Transnational Network of Integrated Planning Labs:
Co-creating knowledge on forward-looking transdisciplinary planning perspectives addressing climate change and urban life in the post-pandemic city
Project number: 2023-1-EL01-KA220-HED-000160477 Erasmus+

Analytical planning-support approaches for integrated urbanism-mobility planning

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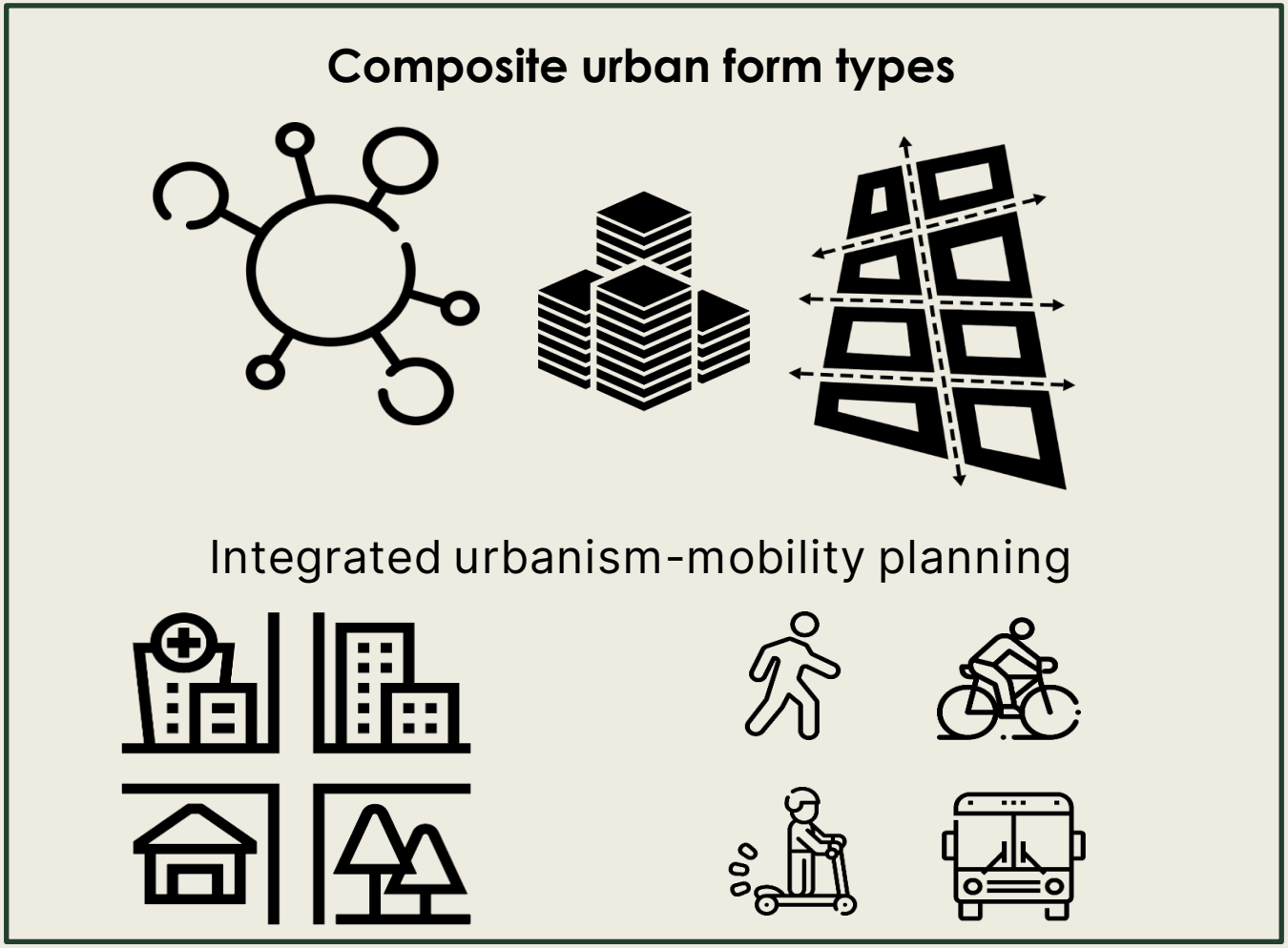
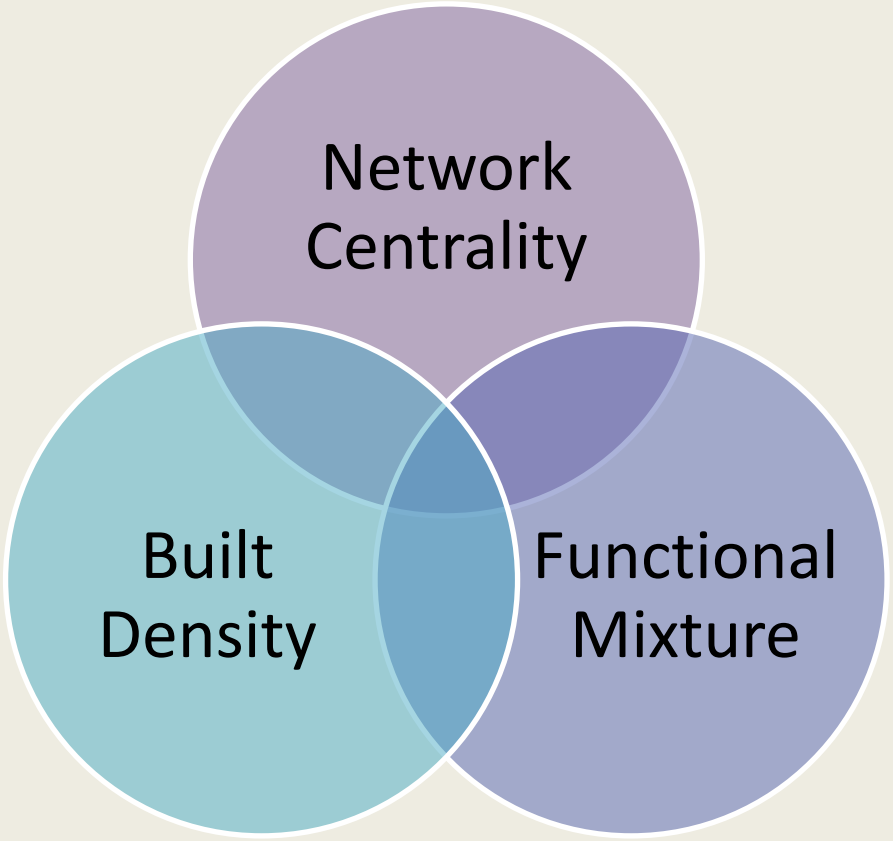
The Concept

Building blocks of this mini-course



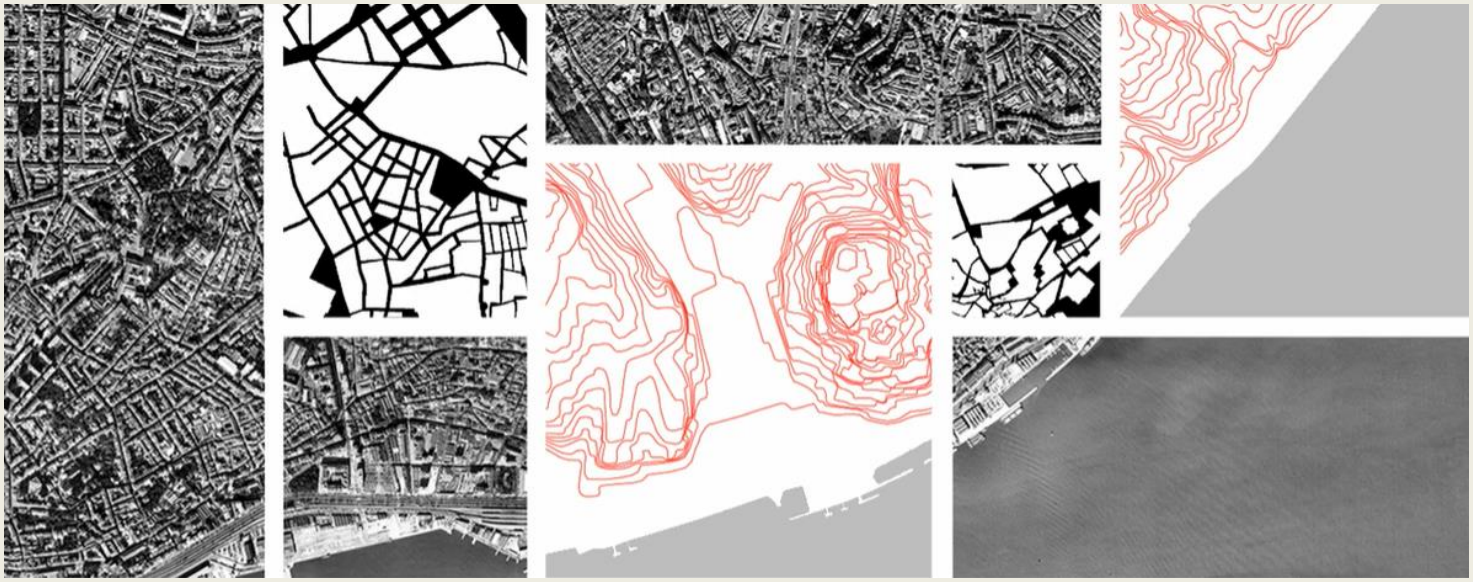
Spatio-functional urban types: Addressing Form + Function,

As a quantitative spatial language decoding urban space, linking analytical findings to planning solutions and arguing for supporting them



Urban form types

- Urban form is an important aspect of what constitutes the "city", and typo-morphology is a valuable tool for reading and planning the city *(Moudon, 1994; Moudon, 1997)*



Source: *http://formaurbislab.fa.ulisboa.pt/indexEN.html*

- We will focus on exploring the typologies of three elemental components of urban form *(Smailes, 1953; Lozano, 1990; Cowan, 2005)* , which have been used extensively in relevant research *(Berghauser Pont, et al., 2019; Ye, et al., 2017; Araldi & Fusco, 2019; Fleischmann et al., 2021)*: **built density**, **network centrality** and **functional mixture**.

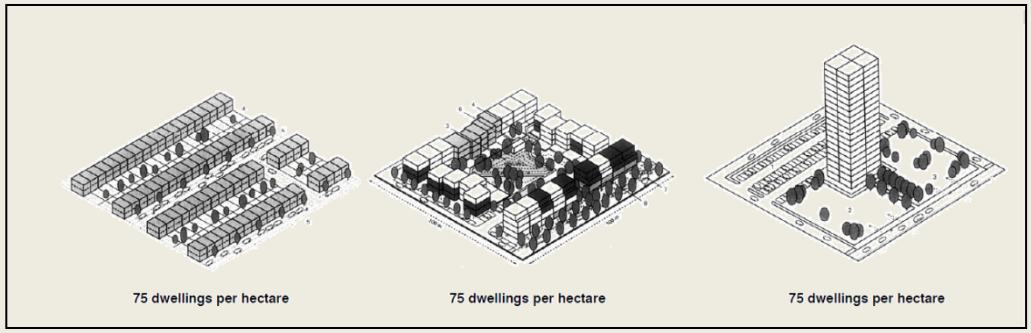
Why urban form types?

- Constitute the **backbone** of the city and it refers to characteristics **hardwired into the character** and **performance** of the city
- They can function as **proxies/"descriptors"** of the urban systems crucial for the everyday urban life (i.e. socio-cultural characteristics).
- **Availability of (open) datasets** for the European urban space providing an accessible and cost-effective planning-support framework

Composite Urban Form Types

Built Density | Definition of Analytical Components

- Built density is a crucial aspect for describing and planning the city, and a fundamental element of urban form *(Smailes, 1953; Shirvani, 1985)*
- However, built density should be defined as a multi-variable phenomenon in order to relate it effectively with urban form *(Van Nes, et al., 2012)*



***Source**: Berghauser Pont & Haupt, 2009*

- Therefore, following the relevant literature *(Berghauser Pont, et al 2019)* for quantitatively describing the types of built density we used:
  - **Ground Space Index (GSI)**
  - **Floor Space Index (FSI)**

Built Density | Calculation of Analytical Components

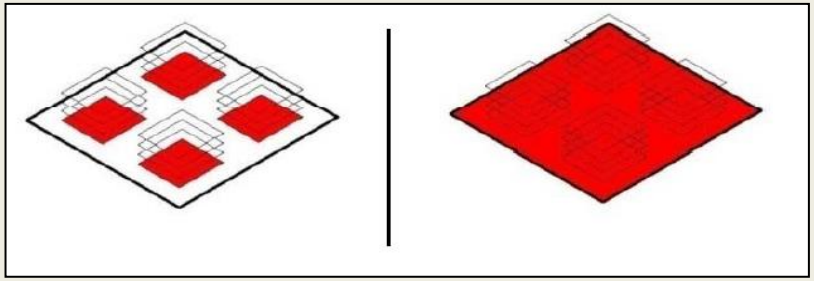
Ground Space Index – GSI

(Berghauser Pont & Haupt, 2009)

Reflects the coverage, or compactness, of the development.

It is calculated with the following formula:

$$GSI_i = \frac{Built - up\ surface_i}{Area\ of\ the\ urban\ fabric_i}$$



Source: *Berghauser Pont & Haupt, 2009*

Floor Space Index – FSI

(Berghauser Pont & Haupt, 2009)

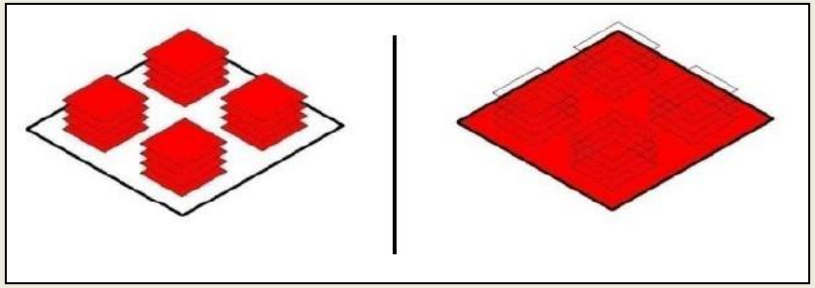
Gives an indication of the built intensity in an area.

It is calculated with the following formula:

$$FSI_i = \frac{Gross\ Floor\ Area_i}{Area\ of\ the\ urban\ fabric_i}$$

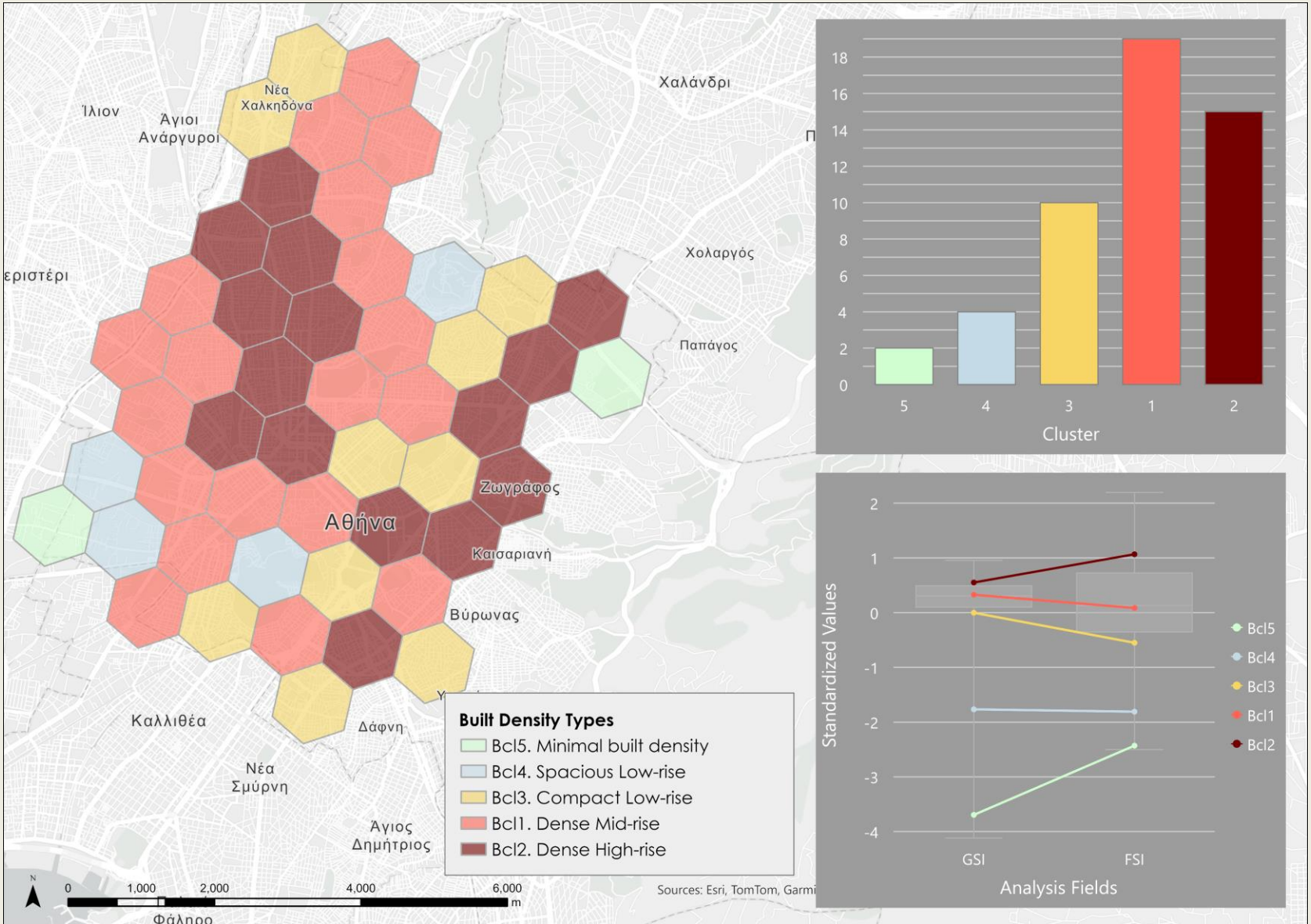
or

$$FSI_i = GSI_i \times AVG\_BuidHeight_i$$



Source: *Berghauser Pont & Haupt, 2009*

Athens's types of built density



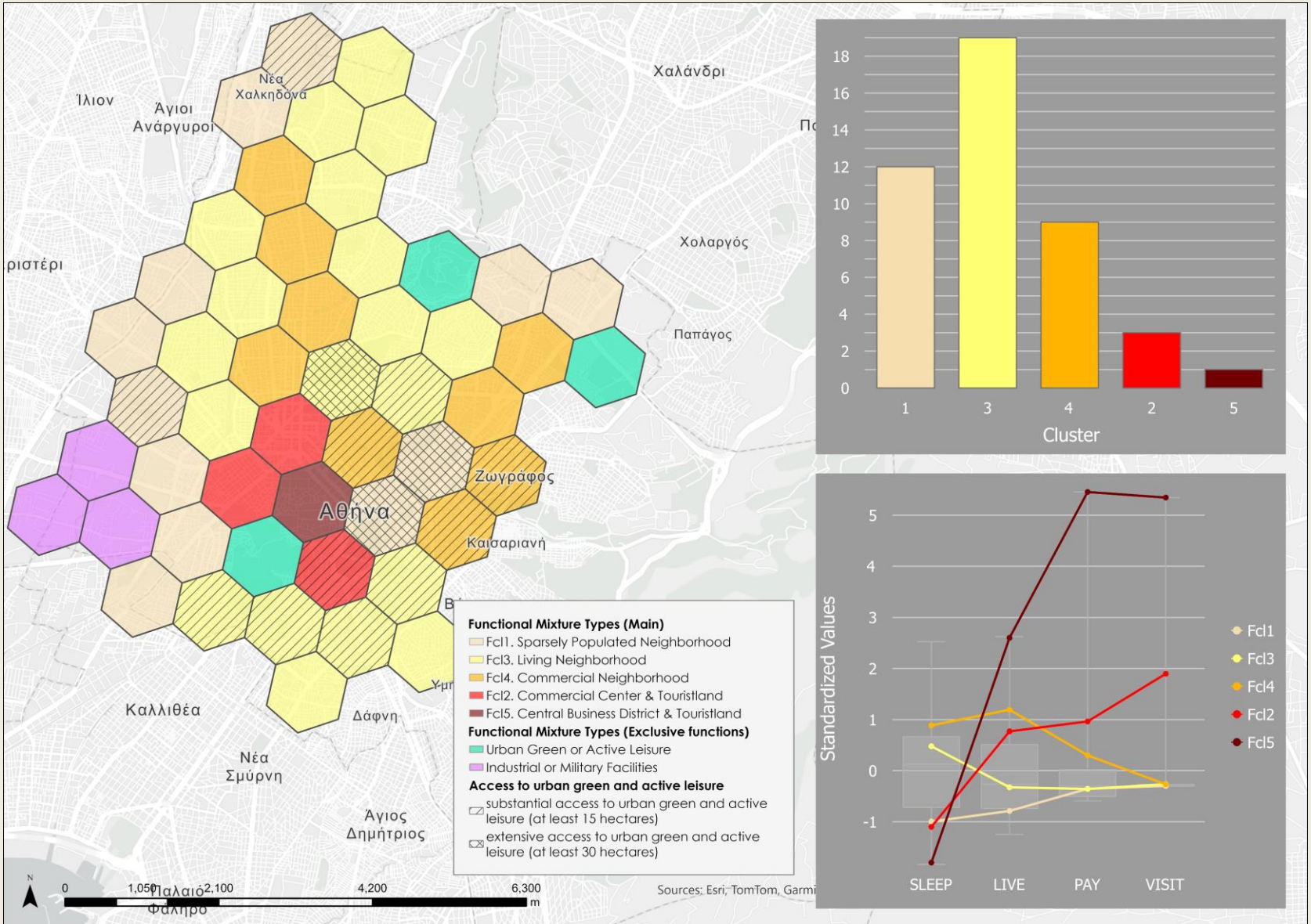
Functional Mixture | Definition of Analytical Components

- The "**functional mixture**"- encompasses important information about the socio-economic characteristics of a city *(Araldi & Fusco, 2019)* and they been recognized by many researchers as a fundamental element of urban form (Conzen, 1960).
- It refers to the combination of land-uses, as well as economic and human activities
- However, to successfully describe the **functional form** of a city the usual land-use map is not enough.

Functional Mixture | Definition of Analytical Components

- To that end we propose multiple analytical components to quantitatively describe the types of functional mixture:
  - **SLEEP** referring to the residential function and quantified by **population density**
  - **LIVE** referring to the amenities and facilities relevant to everyday life and quantified by the kernel-estimated density of relevant points of interest
  - **PAY** referring to the **commercial** facilities for entertainment and shopping and quantified by the kernel-estimated density of relevant points of interest
  - **VISIT** referring to the **tourist facilities** and **attractions** of the city and quantified by the kernel-estimated density of relevant points of interest
- Apart from the analytical components of used for developing the main functional mixture types, we also include **Urban Green and Active Leisure** referring to the shared spaces of urban green, sports and leisure

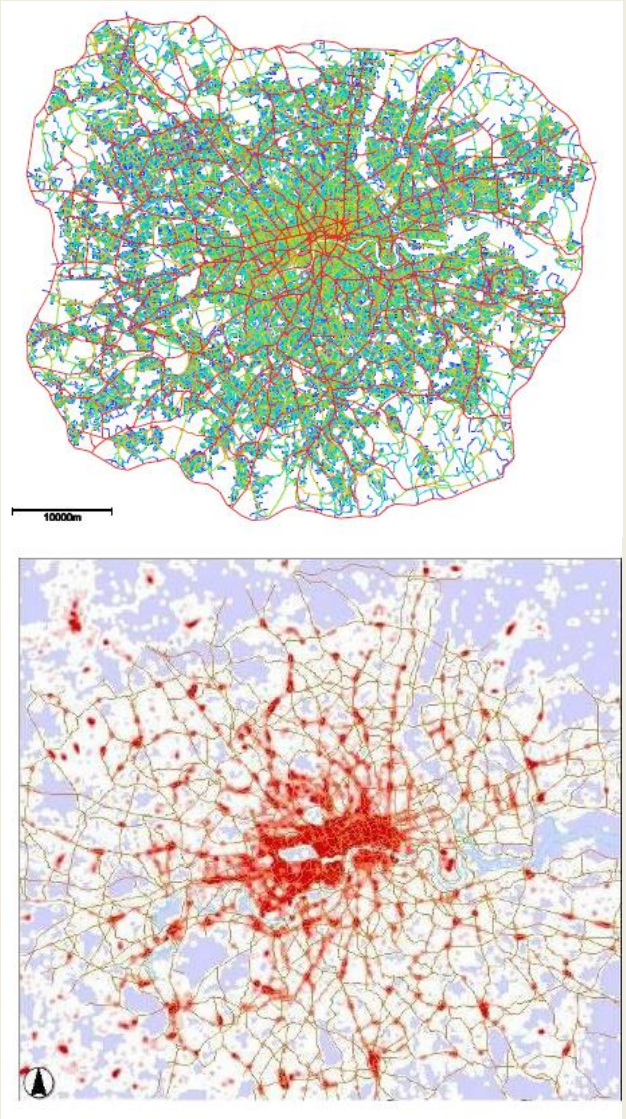
Athens's types of functional mixture



Network Centrality

Definition of Analytical Components

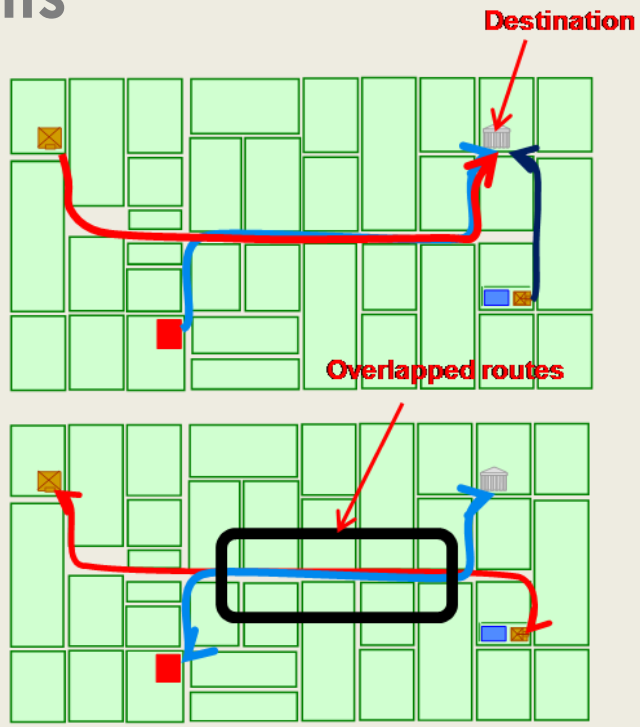
- The network is the urban element connecting all urban functions in the city and a key aspect of urban form *(Smailes, 1953)* It has an architecture, that is a certain geometry, a certain topology and a certain scaling.
- Network centrality, as defined by space syntax *(Hillier & Hanson, 1984; Hanson & Hillier, 1987)*, addresses the inherit property of space to shape human movement and ultimately activity in space *(Hillier, et al., 1993; Penn, et al., 1998)*
- Apart form the space syntax derived centrality, we utilize the infrastructural characteristics of network that can produce centrality



***Source**: Hillier, 2014*

Definition of Analytical Components

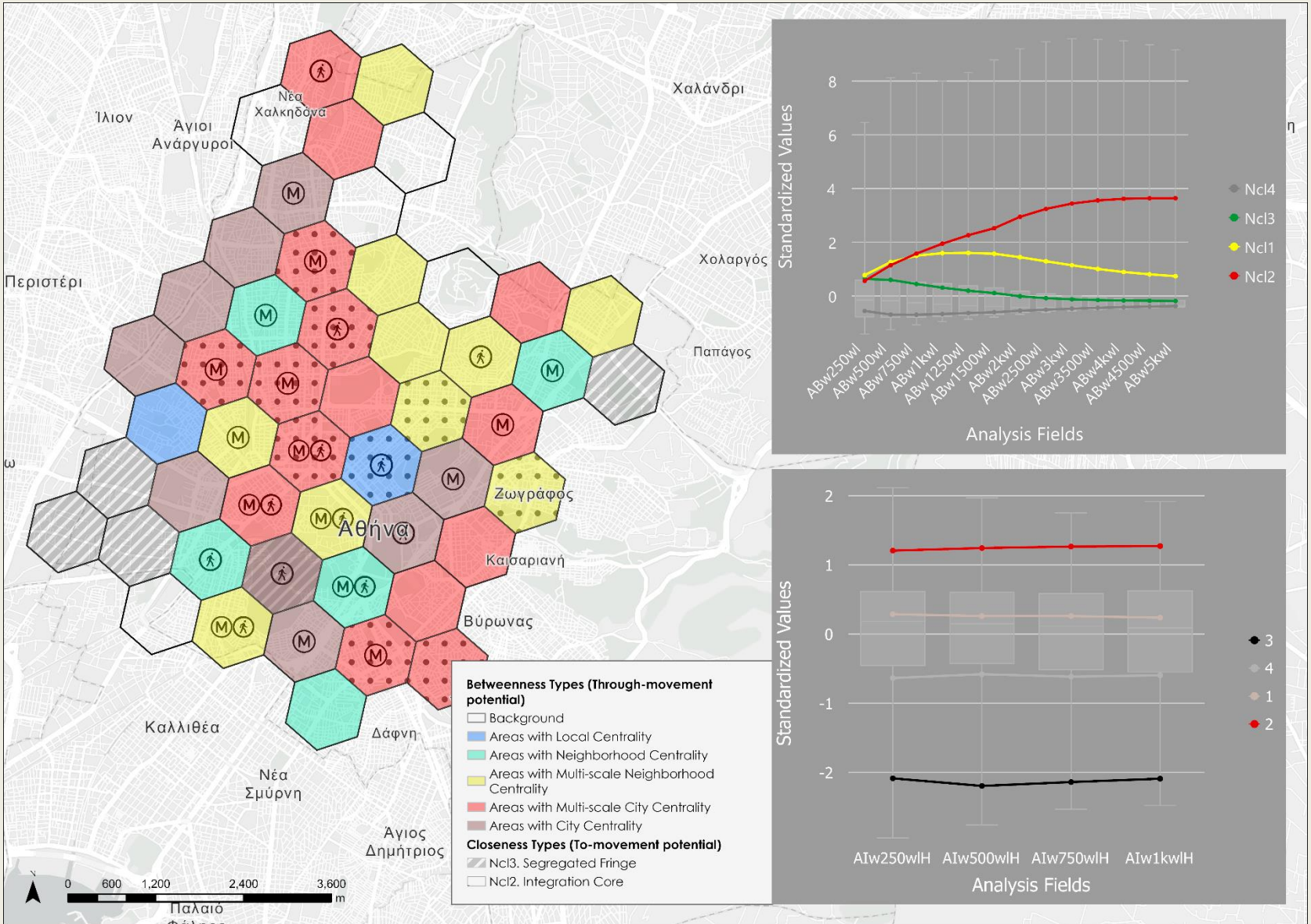
- **Closeness (integration)** reflects to-movement potential meaning the potential of place to attract movement as a destination



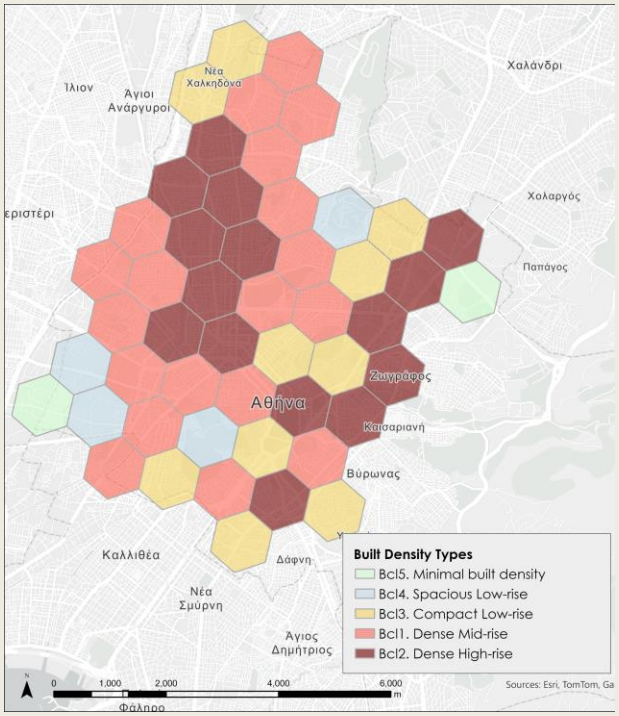
- **Betweenness** reflects through-movement potential meaning the potential of place to attract movement as a route/ pass-through space.

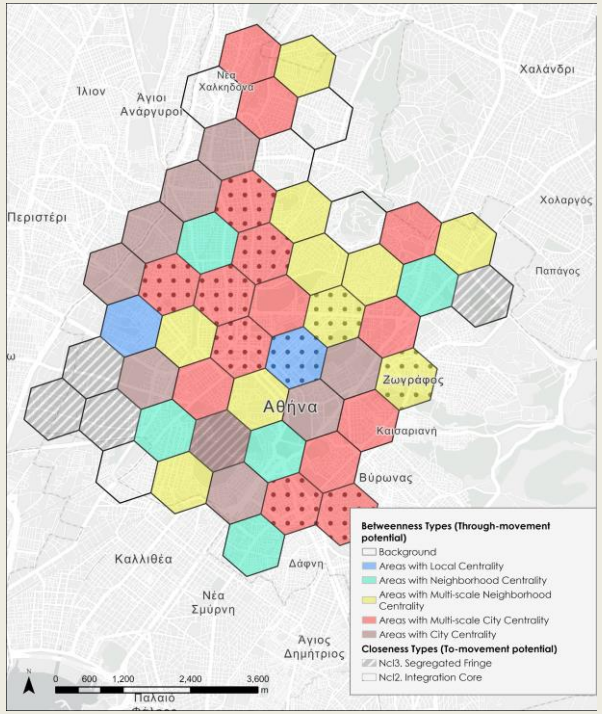
- **Active Mobility Conductors**
- **Access to high-speed public transport (metro or subway stations)**

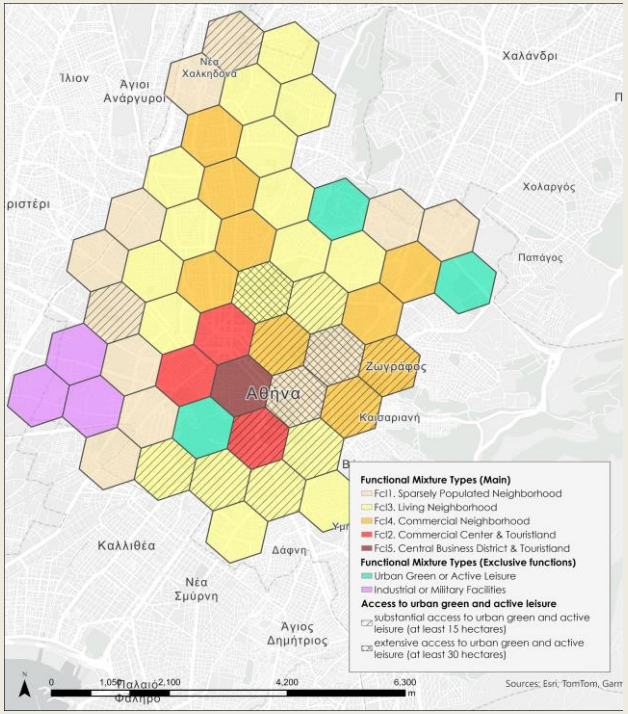
Athens's types of network centrality



Urban form types towards integrated planning







Patterns of build density

Proxy for socio-cultural patterns and processes for production of space

Patterns of network centrality

Proxy for urban mobility, aims to predict human-scale movement

Patterns of functional mix

Proxy for urban activity and human practices in the urban space

thank you!

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