THE BEST OF ALL POSSIBLE WORLDS:

DIGITAL DESIGN & DECISION SUPPORT TOOLS

Peter Nijkamp

In collaboration with

Karima Kourtit

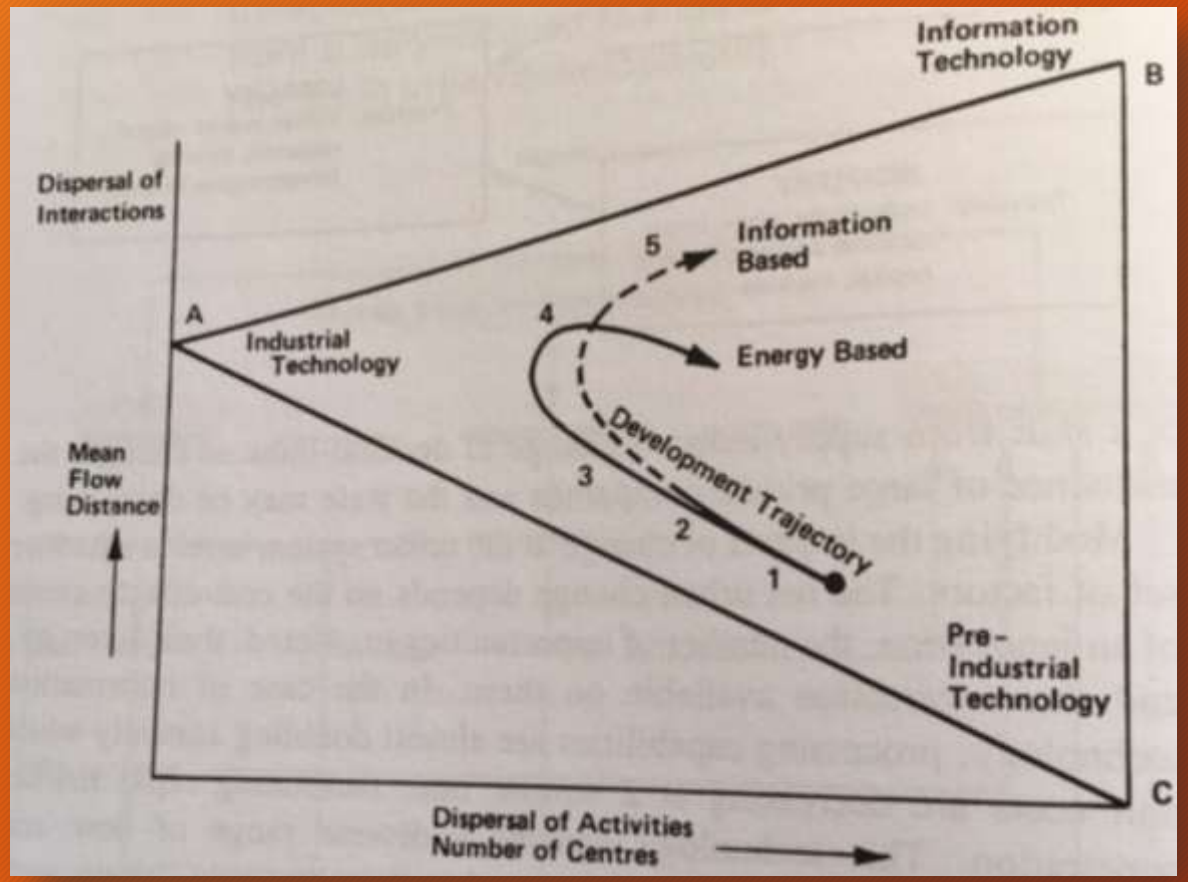
The Best of All Possible Worlds

INTELLIGENT CITIES

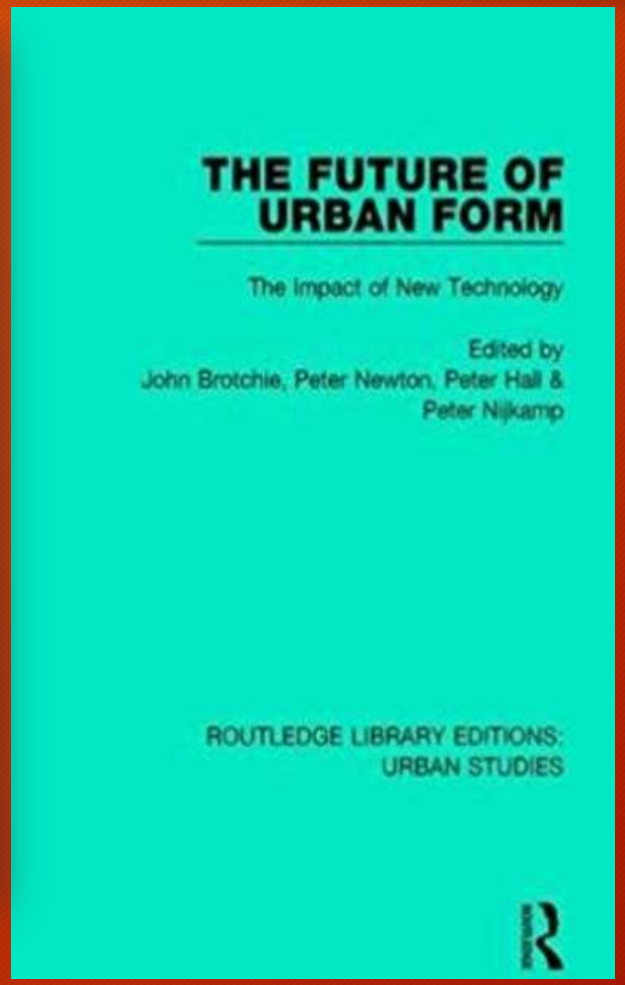
CHALLENGES

- ‘*New Urban World*’
- Accelerated Growth and Slow Shrinking
- Multple Life Cycles of Cities
- Citirs of People vs. Cities for People
- Body and Soul
- Morphological Dynamics and Social Happiness
- Impact of Digital Technology
- What is the City?
- What is the City of the Future?
- Dashboards for City Planning

DEATH OF DISTANCE CONTESTED



The Trajectory of Metropolitan Development



- Geographical Concentration?
- Geographical Dispersion?
- Network Cities?

EXAMPLE: TOKYO

- **Vision**: *A highly developed mature city that is relaxing and full of vitality.*

- Goals: - To build a metropolis with an urban structure for exchange, collaboration, and taking on challenges.
  - To bolster exchange and coordination amoing various fields,including industry and tourism.

- Realisation: - To concentrate functions around geographical hubs (‘compact cities in a compact city’)
  - To secure an effective use of transportation networks based on community engagement
  - To harness local resources and featurws, so that people feel attached to the community

- Final Target: - Tokyo 2035 is a Radiant World City!
  - Robotics
  - Digital Technology
  - Nanotechnology

GEODESIGN PLUS (1)

- Geodesign: Changing Geography by design (Carl Steinitz).
- Adaptive intelligent city tool that integrates complex bottom-up ideas into a coherent realistic outcome, through geographic information, systematic architecture and digital technology (Kourtit and Nijkamp 2017).
- Geodesign presupposes a shared perspective among various stakeholders, by providing object-based and used-oriented 2D or 3D information (Henk Scholten).
- Building Information Modelling (BIM): avalanche of diverse information of users and stakeholders of the built environment in cities, with different spatial and time scales (Whyte and Hartmann).

GEODESIGN PLUS (2)

- In the new era of big data need for appropriate urban data analytics, with a wide array of statistical and modelling techniques (Mike Batty).
- Need for integrative perspective on the ‘real city’ in the ‘urban century’’: the microcosmic city (Kourtit and Nijkamp)
- Alignment between microcosmic structural city view and geodesign/geo-science approach through analysis, evaluation, design and decision support techniques: Dashboards

Aims and Scope

Megatrends:

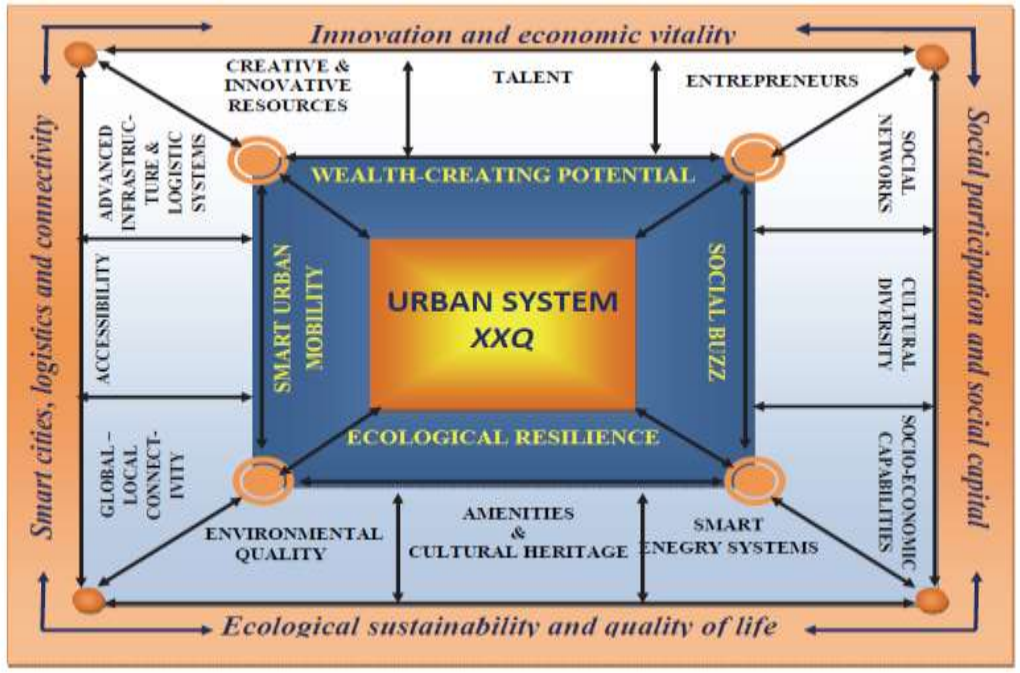
- Emergence of smart / intelligent cities
- Rapid penetration of social media in a digital world
- Rise of Big Data systems
- Need of data-rich decision-support tools: urban dashboards

Aims:

- To review the drastically changing urban governance arena and to demonstrate the strategic importance of digital technology and big data for intelligent cities
- To illustrate the importance of data-rich information for urban analytics and planning
- To demonstrate the relevance and value added of urban dashboards

Systemic View on the City

- City is a spatially coherent and functionally integrated geographical system
- Illustration of the above statement: ancient cities
- Modern conceptualization: Piazza Model



Source:
Kourtit, K., Nijkamp, P., Franklin, R.S. and Rodríguez-Pose, A. (2014), A Blueprint for Strategic Urban Research: the 'Urban Piazza', Town Planning Review, 85 (1). 97-126.

- Characteristics of Piazza Model:
  - Organized spatial entity
  - Multiple layers and dimensions
  - Multi-functional and multi-client fabric
  - Citizen-oriented
  - Adaptive evolutionary mechanism

Manifestation of the Microcosmic Principle!

From Smart to Intelligent Cities

Smart Cities - concepts

- Wired cities (Dutton, 1987)
- Techno cities (Downey and McGuigan, 1999)
- Cyber cities (Graham and Marvin, 1999)
- Creative cities (Florida, 2005)
- Knowledge-based cities (Carrillo, 2006)
- Real-time city (Townsend, 2000)
- WIKI cities (Calabrese et al., 2007; Ratti et al., 2007)
- Digital cities (Komninos, 2008)
- Live City (Resch et al., 2012)
- Networked cities (Castells, 1996)
- Sentient cities (Shepard, 2011)
- Computable city
- Ubiquitous city
- Sustainable / resilient city
- Green city
- Open city……

- **Latest (most used) concepts:**
- Intelligent city (Komninos, 2006, 2008; Sassen, 2011).
- Smart city (Mitchell, 2006; Giffinger et al., 2007)
- Incredible cities (Kourtit et al. 2010)

The 'invisible city' (Batty 1990)
The 'informational city' (Castells, 1989)
The 'weak metropolis' (Dematteis, 1988)
The 'wired city' (Dutton et al., 1987)
The 'telecity' (Fathy, 1991)
The 'city in the electronic age' (Harris, 1987)
The 'information city' (Hepworth, 1987)
The 'knowledge-based city' (Knight, 1989)
The 'intelligent city' (Latterasse, 1992)
The 'virtual city' (Martin, 1978)
'Electronic communities' (Poster, 1990)
'Communities without boundaries' (Pool, 1980)
'Electronic cottage' (Toffler, 1981)
The city as 'Electronic spaces' (Robins and Hepworth, 1988)
The 'overexposed city' (Virilio, 1987)
The 'flexicity' (Hillman, 1993)
The 'virtual community (Rheingold, 1994)
The 'non-place urban realm' (Webber, 1964)
'Teletopia' (Piorunski, 1991)
The 'Cyberville' (Von Schuber, 1994)

Graham, S. and S. Marvin, 1996

Smart Cities – key characteristics

- Each of these concepts are used in a particular way to conceptualise the relationship between ICT and contemporary urbanism, however, they share a common focus on the effects of ICT on urban developments.

Key characteristics:

- networked (community and space-economy)
- wired
- digital
- innovation
- knowledge (creation)
- learning (capacity)
- smart, intelligent,
- creativity, productivity,
- competitive and participation.

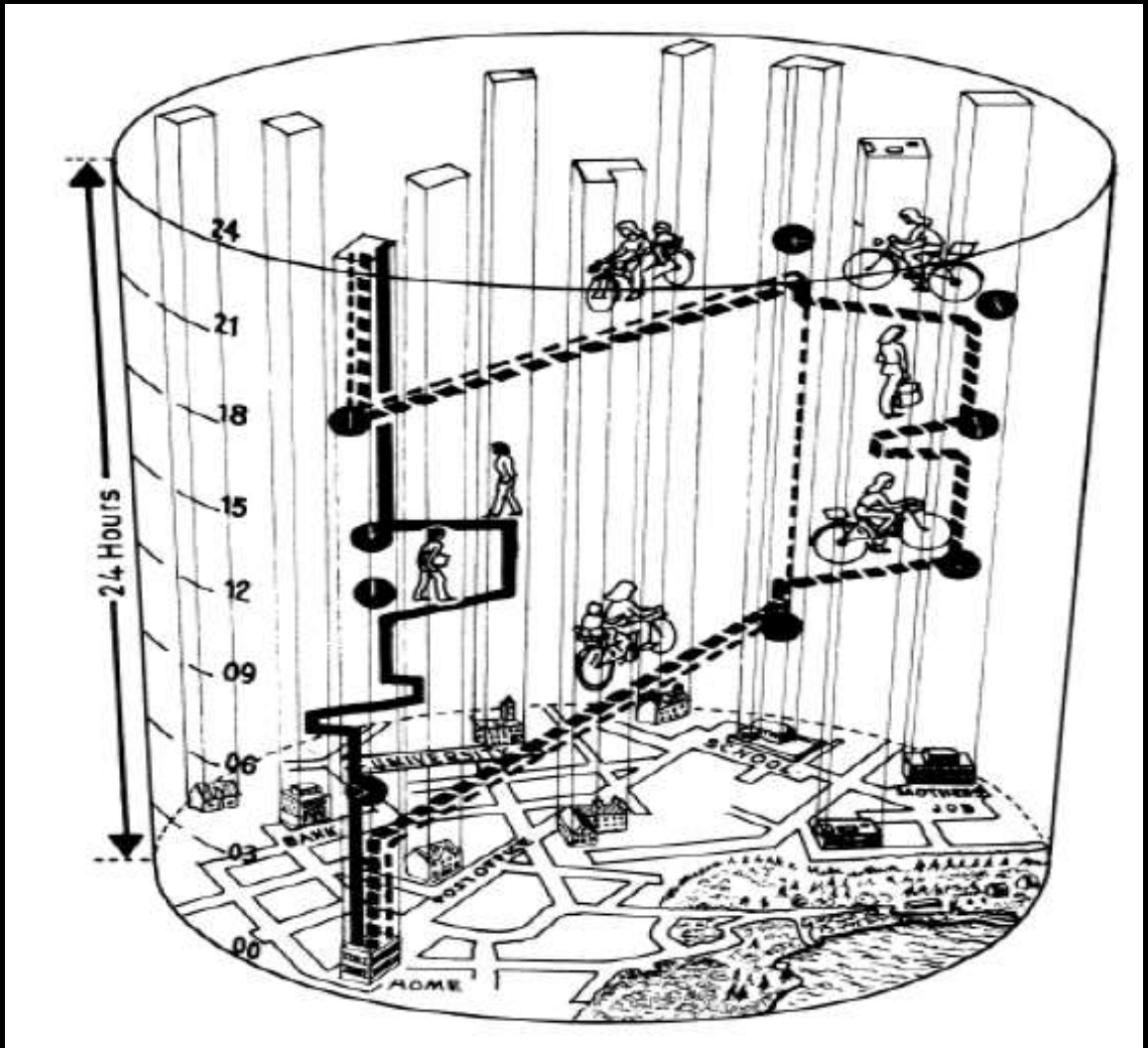
Urban analytics – Space and time

- The use of digital data to support urban analytics enables the research community to analyze and model the dynamic *pulse of the city* or *heartbeat* (Batty, 2010).
- The underlying assumption of space-time geography methods is not a static canvas of urban zones or urban morphology, but instead a dynamic understanding of the urban environment, as manifested in numerous and diverse individual urban life-styles.
  - Space is not separated by time; the domain of such urban analytics is the space-time continuum.

Hägerstrand’s Time-Space Model

The concept of a space-time path is to illustrate how a person navigates his or her way through the spatial-temporal environment.

- Hägerstand (1970) shows how people travel and live through time and space from birth to death.
- People always have to deal with decisions they made earlier (historical setting) and some constraints (divided in 3 groups).



Cities for People

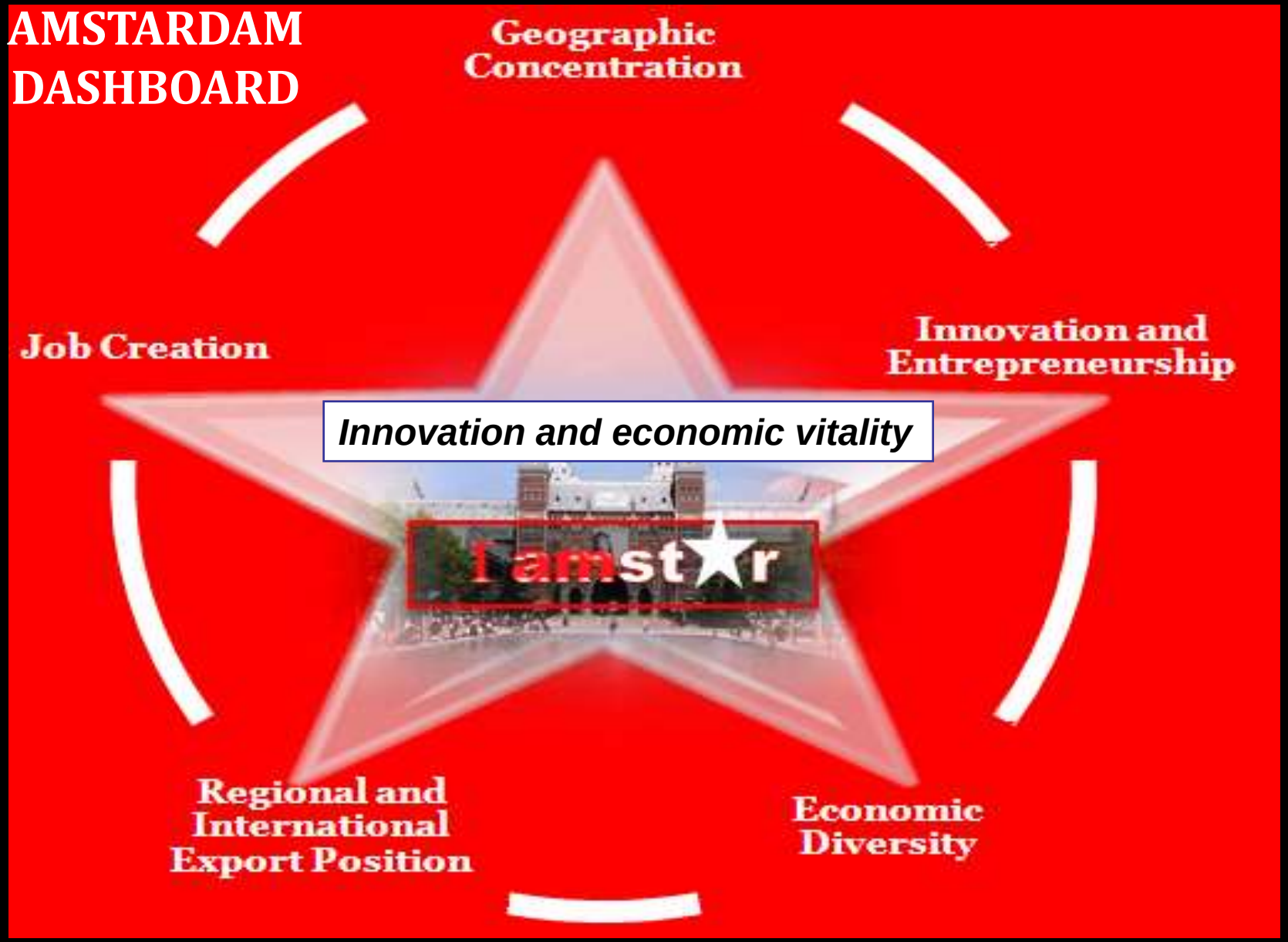
"*Urbanism as a way of life*" (Wirth 1938)

- Externalities (MAR, Jacobs, Babylon)
- 'The New Urban World'
- *Compelling* Cities (deterministic blueprint planning) or *enabling* cities possibilism as a planning mode; Vidal del la Blache)
- Cities in plural (new towns, garden city, poly-nuclear cities, edge cities, megalopolis etc.)
- Urban sprawl ('crystallization of chaos': Mumford 1922)
- What about the geographical scale of settlements?
- What is a 'non-city'?

A Microcosmic Perspective

- A city is an interconnected multi-scale organism
- A city is an evolutionary, organized system, with interacting parts based on a smart (hierarchical) decomposition (Simon).
- Principles of CPT do also hold for the development of cities ('cities of systems' vs. 'systems of cities': Brian Berry).
- Connectivity as the basis for systemic organization of cities, comparable to Barabasi's small world networks (see also Batty).
- Deconstruction of cities based on neighbourhoods, communities and streets (connectivity corridors).
- Fractal variation in city development, based on a '*microcosmic*' architectural perspective, governed by Torre's proximity forces (cf. super-proximity of Kourtit).
- Shared spaces in cities determine symbiotic value of cities (UN Habitat 2013); 'Who owns the city?' (Sassen).
- Is the modern city a 'tragedy of the commons' (Hardin)? And is the 'sharing economy' a meaningful concept for understanding and planning cities??

Complex Choices

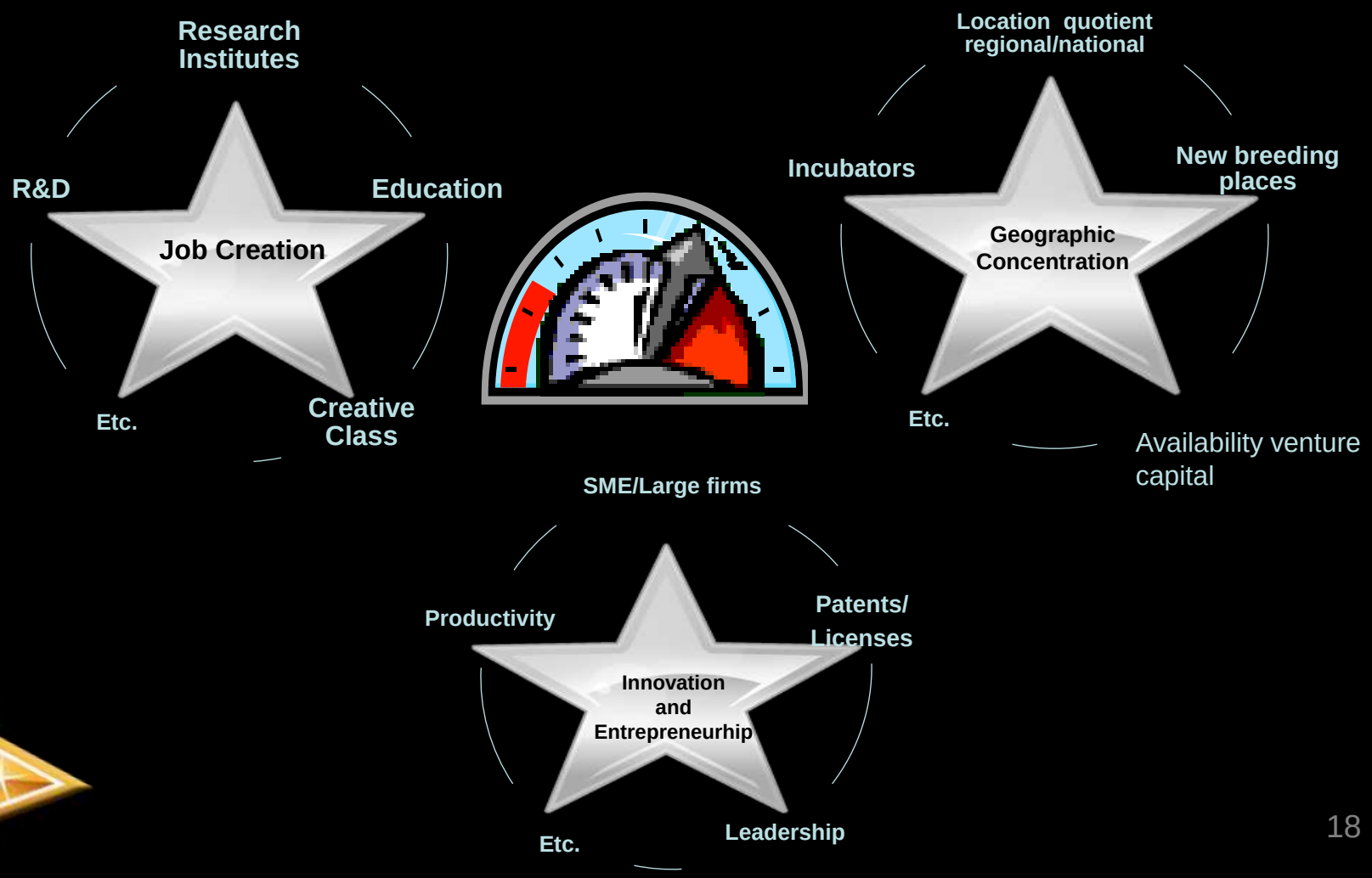


Measurement and Monitoring Performance system: ***DASHBOARDS***

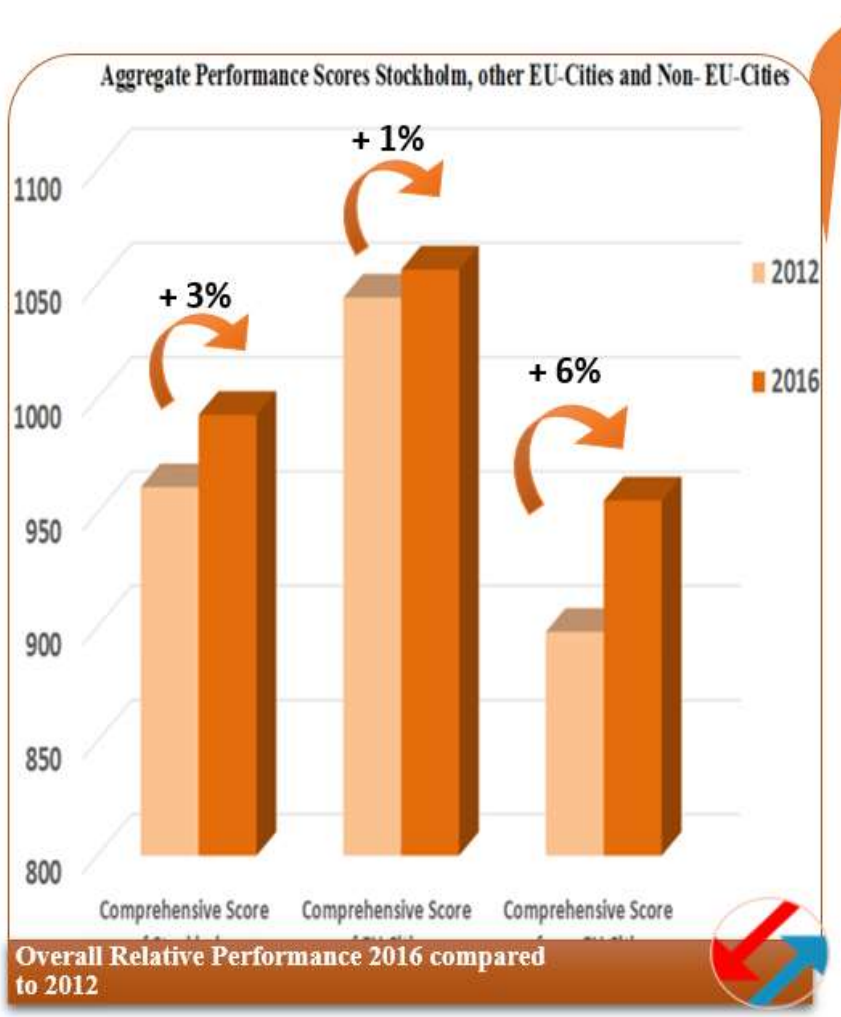
- In general, space-time geography (data) form a way to better understand the urban environment and its dynamics and a HEALTH CHECK of Smart Cities.
  - Such data can serve to reveal how we as citizens relate to our urban contexts
  - Highlights the needs for strategic urban planning and complex urban management issues.
- In this sense:
  - data analysis (*usually enabled by data visualizations*) can empower a city with smartness and intelligence by helping us to identify patterns and relationships, enabling citizens and decision bodies with tools that support better decision making, discovery, exploration, and explanation of the city.

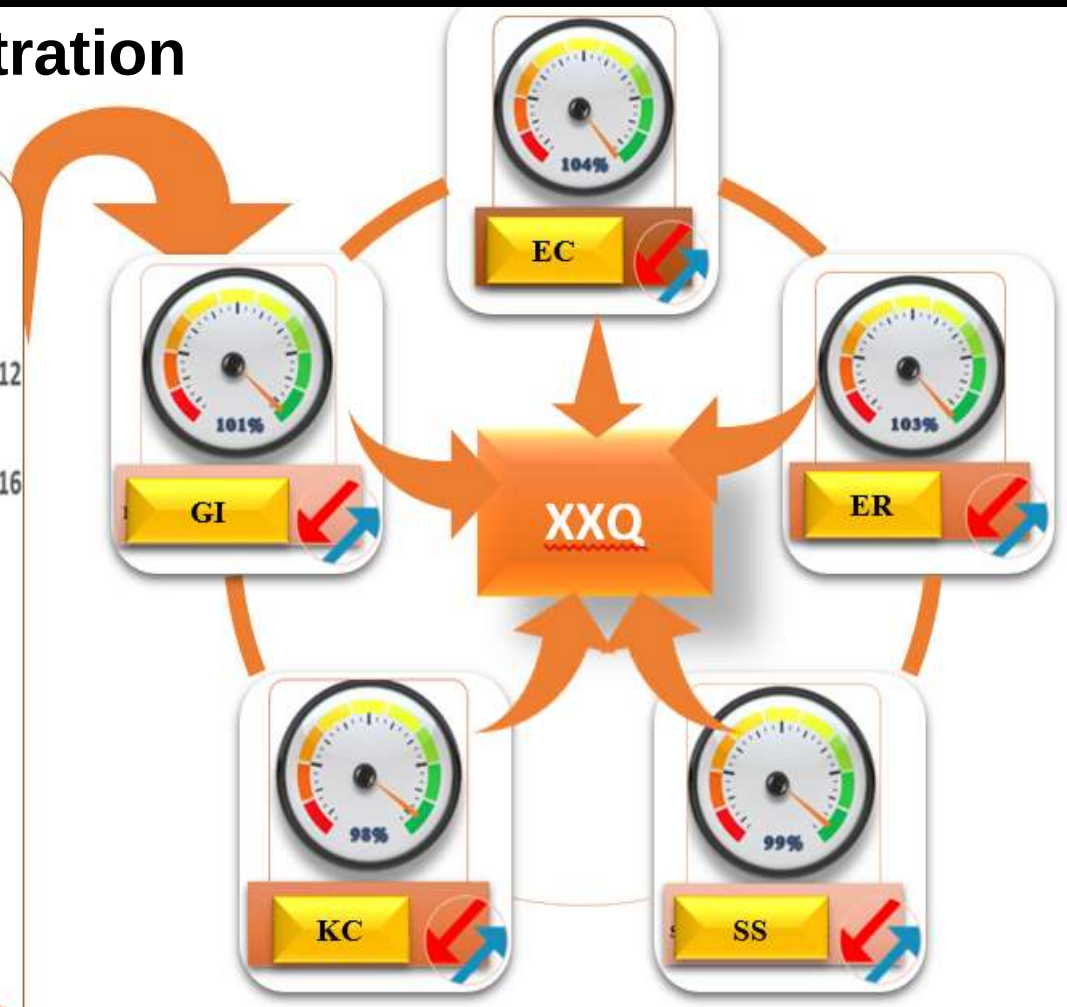
I- AMSTARDAM DASHBOARD

- **Examples of smart sub-performance indicators measure:**



Stockholm: Empirical Illustration





(a) Overall relative performance Stockholm (EU-cities and Non-EU cities (2012-2016)

b) XXQ performance of Stockholm (2016 compared to 2012)

Figure: Relative performance measurements of XXQ factors from the Pentagon model

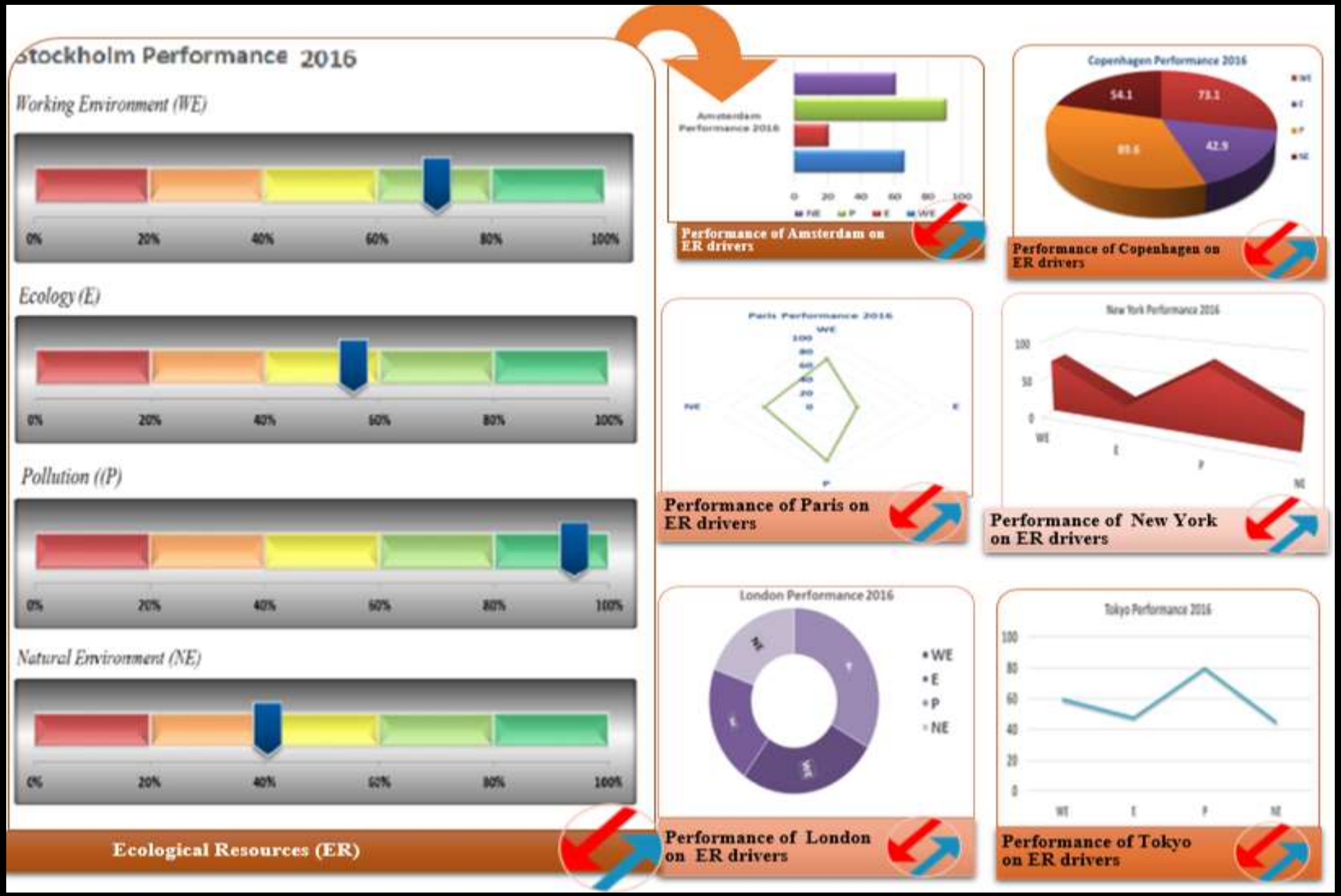


Figure : Decomposed Dashboard Presentation of Performance of *Ecological Resources*(ER) of Stockholm, Compared to Other Cities

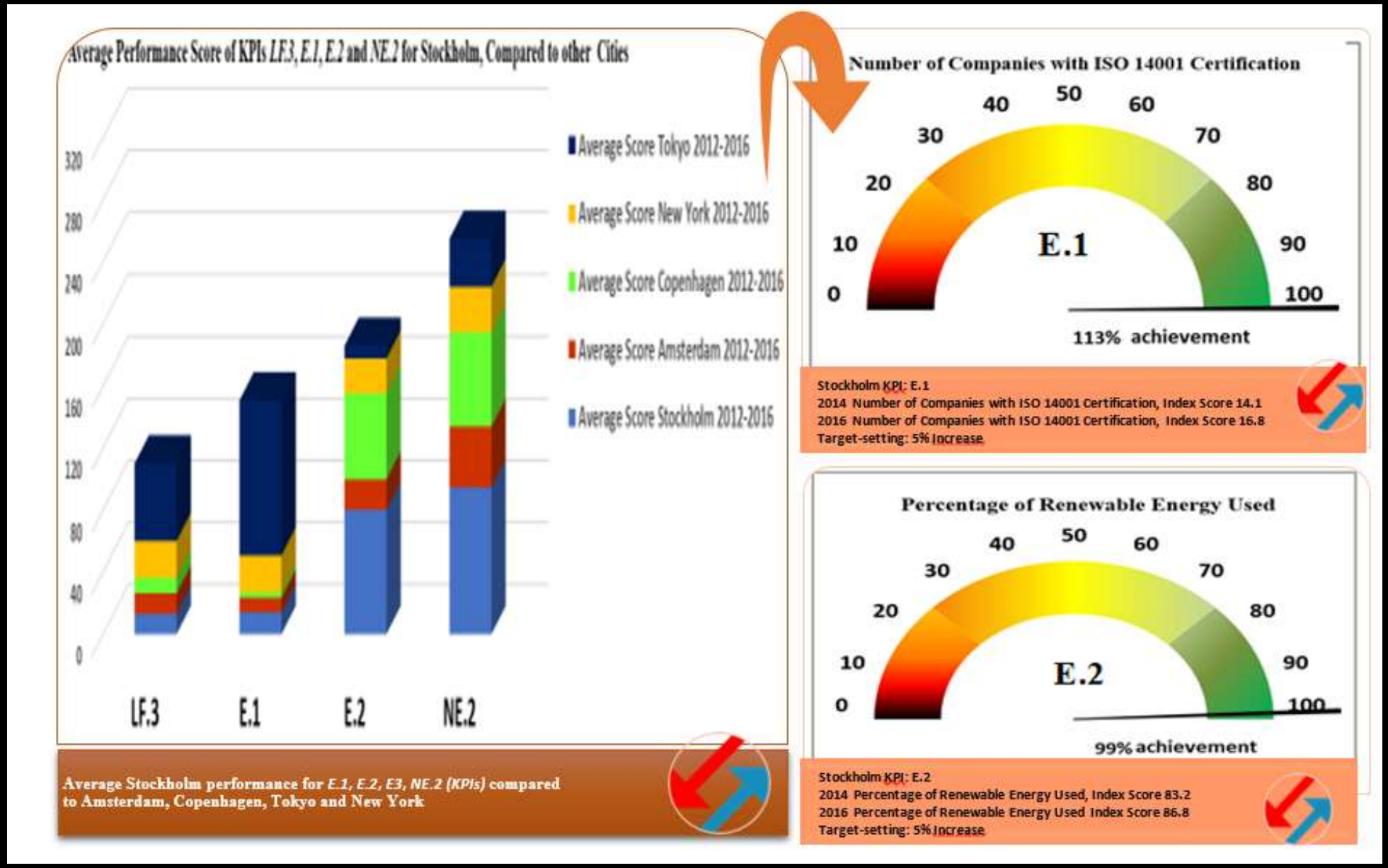


Figure: Average Stockholm performance per KPI compared to Amsterdam, Copenhagen, Tokyo and New York

Conclusions

- Our review: unprecedented potential of digital technology and big data for urban planning.
- Urban analytics: current applications are only the top of an unexplored ice-berg.
- City decision-support systems: urban dashboards need to be more spatially disaggregated and functionally differentiated

Gottfried Wilhelm Leibniz

You have to be ‘Smart’ (Helena Rubinstein)

In 1941, Rubinstein wanted to rent the penthouse apartment at 625 Park Avenue but was told the building didn’t allow Jews. So she promptly bought the building — and installed herself in the triplex at the top.


Thank
you