

Gintaras Stauskis VILNIUS TECH

Smart Spatial Planning for Climate-Neutral Cities



2025-9-5

Challenges for Urban Areas

- Demographic trends
- Climate change (climatic extremes, warming, water scarcity, flooding)
- Air and water quality, pollution
- Resilience
- Suburban sprawl



Challenges for Rural Areas

- Low biodiversity
- Industrial agriculture



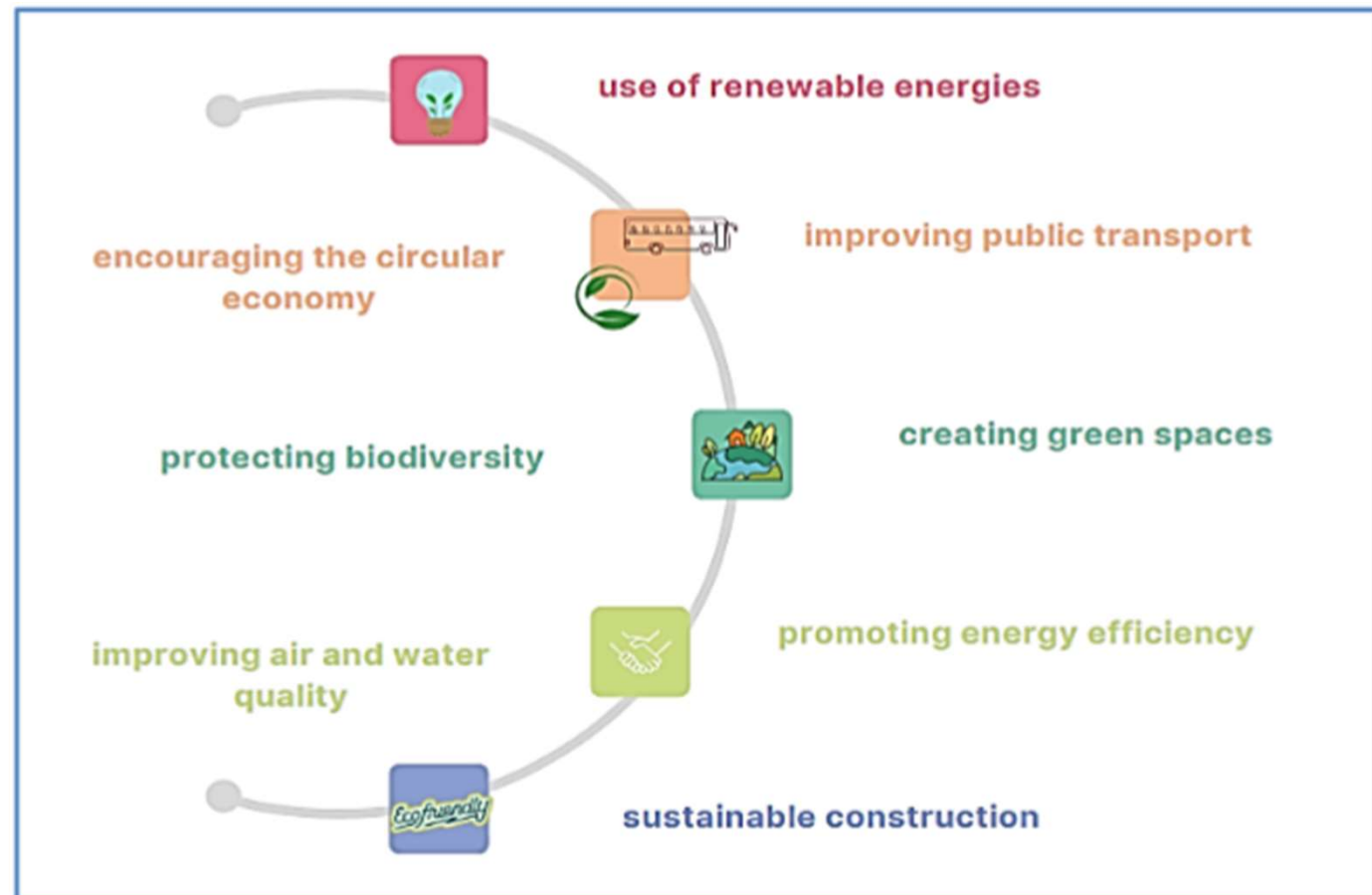
Integrating SDGs with spatial planning



98%
undeveloped

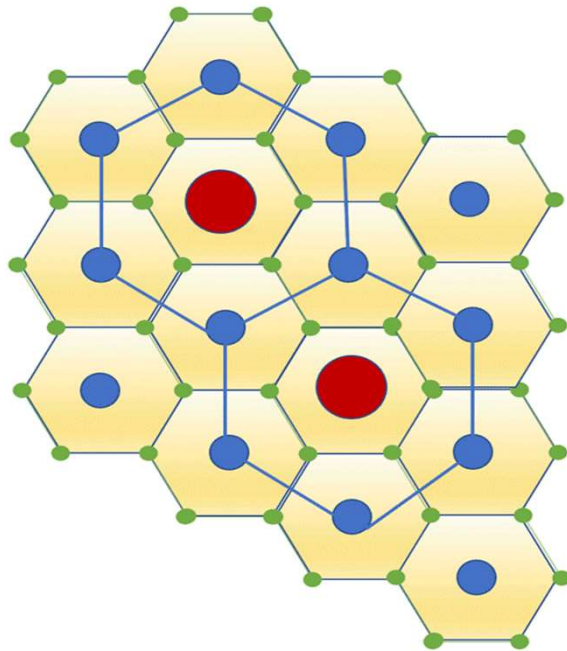
The rural areas

We should care more about the rural areas that are being rapidly developed by the mega-industries

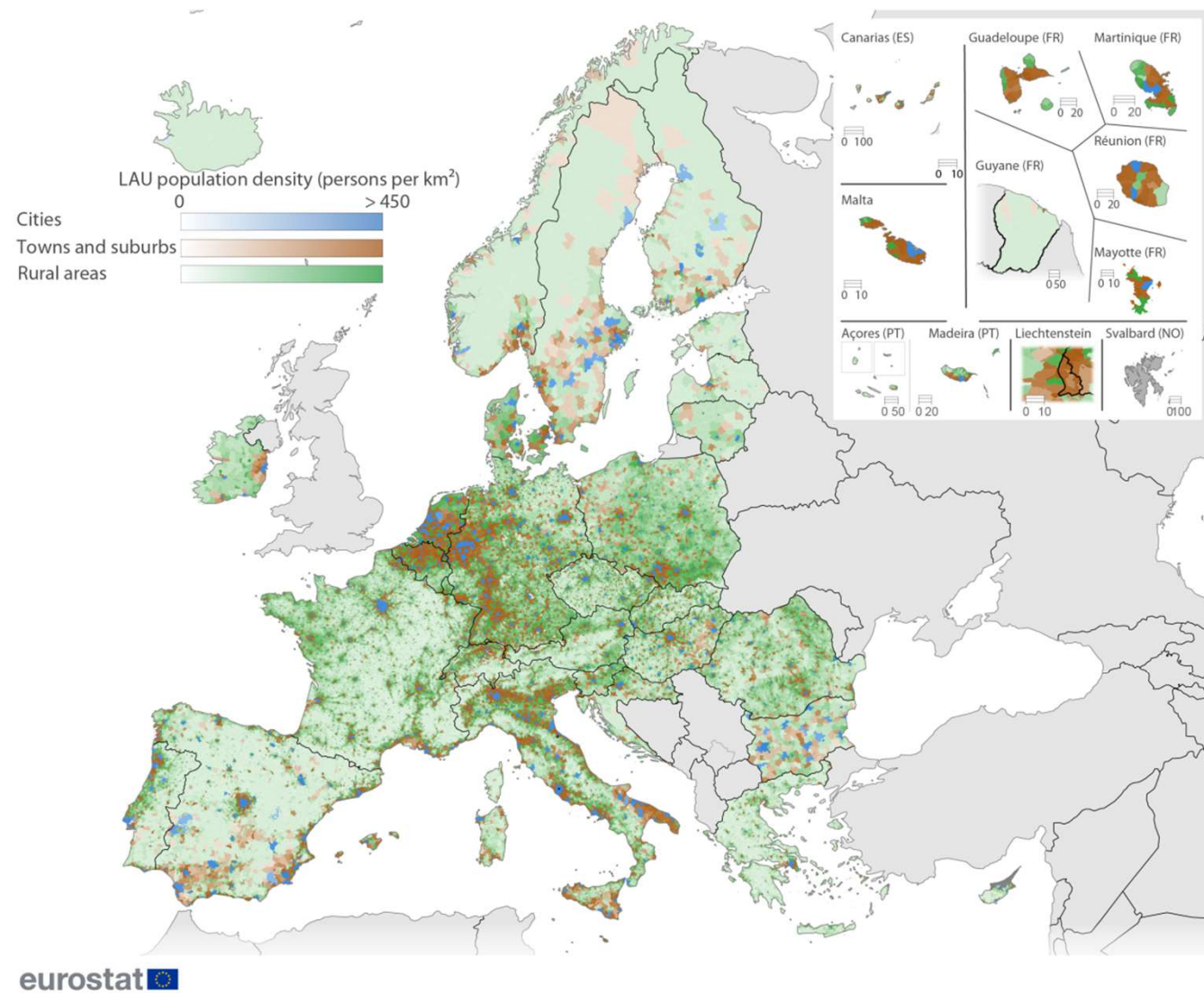


Network of Cities and Towns

- Big cities and smaller towns
- The EU goal::equal development of ALL EU territory



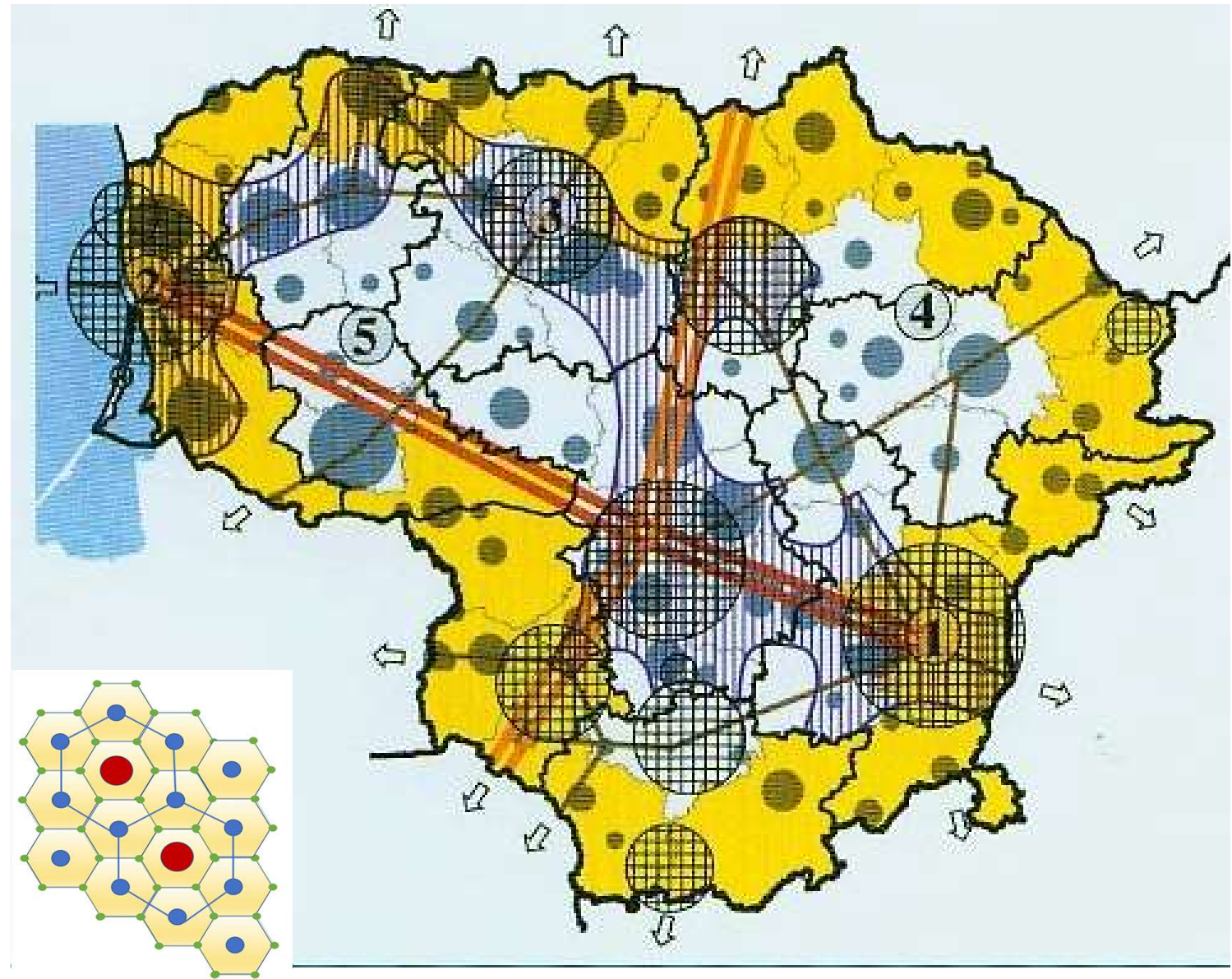
Degree of urbanisation, 2021



Source: Eurostat (based on Census Population Grid 2021 and Local Administrative Units 2021)

Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat
Cartography: Eurostat – IMAGE, 07/2024

Network of Cities and Towns



Mega centres vs
Developed regions

The Limits to Growth (MIT): global equilibrium model 1972

Global growth vs carrying capacity of the environment

The trend:

- Exponential growth of population
- Growth of capital
- Growth and collapse cycles of the system

Negative loops:

- **Pollution** of environment
- Resources **depletion**
- **Demographic** inequalities

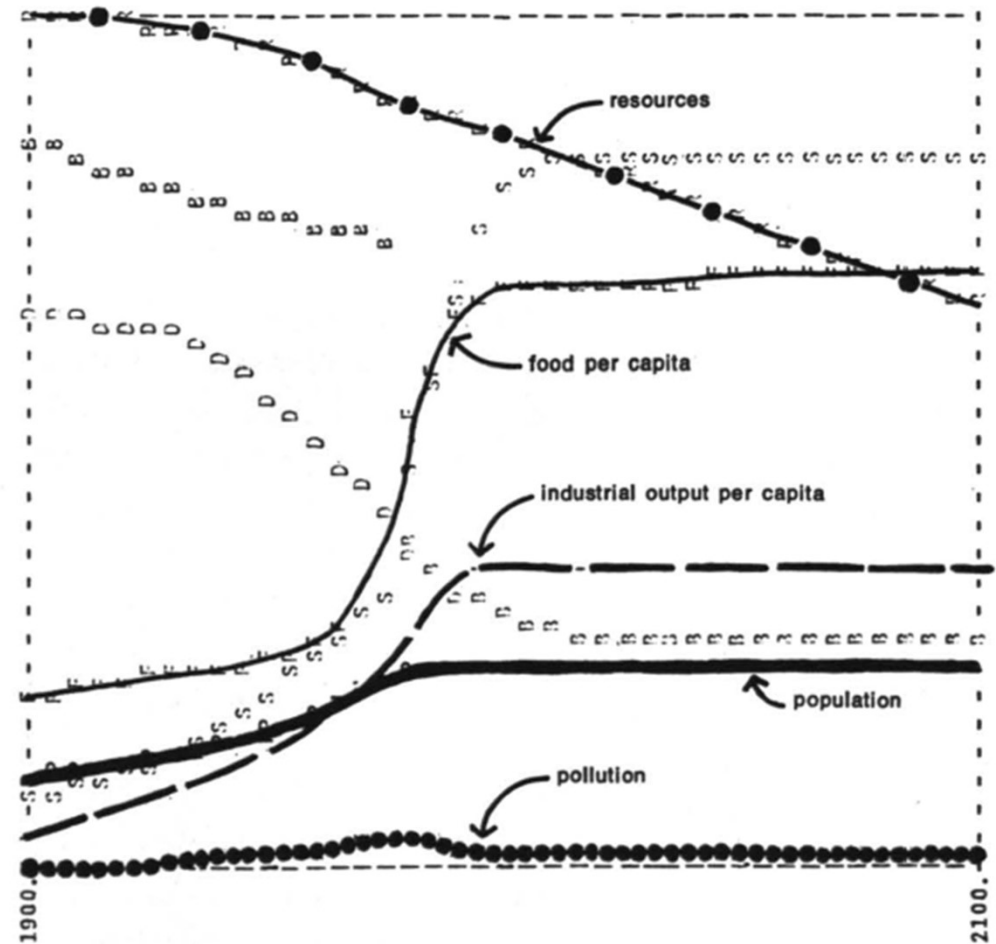
The concept:

Bring the system to global equilibrium

The goal:

- sustainable without sudden and uncontrollable collapse;
- capable of satisfying the basic material requirements

Figure 46 STABILIZED WORLD MODEL I



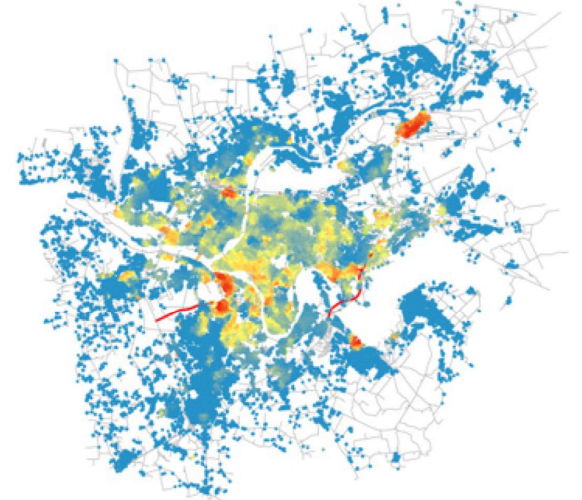
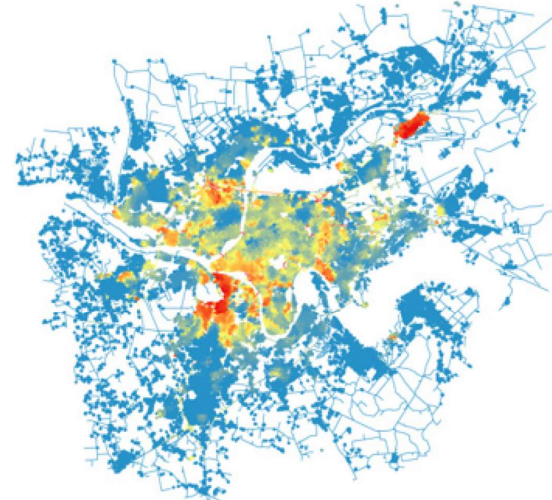
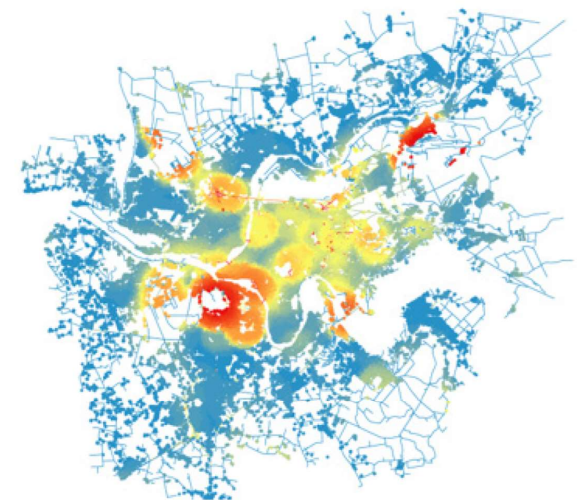
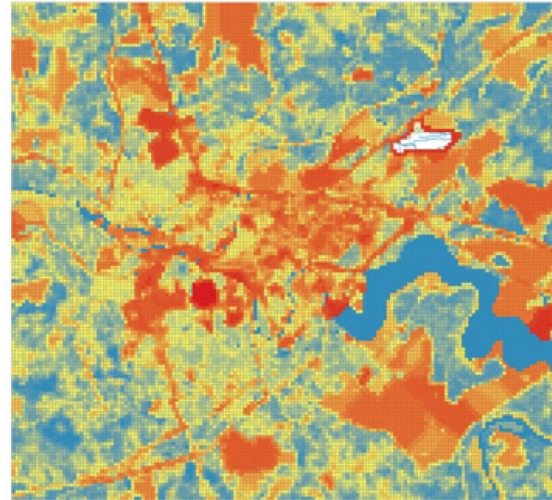
Club of Rome, since 1968

Traditional buildings and urban blocks are no longer the primary drivers of the city's future. The unbuilt void, the landscape is.

Rem Koolhaas, SMLXL

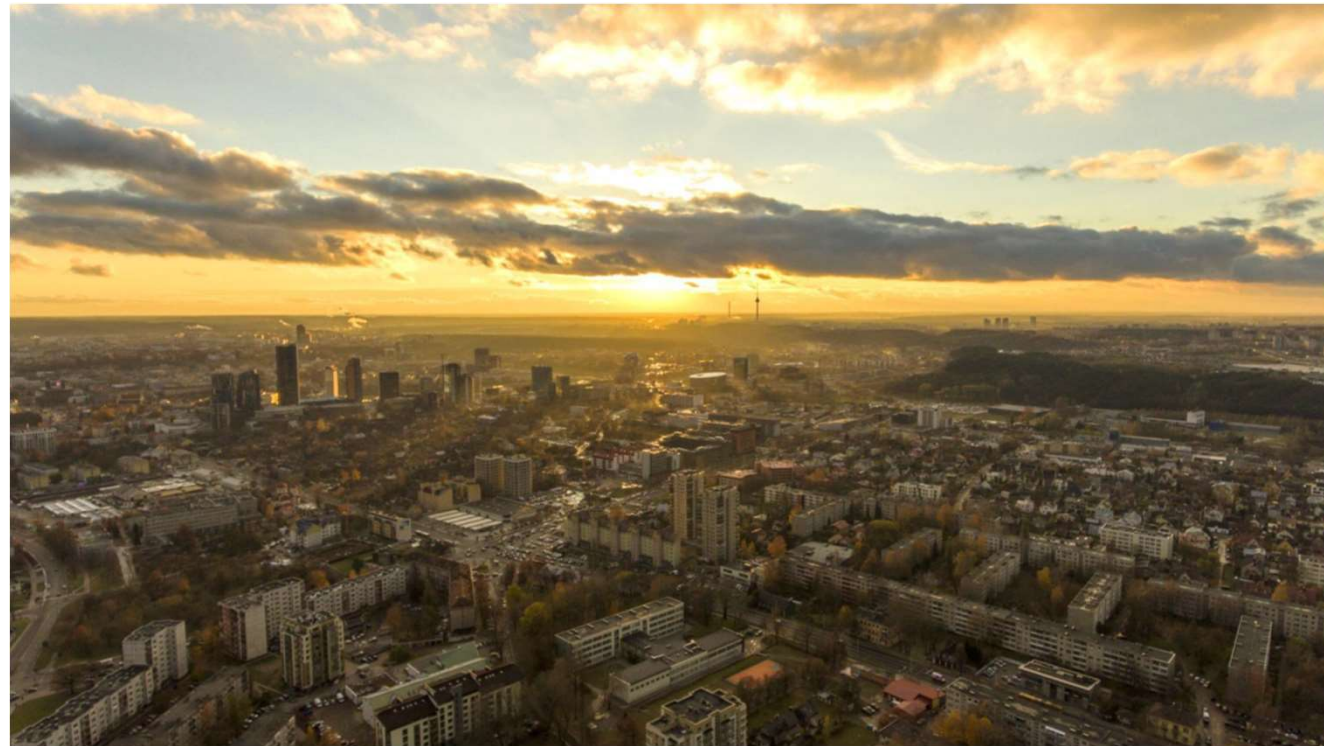
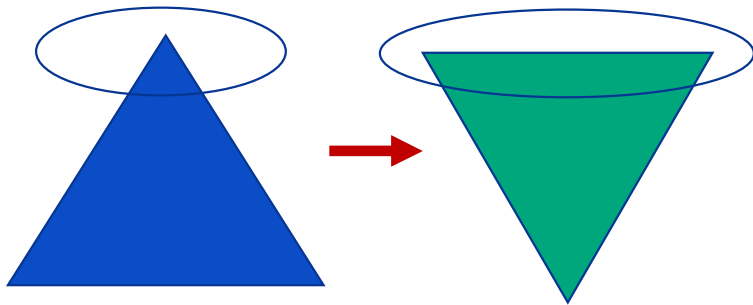
Spatial Planning - Smart

- Intensive use of ICT (Networking and Communication)
- Smart mobility SUMP
- Smart buildings
- Smart home
- Smart energy
- Smart security
- Smart governance and participation
- Smart economy
- Smart environment
- Smart living
- Smart mobility
- Smart infrastructure and ICT



Spatial Planning 21

- From dictating to guiding
- From output-based to process-oriented
- From linear to circular
- From hierarchic to collaborative



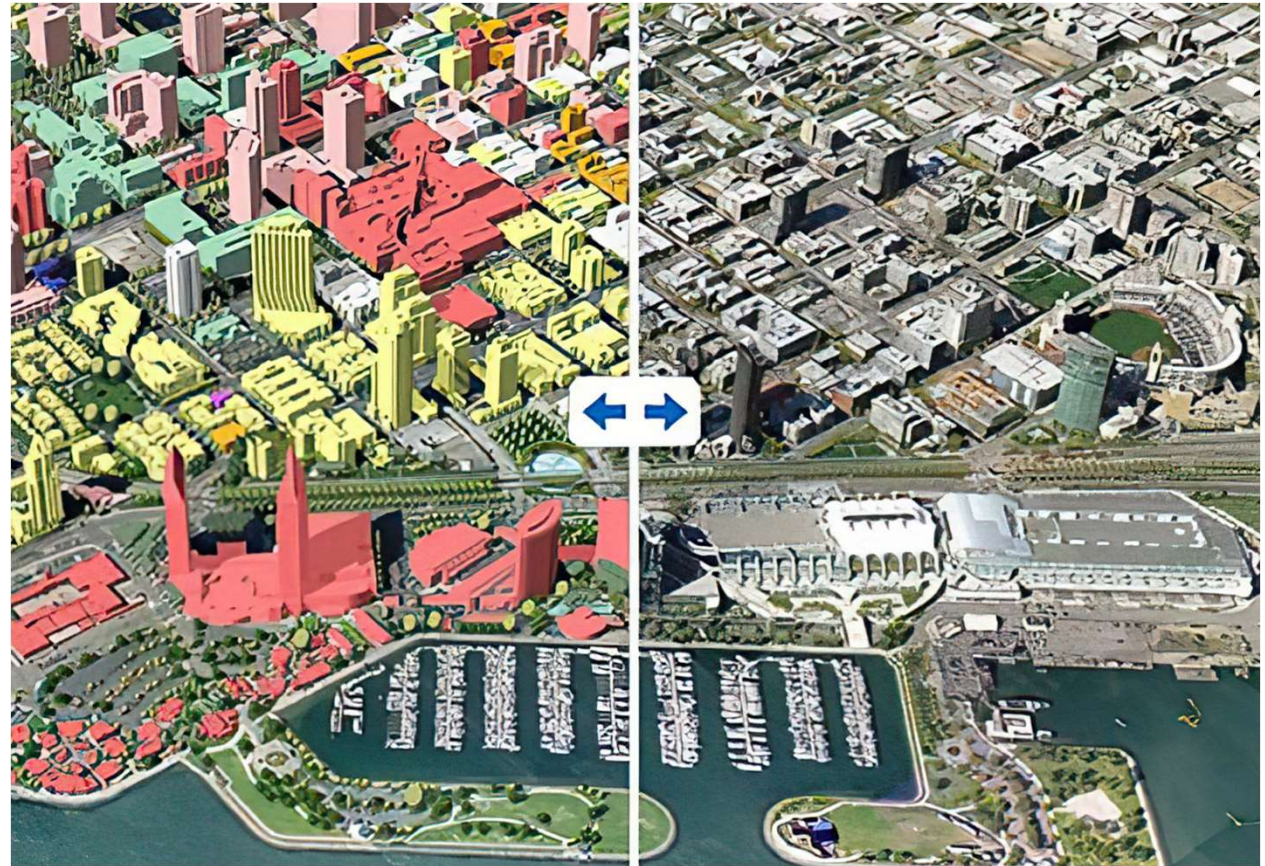
Spatial Planning 21: Key goals

Spatial integration

Access and
inclusion

Growth and
development

Governance and
management



Issues with spatial planning

Poor skills of engaging with civil society

Lack of innovative co-produced solutions

Lack of quality open spaces



Planning a region

INNOVATIVE BUSINESS DEVELOPMENT

1. More exports by SMEs
2. More new scaled-up growth companies

IMPROVED ENVIRONMENT AND RESOURCE USE

3. Joint circular economy solutions
4. Improved coastal and marine environment
5. Decreased CO2 emissions

IMPROVED EMPLOYMENT OPPORTUNITIES

6. Improved employment opportunities on labour market

IMPROVED PUBLIC SERVICES

7. Improved public services and solutions for the citizens

Regional systems:

- Green – grey infrastructure
- Transport
- Education
- Health care
- Food chain
- Waste management
- Some other

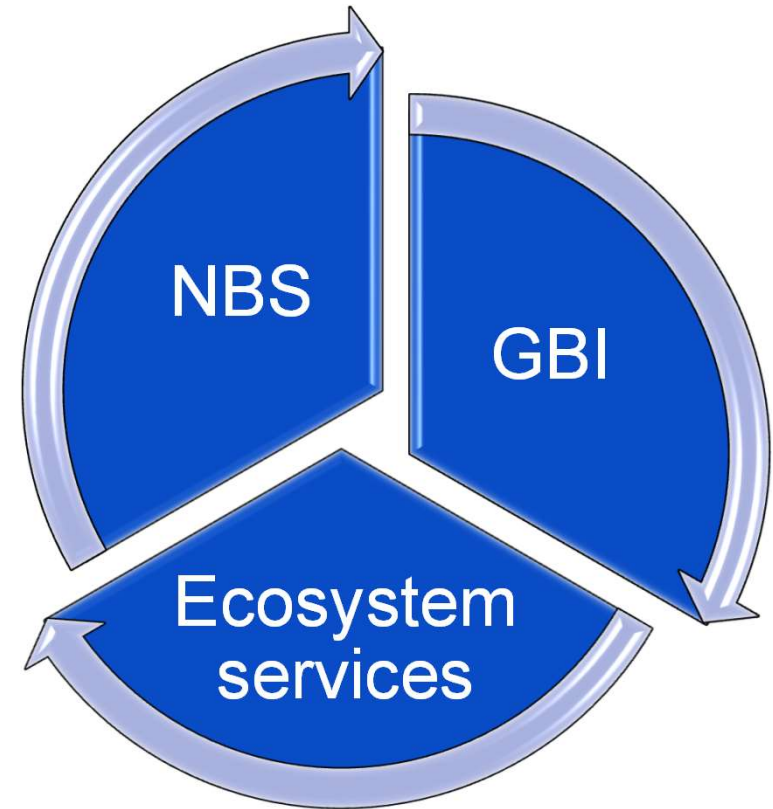


Reality of urbanization in the EU

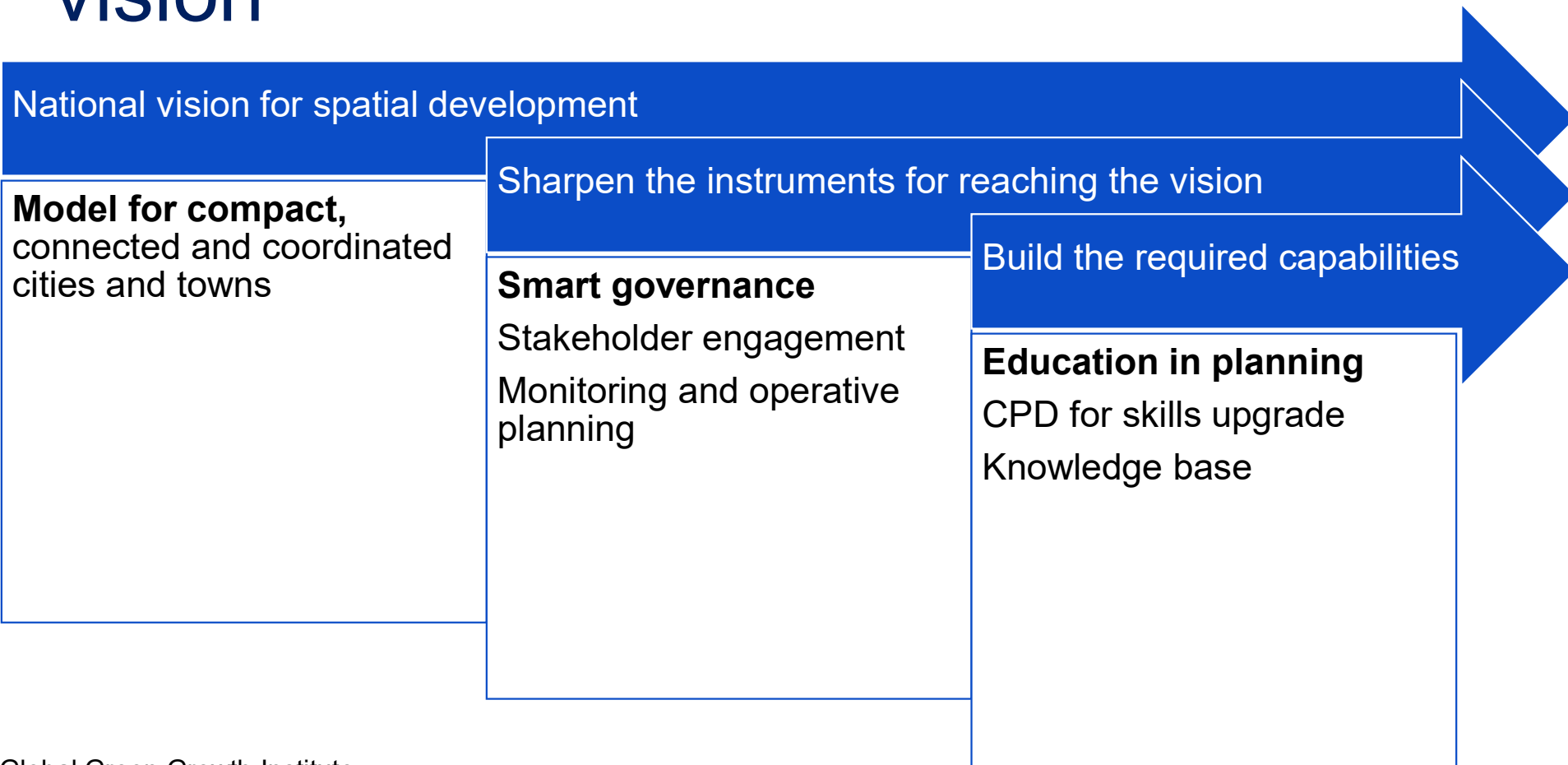
- Interrelation of big cities and smaller towns
- Different density of urban regions
- Different development of infrastructure
- Experience in controlling the sprawl
- Various experiences in citizen engagement

Nature-based spatial planning

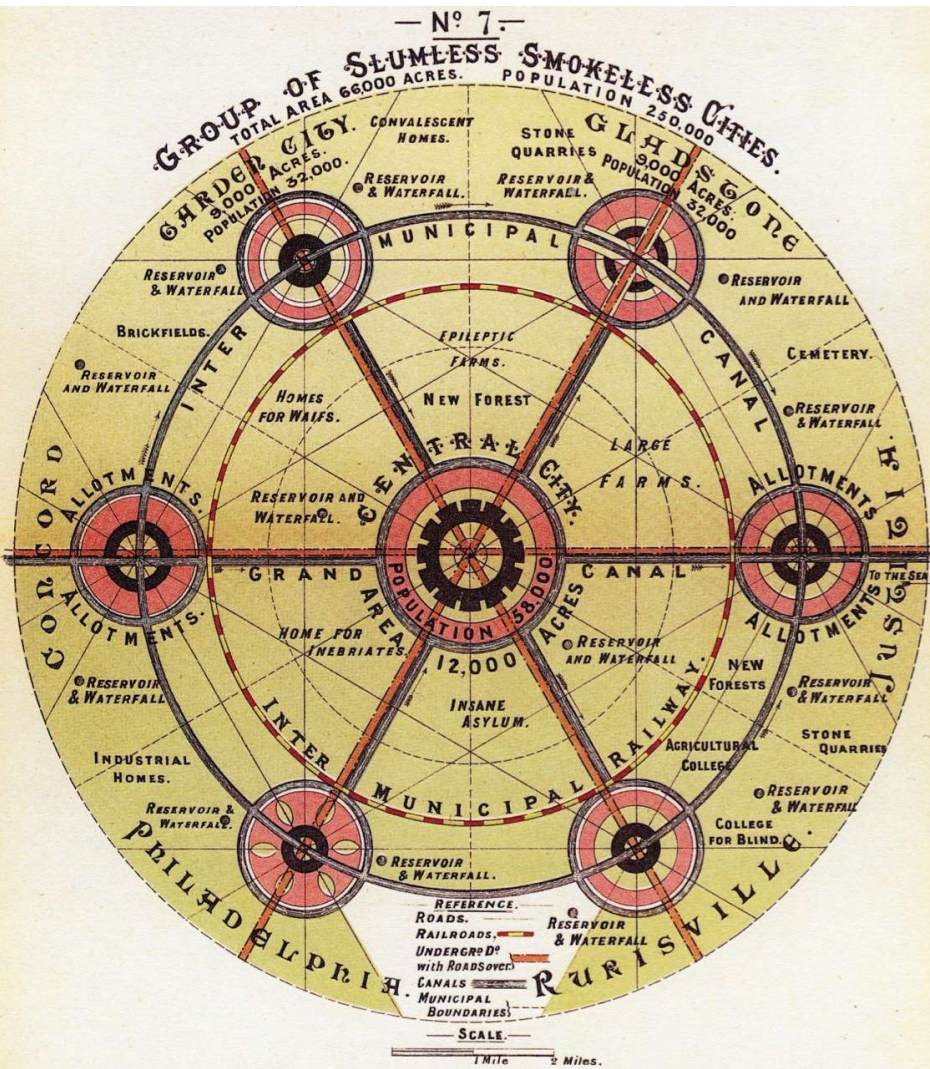
- Starting with landscape character assessment
- SUDS is a must
- Adjusting infrastructure to nature is a priority



Spatial development: the vision



Garden city 2



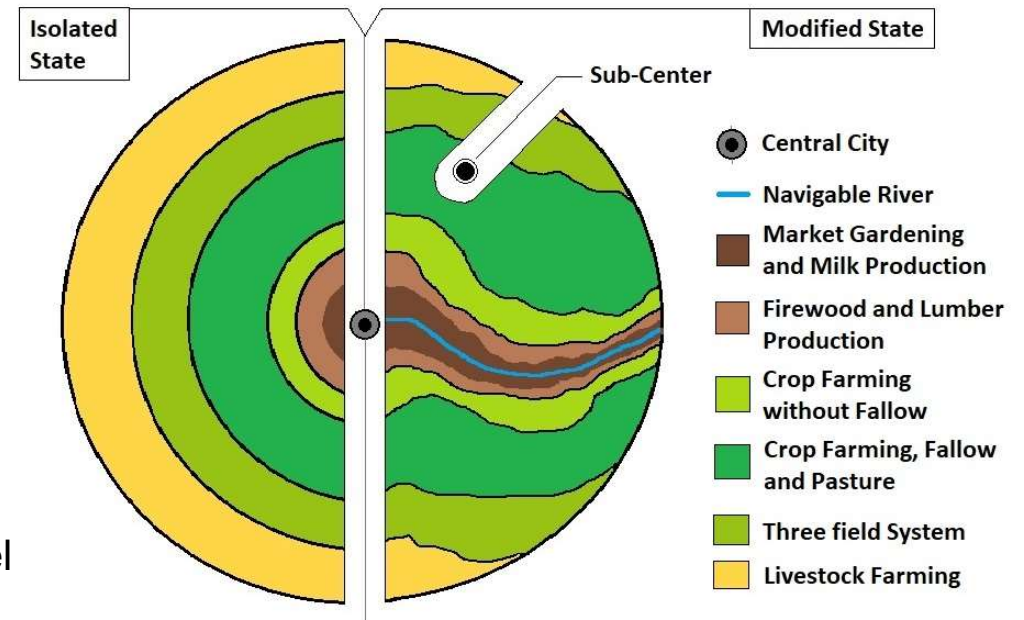
Ebenezer Howard To-morrow 1898



Outskirts of Copenhagen nature@cgtn.com

A sponge-type city

Von Thunnen model

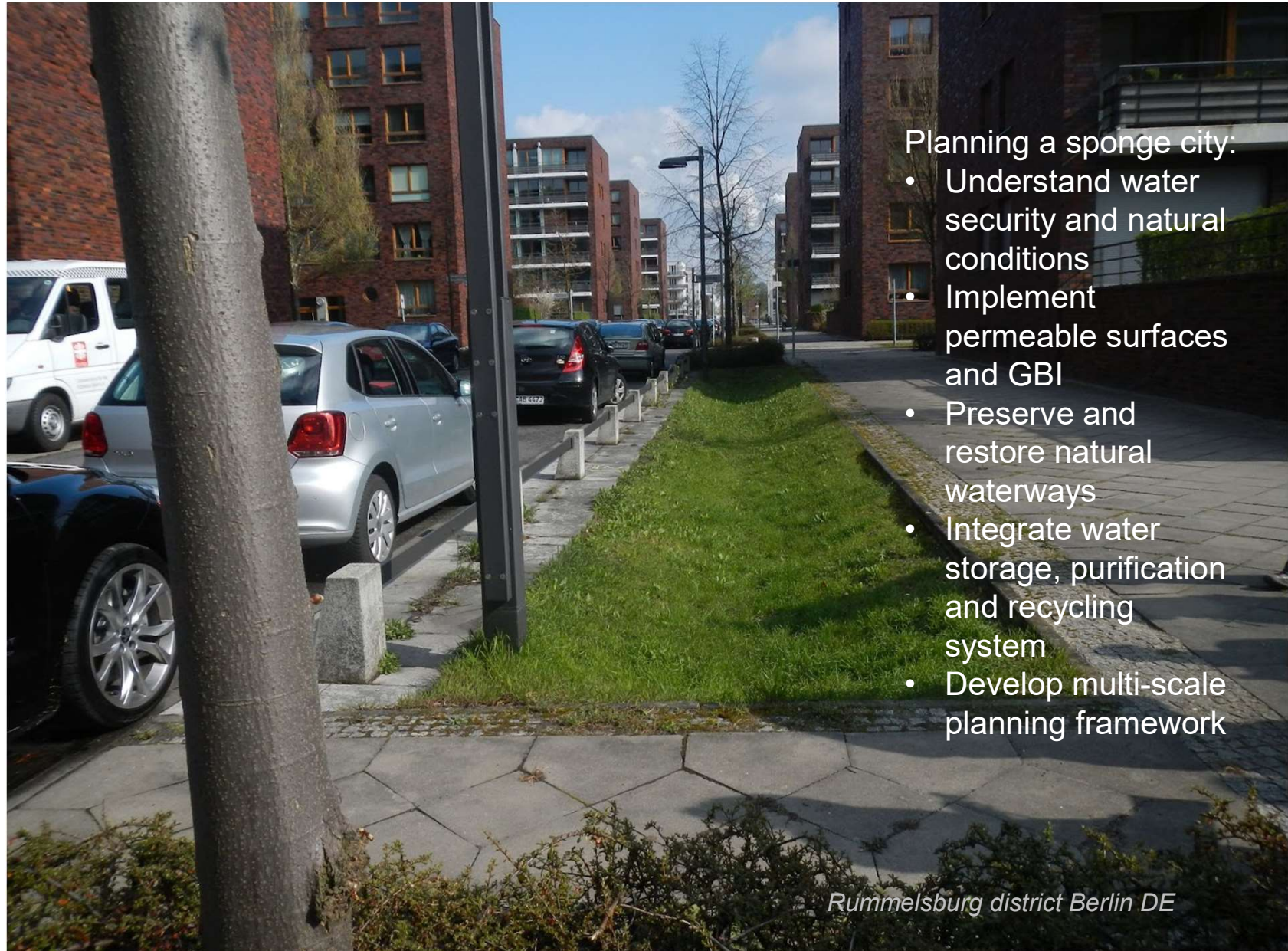


Sponge-type city

Low-tech solutions toolbox for urban water absorption:

- **Bioswales, green roofs**
- **Water strands, green wall**
- **Retention ponds**
- Other shallow drains
- Acts as water reservoir
- Could be measured = ratio of open and sealed surfaces
- Should be planned, need space (5-10%).

Natural drain system
NDS: www.dsd.gov.hk

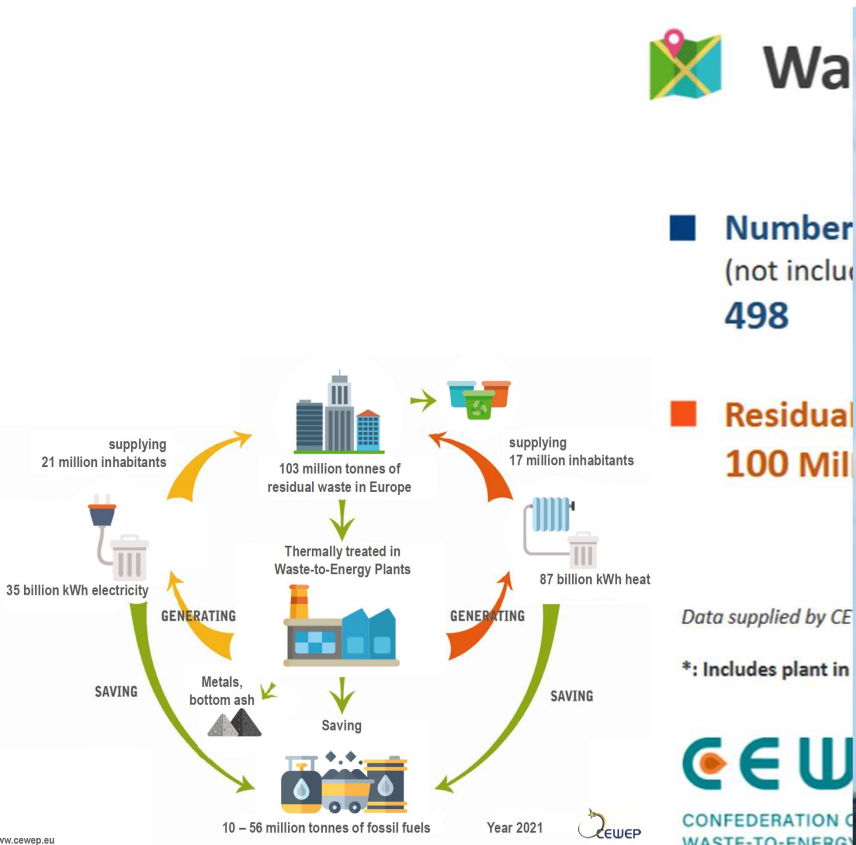


Planning a sponge city:

- Understand water security and natural conditions
- Implement permeable surfaces and GBI
- Preserve and restore natural waterways
- Integrate water storage, purification and recycling system
- Develop multi-scale planning framework

Rummelsburg district Berlin DE

Waste-to-Energy solutions



Low Impact Urban Design & Development is an integrated urban design and development process using nested scales within catchments in urban and peri-urban environments.

LIUDD is focused on avoiding a wide range of adverse effects of a physiochemical, biodiversity, social, economic and amenity nature resulting from conventional development.

LIUDD aims to protect aquatic and terrestrial ecological integrity while allowing urbanisation at all densities.

Low impact urban development

Work with nature's cycles:
carbon, photosynthesis,
nitrogen, water

Maximise local
resource, minimise
waste

Restore, enhance,
protect biodiversity

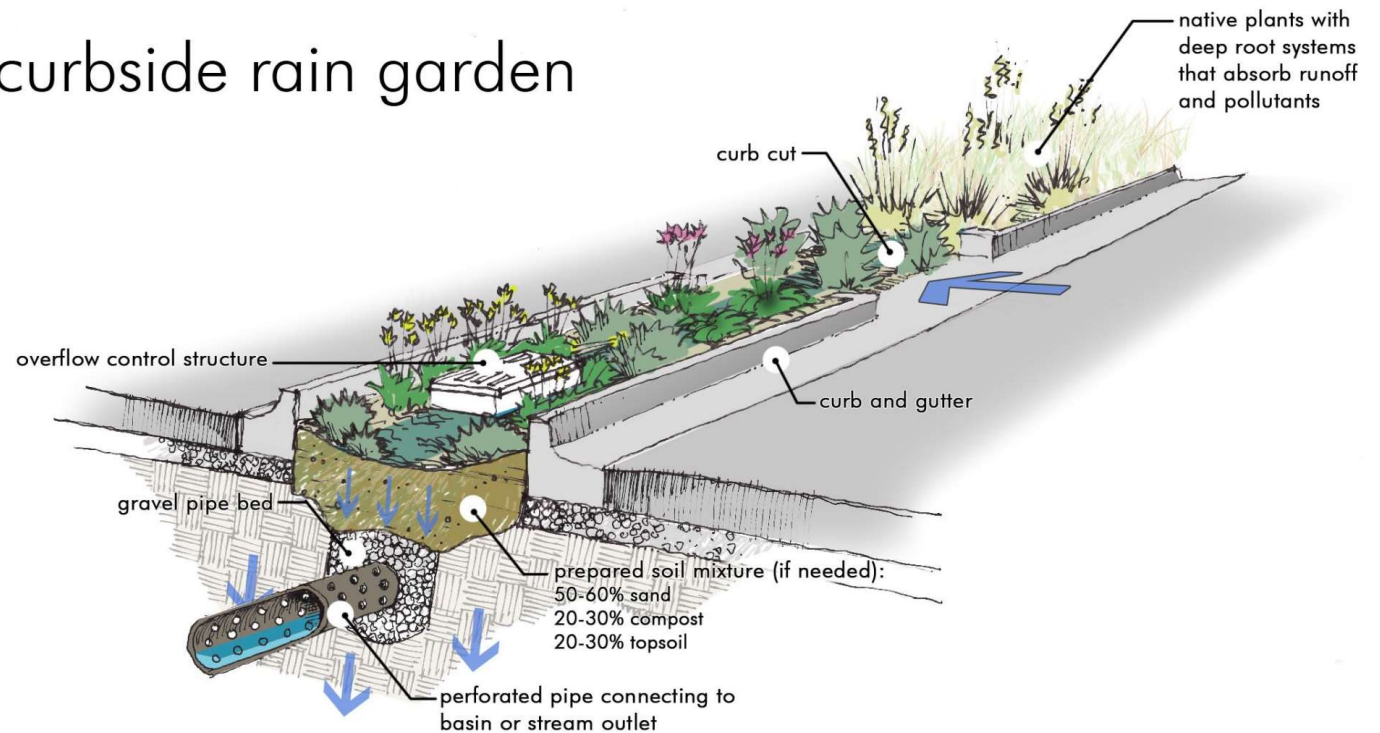


Low impact urban development



curbside rain garden

- Green infrastructure
- Low-impact industrial areas
- Sustainable urban drain system
- 3Waters: storm, grey, supply
- Green streets
- Green urban blocks



<https://pinnacleiit.com/blogs/low-impact-development-lid-in-urban-planning-a-simple-guide/>

Inclusive urban development

Ensure universal access

Develop diverse human experiences

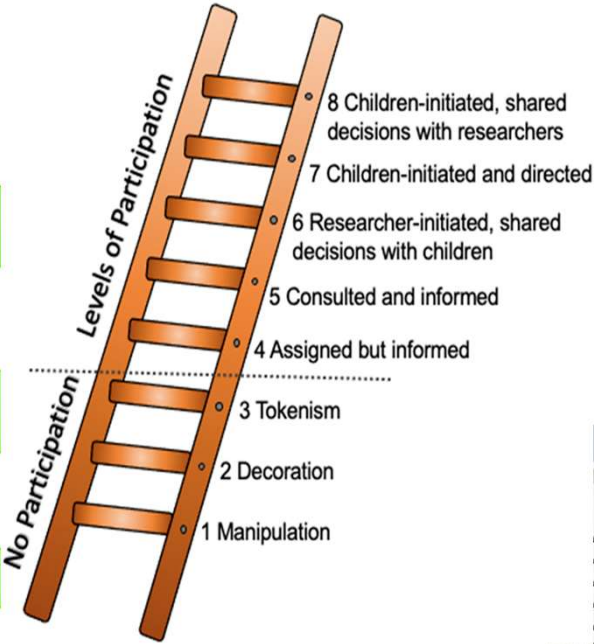
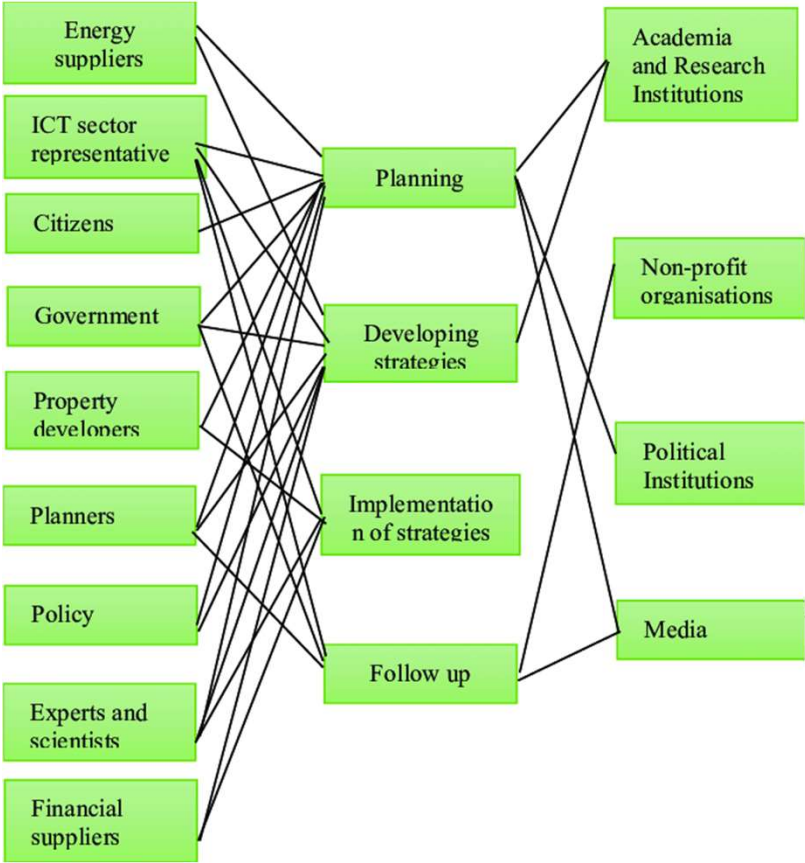
Community involvement and participation

Develop sense of belonging

Develop sustainable practices



Advanced participatory methods



Žaidimas vyksta 1-ame LK aukšte. Žaidimo uždutis - surasti draugui biurą, apieinant visas patalpas, jas apžiūrint, vertinant pagal suradimo paprastumą/sunkumą, kelių iki jos. Suradus spausiti ENTER, tuo metu atsiras patalpoje baldai, pagal kuriuos matysite jos paskirtį bei pavadinimą.

- Pasivaikščiok po 1-q LK pastato aukštą
- Išrink tinkamiausią patalpą spaudžiant ENTER
- Vadovaukis patalpos suradimo ir lokacijos patogumo principu.
- Žaidimo laikas 5 min.
- "PAUZĖ", "IŠEITI IŠ ŽAIDIMO", "PAGRINDINIS MENIU" - spausiti "B"
- Žaidimo pabaigoje suvesti savo duomenis ir klaviatūroje paspausti "PRINT SCREEN"

Žaidimo valdymas:

- W - eijimas į priekį arba ^
- S - eijimas atgal arba _
- D - eijimas į dešinę arba →
- A - eijimas į kairę arba ←
- B - pauzė



Cities and towns that are dynamic and efficient, foster entrepreneurialism and innovation, sustain livelihoods, enable inclusive economic growth, and generate the tax base needed to sustain and expand public services and amenities.

CS1 Browary Warszawskie:

former brewery converted into a culture and residence district.
The best urban regeneration 2022

- Urban integrity
- Sustainable construction
- Quality open spaces
- Revitalised industrial buildings



CS2 Kalasatama Helsinki

A smart city district of old harbour and industrial area

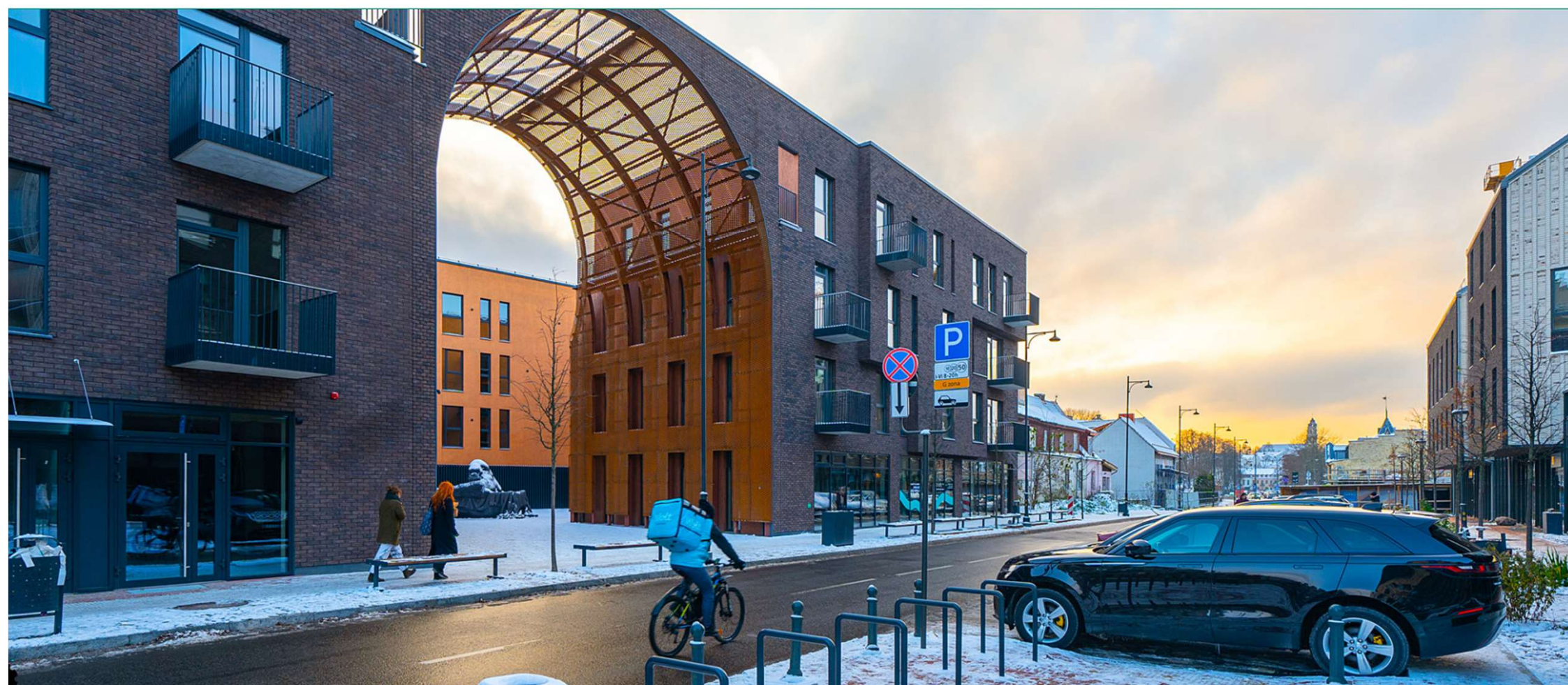
- Innovation platform and urban lab
- Digital twin
- Smart energy grids (heat storage)
- Smart and green infrastructure
- Health and wellbeing services
- Inclusive open spaces
- Living in a community
- AEV



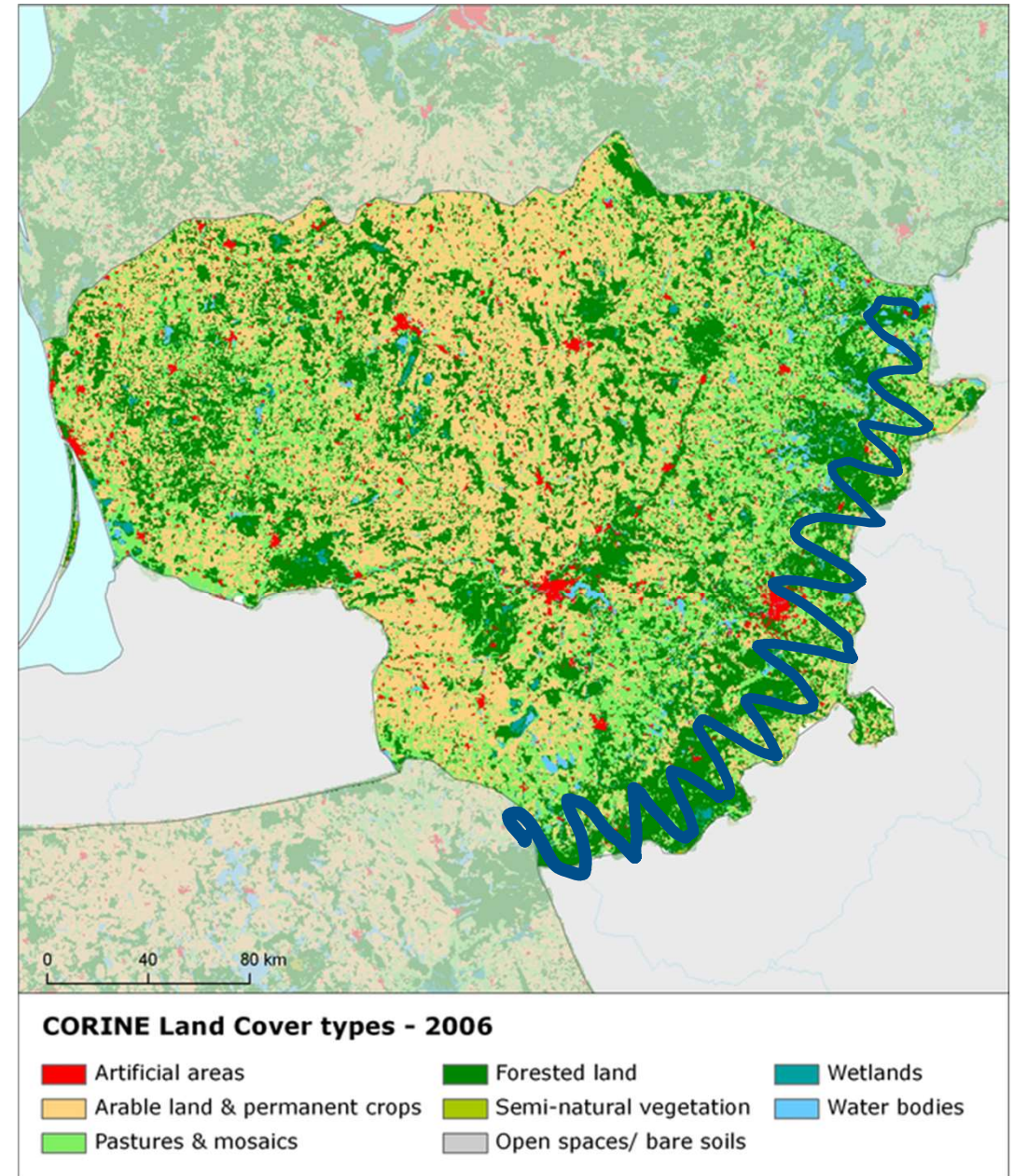
<https://fiksukalasatama.fi/en/materials/>

CS3 Paupys micro-district Vilnius City LT

Mixed-use district in the place of former leather industry



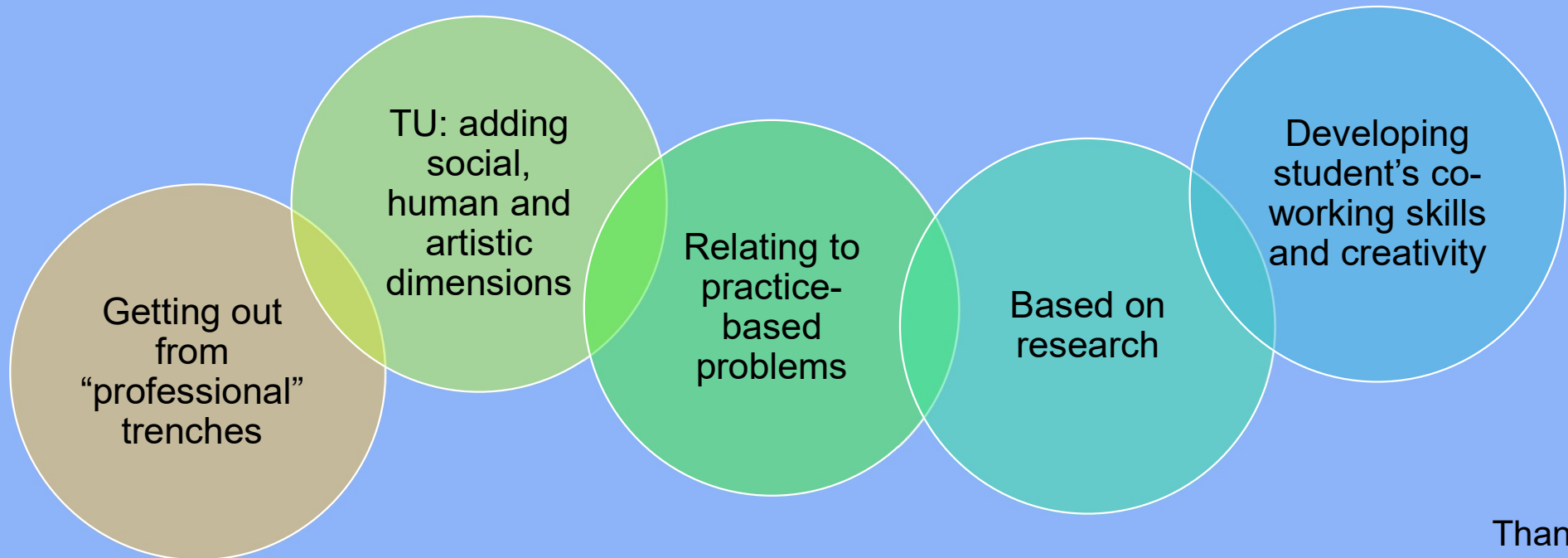
Policy levers



“21 c. spatial planning is a social contract drafted by a planner, moderated by authorities and signed by a society for generations to come”



Implications on education and learning



Thank you!

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