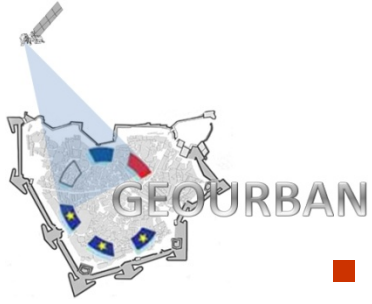# 1ˢᵗ CoP Meeting

## Basel, April 25, 2012

GEOURBAN

Introduction to GEOURBAN

Nektarios Chrysoulakis
FORTH

The problem

- Urban development has to meet the main requirements for **sustainability**, by optimising the use of **space**, **energy** and **materials** and by decoupling resource use from economic development.

- The planning policies reflect the logic of the market. They would better reflect a vision of urban development, in which **environmental considerations** play more important role in urban planning.

- The problems of cities cannot be solved at the local level alone. Better policy integration and new governance, involving closer partnership and coordination at **micro-scale** (building block) and **local scale** (neighbourhood, city), as well as at **regional scale** (region, country) are needed.
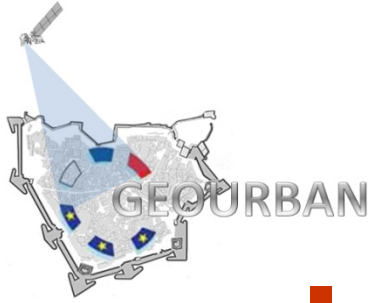
The problem
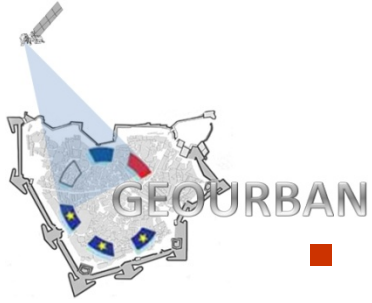
- All the **available EO data** on many case studies are useless, if the **link** between the EO scientists and the urban planning community is missing.
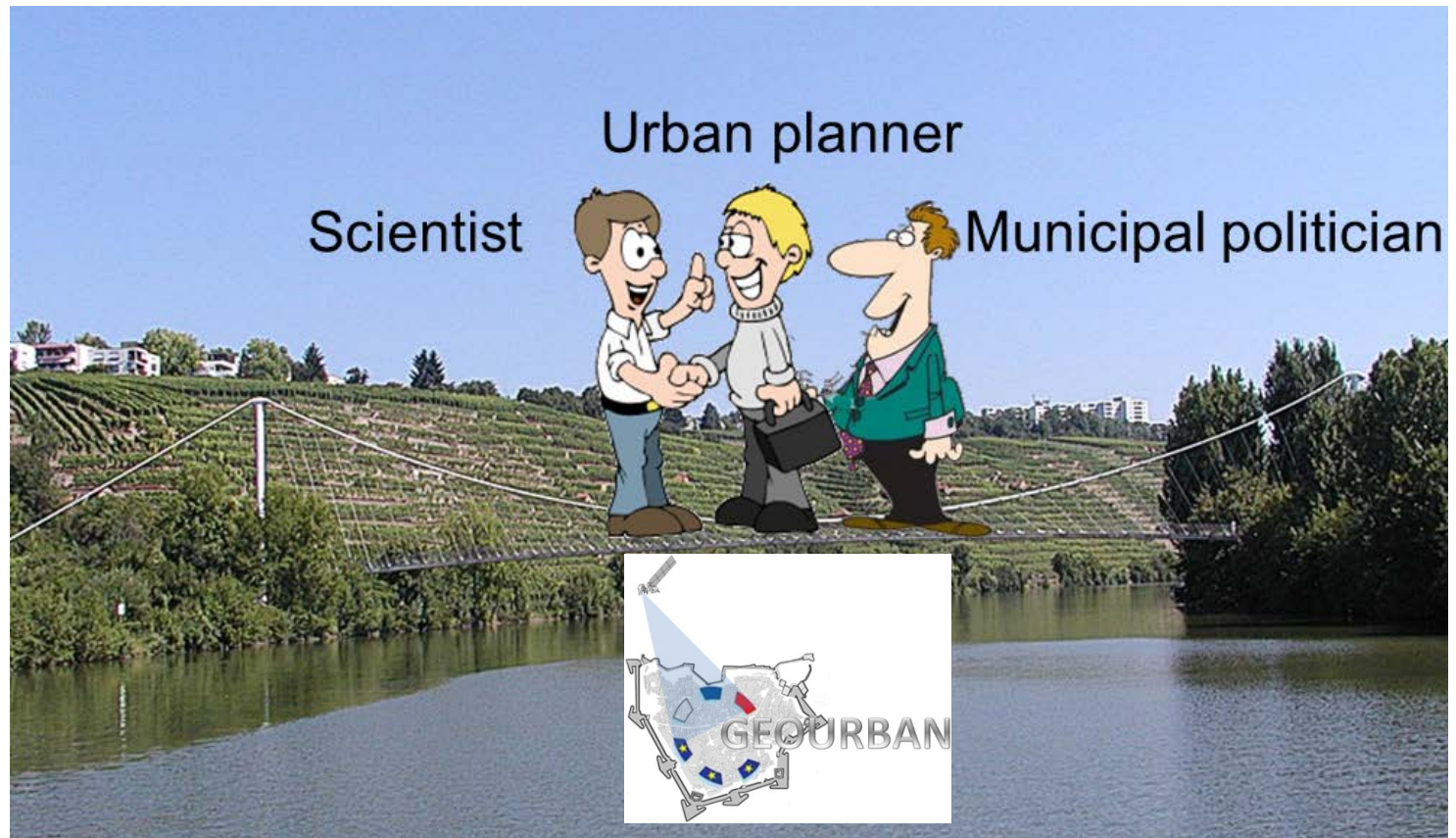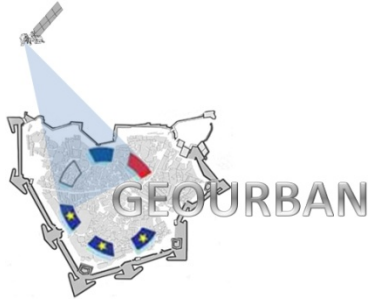
Why GEOURBAN?

- Recent advances in EO have led to **new methods** to estimate urban surface and environmental parameters.

- There is **poor communication** of this new knowledge to end-users, such as planners, architects, engineers and policy makers.

- GEOURBAN responds to this challenge by providing the means to **close the gap** between EO scientists and urban planners, and to illustrate the advantages of **accounting** for EO in urban planning.

The GEOURBAN idea
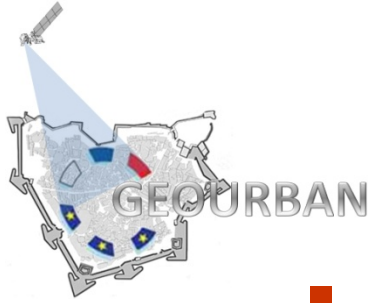
- To demonstrate the ability of current and future **EO** systems to depict parameters of **urban structure** and urban **environmental quality**.

- To develop a set of **products** and **indicators**, easily understood by a non-scientific public, to **link** the satellite derived information with multidimensional issues of **urban planning** and **management**.

- To develop a **web-based information system** capable of evaluating these indicators.

The GEOURBAN idea

The GEOURBAN idea

The GEOURBAN idea

aot [-]

0.0 0.07 0.14 0.21 0.29 0.36 0.43 0.5

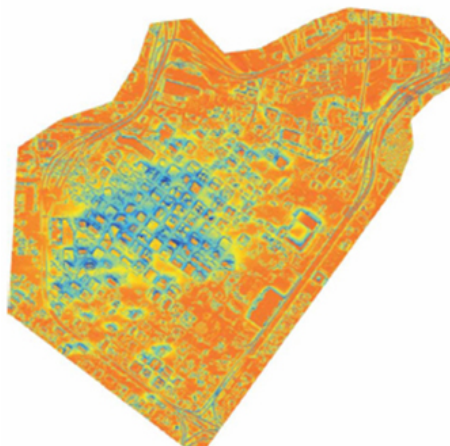*(Benas and Chrysoulakis 2012)*

The GEOURBAN idea

(Yu et al. 2009)
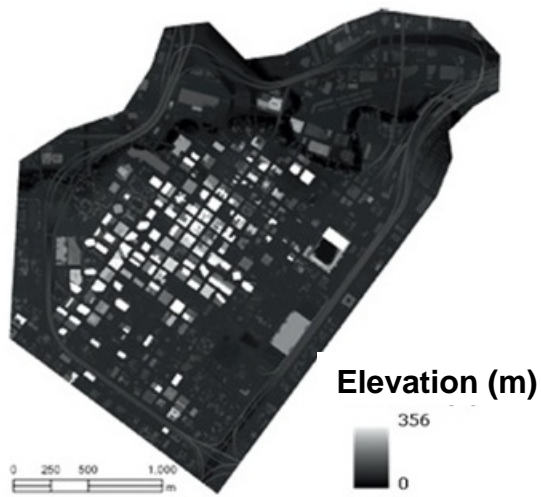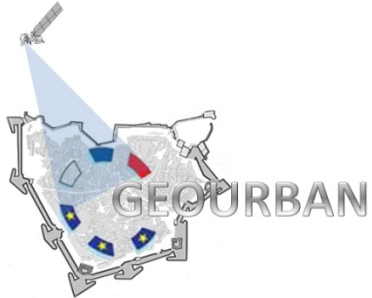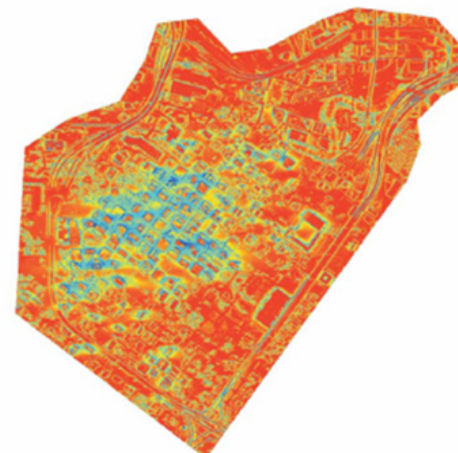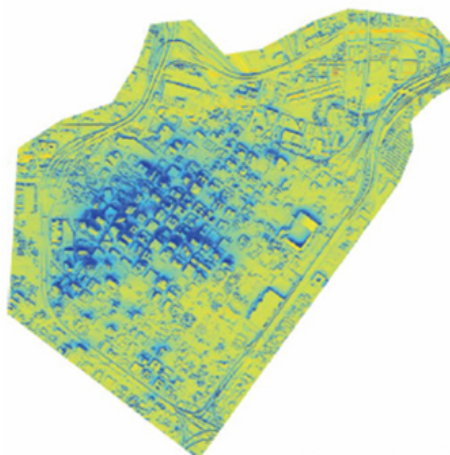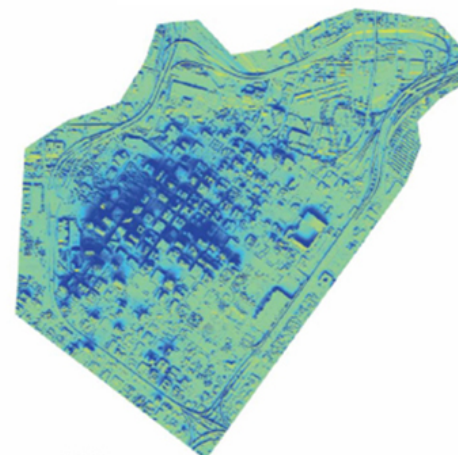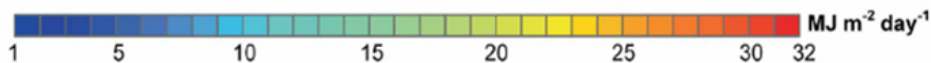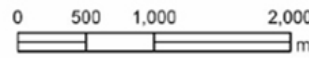
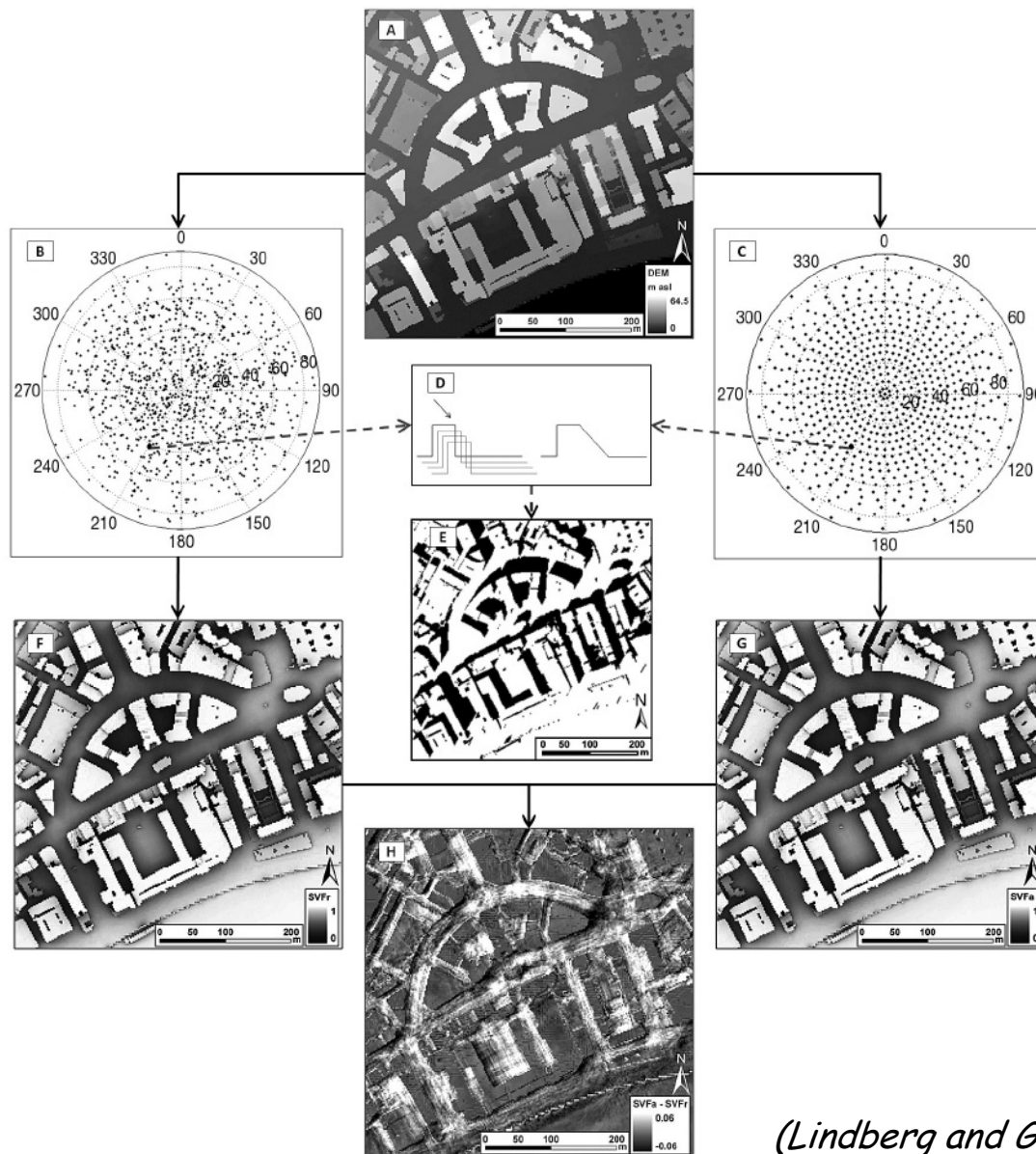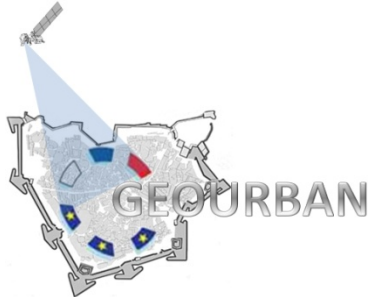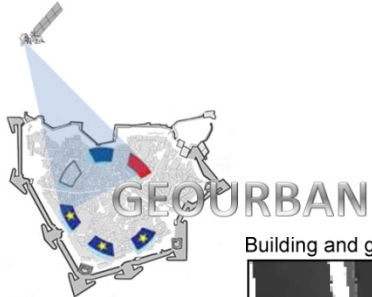# The GEOURBAN idea

(Lindberg and Grimmond 2010)

The GEOURBAN idea
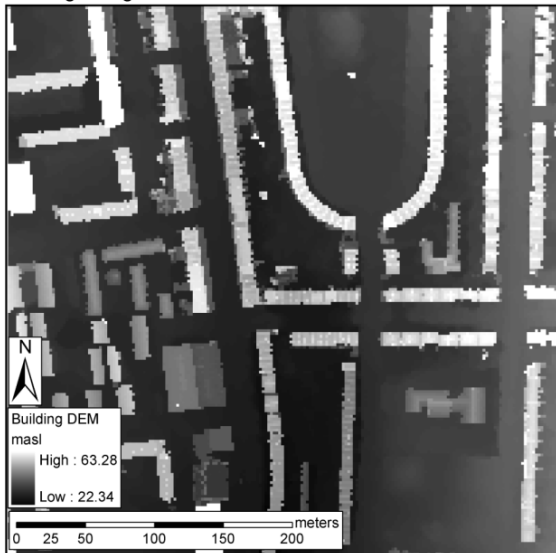
The GEOURBAN idea

Request

Space Agencies (on-line products)

Request GEOURBAN

Product

GEOURBAN
(off-line products
on-line indicators)

User

Map

Data+Request

User

Map
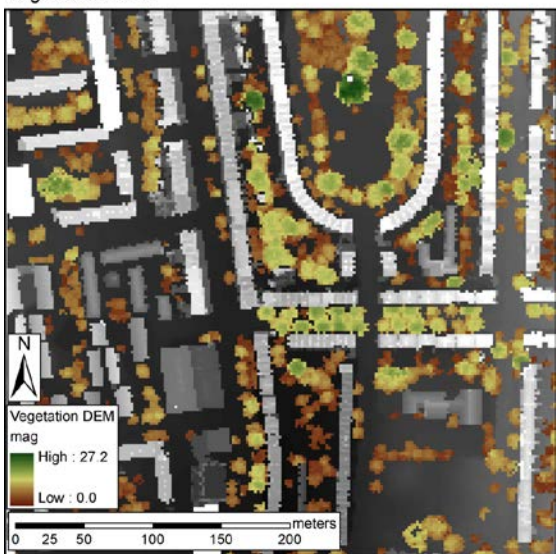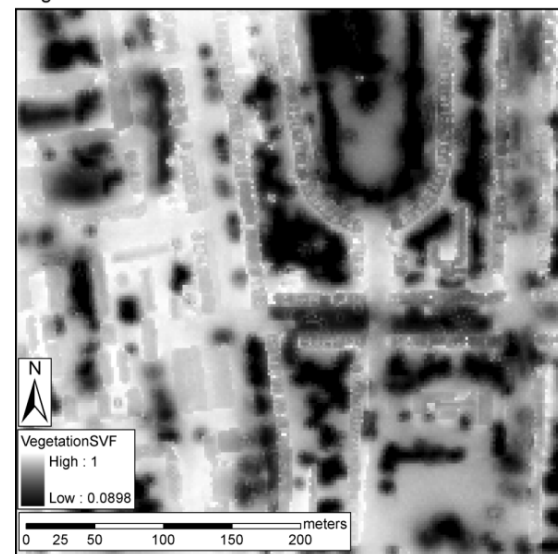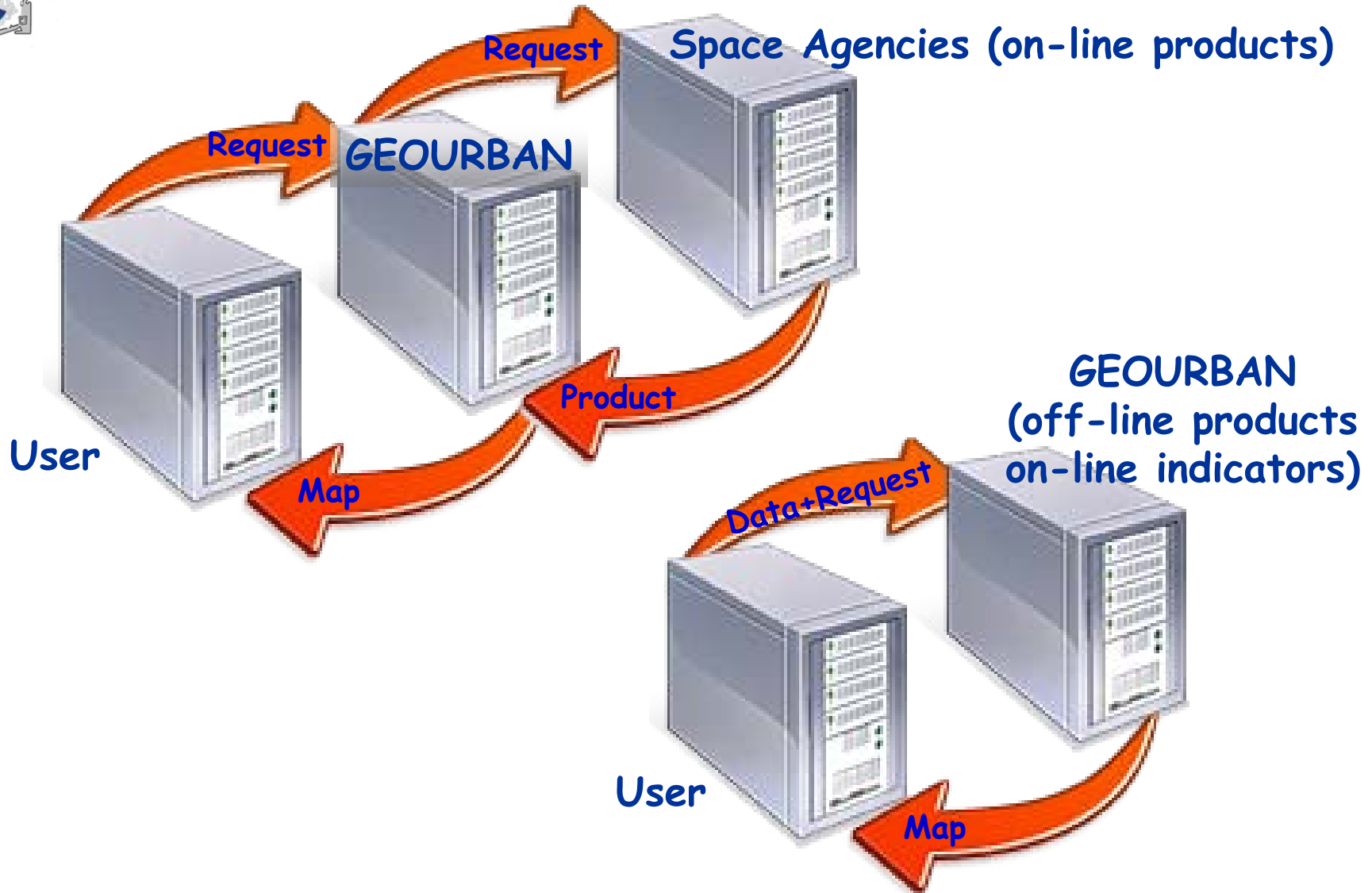
The objectives
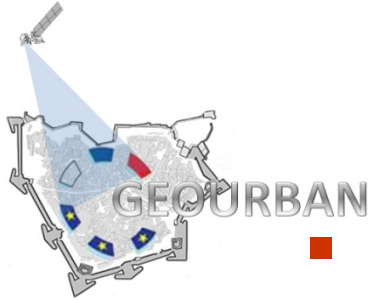
- **Bridge the gap** between EO scientists and urban planners by addressing issues of needs and the potential of EO methods and data.

- Analyse the urban planning and management **requirements** relative to EO.

- **Review** the EO data sources and the respective analysis techniques and implement the most promising ones at selected case studies.

- Analyze the **potential** of future EO missions to support urban planning and management.

- Develop a set of **EO-based products and indicators** to support sustainable urban planning and management.

- Develop a **web-based information system**.

- **Demonstrate** the developed system in specific case studies.

The approach
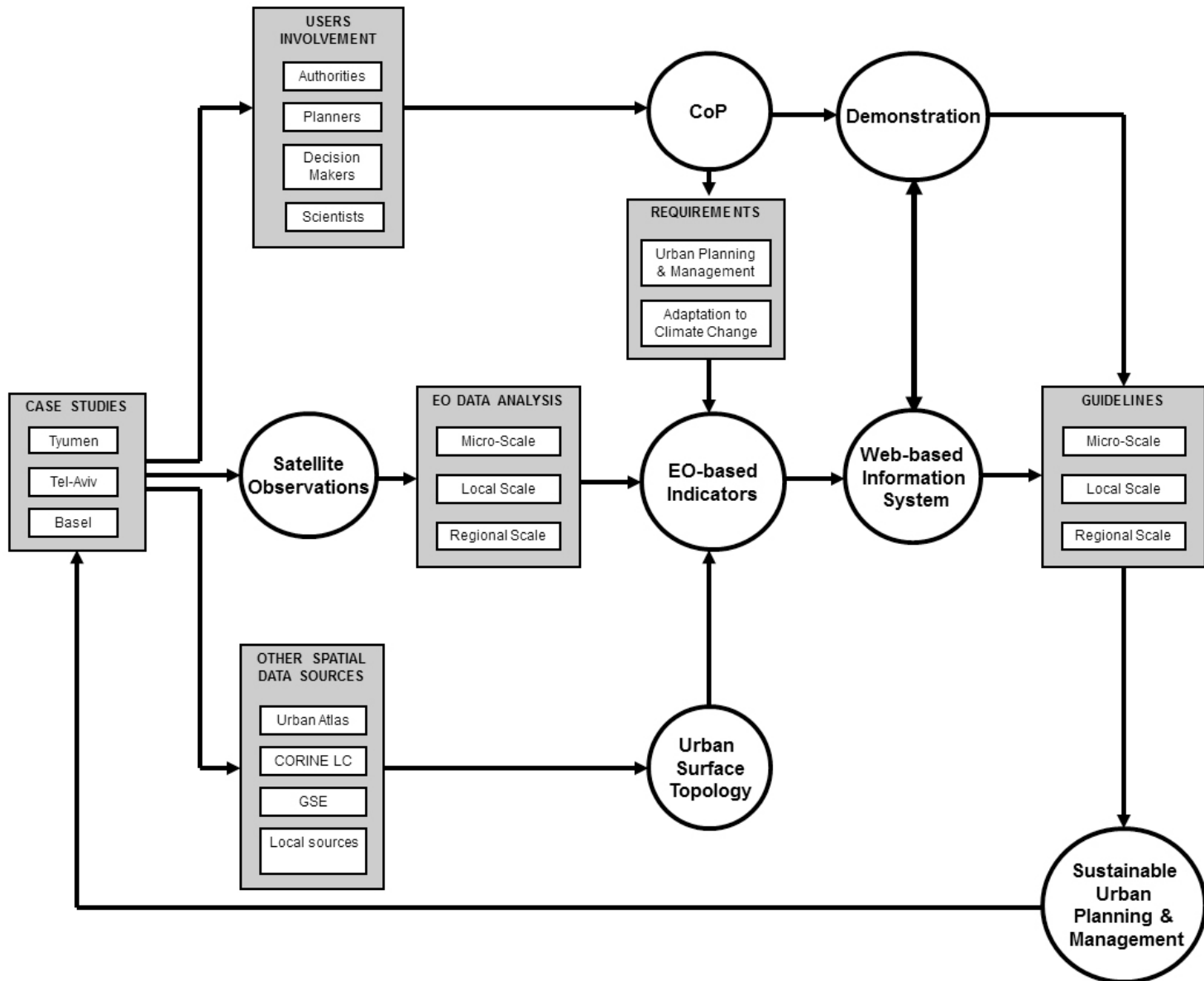
The main components

■ CoPs in GEOURBAN Case studies.

The main components

The main components

- The GEOURBAN **indicators** will be the means to exploit EO potential in addressing the following issues :
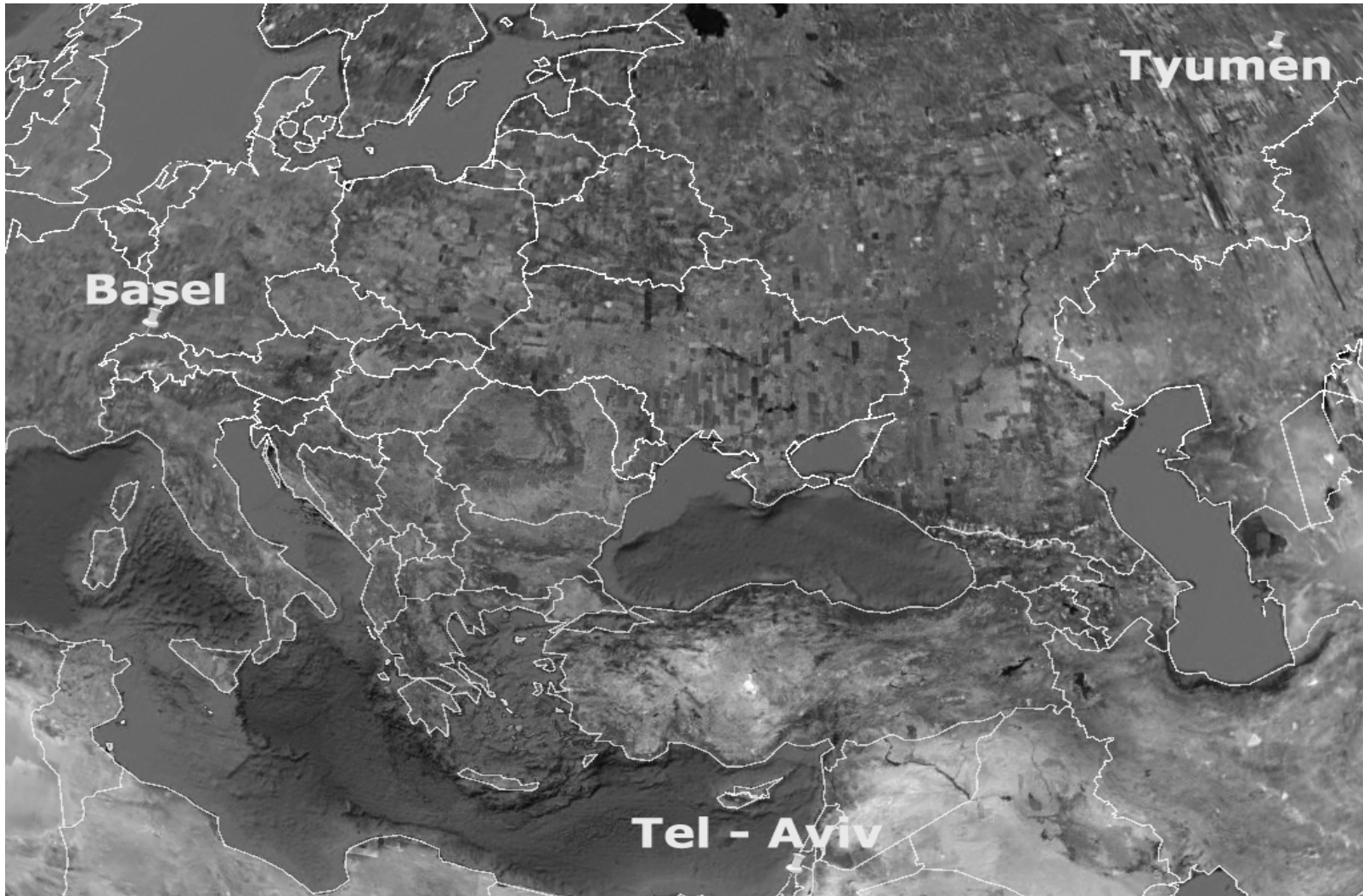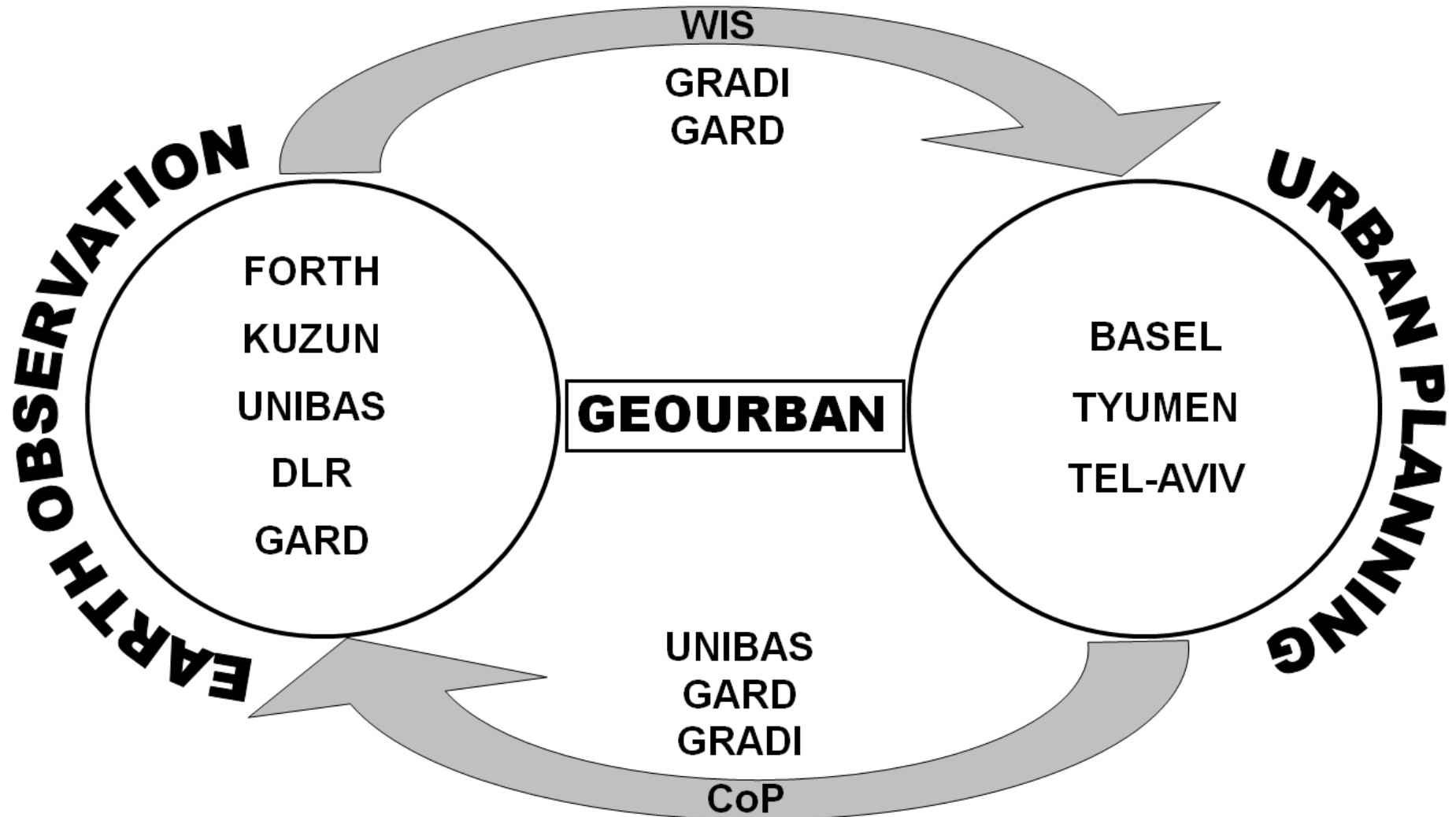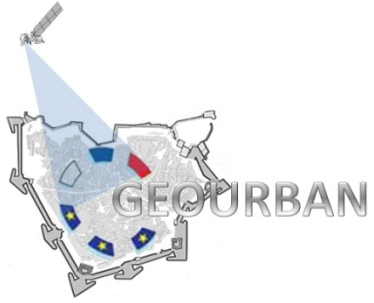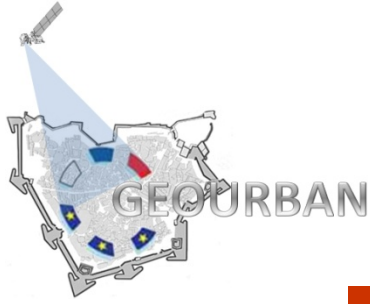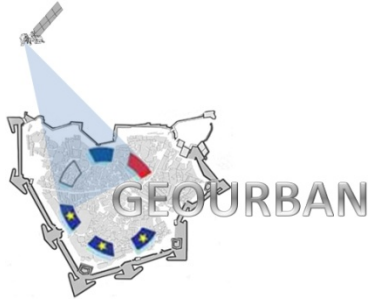
    ✓ Urban surface structure.

    ✓ Urban surface type.

    ✓ Urban sprawl.

    ✓ Urban environmental quality.

    ✓ Vulnerability to hazards.
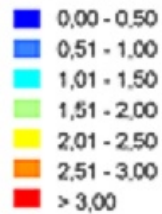
    ✓ Socioeconomics.

Indicators examples

Degree of building density [%]
- 0 - 10
- 11 - 20
- 21 - 30
- 31 - 40
- 41 - 50
- 51 - 60
- 61 - 70
- 71 - 80
- 81 - 90
- > 90

500 m

Floor-space index
- 0,00 - 0,50
- 0,51 - 1,00
- 1,01 - 1,50
- 1,51 - 2,00
- 2,01 - 2,50
- 2,51 - 3,00
- > 3,00

500 m

Urban structure
- Detached- and semi-detached houses
- Terraced houses
- Blocks of houses
- Multi-storey buildings
- High-rise buildings
- Commerce and industry
- Unclassified

Land-cover
- Imperviouse surface
- Vegetation
- Water
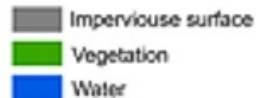
(Taubenböck and Dech 2010)

Indicators examples

Building volume [m³]
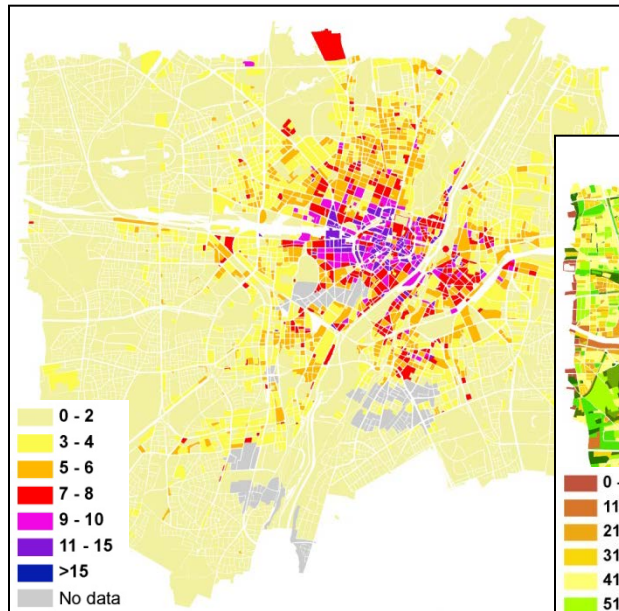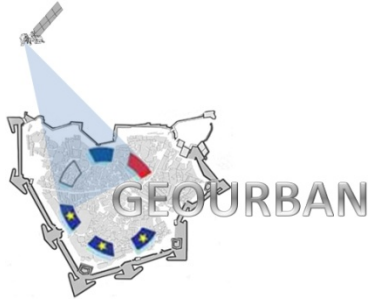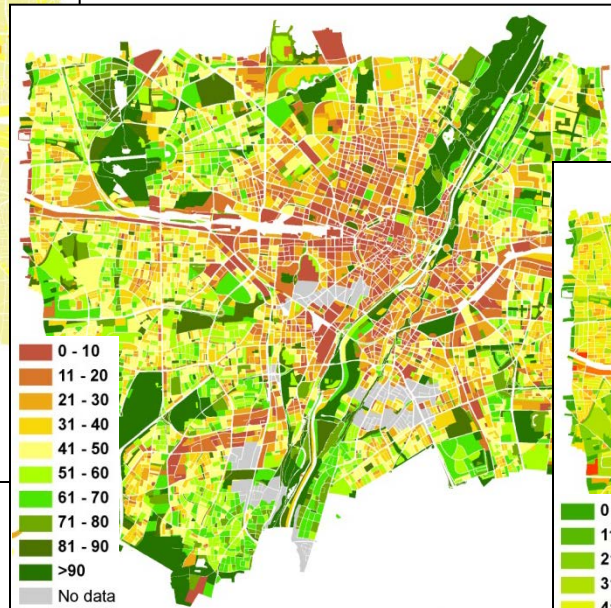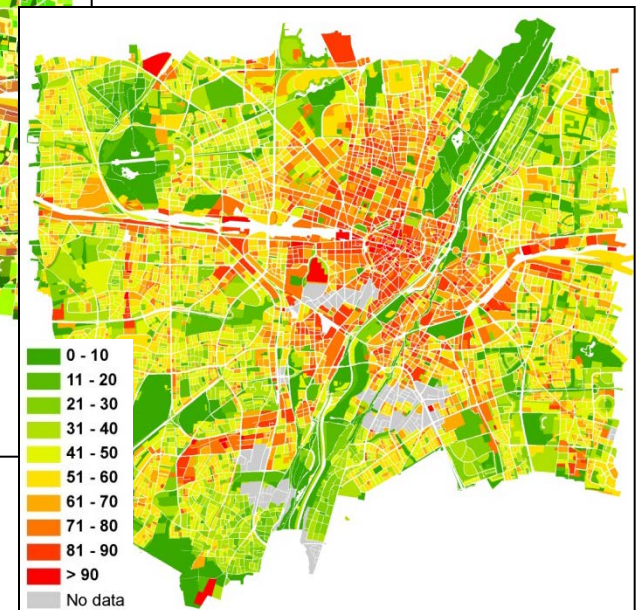
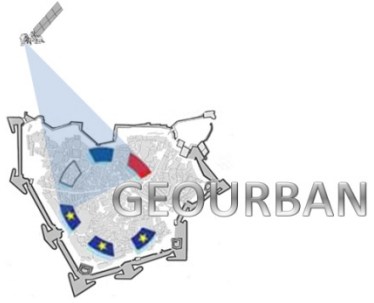Vegetation density [%]
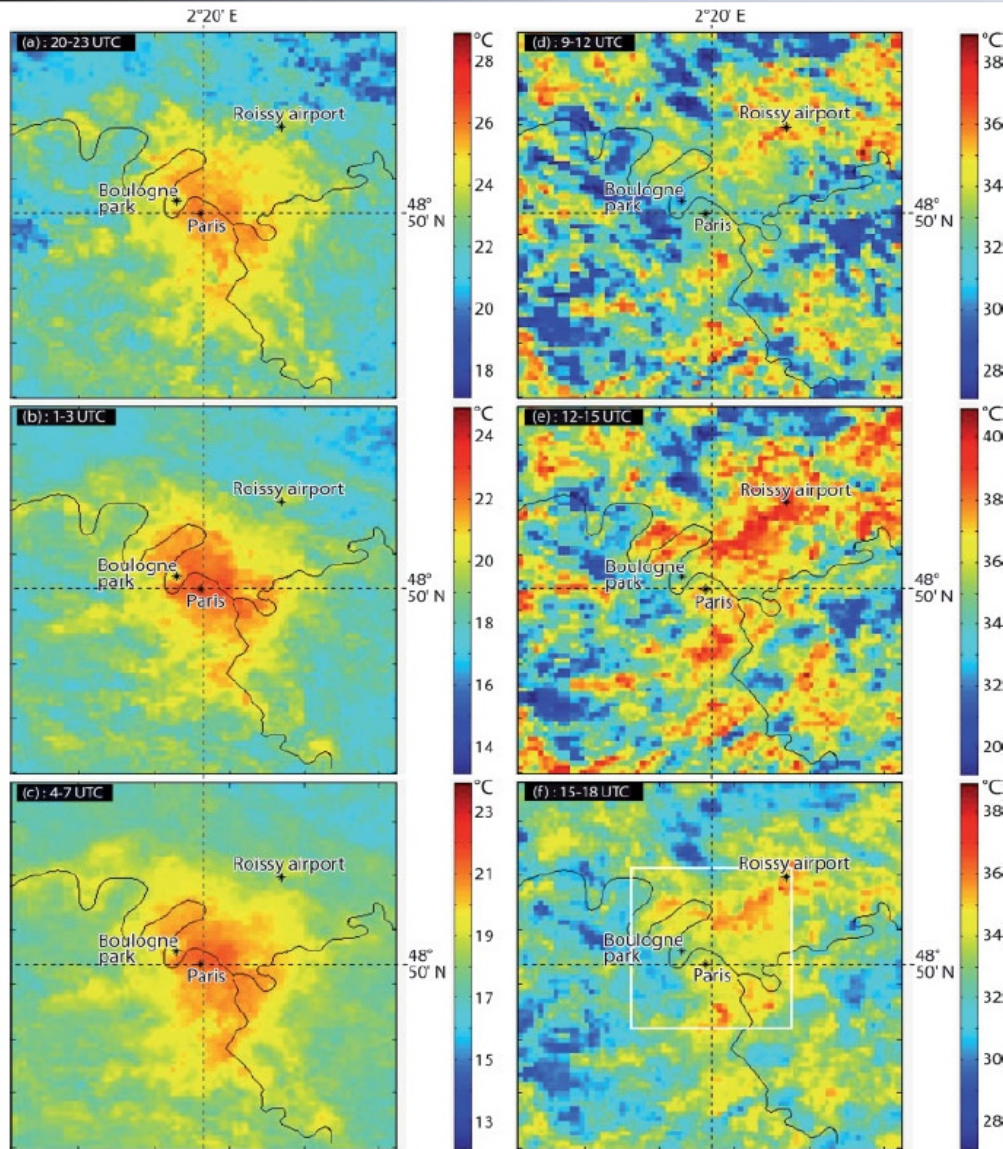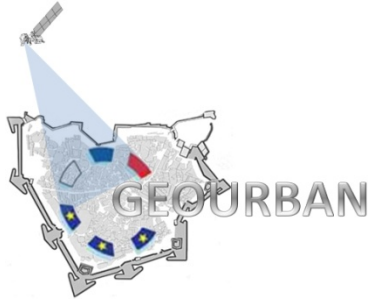
Impervious surface [%]

(Esch et al. 2012)

Indicators examples

ΑΣΤΙΚΕΣ ΠΕΡΙΟΧΕΣ
- 2000
- 2004
- 2007

2000
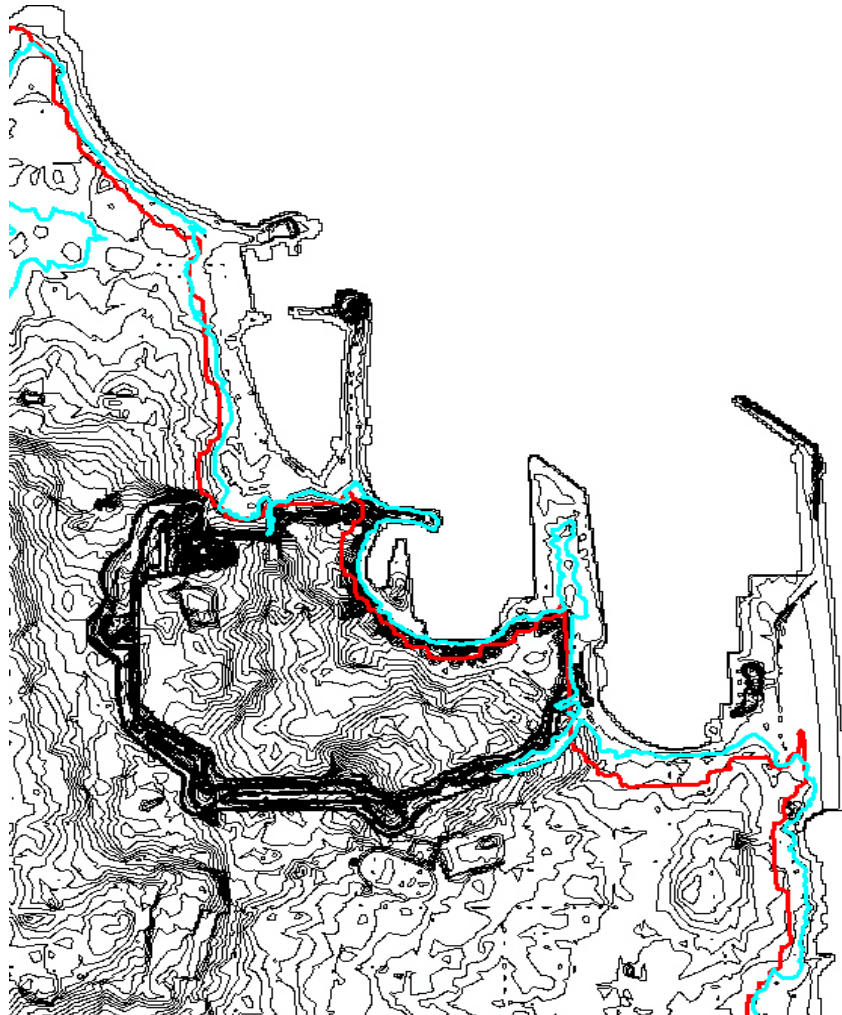
2004

2007

(Chrysoulakis et al. 2011)
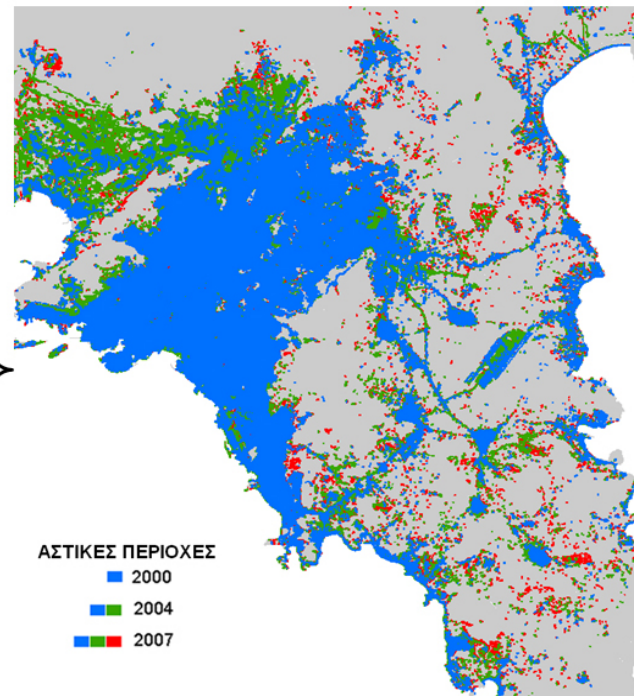
Indicators examples

(Dousset et al. 2011)

Indicators examples

Scenario 1
Scenario 2
Scenario 3
Scenario 4
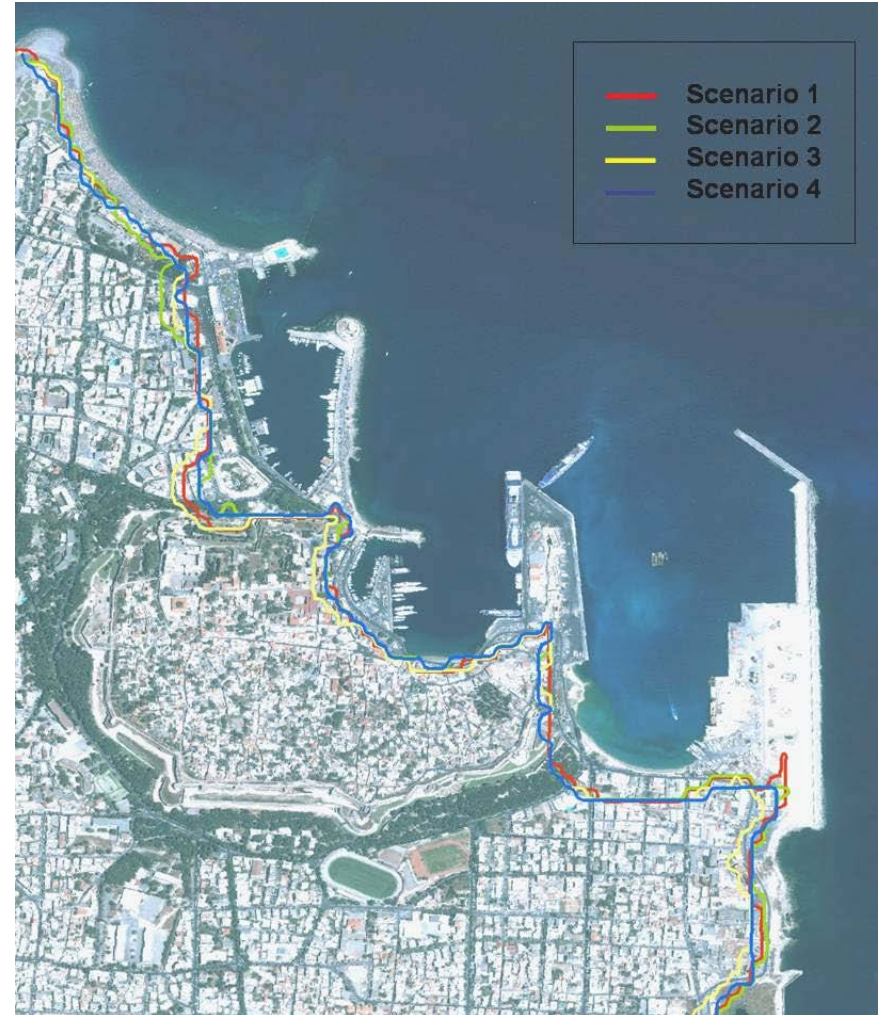
(Mitsoudis et al. 2012)

Indicators examples
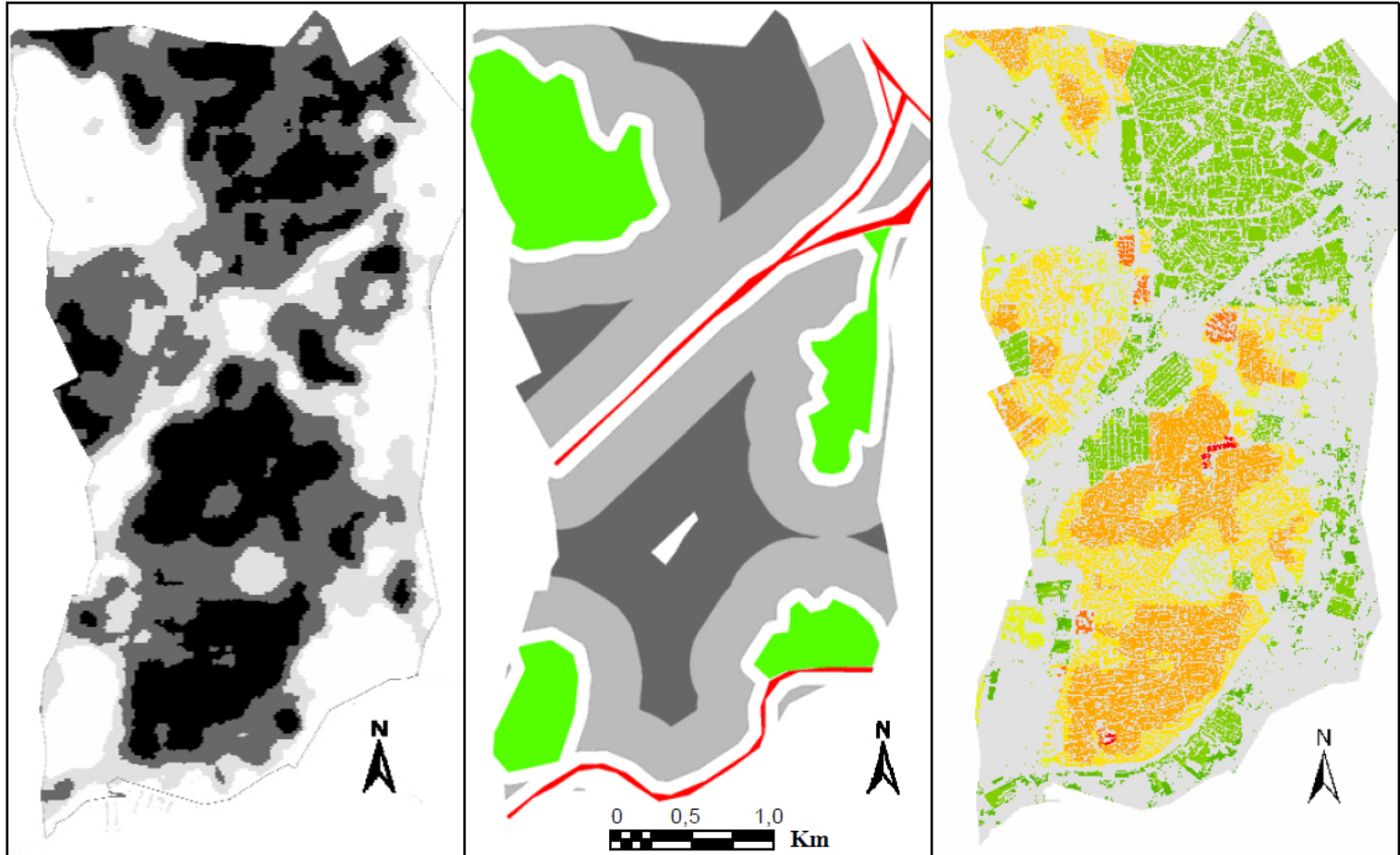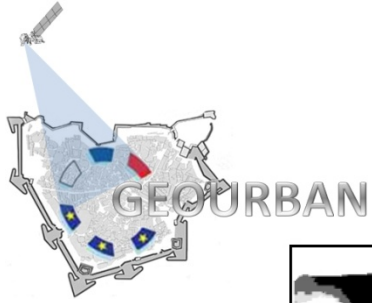
Built-up density
- High density
- Medium density
- Low density
- Open space

Thematic class
- Inner-city highway
- Open spaces

Distances
- 0-100 m
- 100-500 m
- > 500 m

Population in 1000 / km²
- 0-1
- 1-5
- 5-10
- 10-20
- 20-30
- 30-40
- 40-50
- 50-60
- 60-100

(Taubenböck et al. 2008)
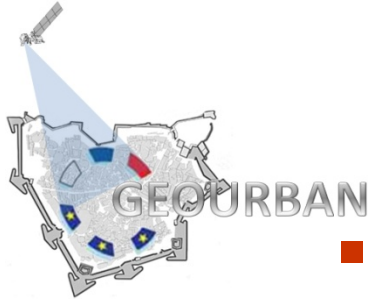
The main components
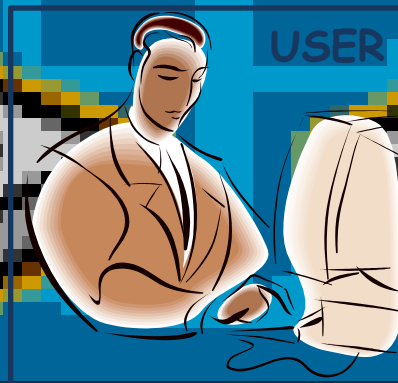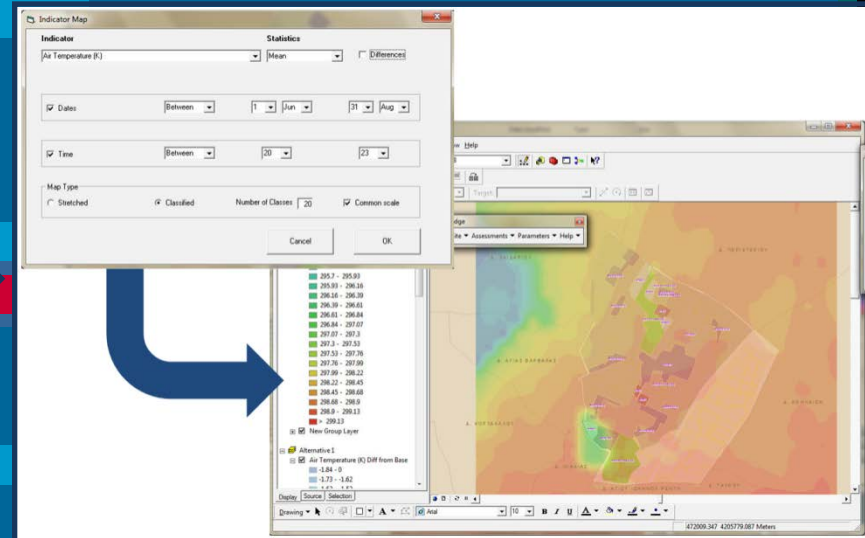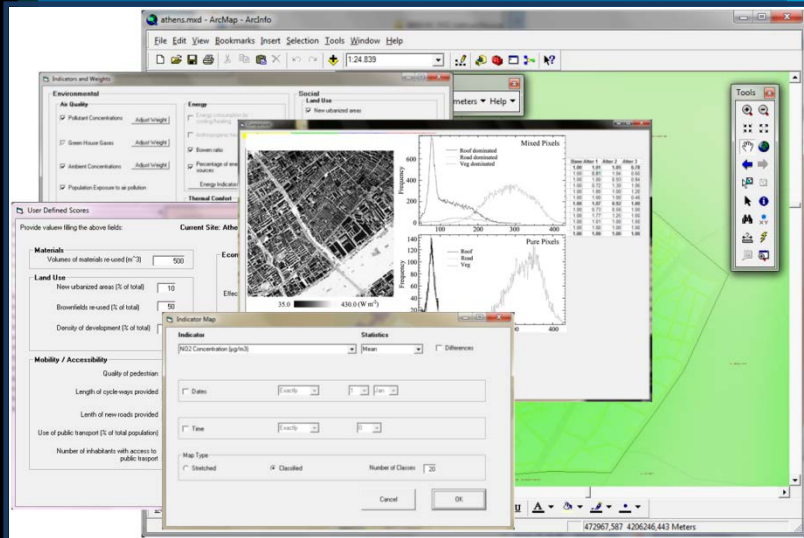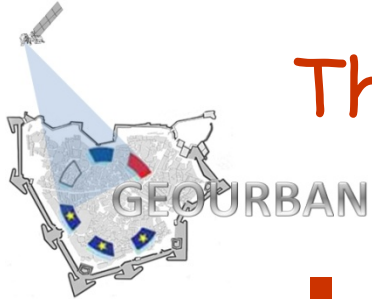
■ The information system.

ANALYTICAL COMPONENT

VISUALIZATION COMPONENT

www + upload

USER

www + download

The vision: towards to an operational tool

- The web-based tool will have both **automatic** and **semi-automatic** functionality, depending on the application and scale, since it will cover **micro-**, **local** and **regional scales**.

- GEOURBAN will develop a **prototype** with the potential to lead to **new services** since it will be easily transferable to any city.

- Beyond GEOURBAN the consortium may further **exploit** the prototype by **updating** it with new processing modules and by **adapting** it to future missions (i.e. Sentinels, EnMAP, HyspIRI, etc.).

- A **fully operational tool** can be therefore developed, provided that EO data at the requested **spatial** and **temporal scales** are available.