VC-BL 2												
4.3.6.1.0-1.0-2	[T1-R1168]	The VC GeoView shall be capable of utilising the gazetteer data via an available Gazetteer Web Service.	VC-BL 2												
4.3.6.1.0-1.0-3	[T1-R1169]	The VC GeoView shall allow the user to load the gazetteer data from a selected source.	VC-BL 2												
4.3.6.1.0-1.0-4	[T1-R1170]	The VC GeoView shall allow the user to search for features in the gazetteer.	VC-BL 2												
4.3.6.1.0-1.0-5	[T1-R1171]	The VC GeoView shall display the gazetteer search results in sortable tabular format with an option to indicate the selected item on the map.	VC-BL 2												
4.3.6.1.0-1.0-6	[T1-R1172]	The VC GeoView shall hold gazetteer dataset as a vector dataset, with the place names as attributes.	VC-BL 2												
4.3.6.2		**Search**													
4.3.6.2.0-1.0-1	[T1-R1173]	The VC GeoView shall provide a Search capability to allow the user to look for a C4ISR Object or map feature using a query.	VC-BL 2												
4.3.6.2.0-1.0-2	[T1-R1174]	The VC GeoView Search shall display the Search Results in sortable tabular format with an option to find and display an item on the Map Panel. The search results shall enable hyperlinks within attributes.	VC-BL 2												
4.3.6.2.0-1.0-3	[T1-R1175]	The VC GeoView Search shall allow the user to constrain the search to a geographic area defined by the user, a feature or C4ISR Object.	VC-BL 2												
4.3.6.3		**Geo-Data Export and Import**													
4.3.6.3.0-1.0-1	[T1-R1176]	The VC shall be able to export components (i.e. the current view including all Layers, symbology, annotations, etc.) of the Map Panel into a file in Recognised Geo-Output File Format (including a reloadable file format compatible with the NATO Core GIS and data exchange formats) as defined in the Description or in Recognised Graphics File Format (as defined in Paragraph 1.5).	VC-BL 2												
4.3.6.3.0-1.0-2	[T1-R1177]	The VC shall be able to export selected layers into single file for NVG and KML/KMZ.	VC-BL 2												
4.3.6.3.0-1.0-3	[T1-R1178]	The VC shall be able to export and losslessly compress all files referring to the same Shape File into an archived file (e.g. zip).	VC-BL 2												
4.3.6.3.0-1.0-4	[T1-R1179]	The VC shall keep classification, releasability, user name and timestamp information in NVG and KML/KMZ files as a key-value pair while exporting. For Shape File, classification shall be kept as a "zip" file name. Timestamp and user name of a Shape File shall be kept in geospatial metadata in XML format compliant to [STANAG 2586].	VC-BL 2												
4.3.6.3.0-1.0-5	[T1-R1180]	The VC shall be able to export individual or selected set of features as an NVG or KML file.	VC-BL 2												
4.3.6.3.0-1.0-6	[T1-R1181]	The VC shall be able to import active elements from a Recognised Geo-Input File Format as defined in the Description into a Layer indicated by the user.	VC-BL 2												
4.3.6.3.0-1.0-7	[T1-R1182]	The VC shall be able to activate the import process when the user drags a file and drops it into the GeoView. If the process cannot be completed, the user shall be notified.	VC-BL 2												
4.3.6.3.0-1.0-8	[T1-R1183]	The VC GeoView shall allow the user to select the elements to be exported into a Recognised Geo-Output File Format as defined in the Description and provide the file name and path.	VC-BL 2												
4.3.6.4		**Screenshot**													
4.3.6.4.0-1.0-1	[T1-R1184]	The VC GeoView shall be able to capture the Map Panel and all its visible layers as a screenshot and save it to a file in Recognised Graphics File Format given in Paragraph 1.5.	VC-BL 2												
4.3.6.4.0-1.0-2	[T1-R1185]	The VC GeoView shall allow the user to select only the Base Map or indicated Map Features including the visible Layers to be captured as a Screenshot.	VC-BL 2												
4.3.6.4.0-1.0-3	[T1-R1186]	The VC GeoView shall allow the user to save the Screenshot into a file with a user-provided name and path.	VC-BL 2												
4.3.6.4.0-1.0-4	[T1-R1187]	The VC GeoView shall allow the user to send the Screenshot directly to a printer.	VC-BL 2												
4.3.6.5		**Printing**													
4.3.6.5.0-1.0-1	[T1-R1188]	The VC shall support printing to local and network printers including printing into a file in Portable Document Format (PDF) at a user defined resolution.	VC-BL 2												
4.3.6.5.0-1.0-2	[T1-R1189]	The VC shall ensure that it maintains stability when printing if no printer is installed.	VC-BL 2												
4.3.6.5.0-1.0-3	[T1-R1190]	The VC shall be able to print Map Panel Screenshot to the resolutions supported by the printer or output device.	VC-BL 2												
4.3.6.5.0-1.0-4	[T1-R1191]	The VC shall support printing to printers with Long File Names (e.g. printer names include all legal Long File Name characters and are at least 128 characters long).	VC-BL 2												
4.3.6.5.0-1.0-5	[T1-R1192]	The VC shall support printing of landscape, portrait and all other supported paper sizes and layouts.	VC-BL 2												
4.3.6.5.0-1.0-6	[T1-R1193]	The VC shall allow the user to preview (Print Preview) the print content before it is printed.	VC-BL 2												
4.3.6.5.0-1.0-7	[T1-R1194]	The VC Print Preview shall display the print content to the user with the selected printer settings.	VC-BL 2												
4.3.6.6		**Presentation Support**													
4.3.6.6.0-1.0-1	[T1-R1195]	The VC shall be able generate presentation slides and export them into an Office Open XML Presentation (pptx) file.	VC-BL 2												
4.3.6.6.0-1.0-2	[T1-R1196]	The VC shall allow the user to configure the presentation slide master outline, select the Presentation Options given in the Description, and initiate the export.	VC-BL 2												
4.3.6.6.0-1.0-3	[T1-R1197]	The VC shall allow the user to define a coverage area on the Map Panel, select the C4ISR Objects and geospatial information to be included in the presentation slides.	VC-BL 2												
4.3.7		**Geo Processing Tools**													
4.3.7.1		**Distance Measurement**													
4.3.7.1.0-1.0-1	[T1-R1198]	The VC GeoView shall allow the user to measure the horizontal distance between two user-selected points as a line in the projected map plane.	VC-BL 1												
4.3.7.1.0-1.0-2	[T1-R1199]	The VC GeoView shall calculate and display the horizontal distance between two points and the bearing from the starting point using the selected Base Line (as given in the Description) for grid bearing calculation.	VC-BL 1												
4.3.7.1.0-1.0-3	[T1-R1200]	The VC GeoView shall allow the user to measure the horizontal distance and the slant range (if applicable) between two selected C4ISR Objects.	VC-BL 1												
4.3.7.1.0-1.0-4	[T1-R1201]	The VC GeoView shall calculate the distance between two selected C4ISR Objects based on their last known positions and display the true bearing from the first object to the second and the distance. The height or depth attribute of the Objects shall be taken into account for slant range calculations and displayed separately.	VC-BL 1												
4.3.7.1.0-1.0-5	[T1-R1202]	The VC GeoView shall allow the user to measure the horizontal distance between two points following a path with any number of waypoints.	VC-BL 1												
4.3.7.1.0-1.0-6	[T1-R1203]	The VC GeoView shall calculate and display the total distance of a path with waypoints according to the current map projection.	VC-BL 1												
4.3.7.1.0-1.0-7	[T1-R1204]	The VC GeoView shall allow the user to move any vertex of the measurement line or of the path to a new position by using the pointing device.	VC-BL 1												
4.3.7.1.0-1.0-8	[T1-R1205]	The VC GeoView shall adjust the visualisation of the moved measurement line or path according to the current projection and re-compute the projected curve and the values for starting and end bearing.	VC-BL 1												
4.3.7.1.0-1.0-9	[T1-R1206]	The VC GeoView shall display the measured path on the Map Panel, in units selected by the user, until it is cleared or a new measurement is started.	VC-BL 1												
4.3.7.2		**Area Measurement**													
4.3.7.2.0-1.0-1	[T1-R1207]	The VC GeoView shall allow the user to measure an area determined by a polygon or a circle drawn by the pointing device.	VC-BL 1												
4.3.7.2.0-1.0-2	[T1-R1208]	The VC GeoView shall compute the area of the footprint based on the current projection system and display it in units selected by the user. The area of a polygon shall be calculated when the polygon shape is completed (closed), and the area of circle shall be calculated continuously as the pointer is moved.	VC-BL 1												
4.3.7.3		**Line of Sight Analysis**													
4.3.7.3.0-1.0-1	[T1-R1209]	The VC GeoView shall allow the user to perform LOS Analysis if the available GIS Server can provide it as a service.	VC-BL 1												
4.3.7.3.0-1.0-2	[T1-R1210]	The VC GeoView shall be able to use LOS Service and Elevation Service provided by the GIS Server.	VC-BL 1												
4.3.7.3.0-1.0-3	[T1-R1211]	The VC GeoView shall allow the user to set the parameters of a LOS Analysis by manually entering values.	VC-BL 1												
4.3.7.3.0-1.0-4	[T1-R1212]	The VC GeoView shall allow the user to set the centre point of a LOS Analysis by selecting a geographical point on the map. If the height information is available on the map, it shall be used in the calculation.	VC-BL 1												
4.3.7.3.0-1.0-5	[T1-R1213]	The VC GeoView shall allow the user to perform more than one LOS Analysis and display them on the Map Panel as layers.	VC-BL 1												
4.3.7.3.0-1.0-6	[T1-R1214]	The VC GeoView shall allow the user to delete the selected LOS illustration from the Map Panel.	VC-BL 1												
4.3.7.4		**Depth Analysis**													
4.3.7.4.0-1.0-1	[T1-R1215]	The VC GeoView shall be able to use Depth/Elevation Service provided by the GIS Server for depth analysis.	VC-BL 2												
4.3.7.4.0-1.0-2	[T1-R1216]	The VC GeoView shall allow the user to perform Depth Analysis if the available GIS Server can provide it as a service.	VC-BL 2												
4.3.7.4.0-1.0-3	[T1-R1217]	The VC GeoView shall allow the user to set the parameters of a Depth Analysis by manually entering area values or drawing a circle or polygon on the Map Panel.	VC-BL 2												
4.3.7.4.0-1.0-4	[T1-R1218]	The VC GeoView shall allow the user to perform more than one Depth Analysis and display them on the Map Panel as Layers.	VC-BL 2												
4.3.7.4.0-1.0-5	[T1-R1219]	The VC GeoView shall display the minimum and maximum depth values of the selected area on the Map Panel.	VC-BL 2												
4.3.7.5		**Height Analysis**													
4.3.7.5.0-1.0-1	[T1-R1220]	The VC GeoView shall be able to use Depth/Elevation Service provided by the GIS Server for height analysis.	VC-BL 2												
4.3.7.5.0-1.0-2	[T1-R1221]	The VC GeoView shall allow the user to perform Height Analysis if the available GIS Server can provide it as a service.	VC-BL 2												
4.3.7.5.0-1.0-3	[T1-R1222]	The VC GeoView shall allow the user to set the parameters of a Height Analysis by manually entering area values or drawing a circle or polygon on the Map Panel.	VC-BL 2												
4.3.7.5.0-1.0-4	[T1-R1223]	The VC GeoView shall allow the user to perform more than one Height Analysis and display them on the Map Panel as Layers.	VC-BL 2												
4.3.7.5.0-1.0-5	[T1-R1224]	The VC GeoView shall display the minimum and maximum height values of the selected area on the Map Panel.	VC-BL 2												
4.3.7.6		**Range Rings**													
4.3.7.6.0-1.0-1	[T1-R1225]	The VC GeoView shall allow the user to configure the settings related to the Range Rings.	VC-BL 2												
4.3.7.6.0-1.0-2	[T1-R1226]	The VC GeoView shall allow the user to initiate displaying Range Rings by selecting its position on the map or selecting a C4ISR Object.	VC-BL 2												
4.3.7.6.0-1.0-3	[T1-R1227]	The VC GeoView shall display Range Rings according to user defined parameters on the Map Panel as a separate layer. The distances are referring to geodesic distances on the Earth ellipsoid (potentially a spherical approximation) and shall be rendered in the map in the map projection.	VC-BL 2												
4.3.7.6.0-1.0-4	[T1-R1228]	The VC GeoView shall adjust the size of the Range Rings with respect to the current map scale.	VC-BL 2												
4.3.7.6.0-1.0-5	[T1-R1229]	The VC GeoView shall display the Range Rings with orientation from True North to three-hundred fifty-nine (359) degrees True.	VC-BL 2												
4.3.7.6.0-1.0-6	[T1-R1230]	The VC GeoView shall display the Range Rings with orientation which dynamically matches with the heading of the selected (slaved) object if it has heading value.	VC-BL 2												
4.3.8		**3D Visualisation**													
4.3.8.1		**3D Display Framework**													
4.3.8.1.0-3.0-1	[T1-R1231]	The VC shall provide infrastructure for supporting Three-Dimensional (3D) or Pseudo-Three-Dimensional (2.5D) Display capability. The guidance in [MIL-STD-2525D] should be used.	VC-BL 1												
4.3.8.1.0-3.0-2	[T1-R1232]	The VC GeoView "should" allow the user to select 2D or 3D Display in the Map Panel. The 3D Display should be used in the Map Panel with configurable settings (e.g. default height of the Viewpoint, perspective ratio).	VC-BL 3												
4.3.8.1.0-3.0-3	[T1-R1233]	The VC "will" receive maps with terrain data from the GIS Server, display them in a 2.5D environment as guided in [MIL-STD-2525D].	VC-BL 3												
4.3.8.1.0-3.0-4	[T1-R1234]	The VC 3D Display "should" be able to display C4ISR Objects in a 2.5D environment as described in [MIL-STD-2525D] using Symbicons and Marker Posts.	VC-BL 3												
4.3.8.1.0-3.0-5	[T1-R1235]	The VC 3D Display "should" be able to provide fly-through over the terrain.	VC-BL 3												

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
4.3.8.1.0-3.0-6	[T1-R1236]	The VC 3D Display "should" allow the user to control the fly-through using the pointing device and keyboard.	VC-BL 3												
4.3.8.2		**Navigation**													
4.3.8.2.0-1.0-1	[T1-R1237]	The VC 3D Display "should" provide navigation control by adjusting the Navigation Controls given in the Description.	VC-BL 3												
4.3.8.2.0-1.0-2	[T1-R1238]	The VC 3D Display "should" allow the user to navigate through the Map Panel by changing the Navigation Controls given in the Description with the combination of the pointing device and the keyboard.	VC-BL 3												
4.3.8.2.0-1.0-3	[T1-R1239]	The VC 3D Display "should" allow the user to return to the Default Viewpoint using the Navigation Controls.	VC-BL 3												
4.3.8.2.0-1.0-4	[T1-R1240]	The VC 3D Display "should" be able to render the display, including the terrain data and movement of C4ISR Objects at a rate of at least fifteen (15) frames per second at a display resolution of at least 1280x1024 when navigation is started.	VC-BL 3												
4.3.8.2.0-1.0-5	[T1-R1241]	The VC 3D Display "should" be able to initiate a fly-through over the terrain by setting the Navigation Controls given in the Description.	VC-BL 3												
4.3.8.2.0-1.0-6	[T1-R1242]	The VC 3D Display "should" display the Direction Indicators in a fly-through.	VC-BL 3												
4.3.8.2.0-1.0-7	[T1-R1243]	The VC 3D Display "should" allow the user to change the settings during a fly-through.	VC-BL 3												
4.3.8.2.0-1.0-8	[T1-R1244]	The VC 3D Display "should" be able to slave the Viewpoint to a selected C4ISR Object so that it moves together with the Object from a user-selected distance during the lifecycle of the Object. For example, the Viewpoint can be slaved to an aircraft and updated as the kinematics of the aircraft is updated. The Object motion "should" be extrapolated according to a configurable frame rate with a default of fifteen (15) Hertz.	VC-BL 3												
4.3.8.2.0-1.0-9	[T1-R1245]	The VC 3D Display "should" allow the user to select a C4ISR Object, select a distance, Viewing Angle, Viewing Direction relative to the Object motion, and initiate a fly-through. The fly-through "should" be stopped when the users stops it or the Object is deleted.	VC-BL 3												
4.3.8.3		**Animation**													
4.3.8.3.0-1.0-1	[T1-R1246]	The VC 3D Display "should" be able to animate the motion of selected C4ISR Objects with the geospatial data provided by the AppView.	VC-BL 3												
4.3.8.3.0-1.0-2	[T1-R1247]	The VC 3D Display "should" allow the user to control the animated motion using the GeoView Timeline.	VC-BL 3												
4.3.9		**User Settings**													
4.3.9.1		**Theme Selection**													
4.3.9.1.0-1.0-1	[T1-R1248]	The VC GeoView shall support configurable Themes for the GUI elements.	VC-BL 3												
4.3.9.1.0-1.0-2	[T1-R1249]	The VC GeoView shall provide a Dark Theme and Light Theme as the default.	VC-BL 3												
4.3.9.1.0-1.0-3	[T1-R1250]	The VC GeoView shall maintain a list of Personal Themes.	VC-BL 3												
4.3.9.1.0-1.0-4	[T1-R1251]	The VC GeoView shall be able to use Style Sheets.	VC-BL 3												
4.3.9.1.0-1.0-5	[T1-R1252]	The VC GeoView shall allow the user to manage (load, modify, save) the Personal Theme List.	VC-BL 3												
4.3.9.1.0-1.0-6	[T1-R1253]	The VC GeoView shall allow the user to select a predefined Theme.	VC-BL 3												
4.3.9.2		**Most Used Functions**													
4.3.9.2.0-1.0-1	[T1-R1254]	The VC GeoView shall have a list of the last used functions, if applicable, the Most Used Functions.	VC-BL 3												
4.3.9.2.0-1.0-2	[T1-R1255]	The VC GeoView shall allow the user to manage (add, modify, delete) the Most Used Functions List.	VC-BL 3												
4.3.9.2.0-1.0-3	[T1-R1256]	The VC GeoView shall execute the function when the user selects it from the Most Used Function List.	VC-BL 3												
4.3.9.3		**Own Position**													
4.3.9.3.0-1.0-1	[T1-R1257]	The VC GeoView shall be able to receive a C4ISR Object designated as Own Position from the AppView (as part of the API) as an option.	VC-BL 2												
4.3.9.3.0-1.0-2	[T1-R1258]	The VC GeoView shall allow the user to set Own Position to a geographic position or to a selected C4ISR Object.	BL 2												
4.3.9.4		**Display Settings**													
4.3.9.4.0-1.0-1	[T1-R1259]	The VC shall be able to retrieve the personal Display Settings given in the Description from the AppView using the NMAPI and apply them.	VC-BL 1												
4.3.9.4.0-1.0-2	[T1-R1260]	The VC shall allow the user to configure the Display Settings according to personal preferences and send them to the AppView using the NMAPI to be saved in the Functional Service Application context.	VC-BL 1												
4.3.9.4.0-1.0-3	[T1-R1261]	The VC shall automatically save the Display Settings when the user terminates the GeoView or logs out from the AppView.	VC-BL 1												
4.3.9.4.0-1.0-4	[T1-R1262]	The VC shall provide the defaults for the Display Settings as set by the authorised user.	VC-BL 1												
4.3.10		**Security**													
4.3.10.0-1.0-1	[T1-R1263]	The VC shall conform the security requirements defined for TRITON in Subsection 5.2.	VC-BL 1												
4.3.11		**Error Handling**													
4.3.11.0-1.0-1	[T1-R1264]	The VC shall handle all occurring errors and report them to the AppView.	VC-BL 1												
4.3.11.0-1.0-2	[T1-R1265]	The VC shall notify the user when an error occurred within the sub-components of the VC.	VC-BL 1												
4.3.12		**On-line Help**													
4.3.12.0-1.0-1	[T1-R1266]	The VC shall support On-line Help describing the basic functionality of the VC by using Contents, Index with its associated Search and a link to the On-line Help provided by the AppView (if exists).	VC-BL 2												
4.3.12.0-1.0-2	[T1-R1267]	The VC On-line Help shall translate every use case and scenario into a browsing sequence. Every browsing sequence shall be structured according to a generic user workflow.	VC-BL 2												
4.3.12.0-1.0-3	[T1-R1268]	The VC shall allow the user to access the On-line Help function at any stage of execution of a function.	VC-BL 2												
4.3.12.0-1.0-4	[T1-R1269]	The VC On-line Help shall describe each basic VC function, the interrelationships between and the logical sequence of functions.	VC-BL 2												
4.3.12.0-1.0-5	[T1-R1270]	The VC On-line Help shall explain all menu items, dialog windows, data entry and query fields implemented in the VC Product Baseline.	VC-BL 2												
4.3.12.0-1.0-6	[T1-R1271]	The VC On-line Help shall include a glossary providing definitions of all terms and acronyms implemented in the VC Product Baseline.	VC-BL 2												
4.3.12.0-1.0-7	[T1-R1272]	All definitions in the VC glossary shall be available in roll-over, pop-up windows linked to every appearance in On-line Help of the corresponding term or acronym.	VC-BL 2												
4.3.12.0-1.0-8	[T1-R1273]	The VC shall provide On-line Help option for each dialogue, menu item, toolbar item, function, field or button (each item on the screen). This shall be clearly visible, but not intrusive.	VC-BL 2												
4.3.12.0-1.0-9	[T1-R1274]	The VC On-line Help shall provide meaningful advice and hints to the users appropriate to the actions they are trying to take.	VC-BL 2												
4.3.12.0-1.0-10	[T1-R1275]	The VC On-line Help shall be concise, compact and clear to the user.	VC-BL 2												
4.3.12.0-1.0-11	[T1-R1276]	The VC On-line Help shall include screenshots of the GeoView. The screenshots shall be provided in a suitable lightweight format (e.g. GIF, PNG) approved by the Purchaser.	VC-BL 2												
4.3.12.0-1.0-12	[T1-R1277]	Pictures in the VC On-line Help showing more than five (5) GUI elements/controls shall have a clickable image map describing each element.	VC-BL 2												
4.3.12.0-1.0-13	[T1-R1278]	If the VC On-line Help topic requires a large picture that does not fit on a normal page, a reduced copy shall be additionally included on the Help page that will expand to its full size on user request.	VC-BL 2												
4.3.12.0-1.0-14	[T1-R1279]	The VC On-line Help shall be context-sensitive (i.e. based on a specific point in the state of the software and providing help for the situation that is associated with that state on action being performed).	VC-BL 2												
4.3.12.0-1.0-15	[T1-R1280]	The Security Classification of any example data that is displayed in VC On-line Help shall not be higher than NATO UNCLASSIFIED.	VC-BL 2												
4.3.12.0-1.0-16	[T1-R1281]	The VC On-line Help context-sensitive GUI elements shall be linked to the relevant User Manual topics.	VC-BL 2												
4.3.12.0-1.0-17	[T1-R1282]	The VC On-line Help shall be given by a small pop-up screen or infotip screen. This screen shall appear quickly and be very easy to hide, for instance clicking anywhere within it.	VC-BL 2												
4.3.12.0-1.0-18	[T1-R1283]	The VC On-line Help shall open a dedicated Web page when the user requests access to the full content of the On-line Help. The On-line Help shall not be preventing the user to perform on the GeoView.	VC-BL 2												
4.3.12.0-1.0-19	[T1-R1284]	The VC GeoView shall allow the user to hide the On-line Help screen just by clicking anywhere else, or there shall be another single action hiding mechanism.	VC-BL 2												
4.3.12.0-1.0-20	[T1-R1285]	The VC On-line Help shall include a searchable Index that allows the user to locate keywords or phrases (identified by enclosure within double-quotation marks) in the User Manual.	VC-BL 2												
4.3.12.0-1.0-21	[T1-R1286]	The VC shall support search queries for finding help items in the On-line Help.	VC-BL 2												
4.3.12.0-1.0-22	[T1-R1287]	The VC On-line Help shall be able to display search query results for finding help items in the On-line Help in a list. The VC GeoView shall display the help item when the user selects a query result in this list.	VC-BL 2												
4.3.12.0-1.0-23	[T1-R1288]	The VC On-line Help shall be prepared as a compiled/scripted HTML help file (.chm) which shall include all project-related source elements and graphics.	VC-BL 2												
4.3.13		**External Interfaces**													
4.3.13.1		**Application Programming Interface**													
4.3.13.1.1		**NATO Map API**													
4.3.13.1.1.0-1.0-1	[T1-R1289]	The VC shall provide an API named as "NATO Map API" for interfacing between the AppView and GeoView.	VC-BL 1												
4.3.13.1.1.0-1.0-2	[T1-R1290]	The VC shall implement CMAPI v1.3.0 for the NMAPI.	VC-BL 1												
4.3.13.1.1.0-1.0-3	[T1-R1291]	The VC NMAPI shall include definition of C4ISR Objects and their data model.	VC-BL 1												
4.3.13.1.1.0-1.0-4	[T1-R1292]	The VC NMAPI and integration issues shall be defined and documented in the VC ICD for enabling the use of the VC within other Functional Services.	VC-BL 1												
4.3.13.1.2		**Application Framework**													
4.3.13.1.2.0-1.0-1	[T1-R1293]	The VC shall provide the necessary implementation details in its documentation to implement the API within the interfacing Application.	VC-BL 1												
4.3.13.2		**Map Interface**													
4.3.13.2.0-1.0-1	[T1-R1294]	The VC shall have an interface with the NATO Core GIS relying on file and information exchange formats described in GIS Services Standards and File Formats [Core GIS SIP].	VC-BL 1												
4.3.13.2.0-1.0-2	[T1-R1295]	The VC shall have interfaces compliant with Web Services Common Standard [OGC WSCommon].	VC-BL 1												
4.3.13.2.0-1.0-3	[T1-R1296]	The VC shall be able to receive data in NVG and KML format, and display them.	VC-BL 1												
4.3.13.2.1		**Web Map Service**													
4.3.13.2.1.0-1.0-1	[T1-R1297]	The VC shall be able to consume OGC-compliant, WMS defined by the OGC specifications [OGC WMS].	VC-BL 1												
4.3.13.2.1.0-1.0-2	[T1-R1298]	The VC shall be able to display the maps in JPEG and PNG (with transparency) provided by the WMS. The map formats given in the Description shall be applicable.	VC-BL 1												
4.3.13.2.2		**Web Map Tile Service**													
4.3.13.2.2.0-1.0-1	[T1-R1299]	The VC shall be able to use OGC-compliant, WMTS-based services defined by the OGC specifications [OGC WMTS].	VC-BL 1												
4.3.13.2.3		**Web Processing Service**													
4.3.13.2.3.0-1.0-1	[T1-R1300]	The VC shall be able to use OGC-compliant, WPS-based services defined by the OGC specifications [OGC WPS].	VC-BL 1												
4.3.13.3		**Geo Services Interfaces**													
4.3.13.3.0-1.0-1	[T1-R1301]	The VC shall be able to use the Geo Services given in the Description as Geo Services Interfaces.	VC-BL 1												
4.3.13.3.0-1.0-2	[T1-R1302]	The VC shall provide feedback to the user within five (5) seconds in a static network environment when a Geo Service is invoked by the user. If the data cannot be made available within ten (10) seconds, the user shall be notified with an option to cancel the request.	VC-BL 3												
4.3.13.4		**Symbology Service Interface**													
4.3.13.4.0-1.0-1	[T1-R1303]	The VC Symbology Service shall have a Web service for its interface defined in its Service Interface Profile.	VC-BL 2												
4.3.13.4.0-1.0-2	[T1-R1304]	The VC ICD shall include the Service Interface Profile for the Symbology Service.	VC-BL 2												
4.3.13.5		**Interface Control Description**													
4.3.13.5.0-1.0-1	[T1-R1305]	The VC shall have an ICD describing all the API, integration procedures, and interfaces with the GIS Server and Symbology Server, data and error handling mechanisms and applicable standards.	VC-BL 1												
4.3.13.5.0-1.0-2	[T1-R1306]	The VC ICD shall be developed and made available in increments.	VC-BL 1												
4.3.13.6		**Conformance Test Kit**													
4.3.13.6.0-1.0-1	[T1-R1307]	The VC shall have a Conformance Test Kit to allow testing the external interfaces and correctness of the computations.	BL 3												
4.4		**TRITON Deployable Kit Requirements**													
4.4.1		**TDK Hardware**													
4.4.1.1		**TDK Case**													
4.4.1.1.0-1.0-1	[T1-R1308]	TDK Case shall enclose a 19-inch rack with height not exceeding eight (8) Rack-Unit (RU).	BL 4												
4.4.1.1.0-1.0-2	[T1-R1309]	TDK Case shall be watertight, dust proof, crush proof, equipped with anti-vibration shock mounts and Automatic Pressure Equalization Valve (suitable for transportation with air cargo).	BL 4												
4.4.1.1.0-1.0-3	[T1-R1310]	TDK Case size shall not exceed one hundred and twenty (120) cm long X seventy (70) cm wide X sixty (60) cm high.	BL 4												
4.4.1.1.0-1.0-4	[T1-R1311]	TDK Case weight including the content shall not exceed sixty (60) kg in total.	BL 4												
4.4.1.1.0-1.0-5	[T1-R1312]	TDK Case shall have handles or special harnesses both on their sides and on top (in order to be able to carry in vertical position over ship ladders and durable enough to use crane).	BL 4												
4.4.1.1.0-1.0-6	[T1-R1313]	TDK Case shall have detachable wheels with locking mechanism.	BL 4												
4.4.1.1.0-1.0-7	[T1-R1314]	TDK Case shall have front and end lids with securing locks and keys.	BL 4												
4.4.1.2		**Carrying Case**													
4.4.1.2.0-1.0-1	[T1-R1315]	TDK Carrying Case shall be watertight, dust proof, crush proof and lockable, equipped with inner cushions, Automatic Pressure Equalization Valve (suitable for transportation with air cargo), handles and wheels.	BL 4												
4.4.1.2.0-1.0-2	[T1-R1316]	TDK Carrying Case size shall not exceed one hundred and twenty (120) cm long X seventy (70) cm wide X sixty (60) cm high.	BL 4												
4.4.1.2.0-1.0-3	[T1-R1317]	TDK Carrying Case weight including the content shall not exceed sixty (60) kg in total.	BL 4												
4.4.1.2.0-1.0-4	[T1-R1318]	TDK Carrying Case interior design shall be configurable.	BL 4												
4.4.1.2.0-1.0-5	[T1-R1319]	TDK Carrying Case used as the Secure Box shall have security labels and locks.	BL 4												
4.4.1.3		**Uninterruptible Power Supply**													
4.4.1.3.0-1.0-1	[T1-R1320]	TDK UPS shall support all components within a TDK Unit for at least thirty (30) minutes after the main power is gone.	BL 4												
4.4.1.3.0-1.0-2	[T1-R1321]	TDK UPS shall be able to operate using both 110 VAC 60Hz and 220 VAC 50Hz as the main power input.	BL 4												
4.4.1.3.0-1.0-3	[T1-R1322]	TDK UPS shall have replaceable batteries.	BL 4												
4.4.1.4		**Central Control Unit**													
4.4.1.4.0-1.0-1	[T1-R1323]	Each TDK Unit shall have a Central Control Unit (CCU).	BL 4												
4.4.1.4.0-1.0-2	[T1-R1324]	TDK CCU shall have power distribution capability to all components inside the TDK Cases.	BL 4												
4.4.1.4.0-1.0-3	[T1-R1325]	TDK CCU shall monitor the main power and the UPS status continuously.	BL 4												
4.4.1.4.0-1.0-4	[T1-R1326]	TDK CCU shall be able to detect main power loss within one second and provide a visual and an audible notification (e.g. beep and flashing light).	BL 4												
4.4.1.4.0-1.0-5	[T1-R1327]	TDK CCU shall have a control switch to initiate the start-up and shut-down sequences.	BL 4												
4.4.1.4.0-1.0-6	[T1-R1328]	TDK CCU shall provide the System Management with the current power status (i.e. power source as external or UPS, UPS power percentage and remaining time to auto shut-down) using SNMP.	BL 4												
4.4.1.4.0-1.0-7	[T1-R1329]	TDK CCU shall provide a single Grounding Point for all components inside the TDK Cases using grounding cables (sheets).	BL 4												
4.4.1.4.0-1.0-8	[T1-R1330]	TDK CCU shall be able to receive a shut-down command from the server unit and initiate the orderly shut-down process for all components.	BL 4												
4.4.1.4.0-1.0-9	[T1-R1331]	TDK CCU shall issue an automatic shut-down command to all components if the UPS remaining power gets below the critical threshold.	BL 4												
4.4.1.5		**Monitor Keyboard Unit**													
4.4.1.5.0-1.0-1	[T1-R1332]	Each TDK Unit shall have a 19-inch, one (1) RU, slide-out standard English QWERTY keyboard with built-in two-button pointing device and a fold-down colour LCD monitor with at least Full HD resolution connected to the Server Unit.	BL 4												
4.4.1.6		**Installation Kit**													
4.4.1.6.0-1.0-1	[T1-R1333]	TDK shall have an Installation Kit including a fixing gear, power cables, grounding cables and data cables.	BL 4												

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
4.4.1.6.0-1.0-2	[T1-R1334]	TDK Installation Kit shall have harnesses and gears to securely fix the TDK Cases on the deck allowing both vertical (one case on top of the other one) and horizontal (side-by-side) orientation.	BL 4												
4.4.1.6.0-1.0-3	[T1-R1335]	TDK Installation Kit shall allow the installation crew to fasten the TDK Cases on the deck to withstand ship movements at Sea State seven (7).	BL 4												
4.4.1.6.0-1.0-4	[T1-R1336]	TDK Installation Kit shall allow the installation crew to unfasten the TDK Cases, move them to another compartment and fasten them there in case of a re-planning or an emergency.	BL 4												
4.4.1.6.0-1.0-5	[T1-R1337]	TDK Installation Kit shall have at least ten (10) metres of power cable with an industrial type plug and potential adapters for each of the NS and NU Unit.	BL 4												
4.4.1.6.0-1.0-6	[T1-R1338]	TDK Installation Kit shall have at least twenty (20) metres of both fibre-optic and copper Gigabit Ethernet cables (CAT-6) with commercial-type jacks (i.e. RJ-45) for each of the NS and NU Unit.	BL 4												
4.4.1.6.0-1.0-7	[T1-R1339]	TDK Installation Kit shall have a grounding cable (sheet) to connect the TDK Unit Grounding Point to the ship grounding point. A combined grounding cable can be used for both units.	BL 4												
4.4.1.7		**Computing Hardware**													
4.4.1.7.1		**Server Unit**													
4.4.1.7.1.0-1.0-1	[T1-R1340]	TDK Server Unit shall host the TRITON Operational Software configured for ACP.	BL 4												
4.4.1.7.1.0-1.0-2	[T1-R1341]	TDK Server Unit shall be 19-inch rack type whose chassis height does not exceed two (2) RU.	BL 4												
4.4.1.7.1.0-1.0-3	[T1-R1342]	TDK Server Unit shall have at least two (2) physical CPUs each having at least four (4) cores.	BL 4												
4.4.1.7.1.0-1.0-4	[T1-R1343]	TDK Server Unit shall have at least one-hundred-and-twenty-eight (128) Gigabytes of memory.	BL 4												
4.4.1.7.1.0-1.0-5	[T1-R1344]	TDK Server Unit shall have graphics support capability for the local fold-down KVM.	BL 4												
4.4.1.7.1.0-1.0-6	[T1-R1345]	TDK Server Unit shall have at least five (5) Terabytes of storage. If SAN is used, one (1) Terabytes of local storage shall be included in the Server Unit.	BL 4												
4.4.1.7.1.0-1.0-7	[T1-R1346]	TDK Server Unit shall be compliant to the general specifications for the static site Server Unit.	BL 4												
4.4.1.7.1.0-1.0-8	[T1-R1347]	In case processing capacity for the TDK Server Unit is considered to be less than the required level, then additional components shall be provided and integrated into the existing infrastructure, including the management features.	BL 4												
4.4.1.7.2		**Storage Unit**													
4.4.1.7.2.0-1.0-1	[T1-R1348]	TDK Storage Unit shall be 19-inch rack type whose chassis height does not exceed two (2) RU.	BL 4												
4.4.1.7.2.0-1.0-2	[T1-R1349]	TDK Storage Unit shall have a capacity of at least five (5) Terabytes.	BL 4												
4.4.1.7.2.0-1.0-3	[T1-R1350]	TDK Storage Unit shall be compliant to the general specifications for the static site Storage Unit.	BL 4												
4.4.1.7.2.0-1.0-4	[T1-R1351]	In case storage capacity of the TDK Storage Unit (including I/O performance, Storage Network Capacity and licences) is considered to be less than the required level, then additional components shall be provided and integrated into the existing infrastructure, including the management features.	BL 4												
4.4.1.7.3		**Network Elements**													
4.4.1.7.3.0-1.0-1	[T1-R1352]	TDK Network Switch shall be 19-inch rack type whose chassis height does not exceed two (2) RU.	BL 4												
4.4.1.7.3.0-1.0-2	[T1-R1353]	TDK Network Switch shall support at least 10/100/1000 Mbps UTP and 1/10 Gbps fibre channels.	BL 4												
4.4.1.7.3.0-1.0-3	[T1-R1354]	TDK Network Switch shall have at least eight (8) UTP and eight (8) fibre ports.	BL 4												
4.4.1.7.3.0-1.0-4	[T1-R1355]	TDK Network Switch shall have manageability, routing and Quality of Service capability.	BL 4												
4.4.1.7.3.0-1.0-5	[T1-R1356]	In case networking capacity (ports, bandwidth or other performance levels, licences) for the Network Elements is considered to be less than the required level, then additional components shall be provided and integrated into the existing infrastructure, including the management features.	BL 4												
4.4.1.7.4		**IEG-Data Diode**													
4.4.1.7.4.0-1.0-1	[T1-R1357]	The IEG-Data Diode shall provide secure, one-way data transfer from the NU Domain to the NS Domain.	BL 4												
4.4.1.7.4.0-1.0-2	[T1-R1358]	The IEG-Data Diode shall be compliant to the specification provided by the Purchaser.	BL 4												
4.4.1.7.4.0-1.0-3	[T1-R1359]	The IEG-Data Diode shall be in a form of 19-inch rack type whose chassis height does not exceed one (1) RU.	BL 4												
4.4.1.7.5		**Client Workstations**													
4.4.1.7.5.0-1.0-1	[T1-R1360]	TDK Unit shall have two (2) Workstations and two (2) Laptops to be used as TRITON Clients.	BL 4												
4.4.1.7.5.0-1.0-2	[T1-R1361]	TDK Client Workstation shall have a similar configuration to the NATO Workstation Hardware Configuration as a Thin Client. The Server Unit shall provide the computing platform for the Thin Clients.	BL 4												
4.4.1.7.5.0-1.0-3	[T1-R1362]	TDK Client Workstation shall have two (2) twenty-two (22) inch monitors with at least Full HD (1920 x 1080) resolution, one standard English QWERTY keyboard and one mouse with two buttons and a wheel.	BL 4												
4.4.1.7.5.0-1.0-4	[T1-R1363]	TDK Client Workstation and Laptop "should" have small form factor, preferably in industrial standards, suitable to be used on board ships in small, air-conditioned compartments with 110/220V 50/60Hz.	BL 4												
4.4.1.7.5.0-1.0-5	[T1-R1364]	TDK Client Laptop shall have a similar configuration to the NATO Laptop Hardware Configuration with at least Full HD (1920 x 1080) screen resolution, standard English QWERTY keyboard and touch-pad with two buttons.	BL 4												
4.4.2		**TDK Software**													
4.4.2.1		**Infrastructure Software**													
4.4.2.1.0-1.0-1	[T1-R1365]	TDK Infrastructure Software shall be identical to the static site Infrastructure Software.	BL 4												
4.4.2.1.0-1.0-2	[T1-R1366]	TDK Infrastructure Software shall be configurable according to the operational use of TDK.	BL 4												
4.4.2.1.0-1.0-3	[T1-R1367]	TDK Infrastructure Software shall have its own Core Services to be able to operate in Standalone Mode. Instances of NATO Core Enterprise Services shall be used.	BL 4												
4.4.2.1.0-1.0-4	[T1-R1368]	TDK Infrastructure Software shall support automated monitoring of devices and services via Simple Network Management Protocol (SNMP).	BL 4												
4.4.2.1.0-1.0-5	[T1-R1369]	TDK Infrastructure Software on each TDK Unit shall be able to support at least fifty (50) concurrent users.	BL 4												
4.4.2.2		**Local Geospatial Services**													
4.4.2.2.0-1.0-1	[T1-R1370]	TDK shall utilise a Local Geospatial Service in both Networked and Standalone Modes for each Unit.	BL 4												
4.4.2.2.0-1.0-2	[T1-R1371]	TDK shall use the NATO Bi-SC AIS Core GIS as the default Local Geospatial Service if available. If the NATO Core GIS is not available for TDKs, an Interim Local Geospatial Service shall be provided. This interim solution can be replaced by the NATO Core GIS when it becomes available.	BL 4												
4.4.2.2.0-1.0-3	[T1-R1372]	TDK Interim Local Geospatial Service shall provide, as a minimum, map handling capability with an interface compliant with the Service Interface Profile that NATO Core GIS provides [Core GIS SIP].	BL 4												
4.4.2.2.0-1.0-4	[T1-R1373]	TDK Interim Local Geospatial Service shall be able to use the geo-information exported from the NATO Core GIS.	BL 4												
4.4.2.2.0-1.0-5	[T1-R1374]	TDK Interim Local Geospatial Service shall provide means to import the geo-information and Geospatial Service configurations already exported from the NATO Core GIS.	BL 4												
4.4.2.2.0-1.0-6	[T1-R1375]	TDK Interim Local Geospatial Service shall be readily available as a re-usable component in any context in both NS and NU Domains with no additional license cost if open source or custom-developed components are used.	BL 4												
4.4.2.3		**TRITON Operational Software**													
4.4.2.3.0-1.0-1	[T1-R1376]	TDK shall host the TRITON-NS Operational Software configured for ACP on the NS-Unit.	BL 4												
4.4.2.3.0-1.0-2	[T1-R1377]	TDK shall host the TRITON-NU Operational Software configured for ACP on the NU-Unit.	BL 4												
4.4.2.3.0-1.0-3	[T1-R1378]	TDK shall have its own installation tools and configuration procedures to install and operate the TRITON Operational Software.	BL 4												
4.5		**TRITON Support Systems Requirements**													
4.5.1		**TRITON Test Systems**													
4.5.1.1		**Operational Software**													
4.5.1.1.0-1.0-1	[T1-R1379]	TRITON Test Systems shall have the TRITON Operational Software Baseline to be tested.	BL 1												
4.5.1.1.0-1.0-2	[T1-R1380]	TRITON Test Systems shall provide interface simulators and test data to test the interfaces for any external system.	BL 1												
4.5.1.2		**Infrastructure**													
4.5.1.2.0-1.0-1	[T1-R1381]	TRITON Test Systems shall have their own Virtualised Environment including operating systems and any other required third party software.	BL 1												
4.5.1.2.0-1.0-2	[T1-R1382]	TRITON Test Systems shall have the same Infrastructure Software as the TRITON Functional Services at static sites.	BL 1												
4.5.1.2.0-1.0-3	[T1-R1383]	Each TRITON Test System shall be able to support at least one-hundred (100) concurrent users.	BL 1												
4.5.2		**TRITON Reference Systems**													
4.5.2.1		**Operational Software**													
4.5.2.1.0-1.0-1	[T1-R1384]	TRITON Reference Systems shall have the TRITON Operational Software Baseline to be tested.	BL 2												
4.5.2.1.0-1.0-2	[T1-R1385]	TRITON Reference Systems shall provide interface simulators and test data to test the interfaces for any external system.	BL 2												
4.5.2.2		**Infrastructure**													
4.5.2.2.0-1.0-1	[T1-R1386]	TRITON Reference Systems shall utilise the Virtualised Environment provided by the Purchaser.	BL 2												
4.5.2.2.0-1.0-2	[T1-R1387]	TRITON Reference Systems shall have the same Infrastructure Software as TRITON Functional Services at static sites.	BL 2												
4.5.2.2.0-1.0-3	[T1-R1388]	Each TRITON Reference System shall be able to support at least one-hundred (100) concurrent users.	BL 2												
4.5.3		**TRITON Training Systems**													
4.5.3.1		**Operational Software**													
4.5.3.1.0-1.0-1	[T1-R1389]	TRITON Training Systems shall have the TRITON Operational Software installed as Operational Baseline.	BL 2												
4.5.3.1.0-1.0-2	[T1-R1390]	TRITON Training Systems shall have the Training Environment to simulate external systems and services based on user-based scenario.	BL 2												
4.5.3.2		**Infrastructure**													
4.5.3.2.0-1.0-1	[T1-R1391]	TRITON Training Systems shall utilise the Virtualised Environment provided by the Purchaser.	BL 2												
4.5.3.2.0-1.0-2	[T1-R1392]	TRITON Training Systems shall have the same Infrastructure Software as TRITON Functional Services at static sites. Instances of NATO Core Services shall be used to the extent possible.	BL 2												
4.5.3.2.0-1.0-3	[T1-R1393]	Each TRITON Training System shall be able to support at least one-hundred (100) concurrent users.	BL 2												
5		**NON-FUNCTIONAL REQUIREMENTS**													
5.1		**Quality Requirements**													
5.1.1		**Performance Efficiency**													
5.1.1.1		**Performance by Time Behaviour**													
5.1.1.1.0-1.0-1	[T1-R1394]	TRITON Functional Services shall become available according to the Initial Availability Criteria as given in the Description within ten (10) minutes after the operating system of the TRITON Server is started up.	BL 1												
5.1.1.1.0-1.0-2	[T1-R1395]	TRITON shall complete mode changes in less than five (5) minutes and become ready to accept user input in less than ten (10) minutes for both static and afloat Servers.	BL 3												
5.1.1.1.0-1.0-3	[T1-R1396]	In case a critical failure in the TRITON Static Server is detected, the authorised user shall be notified, and TRITON Functional Services shall be switch to the specified secondary Static Server within five (5) minutes after the authorised user acknowledgement. The authorised user shall continuously be informed about the status of the server change process.	BL 3												
5.1.1.1.0-1.0-4	[T1-R1397]	TRITON shall be available for accepting user commands within thirty (30) seconds after accessing or starting a user application via a Client at a static site.	BL 1												
5.1.1.1.0-1.0-5	[T1-R1398]	TRITON shall be available for accepting user commands within sixty (60) seconds after accessing or starting a user application via a Client at an afloat site.	BL 4												
5.1.1.1.0-1.0-6	[T1-R1399]	TRITON shall be able to support at least twenty (20) concurrent update events per node.	BL 1												
5.1.1.1.0-1.0-7	[T1-R1400]	TRITON shall be able to update the Maritime Operational Objects to be displayed at Clients with a rate of at least one-thousand (1000) tracks per minute.	BL 1												
5.1.1.1.0-1.0-8	[T1-R1401]	TRITON shall provide a response to a user, in either AppView or GeoView, in any environment, for any action, in less than five (5) seconds.	BL 3												
5.1.1.2		**Performance by Bandwidth Efficiency**													
5.1.1.2.0-1.0-1	[T1-R1402]	TRITON shall be designed and implemented to minimise the use of network bandwidth (e.g. caching, light-weight previewing, metadata exchange, lazy loading, query pairing) and computational resources.	BL 3												
5.1.1.2.0-1.0-2	[T1-R1403]	TRITON shall implement a caching mechanism to improve user performance and minimise bandwidth utilisation wherever possible.	BL 3												
5.1.1.2.0-1.0-3	[T1-R1404]	TRITON shall use data compression methods to reduce bandwidth usage by at least twenty-percent (20%) during information exchange between TRITON Servers.	BL 3												
5.1.1.2.0-1.0-4	[T1-R1405]	TRITON Clients shall be able to operate with selected static TRITON Servers using network bandwidth as low as five-hundred (500) Kbps and network latency as high as five-hundred (500) milliseconds. The efficiency shall be tested on the Test System simulating the bandwidth and latency characteristics.	BL 3												
5.1.1.2.0-1.0-5	[T1-R1406]	TRITON ACP Server shall be able to synchronise itself with a selected static Server using five-hundred (500) Kbps of network bandwidth on the Test System. The test shall be executed in a test environment simulating the bandwidth.	BL 4												
5.1.1.3		**Performance by Network Status**													
5.1.1.3.0-1.0-1	[T1-R1407]	When the LAN is degraded by more than fifty percent (50%),TRITON shall automatically change its operational state to "Degraded" and shall be capable of providing the same range and level of services to individual users with a reduction in performance not more than fifty percent (50%).	BL 1												
5.1.1.3.0-1.0-2	[T1-R1408]	TRITON Deployable Kit shall be able to operate in Standalone Mode when WAN connectivity is lost more than a configurable time period. The detection of the loss of WAN connectivity will be subject to the netwotk infrastructure located on board.	BL 4												
5.1.1.4		**Resource Utilisation**													
5.1.1.4.0-1.0-1	[T1-R1409]	TRITON shall notify the authorised user when seventy-five percent (75%) of the allocated storage is reached.	BL 1												
5.1.1.4.0-1.0-2	[T1-R1410]	TRITON shall not exceed fifty percent (50%) of the dedicated processor capacity in average.	BL 1												
5.1.1.5		**Capacity**													
5.1.1.5.0-1.0-1	[T1-R1411]	TRITON shall be able to provide service for at least five-hundred (500) concurrent users per Instance at static sites. The test shall be executed in a test environment with virtual users.	BL 3												
5.1.1.5.0-1.0-2	[T1-R1412]	TRITON shall not have any licensing restrictions on the number of users who can simultaneously access a particular functionality.	BL 3												
5.1.1.5.0-1.0-3	[T1-R1413]	TRITON shall be able to support at least twenty percent (20%) increase in users with no performance degradation during surge situations.	BL 3												
5.1.1.5.0-1.0-4	[T1-R1414]	TRITON shall be able to support storage size of at least ten (10) Terabytes per Instance at static sites.	BL 3												
5.1.1.5.0-1.0-5	[T1-R1415]	TRITON shall have growth potential beyond the figures given to indicate data storage capacity, database or list sizes, and shall not deem any limitation on design.	BL 3												
5.1.2		**Compatibility**													
5.1.2.1		**Co-existence**													
5.1.2.1.0-1.0-1	[T1-R1416]	TRITON shall operate with other Bi-SC AIS Functional Services in the same environment without causing any error condition in itself or in other systems.	BL 3												
5.1.2.2		**Interooerability**													
5.1.2.2.0-1.0-1	[T1-R1417]	TRITON shall provide coherent interfaces for others to access its services. The External Interfaces are described in Section 6.	BL 1												
5.1.2.2.0-1.0-2	[T1-R1418]	TRITON shall be compliant to the standards given in the NISP [ADatP-34].	BL 1												
5.1.3		**Usability**													
5.1.3.1		**Appropriateness Recognisability**													
5.1.3.1.0-1.0-1	[T1-R1419]	TRITON "should" provide the user with capabilities that are easy to understand to perform user functions. Usability Engineering	BL 1												
5.1.3.2		**Learnability**													
5.1.3.2.0-1.0-1	[T1-R1420]	TRITON shall have role-based access control to authorise users on functionalities according to certain expertise (e.g. WSM Operator, RMP Operator).	BL 1												

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
5.1.3.2.0-1.0-2	[T1-R1421]	Any user with basic computer skills shall be able to operate TRITON general user functions with no more than two (2) days of training.	BL 1												
5.1.3.2.0-1.0-3	[T1-R1422]	A user with basic system administrator skills (i.e. MS Windows system administrator) shall be able to install the TRITON Infrastructure and Operational Software, and configure it, perform node admisnitration tasks (e.g. manage users, manage domain values) with a maximum of one (1) week of Svstem Administrator Trainina.	BL 1												
5.1.3.3		**Operability**													
5.1.3.3.0-1.0-1	[T1-R1423]	TRITON shall allow the user to control all the functionality associated to a specific application.	BL 1												
5.1.3.3.0-1.0-2	[T1-R1424]	TRITON shall provide the user to always enter data with correct type and format.	BL 1												
5.1.3.3.0-1.0-3	[T1-R1425]	TRITON shall provide the user with error tolerance by restricting inappropriate function execution (e.g. the user shall be prevented to press a button which is not allowed at a certain stage of a function).	BL 1												
5.1.3.4		**User Error Protection**													
5.1.3.4.0-1.0-1	[T1-R1426]	TRITON shall be tolerant to input errors. Users shall be given guidance and suggestions to help them correct or overcome mistakes they have already made.	BL 1												
5.1.3.4.0-1.0-2	[T1-R1427]	TRITON shall provide Error Management capability which is readily distinguishable from other displayed information (e.g. Pop-up Error Window).	BL 1												
5.1.3.4.0-1.0-3	[T1-R1428]	TRITON shall provide the users with meaningful error messages and informed about the actions they need to take in order to fix or at least to report the problem.	BL 1												
5.1.3.5		**User Interface Aesthetics**													
5.1.3.5.1		**User Friendliness**													
5.1.3.5.1.0-1.0-1	[T1-R1429]	TRITON shall provide User Guidance Information, given in the Description, which is readily distinguishable from other displayed information.	BL 1												
5.1.3.5.1.0-1.0-2	[T1-R1430]	TRITON shall use menu dialogues with the Menu Aspects, given in the Description, when use of the system is infrequent and the user does not know what options are available and shall be considered in order to provide the user with useful information in due time and low effort.	BL 1												
5.1.3.5.1.0-1.0-3	[T1-R1431]	TRITON shall comply with the Dialogue Principles given in the Description.	BL 1												
5.1.3.5.1.0-1.0-4	[T1-R1432]	TRITON shall comply with the Information Presentation Criteria given in the Description.	BL 1												
5.1.3.5.1.0-1.0-5	[T1-R1433]	TRITON shall keep page size limited on one screen and in order to reduce the need for scrolling to see the submit button.	BL 1												
5.1.3.5.1.0-1.0-6	[T1-R1434]	Interactions with TRITON with a pointing device or keyboard shall produce similar results in and throughout all applications. TRITON shall provide the use of keyboard shortcuts and MS Windows accelerators.	BL 1												
5.1.3.5.1.0-1.0-7	[T1-R1435]	TRITON shall maintain changes of data entered on any form and inform the user on cancellation of change (or browse away from form) for loss of data.	BL 1												
5.1.3.5.1.0-1.0-8	[T1-R1436]	TRITON shall notify the user who has initiated an action that processing of the action has started and convey the sense of processing progress (by means of a progress indicator, dialog boxes).	BL 1												
5.1.3.5.2		**Ease of Navigation**													
5.1.3.5.2.0-1.0-1	[T1-R1437]	TRITON shall made navigation possible with both keyboard and pointing device and both shall be self-explanatory.	BL 1												
5.1.3.5.2.0-1.0-2	[T1-R1438]	TRITON shall provide on-screen "drill-down" features to view lower-level details (where and whenever lower level details are available). For example, a summary of track label can be available on the display, more information can be accessed by initiating track detailed information dialog. Augmented information will be available if the track is associated to a vessel.	BL 1												
5.1.3.5.2.0-1.0-3	[T1-R1439]	TRITON shall reflect the updated information to all levels while a user is in drill-down process.	BL 1												
5.1.3.5.2.0-1.0-4	[T1-R1440]	TRITON table columns shall be selectable and switchable so as to present data in any desired form, complex sorting and filtering capabilities shall be provided on the table rows.	BL 1												
5.1.3.5.2.0-1.0-5	[T1-R1441]	TRITON shall support editing of displayed information in a logical order. The GUI forms shall allow navigation using the tab key in a logical order. This means that the tab order shall represent the same logical order shown on screen.	BL 1												
5.1.3.5.2.0-1.0-6	[T1-R1442]	TRITON shall disable the submit button for a form on click and re-enabled after any change to the entry content. This prevents clicking twice or more resulting in duplicate entries.	BL 1												
5.1.3.5.2.0-1.0-7	[T1-R1443]	TRITON shall provide GUI lavouts which are uniform and standardised.	BL 1												
5.1.3.5.2.0-1.0-8	[T1-R1444]	In TRITON, the submit button for a form shall become disabled on click and re-enabled after any change to the entry content. This prevents clicking twice or more times resulting in duplicate entries.	BL 1												
5.1.3.5.2.0-1.0-9	[T1-R1445]	In TRITON the ENTER key shall not trigger form submission, especially in cases where forms are too long to display on one screen (e.g. where the submit button may fall below the initially visible area).	BL 1												
5.1.3.5.2.0-1.0-10	[T1-R1446]	In TRITON, scrolling bars (i.e. horizontal and vertical) shall be available when information does not fit onto one screen.	BL 1												
5.1.3.5.2.0-1.0-11	[T1-R1447]	The TRITON GUI shall provide Breadcrumbs on Web interfaces to reflect "where I am now in the system".	BL 1												
5.1.3.5.3		**Appearance**													
5.1.3.5.3.0-1.0-1	[T1-R1448]	The look of the TRITON GUI shall resemble the interfaces of existing operational systems or operational prototypes, with which users are alreadv familiar.	BL 1												
5.1.3.5.3.0-1.0-2	[T1-R1449]	The design of the TRITON GUI shall be based on a single theme with variations. TRITON shall have a common look and feel carried across the entire application's GUI within which a small number of similar but easily distinguished layouts are used. Similar parts of the application should have similar GUIs and layouts throughout the application.	BL 1												
5.1.3.5.3.0-1.0-3	[T1-R1450]	Visual elements and interaction schemes of the TRITON GUI shall be reused on similar functions and features. Uniformity is created this way, which helps users to understand where they are and what they can do.	BL 1												
5.1.3.5.3.0-1.0-4	[T1-R1451]	TRITON GUI shall use a consistent font across Applications.	BL 1												
5.1.3.5.3.0-1.0-5	[T1-R1452]	TRITON GUI shall be structured so that options, features and functions of the application are organised in a way that reflects their relationships.	BL 1												
5.1.3.5.3.0-1.0-6	[T1-R1453]	The presence of required fields and their styling shall always be noted in advance. Although it is common to flag required fields with an asterisk, this shall be noted at the top of the form, not as a footnote at the bottom. Redundant flagging of required fields with a special character or glyph plus bolding, highlighting, outlining, or a distinct colour shall be considered as the best practice.	BL 1												
5.1.3.5.3.0-1.0-7	[T1-R1454]	TRITON shall support the display of textual data in tabular displays with backgrounds, tabs, buttons and borders that are semi opaque. Transparency of a panel in the display shall be configurable by the user.	BL 1												
5.1.3.5.3.0-1.0-8	[T1-R1455]	Web-based functionality under TRITON "should" be designed with a GUI conforming [W3C MWBP] which can be customised for viewing on mobile devices.	BL 3												
5.1.3.5.4		**Menus. Pointing Device Actions and Shortcuts**													
5.1.3.5.4.0-1.0-1	[T1-R1456]	TRITON GUI shall produce similar results for actions initiated by a pointing device (mouse of trackball) or keyboard throughout all applications. The options given in Description shall be used.	BL 1												
5.1.3.5.4.0-1.0-2	[T1-R1457]	TRITON GUI shall provide clickable (selectable) links and buttons that are clearly distinguishable from non-clickable text.	BL 1												
5.1.3.5.4.0-1.0-3	[T1-R1458]	TRITON GUI shall made keyboard shortcuts available to access functions.	BL 1												
5.1.3.5.4.0-1.0-4	[T1-R1459]	TRITON GUI shall support Selection Options as given in the Description and extended selection by Ctrl (i.e. individual selected items) and Shift (i.e. select from-to) keys.	BL 1												
5.1.3.5.4.0-1.0-5	[T1-R1460]	TRITON GUI shall support normal MS Windows Accelerators given in the Description.	BL 1												
5.1.3.5.4.0-1.0-6	[T1-R1461]	TRITON GUI shall support context (i.e. right-button) menus. The use of context menus shall be limited for advanced options only. General and common functions shall also be accessible through the Ribbon, view or dialog buttons.	BL 1												
5.1.3.5.4.0-1.0-7	[T1-R1462]	TRITON GUI shall support the Selection Functions given in the Description unless otherwise specified.	BL 1												
5.1.3.5.5		**Role-based Presentation**													
5.1.3.5.5.0-1.0-1	[T1-R1463]	TRITON GUI shall work on the principle of "visibility" which means the application shows Users whatever they need for the current task without distracting or overwhelming them with unrelated tasks or options.	BL 1												
5.1.3.5.5.0-1.0-2	[T1-R1464]	TRITON GUI shall filter user-accessed information according to the user's authorisation, so that users can only see what they are allowed to view and/or change (including both data and functionality).	BL 1												
5.1.3.5.5.0-1.0-3	[T1-R1465]	TRITON GUI shall only show functionality (e.g. menu items, buttons, selections) that is appropriate to the situation based on user role and permissions and object status. TRITON shall hide or clearly disable (e.g. grey out) functionality not appropriate at the time, including items on second-level and lower-level menus and dialogue boxes.	BL 1												
5.1.3.5.5.0-1.0-4	[T1-R1466]	TRITON GUI shall be minimised according to what the user can do. The GUI shall only show entities and attributes (e.g. forms and fields) and functions (e.g. menus and buttons) that are actually available within the security authorisation of the user. Disabled functions due to permissions shall not be shown at all.	BL 1												
5.1.3.5.6		**Data Entry**													
5.1.3.5.6.0-1.0-1	[T1-R1467]	TRITON GUI shall display the expected input format on all form fields to the user if the label is not clear enough (e.g. date input format - ddmmyyyy or dd-mm-yyyy). This may be done via tooltips, greyed-out example content, additional labels, or some other means.	BL 1												
5.1.3.5.6.0-1.0-2	[T1-R1468]	TRITON GUI shall be tolerant to the delimiters of input format, including Date format (e.g. dd-mm-yyyy could also be entered as ddmmyyyy or d-m-yy without error or picked from a calendar) and Location format (e.g. latitude/longitude could be entered as degrees-minutes-seconds or degrees.decimal degrees).	BL 1												
5.1.3.5.6.0-1.0-3	[T1-R1469]	TRITON shall apply automatic layout (format) of data where possible (e.g. correct format of dates).	BL 1												
5.1.3.5.6.0-1.0-4	[T1-R1470]	TRITON shall prevent ambiguity and make it clear what information in what format is required for each data entry field. All information shall have its units of measure when applicable (e.g. degrees, metres, yards, knots, seconds).	BL 1												
5.1.3.5.6.0-1.0-5	[T1-R1471]	For all attributes related to geographic coordinates, TRITON GUI shall allow the user to enter geographic coordinates in a single text field (not requiring the user to copy/paste more than once to input a geographic value). TRITON shall automatically identify and parse the Location Information Entrv as given in the Description.	BL 1												
5.1.3.5.6.0-1.0-6	[T1-R1472]	TRITON GUI shall use predefined drop-down or pull-down lists in appropriate situations to speed up the entry if information and prevent input mistakes. Open text input fields shall be avoided to prevent errors during input.	BL 1												
5.1.3.5.6.0-1.0-7	[T1-R1473]	TRITON GUI shall allow usage of the keyboard to directly input the code of a value of a list. TRITON shall verify the code and match it against the Domain Values for that list.	BL 1												
5.1.3.5.6.0-1.0-8	[T1-R1474]	TRITON GUI shall retain entered data even after use of the back or reload button or any other user action except conscious choice to delete the data or empty (or reset) the web form fields.	BL 1												
5.1.3.5.6.0-1.0-9	[T1-R1475]	TRITON GUI shall not lose, discard, or corrupt user input without user consent.	BL 1												
5.1.3.5.7		**Real-Estate Management**													
5.1.3.5.7.0-1.0-1	[T1-R1476]	TRITON GUI shall keep page size limited on one screen and in order to reduce the need for scrolling to see the submit button to the extent possible. For additional information tabbed forms shall be used, where appropriate.	BL 1												
5.1.3.5.7.0-1.0-2	[T1-R1477]	TRITON GUI shall be designed to support various screen sizes. TRITON pages shall expand to the right size of the user screen to the extent where the GUI is not distorted.	BL 1												
5.1.3.5.7.0-1.0-3	[T1-R1478]	TRITON shall allow grouping of items with expand/minimise buttons (Microsoft Explorer style) in tree views, or using a "group by column" feature in tabular views.	BL 1												
5.1.3.5.7.0-1.0-4	[T1-R1479]	TRITON shall provide wizards if input of certain information requires filling out more than one form, or require a form larger than one screen. This means long forms or lists shall be split up over different subpages (or tabs) within the wizard.	BL 1												
5.1.3.5.8		**Time Display**													
5.1.3.5.8.0-1.0-1	[T1-R1480]	TRITON shall use Coordinated Universal Time (UTC) (temps universel coordonné) for all time stamps and DTGs to be stored internally.	BL 1												
5.1.3.5.8.0-1.0-2	[T1-R1481]	TRITON shall display time in UTC by default. It shall be displayed on the GUI with Zulu Time Zone.	BL 1												
5.1.3.5.8.0-1.0-3	[T1-R1482]	TRITON shall present the local time of any other possible time zone if selected by the user.	BL 1												
5.1.3.5.8.0-1.0-4	[T1-R1483]	TRITON shall clearly identify time values as Zulu (e.g. 0815Z) or Local in user displays and logs.	BL 1												
5.1.3.5.8.0-1.0-5	[T1-R1484]	TRITON shall represent date/time data according to ISO 8601 [ISO 8601] by default. Application-specific displays of date/time data shall use the military convention for DTG.	BL 1												
5.1.3.5.9		**Standard Functionality**													
5.1.3.5.9.0-1.0-1	[T1-R1485]	TRITON GUI shall support copying and pasting from other applications via the Clipboard (including text and graphics). The copy and paste action shall take into account the view and the status of the view (e.g. sorting, labelling) from which the information was copied and into which type of application it was pasted. As an example, information copied from a Matrix View and pasted into Microsoft Excel shall cause the information to be placed into corresponding cells (i.e. not a single cell containing all copied/pasted information) in the same sort order.	BL 1												
5.1.3.5.9.0-1.0-2	[T1-R1486]	TRITON GUI shall allow an operation to apply to multiple-selected objects where possible.	BL 1												
5.1.3.5.9.0-1.0-3	[T1-R1487]	TRITON GUI shall render row and column headers for data matrices.	BL 1												
5.1.3.5.9.0-1.0-4	[T1-R1488]	TRITON GUI shall allow the user to sort (with an initial default of 'ascending') the contents of a matrix or list by clicking on the column header for the attribute on which the sort is to be based.	BL 1												
5.1.3.5.9.0-1.0-5	[T1-R1489]	TRITON GUI shall allow the user to reverse the sort order (i.e. ascending to descending, descending to ascending) by clicking again on the column header for the attribute on which the current sort is based.	BL 1												
5.1.3.5.9.0-1.0-6	[T1-R1490]	TRITON GUI shall allow the user to select which columns are displayed in matrix-views (i.e. hide/unhide columns). The user shall be able to store the column selection as a preference.	BL 1												
5.1.3.5.9.0-1.0-7	[T1-R1491]	TRITON GUI shall allow the user to select the order in which columns in a matrix-view are displayed. The user shall be able to store the column order as a preference.	BL 1												
5.1.3.5.9.0-1.0-8	[T1-R1492]	TRITON GUI shall allow the user to enable or disable screen tips and visual aids.	BL 1												
5.1.3.5.9.0-1.0-9	[T1-R1493]	TRITON GUI shall support screen tips (as titles or alt-text) on all icons and attributes that offer added explanation and assistance.	BL 1												
5.1.3.5.9.0-1.0-10	[T1-R1494]	TRITON GUI shall provide undo/redo functionality for changes to objects to the largest extent possible (not limited to formatting), at least until the last save action.	BL 1												
5.1.3.5.9.0-1.0-11	[T1-R1495]	For changes that cannot be undone, TRITON shall ask the user to confirm with an additional warning about the irreversible effect of the action.	BL 1												
5.1.3.5.9.0-1.0-12	[T1-R1496]	TRITON GUI shall save the positions and states of the GUI elements for each user between application sessions, and shall restore the GUI on starting another session.	BL 1												
5.1.3.5.9.0-1.0-13	[T1-R1497]	TRITON GUI shall allow the user to navigate on tabular lists row-by-row or by paging.	BL 1												
5.1.3.5.9.0-1.0-14	[T1-R1498]	TRITON GUI, when suitable, shall use asynchronous technologies, to provide native application's responsiveness experience on the Web interface.	BL 1												
5.1.3.5.10		**Defaults**													
5.1.3.5.10.0-1.0-1	[T1-R1499]	TRITON GUI shall provide auto-completion feature with session-available information to be filled automatically by TRITON (i.e. date/time, name and other profile information of the user, classification). This shall apply to "entry fields" (including text-fields, drop down lists. radio-buttons).	BL 1												
5.1.3.5.10.0-1.0-2	[T1-R1500]	TRITON GUI shall apply automatic layout (format) of data where possible (e.g. capitalisation of names, correct format of dates, geographic positions).	BL 1												
5.1.3.5.10.0-1.0-3	[T1-R1501]	TRITON shall provide data defaults where applicable.	BL 1												
5.1.3.5.11		**User Feedback**													
5.1.3.5.11.0-1.0-1	[T1-R1502]	TRITON GUI shall provide user feedback for each user action.	BL 1												
5.1.3.5.11.0-1.0-2	[T1-R1503]	After the user has initiated a prolonged action, TRITON GUI shall inform that processing of an action has started and convey the sense of processing progress (by means of an animated progress indicator such as sand glass and progress bar). Where the action is quantifiably measurable (e.g. performing N actions) the animation shall provide a quantifiable display (e.g. a progress bar, time remaining). Where the action is not quantifiably measurable (e.g. awaiting a response) the animation shall provide a generic display (e.g. sand glass).	BL 1												

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
5.1.3.5.11.0-1.0-3	[T1-R1504]	TRITON GUI shall provide prompts (i.e. allow cancellation or confirmation) when input or changes may be lost due to navigation or logging out.	BL 1												
5.1.3.5.11.0-1.0-4	[T1-R1505]	TRITON GUI shall provide user feedback on required fields which have not been correctly entered (i.e. by highlighting the field or the field label in red).	BL 1												
5.1.3.5.12		**Tooltips**													
5.1.3.5.12.0-1.0-1	[T1-R1506]	TRITON GUI shall provide Tooltips to describe the function when a user hovers the cursor over a GUI symbol.	BL 2												
5.1.3.6		**Accessibility**													
5.1.3.6.0-1.0-1	[T1-R1507]	Sufficient contrast shall be used throughout the application. Highlighting information shall not rely on colours only.	BL 1												
5.1.3.6.0-1.0-2	[T1-R1508]	TRITON GUI shall comply with "Level A" of the Web Content Accessibility Guidelines as defined by the W3C (see [WCAG]).	BL 1												
5.1.3.6.0-1.0-3	[T1-R1509]	The TRITON accessibility features shall apply to the application GUI, including the help pages, CBT pages, the error/warning/notification messages, etc.	BL 1												
5.1.3.6.0-1.0-4	[T1-R1510]	TRITON information on screens shall also contain text. Reliance on pictures or icons alone is not desired.	BL 1												
5.1.3.6.0-1.0-5	[T1-R1511]	TRITON shall scale the user interface to fit the screen when low resolutions are used for poor vision accessibility.	BL 1												
5.1.3.7		**Language**													
5.1.3.7.0-1.0-1	[T1-R1512]	TRITON shall use "UK English" as the default language. This shall apply to all system and supporting components, including views, dialogs, help screens, tooltips, CBT, error/notification/warning messages and documentation.	BL 1												
5.1.3.7.0-1.0-2	[T1-R1513]	TRITON shall allow the user to set localisation (alternative languages/regional settings).	BL 1												
5.1.3.7.0-1.0-3	[T1-R1514]	All TRITON On-line Help screens, CBT pages and User Guides shall have a score of at least forty (40) in the Flesch Reading Ease test.	BL 3												
5.1.3.7.0-1.0-4	[T1-R1515]	TRITON shall use the common Maritime Domain terminology consistent with this SRS and other NATO documents.	BL 1												
5.1.3.7.0-1.0-5	[T1-R1516]	Labels used in TRITON shall be context-dependent, meaningful and descriptive to the function or action at hand.	BL 1												
5.1.3.7.0-1.0-6	[T1-R1517]	TRITON internal development documentation shall be in English.	BL 1												
5.1.3.7.0-1.0-7	[T1-R1518]	TRITON source code shall be readable in English (i.e. variables. functions and procedures shall be in English).	BL 1												
5.1.4		**Reliability**													
5.1.4.0-1.0-1	[T1-R1519]	TRITON shall gracefully degrade in case the conditions given in the System Configuration Settings and the Dependent Services given in the Description are not available (see Operational States and State Transitions). The status of internal components shall be reported to Enterprise SMC via System Management.	BL 1												
5.1.4.0-1.0-2	[T1-R1520]	TRITON shall provide data integrity during mode and state changes. The last state of data before the state change shall be preserved.	BL 3												
5.1.4.1		**Maturity**													
5.1.4.1.0-1.0-1	[T1-R1521]	TRITON Operational Software at each installed operational node shall exhibit a Mean-Time-Between-Failure (MTBF) characteristic of less than one (1) failure in twenty-four (24) hours, and that shall not be affected by the total number of nodes which are active during that period. The MTBF measurement shall not include failures resulting from factors determined to be external to TRITON (e.g. loss of domain controller).	BL 4												
5.1.4.2		**Availability**													
5.1.4.2.0-1.0-1	[T1-R1522]	TRITON, including hardware, infrastructure and Operational Software, shall be available for use at static sites (via Data Centres) twenty-four (24) hours per day, three-hundred and sixty-five (365) days per year with an availability of ninety-nine point zero percent (99.0%) (Level 3 of Operational Continuity).	BL 3												
5.1.4.2.0-1.0-2	[T1-R1523]	TRITON Operational Software shall be available for at least ninety-nine point nine percent (99.9%) of time (Level 2 of Operational Continuity) at Data Centres using multi-site operation capability.	BL 3												
5.1.4.2.0-1.0-3	[T1-R1524]	TRITON Deployable Kit, including the hardware, the infrastructure and the Operational Software, shall be available at least ninety-nine point zero percent (99.0%) of time (Level 3 of Operational Continuity).	BL 4												
5.1.4.2.0-1.0-4	[T1-R1525]	One TRITON instance shall provide a Mean-Time-To-Repair (MTTR) of one (1) hour or less.	BL 3												
5.1.4.2.0-1.0-5	[T1-R1526]	TRITON shall always be available for any incoming service request even though it is executing time-consuming function.	BL 3												
5.1.4.2.0-1.0-6	[T1-R1527]	TRITON shall ensure system availability to users so that they do not experience interruption of services as a result of intermittent connection, except as it impacts their direct access to Web Application Server for an in-progress action. Intermittent connection is defined as loss of connectivity that is less than thirty (30) seconds.	BL 3												
5.1.4.2.0-1.0-7	[T1-R1528]	TRITON shall ensure system availability to users so that they do not experience interruption of services as a result of Limited Bandwidth. Limited Bandwidth is defined as a bandwidth of less than sixty-four (64) kbps for afloat sites and five-hundred-and-twelve (512) kbps for static sites.	BL 3												
5.1.4.2.0-1.0-8	[T1-R1529]	TRITON shall ensure system availability to users so that they do not experience interruption of services as a result of high latency. High latency is defined as latency exceeding one-thousand-and-one-hundred (1100) milliseconds.	BL 3												
5.1.4.2.0-1.0-9	[T1-R1530]	In case of TRITON failure the availability interruption shall not exceed two (2) hours in eighty percent (80%) of cases for an individual TRITON user at static site. In no case shall the availability interruption exceed twenty-four (24) hours for an individual TRITON User at static site. Measurements of availability shall not include failures resulting from factors determined to be external to TRITON (e.g. loss of domain controller, loss of network connectivity).	BL 3												
5.1.4.2.0-1.0-10	[T1-R1531]	TRITON non-availability time shall be measured by adding the Downtime period (time elapsed from Time of Occurrence to Time of Recoverv) for each svstem. service or application failure.	BL 3												
5.1.4.3		**Accuracy**													
5.1.4.3.0-1.0-1	[T1-R1532]	TRITON shall provide accuracy of timing for information object time stamps (e.g. time of update) to one second. Other system-level functions (e.g. process synchronisation) may require additional accuracy as required for correct operation.	BL 1												
5.1.4.3.0-1.0-2	[T1-R1533]	TRITON geographic location accuracy shall be less than 0.0001 minutes, distance accuracy less than one metre (i.e. sub-metre accuracy) for translation of values (UTM, Latitude/Longitude, others). Confidence interval shall be shown within values.	BL 1												
5.1.4.3.0-1.0-3	[T1-R1534]	TRITON shall ensure consistency and accuracy of all the data displayed on all open views and applications.	BL 1												
5.1.4.4		**Fault Tolerance**													
5.1.4.4.0-1.0-1	[T1-R1535]	TRITON shall not have any unhandled exceptions. All errors shall be handled and minimise the impact upon the users workflow.	BL 1												
5.1.4.4.0-1.0-2	[T1-R1536]	TRITON shall notify the user for potential loss/deletion of information objects during modification of any information object (e.g. by cascading deletion). When prompted by a notification about the data that might be lost/deleted, the user shall be able to choose the action that shall be taken by the system (e.g. cancel, continue).	BL 1												
5.1.4.4.0-1.0-3	[T1-R1537]	TRITON shall automatically report errors and suggested corrective actions with respect to the creation, change, exchange and storage of data elements, objects and products.	BL 1												
5.1.4.4.0-1.0-4	[T1-R1538]	TRITON messages (e.g. error, warning, notification, and informative messages) shall contain initiating module information, and contain context sensitive help and directives on where to find answers and solutions. Technical or debugging error scripts are not acceptable (e.g. "Java object 01 not accessible").	BL 1												
5.1.4.4.0-1.0-5	[T1-R1539]	TRITON shall report errors in context (e.g. given within the same page where they are encountered). An error message shall be displayed or provided in a popup. Invalid entries shall be highlighted or marked so they can be quickly identified and corrected.	BL 1												
5.1.4.4.0-1.0-6	[T1-R1540]	TRITON shall popup screens or windows are used to report about errors. They shall be closable with a single click.	BL 1												
5.1.4.4.0-1.0-7	[T1-R1541]	TRITON shall display only one error report popup screen for the same error.	BL 1												
5.1.4.4.0-1.0-8	[T1-R1542]	TRITON shall not in any case permit loss of user-entered data due to receipt of an error or other message. User input shall never be lost, discarded or corrupted unless a user actually chooses to delete or reset the input.	BL 1												
5.1.4.4.0-1.0-9	[T1-R1543]	TRITON shall allow a user to report problems, bugs and change requests when they encounter a problem or an unexpected result. The feature shall send a message to the Organizational Node Administrators for their review. The user shall not need to do any configuration of the actual sending of the message; the system shall handle that automatically.	BL 1												
5.1.4.4.0-1.0-10	[T1-R1544]	TRITON error messages shall provide the users the capability of attaching the user comments on the nature of the problem in addition of automatic reporting the error messages, screen dumps and other related system data for problem reports.	BL 1												
5.1.4.4.0-1.0-11	[T1-R1545]	TRITON error message content shall allow the TRITON System Administrator to re-create the conditions when the problem occurred (e.g. the appropriate screen and information content that caused the problem).	BL 1												
5.1.4.4.0-1.0-12	[T1-R1546]	TRITON Server shall gracefully degrade in the condition where any dependent services and components are not available and notify the user for the limited functionality. Upon restoration of services, TRITON Server shall become fully operational. TRITON shall change its Operational State accordingly.	BL 1												
5.1.4.4.0-1.0-13	[T1-R1547]	TRITON shall be able to queue requests to an unavailable Core Service and deliver them when the Service becomes available again. TRITON shall change its Operational State accordingly.	BL 1												
5.1.4.5		**Recoverability**													
5.1.4.5.0-1.0-1	[T1-R1548]	In case of a TRITON Server failure, TRITON shall be capable of switching to a TRITON Backup Server within three (3) minutes.	BL 3												
5.1.4.5.0-1.0-2	[T1-R1549]	TRITON operation shall not be interrupted during incorporation of in-service equipment updates or maintenance software updates.	BL 3												
5.1.4.6		**Survivability**													
5.1.4.6.0-1.0-1	[T1-R1550]	TRITON shall support fail-over in its architecture. Clients shall be able to survive failure of the Application Server without crashing or affecting the stability of the overall system.	BL 3												
5.1.4.6.0-1.0-2	[T1-R1551]	TRITON shall be able to roll-back if transactions are not completed due to an error.	BL 3												
5.1.4.6.0-1.0-3	[T1-R1552]	TRITON shall provide data survivability by using backups and archiving.	BL 3												
5.1.4.6.0-1.0-4	[T1-R1553]	TRITON shall automatically detect the availability and re-establishment of network connectivity and shall automatically continue or restart tasks that were on-going at the time a failure occurred, initiate subsequent tasks as though network connectivity had not been lost, provide a visual notification of the connectivity status (connected, limited, unconnected) and highlight a change in status.	BL 3												
5.1.4.6.0-1.0-5	[T1-R1554]	TRITON shall not cause data corruption or loss of data integrity due to connection failure or other hardware/software failures.	BL 3												
5.1.5		**Maintainability and Supportability**													
5.1.5.1.0-1.0-1	[T1-R1555]	TRITON components shall be capable of being installed by a MS Windows Installer or similar service/product installation package in any Bi-SC AIS approved platform.	BL 1												
5.1.5.1.0-1.0-2	[T1-R1556]	TRITON shall be capable of being installed and correctly run on multi-processor and multi-core systems.	BL 1												
5.1.5.1.0-1.0-3	[T1-R1557]	TRITON shall support successful installation on both 32-bit and 64-bit operating systems (e.g. where the default program files folder is "Program Files (x86)").	BL 1												
5.1.5.1.0-1.0-4	[T1-R1558]	TRITON shall allow the authorised user to install all or selected components of TRITON Infrastructure and Operational Software.	BL 1												
5.1.5.1.0-1.0-5	[T1-R1559]	TRITON shall detect, during installation, if the user has insufficient privileges required for installation (e.g. folder or registry access). TRITON shall report the details of the access failure to the user before aborting the installation.	BL 1												
5.1.5.1.0-1.0-6	[T1-R1560]	The TRITON installer shall detect and appropriately address issues of disk space and drives with "not enough" space prior to beginning installation.	BL 1												
5.1.5.1.0-1.0-7	[T1-R1561]	The TRITON installer shall detect and appropriately address a previous installation of the same application. In this case, the installer shall notify the authorised user and prompt if the user wants to reinstall, repair or cancel, and proceed accordingly.	BL 1												
5.1.5.1.0-1.0-8	[T1-R1562]	The TRITON installer shall detect and appropriately address an earlier version of the application. In this case, the installer shall notify the authorised user and prompt if the user wants to upgrade or cancel the installation, and proceed accordingly.	BL 1												
5.1.5.1.0-1.0-9	[T1-R1563]	The TRITON installer shall detect and appropriately address files protected by MS Windows File Protection (if MS Windows is chosen as the operating system) or other operating system file protection function, and not attempt to replace these files.	BL 1												
5.1.5.1.0-1.0-10	[T1-R1564]	TRITON shall ensure that all shared application files are referenced during installation.	BL 1												
5.1.5.1.0-1.0-11	[T1-R1565]	TRITON shall install into "Program Files" application directory by default or allow alternate directory/drive to be selected for installation.	BL 1												
5.1.5.1.0-1.0-12	[T1-R1566]	TRITON shall support successful installation and running on non-English language versions of MS Windows (e.g. the Italian version of MS Windows uses "Programmi" instead of "Program Files") if MS Windows is chosen as the operating system.	BL 1												
5.1.5.1.0-1.0-13	[T1-R1567]	TRITON shall allow, as appropriate, "Complete", "Typical" and "Custom" installation options to perform complete (i.e. all components), typical (i.e. typical components for a standard installation) and custom (i.e. User-selected components), respectively.	BL 1												
5.1.5.1.0-1.0-14	[T1-R1568]	TRITON shall provide an installation supported by a complete. clearly-worded Installation Manual.	BL 1												
5.1.5.1.0-1.0-15	[T1-R1569]	TRITON shall ensure the ability to re-run, allow addition or removal of components that have been or are still to be installed.	BL 1												
5.1.5.1.0-1.0-16	[T1-R1570]	The TRITON installer shall detect and appropriately address components shared with other applications. The installer shall not adversely affect other installed applications.	BL 1												
5.1.5.1.0-1.0-17	[T1-R1571]	The TRITON installer shall detect and appropriately address issues of disk space and drives with "not enough" space prior to beginning installation.	BL 1												
5.1.5.1.0-1.0-18	[T1-R1572]	The TRITON installer shall detect and appropriately address files protected by MS Windows File Protection (if MS Windows is chosen as the Operating System), and not attempt to replace these files.	BL 1												
5.1.5.1.0-1.0-19	[T1-R1573]	The TRITON installer shall detect and appropriately address the presence or absence of special hardware (e.g. Deployable Kit Central Control Unit).	BL 1												
5.1.5.1.0-1.0-20	[T1-R1574]	The TRITON installer shall set-up Program group/folders as appropriate. All expected program group folders, shortcuts and links (icons) shall appear correctly and be installed where expected.	BL 1												
5.1.5.1.0-1.0-21	[T1-R1575]	TRITON shall allow termination of the installation before it is complete. Cancellation of an installation shall terminate the process and remove all program files and directories, registry entries, program and group directories, as appropriate, retaining all shared and system files. Restart of the installation shall allow the installation to complete without error.	BL 1												
5.1.5.1.0-1.0-22	[T1-R1576]	Once installed by an administrator, TRITON shall be usable by all authorised users of the system (i.e. it shall not require all users to have administrator privileges).	BL 1												
5.1.5.2		**Uninstallation**													
5.1.5.2.0-1.0-1	[T1-R1577]	TRITON shall provide a capability to uninstall the TRITON Operational Software and individual applications.	BL 1												
5.1.5.2.0-1.0-2	[T1-R1578]	The TRITON Uninstallation Capability shall be available from the Control Panel's add/remove programs applet (Application Manager) for only the authorised user.	BL 1												
5.1.5.2.0-1.0-3	[T1-R1579]	TRITON shall prompt the authorised user to confirm the uninstallation.	BL 1												
5.1.5.2.0-1.0-4	[T1-R1580]	The TRITON Uninstallation Capability shall remove all program files and folders, registry entries, program and group folders, as appropriate, retaining all shared and system files.	BL 1												
5.1.5.2.0-1.0-5	[T1-R1581]	The TRITON Uninstallation Capability shall retain all shared and system files, and shall not adversely impact other installed applications.	BL 1												
5.1.5.3		**Co-existence**													
5.1.5.3.0-1.0-1	[T1-R1582]	Installing, running and uninstalling the capability shall not adversely impact other applications or the system it is installed on, running on or uninstalled from.	BL 1												
5.1.5.4		**Configuration Data**													
5.1.5.4.0-1.0-1	[T1-R1583]	TRITON shall store temporary files only in the user's temporary folder.	BL 1												

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
5.1.5.4.0-1.0-2	[T1-R1584]	TRITON shall not store any user data in Registry unless approved by the Purchaser.	BL 1												
5.1.5.4.0-1.0-3	[T1-R1585]	TRITON shall ensure that the application stores user configuration data in User Profile to prevent loe-in delays. etc.	BL 1												
5.1.5.5		**Remote Automated Deolovment and Reporting**													
5.1.5.5.0-1.0-1	[T1-R1586]	TRITON shall support remote deployment, restore, configuration and uninstallation of all TRITON components and updates.	BL 1												
5.1.5.5.0-1.0-2	[T1-R1587]	TRITON shall support collection and reporting of asset inventory metrics for all TRITON components using Microsoft System Centre Configuration Manager, if MS Windows is chosen as the operating system, including memory, operating system, peripherals, services, login tracking, licensing, software existence and usage.	BL 1												
5.1.5.6		**Usage Scope and Limitations**													
5.1.5.6.0-1.0-1	[T1-R1588]	TRITON shall be installable and executable by NATO resources only.	BL 1												
5.1.5.6.0-1.0-2	[T1-R1589]	TRITON shall bear no limitation on the usage scope in term of time. duration and location of usage.	BL 1												
5.1.5.6.0-1.0-3	[T1-R1590]	TRITON usage shall be permitted for any type of event or activities, including but not limited to training, demonstration, exercise, static, deployed, mobile, civil or military locations, aircrafts or ships.	BL 1												
5.1.5.6.0-1.0-4	[T1-R1591]	TRITON shall not bear additional licences and charges for deployment of TRITON if used in a NATO context (exercise, mission, static and deployable commands, NRF).	BL 1												
5.1.5.7		**Supportability**													
5.1.5.7.0-1.0-1	[T1-R1592]	TRITON Operational Software shall permit the authorised users to perform First Level of Support, such as routine daily administration, data management, disaster recovery and back up at the local level.	BL 1												
5.1.5.7.0-1.0-2	[T1-R1593]	TRITON Operational Software shall permit the authorised users to perform Second Level of Support such as client/server installation, configuration management, help desk, identification of required corrective actions, etc., remotely from a centralised support site.	BL 1												
5.1.6		**Portability**													
5.1.6.1		**Environment**													
5.1.6.1.0-1.0-1	[T1-R1594]	TRITON Operational Software shall run on both 32-bit and 64-bit Intel architecture.	BL 1												
5.1.6.1.0-1.0-2	[T1-R1595]	TRITON Client shall be able to be run in any Web Browser present and Web Browser plug-ins present on the Approved Fielded Product List at the time of deployment.	BL 1												
5.1.6.1.0-1.0-3	[T1-R1596]	TRITON Client software shall run natively (no emulation) on the Standard NATO Bi-SC AIS Workstation (Desktop Environment).	BL 1												
5.1.6.1.0-1.0-4	[T1-R1597]	TRITON shall support the use of IPv6 without impaired functionality and performance within a network environment.	BL 1												
5.1.6.1.0-1.0-5	[T1-R1598]	TRITON shall not rely on the NetBIOS interface to communicate with other applications, clients or management services. Disabling NetBIOS shall not affect the applications operation or interoperability in any way.	BL 1												
5.1.6.1.0-1.0-6	[T1-R1599]	TRITON shall run successfully independent of environment regional settings (e.g. decimal symbol, date/time format).	BL 1												
5.1.6.2		**Customisability**													
5.1.6.2.0-1.0-1	[T1-R1600]	TRITON shall support customisation of user environment with Workspaces.	BL 1												
5.1.6.2.0-1.0-2	[T1-R1601]	TRITON shall allow a change to the GUI only when committed separately by the authorised user. If no commit is entered, the GUI will revert to the previous state.	BL 1												
5.1.6.3		**Adaptability**													
5.1.6.3.0-1.0-1	[T1-R1602]	TRITON Operational Software shall be adaptable to newer versions of the virtualised environment.	BL 1												
5.1.6.3.0-1.0-2	[T1-R1603]	TRITON Operational Software output design shall be adaptable to changing environment. It shall be possible to apply changes on the system display and output such as screen layouts, data fields, table formats, report formats.	BL 1												
5.1.6.4		**Replaceability**													
5.1.6.4.0-1.0-1	[T1-R1604]	TRITON shall support replaceability through reusable software components. The defined software component for this Increment shall be the "C4ISR Visualisation Component".	BL 3												
5.1.6.4.0-1.0-2	[T1-R1605]	TRITON Deployable Kit shall support replaceability through hardware components.	BL 4												
5.1.7		**Modularity**													
5.1.7.0-1.0-1	[T1-R1606]	TRITON design shall support modular approach by defining Components, User Applications and Technical Services as defined in NAF [AC/322-D(2007)0048] and [C3TAXO].	BL 1												
5.1.8		**Reusability**													
5.1.8.0-1.0-1	[T1-R1607]	TRITON design shall include identifying and implementing reusable software components. The defined reusable software components for this Increment shall be the C4ISR Visualisation Component.	BL 3												
5.1.8.0-1.0-2	[T1-R1608]	TRITON design shall include reusing software modules and libraries that are developed for a particular function.	BL 3												
5.1.9		**Analysability**													
5.1.9.0-1.0-1	[T1-R1609]	TRITON shall provide the authorised user with capabilities to measure the performance level of the Operational Software.	BL 1												
5.1.9.0-1.0-2	[T1-R1610]	TRITON shall provide the authorised user with capabilities to diagnose for causes of failures.	BL 1												
5.1.9.0-1.0-3	[T1-R1611]	TRITON shall provide the authorised user with capabilities to analyse the system output against the actual data inputs (e.g. by comparing the result of a process when data is input).	BL 1												
5.1.9.0-1.0-4	[T1-R1612]	TRITON shall have input data logging capability for analysing external system interfaces.	BL 1												
5.1.9.0-1.0-5	[T1-R1613]	TRITON shall allow the user to turn on and off the input data logging capability.	BL 1												
5.1.10		**Modifiability**													
5.1.10.0-1.0-1	[T1-R1614]	TRITON design shall support maintenance of software modules without effecting the rest of the system.	BL 1												
5.1.11		**Testability**													
5.1.11.0-1.0-1	[T1-R1615]	TRITON shall be designed and implemented to allow testing and validating the whole or part of the Operational Software.	BL 1												
5.1.12		**Scalability**													
5.1.12.0-1.0-1	[T1-R1616]	TRITON shall be scalable and technically upgradeable to maintain performance against threat growth.	BL 1												
5.1.12.0-1.0-2	[T1-R1617]	TRITON shall use an architecture that allows vertical scalability and allows the various components to be deployed on separate machines.	BL 1												
5.1.12.0-1.0-3	[T1-R1618]	TRITON shall use an architecture that allows horizontal scalability and allows the same component to be deployed on multiple machines without interference.	BL 1												
5.1.12.0-1.0-4	[T1-R1619]	TRITON shall be dimensioned and configured to scale in performance to support at least twenty percent (20%) increase in users at each site and at least twenty percent (20%) growth in data per year for five (5) years without degradation of performance.	BL 1												
5.1.12.0-1.0-5	[T1-R1620]	The TRITON databases shall be dimensioned to support all the relevant data based on current estimates of numbers and sizes of Maritime Information Entities and provide an additional twenty percent (20%) of space a year for five (5) years.	BL 1												
5.2		**Security Requirements**													
5.2.1		**General**													
5.2.1.0-1.0-1	[T1-R1621]	TRITON-NS shall run on the NS Network provided by both static and afloat sites.	BL 1												
5.2.1.0-1.0-2	[T1-R1622]	TRITON-NU shall run on the NU Network provided by both static and afloat sites.	BL 2												
5.2.1.0-1.0-3	[T1-R1623]	TRITON-NU shall be able to run on the NR Network (aka Private Business Network - PBN) if it is available on the static sites.	BL 2												
5.2.1.0-1.0-4	[T1-R1624]	TRITON shall be able to run on a Mission Network if it is deployed and configured.	BL 3												
5.2.1.0-1.0-5	[T1-R1625]	TRITON shall be compliant with NATO document [C-M(2002)49] for the protection of NATO classified information, supporting systems services and resources in CIS, or other storing devices, processing and transmitting systems.	BL 1												
5.2.1.0-1.0-6	[T1-R1626]	TRITON shall operate in the "System High" mode of operation with security levels. That is, all individuals with access to the system are cleared to the highest classification of the information stored, processed or transmitted within the system, but not all individuals with access to the system have a common need to know for the information stored, processed or transmitted within the system.	BL 1												
5.2.2		**Compliance with Bi-SC AIS Security Requirements**													
5.2.2.0-1.0-1	[T1-R1627]	The security settings of TRITON shall be compliant with the Secure AIS CSRS for Bi-SC AIS Security Settings and File Systems.	BL 1												
5.2.2.0-1.0-2	[T1-R1628]	TRITON shall be capable of operating across multiple security domains including National, NATO, Coalition and Mission. These domains shall include SIGINT COINS, NS, MS, NR and NU networks) in accordance with the security policy set by the Purchaser.	BL 1												
5.2.2.0-1.0-3	[T1-R1629]	Performance of a TRITON instance on a security domain shall not be degraded more than 10% because of the presence of other security domains.	BL 1												
5.2.2.0-1.0-4	[T1-R1630]	TRITON shall be compliant with the security infrastructure as provided by the Bi-SC AIS Core Services. The Service Interface Profiles [NCIA-06.02.01]. [NCIA-06.02.02]. [NCIA-06.02.03]. [NCIA-06.02.04] shall be applicable.	BL 1												
5.2.2.0-1.0-5	[T1-R1631]	TRITON shall adhere to NATO INFOSEC security requirements as specified in [ACO-70-1].	BL 1												
5.2.2.1		**Bi-SC AIS Security Settings**													
5.2.2.1.0-1.0-1	[T1-R1632]	TRITON shall be capable of operating within the NS, MS, NR and NU WAN environment (including servers, network, services and workstations) in the presence of the approved NATO Security Settings (target version to be provided by the Purchaser during the Design Stage).	BL 1												
5.2.2.1.0-1.0-2	[T1-R1633]	TRITON shall be compliant to the NCIRC Configuration Guides which will be provided by the Purchaser according to the selected COTS products. Any deviations from the approved security settings shall be identified by the Contractor prior to testing and shall be subject to approval of the Purchaser.	BL 1												
5.2.2.2		**Cross-Domain Support**													
5.2.2.2.1		**Data Labelling**													
5.2.2.2.1.0-1.0-1	[T1-R1634]	TRITON shall assign Confidentiality Labels as defined in [ADatP-4774] and [ADatP-4778] to all Maritime Information Entities including information products, information objects, messages, files, bounded data streams that are subject to be transferred over IEG.	BL 1												
5.2.2.2.1.0-1.0-2	[T1-R1635]	TRITON shall use a binding mechanism to indicate the relationship between a Maritime Information Entity and its label(s) or marking. The methods of binding are defined in the NATO Directives.	BL 1												
5.2.2.2.1.0-1.0-3	[T1-R1636]	TRITON shall maintain Confidentiality Label information for Maritime Information Entity across TRITON Services.	BL 1												
5.2.2.2.1.0-1.0-4	[T1-R1637]	TRITON shall maintain Confidentiality Label information for Maritime Information Entity in the data sent by every Web services that TRITON expose.	BL 1												
5.2.2.2.1.0-1.0-5	[T1-R1638]	TRITON shall support Confidentiality Labels upon Maritime Information Entity entry and create the corresponding Security Classification using approved NATO labelling standards for each Maritime Information Entity. "Entry" refers to direct creation in TRITON. Entities imported from an external system/file shall be required to have security labels.	BL 1												
5.2.2.2.1.0-1.0-6	[T1-R1639]	TRITON shall maintain Security Classification on received information using Confidentiality Labels across all TRITON Services and using NATO approved labelling standards.	BL 1												
5.2.2.2.1.0-1.0-7	[T1-R1640]	TRITON shall create Confidentiality Label upon information production based on Security Classification.	BL 1												
5.2.2.2.1.0-1.0-8	[T1-R1641]	TRITON shall sign the Confidentiality Label using the source entity credentials upon production of information.	BL 1												
5.2.2.2.1.0-1.0-9	[T1-R1642]	TRITON shall allow the authorised user to set the Confidentiality Label of any Maritime Information Entity.	BL 1												
5.2.2.2.2		**IEG**													
5.2.2.2.2.0-1.0-1	[T1-R1643]	TRITON shall be able to use the IEG-A to securely exchange information with Nations on National Enclaves.	BL 3												
5.2.2.2.2.0-1.0-2	[T1-R1644]	TRITON shall be able to use IEG-C to securely exchange information with Mission Network when necessary.	BL 3												
5.2.2.2.2.0-1.0-3	[T1-R1645]	TRITON shall be able to use the existing Data Diode to securely transfer information from the NU Domain to the NS Domain on static sites (e.g. transferring WP from TRITON-NU to TRITON-NS).	BL 3												
5.2.2.2.2.0-1.0-4	[T1-R1646]	TRITON shall make use of the Data Diode to securely transfer information from the NU Domain to the NS Domain on TRITON Deployable Kits.	BL 4												
5.2.2.3		**Web Security Features**													
5.2.2.3.1		**Validation of Input**													
5.2.2.3.1.0-1.0-1	[T1-R1647]	TRITON shall validate all user input at the front end of the User Interface before accepting and using it.	BL 1												
5.2.2.3.1.0-1.0-2	[T1-R1648]	TRITON shall automatically validate the entries, given in the Descripton, into TRITON to ensure that they conform to the required formats and limits.	BL 1												
5.2.2.3.2		**Enforcement of Access Control**													
5.2.2.3.2.0-1.0-1	[T1-R1649]	TRITON shall ensure that privilege restrictions of authenticated users are properly enforced.	BL 1												
5.2.2.3.2.0-1.0-2	[T1-R1650]	TRITON shall not rely on the secrecy of identification information (i.e. IDs) for protection.	BL 1												
5.2.2.3.2.0-1.0-3	[T1-R1651]	TRITON shall prevent Forced Browsing. as defined in the Descriotion. past access control checks.	BL 1												
5.2.2.3.2.0-1.0-4	[T1-R1652]	TRITON shall prevent Path Traversal. as defined in the Description. past access control checks.	BL 1												
5.2.2.3.2.0-1.0-5	[T1-R1653]	TRITON shall securely configure and enforce file permissions. Unless specifically authorised by the Purchaser, only files that are specifically intended to be presented shall be marked as readable. Best practices suggest that most directories should not be readable, and very few files, if any, should be marked as executable.	BL 1												
5.2.2.3.2.0-1.0-6	[T1-R1654]	TRITON shall prevent compromise of information via client-side caching, including best practice use of mechanisms such as HTTP headers and meta tags.	BL 1												
5.2.2.3.3		**Authentication and Session Management**													
5.2.2.3.3.0-1.0-1	[T1-R1655]	TRITON shall use the Directory Services or operating system to authenticate a user. TRITON shall not maintain its own set of usernames and passwords.	BL 1												
5.2.2.3.3.0-1.0-2	[T1-R1656]	TRITON shall ensure that account credential and session tokens are properly protected.	BL 1												
5.2.2.3.3.0-1.0-3	[T1-R1657]	TRITON shall lock user accounts for which a configurable number of failed authentication attempts have been made to await administrator action. By default, TRITON shall lock user accounts after three (3) failed login attempts.	BL 1												
5.2.2.3.3.0-1.0-4	[T1-R1658]	TRITON shall protect authentication details in the storage. All authentication details shall be stored in either hashed or encrypted form to protect them from exposure, regardless of where they are stored.	BL 1												
5.2.2.3.3.0-1.0-5	[T1-R1659]	Authentication details shall not be hard-coded in any part of the source code. Decryption keys shall be strongly protected to prevent unauthorised access.	BL 1												
5.2.2.3.3.0-1.0-6	[T1-R1660]	TRITON shall protect user credentials in transit. TRITON shall employ encryption of the entire authentication transaction using SSL or similar technologies.	BL 1												
5.2.2.3.3.0-1.0-7	[T1-R1661]	TRITON shall protect session IDs. TRITON shall protect the user's entire session via SSL to ensure that the session ID (e.g. session cookie) cannot be read off the network. Session IDs shall never be included in any URL or sent in the referrer header to prevent caching by the browser. Session IDs shall be long, complicated random numbers which cannot be easily guessed. Session IDs chosen by a user shall not be accepted.	BL 1												
5.2.2.3.3.0-1.0-8	[T1-R1662]	TRITON shall not submit authentication and session data as part of a GET. Authentication pages shall be marked with all varieties of the no cache tag to prevent use of the back button in the web browser and re-submission of the credentials. Best practices suggest the use of "autocomplete=false" flag to prevent storing of credentials in autocomplete caches.	BL 1												
5.2.2.3.3.0-1.0-9	[T1-R1663]	TRITON shall allow the System Administrator to set a "timeout" period which shall automatically log-out any sessions which have been inactive for that period of time. The system administrator shall be able to disable this feature.	BL 1												
5.2.2.3.3.0-1.0-10	[T1-R1664]	TRITON shall allow the System Administrator to prevent multiple concurrent authentications from the same user from different locations (IP addresses). The system administrator shall be able to disable this feature.	BL 1												
5.2.2.3.4		**Cross-Site Scripting**													
5.2.2.3.4.0-1.0-1	[T1-R1665]	TRITON shall perform validation of all headers, cookies, query strings, form fields and hidden fields.	BL 1												
5.2.2.3.4.0-1.0-2	[T1-R1666]	TRITON shall ensure that the HTTP TRACE method is turned off on all Web servers to prevent compromise of cookie data.	BL 1												
5.2.2.3.4.0-1.0-3	[T1-R1667]	TRITON shall encode user-supplied output using the best practices for Conversion of Characters to prevent XSS.	BL 1												
5.2.2.3.5		**Injection Flows**													
5.2.2.3.5.0-1.0-1	[T1-R1668]	TRITON shall constrain the input by validating it for type, length, format and range.	BL 1												

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
5.2.2.3.5.0-1.0-2	[T1-R1669]	TRITON shall use type-safe SQL parameters. Input shall be treated as a literal value, and TRITON shall not treat it as executable code.	BL 1												
5.2.2.3.5.0-1.0-3	[T1-R1670]	TRITON shall use filter routines that sanitise the code, adding escape characters that have special meaning to SQL.	BL 1												
5.2.2.3.5.0-1.0-4	[T1-R1671]	TRITON shall create custom error pages to prevent server error messages from being disclosed.	BL 1												
5.2.2.3.6		**Buffer Overflow**													
5.2.2.3.6.0-1.0-1	[T1-R1672]	TRITON shall be configured with the latest patches to the web and application server products.	BL 1												
5.2.2.3.6.0-1.0-2	[T1-R1673]	TRITON shall ensure that application code which accepts input from Users via the HTTP request provides appropriate size checking on all inputs.	BL 1												
5.2.2.3.7		**Improper Error Handling**													
5.2.2.3.7.0-1.0-1	[T1-R1674]	TRITON shall use custom error pages to prevent server error messages from being disclosed.	BL 1												
5.2.2.3.8		**Unsecured Storage**													
5.2.2.3.8.0-1.0-1	[T1-R1675]	TRITON shall properly apply selected asymmetric encryption mechanisms (SSL and SQL server security mechanisms) according to the standards approved by NATO Infosec Technical Centre (NITC) to protect information and credentials.	BL 1												
5.2.2.3.9		**Application Denial of Service**													
5.2.2.3.9.0-1.0-1	[T1-R1676]	TRITON shall protect itself against application denial of service using best practices.	BL 1												
5.2.2.3.9.0-1.0-2	[T1-R1677]	TRITON shall limit the number of resources allocated to any user to a bare minimum. For authenticated users, TRITON shall consider implementing quotas to limit the amount of load a particular user can put on the system.	BL 1												
5.2.2.3.9.0-1.0-3	[T1-R1678]	TRITON shall limit the number of requests a user can have active at any one time.	BL 1												
5.2.2.3.9.0-1.0-4	[T1-R1679]	TRITON shall avoid unnecessary access to databases or other expensive resources. Consideration should also be given to caching the content received by unauthenticated Users instead of generating it or accessing databases to retrieve it.	BL 1												
5.2.2.3.10		**Unsecured Configuration Management**													
5.2.2.3.10.0-1.0-1	[T1-R1680]	TRITON security mechanisms shall be properly configured according to the best practices.	BL 1												
5.2.2.3.10.0-1.0-2	[T1-R1681]	TRITON components and software elements shall be configured with the latest security patches and updated with the latest security guidelines from the NATO Information Assurance Technical Centre (NIATC).	BL 1												
5.2.2.4		**File System**													
5.2.2.4.0-1.0-1	[T1-R1682]	TRITON shall support access to the file system using MS Windows standards, including long file names and legal naming characters.	BL 1												
5.2.2.4.0-1.0-2	[T1-R1683]	TRITON shall allow saving to and opening from the (Secure) Bi-SC AIS-supported devices given in the Description.	BL 1												
5.2.3		**Accountability, Auditability and Non-Repudiation**													
5.2.3.1		**Audit Logging**													
5.2.3.1.0-1.0-1	[T1-R1684]	TRITON shall provide audit capability for all types of Maritime Information Entities by recording important events into Audit Log.	BL 1												
5.2.3.1.0-1.0-2	[T1-R1685]	TRITON shall use the details of the External Service user and of the Logged-in User to maintain the audit traceability.	BL 1												
5.2.3.1.0-1.0-3	[T1-R1686]	TRITON traceability mechanisms shall be embedded in the data itself and independent of the way data are exchanged.	BL 1												
5.2.3.1.0-1.0-4	[T1-R1687]	TRITON audit tracing system shall be permanently effective.	BL 1												
5.2.3.1.0-1.0-5	[T1-R1688]	All errors and faults in TRITON shall be recorded in an Error Log which shall be centrally and locally maintained.	BL 1												
5.2.3.1.0-1.0-6	[T1-R1689]	TRITON Error Log and Audit Log shall contain all required information in order to provide the support staff with interpretable and comprehensive information about the cause and nature of the error/change.	BL 1												
5.2.3.1.0-1.0-7	[T1-R1690]	TRITON shall allow the authorised user to view the audit traceability for the objects authorised for a user.	BL 1												
5.2.3.1.0-1.0-8	[T1-R1691]	TRITON shall allow the authorised user to view faults and errors in the Error Log.	BL 1												
5.2.3.1.0-1.0-9	[T1-R1692]	TRITON shall allow the authorised user to select the events to be logged in the Audit Log.	BL 1												
5.2.3.2		**User Auditing**													
5.2.3.2.0-1.0-1	[T1-R1693]	TRITON shall record in traceable Audit Logs all selected transactions, database activities, technical events (e.g. dataset synchronisation, directory replication) and accessing of data.	BL 1												
5.2.3.2.0-1.0-2	[T1-R1694]	TRITON shall ensure that any Information Object can always be traced to its original source (i.e. Organizational Node, User and/or system).	BL 1												
5.2.3.2.0-1.0-3	[T1-R1695]	TRITON shall maintain a record of the date, time and user that created an Information Object in the Audit Log.	BL 1												
5.2.3.2.0-1.0-4	[T1-R1696]	TRITON shall maintain a record of the date, time, details of the change and user that last modified an Information Object.	BL 1												
5.2.3.2.0-1.0-5	[T1-R1697]	TRITON shall support audit trailing to all user and TRITON system actions and user activities if so configured.	BL 1												
5.2.3.2.0-1.0-6	[T1-R1698]	TRITON shall log all configurations changes with the trace to persons or systems if so configured.	BL 1												
5.2.3.2.0-1.0-7	[T1-R1699]	TRITON shall log the use of all system functions and their corresponding messages including data exchanges with the trace to persons or systems if so configured.	BL 1												
5.2.3.2.0-1.0-8	[T1-R1700]	TRITON shall log a user action by user, timestamp and function name(s) if so configured.	BL 1												
5.2.3.2.0-1.0-9	[T1-R1701]	TRITON shall log changes by user, timestamp, field name, new value and old value if so configured.	BL 1												
5.2.3.3		**System Monitoring**													
5.2.3.3.0-1.0-1	[T1-R1702]	TRITON shall record each of the Auditable Events given in the Description in the Audit Log.	BL 1												
5.2.3.3.0-1.0-2	[T1-R1703]	TRITON shall associate individual user identities to Auditable Events, and shall include date and time of the event, type of event, user identity, and the outcome (success or failure) of the event.	BL 1												
5.2.3.3.0-1.0-3	[T1-R1704]	TRITON shall notify the authorised user and the Enterprise Management System when the Audit Log reaches ninety-percent (90%) of its maximum permitted size.	BL 1												
5.2.3.3.0-1.0-4	[T1-R1705]	TRITON shall archive the Audit Log after a period of time as configured by the authorised user. By default the log shall be archived after forty-eight (48) hours of Logging Period. If the log activity reaches the limit of the log file size before the Logging Period completed, TRITON shall create another log file and continue logging with notification to the authorised user.	BL 1												
5.2.3.3.0-1.0-5	[T1-R1706]	TRITON shall use integrity checking countermeasures to ensure that the Audit Log has been archived successfully after each archiving process.	BL 1												
5.2.3.3.0-1.0-6	[T1-R1707]	TRITON shall generate warning for the System Events for Warning given in Description.	BL 1												
5.2.3.3.0-1.0-7	[T1-R1708]	TRITON shall generate error condition for the System Events for Error given in the Description.	BL 1												
5.2.3.3.0-1.0-8	[T1-R1709]	TRITON shall allow the authorised user to display system events using standard system management tools like the MS Windows Management Console and TRITON System Technical Management functions.	BL 1												
5.2.3.3.0-1.0-9	[T1-R1710]	TRITON shall allow the authorised user to filter and sort system events by date/time range, event Identifier, event type, category, description text, Operating System (OS) User/OS User Group, or source.	BL 1												
5.2.3.3.0-1.0-10	[T1-R1711]	TRITON shall allow the authorised user to perform system event log clearing and backup.	BL 1												
5.2.3.3.0-1.0-11	[T1-R1712]	TRITON shall be able to generate debug messages with multiple levels of verboseness.	BL 1												
5.2.3.3.0-1.0-12	[T1-R1713]	TRITON shall allow the authorised user to dynamically set (i.e. a node configuration setting) the level of verboseness for debug messages.	BL 1												
5.2.3.3.0-1.0-13	[T1-R1714]	TRITON shall notify the user when a system event of type "Error" arises.	BL 1												
5.2.3.3.0-1.0-14	[T1-R1715]	TRITON shall log a memory dump of the whole system when TRITON Server crashes.	BL 1												
5.2.3.3.0-1.0-15	[T1-R1716]	TRITON shall be able to maintain a Performance Log, selectively (i.e. as a configuration setting) logging queries and accesses to Maritime Information Entities.	BL 1												
5.2.3.3.0-1.0-16	[T1-R1717]	TRITON shall allow the authorised user to review the Performance Log.	BL 1												
5.2.4		**Authenticity**													
5.2.4.0-1.0-1	[T1-R1718]	TRITON shall implement Identification and Authentication (I&A) for uniquely identifying and authenticating users.	BL 1												
5.2.4.0-1.0-2	[T1-R1719]	TRITON shall comply with the Authentication Standards given in the Description.	BL 1												
5.2.5		**Authorisation**													
5.2.5.0-1.0-1	[T1-R1720]	TRITON shall provide authorisation for an authenticated user after login. The associated privileges shall be given to the user during the authorisation.	BL 1												
5.2.6		**Confidentiality**													
5.2.6.0-1.0-1	[T1-R1721]	TRITON shall protect its data for confidentiality purposes.	BL 1												
5.2.6.0-1.0-2	[T1-R1722]	TRITON shall ensure that Security Classifications are automatically included into all TRITON products (showing the highest classification of information they contain).	BL 1												
5.2.6.0-1.0-3	[T1-R1723]	TRITON shall provide visual confirmation to users of the Security Classification of the displayed data. The visual confirmation shall include a configurable colour-based visual cue in addition to text to indicate classification. The highest Security Classification shall be displayed as the Header on both AppView and GeoView.	BL 1												
5.2.6.0-1.0-4	[T1-R1724]	TRITON shall use the Security Classification as a domain value for each Maritime Operation.	BL 1												
5.2.6.0-1.0-5	[T1-R1725]	TRITON shall insert a Security Classification construct into headers/footers and metadata of generated, created or exported reports, MS Office files and PDF files. The user shall be prompted during the process. By default TRITON shall propose the highest classification level of the selected objects. If no classification is specified for the selected objects, then the repository classification level shall be proposed. The user shall be able to override the proposed classification level by choosing another level.	BL 1												
5.2.6.0-1.0-6	[T1-R1726]	For generated or export file formats that do not use headers/footers (e.g. screen, print-out, MS Excel files) TRITON shall include the Security Classification of a file into an appropriate part of the file so that it is clearly visible to users.	BL 1												
5.2.7		**Data Protection Policy**													
5.2.7.1		**Protection of System and Maritime Information**													
5.2.7.1.0-1.0-1	[T1-R1727]	TRITON shall ensure that the system, the information and functionalities are only available to authorised users using authorised functionality.	BL 1												
5.2.7.1.0-1.0-2	[T1-R1728]	TRITON shall ensure that access to system and information available users only via authorised TRITON applications, unless specifically authorised.	BL 1												
5.2.7.1.0-1.0-3	[T1-R1729]	TRITON shall ensure that mechanisms to provide access to system and information via authorised TRITON applications shall not, as a side effect, also provide access via non-authorised applications.	BL 1												
5.2.7.1.0-1.0-4	[T1-R1730]	Maritime Information Entities within TRITON shall be updated/removed by only authorised users.	BL 1												
5.2.7.1.0-1.0-5	[T1-R1731]	TRITON shall prevent access by non-TRITON Users (e.g. external systems) to Maritime Information Entities marked as unfinished products.	BL 1												
5.2.7.1.0-1.0-6	[T1-R1732]	TRITON shall ensure that unfinished products are not shared with, or included in data exchanges with other systems.	BL 1												
5.2.7.1.0-1.0-7	[T1-R1733]	TRITON shall contain residual information protection mechanisms to ensure that deleted information is no longer accessible (i.e. information that has been logically deleted).	BL 1												
5.2.7.1.0-1.0-8	[T1-R1734]	TRITON shall ensure that newly created objects do not contain information that shall not be accessible.	BL 1												
5.2.7.1.0-1.0-9	[T1-R1735]	TRITON shall prevent a user to open simultaneously more than one 'database' (e.g. operational, training, exercise) being opened by a single TRITON application execution.	BL 1												
5.2.7.2		**Protection of Licensed Information**													
5.2.7.2.0-1.0-1	[T1-R1736]	TRITON shall be able to restrict the access to collections of information based on user attributes (e.g. Country, Organization).	BL 1												
5.2.7.2.0-1.0-2	[T1-R1737]	TRITON shall allow the access to collections of information to be limited based on the number of simultaneous users.	BL 1												
5.2.7.2.0-1.0-3	[T1-R1738]	TRITON shall allow the auditing of access to collections of information (e.g. number of simultaneous users).	BL 1												
5.2.7.3		**Protection of Personal Information**													
5.2.7.3.0-1.0-1	[T1-R1739]	TRITON shall provide protection and management of Personal Information (e.g. User Profile and expertise information) held within TRITON.	BL 1												
5.2.7.3.0-1.0-2	[T1-R1740]	TRITON shall provide protection and management of information related to people such as Person of Maritime Interest.	BL 1												
5.3		**Safety Requirements**													
5.3.1		**Safety at Static Deployment**													
5.3.2		**Safety at Afloat Deployment**													
5.3.2.0-1.0-1	[T1-R1741]	The TRITON Deployable Kits shall be able to withstand ship movements at Sea States at least seven (7) without harming surrounding equipment and personnel.	BL 4												
5.3.2.0-1.0-2	[T1-R1742]	The TRITON Deployable Kits shall be able to withstand instantaneous shocks up to one G from any direction without causing any harm to surroundings (i.e. no parts or pieces will be scattered around).	BL 4												
5.3.2.0-1.0-3	[T1-R1743]	Each carrying case of the TRITON Deployable Kit shall be carried safely by two persons.	BL 4												
5.3.2.0-1.0-4	[T1-R1744]	Each carrying case of the TRITON Deployable Kit shall be safely lifted by a crane using its designated handles.	BL 4												
5.4		**Computer Resource Requirements**													
5.4.1		**Virtualised Environment**													
5.4.1.0-1.0-1	[T1-R1745]	The TRITON infrastructure requirements for each instance shall be identified in terms of Service Parameters as defined in the Description.	BL 1												
5.4.1.0-1.0-2	[T1-R1746]	The Virtual Machine Performance Parameters shall be scaled not to exceed fifty percent (50%) load on average in twenty-four (24) hours.	BL 1												
5.4.1.0-1.0-3	[T1-R1747]	TRITON shall use Open Virtualisation Format, Option B. Mission Participant can create single, pre-packaged appliances and service providers can export and import virtual machines that can run across different virtualisation platforms.	BL 1												
5.4.1.0-1.0-4	[T1-R1748]	TRITON shall be able to execute in the virtualisation hypervisor environments supported by NATO, namely "MS Hyper-V Server 12 or later" and "VMWare 5.5 or later".	BL 1												
5.4.1.0-1.0-5	[T1-R1749]	The Server deployment package (virtual appliance or installation package) shall be tested against the used hypervisors, configured in accordance with NATO Security Settings "VMWare ESXi 5.5 or later" and "Microsoft Hyper-V 2012 or later".	BL 1												
5.4.2		**Operating System**													
5.4.2.0-1.0-1	[T1-R1750]	TRITON shall use a COTS Operating System on a Virtualised Environment. If the proposed solution does not use MS Windows, it shall be specified, documented, justified and the necessary licenses shall be provided.	BL 1												
5.4.2.0-1.0-2	[T1-R1751]	TRITON shall comply with the latest versions of the operating system available and supported by the Bi-SC AIS Servers and Workstations. This should include all versions of the operating systems planned to become available for the Bi-SC AIS prior to the TRITON System Integration Tests.	BL 1												
5.4.2.0-1.0-3	[T1-R1752]	The Operating System selected for TRITON shall have an operating lifetime of at least five (5) years. Any deviations shall be described and justified in the Obsolescence Management Plan (OMP). Standard documentation shall be provided.	BL 1												
5.4.3		**Virtualised Servers**													
5.4.3.0-1.0-1	[T1-R1753]	TRITON shall be able to utilise Virtualised Server provided by the Virtualised Environment.	BL 1												
5.4.3.0-1.0-2	[T1-R1754]	TRITON Virtualised Server shall be designed considering performance, scalability and load balancing factors.	BL 1												
5.4.3.0-1.0-3	[T1-R1755]	TRITON Virtualised Server shall use the Server Components given in the Description. Any necessary third-party software and licenses shall be provided for each instance of TRITON.	BL 1												
5.4.3.0-1.0-4	[T1-R1756]	TRITON Virtualised Server shall be compatible with the native file system used on NATO Servers. Any deviation shall be documented in detail with justification and be subject to the Purchaser's evaluation and approval.	BL 1												
5.4.4		**Virtualised Data Storage**													
5.4.4.0-1.0-1	[T1-R1757]	TRITON shall be able to utilise Virtualised Data Storage provided by the Virtualised Environment.	BL 1												
5.4.4.0-1.0-2	[T1-R1758]	The TRITON Operational Software shall not have any direct dependency to the physical parameters of the storage environment (such as disk type, connection type, Storage Area Network and protocol) provided by the Virtualised Environment.	BL 1												
5.4.4.0-1.0-3	[T1-R1759]	All UNC, File Path, Drive Letter or similar storage location settings used in TRITON Virtualised Data Storage shall be parametric, configurable, and possible to automate for unattended installation, backup, recovery. No hard-coded location setting shall be used.	BL 1												
5.4.5		**Third-Party COTS Software**													
5.4.5.0-1.0-1	[T1-R1760]	TRITON may use third-party COTS Software or Open Source Software to support its Infrastructure Software. Samples are given in the Description.	BL 1												

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
5.4.5.0-1.0-2	[T1-R1761]	The third-party COTS Software shall be the latest commercial version with the latest updates, unless agreed by the Purchaser.	BL 1												
5.4.5.0-1.0-3	[T1-R1762]	The licensing for all third-party COTS Software components (including versions/editions, client access licenses, etc.) shall allow the component to take full advantage of the number of allocated processors and memory of the Virtualised Server to support the maximum number of users.	BL 1												
5.4.5.0-1.0-4	[T1-R1763]	All third-party COTS Software shall have standard product documentation, a product support and validity time of at least five (5) years. Any deviations shall be described in the Obsolescence Management Plan.	BL 1												
5.4.5.0-1.0-5	[T1-R1764]	TRITON may use COTS Software in its architecture in place of dedicated solutions when the functionalities of a COTS product matches the requirements for a service with no or minimal adaptation.	BL 1												
5.4.5.0-1.0-6	[T1-R1765]	When COTS solutions are used, adaptations shall be delivered as additional services that complement the COTS Software native functionalities.	BL 1												
5.4.6		**Network Configuration**													
5.4.6.0-1.0-1	[T1-R1766]	All URL, DNS, IP Addressing and similar network settings used in TRITON shall be parametric, configurable, and possible to automate for unattended installation, backup, recovery. No hard-coded address settings shall be used.	BL 1												
5.4.7		**Client Environment**													
5.4.7.0-1.0-1	[T1-R1767]	TRITON Client shall be able to run on a NATO Standard Workstation with the Client Configuration given in the Description.	BL 1												
5.4.7.0-1.0-2	[T1-R1768]	TRITON Client installation requirements (workstation software, add-ons, plug-ins) shall be clearly defined in advance and their use shall be subject to approval of the Purchaser.	BL 1												
5.4.7.0-1.0-3	[T1-R1769]	TRITON GUI shall be able to handle normalised input events which are not bounded to an input device. The GUI should have growth potential to be used on mobile devices with touch screens conforming to [W3C WBMP].	BL 3												
5.5		**Design and Construction Constraints**													
5.5.1		**Reference Architecture**													
5.5.1.1		**User Applications**													
5.5.1.2		**Technical Services**													
5.5.1.3		**Information Products**													
5.5.2		**Architectural Views**													
5.5.2.0-1.0-1	[T1-R1770]	TRITON shall be designed considering the standards given in the section "Applicable Standards". Any proposed deviation shall be subjected to the Purchaser's approval.	BL 1												
5.5.2.0-1.0-2	[T1-R1771]	The proposed software architecture, development environment, middleware and the separation of components (Human-Machine Interface, Business and Data) for TRITON shall be documented and explained in detail.	BL 1												
5.5.2.0-1.0-3	[T1-R1772]	TRITON shall expose selected functionality as Technical Services, as components of SOA to encourage reuse and interoperability with other applications in a distributed way. The criteria used for selection of functionality shall be documented.	BL 1												
5.5.2.0-1.0-4	[T1-R1773]	The TRITON Technical Services shall comply with the C3 Taxonomy [C3TAXO].	BL 1												
5.5.2.0-1.0-5	[T1-R1774]	TRITON shall, where applicable, make use of Representational State Transfer (REST) architecture according to the Service Interface Profile given in [NCIA-06.02.07] to make resources available over a URL in promotion of interoperability.	BL 1												
5.5.2.0-1.0-6	[T1-R1775]	The TRITON design process shall balance design implementation with cost for implementation and support to minimise life cycle cost. TRITON design shall take into account the technical, support and cost impacts for NATO.	BL 1												
5.5.3		**Browser-based Functionality**													
5.5.3.0-1.0-1	[T1-R1776]	TRITON user functionality shall be provided via browser-based Web applications, except as specifically waived by the Purchaser.	BL 1												
5.5.3.0-1.0-2	[T1-R1777]	TRITON user functionality shall require only a browser and should not require the installation of additional software, components or plug-ins on the user workstation, except as specifically waived by the Purchaser.	BL 1												
5.5.3.0-1.0-3	[T1-R1778]	TRITON shall use browser-based applications with standard internet addressing, Universal Resource Locator (URL) and Universal Resource Identifier (URI).	BL 1												
5.5.4		**Component-Based Development**													
5.5.4.0-1.0-1	[T1-R1779]	TRITON software architecture shall be able to support loosely-coupled software components through an infrastructural framework.	BL 3												
5.5.4.0-1.0-2	[T1-R1780]	TRITON shall integrate with the C4ISR Visualisation Component at both server and client side.	BL 1												
5.5.4.0-1.0-3	[T1-R1781]	TRITON "should" have a Middleware as a replaceable component to provide communication between all internal components.	BL 3												
5.5.4.0-1.0-4	[T1-R1782]	TRITON "should" have a WSM/PMI Component to provide basic computation for subsurface mission space management.	BL 3												
5.5.4.0-1.0-5	[T1-R1783]	TRITON "should" have Formatted Message Handling Component as a replaceable component to handle (parse or prepare) Formatted Messages.	BL 3												
5.5.4.0-1.0-6	[T1-R1784]	TRITON "should" have Interface Simulators as replaceable components to simulate interfaces of external systems as defined in the Interfaces Section.	BL 2												
5.5.4.0-1.0-7	[T1-R1785]	TRITON "should" have an Interim Local Geospatial Service as a replaceable component in case NATO Core GIS is not available for for static or afloat sites.	BL 4												
5.5.4.0-1.0-8	[T1-R1786]	TRITON "should" have Local Core Services as replaceable components to support standalone operation of TRITON Deployable Kits.	BL 4												
5.5.5		**Implementation Constraints**													
5.5.5.0-1.0-1	[T1-R1787]	TRITON shall be designed to work within the Bi-SC AIS environment as a Functional Service without causing any interference to other Functional Services. All components of TRITON shall use the same software architecture.	BL 1												
5.5.5.0-1.0-2	[T1-R1788]	TRITON Deployable Kits shall be designed to work in low bandwidth for synchronising their databases with a static TRITON instance over the available communication environment.	BL 4												
5.5.6		**Programming Languages**													
5.5.6.0-1.0-1	[T1-R1789]	TRITON "will" be developed using the latest version of Microsoft Visual Studio .NET if C# is used as the programming language.	BL 1												
5.5.6.0-1.0-2	[T1-R1790]	TRITON shall be compatible with the .NET Framework version 4.5 or newer if .NET Framework is utilised for development.	BL 1												
5.5.6.0-1.0-3	[T1-R1791]	TRITON shall comply with the standards and language specifications given in the Description as the Preferred Languages. Any variations from the languages or specifications shall be agreed with the Purchaser.	BL 1												
5.5.6.0-1.0-4	[T1-R1792]	TRITON scripting language and standard shall be JavaScript and compliant to [ECMA-262].	BL 1												
5.5.6.0-1.0-5	[T1-R1793]	TRITON shall not use DCOM, COM, ActiveX and/or COM+ unless specifically authorised in advance by the Purchaser.	BL 1												
5.5.6.0-1.0-6	[T1-R1794]	TRITON shall use XML as the main data and document format. The XML Standards given in the Description shall be used.	BL 1												
5.5.6.0-1.0-7	[T1-R1795]	All information exchanged across TRITON boundaries shall be available in XML format.	BL 1												
5.5.7		**Code Documentation**													
5.5.7.0-1.0-1	[T1-R1796]	All TRITON software source code shall be documented with in-line comments using the best practices in the level of commenting.	BL 1												
5.5.7.0-1.0-2	[T1-R1797]	Comments in TRITON source code shall clarify the intent of the code by considering the Basic Usage of Comments given in the Description.	BL 1												
5.5.7.0-1.0-3	[T1-R1798]	Comments in TRITON source code shall be formatted according with best practices applicable to the specific programming language and allow for the automated extraction and formatting for augmenting technical documentation. The source code comments of the client applications shall be removed by an automated process before entering into production.	BL 1												
5.5.8		**Coding Standards**													
5.5.8.0-1.0-1	[T1-R1799]	Whilst the specifics of coding syntax are not specified, a convention shall be adopted and applied consistently across all code artefacts for each programming language employed. Sample sets of rules are given in the Description.	BL 1												
5.5.8.0-1.0-2	[T1-R1800]	TRITON ".NET" components shall be developed in conformance to Microsoft's ".NET Framework Design Guidelines" and in compliance of the Microsoft FXCop Static Code Analysis Tool rule sets.	BL 1												
5.5.8.0-1.0-3	[T1-R1801]	All code delivered as part of the TRITON Contract shall comply with the standards defined in the SRS. Code derived from other sources (e.g. prototype systems, COTS products, open source components) shall be refactored as necessary to meet standards.	BL 1												
5.5.9		**Free and Open Source Software**													
5.5.9.0-1.0-1	[T1-R1802]	TRITON may use Free and Open Source Software (FOSS) components which shall comply with the NATO strategy on the use of FOSS in NATO systems.	BL 3												
5.5.9.0-1.0-2	[T1-R1803]	Any TRITON component based on FOSS shall be provided with the source code of the FOSS. The source code shall correspond to the delivered component (i.e. same version), and that component shall be capable of being built from the delivered source code with the provided documentation.	BL 3												
5.5.9.0-1.0-3	[T1-R1804]	Use of a FOSS component shall not limit the deployment or use of the TRITON in any way and shall not require the release of code developed for TRITON.	BL 3												
5.5.9.0-1.0-4	[T1-R1805]	Any component-based on FOSS shall be verified for compliance to other non-functional requirements, including security requirements.	BL 3												
5.5.10		**Code Refactoring**													
5.5.10.0-1.0-1	[T1-R1806]	All code delivered as part of TRITON shall comply with the Contractor's QA Standard. The Contractor's QA Standard shall be approved by the Purchaser. Code derived from other sources (e.g. prototype systems, COTS products, open source components) may be refactored as necessary to meet standards when proposed by the Contractor and approved by the Purchaser.	BL 1												
5.5.11		**Data Modelling**													
5.5.11.0-1.0-1	[T1-R1807]	TRITON shall have documented Conceptual, Logical and Physical Data Models.	BL 1												
5.5.11.0-1.0-2	[T1-R1808]	TRITON Data Model documentation shall be compliant with RAS (OMG Reusable Asset Specification).	BL 1												
5.5.11.0-1.0-3	[T1-R1809]	TRITON Data Model file format for the system of record shall be XMI (OMG XML Metadata Interchange).	BL 1												
5.5.11.0-1.0-4	[T1-R1810]	TRITON Data Model shall support multiple Security Classifications.	BL 1												
5.5.11.0-1.0-5	[T1-R1811]	TRITON Data Model shall internally use storage values in International System (S.I.) units (unless otherwise specified).	BL 1												
5.5.11.0-1.0-6	[T1-R1812]	TRITON Data Model shall be compliant with the NATo Core Metadata Specification [AC/322-D(2014)0010].	BL 1												
5.5.12		**Registry Settings**													
5.5.12.0-1.0-1	[T1-R1813]	All usage of the MS Windows Registry by TRITON Applications shall be fully documented in the User Guides.	BL 1												
5.5.12.0-1.0-2	[T1-R1814]	TRITON shall not use Registry hives other than HKEY_LOCAL_MACHINE (during installation) and HKEY_CURRENT_USER (during application operation) except as approved by the Purchaser not later than the System Detailed Design.	BL 1												
5.5.13		**Time Management**													
5.5.13.0-1.0-1	[T1-R1815]	In order to set the time of TRITON Services, TRITON shall verify and complement Operating System time with an external Secured Time source.	BL 1												
5.5.13.0-1.0-2	[T1-R1816]	TRITON shall use the same time source for all time stamping services and application within the same Server.	BL 1												
5.5.13.0-1.0-3	[T1-R1817]	TRITON Instance shall be able to synchronise itself with a Time Server in compliance with NTPv4 [IETF RFC 5905].	BL 1												
5.5.13.0-1.0-4	[T1-R1818]	TRITON Deployable Kit shall use the internal Time Server when it is switched to Standalone Mode.	BL 4												
5.5.13.0-1.0-5	[T1-R1819]	TRITON shall set a centralised time across all services based on the Secured Time.	BL 1												
5.5.13.0-1.0-6	[T1-R1820]	TRITON shall allow the authorised user to select the Time Server available on the network.	BL 1												
5.5.13.0-1.0-7	[T1-R1821]	TRITON shall use a separate Training Time and maintain the correspondence between Training Time and Secured Time.	BL 3												
5.5.13.0-1.0-8	[T1-R1822]	TRITON shall notify the authorised user if the available time source has more than one (1) second different than the current internal time.	BL 1												
5.5.13.0-1.0-9	[T1-R1823]	TRITON shall notify the authorised user if time-based computations result in unexpected behaviour. For example, last time of update of a track is greater than the current time.	BL 1												
5.5.13.0-1.0-10	[T1-R1824]	TRITON Clients shall use the time source available on their own network.	BL 1												
5.5.13.0-1.0-11	[T1-R1825]	TRITON shall use UTC while exchanging time-stamped data among servers.	BL 1												
5.6		**System Environment Requirements**													
5.6.0-1.0-1	[T1-R1826]	Certificate of Conformance for not using hazardous material shall be delivered for any hardware component developed under this Contract.	BL 4												
5.6.0-1.0-2	[T1-R1827]	The equipment used indoors shall be subject to temperature ranging between +10 degrees C and +35 degrees C.	BL 4												
5.6.0-1.0-3	[T1-R1828]	The equipment used indoors shall be subject to humidity ranging from 10 to 90% non-condensing.	BL 4												
5.6.0-1.0-4	[T1-R1829]	The equipment used indoors shall be able to withstand the accumulation of residual dust and sand as can be expected in moderately sheltered environment.	BL 4												
5.6.0-1.0-5	[T1-R1830]	The equipment used indoors shall be fully operational on altitudes at least 3.000 m above mean sea level.	BL 4												
5.6.0-1.0-6	[T1-R1831]	Best commercial practices shall be used to ensure that prolonged periods of exposure to a fungus environment will not result in evidence of fungal growth on component or equipment surfaces.	BL 4												
5.6.0-1.0-7	[T1-R1832]	Any equipment openings (e.g. fans or heating devices) associated with the risk of letting sand, dust, water, snow, and/or moisture into the equipment and shall be described and solutions to overcome the risk of these affecting system availability shall be defined.	BL 4												
5.6.0-1.0-8	[T1-R1833]	All connectors and cables shall have bungs and caps firmly attached to them so that they cannot be lost, in order to prevent the ingress of sand, water and dust. Exceptions to this requirement shall be addressed on a case-by-case basis, and are subject to review and approval by the Purchaser.	BL 4												
5.6.0-1.0-9	[T1-R1834]	The equipment shall be made with non-corroding or suitably protected materials corresponding to the area of operation for a minimum of three (3) years.	BL 4												
5.6.0-1.0-10	[T1-R1835]	All equipment shall be capable of operating in close proximity to other COTS equipment without causing mutual interference problems. Tested and documented compliance with officially recognised Electromagnetic Interference or Electromagnetic Compatibility standards is sufficient to meet this requirement (e.g. Emission Standard EN55022, Immunity Standard EN50022 or FCC Part 15 Class A).	BL 4												
5.7		**Training-Related Requirements**													
5.8		**Logistic-Related Requirements**													
5.8.1		**Spares**													
5.8.1.0-1.0-1	[T1-R1836]	TRITON Deployable Kit Spare Part List shall include at least the items given in the Description.	BL 4												
5.8.2		**Operating Documentation**													
5.8.2.1		**System User Manuals**													
5.8.2.1.0-1.0-1	[T1-R1837]	TRITON shall have System User Manuals (SUM) for each applicable system which includes the subjects given in the Description.	BL 1												
5.8.2.2		**Quick User Guide**													
5.8.2.2.0-1.0-1	[T1-R1838]	TRITON shall have a Quick User Guide (QUG) which describes the frequently-used user functions and main GUI windows.	BL 1												
5.8.2.2.0-1.0-2	[T1-R1839]	The TRITON QUG should be printed on a single page, double-sided, durable paper.	BL 1												
5.8.2.3		**Briefing Manual**													
5.8.2.3.0-1.0-1	[T1-R1840]	TRITON shall have a Briefing Manual which provides a brief overview of TRITON user functionality and the processes that these functions support.	BL 1												
5.8.2.4		**System Administrator Manual**													
5.8.2.4.0-1.0-1	[T1-R1841]	TRITON shall have a System Administrator Manual (SAM) which includes the subjects given in the Description.	BL 1												
6		**INTERFACE REQUIREMENTS**													
6.1		**Interfaces**													

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
6.1.1		**System Interface Services**													
6.1.1.0-1.0-1	[T1-R1842]	TRITON shall implement a SIS Framework providing isolated processing capability. Utilisation of multiple CPUs and load balancing shall be considered during system design and deployment.	BL 1												
6.1.2		**Interface Control Description**													
6.1.2.0-1.0-1	[T1-R1843]	TRITON shall have an Interface Control Description (ICD) having the content given in the Description for its External Interfaces/Services. The External Interfaces/Services are described in Subsection 6.2.	BL 1												
6.1.3		**Interface Mechanisms**													
6.1.3.1		**Network Communication**													
6.1.3.1.0-1.0-1	[T1-R1844]	TRITON shall comply with the Network Communication Interface Standards given in the Description.	BL 1												
6.1.3.1.0-1.0-2	[T1-R1845]	TRITON shall be able to use TCP/IP or UDP/IP for interfacing external Network Addresses.	BL 2												
6.1.3.1.0-1.0-3	[T1-R1846]	TRITON shall be able to reconnect automatically within one second if the TCP/IP or UDP/IP connection is broken.	BL 2												
6.1.3.1.0-1.0-4	[T1-R1847]	TRITON shall use configuration settings for Network Communication Parameters.	BL 2												
6.1.3.1.0-1.0-5	[T1-R1848]	TRITON shall allow the authorised user to alter the configuration settings for a Network Communication.	BL 2												
6.1.3.2		**Web Services**													
6.1.3.2.0-1.0-1	[T1-R1849]	TRITON shall provide an implementation supported by Extensible Mark-up Language (XML) technology and standards for all external interfaces.	BL 2												
6.1.3.2.0-1.0-2	[T1-R1850]	All Web services published by TRITON shall adapt a single, consistent exception handling and error reporting mechanism within the SIS Framework as defined in its SIP.	BL 2												
6.1.3.2.0-1.0-3	[T1-R1851]	TRITON Web service design shall consider alternative response mechanisms where a long running process between request and response results (e.g. sync-on-async pattern interaction).	BL 2												
6.1.3.2.0-1.0-4	[T1-R1852]	TRITON shall avoid the practice, as both a publisher and consumer, of treating Web services as a high frequency, pollable call.	BL 2												
6.1.3.2.0-1.0-5	[T1-R1853]	TRITON shall observe the best practice of preferring primitive types for Web service parameters.	BL 2												
6.1.3.2.0-1.0-6	[T1-R1854]	TRITON shall consider the best practice of avoiding long running Web services to be a design goal.	BL 2												
6.1.3.2.0-1.0-7	[T1-R1855]	TRITON shall observe best practice and prefer message-based interactions over the remote procedure call (RPC) style while implementing Web services.	BL 2												
6.1.3.2.0-1.0-8	[T1-R1856]	TRITON Web services shall observe best practice in the design of chunky interfaces to realise the design goal of minimising round trips.	BL 2												
6.1.3.2.0-1.0-9	[T1-R1857]	TRITON Web services shall be non-sticky (avoid maintaining server state between calls) in order to facilitate scaling out of web services.	BL 2												
6.1.3.2.0-1.0-10	[T1-R1858]	TRITON shall incorporate a compression mechanism for both request and response payloads of Web services.	BL 2												
6.1.3.2.0-1.0-11	[T1-R1859]	TRITON shall use the event-driven mechanisms compliant with OASIS WS-Notifications protocols to consume event driven, time sensitive and critical web services of other system.	BL 2												
6.1.3.2.0-1.0-12	[T1-R1860]	TRITON shall provide Service Interface Profiles (SIP) for all its Service Inter-Operability Points (SIOP) (Web services) using service modelling language.	BL 2												
6.1.3.2.0-1.0-13	[T1-R1861]	TRITON shall promote usage of SOA, by isolating the existing interfaces to the lowest level of communication and transforming information from these channels to SOA compatible means. (i.e. Legacy System Adapter concept in SOA, integration with legacy systems, protocols, etc.)	BL 2												
6.1.3.2.1		**Web Service Standards**													
6.1.3.2.1.0-1.0-1	[T1-R1862]	TRITON shall use the standards given in the Description for the implementation of Web services.	BL 2												
6.1.3.2.1.0-1.0-2	[T1-R1863]	TRITON shall be compliant with the W3C, Web Services Security standards given in the Description.	BL 2												
6.1.3.2.1.0-1.0-3	[T1-R1864]	TRITON shall provide W3C XML schemas to express all XML file formats.	BL 2												
6.1.3.2.1.0-1.0-4	[T1-R1865]	TRITON shall use the XML to facilitate publish and subscribe information brokering as a standard language.	BL 2												
6.1.3.2.1.0-1.0-5	[T1-R1866]	TRITON shall be able to make all information exchanged across its boundaries available in XML format.	BL 2												
6.1.3.2.1.0-1.0-6	[T1-R1867]	TRITON shall validate all received XML files against the schemas published by the suppliers.	BL 2												
6.1.3.2.1.0-1.0-7	[T1-R1868]	TRITON shall have the syntax of the XML documents it accepts and produces in its ICD using models and XML schemas.	BL 2												
6.1.3.2.1.0-1.0-8	[T1-R1869]	TRITON shall use the SOAP XML format to exchange information between the service provider and the service requester.	BL 2												
6.1.3.2.1.0-1.0-9	[T1-R1870]	TRITON shall support both SOAP Web and RESTfull Services to exchange information between the service provider and the service requester.	BL 2												
6.1.3.2.1.0-1.0-10	[T1-R1871]	TRITON shall use the Web Service Description Language (WSDL) XML format to describe the Web services provided.	BL 2												
6.1.3.2.1.0-1.0-11	[T1-R1872]	TRITON shall use the Universal Description, Discovery and Integration (UDDI) protocol [OASIS-UDDI] to publish the Web service metadata.	BL 2												
6.1.3.2.1.0-1.0-12	[T1-R1873]	TRITON shall use XPATH expressions or Schematron to specify semantics that cannot be captured by XML Schema.	BL 2												
6.1.3.2.1.0-1.0-13	[T1-R1874]	TRITON shall prefer, where appropriate, XmlReader or SAX-based parsers over DOM type in-memory expansions.	BL 2												
6.1.3.2.1.0-1.0-14	[T1-R1875]	TRITON Web services shall be compliant with the W3C, XML Digital Signature Standard and Processing.	BL 2												
6.1.3.2.1.0-1.0-15	[T1-R1876]	TRITON shall support XML, Namespaces, XPath, XSLT, XQuery to perform XML-level transformation of document instances. All XML W3C Recommendations shall be supported.	BL 2												
6.1.3.2.2		**Web Service - Service Level Aereement**													
6.1.3.2.2.0-1.0-1	[T1-R1877]	Each TRITON Web service shall be delivered in conjunction with a Web Service - SLA.	BL 2												
6.1.3.2.2.0-1.0-2	[T1-R1878]	TRITON Web Service SLA shall specify performance target values for Availability, Throughput and Response Time, including specification of local and wide-area network capability dependencies.	BL 2												
6.1.3.2.2.0-1.0-3	[T1-R1879]	TRITON Web Service SLA shall specify security configurations for authentication, authorisation, confidentiality, integrity and non-repudiation.	BL 2												
6.1.3.2.2.0-1.0-4	[T1-R1880]	TRITON Web Service SLA shall provide adequate documentation, using a service modelling language, for the meaning of the documents it produces or accepts (An adequate definition is one that enables a programmer or user to understand the meaning of the data and determine whether it is suitable for the intended use). This documentation shall be expressed as annotations on the XML schema for the XML payload.	BL 2												
6.1.3.2.2.0-1.0-5	[T1-R1881]	TRITON shall supply a text definition for every element, attribute, and enumeration value defined in the schema.	BL 2												
6.1.3.2.2.0-1.0-6	[T1-R1882]	TRITON shall publish the XML schema for every external XML interface it defines.	BL 2												
6.1.3.2.3		**Web Service Performance**													
6.1.3.2.3.0-1.0-1	[T1-R1883]	TRITON Web services shall meet the non-functional performance requirements specified in their Web Service SLA.	BL 2												
6.1.3.2.3.0-1.0-2	[T1-R1884]	TRITON shall provide mechanisms to monitor and audit the performance, availability, throughput and response times of Web services that it publishes.	BL 2												
6.1.3.2.4		**Web Service Security**													
6.1.3.2.4.0-1.0-1	[T1-R1885]	TRITON Web services shall meet the non-functional security requirements specified in their Web Service SLA.	BL 2												
6.1.3.2.4.0-1.0-2	[T1-R1886]	TRITON Web services shall be compliant with [OASIS WS-Security] set of specifications for publishing and consuming web services.	BL 2												
6.1.3.2.4.0-1.0-3	[T1-R1887]	TRITON Web services shall support auditing and non-repudiation.	BL 2												
6.1.3.2.4.0-1.0-4	[T1-R1888]	TRITON Web services shall support point-to-point integrity.	BL 2												
6.1.3.2.4.0-1.0-5	[T1-R1889]	TRITON Web services shall support point-to-point confidentiality.	BL 2												
6.1.3.2.4.0-1.0-6	[T1-R1890]	TRITON Web services shall incorporate authorisation according to the Role-Based Access mechanisms.	BL 2												
6.1.3.2.4.0-1.0-7	[T1-R1891]	TRITON Web services shall incorporate authentication.	BL 2												
6.1.3.2.4.0-1.0-8	[T1-R1892]	TRITON shall implement role-based access for accessing external services and service operations.	BL 2												
6.1.3.2.4.0-1.0-9	[T1-R1893]	TRITON shall use approved X.509 certificates produced by the responsible security administrators.	BL 2												
6.1.3.2.4.0-1.0-10	[T1-R1894]	TRITON shall sign a validated service request to external services using its Bi-SC AIS credentials defined in its X.509 certificate.	BL 2												
6.1.3.2.4.0-1.0-11	[T1-R1895]	TRITON shall only accept data signed by external services with valid X.509 certificates.	BL 2												
6.1.3.2.5		**TRITON as a Service Consumer**													
6.1.3.2.5.0-1.0-1	[T1-R1896]	TRITON shall use the Role-Based Access Mechanism for authorization and authentication purposes, for systems interfacing with TRITON.	BL 2												
6.1.3.2.5.0-1.0-2	[T1-R1897]	TRITON shall be able to communicate with NATO Meta-data Registry and Repository to find the available services that it can interact with.	BL 2												
6.1.3.2.5.0-1.0-3	[T1-R1898]	TRITON shall validate the received XML documents against the schemas published by external parties.	BL 2												
6.1.3.2.6		**TRITON as a Service Provider**													
6.1.3.2.6.0-1.0-1	[T1-R1899]	TRITON shall provide interfaces based on the Web services concept which will allow validated clients to access data and functionality. TRITON shall also provide Web service interfaces for the data that it will accept from external systems (e.g. Nations' input).	BL 2												
6.1.3.2.6.0-1.0-2	[T1-R1900]	TRITON shall support both read-only Web services with select and filter capabilities; and write Web services with insert, update, and delete capabilities.	BL 2												
6.1.3.2.6.0-1.0-3	[T1-R1901]	TRITON shall register its Web services to the NATO Meta-data Registry and Repository. If this is not possible, then it shall build and maintain an XML Registry defining its XML interfaces.	BL 2												
6.1.3.2.6.0-1.0-4	[T1-R1902]	TRITON shall publish the W3C XML schemas for every external XML interface it defines. Every element in the defined schema shall be documented using annotations and Interface Control Description document.	BL 2												
6.1.3.2.6.0-1.0-5	[T1-R1903]	TRITON shall guarantee that the XML documents that are generated are valid according to the XML schema that has been published.	BL 2												
6.1.3.2.6.0-1.0-6	[T1-R1904]	TRITON shall provide an implementation supported by XML technology for all external interfaces.	BL 2												
6.1.3.2.6.0-1.0-7	[T1-R1905]	TRITON shall allow the authorised User to export a web service into an XML file in order its data would be consumed by disconnected external systems.	BL 2												
6.1.3.2.6.0-1.0-8	[T1-R1906]	Every Web service method in TRITON shall also include a NATO Confidentiality Label field to determine the sensitivity of the data that is sent. This label will be used by NATO Information Exchange Gateway (IEG) in cross-domain data exchange.	BL 2												
6.1.3.3		**File Exchange**													
6.1.3.3.0-1.0-1	[T1-R1907]	TRITON shall use XML as the primary mechanism for file-level information exchange.	BL 1												
6.1.3.3.0-1.0-2	[T1-R1908]	TRITON shall provide adequate documentation for the content and meaning of the file formats it produces or accepts. An adequate definition is one that enables a programmer or user to understand the meaning of the data and determine whether it is suitable for its intended use. TRITON shall supply a definition for every element, attribute, and enumeration value defined in the file format.	BL 1												
6.1.3.3.0-1.0-3	[T1-R1909]	TRITON shall, to the extent possible, validate the format and contents of all incoming and outgoing files according to the documented format.	BL 1												
6.1.3.4		**Direct Database Access**													
6.1.3.4.0-1.0-1	[T1-R1910]	In TRITON, as a design rule, direct database access by external systems should be avoided.	BL 1												
6.1.3.4.0-1.0-2	[T1-R1911]	TRITON shall allow the authorised users to directly access the database used in TRITON.	BL 1												
6.1.3.4.0-1.0-3	[T1-R1912]	TRITON shall allow the controlled access of authenticated and authorised external systems or components to internal databases via the Direct Database Access Control Mechanism for information items (e.g. records, files) and structures (e.g. tables, directories) to perform an authorised function.	BL 1												
6.1.3.5		**Multi-lateral Interoperability Program Data Exchange Mechanism Information Exchange**													
6.1.3.5.0-1.0-1	[T1-R1913]	TRITON "should" have a growth potential to implement information exchange defined by MIP-DEM.	BL 3												
6.1.3.6		**Application Programming Interface**													
6.1.3.6.0-1.0-1	[T1-R1914]	As a design rule, the use of an API "should" be minimized in TRITON to the extent possible.	BL 1												
6.1.3.6.0-1.0-2	[T1-R1915]	TRITON shall provide adequate documentation for any API it supports.	BL 1												
6.1.3.6.0-1.0-3	[T1-R1916]	TRITON shall allow authorised external systems or components to access the TRITON API.	BL 1												
6.1.3.6.0-1.0-4	[T1-R1917]	TRITON shall allow the controlled access of authenticated and authorised external systems or components through its API.	BL 1												
6.1.4		**Information Products**													
6.1.4.0-1.0-1	[T1-R1918]	TRITON shall be able to export selected information as an Information Product into a file in Recognised Export File Format. For example, a WSM Area can be saved into a Formatted Message as an Information Product.	BL 1												
6.1.4.0-1.0-2	[T1-R1919]	TRITON shall use the "TRITON Track Specification - NS" to receive tracks from external systems and to make the RMP available as an Information Product to the external world on the NS Domain. The TRITON Track Specification - NS shall be documented in the TRITON ICD.	BL 1												
6.1.4.0-1.0-3	[T1-R1920]	TRITON shall use "TRITON Track Specification - NU" to receive tracks from the external world and to make the WP available as an Information Product to the external world on the NU Domain. The TRITON Track Specification - NU shall be documented in the TRITON ICD.	BL 2												
6.2		**External Interface Requirements**													
6.2.1		**NATO Systems and Services**													
6.2.1.1		**NATO Bi-SC AIS Core Services**													
6.2.1.1.1		**Windows Domain Services**													
6.2.1.1.1.0-1.0-1	[T1-R1921]	TRITON shall be integrated with the Bi-SC AIS Directory Services based on MS Windows Active Directory in compliance with the standards given in the Description.	BL 1												
6.2.1.1.1.0-1.0-2	[T1-R1922]	TRITON shall interface with the Active Directory Forest on the NSWAN.	BL 1												
6.2.1.1.1.0-1.0-3	[T1-R1923]	If TRITON requires a schema change, these schema extensions shall be documented.	BL 1												
6.2.1.1.1.0-1.0-4	[T1-R1924]	TRITON shall be compatible with Windows Active Directory services and protocols (e.g. LDAP).	BL 1												
6.2.1.1.1.0-1.0-5	[T1-R1925]	TRITON shall support, as appropriate, Active Directory read, write, change operations.	BL 1												
6.2.1.1.1.0-1.0-6	[T1-R1926]	TRITON shall support interoperability with the name resolution mechanism in the Directory Services.	BL 1												
6.2.1.1.1.0-1.0-7	[T1-R1927]	TRITON shall support integration with MS Windows Server 2016 (or later) File and Print Services (including publishing and lookup through Active Directory).	BL 1												
6.2.1.1.1.0-1.0-8	[T1-R1928]	TRITON shall support integration with MS Windows Server 2016 (or later) built-in services (e.g. Internet Information Services, RUP, Terminal Server).	BL 1												
6.2.1.1.1.0-1.0-9	[T1-R1929]	TRITON shall support integration with MS Windows Server 2016 (or later) Security Services.	BL 1												
6.2.1.1.1.0-1.0-10	[T1-R1930]	TRITON shall support integration with Active Directory-supported Security Access Control (e.g. ACL, security groups).	BL 1												
6.2.1.1.1.0-1.0-11	[T1-R1931]	TRITON shall be able to operate with the latest security settings from the NATO Information Assurance Technical Centre (NIATC) without change.	BL 1												
6.2.1.1.2		**SOA Platform Information Assurance Services**													
6.2.1.1.2.0-1.0-1	[T1-R1932]	TRITON shall provide for SAML-based authentication and authorization.	BL 1												
6.2.1.1.2.0-1.0-2	[T1-R1933]	TRITON shall use a Policy Decision Point to evaluate a request and provide the authorisation decision for services.	BL 1												
6.2.1.1.2.0-1.0-3	[T1-R1934]	TRITON shall use a Policy Enforcement Point as defined in [NCIA-06.02.04] to secure all Services.	BL 1												
6.2.1.1.2.0-1.0-4	[T1-R1935]	TRITON shall use a Security Token Service as defined in [NCIA-06.02.02] to generate, validate and exchange security tokens.	BL 1												
6.2.1.1.2.0-1.0-5	[T1-R1936]	TRITON shall be compatible with the Service Interface Profile for Security Services as defined in [NCIA-06.02.01], [NCIA-06.02.02], [NCIA-06.02.03] and [NCIA-06.02.04].	BL 1												
6.2.1.1.2.0-1.0-6	[T1-R1937]	If the Bi-SC AIS SOA Platform IA Services are not available, TRITON shall establish its own supporting services for the NS and NU Domains.	BL 2												
6.2.1.1.2.0-1.0-7	[T1-R1938]	TRITON shall ensure that no security warnings are generated in the applicable system log as a result of normal operation.	BL 1												
6.2.1.1.3		**Directory Storage Services**													
6.2.1.1.3.0-1.0-1	[T1-R1939]	TRITON shall interface with the NATO-wide Enterprise Directory Services (NEDS) through Lightweight Directory Access Protocol (LDAP) [RFC4510].	BL 1												

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
6.2.1.1.3.0-1.0-2	[T1-R1940]	TRITON shall be compatible with the Enterprise Directory Services SIP [NCIA-06.02.05].	BL 1												
6.2.1.1.3.0-1.0-3	[T1-R1941]	TRITON shall include the necessary administration tool(s) to manage the interface with the NEDS if required by the NEDS Agreement.	BL 1												
6.2.1.1.3.0-1.0-4	[T1-R1942]	TRITON shall be able to use the NEDS Directory as its own directory.	BL 1												
6.2.1.1.3.0-1.0-5	[T1-R1943]	In case TRITON cannot use the NEDS Directory as its own directory, then it shall establish its own directory and that directory shall interface with the NEDS either through the NEDS Meta-Tool or directly by reading/writing into the NEDS Directory through LDAP, and as required by the agreement.	BL 2												
6.2.1.1.4		**Enterprise Management System**													
6.2.1.1.4.0-1.0-1	[T1-R1944]	TRITON shall report its internal performance metrics, enterprise-level errors and suggested corrective actions to the Bi-SC AIS EMS automatically.	BL 1												
6.2.1.1.4.0-1.0-2	[T1-R1945]	TRITON shall be able to report its performance values (load, transaction ratio, active users, active sessions) to the NATO EMS environment (in addition to any project specific requirements).	BL 1												
6.2.1.1.5		**E-mail Services**													
6.2.1.1.5.0-1.0-1	[T1-R1946]	TRITON shall be integrated with the Bi-SC AIS E-mail Services based on MS Exchange.	BL 1												
6.2.1.1.5.0-1.0-2	[T1-R1947]	TRITON shall be compatible with Bi-SC AIS E-mail Services and protocols (e.g. MAPI and SMTP).	BL 1												
6.2.1.1.5.0-1.0-3	[T1-R1948]	E-mail messages produced by TRITON to be provided to the Bi-SC AIS E-mail Services shall be compatible with the formats used in the Bi-SC AIS (e.g. classification header).	BL 1												
6.2.1.1.6		**NATO Information Portal**													
6.2.1.1.6.0-1.0-1	[T1-R1949]	TRITON shall support the information exchange interface standards for the NATO Information Portal.	BL 3												
6.2.1.1.7		**Metadata Repository Services**													
6.2.1.1.7.0-1.0-1	[T1-R1950]	TRITON Web Services shall support WSDL to specify the way to connect to supported Web Services, and the structure of messages that are exchanged with them.	BL 1												
6.2.1.1.7.0-1.0-2	[T1-R1951]	TRITON shall use, when applicable, the NATO Guidance for XML naming and design (see [EAPC(AC/322-SC/5-WG/4)N(2008)0004]) as a reference to work with XML artefacts.	BL 1												
6.2.1.1.7.0-1.0-3	[T1-R1952]	If available, TRITON shall use the NATO Metadata Registry and Repository (NMRR) or other metadata repository services on the related security domain.	BL 1												
6.2.1.1.8		**Service Discovery Services**													
6.2.1.1.8.0-1.0-1	[T1-R1953]	TRITON shall support discovery of Web Services via service discovery/registry mechanisms.	BL 1												
6.2.1.1.8.0-1.0-2	[T1-R1954]	TRITON shall be able to communicate with the provided service discovery/registry mechanism to discover available services which it can utilise.	BL 1												
6.2.1.1.9		**Malware Detection Services**													
6.2.1.1.9.0-1.0-1	[T1-R1955]	TRITON shall coexist (i.e. work correctly and not adversely impact other applications) with Bi-SC AIS standard Anti-Virus software during installation and operation.	BL 1												
6.2.1.1.9.0-1.0-2	[T1-R1956]	TRITON shall be equipped with security software that can detect malicious software contained in files of TRITON-delivered workstations and servers. The software shall have the ability to scan any file or directory to detect any malicious software. The supplied software shall be compatible with the NATO Anti-Virus management centre and approved by the Purchaser.	BL 1												
6.2.1.1.10		**Generic Security Services Application Programming Interface**													
6.2.1.1.10.0-1.0-1	[T1-R1957]	TRITON shall use Generic Security Services Application Program Interface (GSS-API), if possible, as the API for accessing security services.	BL 1												
6.2.1.1.10.0-1.0-2	[T1-R1958]	TRITON security API shall be compliant with [RFC2078].	BL 1												
6.2.1.1.10.0-1.0-3	[T1-R1959]	TRITON primary security services (access control, confidentiality, integrity, authentication, and non-repudiation) shall be supported by X.509.	BL 1												
6.2.1.1.10.0-1.0-4	[T1-R1960]	TRITON X.509 support to primary security services shall be compliant with NATO Public Key Infrastructure (NPKI).	BL 1												
6.2.1.2		**NATO Bi-SC AIS Enabling Services**													
6.2.1.2.1		**NIRIS**													
6.2.1.2.1.0-1.0-1	[T1-R1961]	TRITON shall have a dedicated interface for NIRIS on the NS Domain.	BL 3												
6.2.1.2.1.0-1.0-2	[T1-R1962]	TRITON shall allow the authorised user to select which NIRIS Server will be used for interfacing.	BL 3												
6.2.1.2.1.0-1.0-3	[T1-R1963]	TRITON shall be able to receive surface and subsurface tracks from NIRIS using the NIRIS API according to [NIRIS ICD].	BL 3												
6.2.1.2.1.0-1.0-4	[T1-R1964]	TRITON shall be able to receive available tactical information from NIRIS using the NIRIS API according to [NIRIS ICD].	BL 3												
6.2.1.2.1.0-1.0-5	[T1-R1965]	TRITON shall be able to handle multiple track sources coming from the same NIRIS interface.	BL 3												
6.2.1.3		**NATO Bi-SC AIS Functional Services**													
6.2.1.3.1		**Environmental FS**													
6.2.1.3.1.0-1.0-1	[T1-R1966]	TRITON shall have a dedicated interface for ENV-FS on the NS Domain and implement [ENV-FS ICD].	BL 3												
6.2.1.3.1.0-1.0-2	[T1-R1967]	TRITON shall be able to receive Environmental Information, given in the Description, from ENV-FS according to [ENV-FS ICD] and process it in Environmental Information Management function. If Core GIS can provide it as a service, this service shall be used.	BL 3												
6.2.1.3.2		**CBRN Defence FS**													
6.2.1.3.2.0-1.0-1	[T1-R1968]	TRITON shall have a dedicated interface for CBRN-FS on the NS Domain and implement [CBRN-FS ICD].	BL 3												
6.2.1.3.2.0-1.0-2	[T1-R1969]	TRITON shall be able to receive CBRN Information, given in the Description, from CBRN-FS according to [CBRN-FS ICD] and process it in CBRN Information Management function.	BL 3												
6.2.1.3.3		**Intelligence FS**													
6.2.1.3.3.0-1.0-1	[T1-R1970]	TRITON shall have a dedicated interface for INTEL-FS on the NS Domain and implement [INTEL-FS ICD].	BL 3												
6.2.1.3.3.0-1.0-2	[T1-R1971]	TRITON shall be able to receive the Intelligent Information given in the Description from INTEL-FS according to [INTEL-FS ICD] and process it in Intelligence Information Management function.	BL 3												
6.2.1.3.3.0-1.0-3	[T1-R1972]	TRITON shall be able to send a query to INTEL-FS prepared according to [INTEL-FS ICD] to request intelligence information on an object, and process the returned result in Intelligence Information Management function.	BL 3												
6.2.1.4		**NATO Systems and Capabilities**													
6.2.1.4.1		**Message Handling System**													
6.2.1.4.1.0-1.0-1	[T1-R1973]	TRITON shall have a dedicated interface for MHS over Mail Exchange on the NS Domain.	BL 3												
6.2.1.4.1.0-1.0-2	[T1-R1974]	TRITON shall be able to exchange Formatted Messages with Mail Exchange using SMTP.	BL 3												
6.2.1.4.2		**NCOP**													
6.2.1.4.2.0-1.0-1	[T1-R1975]	TRITON shall have a dedicated interface for NCOP on the NS Domain.	BL 3												
6.2.1.4.2.0-1.0-2	[T1-R1976]	TRITON shall be able to receive RAP from NCOP via NCOP Web Service according to [NCOP ICD].	BL 3												
6.2.1.4.2.0-1.0-3	[T1-R1977]	TRITON shall be able to receive RGP from NCOP via NCOP Web Service according to [NCOP ICD].	BL 3												
6.2.1.4.3		**MCCIS**													
6.2.1.4.3.0-1.0-1	[T1-R1978]	TRITON shall have a dedicated interface for each MCCIS Server on the NS Domain.	BL 1												
6.2.1.4.3.0-1.0-2	[T1-R1979]	TRITON shall be able to receive track and overlay information from MCCIS Server using OTH-T GOLD Messages.	BL 1												
6.2.1.4.3.0-1.0-3	[T1-R1980]	TRITON shall be able to handle interfaces with more than one MCCIS Server.	BL 3												
6.2.1.4.3.0-1.0-4	[T1-R1981]	TRITON shall be able to send selected track information to the selected MCCIS Server usine OTH-T GOLD Messages.	BL 3												
6.2.1.4.4		**Alliance Ground Surveillance System**													
6.2.1.4.4.0-2	[T1-R1982]	TRITON shall have a dedicated interface for AGS on the NS Domain.	BL 3												
6.2.1.4.4.0-3	[T1-R1983]	TRITON shall be able to receive Track Data from AGS via a Web service if the [AGS ICD] is available at the time of implementation. If not, a generic Track Data interface shall be provided for test purposes.	BL 3												
6.2.1.4.4.0-4	[T1-R1984]	TRITON shall be able to receive AIS track data from AGS via a Web service. If AGS is not available at the time of implementation, the interface shall be tested with simulated AIS data.	BL 3												
6.2.2		**Non-NATO Systems and Services**													
6.2.2.1		**AIS Data Source**													
6.2.2.1.0-1.0-1	[T1-R1985]	TRITON shall have a dedicated interface for each AIS Data Source specified on either NS or NU Domain.	BL 2												
6.2.2.1.0-1.0-2	[T1-R1986]	TRITON shall be able to receive AIS track data from a dedicated source on the NU Domain.	BL 2												
6.2.2.1.0-1.0-3	[T1-R1987]	TRITON shall be able to receive AIS track data from a dedicated source on the NS Domain if data source is available at the time of System Integration.	BL 3												
6.2.2.2		**MSSIS**													
6.2.2.2.0-1.0-1	[T1-R1988]	TRITON shall have a dedicated interface for MSSIS via TV32 on the NU Domain.	BL 2												
6.2.2.2.0-1.0-2	[T1-R1989]	TRITON shall be able to receive AIS messages from TV32 using NMEA 0183 format via TCP/IP connection over the Internet.	BL 2												
6.2.2.2.0-1.0-3	[T1-R1990]	TRITON shall be able to process all data received from MSSIS without anv loss.	BL 2												
6.2.2.3		**AIS Data Services**													
6.2.2.3.0-1.0-1	[T1-R1991]	TRITON shall have a dedicated interface for a contracted AIS Data Service on the NU Domain.	BL 2												
6.2.2.3.0-1.0-2	[T1-R1992]	TRITON shall be able to receive AIS data from a contracted AIS Data Service via TCP/IP connection over the Internet.	BL 2												
6.2.2.3.0-1.0-3	[T1-R1993]	TRITON shall be able to process all data received from a AIS Data Service without any loss. Lost track reports shall be recorded as KPI.	BL 2												
6.2.2.3.0-1.0-4	[T1-R1994]	TRITON shall allow the authorised user to adjust the update rate of tracks received from AIS Data sources.	BL 2												
6.2.2.4		**LRIT Data Centre**													
6.2.2.4.0-1.0-1	[T1-R1995]	TRITON shall have a dedicated interface with a contracted LRIT Data Centre to receive LRIT Position Reports on the NU Domain.	BL 2												
6.2.2.4.0-1.0-2	[T1-R1996]	TRITON shall extract track information from LRIT Position Reports, resolve identity of the vessel and process it as a new track or update an existing track.	BL 2												
6.2.2.5		**Space-Based Asset Source**													
6.2.2.5.0-1.0-1	[T1-R1997]	TRITON shall have a dedicated interface for a generic SBA-IU on the NU Domain.	BL 2												
6.2.2.5.0-1.0-2	[T1-R1998]	TRITON shall allow the authorised user to define a region with a timeframe and issue a surveillance request to the SBA-IU.	BL 2												
6.2.2.5.0-1.0-3	[T1-R1999]	TRITON shall generate an XML file that includes the surveillance request and send it to the SBA-IU.	BL 2												
6.2.2.5.0-1.0-4	[T1-R2000]	TRITON shall be able to receive track data in XML file or as a stream from the SBA-IU.	BL 2												
6.2.2.5.0-1.0-5	[T1-R2001]	TRITON shall be able to receive an image file from the SBA-IU with geospatial data and display it in the GeoView in a separate Layer.	BL 2												
6.2.2.5.0-1.0-6	[T1-R2002]	TRITON shall provide an SBA-IU Simulator for interface test purposes.	BL 2												
6.2.2.5.0-1.0-7	[T1-R2003]	TRITON SBA-IU Simulator shall be able to receive surveillance area request from TRITON, and send a predefined image file and at least one-hundred (100) radar and one-hundred (100) AIS tracks in the surveillance region.	BL 2												
6.2.2.6		**Generic Track Source**													
6.2.2.6.0-1.0-1	[T1-R2004]	TRITON shall provide a Generic Track Source Interface module which can be implemented according to a particular external system interface specification.	BL 3												
6.2.2.6.0-1.0-2	[T1-R2005]	TRITON Generic Interface Module shall have a re-usable software module which consists of a standard and a modifiable part to implement an interface for a particular track source. The interface module shall be introduced to the system by configuring the System Management.	BL 3												
6.2.3		**Nation Interfaces**													
6.2.3.1		**Nation Interface - NS**													
6.2.3.1.0-3.0-1	[T1-R2006]	TRITON shall have a dedicated interface per Nation as a service on the NS Domain.	BL 3												
6.2.3.1.0-3.0-2	[T1-R2007]	TRITON shall allow the authorised user to control and monitor each Nation Interface - NS.	BL 3												
6.2.3.1.0-3.0-3	[T1-R2008]	TRITON shall allow a National System to register to the Nation Interface with the RMP Specification as given in the Description.	BL 3												
6.2.3.1.0-3.0-4	[T1-R2009]	TRITON shall make the RMP available according to the RMP Specification via the Nation Interface - NS as a Web Service.	BL 3												
6.2.3.1.0-3.0-5	[T1-R2010]	TRITON shall be able to send the RMP to a registered Nation as a stream on TCP/UDP/IP in compliance with the TRITON Track Specification - NS.	BL 3												
6.2.3.1.0-3.0-6	[T1-R2011]	TRITON shall be able to receive track reports from a Nation as a Web Service in compliance with the TRITON Track Specification - NS.	BL 3												
6.2.3.1.0-3.0-7	[T1-R2012]	TRITON shall be able to receive track reports from a Nation as a stream on TCP/UDP/IP in compliance with the TRITON Track Specification - NS.	BL 3												
6.2.3.1.0-3.0-8	[T1-R2013]	TRITON shall allow the authorised user to specify the destination addresses for the Nation to which the RMP will be disseminated with point-to-point Formatted Messages.	BL 3												
6.2.3.2		**Nation Interface - NU**													
6.2.3.2.0-1.0-1	[T1-R2014]	TRITON shall have a dedicated interface per Nation as a service on the NU Domain.	BL 2												
6.2.3.2.0-1.0-2	[T1-R2015]	TRITON shall allow the authorised user to control and monitor each Nation Interface - NU.	BL 2												
6.2.3.2.0-1.0-3	[T1-R2016]	TRITON shall allow a National System to register to the Nation Interface with the WP Specification as given in the Description.	BL 2												
6.2.3.2.0-1.0-4	[T1-R2017]	TRITON shall make the WP available according to the WP Specification via the Nation Interface - NU as a Web Service.	BL 2												
6.2.3.2.0-1.0-5	[T1-R2018]	TRITON shall be able to send the WP to a registered Nation as a stream on TCP/UDP/IP in compliance with the TRITON Track Specification - NU.	BL 2												
6.2.3.2.0-1.0-6	[T1-R2019]	TRITON shall be able to receive track reports from a Nation as a Web Service in compliance with the TRITON Track Specification - NU or AIS data in NMEA 0183 format.	BL 2												
6.2.3.2.0-1.0-7	[T1-R2020]	TRITON shall be able to receive track reports from a Nation as a stream on TCP/UDP/IP in compliance with the TRITON Track Specification - NU or AIS data in NMEA 0183 format.	BL 2												
6.2.4		**Afloat Command Platform Interfaces**													
6.2.4.1		**ACP Interface - NS**													
6.2.4.1.0-1.0-1	[T1-R2021]	TDK-NS shall have an ACP Interface on the NS Domain for interfacing the systems available on the Command Ship.	BL 4												
6.2.4.1.0-1.0-2	[T1-R2022]	TDK-NS shall allow the authorised user to control and monitor the ACP Interface - NS.	BL 4												
6.2.4.1.0-1.0-3	[T1-R2023]	TDK-NS shall allow an external system to register to the ACP Interface with the RMP Specification (as described in Nation Interface - NS).	BL 4												
6.2.4.1.0-1.0-4	[T1-R2024]	TDK-NS shall make the RMP available according to the RMP Specification (as described in Nation Interface - NS) via the ACP Interface as a service.	BL 4												
6.2.4.1.0-1.0-5	[T1-R2025]	TDK-NS shall be able to receive track reports from an external system as a stream in compliance with the TRITON Track Specification - NS via the ACP Interface - NS.	BL 4												
6.2.4.1.0-1.0-6	[T1-R2026]	TDK-NS shall be able to receive Own Ship Data from external systems as a stream in compliance with the TRITON Own Ship Data Specification via the ACP Interface - NS.	BL 4												
6.2.4.1.0-1.0-7	[T1-R2027]	TDK-NS shall maintain Own Ship Data and automatically initiate and update a track with the highest Confidence Level.	BL 4												
6.2.4.1.0-1.0-8	[T1-R2028]	TDK-NS shall allow the authorised user to manually enter the attributes of Own Ship Data.	BL 4												
6.2.4.1.0-1.0-9	[T1-R2029]	TDK-NS shall have the RMP Service to be activated and controlled by the authorised user if needed.	BL 4												
6.2.4.2		**ACP Interface - NU**													
6.2.4.2.0-1.0-1	[T1-R2030]	TDK-NU shall have an ACP Interface on the NU Domain for interfacing the systems available on the ACP.	BL 4												
6.2.4.2.0-1.0-2	[T1-R2031]	TDK-NU shall allow the authorised user to control and monitor the ACP Interface - NU.	BL 4												
6.2.4.2.0-1.0-3	[T1-R2032]	TDK-NU shall allow an external system to register to the ACP Interface with the WP Specification (as described in Nation Interface - NU).	BL 4												
6.2.4.2.0-1.0-4	[T1-R2033]	TDK-NU shall make the WP available according to the WP Specification (as described in Nation Interface - NU) via the ACP Interface as a service.	BL 4												
6.2.4.2.0-1.0-5	[T1-R2034]	TDK-NU shall be able to receive track reports from an external system as a stream in compliance with the TRITON Track Specification - NU via the ACP Interface - NU.	BL 4												

Object Number	Requirement Number	Heading / Requirement	Default Baseline	Availability of TRITON Functions							Availability of VC Functions				Remarks
				BT	CDS	BL 1	BL 2	BL 3	BL 4	NI	VC-BL 1	VC-BL 2	VC-BL 3	NI	
6.2.4.2.0-1.0-6	[T1-R2035]	TDK-NU shall be able to receive Own Ship Data from external systems as a stream in compliance with the TRITON Own Ship Data Specification via the ACP Interface - NU.	BL 4												
6.2.4.2.0-1.0-7	[T1-R2036]	TDK-NU shall maintain Own Ship Data to automatically initiate and update a track with the highest Confidence Level.	BL 4												
6.2.4.2.0-1.0-8	[T1-R2037]	TDK-NU shall allow the authorised user to manually enter the attributes of Own Ship Data.	BL 4												
6.2.4.2.0-1.0-9	[T1-R2038]	TDK-NU shall have the WP Service to be activated and controlled by the authorised user if needed.	BL 4												
6.2.4.3		**Message Handling System Interface**													
6.2.4.3.0-1.0-1	[T1-R2039]	TDK-NS shall have a dedicated interface service for MHS over Mail Exchange.	BL 4												
6.2.4.3.0-1.0-2	[T1-R2040]	TDK-NS shall be able to exchange Formatted Messages with Mail Exchange using SMTP.	BL 4												
6.2.5		**TRITON External Interfaces**													
6.2.5.1		**RMP Service**													
6.2.5.1.0-1.0-1	[T1-R2041]	TRITON shall have an interface service named as "RMP Service" on the NS Domain.	BL 3												
6.2.5.1.0-1.0-2	[T1-R2042]	TRITON shall make the RMP available according to the RMP Specification (defined in the Description) via a Web service.	BL 3												
6.2.5.1.0-1.0-3	[T1-R2043]	TRITON shall allow external systems/services to register themselves to the RMP Service with the RMP Specification.	BL 3												
6.2.5.1.0-1.0-4	[T1-R2044]	TRITON RMP Service shall provide a search capability compliant to Open Search [Open Search].	BL 3												
6.2.5.1.0-1.0-5	[T1-R2045]	TRITON shall allow the authorised user to control and monitor the RMP dissemination process.	BL 3												
6.2.5.1.0-1.0-6	[T1-R2046]	TRITON shall be able to provide the RMP to external systems/services as a track data stream in compliance with the TRITON Track Specification - NS within one second after applying the requested RMP Specification including filtering.	BL 3												
6.2.5.1.0-1.0-7	[T1-R2047]	TRITON shall be able to send the RMP to the external systems/services using Formatted Messages and point-to-point communication.	BL 3												
6.2.5.1.0-1.0-8	[T1-R2048]	TRITON shall be able to send the RMP to the external systems/services using NVG format according to [NVG].	BL 3												
6.2.5.1.0-1.0-9	[T1-R2049]	TRITON Deployable Kit (NS) shall have the same RMP Service if activated and controlled by the authorised user.	BL 4												
6.2.5.1.0-1.0-10	[T1-R2050]	TRITON RMP Service interface shall be defined in the TRITON ICD.	BL 3												
6.2.5.2		**WP Service**													
6.2.5.2.0-1.0-1	[T1-R2051]	TRITON shall have an interface service named "WP Service" on the NU Domain.	BL 2												
6.2.5.2.0-1.0-2	[T1-R2052]	TRITON shall make the WP available according to the WP Specification (as described above) via a Web service.	BL 2												
6.2.5.2.0-1.0-3	[T1-R2053]	TRITON shall allow the external systems/services to register themselves to the WP Service with the WP Specification.	BL 2												
6.2.5.2.0-1.0-4	[T1-R2054]	TRITON shall be able to provide the WP to external systems/services as a track data stream in compliance with the TRITON Track Specification - NU within one second after applying the requested WP Specification including filtering.	BL 2												
6.2.5.2.0-1.0-5	[T1-R2055]	TRITON WP Service shall provide a search capability compliant to Open Search [Open Search].	BL 2												
6.2.5.2.0-1.0-6	[T1-R2056]	TRITON shall allow the authorised user control and monitor the WP dissemination process.	BL 2												
6.2.5.2.0-1.0-7	[T1-R2057]	TRITON Deployable Kit (NU) shall have the same WP Service if activated and controlled by the authorised user.	BL 4												
6.2.5.2.0-1.0-8	[T1-R2058]	TRITON WP Service interface shall be defined in the TRITON ICD.	BL 2												
6.2.5.3		**Information of Common Interest Service**													
6.2.5.3.0-1.0-1	[T1-R2059]	TRITON shall have an interface service named as "Information of Common Interest (ICI) Service" on both NS and NU Domains.	BL 2												
6.2.5.3.0-1.0-2	[T1-R2060]	TRITON shall allow the authorised user to control the releasability of information of Common Interest.	BL 2												
6.2.5.3.0-1.0-3	[T1-R2061]	TRITON shall make the Maritime Task Organization List available via the ICI Service.	BL 3												
6.2.5.3.0-1.0-4	[T1-R2062]	TRITON shall make the Area of Interest List available via the ICI Service.	BL 3												
6.2.5.3.0-1.0-5	[T1-R2063]	TRITON shall make the Rules of Engagement List available via the ICI Service.	BL 3												
6.2.5.3.0-1.0-6	[T1-R2064]	TRITON shall make the WSM/PMI Areas available via the ICI Service.	BL 3												
6.2.5.3.0-1.0-7	[T1-R2065]	TRITON shall make the Vessel List available via the ICI Service.	BL 3												
6.2.5.3.0-1.0-8	[T1-R2066]	TRITON shall make the Person of Maritime Interest List available via the ICI Service.	BL 3												
6.2.5.3.0-1.0-9	[T1-R2067]	TRITON shall make the Lloyd's Maritime Intelligence Unit List available via the ICI Service.	BL 2												
6.2.5.3.0-1.0-10	[T1-R2068]	TRITON shall make the Detention List available via the ICI Service.	BL 2												
6.2.5.3.0-1.0-11	[T1-R2069]	TRITON shall make the requested data available within one second via the ICI Service.	BL 2												
6.2.5.3.0-1.0-12	[T1-R2070]	TRITON ICI Service shall provide a search capability compliant to Open Search [Open Search].	BL 3												
6.2.5.3.0-1.0-13	[T1-R2071]	TRITON Deployable Kit (NS and NU) shall have the same ICI Services if activated and controlled by the authorised user.	BL 4												
6.2.5.3.0-1.0-14	[T1-R2072]	TRITON ICI Service interface shall be defined in the TRITON ICD.	BL 2												
6.3		**TRITON Internal Interface Requirements**													
6.3.1		**TRITON Internal Interfaces**													
6.3.2		**TRITON-to-TRITON Interfaces**													
6.3.2.0-2.0-1	[T1-R2073]	A static TRITON Instance shall have a dedicated and configurable interfaces with other static TRITON Instances to enable Multi-site Operation.	BL 3												
6.3.2.0-2.0-2	[T1-R2074]	The Static TRITON Instance on a static site having the Master Role, shall have a dedicated interface for each Deployed TRITON Instance toto enable Multi-site Operation. The interface should be able to select the appropriate mechanism for enabling network communication in low bandwidth environment (e.g. reducing the update rate).	BL 3												
6.3.2.0-2.0-3	[T1-R2075]	The TRITON Instance on a static site having the Master Role, shall have a dedicated interface for each Afloat TRITON Instance to enable Multi-site Operation. The interface should be able to select the appropriate mechanism for enabling network communication in low bandwidth environment (e.g. reducing the update rate).	BL 3												
6.3.2.0-2.0-4	[T1-R2076]	The TRITON Instance on an afloat site shall have a dedicated configurable interface for a Static TRITON Instance to enable Multi-site Operation. It shall be able to receive data from a designated IP address without requiring request and acknowledgement.	BL 4												
6.3.2.0-2.0-5	[T1-R2077]	A static TRITON Instance having a System Interface Service for another static TRITON Instance shall be able to synchronise data to enable Multi-site Operation.	BL 3												
6.3.2.0-2.0-6	[T1-R2078]	TRITON shall allow the static site authorised user to control and monitor the System Interface Services for other static or afloat TRITON Instances.	BL 3												
6.3.2.0-2.0-7	[T1-R2079]	TRITON shall allow the afloat site authorised user to control and monitor the System Interface Services for static TRITON Instances.	BL 4												
6.3.2.0-2.0-8	[T1-R2080]	TRITON shall be able to send a selected set of data to a dedicated IP address without requiring request and acknowledgement. The data shall be sent with a logic which provides continuity of dynamic data as explained in the Description.	BL 3												
6.3.2.0-2.0-9	[T1-R2081]	TRITON shall allow the static site authorised user to set the System Interface Service for a selected afloat TRITON Instance to send a selected set of data.	BL 4												
6.3.2.0-2.0-10	[T1-R2082]	TRITON shall allow the authorised user to dynamically add or remove System Interface Services for the selected TRITON Instances.	BL 3												