The smart city paradigm: Models and platforms for transformation and innovation of 21st-century cities

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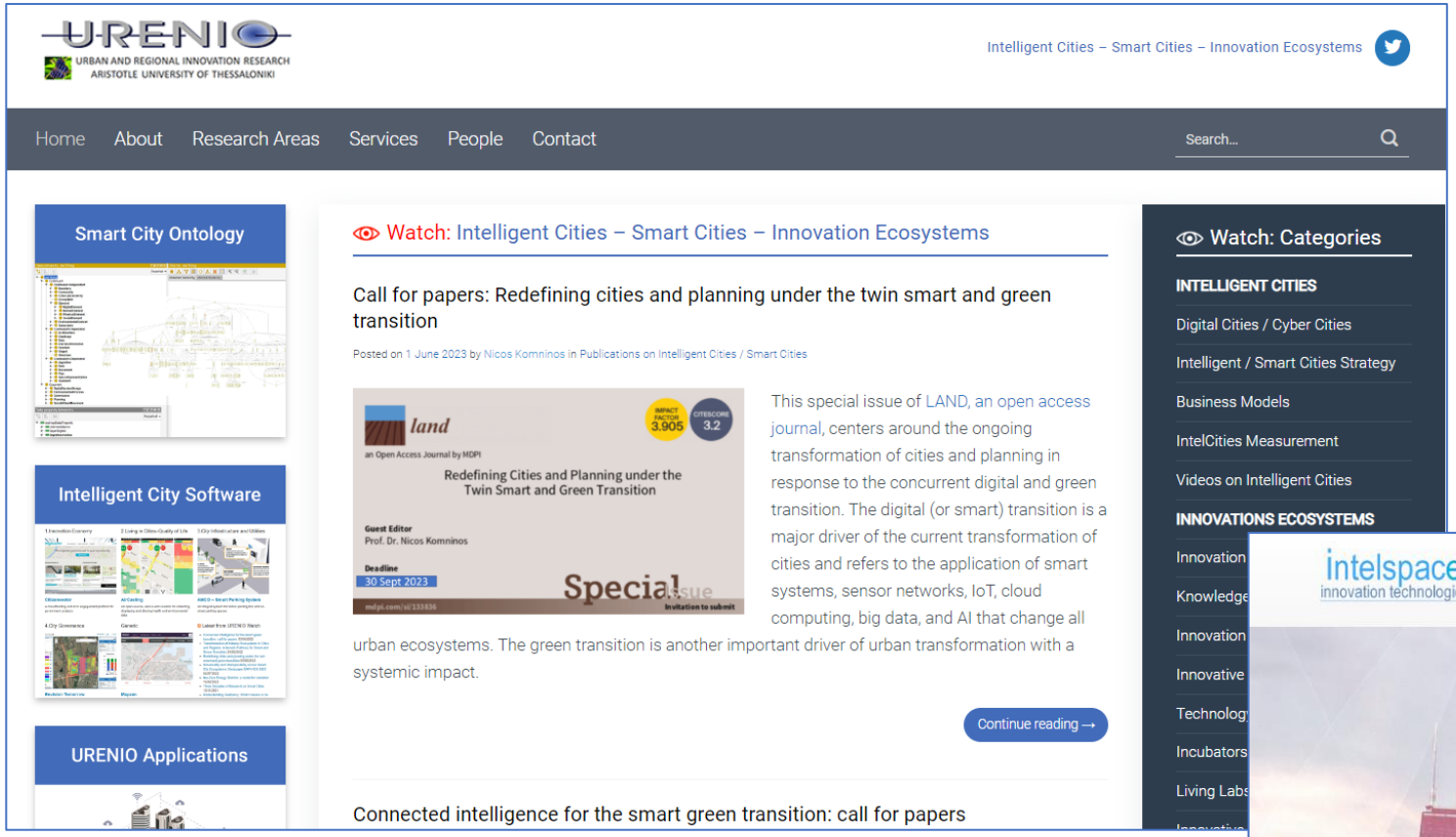
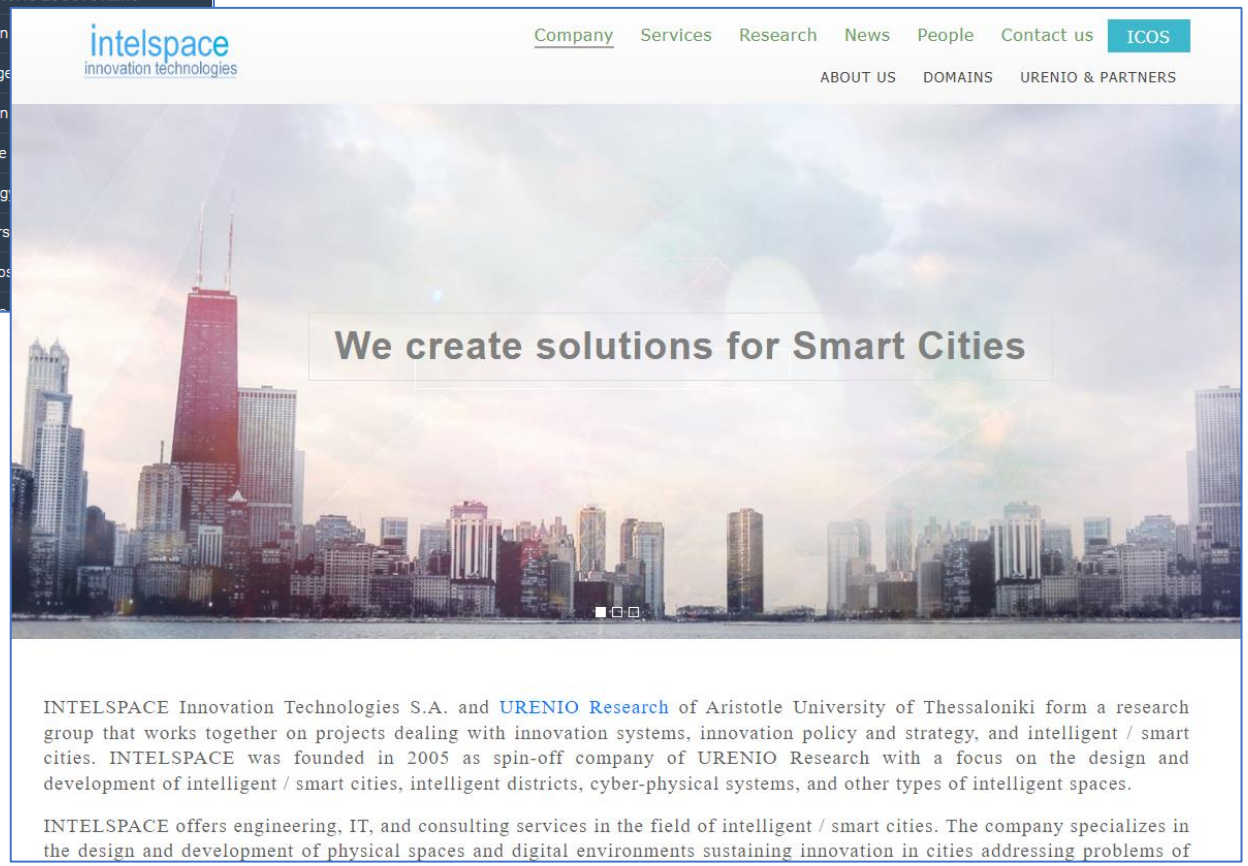
Alexandru Ioan Cuza University of Iasi, 3-7 July 2023

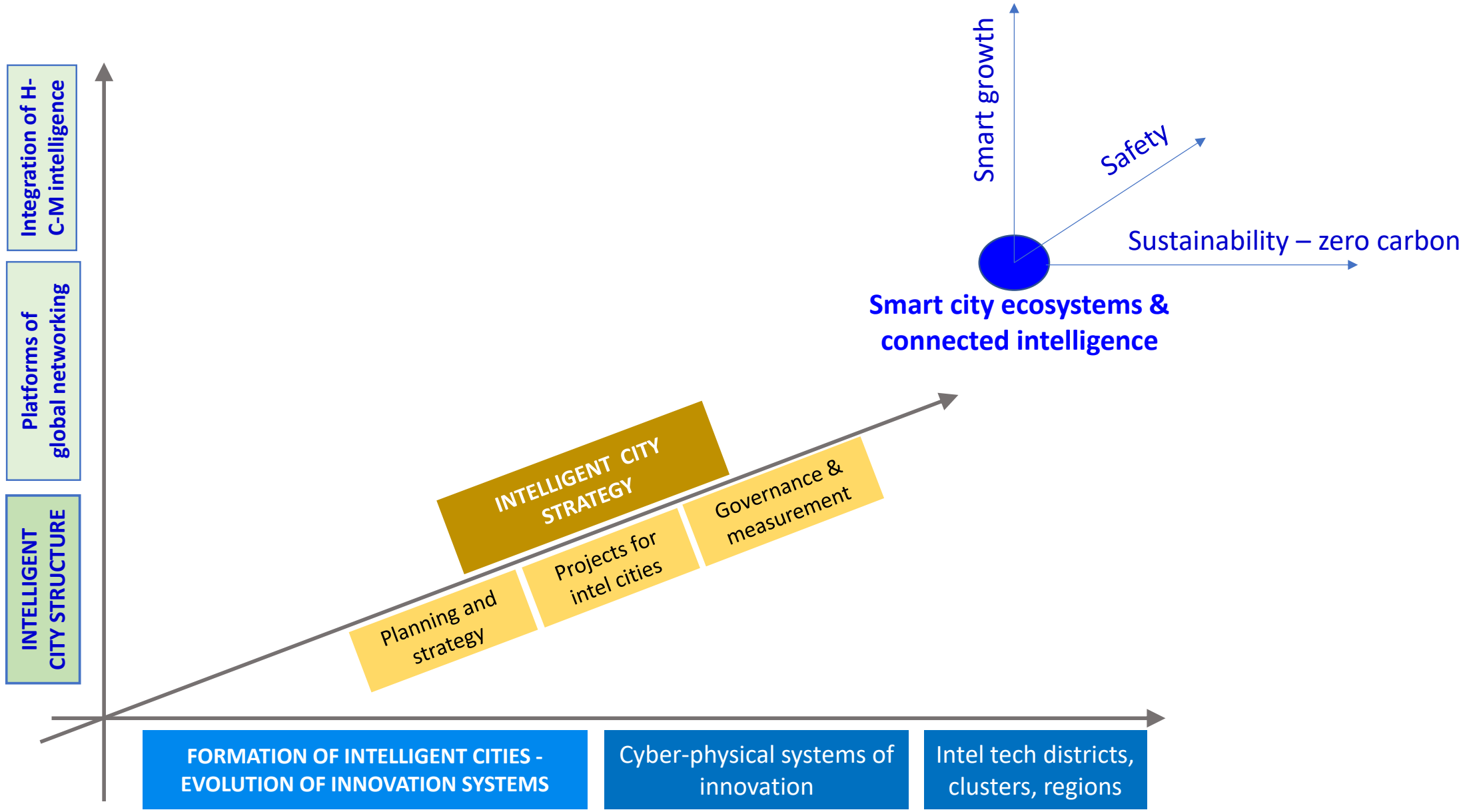


https://www.urenio.org/

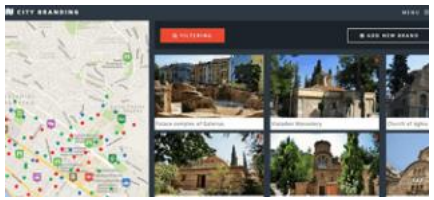
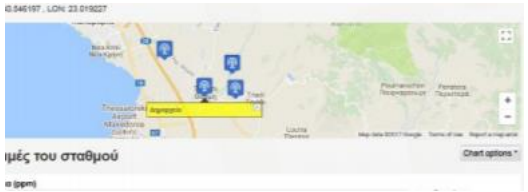
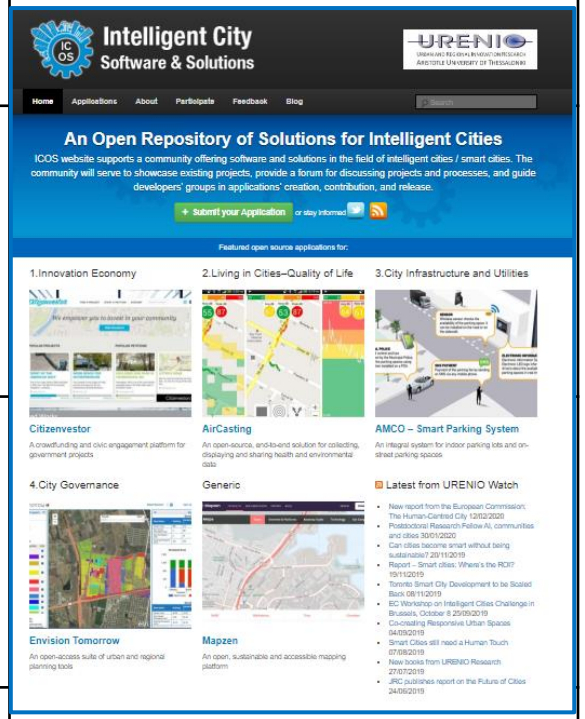
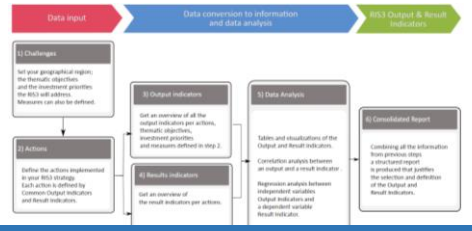
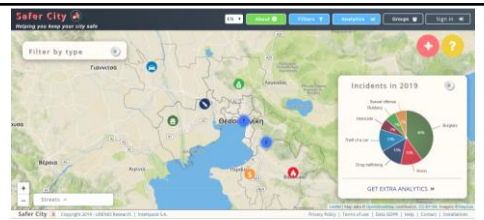


https://www.intelspace.eu/

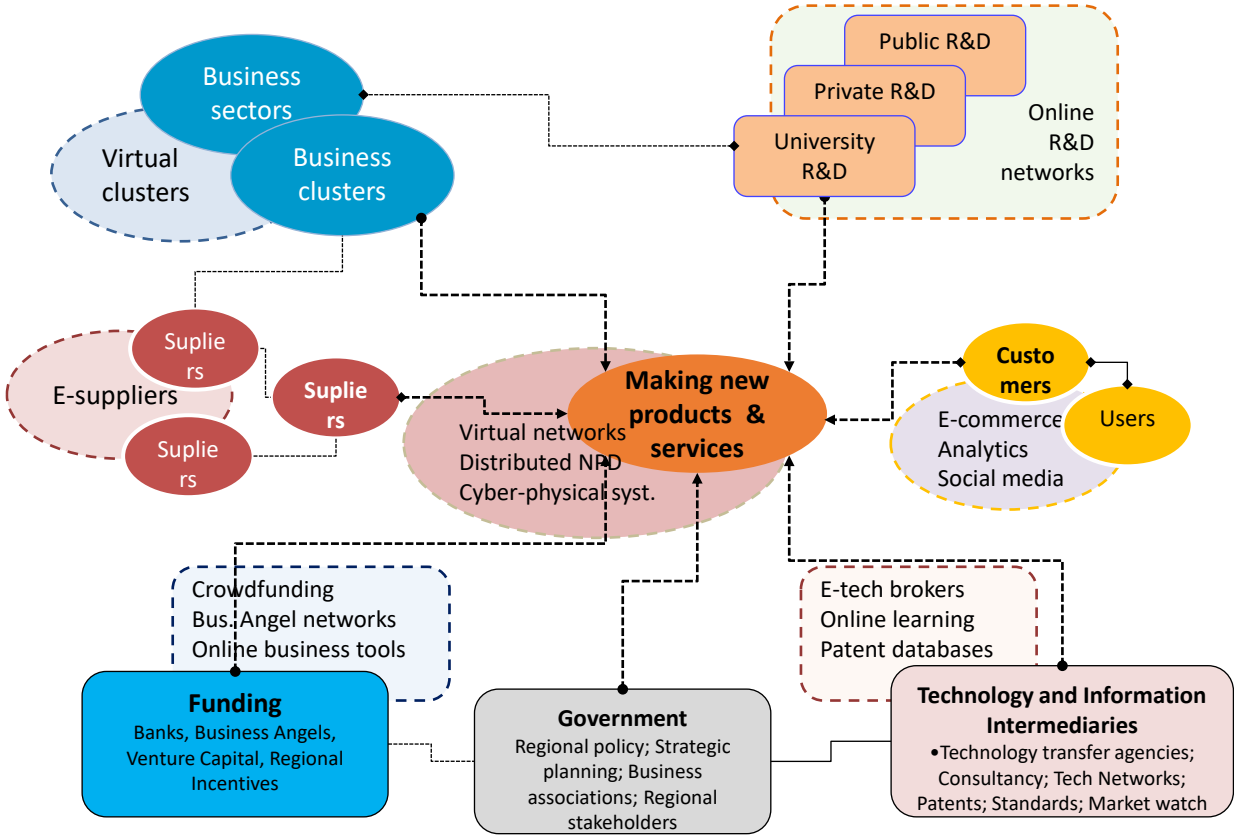
Research area 1: Intelligent cities / smart cities



Intelligent/smart cities: Platforms and applications

INNOVATION ECONOMY	SUSTAINABILITY	GOVERNANCE	APPS REPOSITORY
 CITY BRANDING	 AIR POLLUTION SENSORS	 CITIZEN REQUESTS	
 MARKETPLACE	 ENERGY & CO2 BENCHMARK	 STRATEGY CO-DESIGN	
 CROWDFUNDING	 ENVIRONMENTAL ANALYTICS	 MONITORING & ANALYTICS	
 R&D REPOSITORY		 SAFER CITY	

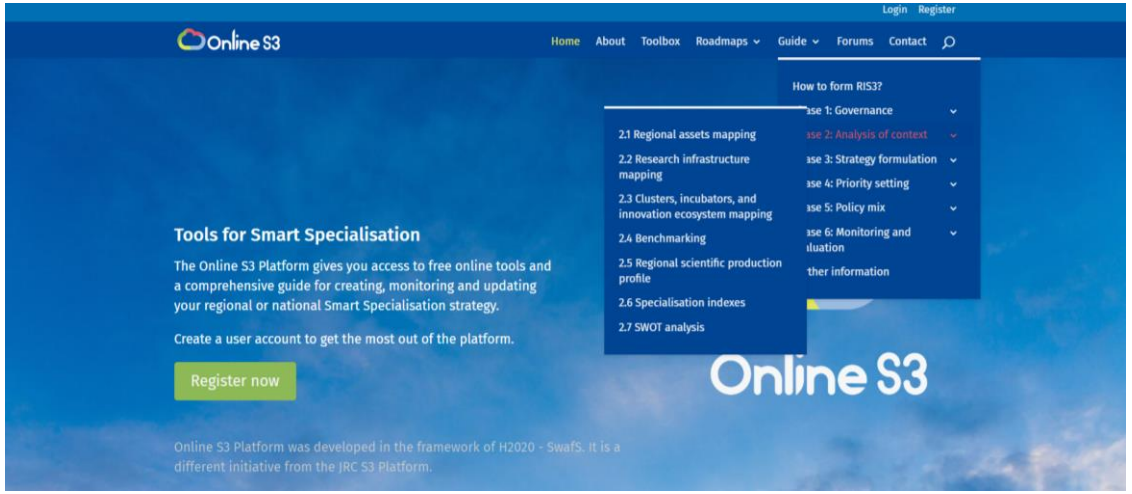
Research area 2: Systems of innovation in cities and regions



Evolution of systems of innovation: technology districts, regional systems of innovation, innovation ecosystems, cyber-physical systems of innovation, platform-based innovation, user-driven innovation, crowdsourcing innovation.

Recent research:

- ***Platform-based*** innovation, ***cyber-physical systems*** of innovation, ***transformative innovations*** of urban and regional ecosystems.
- Research and Innovations Strategies for Smart Specialisation (RIS³). Digitally assisted RIS³. ONLINE S3, a platform of 28 online apps and 4 roadmaps.



Cyber-physical innovation: Online S3 platform - 28 applications, 5 roadmaps

Context analysis

Phase 1: Governance

Vision sharing

Allows RIS3 managers to create visually attractive infographics to present the strategy's vision.

Stakeholder engagement

Invite RIS3 stakeholders to use online deliberation functionalities specifically tailored for EDP.

Debate at a glance

Enables participatory deliberation using functionality like argument mapping software.

Legal & administrative framework

Provides an overview of ERDF regulations and EU processes of selecting and funding projects.

Phase 2: Analysis of context

Regional assets mapping

A comprehensive and up-to-date mapping of the key regional assets.

Research infrastructure mapping

A comprehensive and up-to-date mapping of the existing and planned research infrastructures across the EU regions.

Clusters, incubators & innovation ecosystem mapping

Defining the framework, concepts and categories for mapping the innovation ecosystem of each region.

Benchmarking

Compare the performance of a region with regions that are structurally similar.

Regional scientific production profile

Production of 'scientific profiles' for regions based on Web of Science (WoS) data, Scopus and Google Scholar data.

Specialisation indexes

Technological and economic indexes for understanding the position of regional activities in global value chains

SWOT analysis

Analysis of regional strengths, weaknesses, opportunities and threats is a key starting point for applying more elaborate RIS3 methods.

Strategy design

Phase 3: Strategy formulation

Collaborative vision building

Tailored online guidelines on the necessary additional steps to arrive at a shared vision for regional smart specialisation strategy.

Scenario building

Creates different scenarios to illustrate visions of possible future or aspects of possible future.

Delphi - Foresight

Delphi is the most emblematic Foresight or future studies method. The method makes the data collection and analyses faster and easier.

Phase 4: Priority setting

EDP focus groups

Supports focus groups of stakeholders and business leaders involved in the EDP process, and the communication of conclusions about the opportunities emerged by the I axel and national authorities.

Extroversion analysis

Detects possible industry segments in which regions present increased extroversion, in terms of exports, attraction of FDI, or other forms of regional openness.

Related variety analysis

Calculates the Related/Unrelated variety entropy indexes. It will compare 2-digit and 5-digit sector shares (%) and will estimate the entropy index for regions.

Implementation

Phase 5: Policy mix

Intervention logic

Allows to identify if different policy measures are coherent with the vision and objectives of the region.

Action plan co-design

Co-design is a well-established approach in the process of creation, particularly within the public sector.

Budgeting

Provides a framework for using different budgeting methods (incremental, zero budgeting) to capture the funding dimension.

State aid law compliance for implementation

Aims at constraining the funding possibilities of public authorities to sustain competition within the internal market.

Calls consultation

Enable RIS3 stakeholders to assess calls for projects under SF operational programmes that are made by regional authorities.

Innovation maps

Online visualisation tool that leaves out information about regional technological trends using grant data.

Open data tool

Data repository that allows for a finely grained tracking of projects and initiatives implemented in each region with a link to respective S3 priorities.

Phase 6: Monitoring & evaluation

Monitoring

Collects and processes information about the achievement of expected results and the degree of implementation of policy measures.

Definition of output and result indicators

Output and result indicators constitute an essential part of RIS3 monitoring and evaluation.

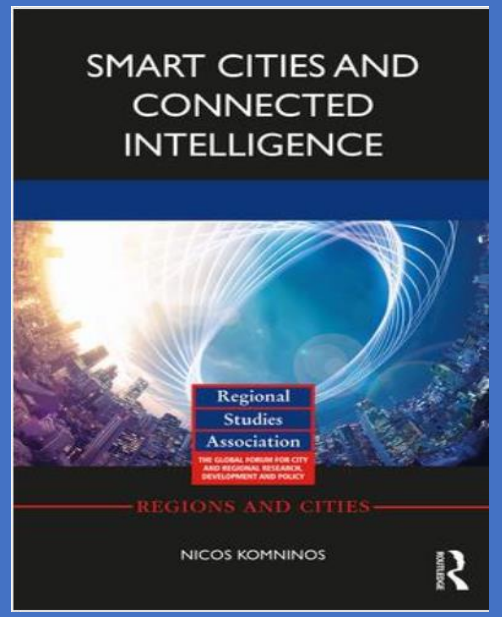
Balanced scorecard

Ensures that the activities are in line with its vision and strategy, and monitors the performance against strategic goals.

This talk is based on the book “Smart Cities and Connected Intelligence”, Routledge 2020.

Main arguments:

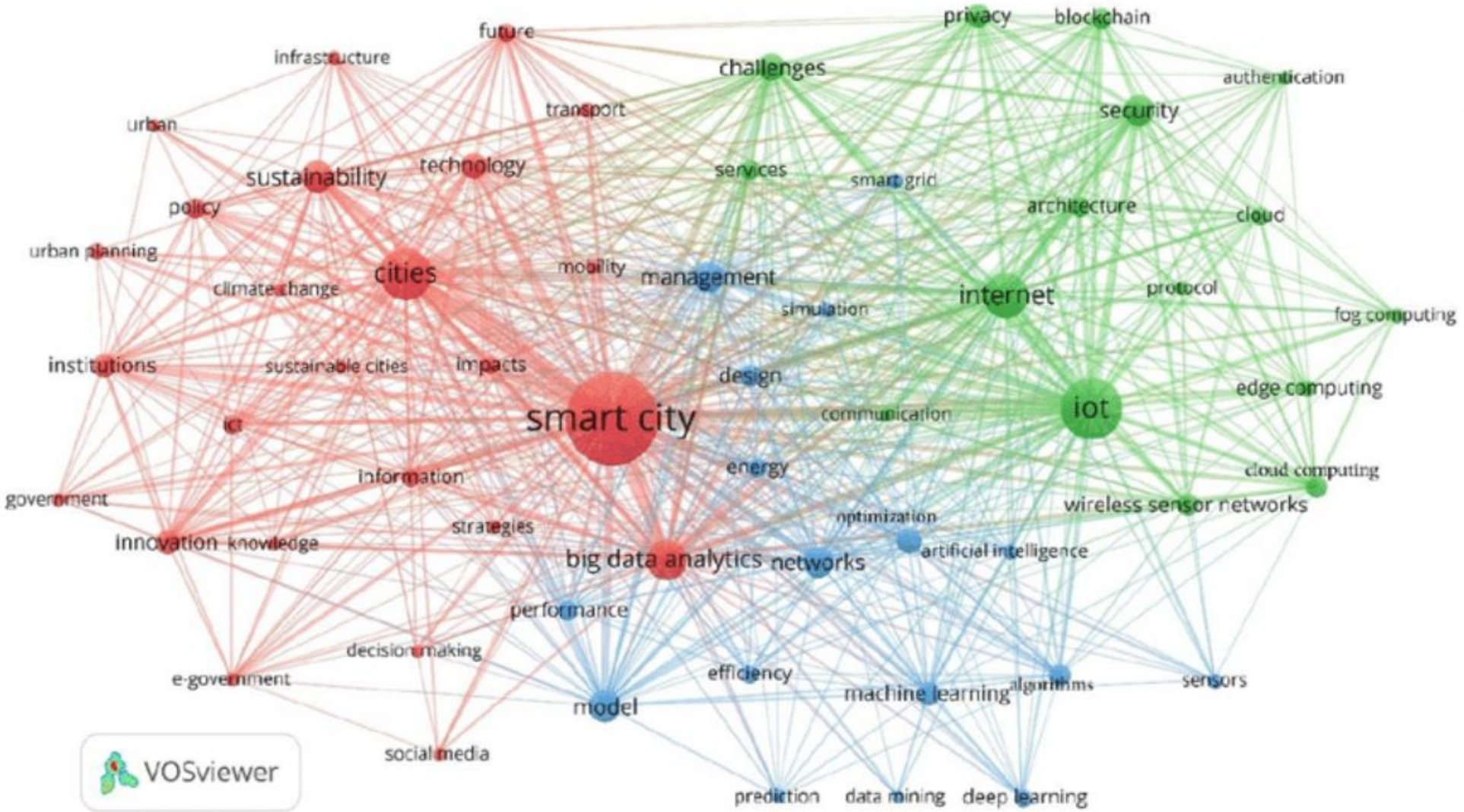
- The smart city is the dominant planning and development **paradigm** for cities in the 21st century
- **Smart city ecosystems are the fundamental entities** of smart cities, where challenges and transformations occur
- **Platform-based models** organise the transformation and innovation of smart ecosystems



Contents

I. The smart city paradigm

Interdisciplinarity: The smart city paradigm brings together urban planning, engineering, data science.



Three major clusters are identified:

(1) Cities, the smart city concept and understanding,

(2) big data analytics, and

(3) the technological aspects, especially in relation to Internet of Things

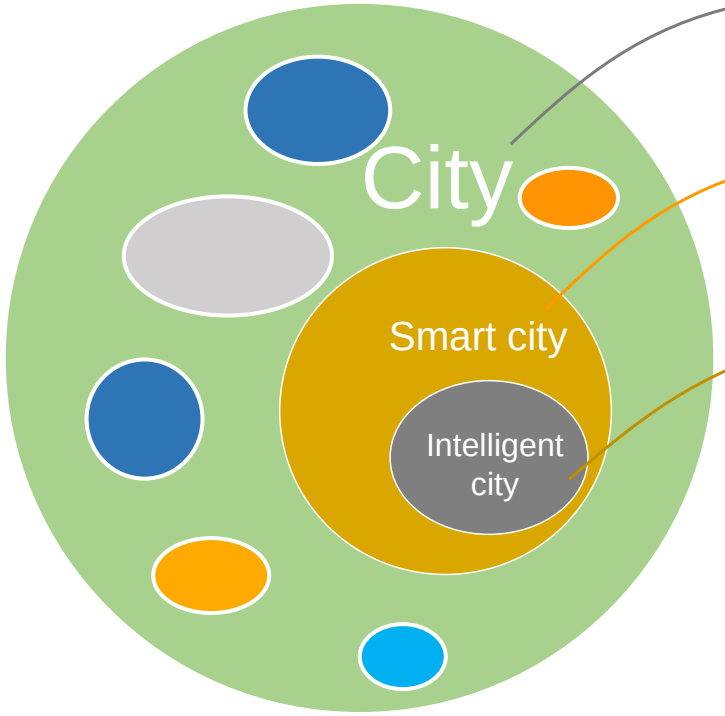
Three Decades of Research on Smart Cities: Mapping Knowledge Structure and Trends

by Ayyoob Sharifi [1,*], Zaheer Allam [2], Bakhtiar Feizizadeh [3] and Hessam Ghamari [4,*]

5722 articles indexed in the Web of Science since 1991

https://www.mdpi.com/2071-1050/13/13/7140

Concept



City: an agglomeration of ecosystems; a system of systems

Smart city: city of data, IoT, automation, algorithmic solutions

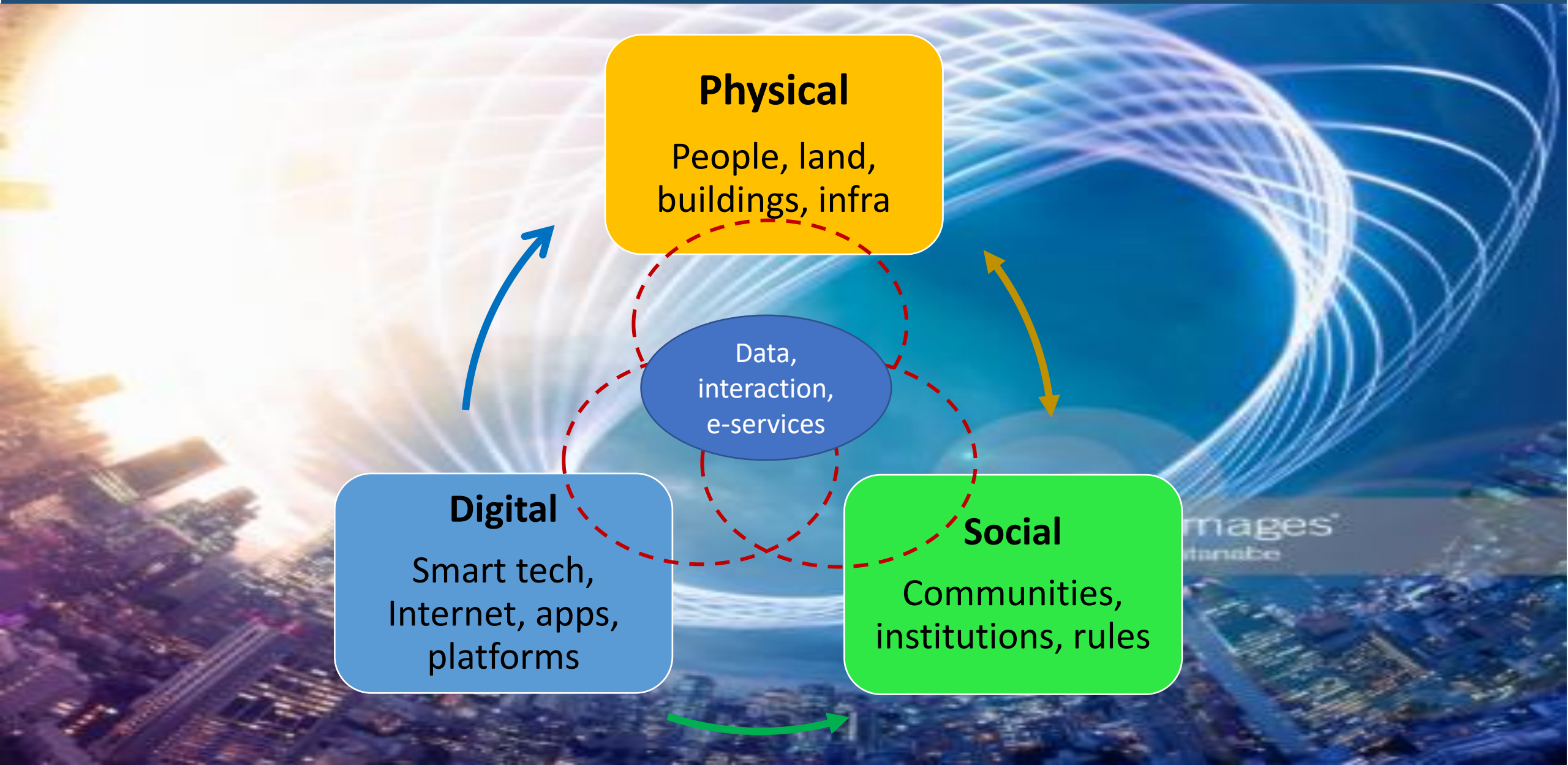
Intelligent city: city of cyber-physical innovation systems, high capabilities

Digital space – smart technologies level

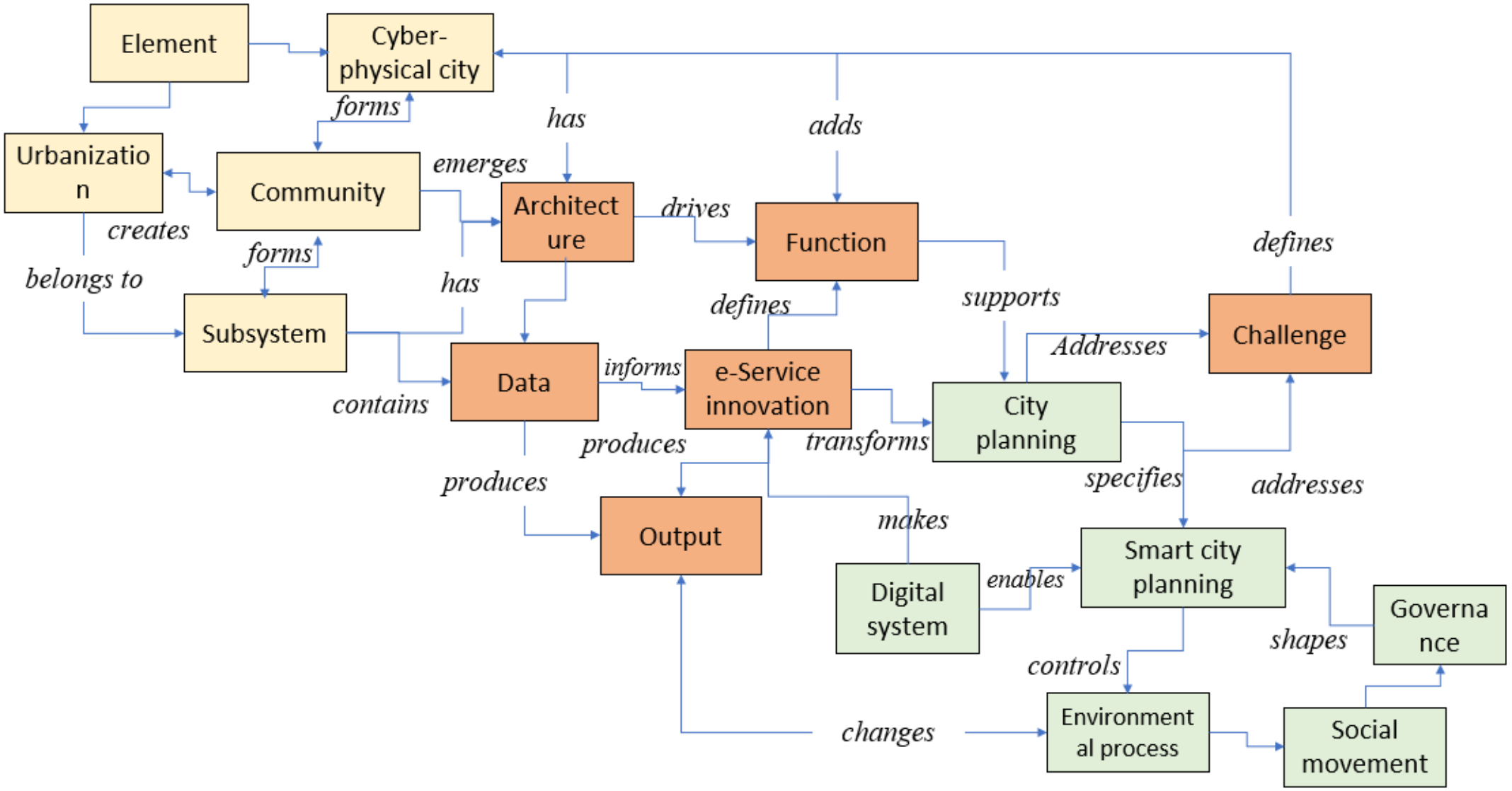
Knowledge and innovation level

People, activities, infrastructure level

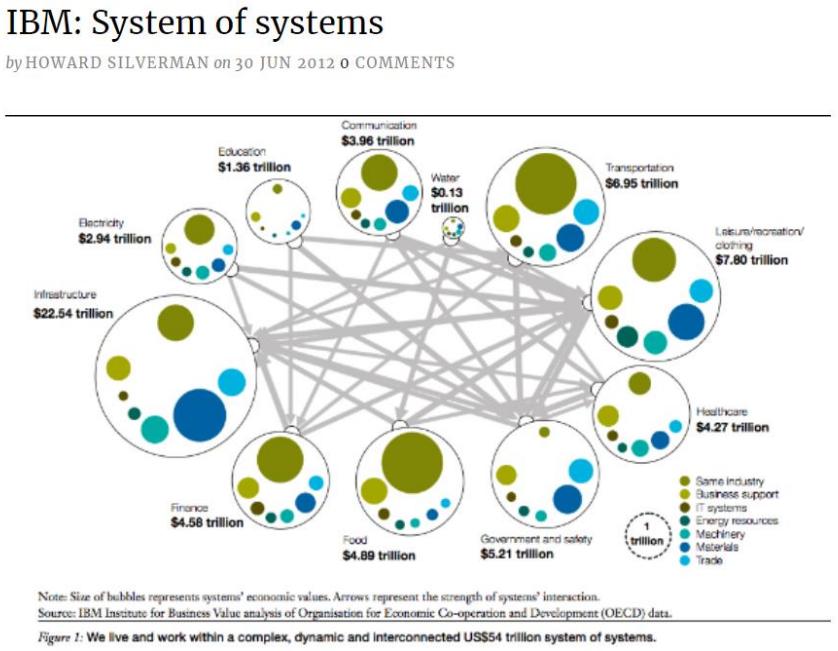
Structure: Smart cities and their ecosystems are made of physical, social, and digital entities (not digital only)



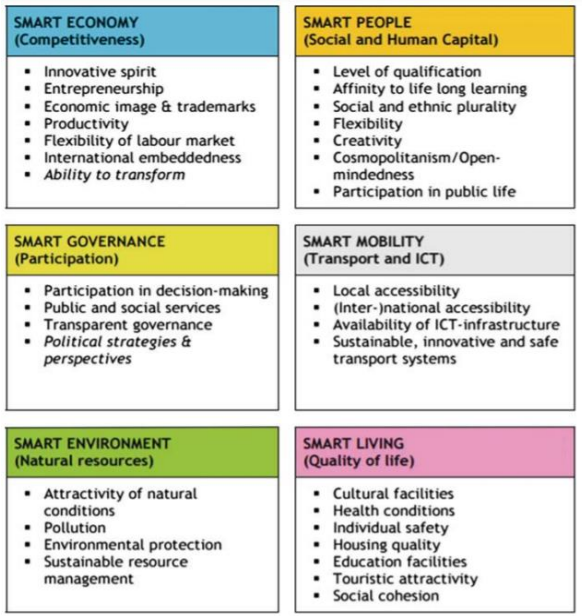
Structure: Three blocks in the smart city ontology, community, data & services, planning



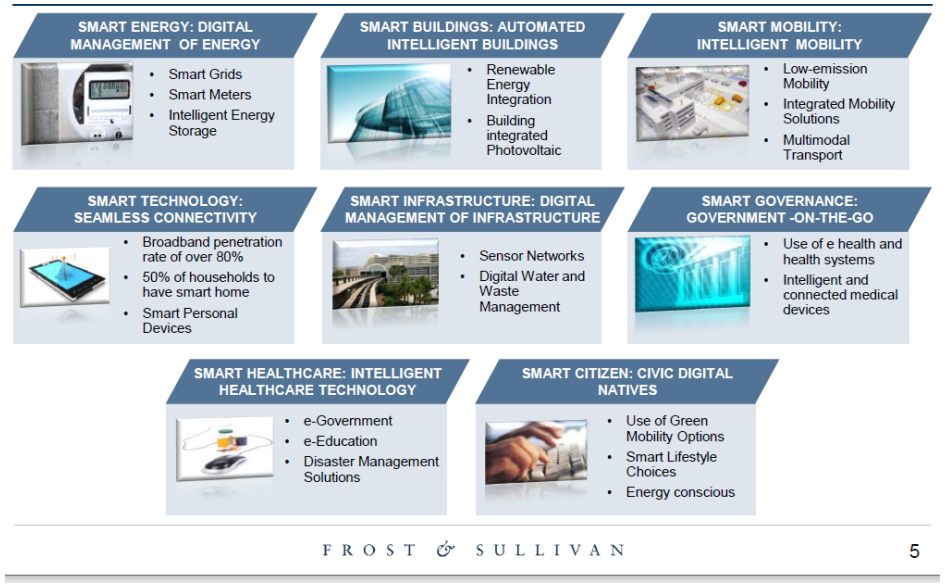
Structure: A system-of-systems composed of smart ecosystems, which follow their own trajectories of change



IBM Institute of Business Value (2010): IBM system of systems

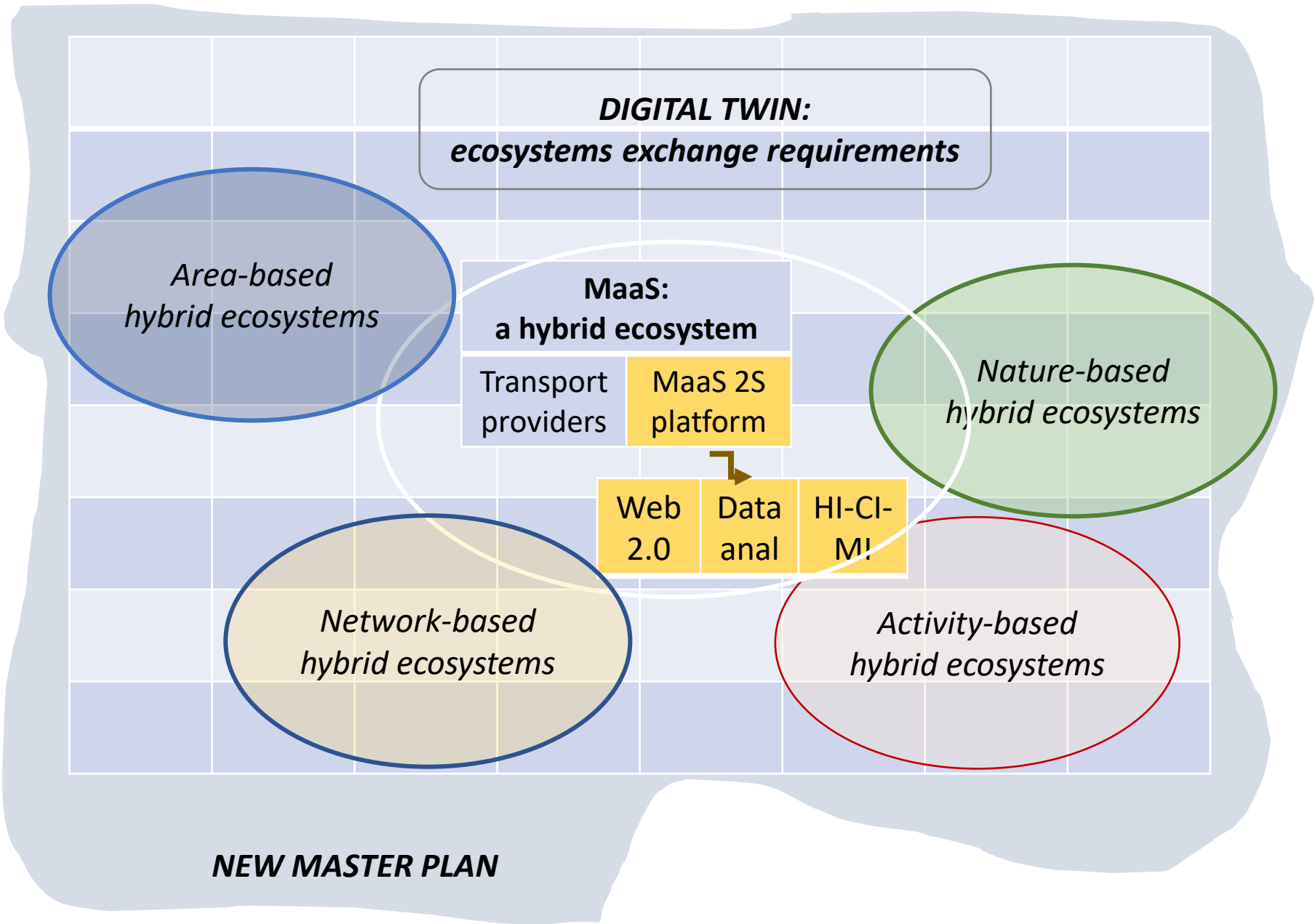


Giffinger, R., & Gudrun, H. (2010). Smart cities ranking: an effective instrument for the positioning of the cities?. ACE: architecture, city and environment, 4(12), 7-26.



Frost & Sullivan (2020). Smart Cities: F&S value proposition

Planning: Master planning to integrate smart ecosystems



Planning: Smart city project and types of impact

Types of smart city projects

E-SERVICES: hundred of digital services for all domains and activities of cities

DATA COLLECTION & ANALYTICS: the city becomes a measured system. Data-modeling-forecasting

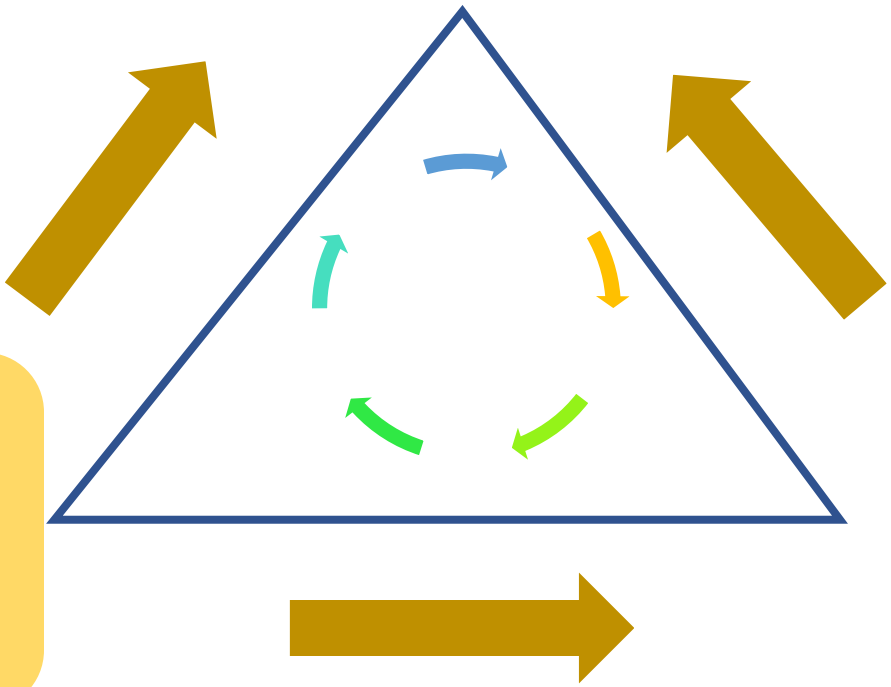
CYBER-PHYSICAL PROJECTS transforming city areas (e.g. Sidewalk Toronto, Quayside project abandoned)

Types of impact on the ecosystem	
DIGITALISATION	**E-services in all ecosystems of cities.** Most projects (apps) just transfer activities from the physical to the digital space. Underlying **routines remain the same**. Usual in e-gov. and e-commerce.
OPTIMIZATION	**The city becomes a measured system.** Data, analytics, algorithms can **optimize activity routines**. GPS, smart meters, virtual assistants, digitally guided behaviour, are examples of optimisation
INNOVATION	**Complex cyber-physical projects change activity routines**, introduce new routines. MaaS, Net zero districts, Vison zero for urban safety are examples of innovation. **Platform ecosystems** re-organize economic activities & services.

Operation: Smart city ecosystems generate connected intelligence

Human intelligence

-Knowledge and decision-making
- System 1 (fast thinking)
-System 2 (slow thinking)
-Intelligence and innovation



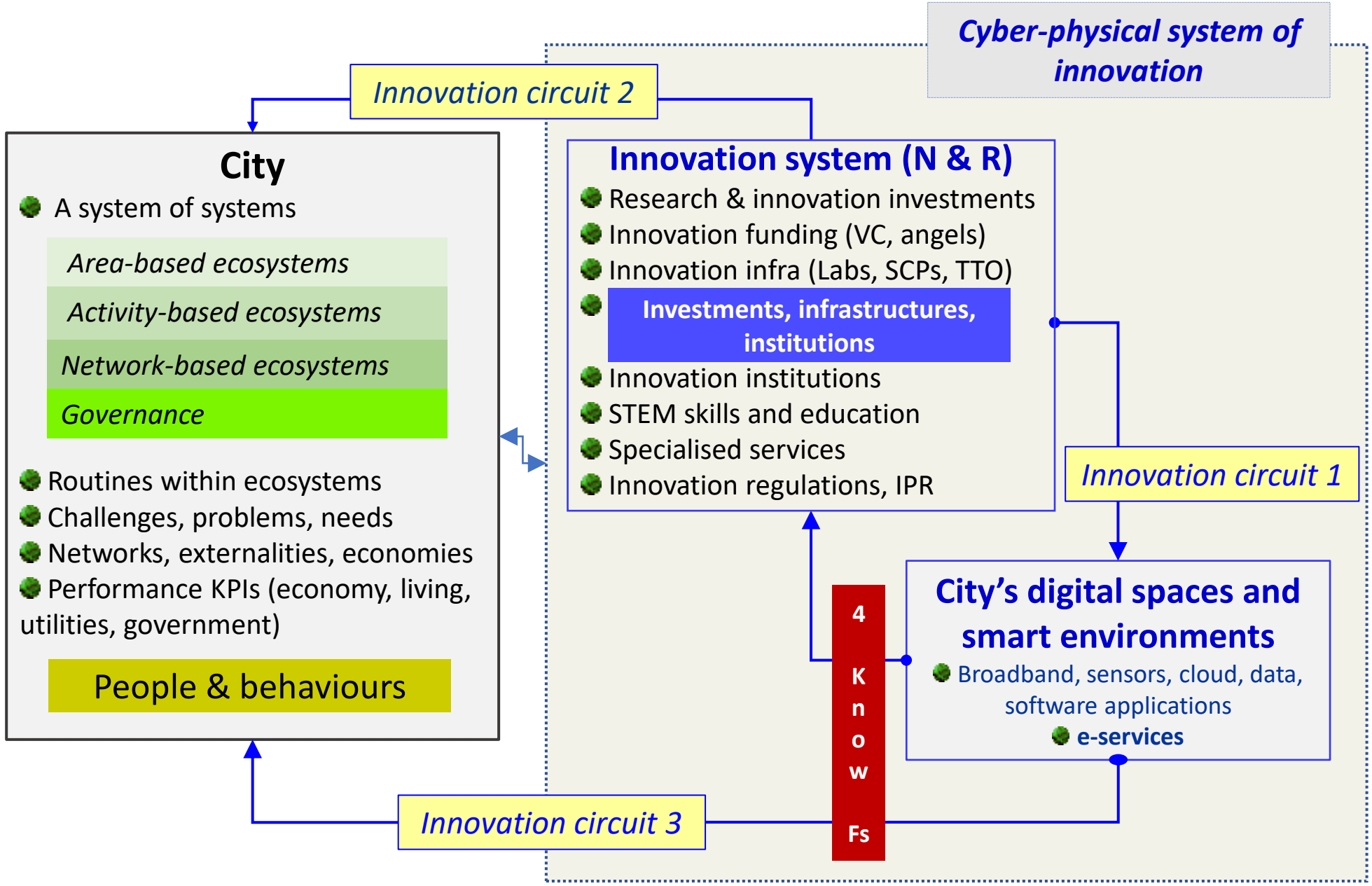
Machine intelligence

L1. A few functions of intelligence (memory, alert, communication)
L2. ANN, narrow AI, GTP-4
L3. Artificial General Intelligence, strong AI, future AI

Collective intelligence

-Community/ecosystem basis
-Specialization-based capabilities
-Design thinking /combinatory lg
-Power-based decision making

Operation: Optimisation & innovation of ecosystem activities



Formation – Structure – Planning - Operation: The entire cycle

CITY ECOSYSTEMS & CHALLENGES

CONTEXT: SOCIAL, TECH, ECONOMIC

SMART CITY PARADIGM

Smart cities

Digital tech

Data, analytics

SMART ECOSYSTEMS

- Cyber-physical-social systems
- Platforms
- Area / activity / network

CONNECTED INTELLIGENCE

- Externalities
- Collaboration
- Awareness
- Interoperability

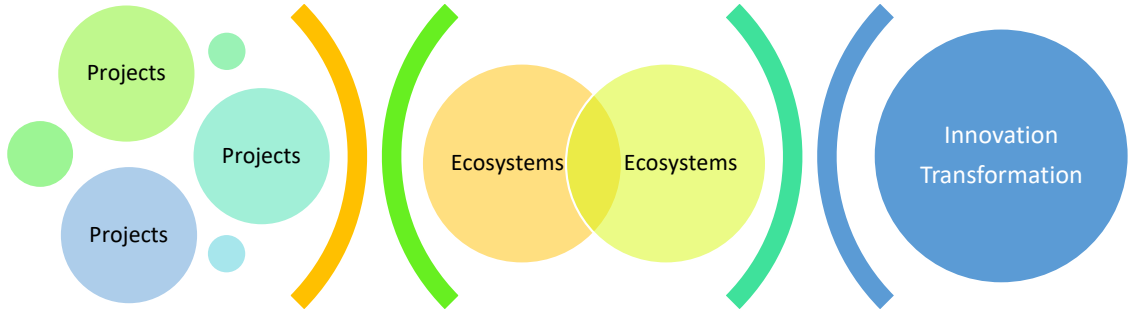
INNOVATION

- Change routines
- Disruptive
- Social innovation
- Eco-innovation
- Business models

SOLVING PROBLEMS of

- Growth
- Safety / living
- Sustainability

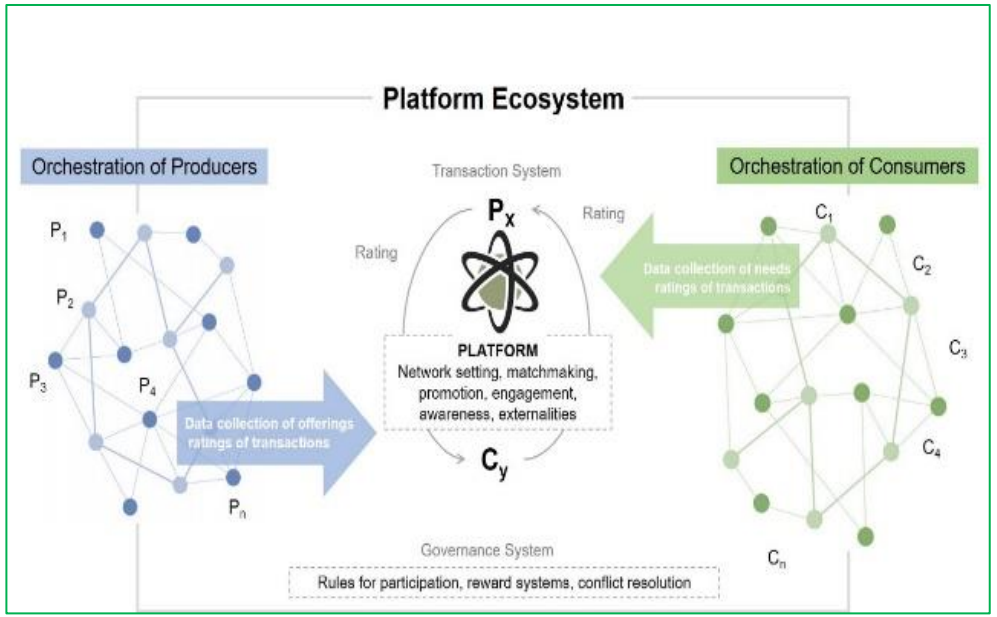
CITY & CHALLENGES BLOCK → INTELLIGENCE BLOCK → IMPACT & BEHAVIOUR BLOCK



SC projects *Smart ecosystems* *Innovation*

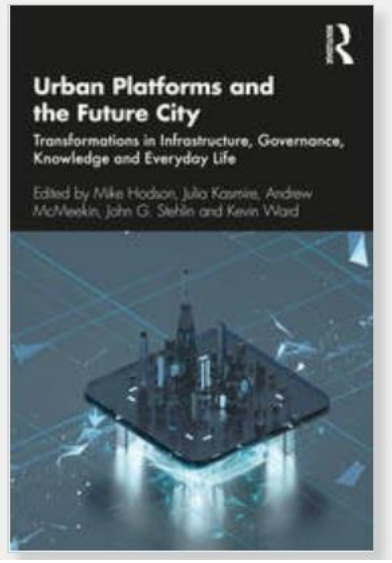
II. Digital platforms, models, and smart ecosystems

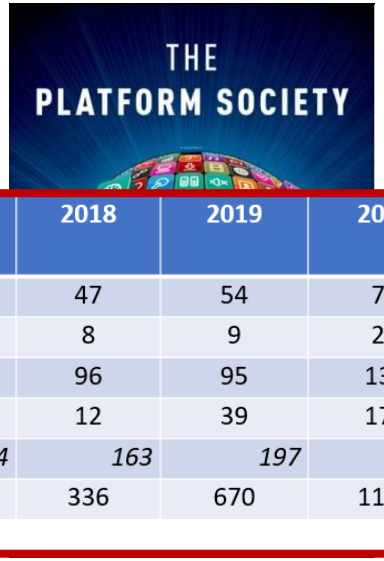
Digital platforms and platformization of cities

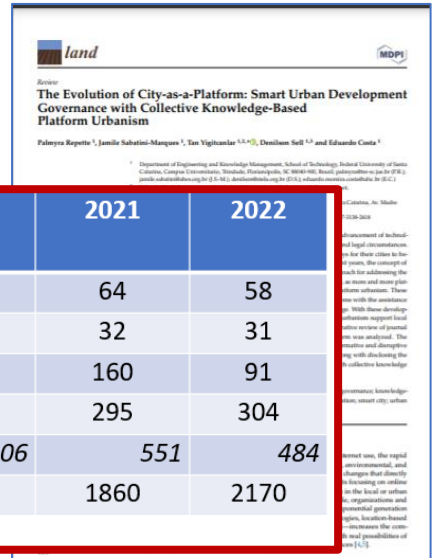


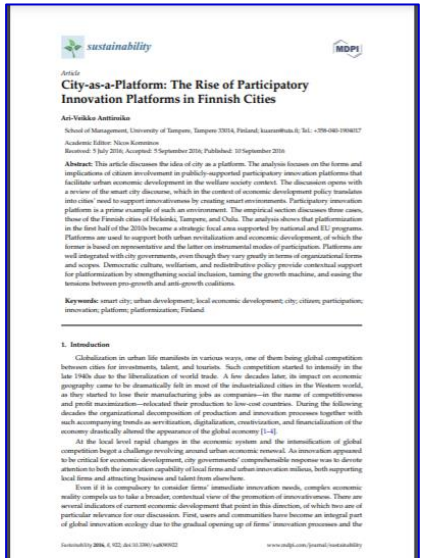
Digital platforms enable city ecosystems to evolve into **platform-based ecosystems**

- ***DP are technological building blocks*** (that can be technologies, products, or e-services) that act as a foundation on top of which a group of interdependent actors (called complementors), develop inter-related products, technologies and services
- ***DP are collaborative business models*** that allow multiple participants (producers, consumers) to connect, interact with each other, create and exchange value, create ecosystems





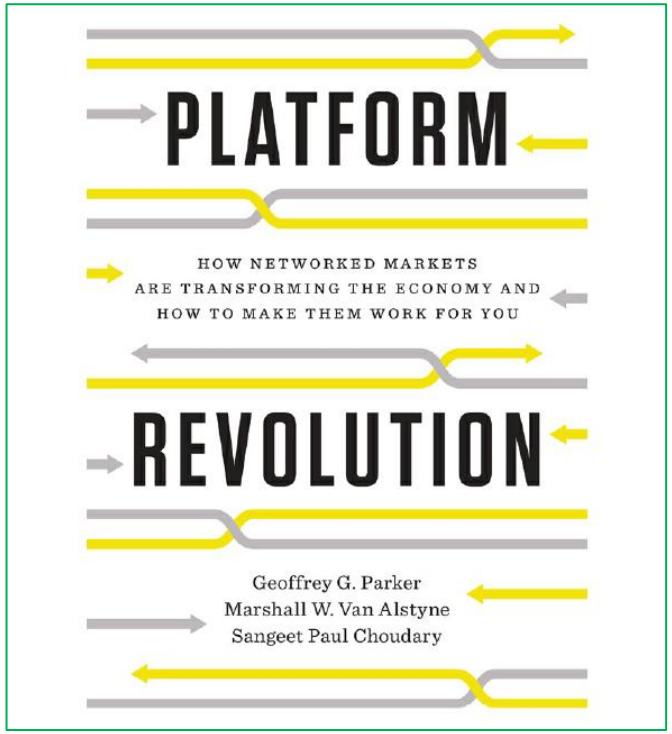




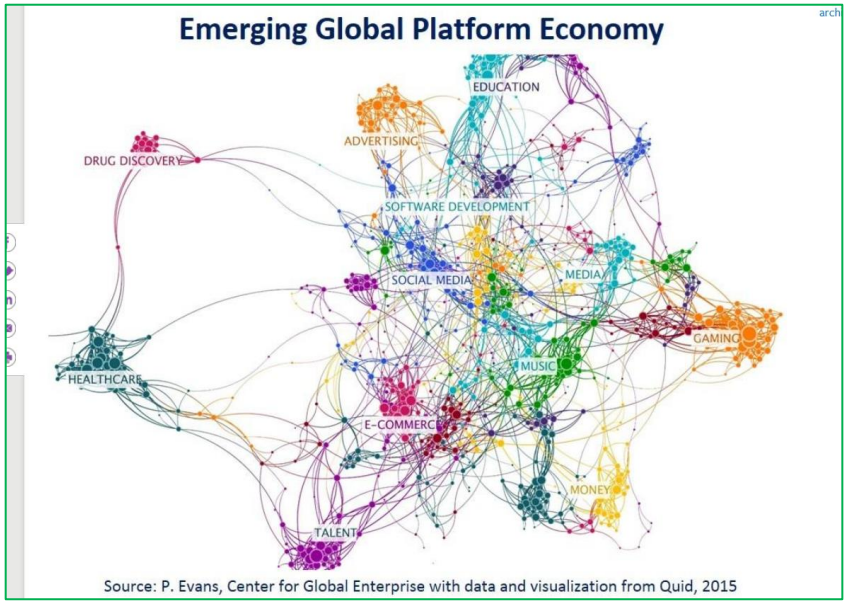
Search terms	2017	2018	2019	2020	2021	2022
"Platform city"	43	47	54	74	64	58
"Platform cities"	8	8	9	23	32	31
"City as a Platform"	59	96	95	135	160	91
"Platform urbanism"	4	12	39	174	295	304
Total	*114*	*163*	*197*	*406*	*551*	*484*
"Platformization"	137	336	670	1100	1860	2170

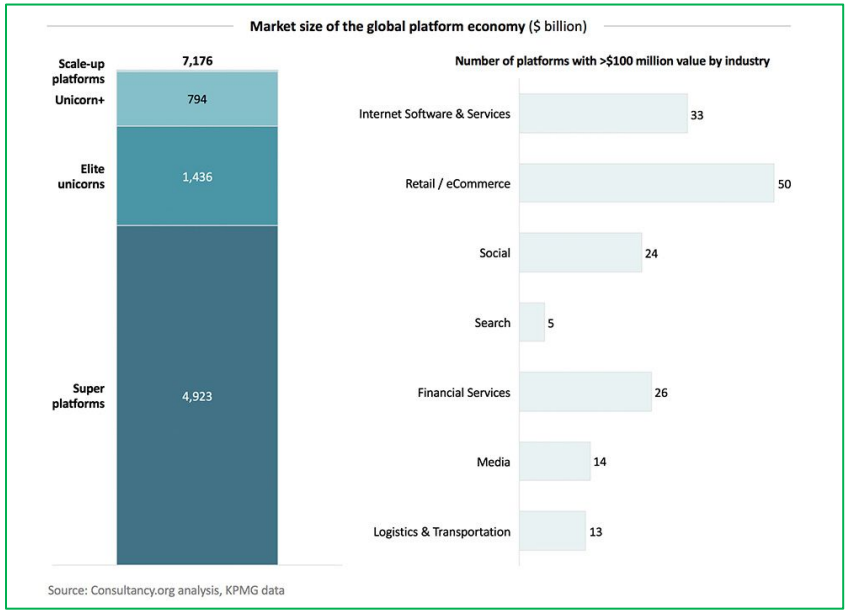
Source: Google Scholar, 2022-10-17

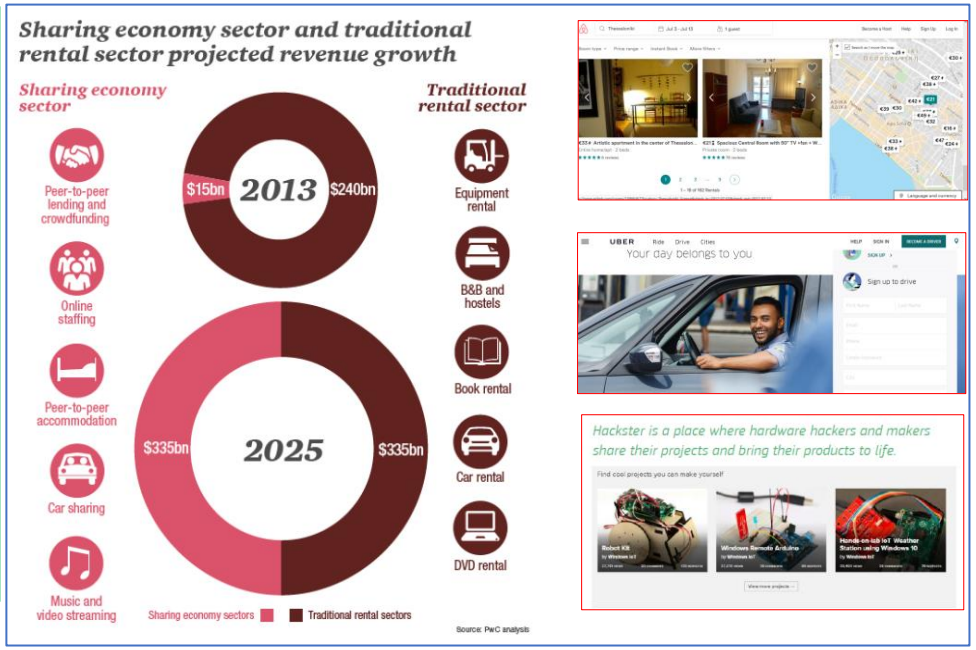
Platform revolution



Platform Revolution: A guide to one of the most significant economic and social developments of our time, the rise of the platform as a business and organizational model.
(Parker, G. G., Van Alstyne, M. W., & Choudary, S. P., 2016)





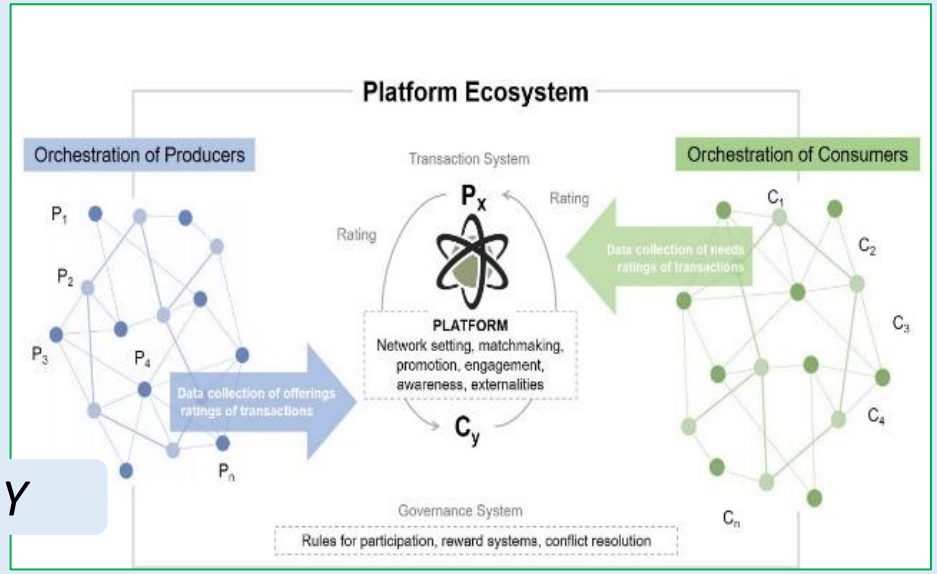


Industries under transformation

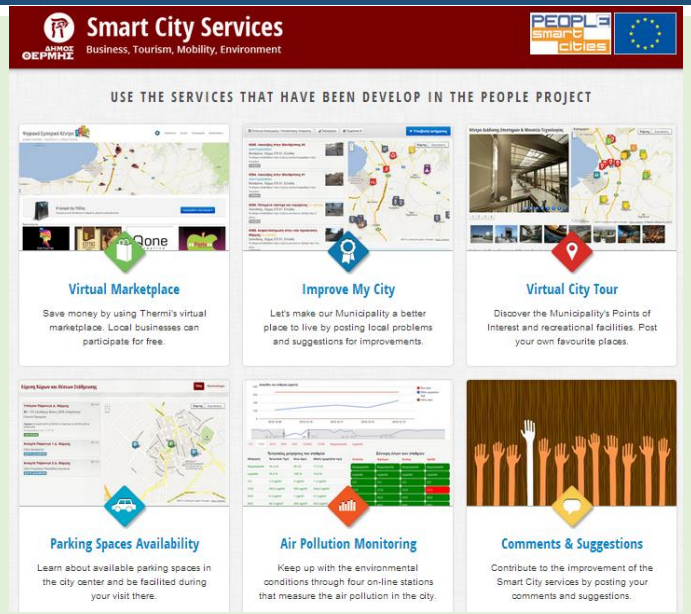
- Transports, mobility
- Financial services
- Freelance professions
- Tourism services,
- Hospitality
- Insurances
- Health services
- Trade, energy, information services

Platform-based are the new models of smart city ecosystems

ECONOMY



GOVERNANCE



HOUSING

Block A. District

Demographics
- Population
- Number of households
- Density

Land use
- Total area of the district
- Housing area
- Social care, education, culture, sports area
- Local retail and services area
- Road and parking area
- Green, gardens, urban forests area

City grid
- Number of building blocks on the grid
- Number of lighting poles on the grid
- Road length of the district grid

Building code
- Building Coverage Ratio
- Floor-Area Ratio
- Housing floor per capita

- People using public transport in commuting-
- People using bicycle or work from home

Block B. Energy usage & CO2

Energy consumption residential
- Energy consumption residential, total
- Energy consumption residential-Heating
- Energy consumption residential-Lighting & appliances
- Energy consumption residential-Domestic water heating
- Energy consumption residential-Cooking
- Energy consumption residential-Cooling
- Energy production renewable

CO2 emissions residential, total
CO2 emissions per category of usage

Energy consumption streetlighting
- Total
- Lamp power per pole
- Street lighting system operating hours per year

Energy consumption in mobility
- Energy consumption in mobility by public transport
- Energy consumption in mobility by private car
- Energy consumption in mobility by electric car & micro-mobility

- CO2 emissions in mobility by public transport
- CO2 emissions in mobility by private car

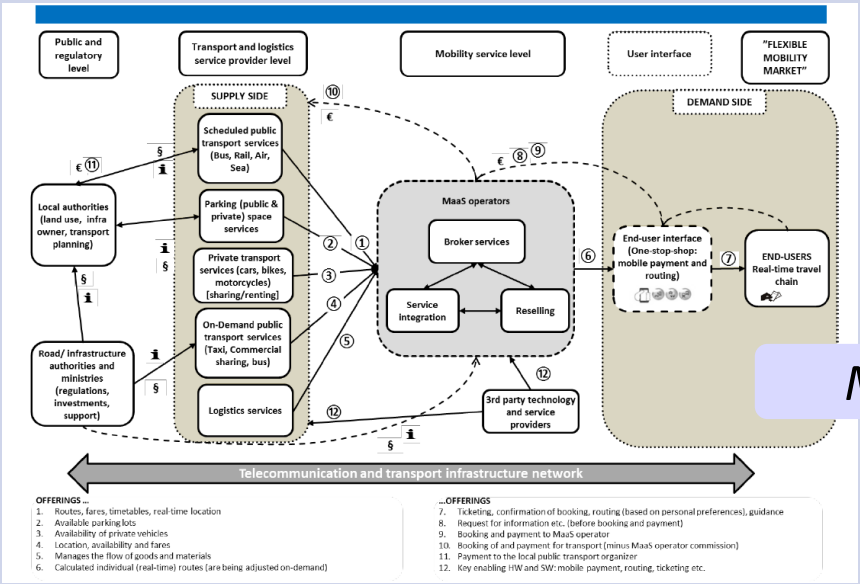
Block C. Measures towards NZED

C1. Housing: energy efficiency by refurbishment
C2: Housing: energy saving by smart home solutions
C3. Public lighting: saving by smart systems
C4. Transport: green mobility & energy saving
C5. Smart grid and storage
C6. Local RE: Photovoltaic panels
C7. Local RE: Geothermal
C8. Nature-based solutions: Tree canopy

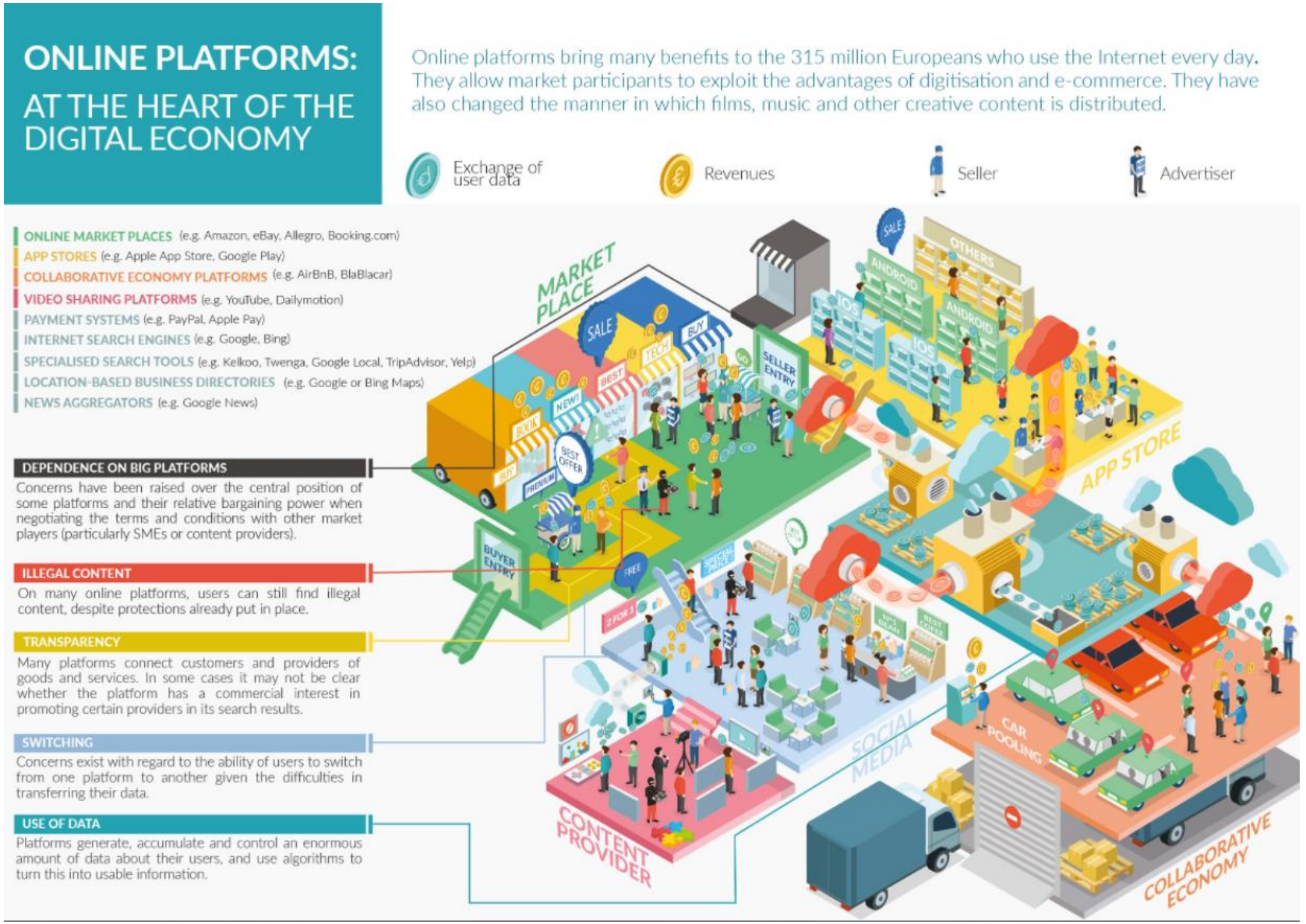
Block D: Balancing energy and CO2

Energy	Residential energy saving	Mobility energy saving	Smart grid, storage, renewable energy	CO2	Green mobility	Nature-based solutions
ΣE_B	Esav [C1 +C2]	Esav [C3+C4]	Eres [C5+C6+C7]	ΣC_{MOB}	-CO2 [C4]	-CO2 [C8]

MOBILITY

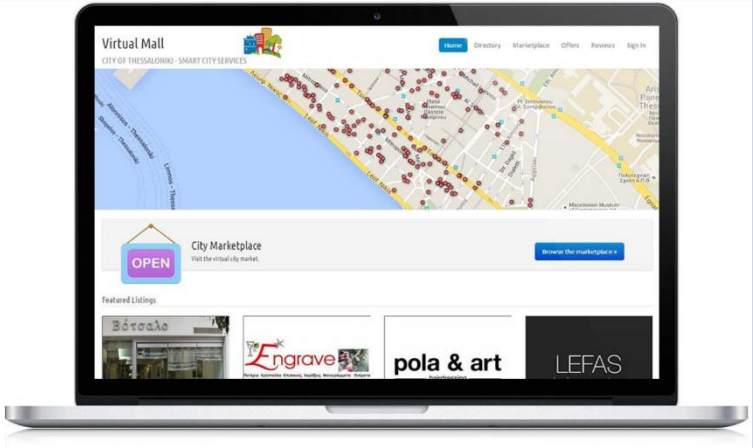
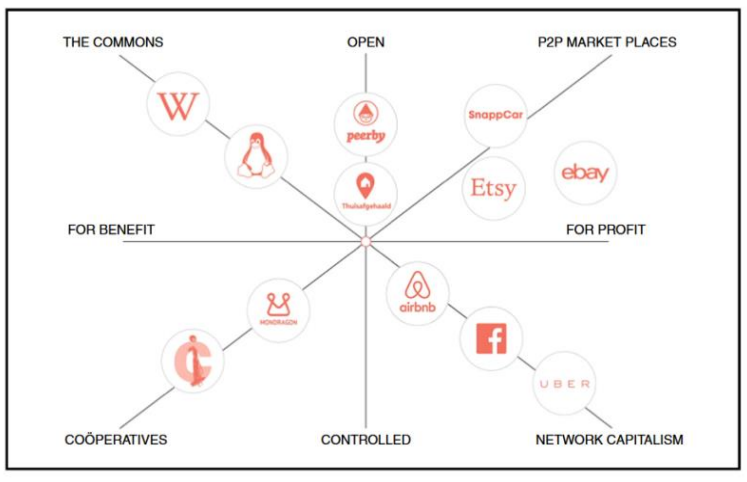


Platforms transform all city ecosystems
Platforms vs Applications: dwarfs standing on shoulders of giants & agglomeration

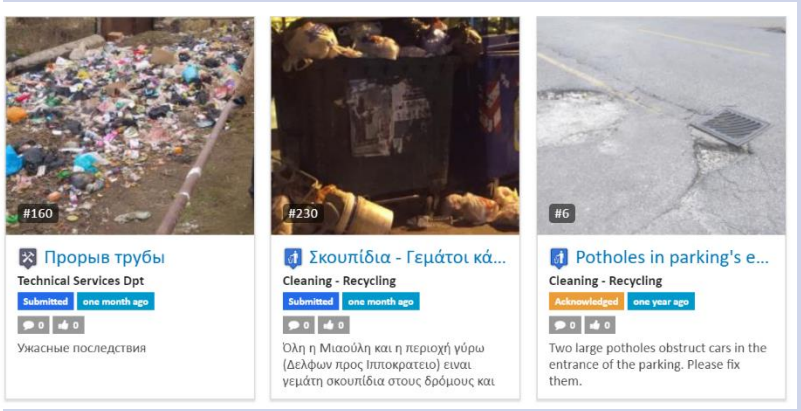
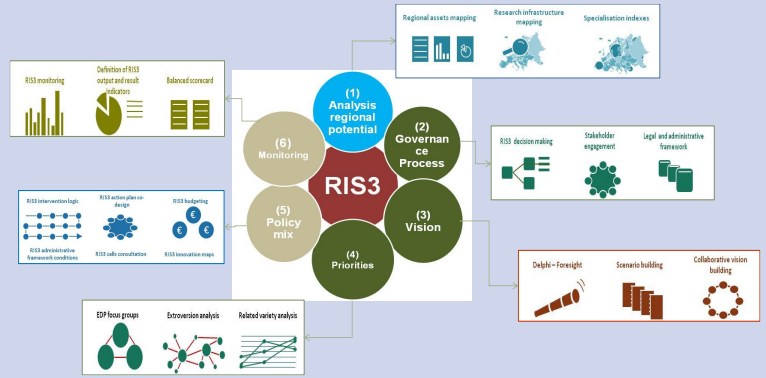


Source: https://ec.europa.eu/information_society/newsroom/image/document/2016-23/platforms_infographic_16081.jpg

Types of platforms: I. Connecting producer and consumer sides (2S)

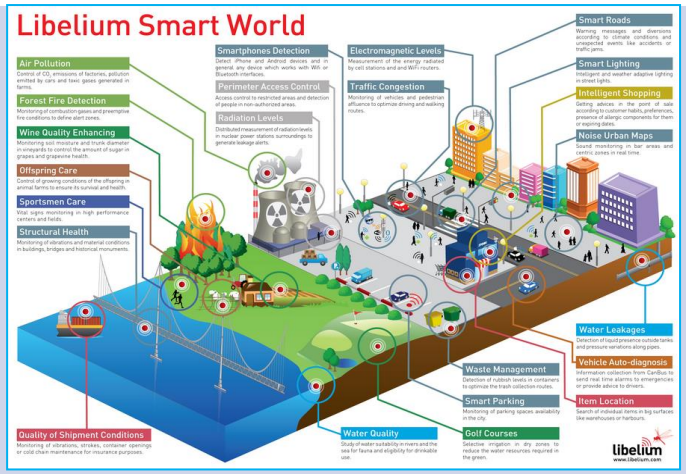
MARKETPLACES	HOSPITALITY	SHARING ECONOMY
		
Every commercial business in a city can create its own virtual store. The marketplace allows customers to have access to a variety of stores that are on the platform	Online platform and hosting facilities for short-term accommodation rental or lease. Airbnb does not own any real estate. It's a platform that takes a fee for every reservation.	Rise of the sharing economy • Business development platforms • Business-to-Business operation • Demand-driven P2P production

Types of platforms: II. Connecting actors and crowds

GOVERNANCE	SOCIAL RESPONSIBILITY	SOCIAL INNOVATION
		
Participatory governance: • Citizens report problems, propose solutions, and participate in city administration. • Extracting information from usage data for better management.	A complex system for zero fatal traffic accidents, which combines • High-risk network mapping • Citizen participation • Network redesign • Digital technology • Monitoring and evaluation	Social innovation and user participation • Social innovation platforms • Non-economic incentives for participation • Forming a common vision of strategies • Participatory design of policies and solutions

Types of platforms: II. Connecting objects and infrastructure

SENSOR NETWORKS



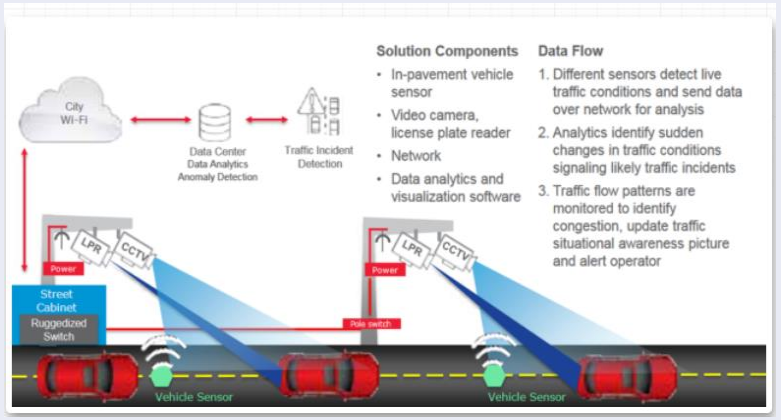
Sensor networks, real-time notification

- Behaviour change / optimization
- Improvement of governance with a focus on the environment, pollution, energy saving, CO2 emissions, climate change

POLLUTION

Santander, Spain's sensors measure everything from the amount of trash in containers, to the number of parking spaces available, to the size of crowds on the sidewalks. *Flickr/FreeBird*

- Prediction of pollution
- Parking management

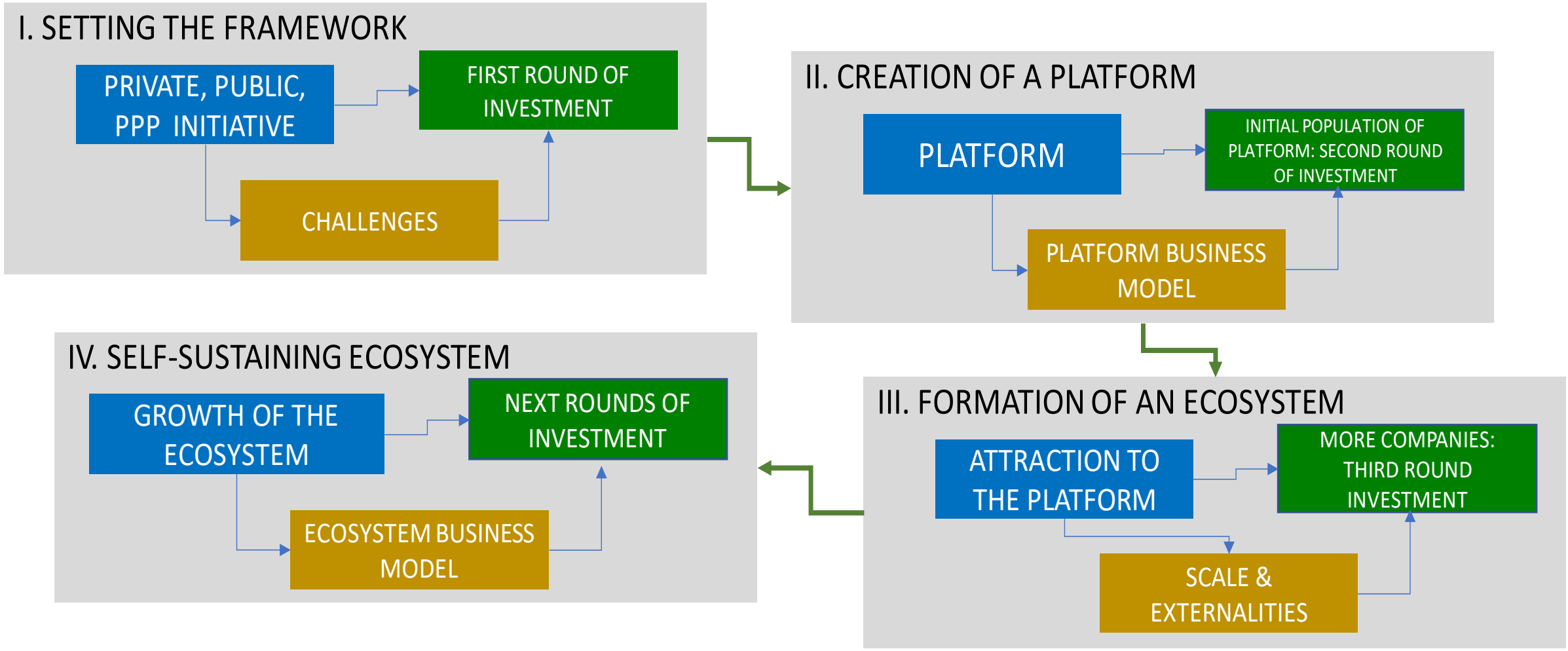


CITY INFRASTRUCTURE

Water sensor and meter network.

- In cities, the amount of water lost due to leaks in the pipelines ranges from 15% -50% of water consumption.
- Pressure and sound sensors can alert and identify the point of leakage.

From platforms to platform-ecosystems



- In a platform-ecosystem, complementors offer products or services.
- Complementors use resources and services provided by the platform.
- Customers receive services through payment or by providing data and feedback.

Setting a platform ecosystem

ECOSYSTEM TYPES

Aggregator

- An Ecosystem driver brings together services from multiple Service contributors
- The aggregator owns the customer relationship
- Network is selective

Example: The SMILE project in Vienna is aggregating services from a number of actors into a single integrated mobility platform

Marketplace

- A Marketplace facilitator runs a marketplace where Service contributors offer services
- The customer relationship is owned by the individual Service contributors
- Network is open and actors joint/ leave frequently

Example: In Milton Keynes the open data approach enables anyone to access large amounts of data from multiple kinds of networks including social media.

End-consumer

Leading roles

Marketplace facilitator
Operates a marketplace where Service contributors can offer services

Ecosystem driver
Brings together services from multiple contributors with own offerings to the end customer

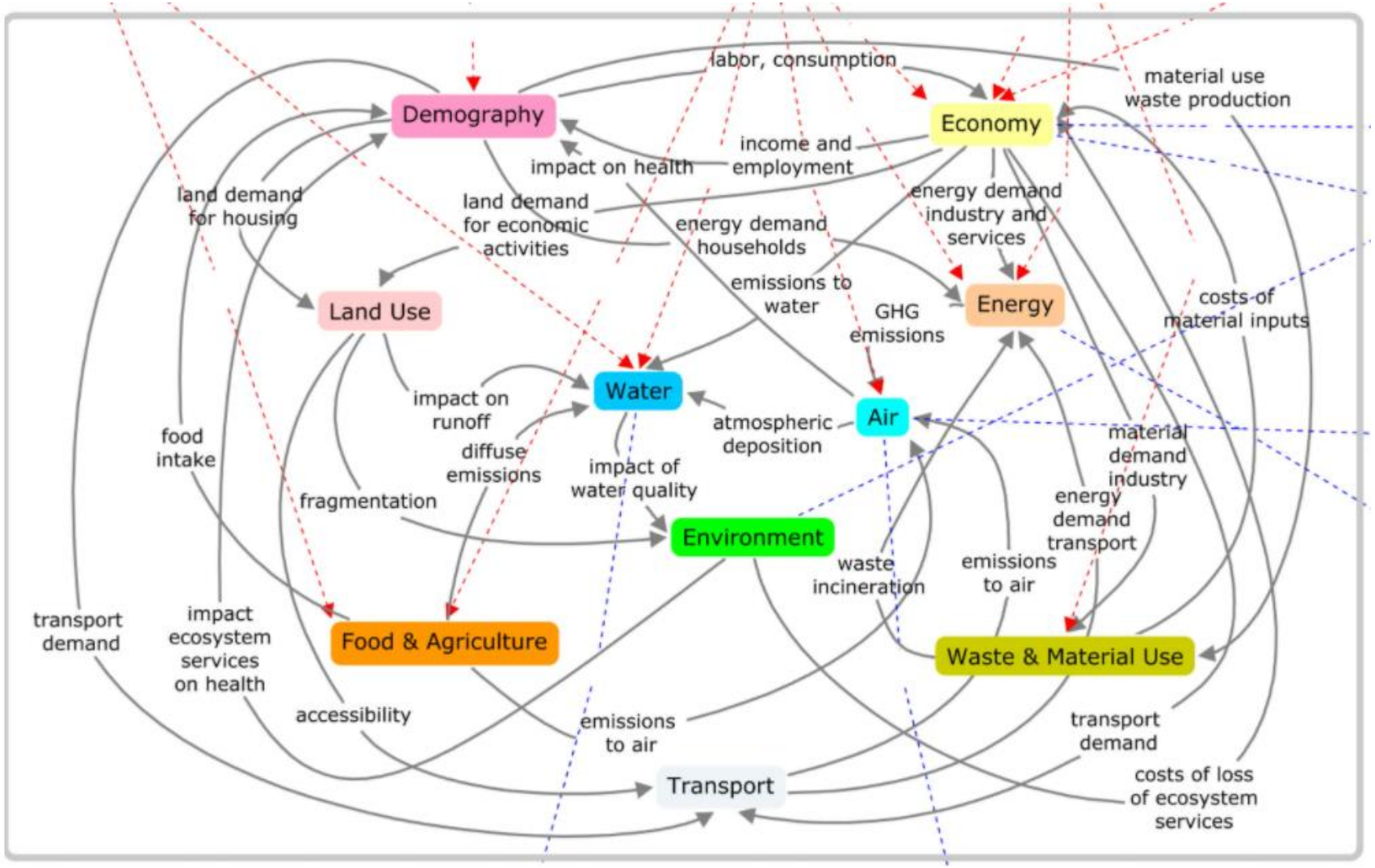
Contributing roles

Service contributor
Offers own services in a marketplace or an aggregator ecosystem

Platform enabler
Provides technical solutions (horizontal and vertical) that enable the ecosystem

https://tesoab5v64mprod.azurewebsites.net/globalassets/telia-company/documents/news/connected_things-publictransport.pdf

Dynamic interdependencies and emergent behaviour in the ecosystem



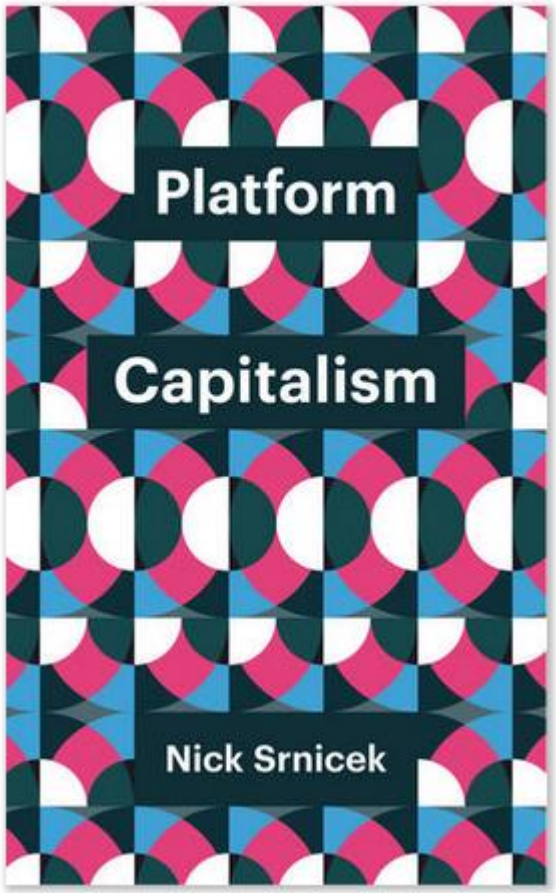
The Unique Value of Crowdfunding Is Not Money — It's Community

by Ethan Mollick

April 21, 2016

III. Economy and governance:
Externality platforms & disruptive innovation

Internet platforms expanding to all industries



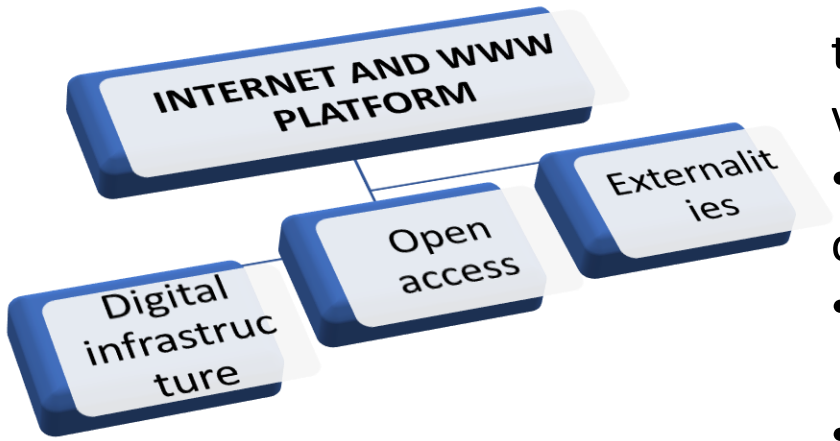
What unites Google and Facebook, Apple and Microsoft, Siemens and GE, Uber and Airbnb?

Across a wide range of sectors, these firms are **transforming themselves into platforms**: businesses that provide the hardware and software **foundation for others** to operate on.

This transformation signals a major shift in how capitalist firms operate and how they interact with the rest of the economy: the emergence of platform capitalism .

Srnicek, N. (2016). Platform capitalism.

Disruptive innovation over digital platforms



NETWORKED BUSINESS DEVELOPMENT

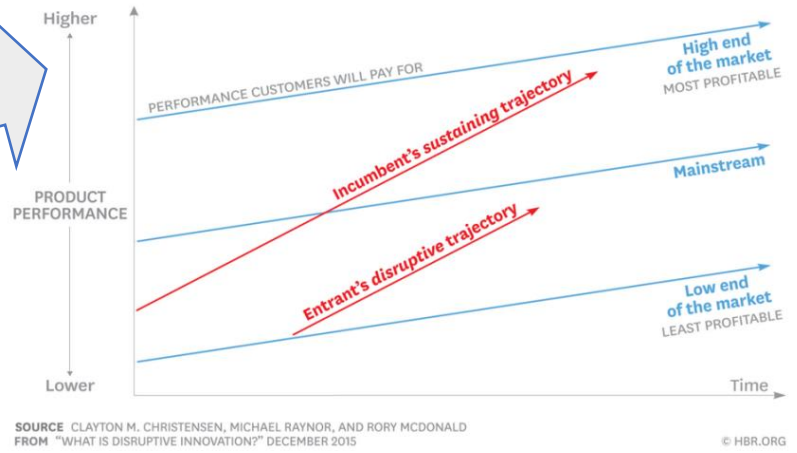
- Platform-based business models
- Business over business

- Complementors (operation over the platform) manage their own value chain
- Consumers become co-creators of value.
- Demand-driven production

- Dominant model in transport, hospitality, insurance, real-estate
- Disrupting one industry sector after the other

DISRUPTIVE INNOVATION

"Disruption" describes a process whereby a smaller company with fewer resources is able to successfully challenge established incumbent businesses (Christensen et al. 2015)

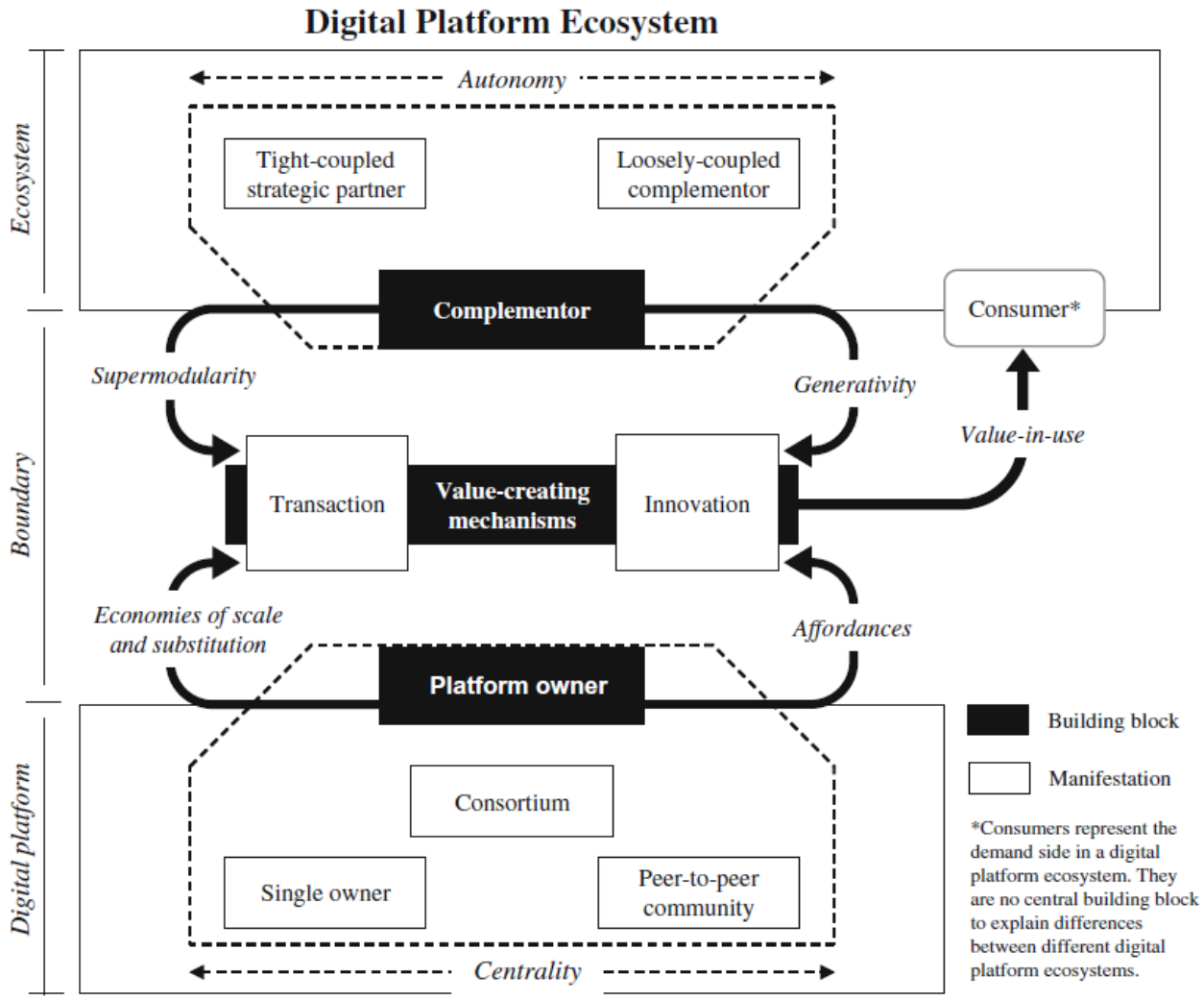


- Internet platforms enable the disruptive trajectory by providing knowledge, sharing, and collaboration externalities

Platforms, gig economy, 2-sided economy

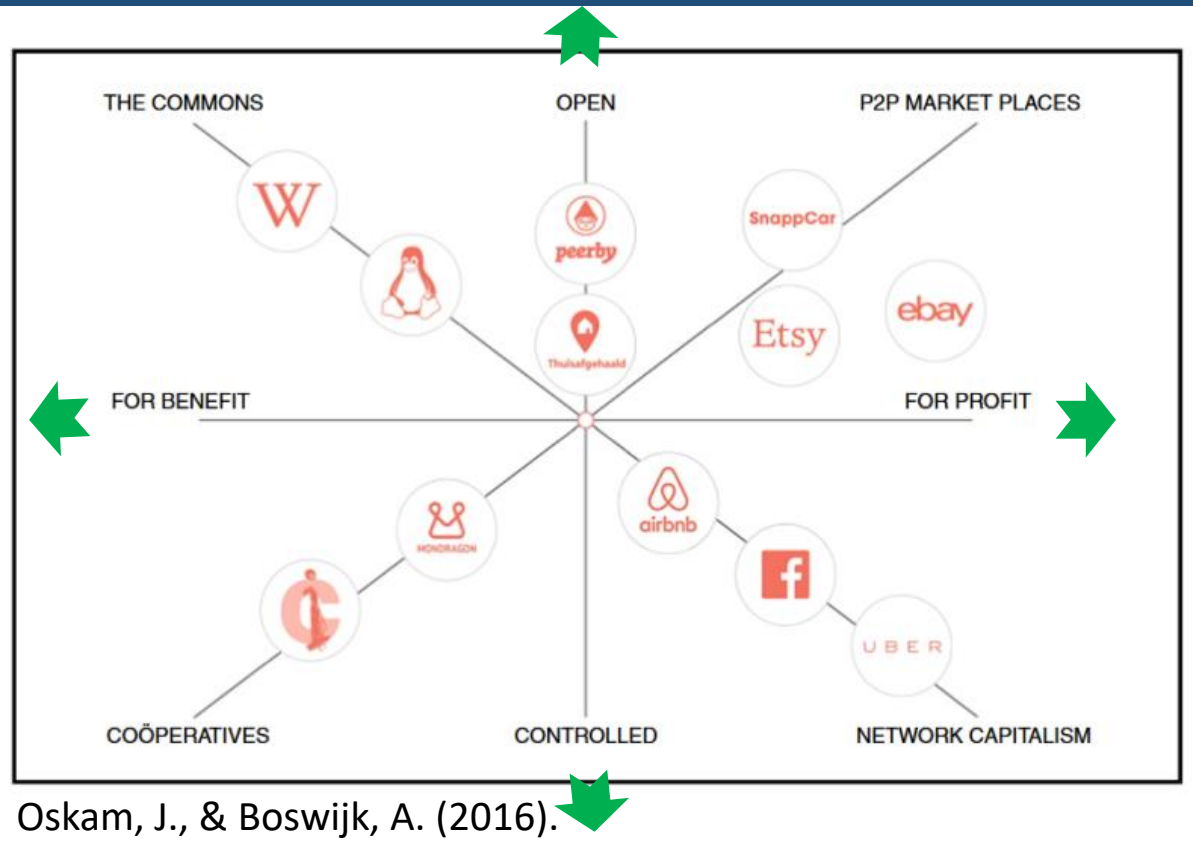
The gig economy

- Gig work
- Logged work model
- Work organised in separate logs
- Standardisation of tasks
- Free-lance workers, unregulated labour
- Demand driven work
- Notification of available gig
- Digital transactions
- Data and assessment
- Surveillance



Source; Hein, A., Schreieck, M., Riasanow, T., Setzke, D. S., Wiesche, M., Böhm, M., & Krcmar, H. (2019). Digital platform ecosystems. *Electronic Markets*, 1-12.

Externality platforms



Oskam, J., & Boswijk, A. (2016).

Typology axis	**Typology axis**
•Supporting SMEs to develop innovative products **vs.** •Supporting authorities to develop innovation policies	•Public **vs.** •Private / corporate

Internet Platforms in urban & regional smart growth policy: key components

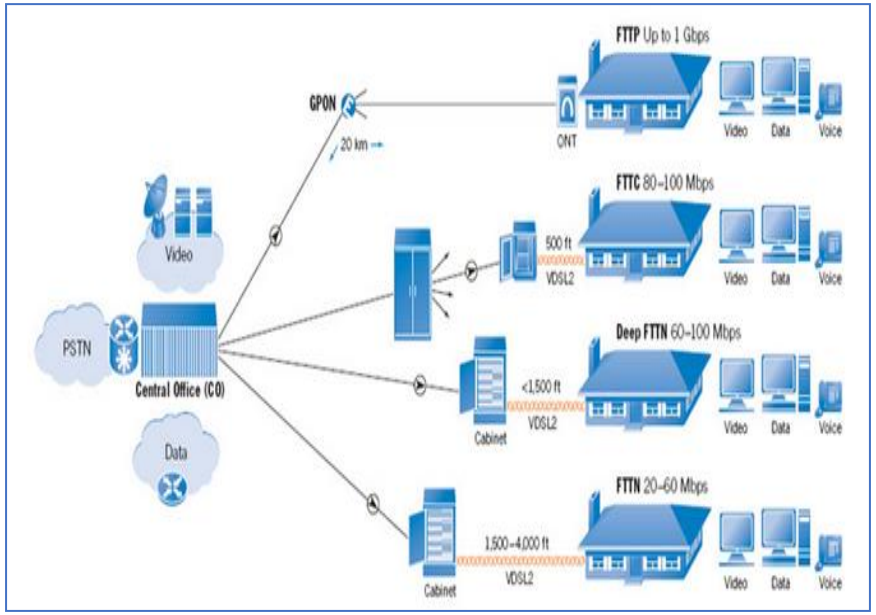
Connectivity
- Internet
- New Generation Networks
- Sensor networks
- Internet of Things

E-services
- R&D and technology
- Supply chain
- Market access
- Funding
- Strategy design

Business models
- Public funding
- P2P
- Reselling
- Data Monetization
- Crowdfunding

Integrated environments / cyber-physical spaces
- Smart districts
- Smart clusters
- Smart hubs

Burgundy: Infrastructure as a platform



Very high-speed broadband, FTTH

- Optical fiber in 174 communities by 2020. 250,000 households will be served. 75% of population by 2023.
- Public investment 850 million Euro
- Principle of citizens' equality
- 10% increase in broadband contributes to additional 1.21% GDP
- New jobs and businesses will be created, directly linked to NGN.

Digital entrepreneurial services

- Offer digital services to enterprises through a "digital portfolio" of applications and solutions.
- In case that digital tools and services are not available or provided under unsatisfactory licence, operators would receive support to develop such tools and enrich the "digital portfolio".

Digital services to citizens

- Culture and hospitality
- Vocational training over the Internet and provide personalised e-training
- Health, Telemedicine and the Personal Medical File.
- E-services in these fields are partly or fully paid from taxation.
- The business models and implementation rely heavily on public action and funding.

Governance

- Vertical e-services are organized by competent department. E-services as component of the respective policy.
- Horizontal e-services and platforms will provide support, G-cloud, monitoring and assessment to all.
- Key principle: open platforms, Service Oriented Architecture, re-use of applications

Platform logic

- High broadband connectivity to all. The network as platform for any kind of activity demanding high bandwidth
- Entrepreneurial services through a the "digital portfolio". An open repository of commons to be used by companies.
- Platform for specialised services. Mass customisation in services.

Regions of Greece: platform-based services for growth

National and 13 regional RIS3
1,240 million Euro investments

e-Government
e-Administration
eEmegency / Risk management
eHealth / Tele-care
eLearning
Smart cities, ITS, Smart energy

E-services for businesses (generic for all industry sectors)
- eBusiness
- eCommerce
- eLogistics / Supply chain
- Digital marketing
- Usual ICT (ERP, CRM, etc.)

E-services for tourism
- Virtual Points of Interest / AR
- Destination management
- eCulture
- mTourism

Typology of e-services: Platform logic

- ***Platform based e-services*** provided over open platforms, such as open marketplaces or open government;
- ***E-services based on resource pooling*** for business development, government, and utilities management (energy saving, transport, environment monitoring). Rely on applications or CMSs that can be standardised and used by various stakeholders and end users (businesses, administrations, citizens).
- ***E-services specific to companies***, with very low level of standardisation and replication, adapted to companies individually,

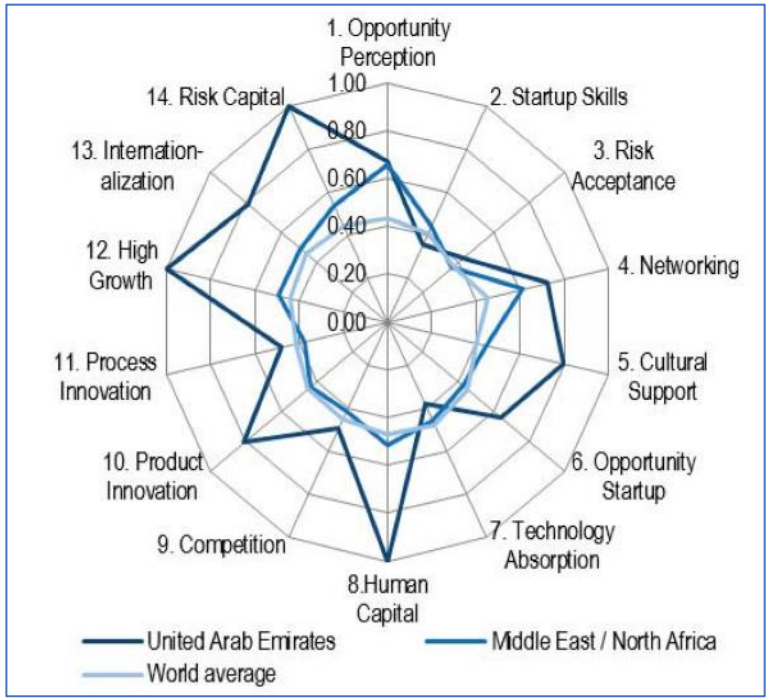
Two business models
(1) a state-aid business model, grants are offered for the development of services of the type 3 of e-services
(2) a platform-based business model using cloud computing for the type 1 and 2 e-services. Software applications will be offered by a central hub together with support to customize and learn using them.

UAE: Intelligent University Campus as a platform

University of Al Ain, UAE

An innovation ecosystem without borders by

(a) establishing global partnerships,
(b) using digital tools for innovation and business development
(c) adopting an open and user-driven approach to innovation.



Centers and technology infrastructure of the Park

1. Business accelerator and incubator for knowledge-based businesses
2. Innovation Pavilion: Services for innovative new businesses
3. Open R&D infrastructure and services
4. Education and training programmes

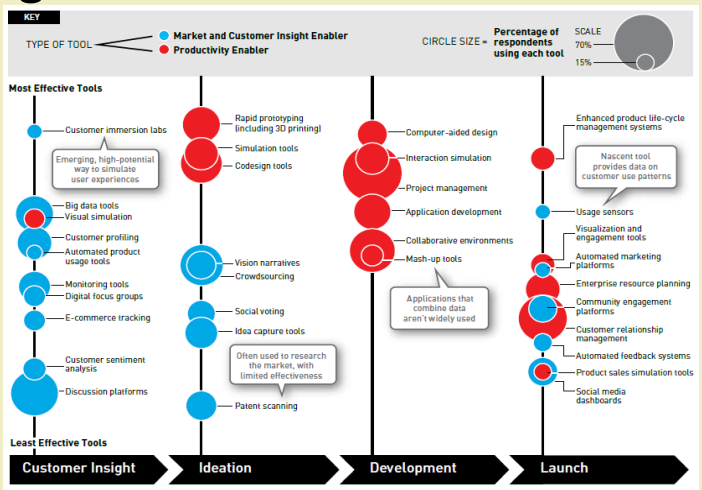
Innovation pipeline services to companies

5. Value added services on New Product Development
6. Ideation and proof of concept
7. Prototype development and testing
8. Commercialization of technology and academic IPR
9. Market creation and USAU SP promotion

Digital innovation environment

10. Broadband, cloud, and data center
11. Online services for technology development and innovation
12. The community of the Park: Building identity and trust

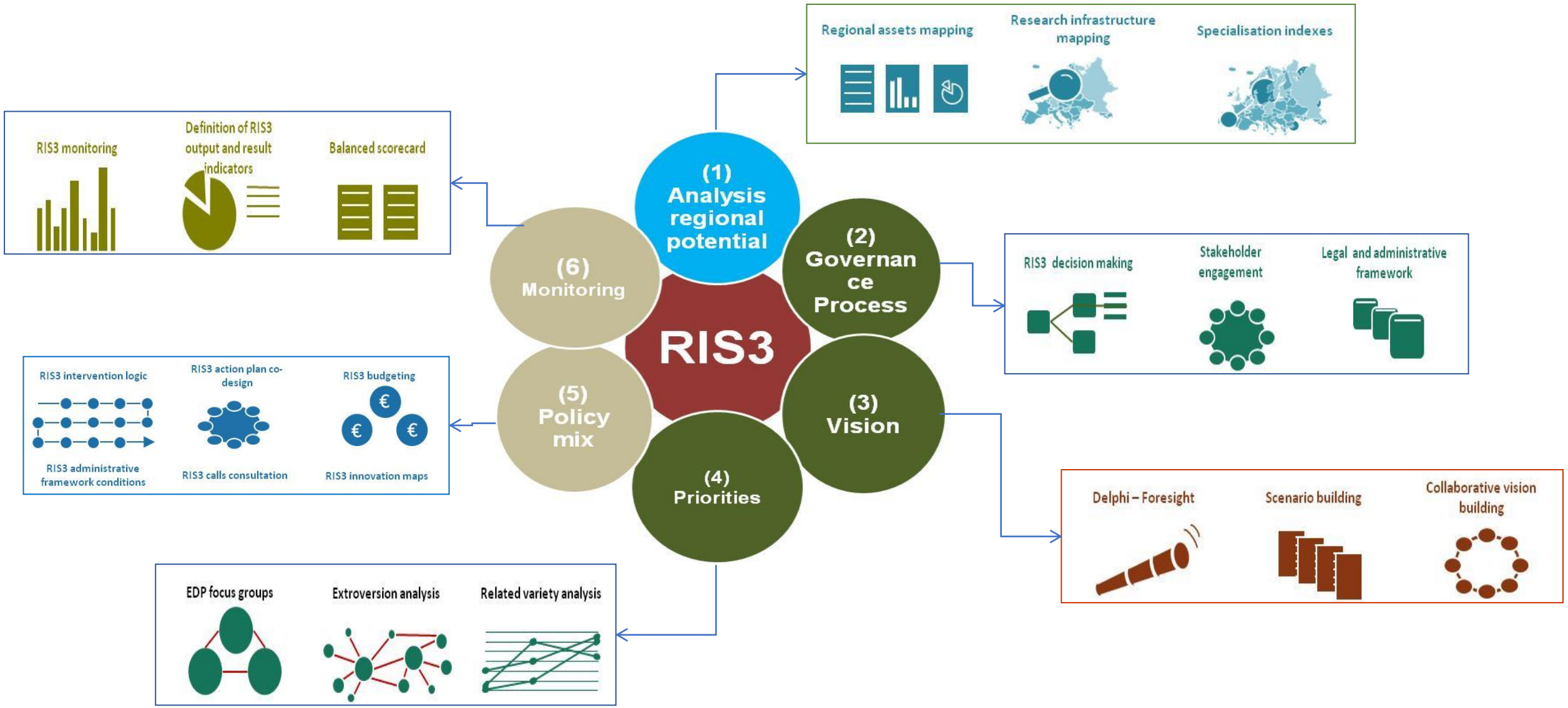
Digital innovation



Platform logic

- The entire system becomes a platform
- Collaboration and integration of the different centres, infrastructures, and digital spaces
- The human community of the area becomes driver for innovation & growth
- A series of web platforms to strengthen its knowledge functions

Online S3 platform: Governance of innovation



Online S3 Platform: Support innovation strategy by 28 applications

Phase 1: Governance

Vision sharing

Allows RIS3 managers to create visually attractive infographics to present the strategy's vision.

Stakeholder engagement

Invite RIS3 stakeholders to use online deliberation functionalities specifically tailored for EDP.

Debate at a glance

Enables participatory deliberation using functionality like argument mapping software.

Legal & administrative framework

Provides an overview of ERDF regulations and EU processes of selecting and funding projects.

Phase 2: Analysis of context

Regional assets mapping

A comprehensive and up-to-date mapping of the key regional assets.

Research infrastructure mapping

A comprehensive and up-to-date mapping of the existing and planned research infrastructures across the EU regions.

Clusters, incubators & innovation ecosystem mapping

Defining the framework, concepts and categories for mapping the innovation ecosystem of each region.

Benchmarking

Compare the performance of a region with regions that are structurally similar.

Regional scientific production profile

Production of 'scientific profiles' for regions based on Web of Science (WoS) data, Scopus and Google Scholar data.

Specialisation indexes

Technological and economic indexes for understanding the position of regional activities in global value chains

SWOT analysis

Analysis of regional strengths, weaknesses, opportunities and threats is a key starting point for applying more elaborate RIS3 methods.

Phase 3: Strategy formulation

Collaborative vision building

Tailored online guidelines on the necessary additional steps to arrive at a shared vision for regional smart specialisation strategy.

Scenario building

Creates different scenarios to illustrate visions of possible future or aspects of possible future.

Delphi - Foresight

Delphi is the most emblematic Foresight or future studies method. The method makes the data collection and analyses faster and easier.

Phase 4: Priority setting

EDP focus groups

Supports focus groups of stakeholders and business leaders involved in the EDP process, and the communication of conclusions about the opportunities emerged by the l asal and national authorities.

Extroversion analysis

Detects possible industry segments in which regions present increased extroversion, in terms of exports, attraction of FDI, or other forms of regional openness.

Related variety analysis

Calculates the Related/Unrelated variety entropy indexes. It will compare 2-digit and 5-digit sector shares (%) and will estimate the entropy index for regions.

Phase 5: Policy mix

Intervention logic

Allows to identify if different policy measures are coherent with the vision and objectives of the region.

Action plan co-design

Co-design is a well-established approach in the process of creation, particularly within the public sector.

Budgeting

Provides a framework for using different budgeting methods (incremental, zero budgeting) to capture the funding dimension.

State aid law compliance for implementation

Aims at constraining the funding possibilities of public authorities to sustain competition within the internal market.

Calls consultation

Enable RIS3 stakeholders to assess calls for projects under SF operational programmes that are made by regional authorities.

Innovation maps

Online visualisation tool that leaves out information about regional technological trends using grant data.

Open data tool

Data repository that allows for a finely grained tracking of projects and initiatives implemented in each region with a link to respective S3 priorities.

Phase 6: Monitoring & evaluation

Monitoring

Collects and processes information about the achievement of expected results and the degree of implementation of policy measures.

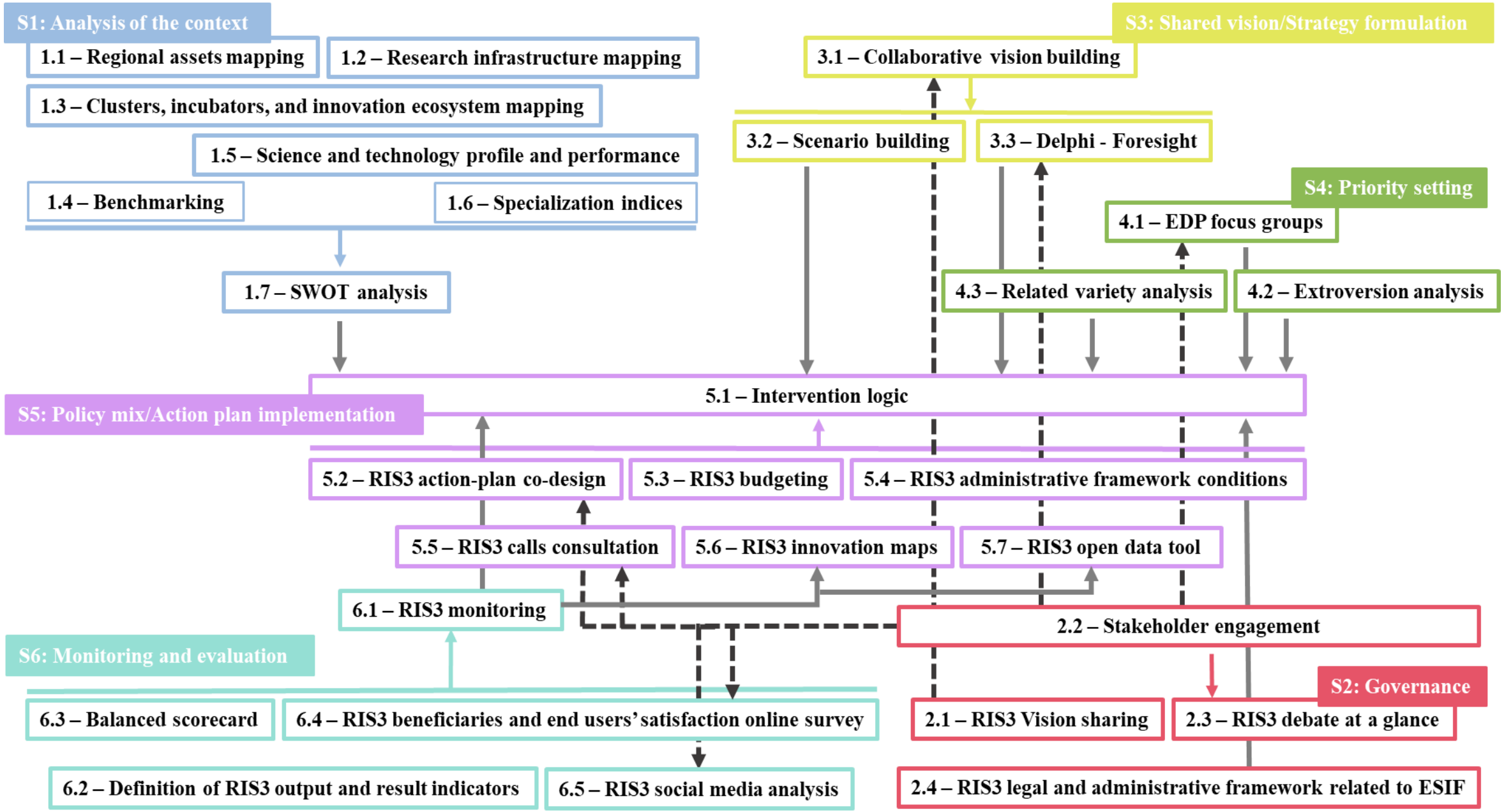
Definition of output and result indicators

Output and result indicators constitute an essential part of RIS3 monitoring and evaluation.

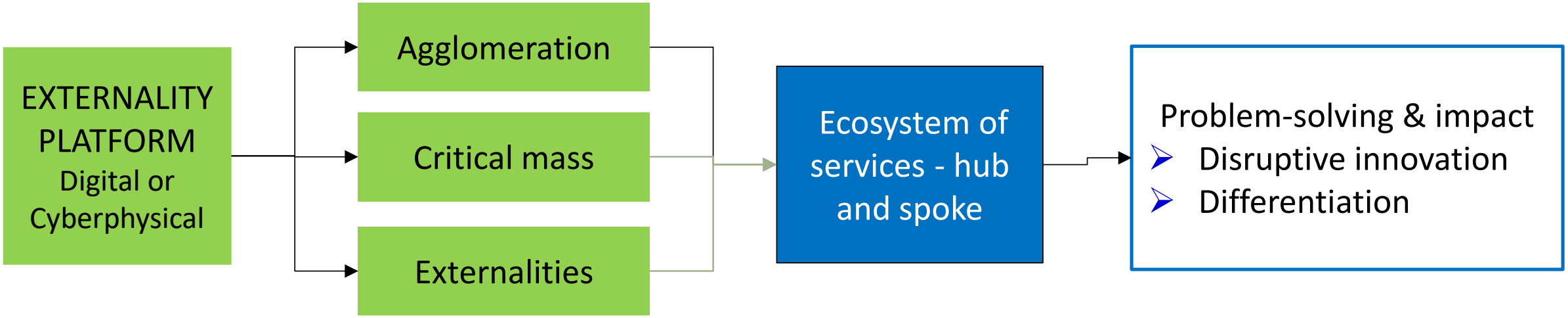
Balanced scorecard

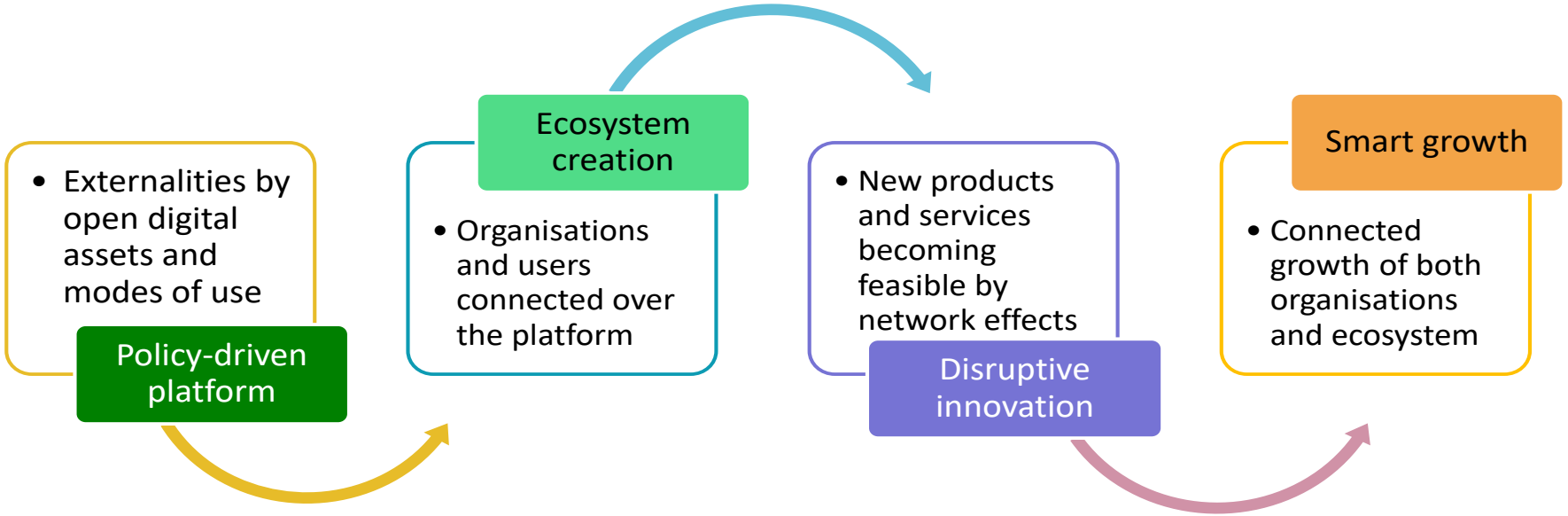
Ensures that the activities are in line with its vision and strategy, and monitors the performance against strategic goals.

A platform- 28 apps: User engagement and data-driven policy



Externality platforms creating hub-and-spoke ecosystems





IV. Environment and sustainability: Awareness platforms & eco innovation

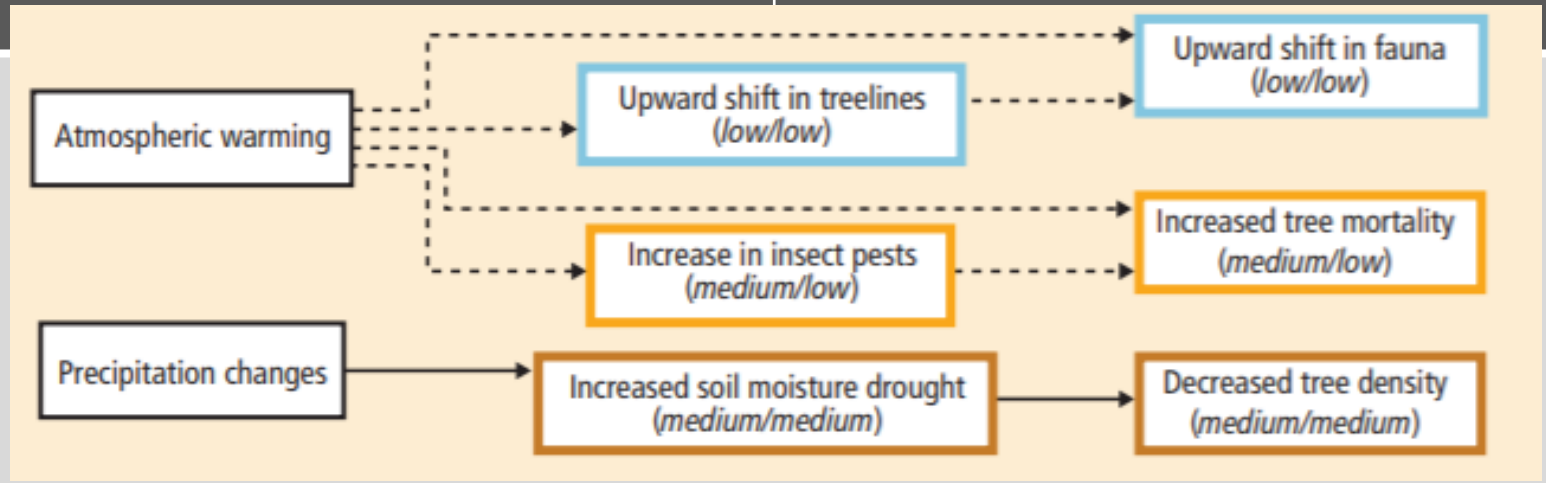
SUSTAINABILITY CHALLENGES

POLLUTION AND NATURAL ECOSYSTEMS AT RISK

Pollution

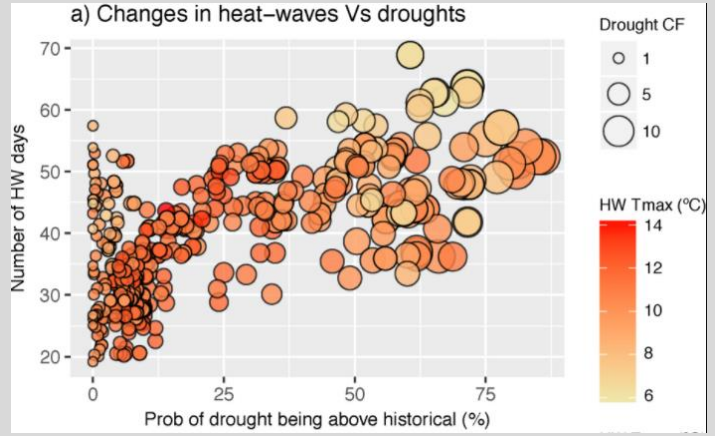
- **Pollution is among the biggest killers**, affecting more than 100 m. worldwide.
- 5000 people die every day as a result of **drinking unclean water**.
- People who live in **high-density air pollution** areas, have 20% higher risk of dying from lung cancer.
- Pollution **kills** more than 1 million **seabirds and 100 m. mammals** per year.

Deforestation & land use changes



Due to pollution and climate change many terrestrial, freshwater and marine ecosystems, **species shift** their geographic ranges, seasonal activities, migration patterns, abundances and species interactions.

Natural ecosystems at risk

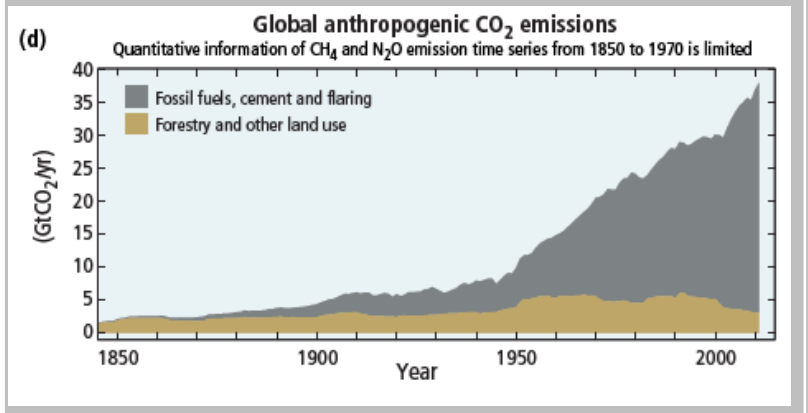


Source: Future heat-waves, droughts and floods in 571 Euro cities

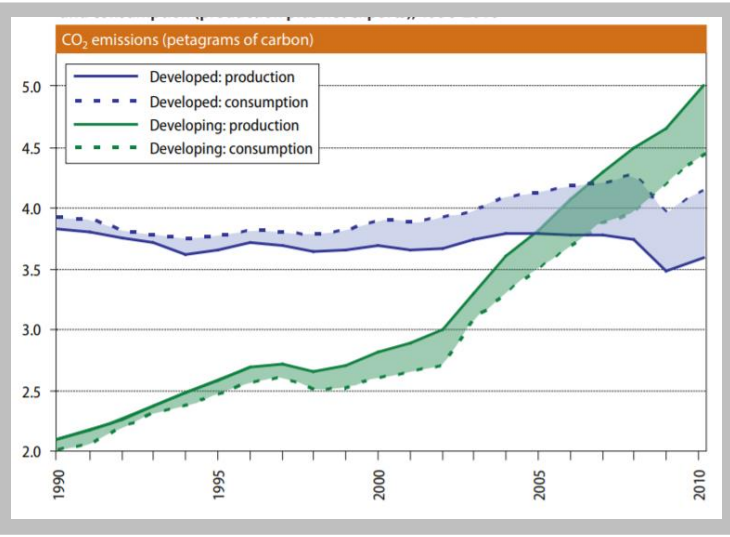
SUSTAINABILITY CHALLENGES

ENERGY & CLIMATE CHANGE, FOSSIL FUELS, GREENHOUSE EMISSIONS

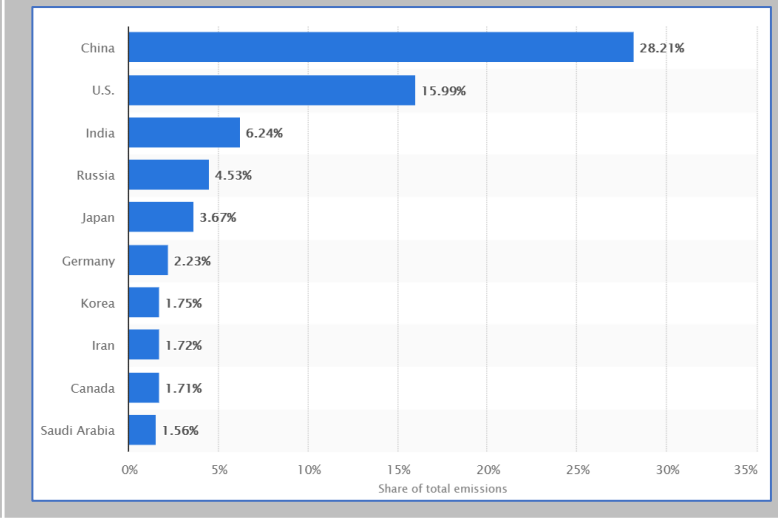
Global anthropogenic CO2 emissions, 1850-2015



CO2 emissions from developed and developing countries



Largest producers of CO2 emissions worldwide in 2016



Stabilisation of emissions in developed countries

- global **relocation of industry** away from developed countries
- **imports of emissions-intensive products** from developing countries, and China in particular.
- **rapid turn of the EU and US to renewable energy** sources. In 2017, renewable energy, in both regions, accounted for almost 50% of new energy capacity

- **Coastal communities**, small islands and megadeltas are particularly vulnerable
- **Agriculture** is negatively impacted by extreme weather events such as heatwaves and droughts
- **Oceans** are affected, leading to rising sea levels and acidification.
- Losses in **biodiversity** are mostly caused by **habitat destruction**.

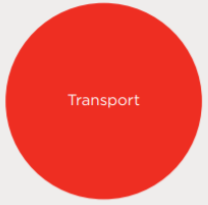
SUSTAINABILITY CHALLENGES

3rd: CITIES, WATER, WASTE INFRA

Cities: Top Challenges	Cities: Top environmental challenges
Transport	Air pollution
Job creation & unemployment	Severe storm and flooding
Population growth	Waste processing & disposal
Housing	Water pollution

Diagram A1.1 Top challenges

What are the three most significant general challenges facing your city today?



Transport
- Increase in private vehicles
- Incomplete public transport network
- Congestion
- Developing an integrated transport system
- Accessibility
- Urban mobility

Jobs
- Creating jobs
- Long-term unemployment
- Local family wage jobs
- Job retention
- Quality job growth

Population Growth
- Demands of rapid growth
- Accommodating an increasing population
- Rapid urbanization
- Demographic challenges
- The challenges of a fast growing city

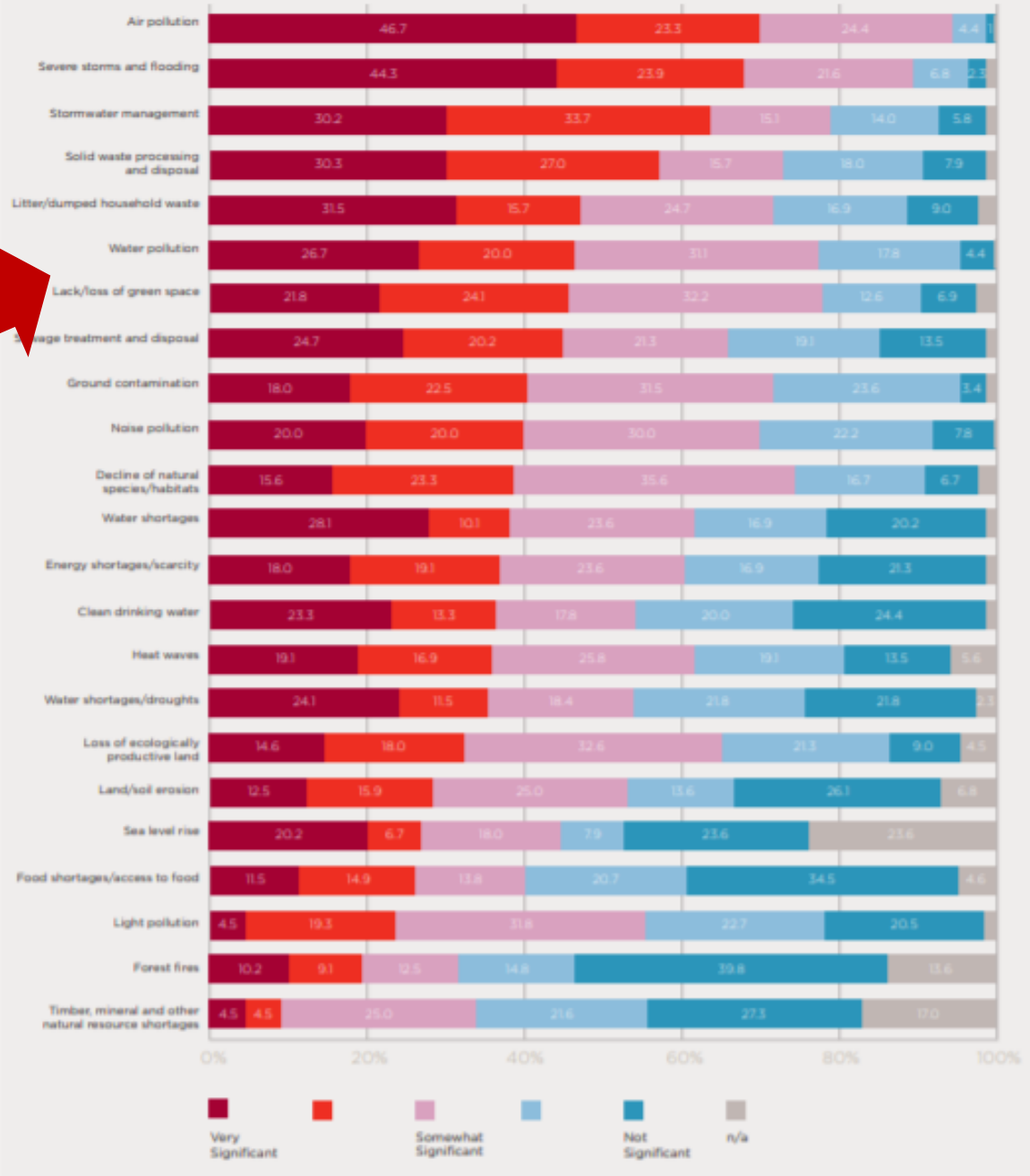
Housing
- Affordable housing
- Homelessness
- Building social housing
- Slums
- Building housing with good environmental standards
- Meeting the housing needs of all income levels

Finance
- Financial Budget limitations
- Maintaining the revenue and tax base
- Financial constraints due to high debt loading
- Revenue shortfalls
- Financing infrastructure
- Taxes

Source: LSE (2013). Going Green. How cities are leading the next economy.

Figure A1.1 Cities' environmental challenges

How significant are the following green challenges for your city and its region?

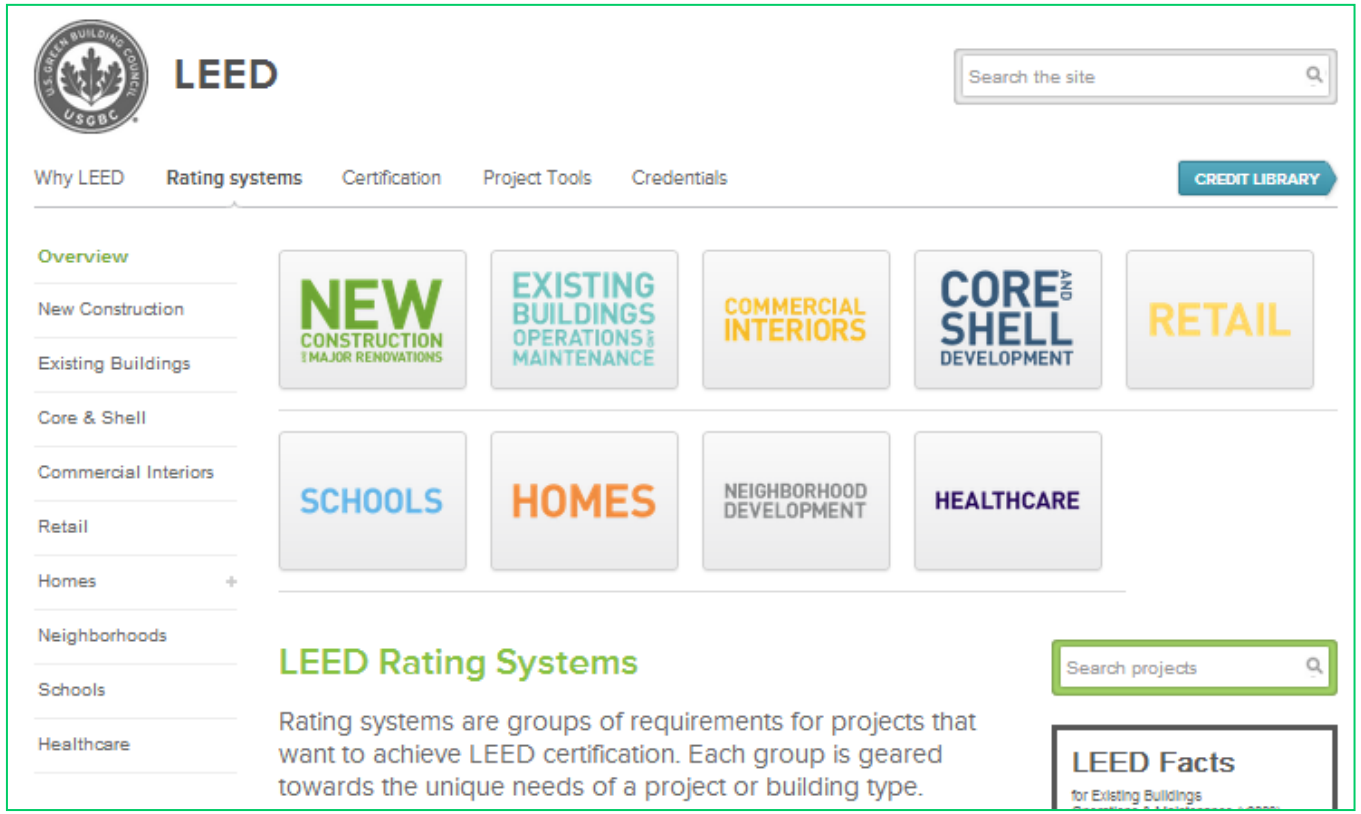


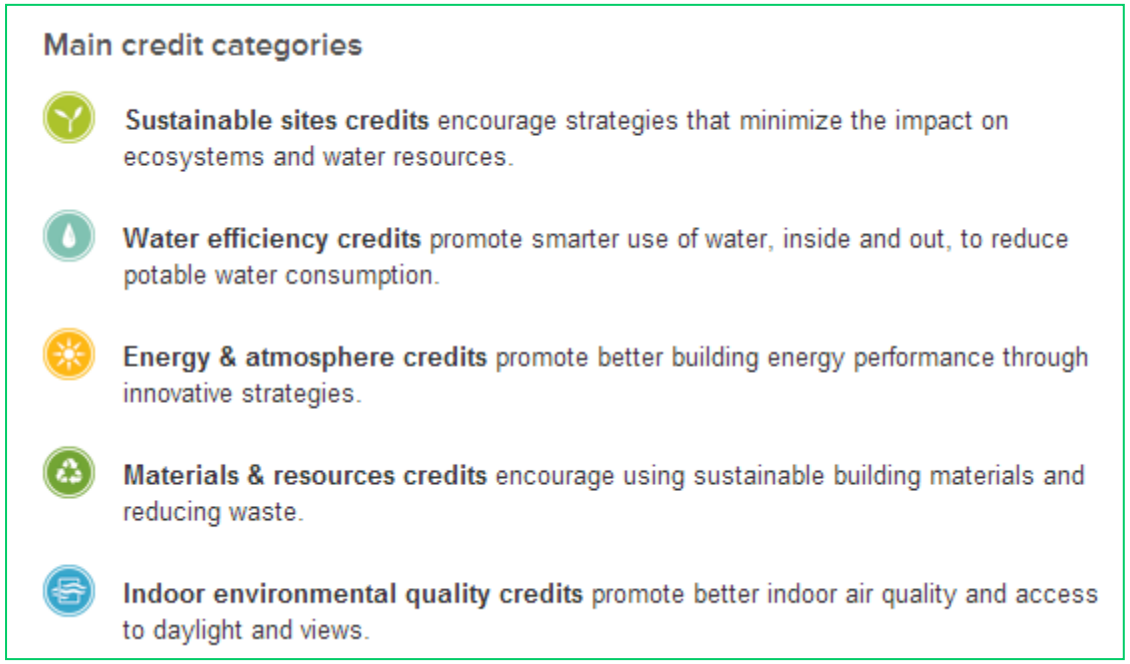
PLANNING FOR SUSTAINABLE CITIES since 1990'

Smart Urban Growth	Transit Oriented Development	New Urbanism
Smart growth is a way of developing cities that -**protects** open areas, natural resources and agricultural land, -revitalizes existing communities, -promotes **compact gro**wth with a focus on mixing uses and facilitating transport as well as pedestrian traffic, -**mix land uses**, **variety of homes** both in terms of typology and affordability	**Transit-oriented development** (TOD) is a mixed-use residential or commercial area intended to maximize access to public transportation. TOD neighborhoods consist of a **center with a public transit station, surrounded by high-density development and lower-density development gradually spreading outward from the center**. TOD eight principles: Walk; cycle; connect; transit; mix; densify; compact; shift the land occupied by vehicles Source: Holmes, J., & van Hemert, J. (2008). Transit oriented development. *The Rocky Mountain Land Use Institute*.	**New Urbanism** focuses on **designing the elements** that make an **attractive**, successful and cohesive neighborhood. These principles are: ➢ Sufficient **residential density** ➢ Urban development with **mix of uses** ➢ Dense road network ➢ Design that emphasizes the **human scale** ➢ Context-based planning ➢ **Compact urban organization** that minimizes distances ➢ Variety of homes to serve different populations

LEADERSHIP FOR ENVIRONMENTAL AND ENERGY DESIGN

LEED FOR NEIGHBORHOOD DEVELOPMENT – DESIGN PRINCIPLES (LEED-ND v4 / 2014)





- **Started in 1998**, LEED standards have been applied to more than 7000 projects in the United States and **30 countries worldwide**.
- The pilot version, LEED NCv1.0, led to LEED NCv2.0, then LEED NCv2.2 in 2005, v3 in 2009, and V4 in 2014

- LEED 2009 has placed a relatively greater emphasis on "the reduction of **energy consumption** and **greenhouse gas** emissions associated with building systems, transportation, the embodied energy of water, materials and solid waste."
- LEED 2014 is simplified with a concern for implementation outside the US

LEADERSHIP FOR ENVIRONMENTAL AND ENERGY DESIGN

LEED FOR NEIGHBORHOOD DEVELOPMENT: 61 DESIGN PRINCIPLES FOR SUSTAINABILITY & SCORES

LEED 2009 for Neighborhood Development
Project Scorecard

Project Name:

Smart Location and Linkage — 27 Points Possible

14 p

Yes	?	No				
Y			Prereq 1	Smart Location	Required
Y			Prereq 2	Imperiled Species and Ecological Communities	Required
Y			Prereq 3	Wetland and Water Body Conservation	Required
Y			Prereq 4	Agricultural Land Conservation	Required
Y			Prereq 5	Floodplain Avoidance	Required
			Credit 1	Preferred Locations	10
			Credit 2	Brownfield Redevelopment	2
			Credit 3	Locations with Reduced Automobile Dependence	7
			Credit 4	Bicycle Network and Storage	1
			Credit 5	Housing and Jobs Proximity	3
			Credit 6	Steep Slope Protection	1
			Credit 7	Site Design for Habitat or Wetland and Water Body Conservation	1
			Credit 8	Restoration of Habitat or Wetlands and Water Bodies	1
			Credit 9	Long-Term Conservation Management of Habitat or Wetlands and Water Bodi	1

Neighborhood Pattern and Design — 44 Points Possible

18 p

Yes	?	No			
Y			Prereq 1	Walkable Streets	Required
Y			Prereq 2	Compact Development	Required
Y			Prereq 3	Connected and Open Community	Required
			Credit 1	Walkable Streets	12
			Credit 2	Compact Development	6
			Credit 3	Mixed-Use Neighborhood Centers	4
			Credit 4	Mixed-Income Diverse Communities	7
			Credit 5	Reduced Parking Footprint	1
			Credit 6	Street Network	2
			Credit 7	Transit Facilities	1
			Credit 8	Transportation Demand Management	2
			Credit 9	Access to Civic and Public Spaces	1
			Credit 10	Access to Recreation Facilities	1
			Credit 11	Visitability and Universal Design	1
			Credit 12	Community Outreach and Involvement	2
			Credit 13	Local Food Production	1
			Credit 14	Tree-Lined and Shaded Streets	2
			Credit 15	Neighborhood Schools	1

Green Infrastructure and Buildings — 29 Points Possible

20 p

Yes	?	No			
Y			Prereq 1	Certified Green Building	Required
Y			Prereq 2	Minimum Building Energy Efficiency	Required
Y			Prereq 3	Minimum Building Water Efficiency	Required
Y			Prereq 4	Construction Activity Pollution Prevention	Required
			Credit 1	Certified Green Buildings	5
			Credit 2	Building Energy Efficiency	2
			Credit 3	Building Water Efficiency	1
			Credit 4	Water-Efficient Landscaping	1
			Credit 5	Existing Building Use	1
			Credit 6	Historic Resource Preservation and Adaptive Reuse	1
			Credit 7	Minimized Site Disturbance in Design and Construction	1
			Credit 8	Stormwater Management	4
			Credit 9	Heat Island Reduction	1
			Credit 10	Solar Orientation	1
			Credit 11	On-Site Renewable Energy Sources	3
			Credit 12	District Heating and Cooling	2
			Credit 13	Infrastructure Energy Efficiency	1
			Credit 14	Wastewater Management	2
			Credit 15	Recycled Content in Infrastructure	1
			Credit 16	Solid Waste Management Infrastructure	1
			Credit 17	Light Pollution Reduction	1

Innovation and Design Process — 6 Points

Yes	?	No			
			Credit 1.1	Innovation and Exemplary Performance: Provide Specific Title	1
			Credit 1.2	Innovation and Exemplary Performance: Provide Specific Title	1
			Credit 1.3	Innovation and Exemplary Performance: Provide Specific Title	1
			Credit 1.4	Innovation and Exemplary Performance: Provide Specific Title	1
			Credit 1.5	Innovation and Exemplary Performance: Provide Specific Title	1
			Credit 2	LEED® Accredited Professional	1

Regional Priority Credit — 4 Points

9 p

Yes	?	No			
			Credit 1.1	Regional Priority Credit: Region Defined	1
			Credit 1.2	Regional Priority Credit: Region Defined	1
			Credit 1.3	Regional Priority Credit: Region Defined	1
			Credit 1.4	Regional Priority Credit: Region Defined	1

Project Totals (Certification estimates) — 110 Points

Certified: 40-49 points, Silver: 50-59 points, Gold: 60-79 points, Platinum: 80+ points

LEED-ND 1. LOCATION AND LINKAGE

Infill and adjacent sites

- Encourage development within and near existing communities and public transit infrastructure.
- Redevelopment of existing cities, suburbs and towns
- Limiting the expansion of the development footprint

Access to quality transit

- Encourage development in locations with multimodal transportation
- Reduced motor vehicle use, low greenhouse gas emissions, air pollution, and other environmental and public health effects associated with motor vehicle use.

Wetland and water body conservation

- Preserve water quality, natural hydrology and biodiversity through conservation of wetlands and water bodies.
- Limit development effects on wetlands, water bodies, and surrounding buffer land.

LEED ND-2: NEIGHBORHOOD DESIGN

Mixed uses neighborhood

- Cluster diverse land uses in accessible neighborhood and regional centers
- Encourage daily walking, biking, and transit use, reduce vehicle miles traveled (VMT)
- Reduce automobile dependence, and support car-free living

Compact development

High density development

- Residential, 12 or more dwelling units per acre or 7 DpA for components outside walk distances
- Nonresidential, 0.80 floor-area ratio (FAR), or 0.50 FAR or greater for components outside the walk distances

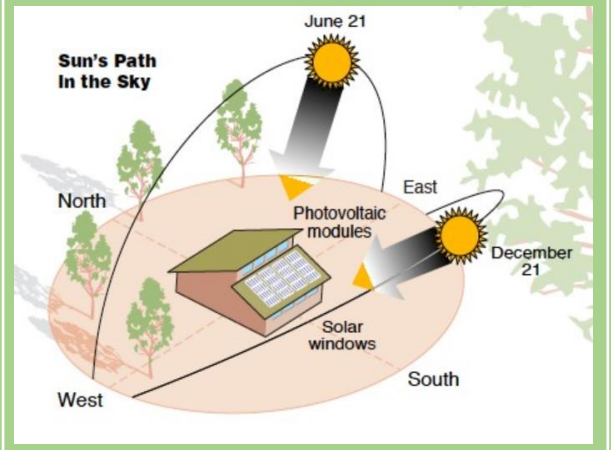
Walkable streets

- Promote walking: safe, appealing, and comfortable streets that support public health,
- Reduce pedestrian injuries and encouraging daily physical activity
- Access to civic and public space

LEED ND-3: GREEN INFRASTRUCTURE AND BUILDINGS

Heat island reduction

- Use non-roof site paving with plant material, shade with architectural devices, and solar reflectance paving
- H**igh-Reflectance and Vegetated Roofs**



Building solar orientation

- Orient the building blocks such that one axis is within ±15 degrees of geographical east-west, and
- The east-west lengths of those blocks are at least as long as the north-south

Renewable energy

- Local production of renewable energy (solar, wind, geothermal, small-scale or micro-hydroelectric, or biomass)
- At least 5% of the district's energy spending

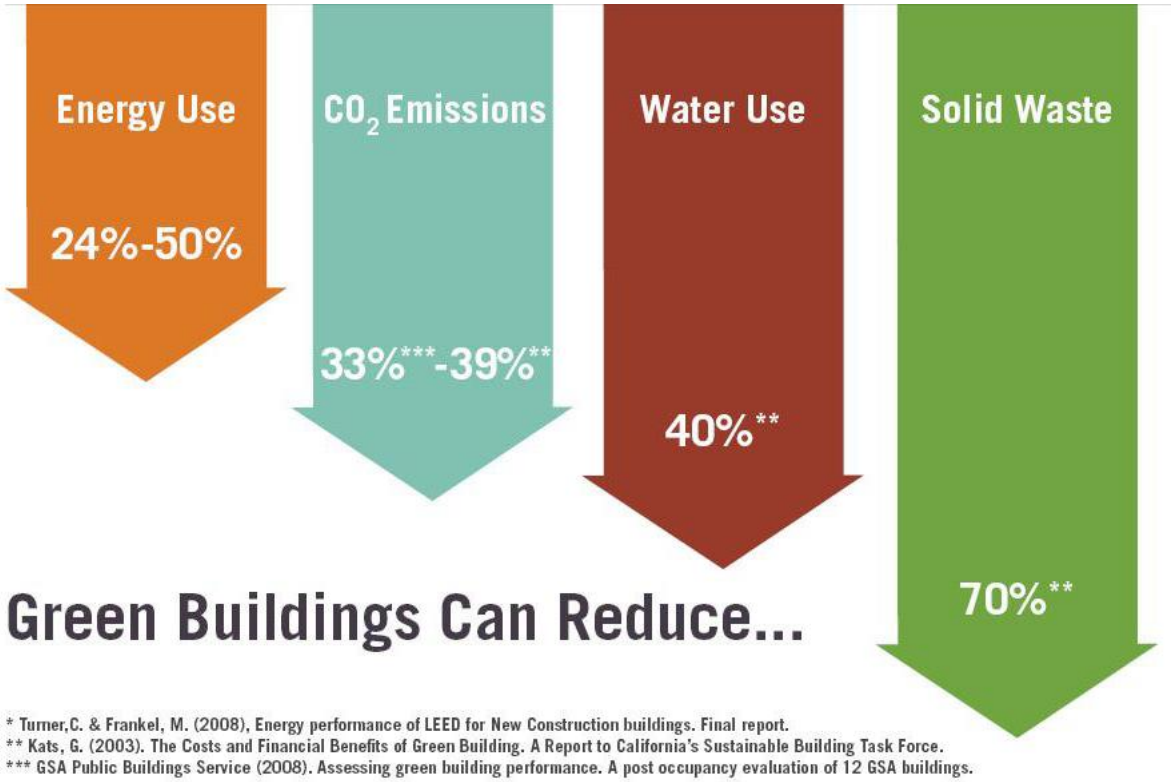
Water management

- Reduce indoor and outdoor use of water.
- Retain on-site at least 25% of the average annual wastewater generated
- Reuse to replace potable water.

LEED – ND

EXPECTED IMPACT

Expected impact



Ewing et al. (2013) predicted that **miles traveled per person** (VMT) in LEED®ND areas would be reduced by 24% - 60 % from their respective regional average.

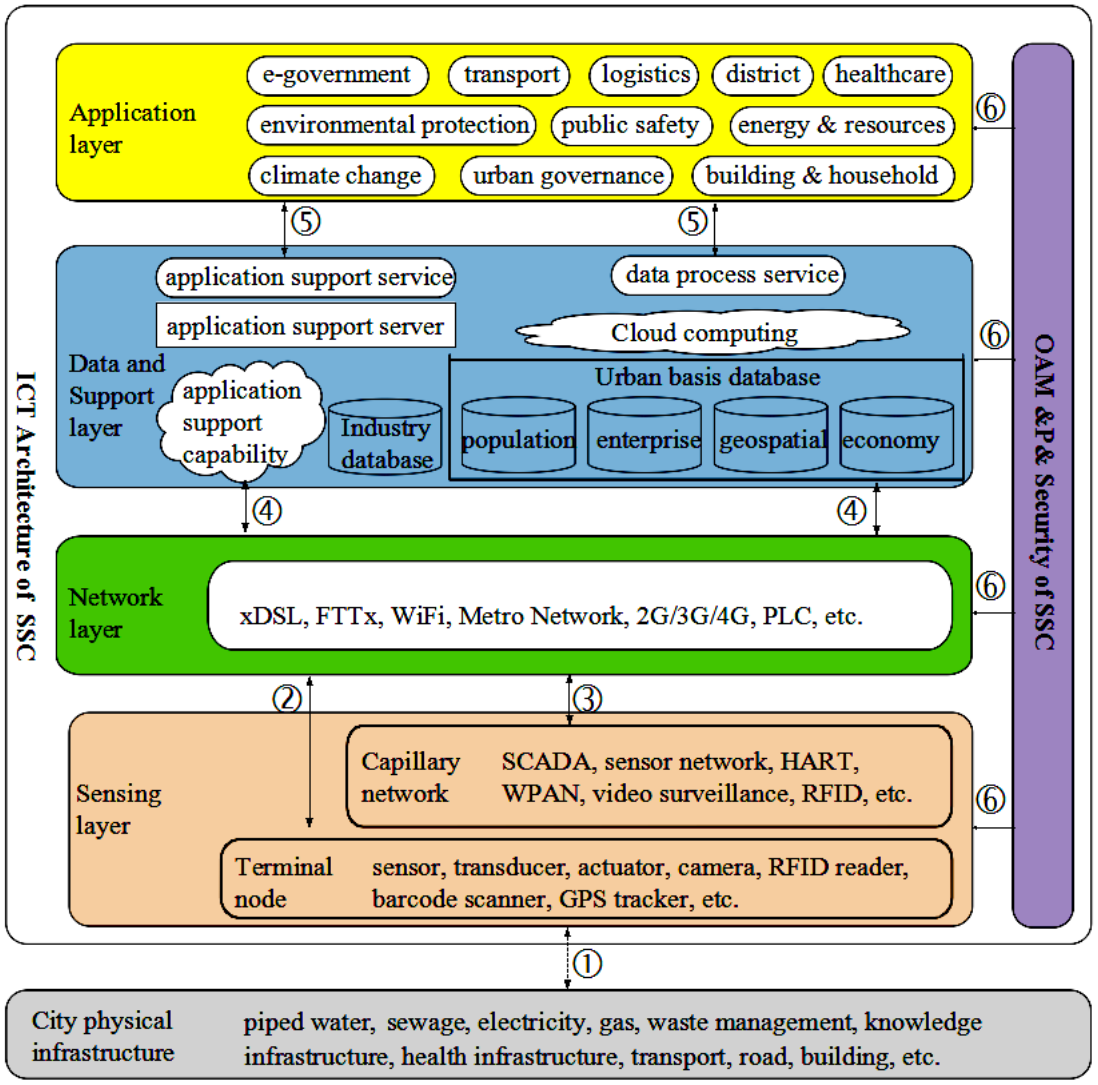
But also critical: Fraker (2013) tested the LEED®ND rating system criteria using performance data from four neighborhoods in Germany (Vauban in Freiburg and Kronsberg) and Sweden (B001 in Malmo and Hammarby Sjostad in Stockholm). The majority of the points in the rating system were awarded to items that do not reduce CO2 emissions in a significant way.

Source: Szibbo, N. A. (2016). Assessing Neighborhood Livability: Evidence from LEED® for Neighborhood Development and New Urbanist Communities. *Articulo-Journal of Urban Research*, (14).

SMART CITY SOLUTIONS

DIGITAL SPACES OPTIMISING CITY ACTIVITIES AND INFRASTRUCTURES

DIGITAL URBAN SPACE



Source: ITU

Innovation economy

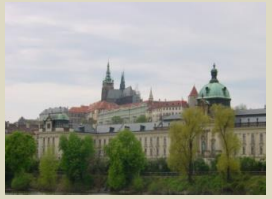
- City sectors / clusters / districts: manufacturing, commerce, business services, education, health, tourism, and other
- Marketplaces, shared platforms
- Crowdfunding, crowdsourcing platforms
- Research and innovation platforms, innovation hubs

Living in the city

- Housing
- Health and social care
- Safety and security
- Environment
- Recreation and sports

City infrastructure – Utilities

Mobility, transport and parking
Energy saving, smart grid, and renewable energy
Water management and saving
Waste management and recycling
Broadband, wired and wireless

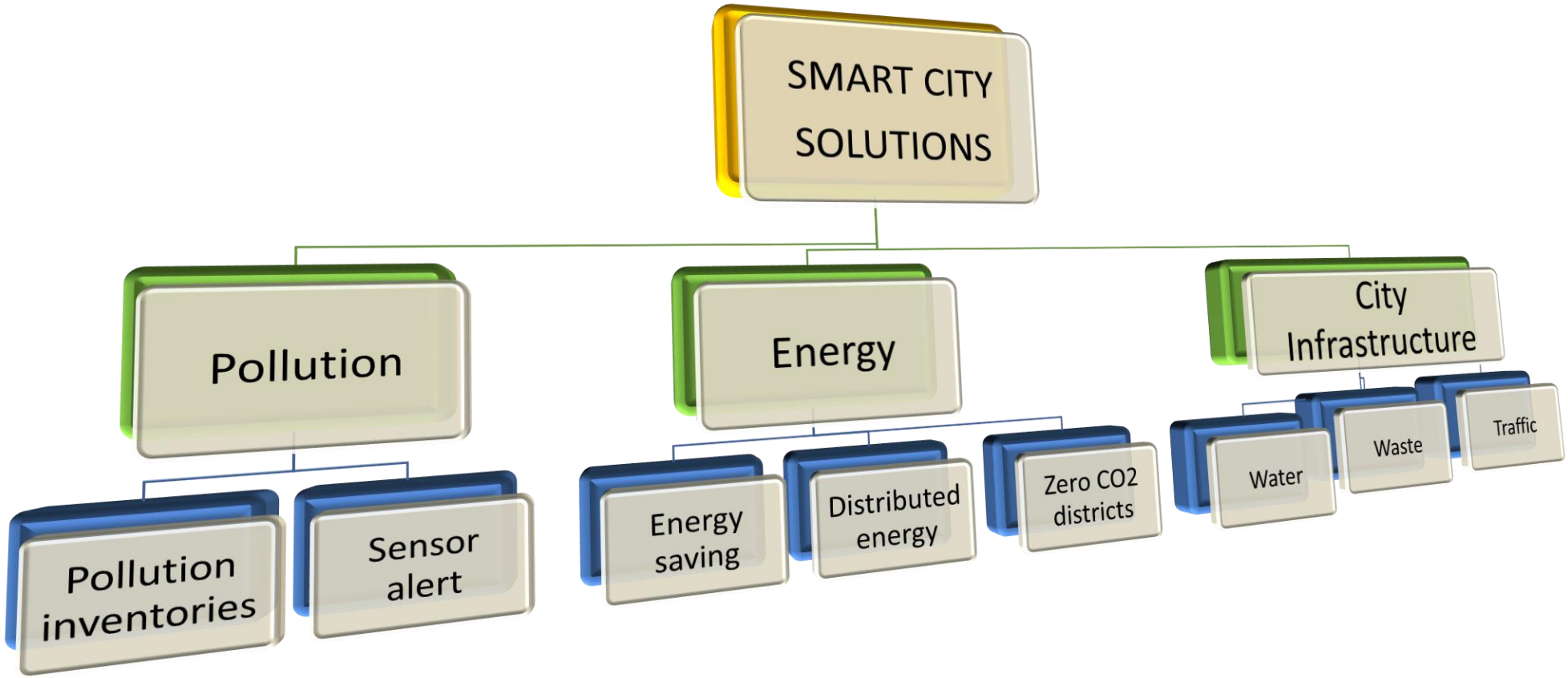


City governance

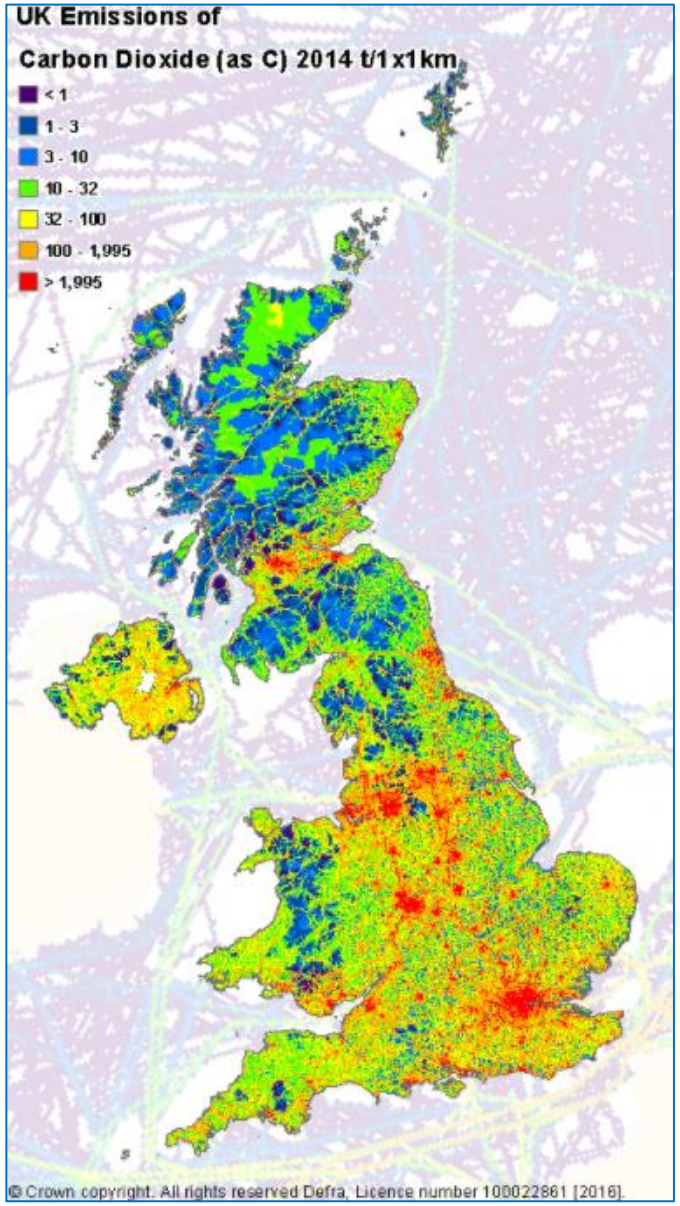
- Decision making / citizen participation / democracy
- Government services to citizens
- City planning / city management
- Monitoring and benchmarking

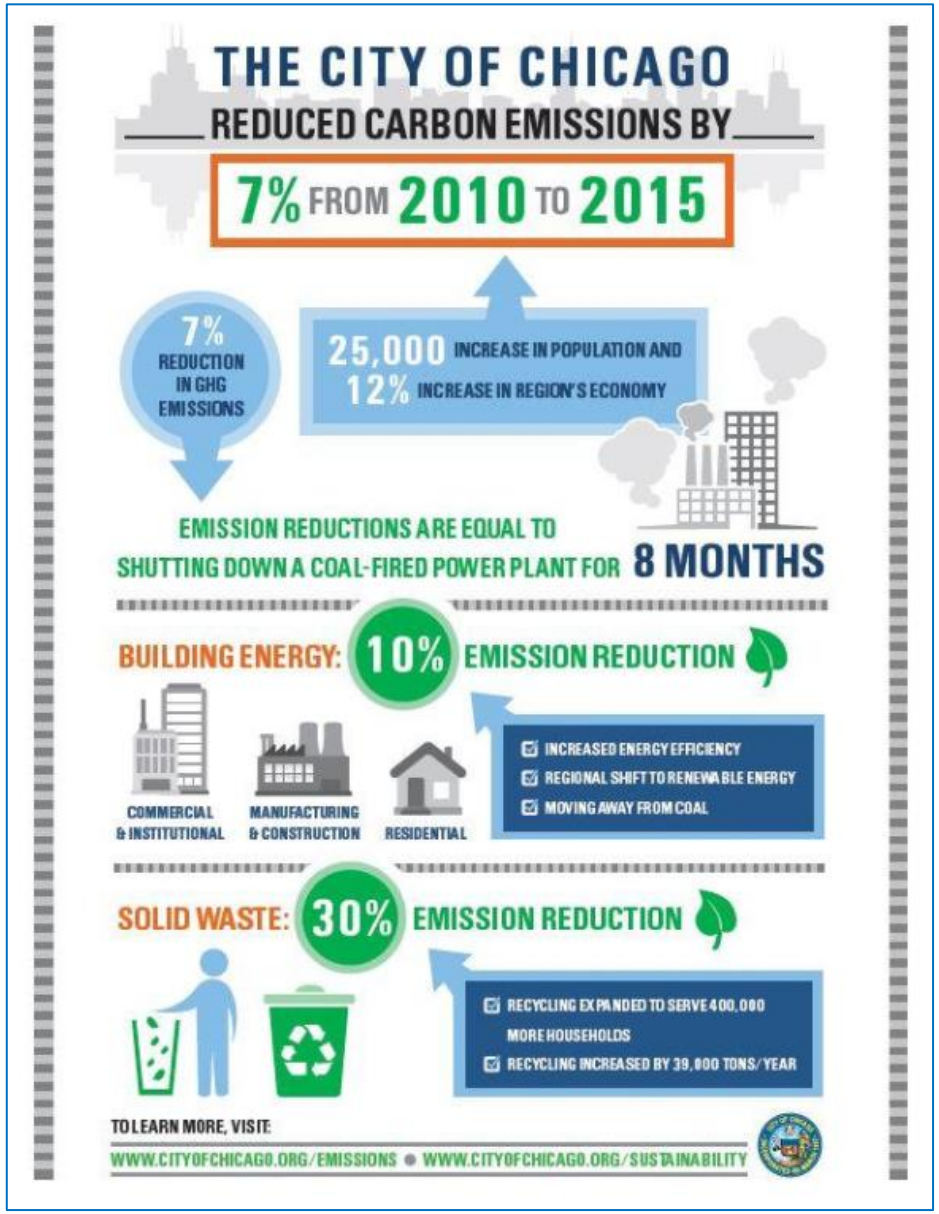
SMART SYSTEMS for ENVIRONMENTAL SUSTAINABILITY

HOW ADDRESS POLLUTION, ENERGY & CO2, CITY INFRASTRUCTURE



POLLUTION: INVENTORIES & AWARENESS





A strategy for emissions reduction starts by mapping emissions and creating emissions inventories.

Inventories measure air pollutants into the atmosphere from **various stationary and mobile sources**,

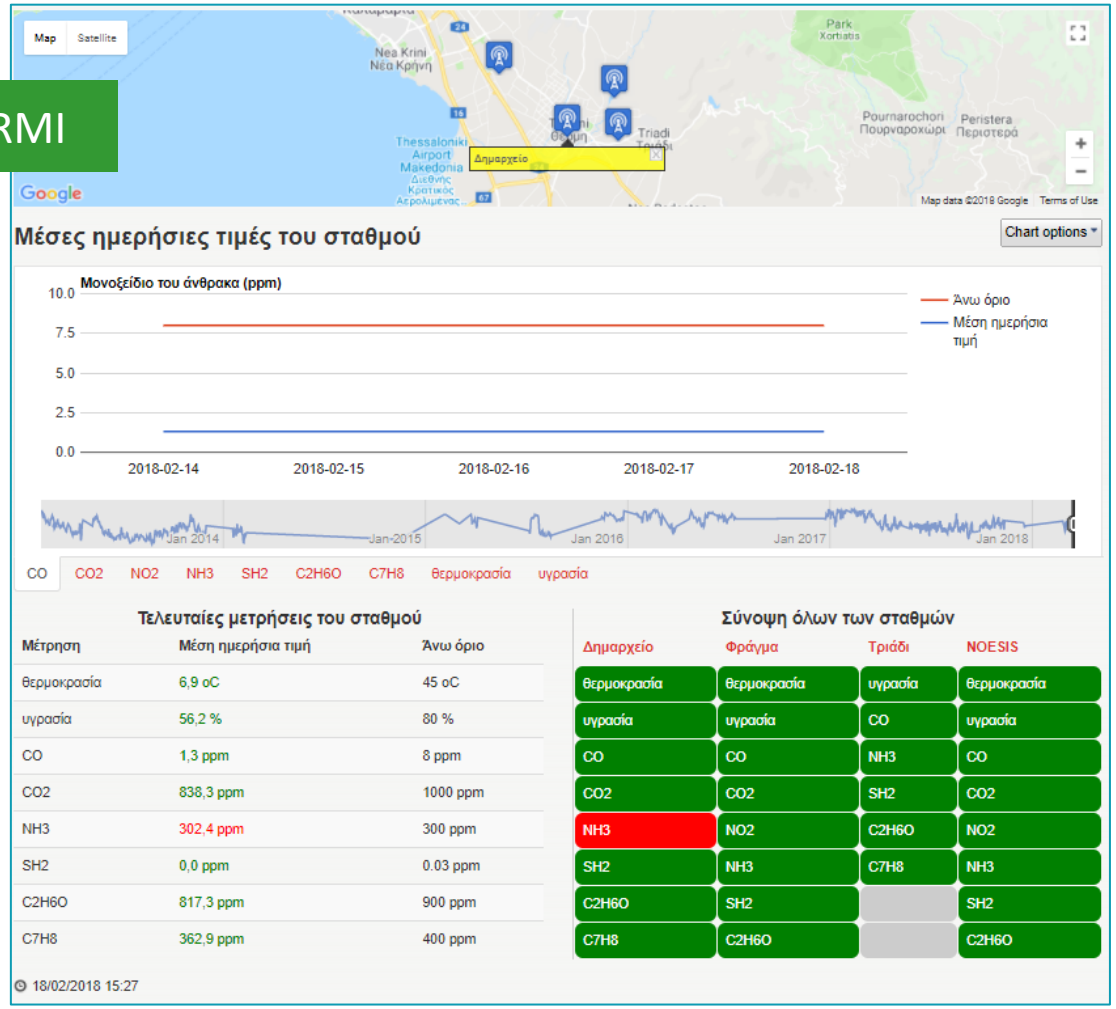
- transport sector,
- electricity generation,
- industrial and manufacturing
- domestic fuel use for heating, cooling and cooking.

The establishment of emissions inventory helps a **city identify sources of emissions, target specific sources in reduction strategies,** and create a baseline to measure progress.

POLLUTION: SENSOR ALERT & BEHAVIOUR CHANGE

Sensors can capture and monitor a series of pollutants, then visualize and transfer this information to citizens, asking to adapt their behaviour to conditions and sources of pollution.

THERMI



Santander, Spain's sensors measure everyt
spaces available, to the size of crowds on th

SMART SANTANDER

In Santander, Spain, algorithms has been used for modelling with monitored learning (prediction, classification) and draw conclusions about the behaviour of pollution variables. **The prediction analysis has been focused on city's centre, with 1-hour, 2-hour, 4-hour, 8-hour and 24-hour forecast horizons.** The models have been trained by machine learning algorithms such as M5P, IBk, Multilayer Perceptron, linear regression, Regression by Discretization, RepTree, Bagging with RepTree, etc. Source: https://data.sngular.team/en/art/6/case-study-in-smart-cities-modeling-air-pollution-in-the-city-of-santander-spain

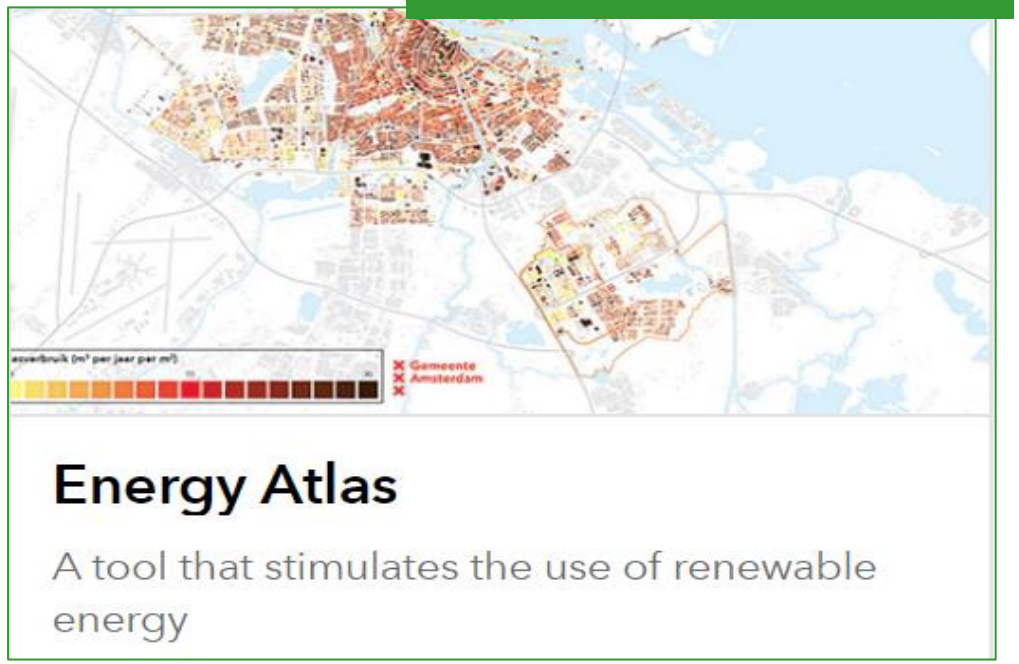
ENERGY: SMART METERS and ENERGY SAVING

Energy saving solutions are based on awareness of (1) energy spending, (2) practices for energy saving.

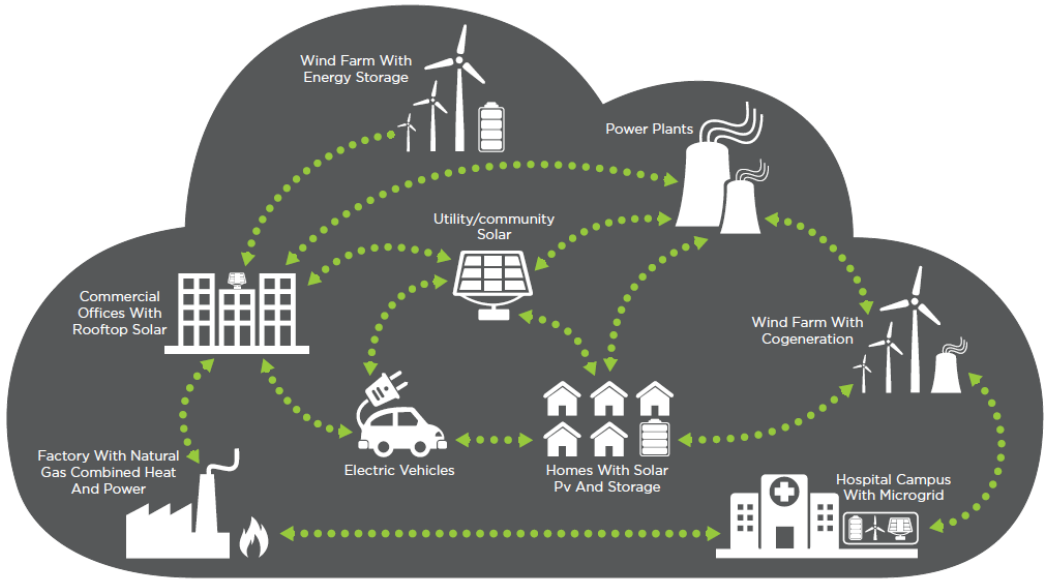
- In house: In a number of households in a city district users can monitor the energy usage in the household. Displays inform on usage per appliance and the overall energy usage 24/360.
- At district level: **Energy Atlas** inform about the use of energy at district level. **Citizens become aware of the usage and the potential gains** (how much energy does my neighbourhood use; how much heat is produced), opportunities for solar or wind energy, and possibilities of matching demand with (renewable) energy supply.
- **Sharing** information among users may inform practices for energy saving.

Expected saving at 15-20% of the baseline energy usage.

SMART AMSTERDAM

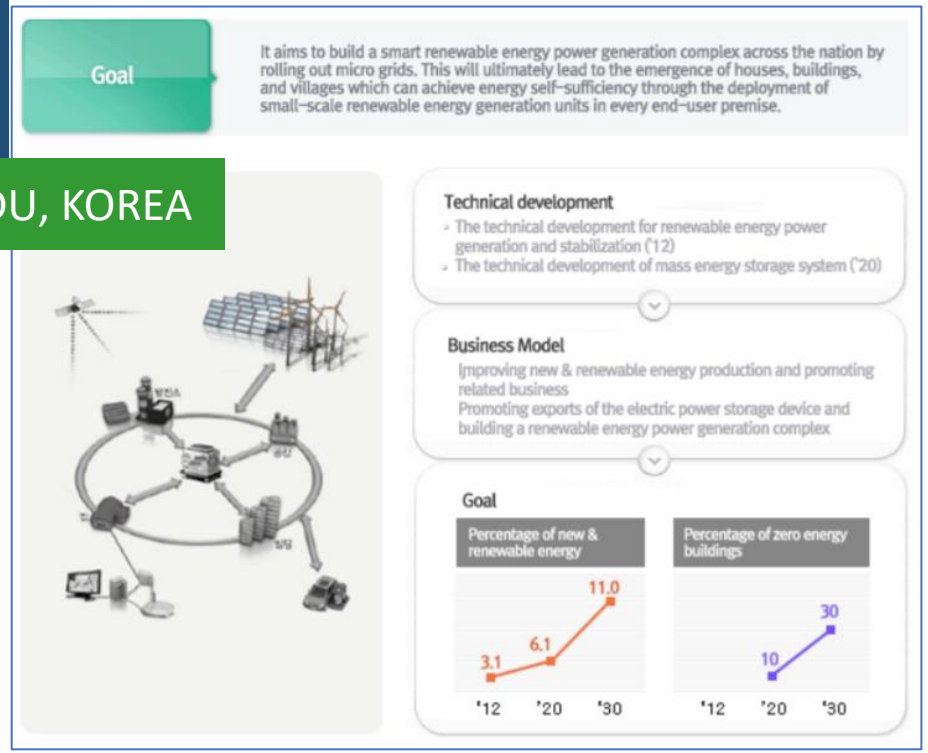


ENERGY: DISTRIBUTED SYSTEMS, SHARING RENEWABLE EN



(Source: Navigant)

JEDU, KOREA



Distributed local energy systems

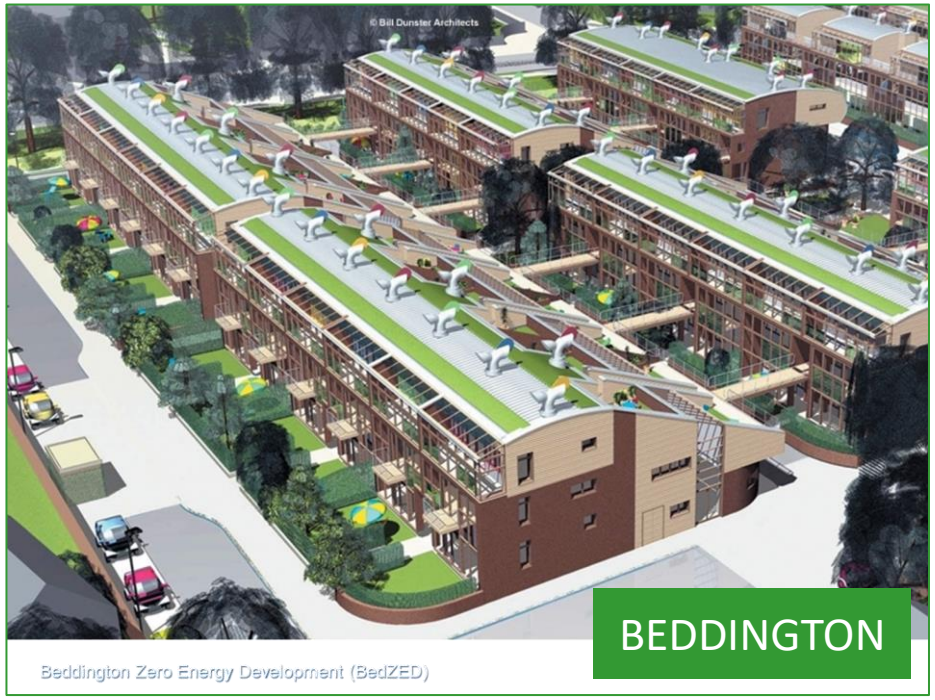
- Multiple inputs and users, supporting two-way energy flows
- **Digitalization** of the electric-mechanical infrastructure: smart grid and behind the metering an energy management system
- **Flexible, dynamic, and resilient energy management**
- Complex market, **transactions, business models** (P2P Singapore)
- Regulation changing rapidly around renewables, distributed generation (solar, microgrid, storage), net metering

NET ZERO ENERGY DISTRICTS

Smart Zero CO2 is a city that have zero carbon emissions on an annual basis. "All the energy that is consumed directly or indirectly will be replaced by renewable energy consumption/local energy production and all the emission that is created by the city's activities will be neutralised by offering carbon-free energy options on the market" (http://smartencity.eu/).

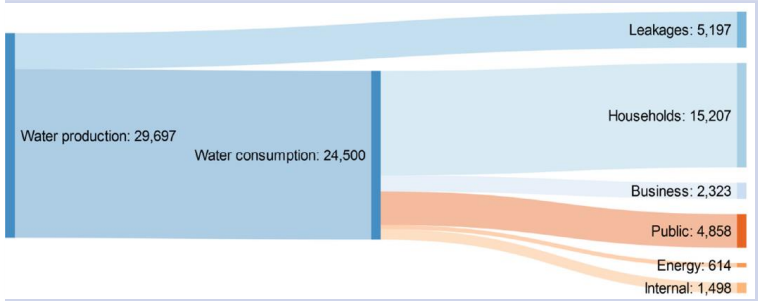
Main components of a smart Zero CO2 city

- Use of renewable energy
- **Smart grid to manage energy production and consumption**, and prioritize different types of RE
- **Energy storage** of exceed RE
- Local energy sharing to balance production and consumption
- Building retrofitting to reduce energy spending
- **Mobility by CO2-neutral public transport**, electric vehicles
- Carbon dioxide uptake solutions with nature (impossible to zero all CO2 emissions)



INFRASTRUCTURE: SENSOR-BASED OPTIMISATION

WATER



A Sankey diagram of the water system reveals the quantity of water wasted due to **water leakages in pipelines** (17%-20% in most developed cities up to 50%). Pressure sensors may identify the leak point, alert & action

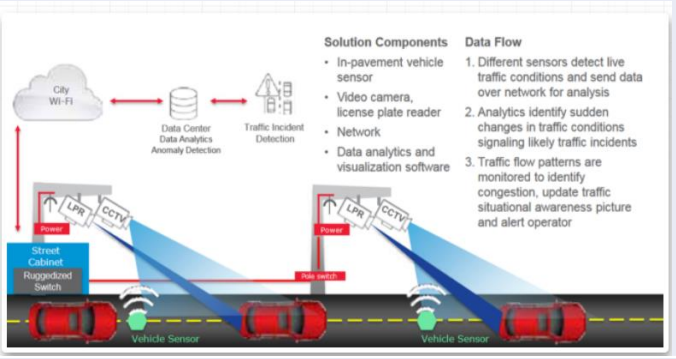
WASTE

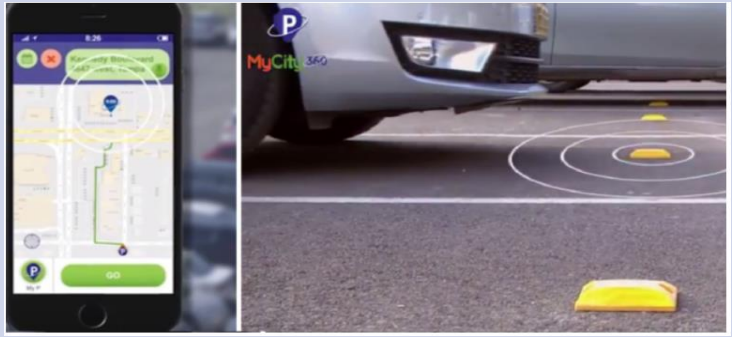
Applications related to waste management are focused mainly on tracking container fill levels and thus optimizing pickup routes by dynamic route choice and selection

Sensor in the waste bin

TRAFFIC

Traffic management solutions focus on (1) forecasting traffic congestion in order to provide route optimization advice, (2) inform about available parking and optimize search



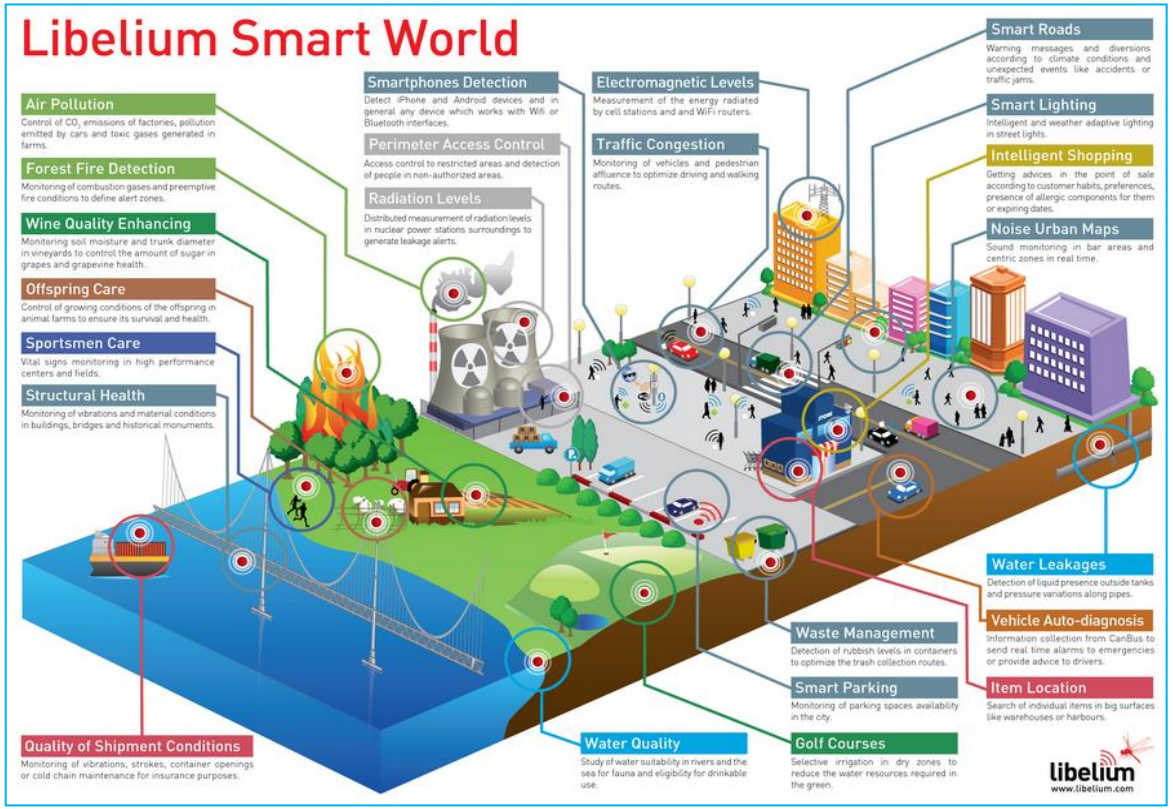


SENSORS, AWARENESS , AND BEHAVIOUR CHANGE

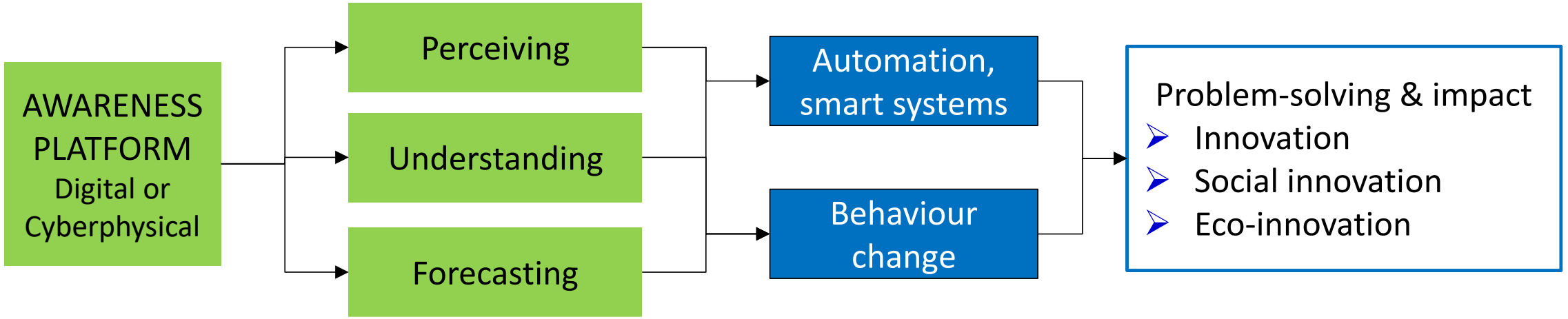
The road to IoT based sustainability

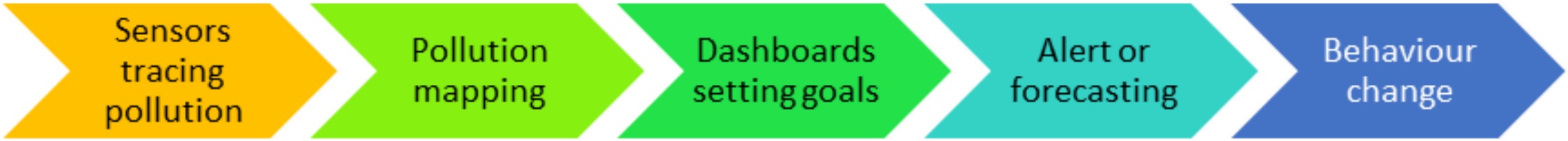
1. Sensor network deployment across city districts , neighbourhoods and utilities to collect and distribute information and raise awareness.
2. Users become motivated to adopt more sustainable behaviour because of (1) direct gain, (2) long term environmental gain, (3) various reward systems.
3. Public authorities follow more sustainable practices to save effort and resources.
4. Impact is measured, disseminated, and actions for sustainability are improved.

SENSOR NETWORK, SANTANDER



Awareness platforms for behaviour change





TWO PATHS TO SUSTAINABILITY
LEED-ND vs. SMART CITY SYSTEMS

	COMPACT URBAN GROWTH - NEW URBANISM	SMART CITY ENVIRONMENTS
Actions for sustainability	Sustainability based on physical elements: location, district design, buildings features	Solutions based on informed and motivated human behavior and decision-making
	Institutional solutions, hard to transfer from place to another due to different context	Technological solutions, easily transferable from one place to the other
Investments	Large-scale investments across multiple city systems and domains (transportation, housing, employment, nature, buildings)	Investment mainly on public broadband and sensor networks, applications and e-services for awareness, sharing, optimization
	Top-down, public sector initiatives and planning	Bottom-up, private sector initiatives in infrastructure and e-services
Impact	Uncertain effectiveness as suggested by a number of LEED-ND critiques	More effective, more ambitious targets, measurable impact

V. Safety and security:
Engagement platforms & social innovation

(1) Improve-my-City: Front end

Features | Live Demo | Installations | Pricing | Open Source | Contact | News | EL

lamp dead already 3 months

314

Traffic Lights

Submitted

lamp dead already 3 months in lont boulevard

Unnamed Road, Tambon Si S...

Updated one month ago | 0 | 0

poubelle laissé e sur la poubelle

321

Environment

Submitted

vue de Corse

7 Rue de l'Industrie, 31320 Ca...

Updated one month ago | 0 | 0

Solide Waste issue

326

Cleaning - Recycling

Submitted

Issues in Kairouan city

نهج أبي الحسن القابسي، Kairouan, T...

What's hot?

We are fully working for the brand new IMC2 and you will be amazed!

Improve-my-City: Administration

Components ▾ Improve My Cit... ▾

Issues

New Issue | Edit | Batch

- Issues
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- Select issue status -
- Select Status -

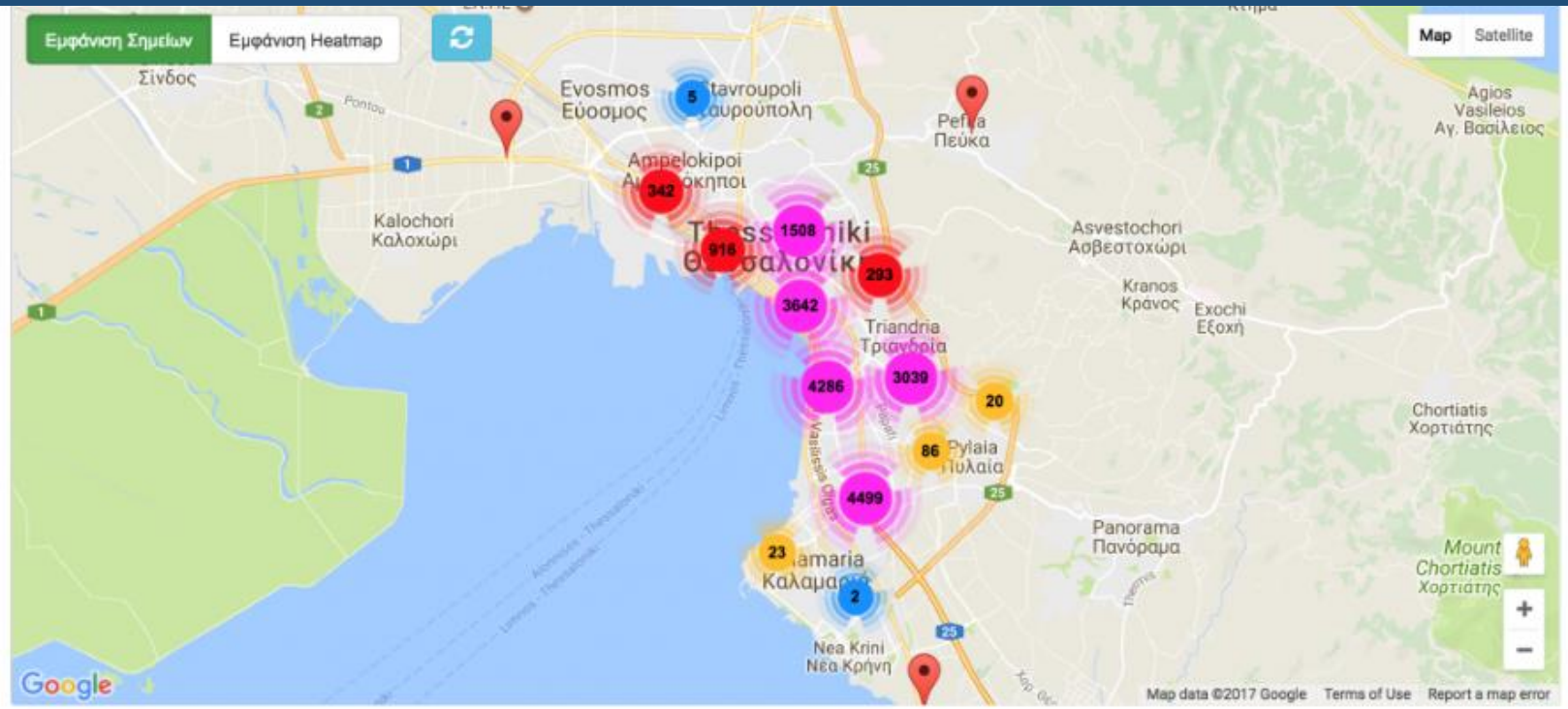
Search

ID ▾ Descending ▾ 20 ▾

Status	Title	Current issue status	Category	Updated	Created	Created by	ID
✓	Cola Under moderation New (Via Scamozzi, 2, 23100 Sondrio SO, Italia, (null))	Submitted	Cleaning - Recycling	Saturday, 10 August 2019 08:04	Saturday, 10 August 2019 08:04	Francesco Scala	332
✓	Ογκώδη αντικείμενα Under moderation New (Καθηγητού Αλεξάνδρου Ζουμετίκου 43, Θεσσαλονίκη 542 49, Ελλάδα, (null))	Submitted	Cleaning - Recycling	Saturday, 03 August 2019 13:43	Saturday, 03 August 2019 13:43	Vagelina Bechlivani	331
✓	Solide Waste issue (نهج أبي الحسن القابسي، Kairouan, Tunisie)	Submitted	Cleaning - Recycling	Saturday, 20 July 2019 00:56	Monday, 01 July 2019 13:28	Abderrahim Sebri	326
✓	Κομμενα κλαδια δεντρων στο πεζοδρομιο Βουλγαρη 19 Under moderation New (Βουλγαρη 19 , 542 48, Greece)	Submitted	Cleaning - Recycling	Sunday, 23 June 2019 01:27	Sunday, 23 June 2019 01:27	Dimitris Lemonas	325
✓	rwste Under moderation New (R. Olegário Mariano, 45 - Jiquiá, Recife - PE, 50850-250, Brasil)	Submitted	Cleaning - Recycling	Thursday, 25 April 2019 01:46	Thursday, 25 April 2019 01:46	Matheus Vieira	323
✓	poubelle laissé e sur la poubelle (7 Rue de l'Industrie, 31320 Castanet-Tolosan, France)	Submitted	Environment	Saturday, 20 July 2019 00:56	Friday, 12 April 2019 16:56	Demo Joe	321
✓	Σκουπιδια Under moderation New (Α/Δ Θεσσαλονικης Ν. Μουδανιων)	Submitted	Cleaning - Recycling	Saturday, 09 March 2019 18:53	Saturday, 09 March 2019 18:53	Demo Joe	319
✓	amburadul Under moderation New (Jl. DR. Cipto No.189, Lingkungan Dhalem, Pajagalan, Kotasumenep, Kabupaten Sumenep, Jawa Timur 69416, Indonesia)	Submitted	Cleaning - Recycling	Thursday, 31 January 2019 15:27	Thursday, 31 January 2019 15:27	Alwi Segaf	313
✓	sabun berantakan Under moderation New	Submitted	Cleaning -	Thursday, 31 January	Thursday, 31 January	Jufria Al	312

Published

Improve-my-City: Analytics



88 Total

83 Submitted
3 Acknowledged
2 Closed

3 years, 9 months, 25 days

Comments
79

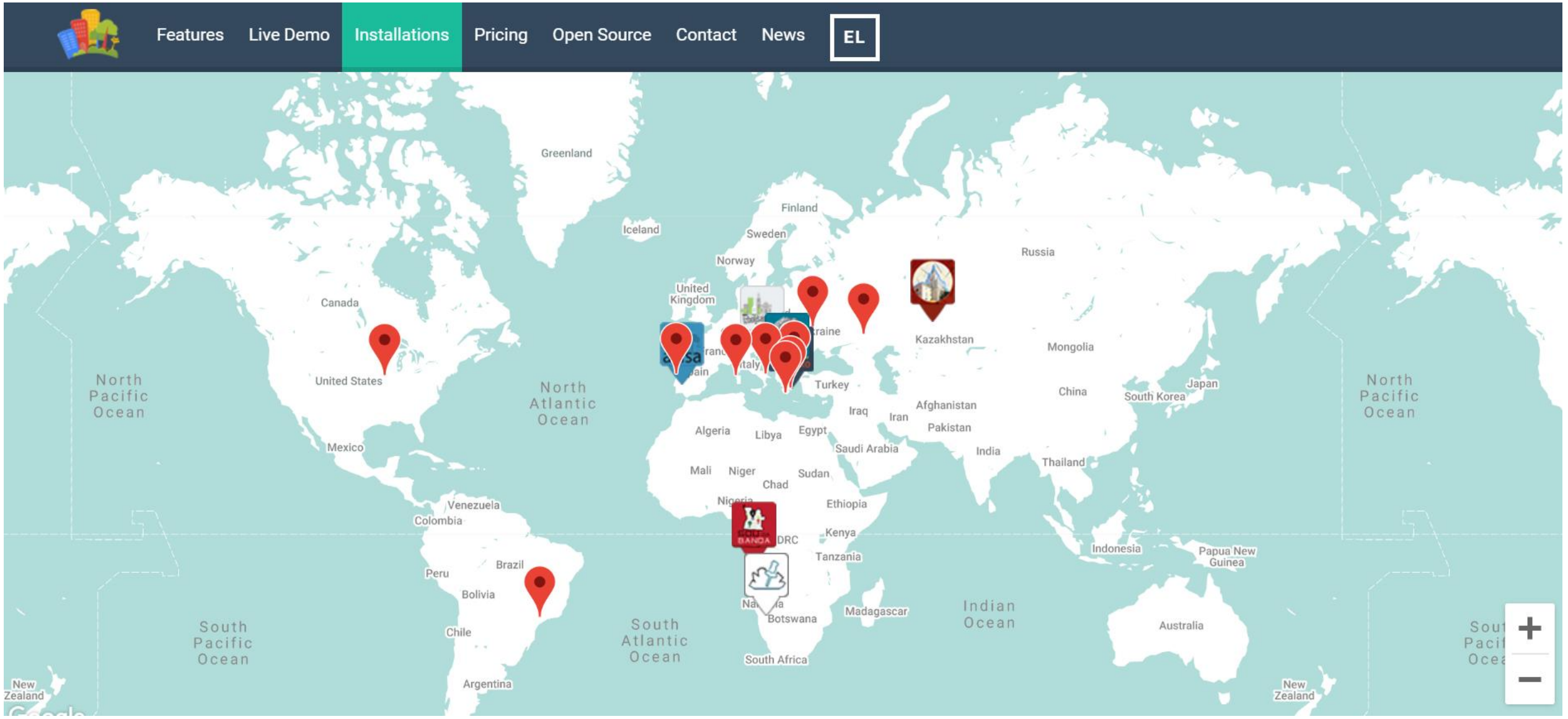
Users
187

Votes
56

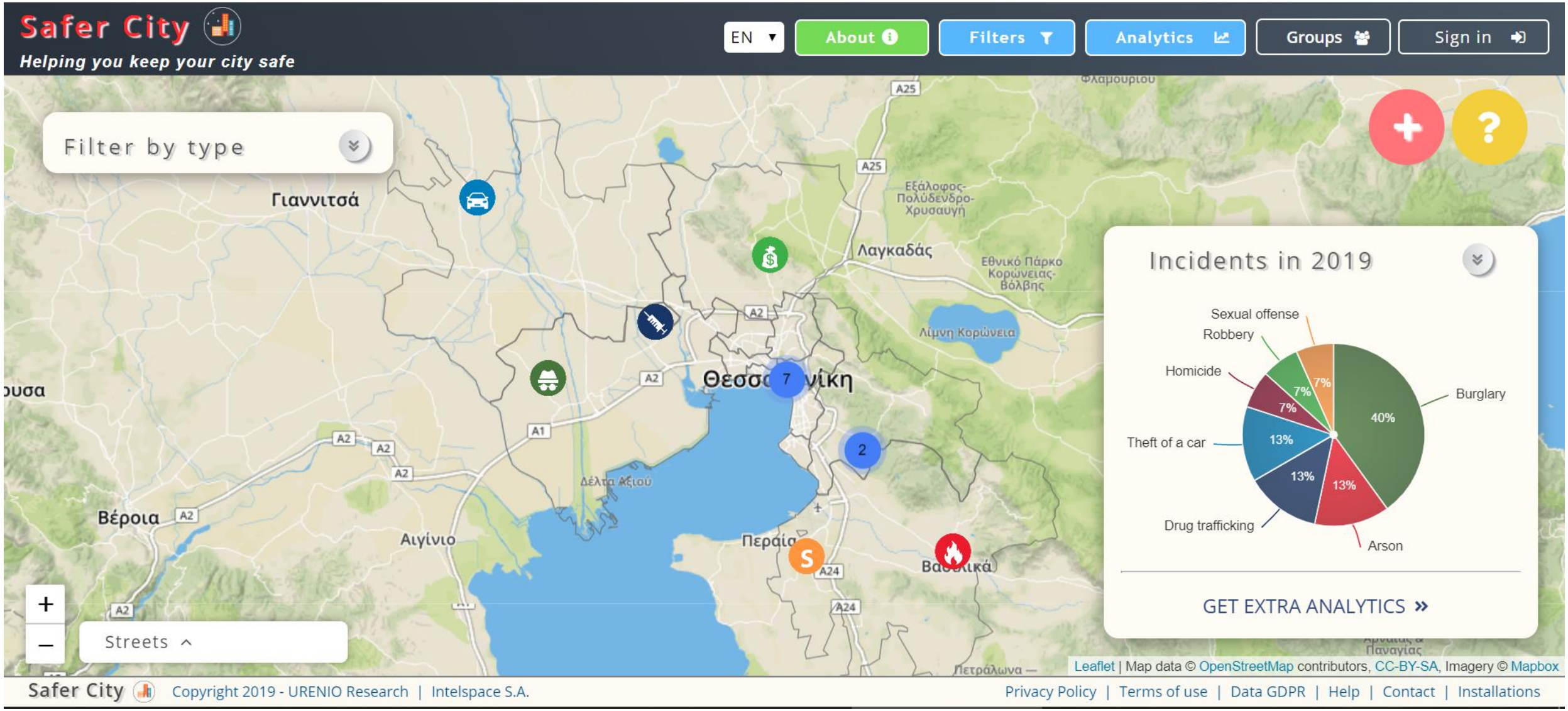
9

Technical Services Dpt
Environment
Municipal Police
Urban planning
Cleaning - Recycling
Suggestions
Other
Traffic Lights
Dangerous constructions

The Improve-my-City platform



(2) Safer city: Awareness and self-protection through collaboration



(3) Complex solutions integrating digital and non-digital elements

What is **Vision Zero?**

Vision Zero is a strategy to eliminate all traffic fatalities and severe injuries, while increasing safe, healthy, equitable mobility for all. First implemented in Sweden in the 1990s, Vision Zero has proved successful across Europe — and now it's gaining momentum in major American cities.

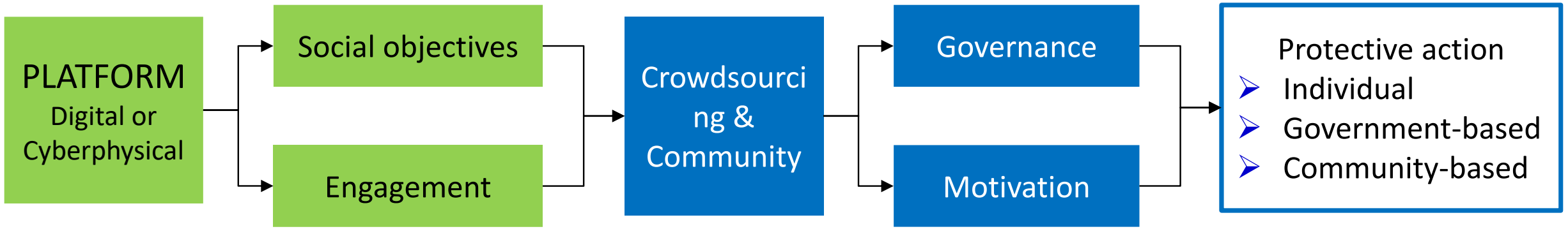
Source: Vision Zero Network.

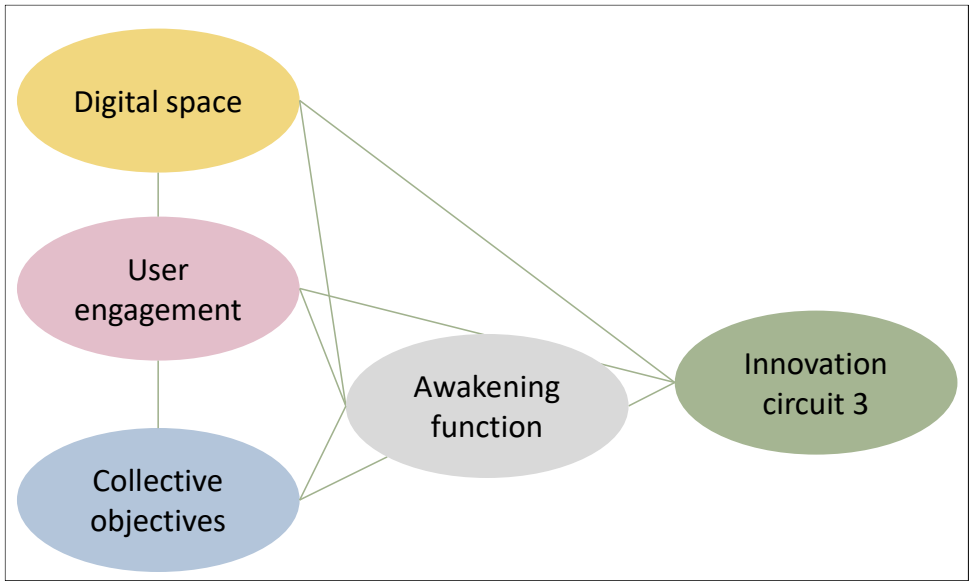
Table 8.2 Vision Zero implementation components

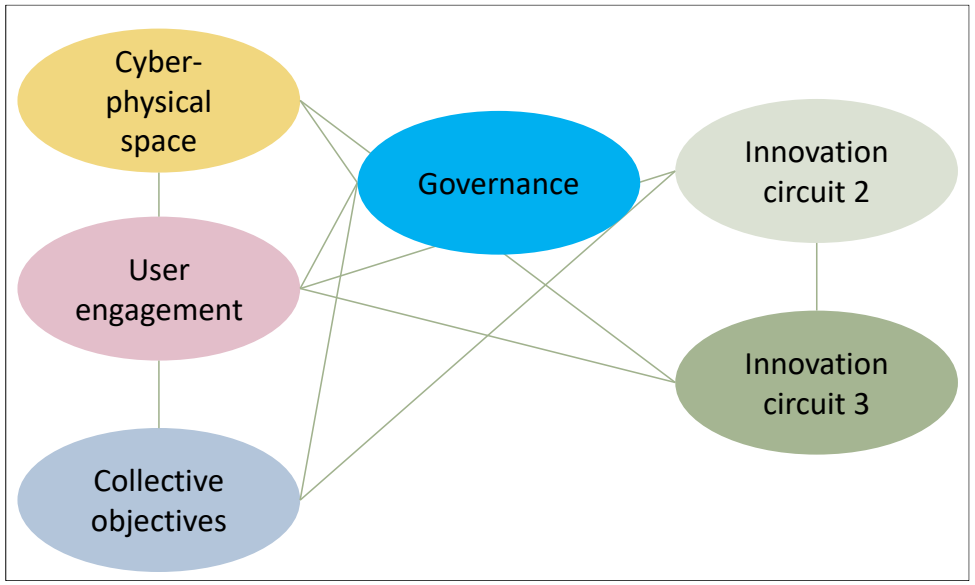
1. MAPPING	1.1	Data: Information collection and dataset creation
	1.2	Identification of high-injury network and risk areas
	1.3	Analytics: Fatalities and major injuries per areas and social groups
2. PEOPLE AND USER ENGAGEMENT	2.1	Reporting and witnessing by users
	2.2	Education: Develop a driving culture for Vision Zero
	2.3	Co-design of safety solutions with users
3. CITY DESIGN	3.1	Intersection re-design for visibility and safety
	3.2	Engineering solutions under the principles of VZ and WalkFirst
	3.3	Creation of arterial slow zones
4. INSTITUTIONAL MEASURES	4.1	Law enforcement
	4.2	Law and policy support VZ and reduce speed on city streets
	4.3	Training of officers on safety measures and recording of events
5. DIGITAL SPACES AND TECHNOLOGIES	5.1	Web-based information collection and dissemination
	5.2	Real-time watch and alert and transportation injury surveillance
	5.3	Car-pooling & car sharing for reducing travelled miles per capita
	5.4	Advanced video-based road-safety analytics
6. MONITORING AND ASSESSMENT	6.1	Definition of output and result indicators
	6.2	Dashboards, data recording and periodic reporting
	6.3	Analytics for assessment

https://visionzeronetwork.org/about/what-is-vision-zero/

Engagement platforms and motivated communities

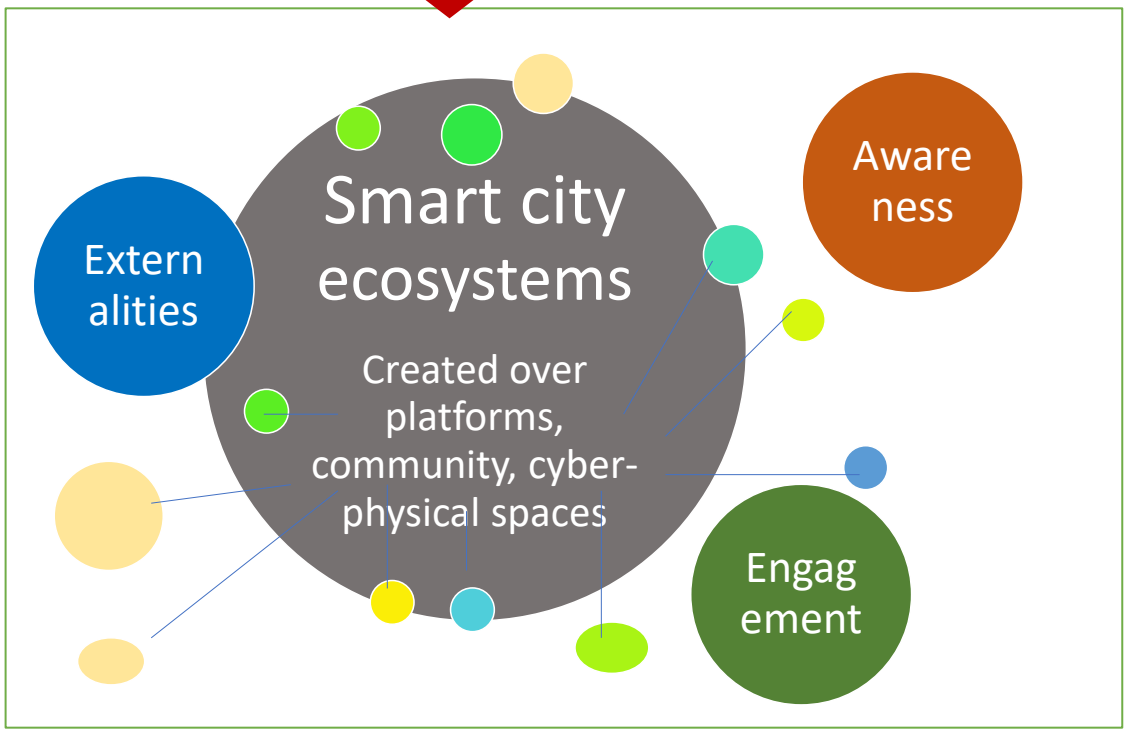


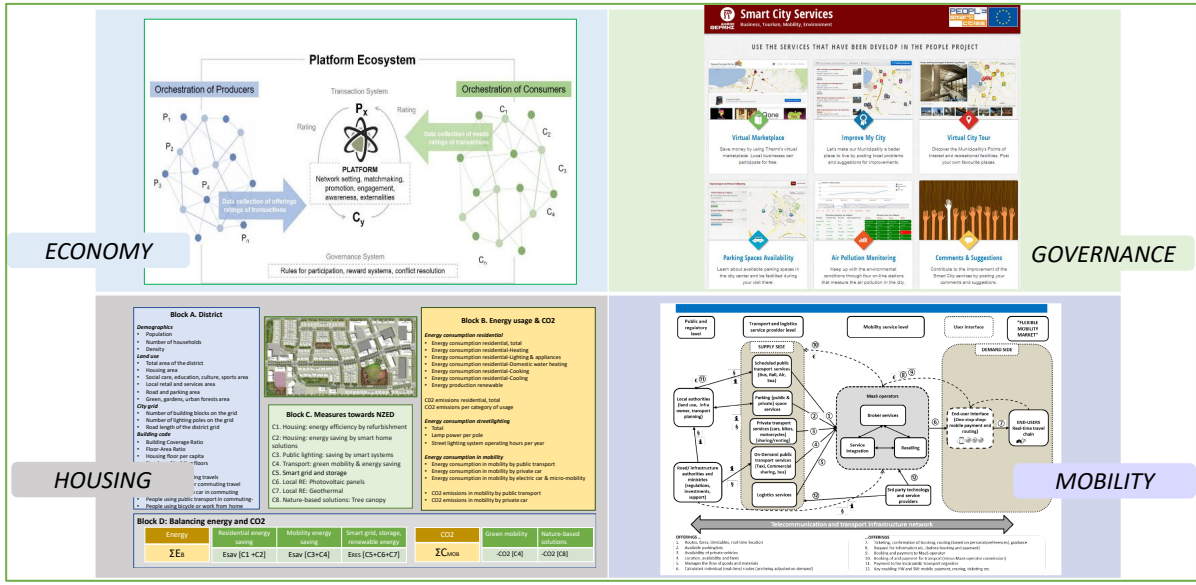




Take away

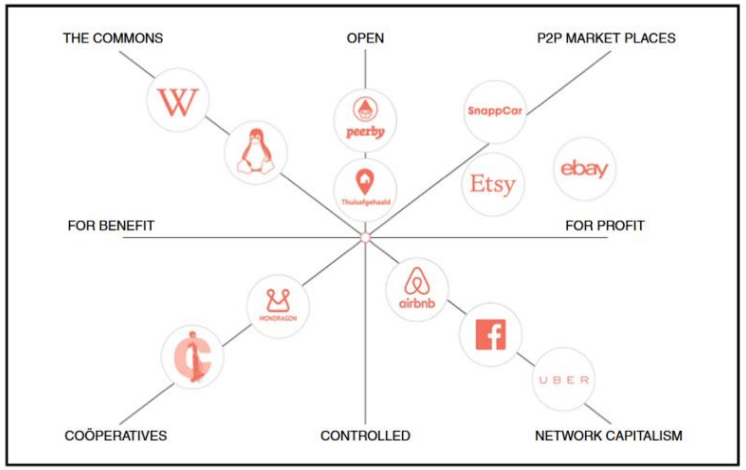
Platforms enable new models for smart city ecosystems





Platforms create shared, awareness, engagement spaces for innovation

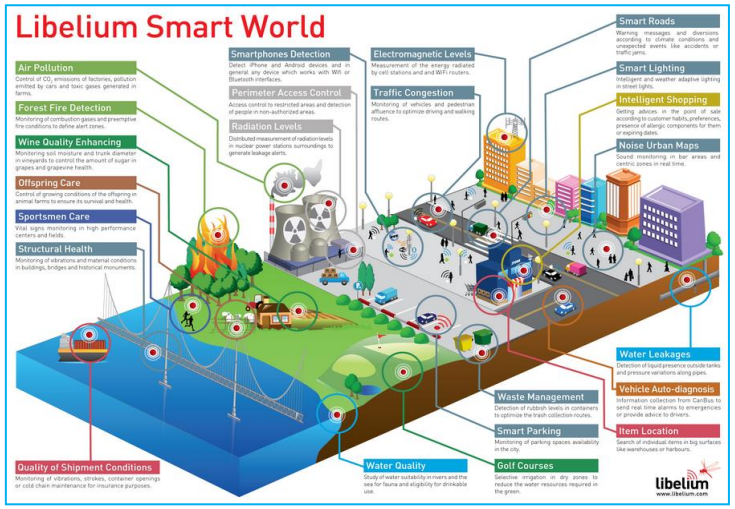
SHARED SPACES
Disruptive Innovation



Πηγή: Oskam, J., & Boswijk, A. (2016)

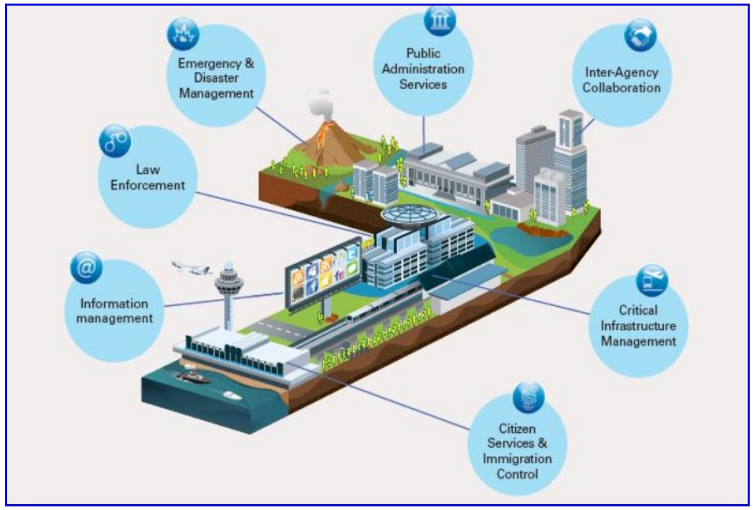
- **Sharing economy – Smart growth**
- Business growth platforms
- Business over Business
- P2P production, demand driven

AWARENESS SPACES
Eco Innovation



- **Sensor networks, real-time alert**
- Behaviour adaptation to external conditions
- Awareness and solutions about the environment, pollution, energy saving, CO2 emissions, climate change

ENGAGEMENT SPACES
Social Innovation



- **Social innovation and citizen non-profit networks**
- Mapping and motivation for participation and change
- Real-time safety and security systems in the public space of cities

generate externalities, behaviour change, collaboration

Externalities over platform

- Digital platforms offer externalities through co-creation of value, opening up opportunities, providing a "lift" to third party practice (Gillespie, 2010)
- A platform is a plug-and-play business model that allows multiple participants (producers and consumers) to connect to it, interact with each other and create and exchange value (Sangeet Paul Choudary)

Awareness over platform

- Digital platforms provide awareness by: (a) information collection, mapping, and analytics, (b) info dissemination, raising understanding, (c) learning and transfer of practices, (d) insights for novel solutions, (e) metrics
- Awareness creates protective environments, alert, behaviour change, or mechanisms for direct intervention in case of event or risk

Collaboration over platform

- Engagement is the commitment made by members of a community to participate in activities that fulfil objectives
- Engagement platforms are crafted through the logic of social innovation. They (a) contribute to creating active communities around topics of concern, and (b) actualise members of the community to accomplish actions for social innovation

enable measuring impact and added value

Growth, efficiency, externality KPIs

- Platform Adoption Rate
- Economic growth rate
- Job creation
- Increased investment
- Business growth
- Cost Savings
- Return on Investment (ROI)
- Market share
- Productivity
- Cost per unit
- Time to market

Sustainability and climate adaptation KPIs

- Platform Adoption Rate
- Air Quality Index
- Energy Efficiency
- Energy intensity
- Renewable energy generation
- Carbon intensity
- CO2 & GHG emissions
- Carbon footprint
- Forest and tree cover
- Net zero buildings
- Net zero districts

Safety & security KPIs

- Platform Adoption Rate
- Crime Rate
- Response Time
- Road safety
- Employee Safety Incidents
- Severe accidents and deaths
- Public Perception of Safety
- Data Privacy and Security Compliance
- Incident Resolution Time
- Satisfaction Index

https://www.routledge.com/Smart-Cities-and-Connected-Intelligence-Platforms-Ecosystems-and-Network/Komninos/p/book/9780367423056