Part A: The Stage

Setting the Scene

The ‘New Urban World’:

• Cities grow in size and in number (Glaeser, Taylor)
• Cities become complex networks (Batty)
• Our planet tends toward global urban connectivity (Neal)
• Cities function as multi-layer data warehouses (Schintler)
Scope of the paper

- Cities are complex and pluriform organisms that need both thorough scientific interest and sustainable policy care.
- Cities need to be understood from their fundamental architecture, their composition, and their functioning, at all scales ranging from micro to meso/macro.
- Cities in a data-rich environment call for systematic and operational decision support tools, in particular, dashboards for sustainable governance.
Structure of the Study

- Microcosmic principles for urban structure and morphology (e.g. hierarchical decomposition).
- ‘Blowing up the city’ in the form of functional deconstruction and building up again through reconstruction.
- Functional interconnected virtual redesign of cities through the use of the PIAZZA model.
Top-down vs. Bottom-up Architecture of City Structure

Blowing up history

Blowing up the city
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

- 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!

Source:
PART B: SMART/INTELLIGENT CITIES
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
Smart Cities - Some elements

Main focus on **soft infrastructure** (i.e. ICT networks, fast internet connections etc.)

Specific papers focus rather on:
- Human capital (Glaeser and Berry 2005, 2006)
- Urban amenities (Shapiro 2008)
- Creative class (Florida 2002)

Two caveats:
- Data flood
- Complex choices
Smart Cities - definitions

- Technological innovation perspective (Komninos, 2006): “territories with high capacity for learning and innovation, which is built-in the creativity of their population, their institutions of knowledge creation, and their digital infrastructure for communication and knowledge management”.

- Economic perspective (Nijkamp, 2011; Caragliu 2011; Kourtit an Nijkamp 2016): “investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure to fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance”.

- Monitoring perspective based on sensors (Giffinger et al., 2007): “a city functions in a sustainable and intelligent way, by integrating all its infrastructures and services into a cohesive whole and using intelligent devices for monitoring and control, to ensure sustainability and efficiency”.

- Networked perspective (Nijkamp, 2008): “geographical hubs (virtual and real) in a modern networked space-economy and will continue to be engines of economic growth, creativity and innovativeness”.


Is the Smart City an Intelligent Response to Urban Challenges?

• [Caragliu. 2011]:

A city is smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance.

• Digital fix or people’s fix (‘hardware’ or humanware’)

• Is the microcosmic city really a place 4 all?

• Is the city ‘the home of man’ or ‘the home for man’?
PART C: BIG DATA
“the city itself is turning into a constellation of computers” (Batty, 1995)

Networked cities are made up by flows of people, vehicles, and information (Sheller, 2004).

Data about these flows are difficult to collect, but are becoming increasingly available for new social science research data and methods (Shoval, 2007).

This trend prompts the question on: the potential use of ‘big data’ in the digital world for effective and efficient planning, management, and research purposes.
Big Data

“Datasets whose size is beyond the ability of typical database software tools to capture, store, manage, and analyze”

or

“Large volumes of high velocity, complex and variable data that require advanced techniques and technologies to enable the capture, storage, distribution, management and analysis of the information”

or the four V’s

– Volume (huge data sets with terabytes or petabytes of information)
– Velocity (time sensitive)
– Variety (unstructured data of all varieties)
– Veracity (quality and provenance of received data)
In other words:

big data consists of massive, dynamic, varied, detailed, inter-related, low cost datasets that can be connected and utilised in diverse ways (Kitchin, 2013).
Bigger data

In other words:
bigger data are larger-sized datasets, often drawn from different sources, with multidimensional structures and levels of many characteristics and activities of a complex economic, social and cultural nature produced by a multiplicity of actors and stakeholders for new and sustainable urban development and advanced urban competitiveness analysed with powerful tools. (Nijkamp and Kourtit 2016).
Complex Choices
I- AMSTARDAM DASHBOARD

• Examples of smart sub-performance indicators measure:
BLOWING UP THE CITY APPROACH

Publication date: February 2018
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
Part E: Prospect

Needed:

• further decomposition into sub-city levels e.g., districts, street, etc.

• consistent combination with big data

• link with digital urban technology

• adaptation mechanism in vulnerable urban systems
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
Thank you