Modelling for making smart city KPIs an essential and user-friendly tool for smart city strategy design

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4th International Workshop on Model-Driven Engineering for the Internet-of-Things
http://www.es.mdh.se/MDE4IoT/

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1ST INTERNATIONAL WORKSHOP ON MODELING SMART CITIES https://mosc.gssi.it/

Agenda

- The experience of the EU Digital Cities Challenge project
- Smart city governance and smart city monitoring framework as the key problems of successful smart city strategies
- Benefits and adoption factors of smart city monitoring frameworks
- The role of the modelling community
- An invitation to reflect on the Covid-19 experience and smart cities

Digital Cities Challenge – A Pan-European Smart City Design Experience

- **Objective**: designing and starting to implement digital transformation strategies for city with a specific impact on economic growth.
- **Cities involved:** Cities with economic growth issues and/or specific sector issues.
- **Duration of the project**: Almost 2 years.
- **Key format elements**: Each city team (usually composed local authority + city stakeholders) were supported by a team of experts.

Digital Cities Challenge – The Digital Transformation Trajectory

- Prepare the City and the expert team for the provision of advisory services

- Determine city's current digital maturity level based on
  - Self-assessment tool
  - Ongoing digital initiatives
- Define a common vision and ambition for city's digital transformation and industrial modernisation
- Create network of relevant stakeholders to be involved in digital transformation

- Develop a strategy for digital transformation and industrial modernisation based on
  - Vision and ambition definition
  - Existing policy strategies
- Embed the strategy among all stakeholders of the network

- Develop a detailed roadmap for the implementation of the strategy
- Subdivide strategy into project tasks and define priorities
- Define the governance and strategic steering of the strategy
- Identify potential funding streams for the implementation of priority projects

- Identify customised performance indicators
- Monitor the progress of strategy implementation

Digital Cities Challenge – The Digital Transformation Framework

Accelerators to enhance digitalisation of industry

Prerequisites to create favourable framework conditions

Overall coordination and **governance** is needed to streamline the process

(**Digital) infrastructure** is a basic requirement to enable digitalisation

The ecosystem greatly benefits from a portfolio of **support services** facilitating digital transformation

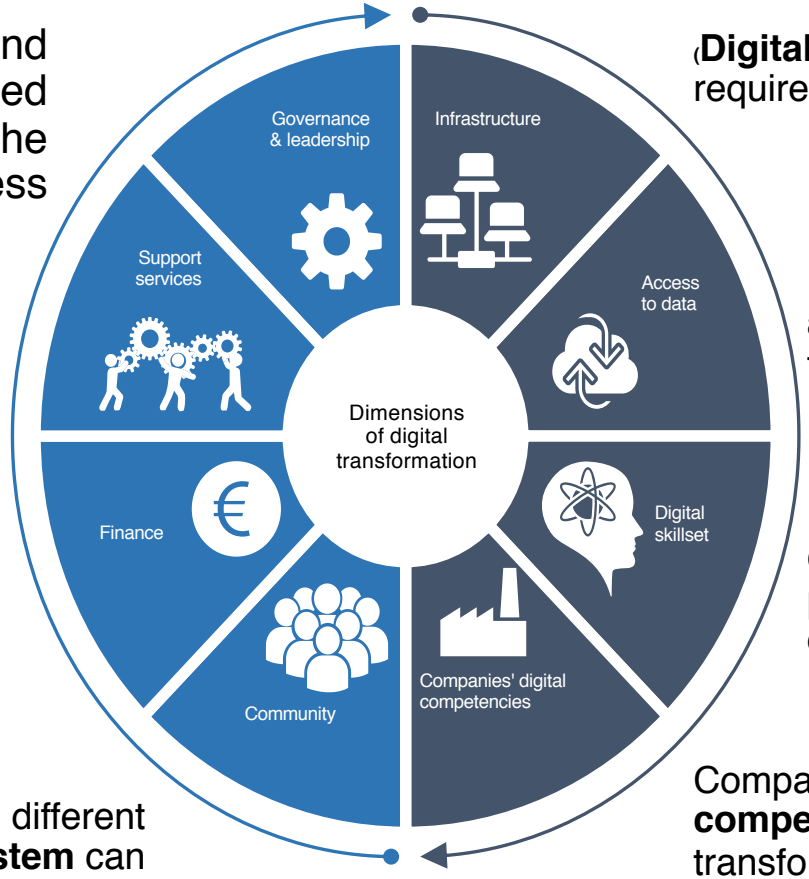
Processing of data requires **access to data** through technology

Funding is needed to support digital projects

Human assets and capabilities are prerequisites to enhance digital transformation

Interactions between different stakeholders of the **ecosystem** can enhance digitalisation

Companies need specific **digital competencies** to realise digital transformation



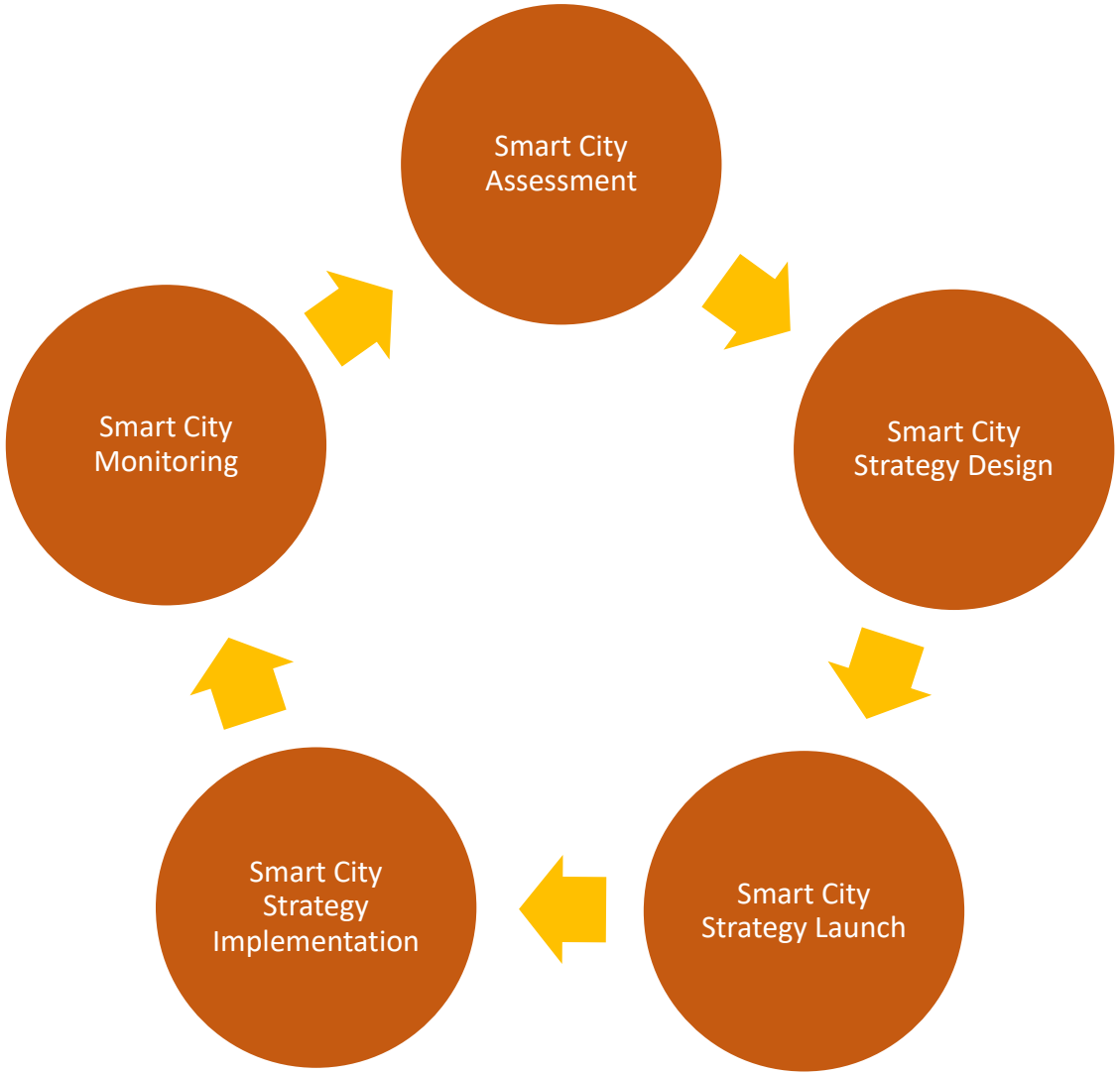
Digital Cities Challenge – The Issues of Smart City Governance and Smart City Monitoring Framework

Designing and implementing a solid **smart city governance** is not an easy task in cities.

Being able to use a robust **smart city monitoring framework** is a critical point for several cities.

https://www.digitallytransformyourregion.eu/digital-library?f%5B0%5D=reports%3A210

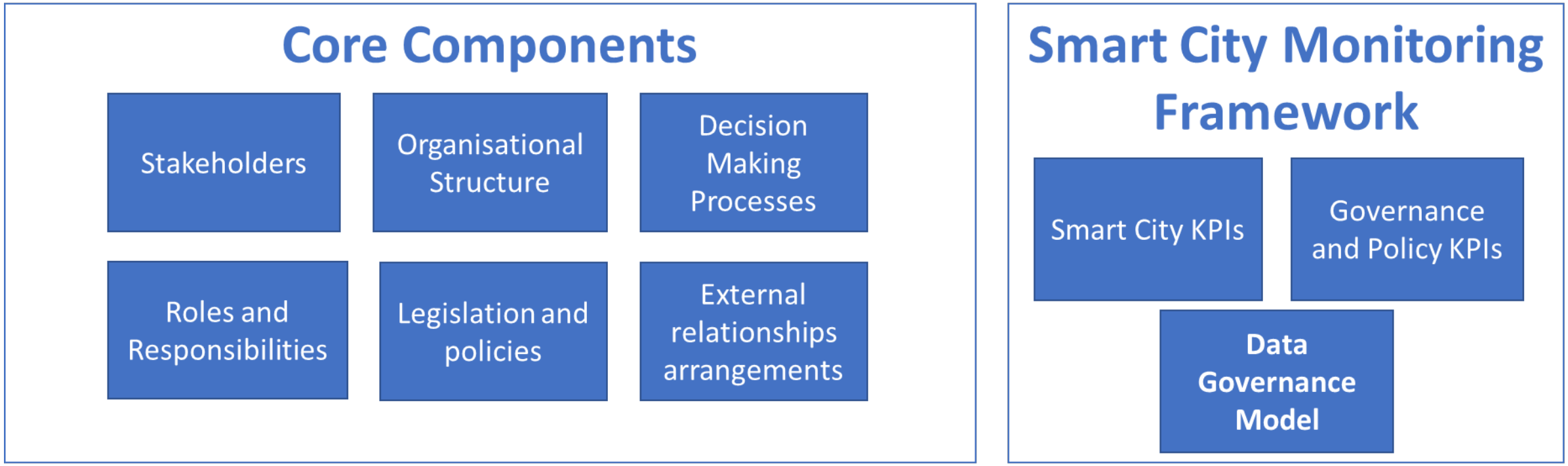
Smart city is not a one-off project!



Smart city is an evolving policy as the city evolves. It has its own lifecycle changing with the city changes.

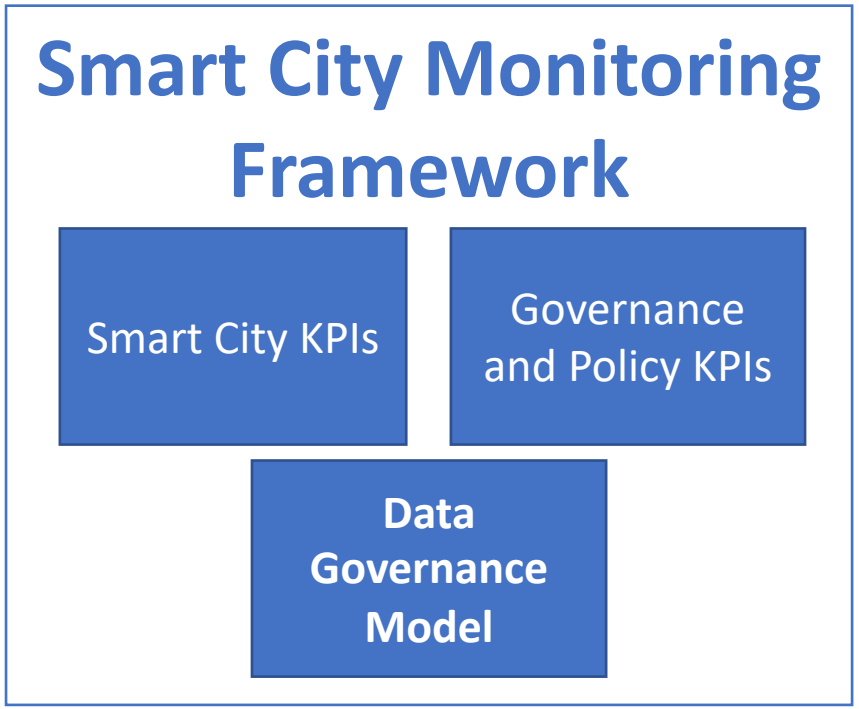
The smart city lifecycle is made of several steps. Those steps need to be managed. Here, the role of a smart city governance.

Smart City Governance Framework



Source: Elaboration on framework proposed in Robert Wilhelm Siegfried Ruhlandt. The Governance of Smart Cities: A Systematic Literature Review. Cities (2018), https://doi.org/10.1016/j.cities.2018.02.014

Smart City Monitoring Framework



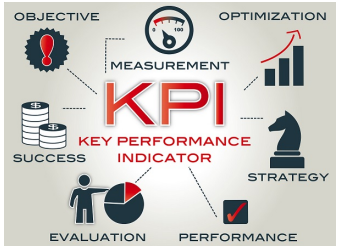
- **Smart City KPIs**. This component measures the outputs of specific smart city projects and the overall impact on the city. That means measuring performance and behaviour of devices and sensors installed and the usage of related applications.
- **Governance and Policy KPIs**. This component evaluates if the smart city strategy is achieving the desired policy objectives and how the smart city governance is performing in relation to those.
- **Data Governance Model**. This component looks at how data is managed and used. If it is open to other stakeholders or exclusively used by smart city governance stakeholders. The Data Governance Model is an important part of the overall smart city strategy and therefore stated in the strategy document.

Smart City Monitoring Framework – Existing ideas

CITY keys

http://www.citykeys-project.eu/

Very comprehensive research on smart city indicators with an extensive sets of KPIs – EU funded project



U4SSC

ITU Sustainable and Smart Cities KPIs used by cities such as Dubai, Singapore, Manizales, Montevideo, Maldonado, Foshan, Wuxi, Guangshan, Kairouan, Pully, Moscow, Valencia and Rimini

https://www.itu.int/en/ITU-T/ssc/Pages/KPIs-on-SSC.aspx

SMART... MONITOR

Very advanced smart cities creating their own frameworks (See Smart.Monitor in Vienna as an interesting example)

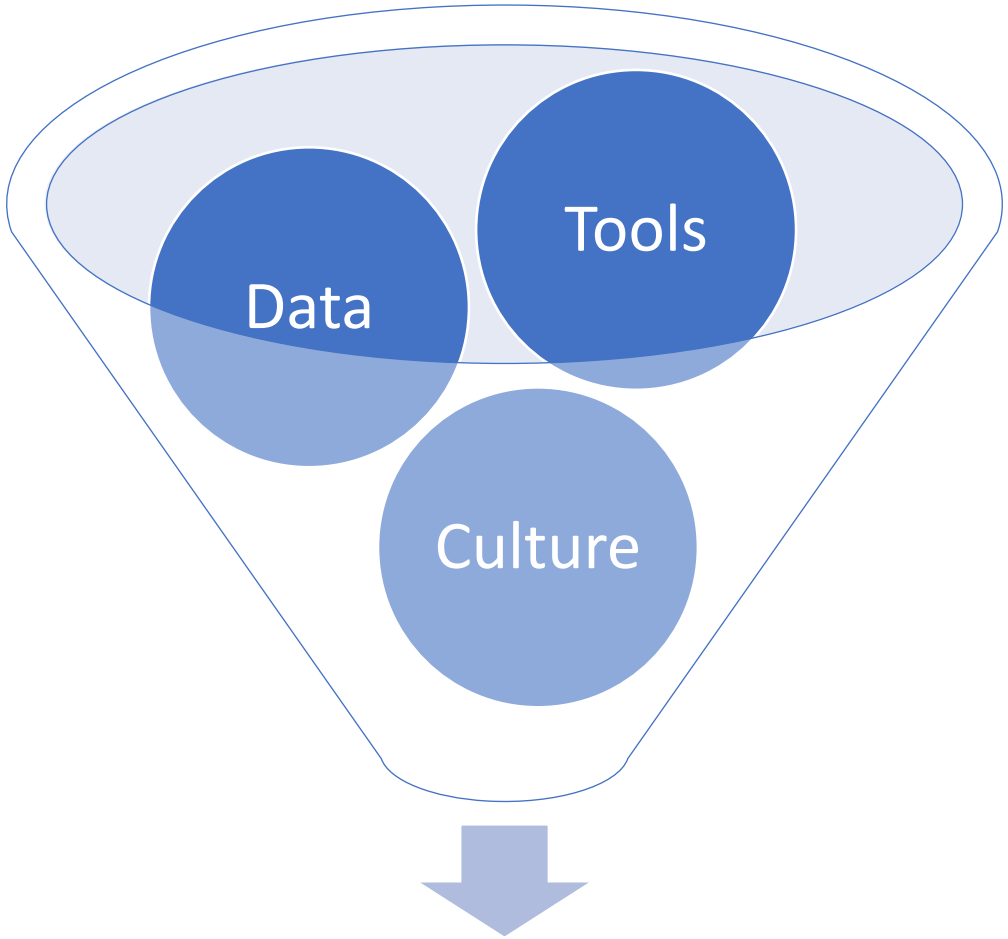
https://www.wien.gv.at/stadtentwicklung/studien/pdf/b008486c.pdf

There are then several business studies and tools developed by consulting organisations of different type proposing metrics on smart cities. However, primarily, they focus on ranking cities. Those organisations also propose KPIs-based tools for supporting city authorities.

Key interrelated factors for adoption of smart city monitoring framework

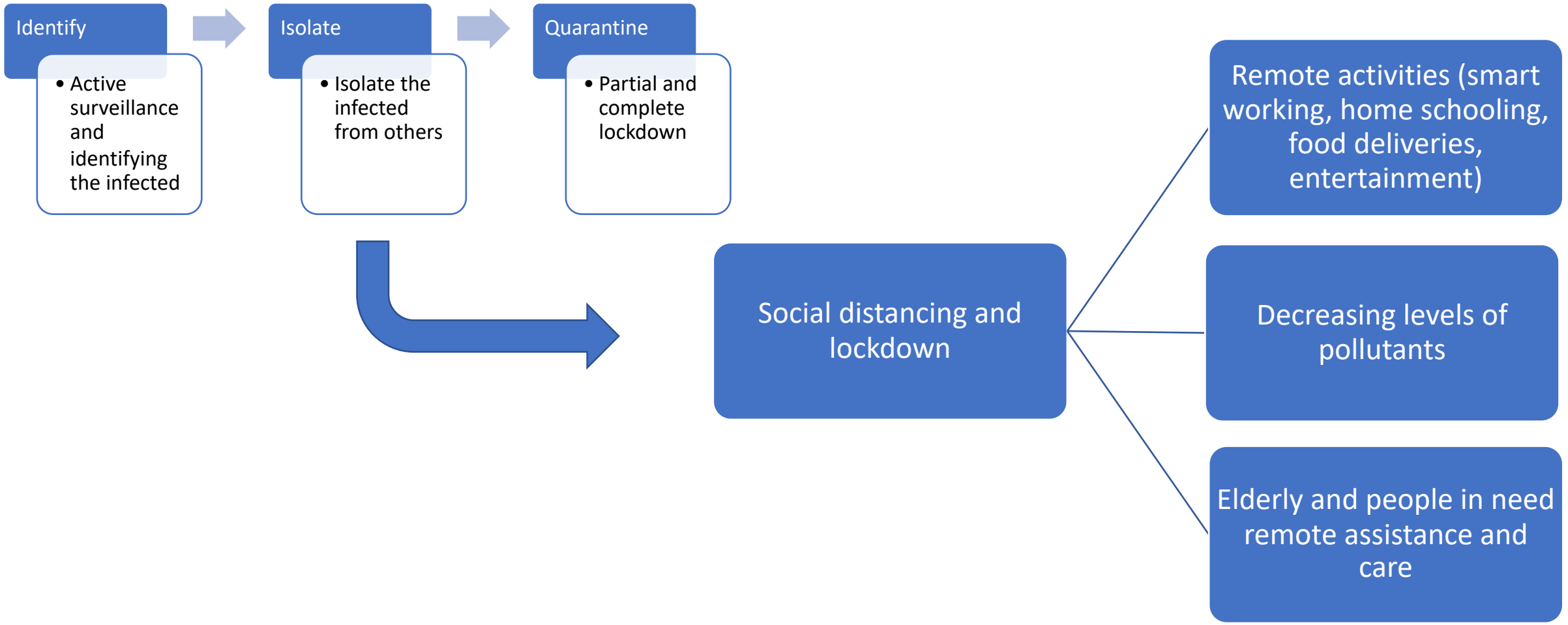
1. **Culture**. Lack of monitoring culture and evidence-based policy making at local level.
2. **Data**. Problems in gathering, organising, and using smart city data. Sometimes, data silos seem to be the norm!
3. **Tools**. There are not available, usable, and affordable tools. We often forget the budget constraints of local authorities.

The work of the modelling community is essential for evidence-based smart city strategies



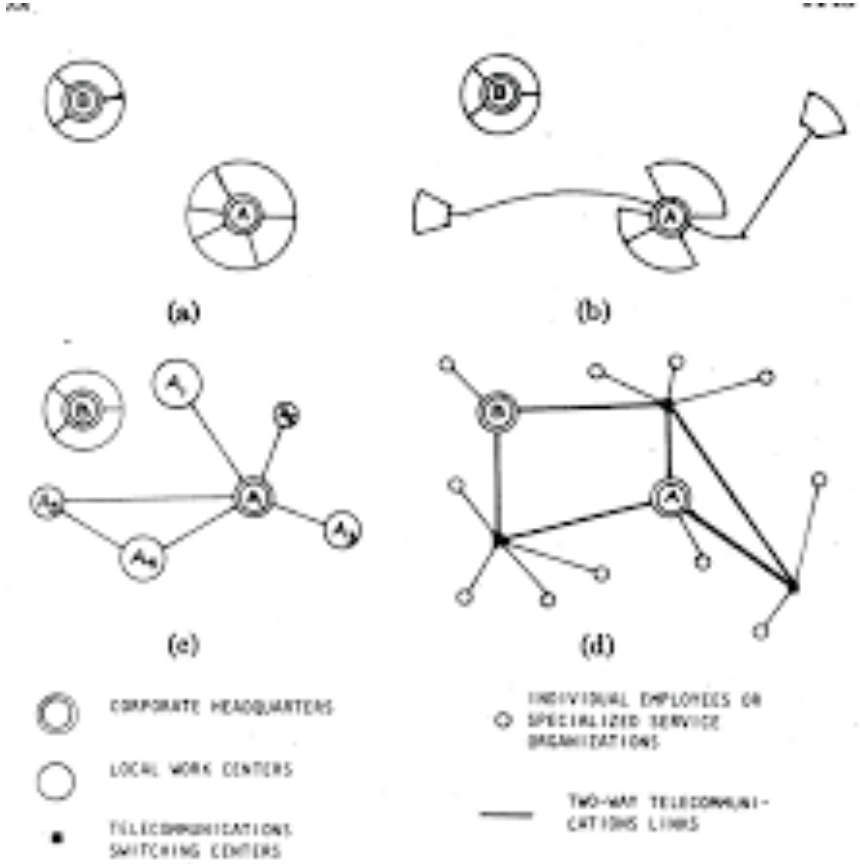
- Organising, orchestrating and modelling smart city data and enabling local authorities to see their city through devices and data.
- Creating easy-to-use tools (abstracting the technological complexity) that enable local authorities to reflect on the city and its future.
- Data + tools for enabling scalability, better performance, risk assessment, and strategy design.
- Data + tools to develop the culture that takes us to evidence-based smart city strategies.

The experience of Covid-19 and the re-thinking of smart city



Source: Interviews with decision makers in public and private organisations. Work in progress

There is an opportunity to re-thinking mobility and living spaces in name of quality of life



The paper "discusses the definition of telecommuting in two different contexts. In the first case, telecommuting is considered in the abstract, in the context of a variety of other remote work options. Each of the remote work options is classified according to its transportation impacts and its managerial implications. In the second case, the efforts of one group to define non-home-based telecommuting in the specific context of an air quality regulation designed to reduce travel are documented."

Patricia L Mokhtarian, *Defining Telecommuting*, Georgia Institute of Technology, 1991.

Jack M.Miles "*Telecommunications and Organisational Decentralisation*" IEEE Transactions in Communications, 1975

Conclusions

- Smart city monitoring framework is essential for smart city strategies.
- The modelling community can contribute to the use of smart city data, create toos, promote the culture of evidence-based smart city strategy development.
- Modelling the continuum of emergency-proof, sustainable and smart communities from cities to villages.

Thank you

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