

Smart City Framework

A holistic approach



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1 Introduction

This document will provide the conceptual outline of a framework for a Smart City. A framework is very important to ensure that concepts of a Smart City are implemented in such a way that it is in line with the vision and goals of the city. If not, the successful implementation and sustainability of such a city will be very difficult. This vision and goals are not only for the local authorities but also the citizens of the city. Citizens must include people and organisations of all sorts – everybody.

A definition of a smart city must be agreed by everybody which is important to align the vision and goals with thereafter.

A smart city is the integration of people, infrastructure, data and technology linking it all.

It will be the building blocks within which the Smart City must function.

This can be achieved by discussing the definition, the why pillars and the success factors of a smart city.

2 A smart city

Various definitions of a smart city exist. Below are a few of them.

“A city that monitors and integrates conditions of all its critical infrastructures, including roads, bridges, tunnels, rails, subways, airports, seaports, communications, water, power, even major buildings, can better optimize its resources, plan its preventive maintenance activities, and monitor security aspects while maximizing services to its citizens”¹.

“The Smart city is the use of Smart Computing technologies to make the critical infrastructure components and services of a city—which include city administration, education, healthcare, public safety, real estate, transportation, and utilities—more intelligent, interconnected, and efficient”².

“Smart City is a city in which it can combine technologies as diverse as water recycling, advanced energy grids and mobile communications in order to reduce environmental impact and to offer its citizens better lives”³.

“Smart” city is defined by IBM as the use of information and communication technology to sense, analyse and integrate the key information of core systems in running cities”⁴.

“A smart City is a city where social and technological infrastructures and solutions facilitate and accelerate sustainable economic growth. This improves the quality of life in the city for everyone”⁵.

¹ Hall, P. (2000). Creative cities and economic development. *Urban Studies*, 37(4), 633–649

² Washburn, D., Sindhu, U., Balaouras, S., Dines, R. A., Hayes, N., & Nelson, L. E. (2009). Helping CIOs understand “smart city” initiatives. *Growth*, 17, 2.

³ Setis-Eu. (2012). setis.ec.europa.eu/implementation/technology-roadmap

⁴ IBM. (2010). Smarter thinking for a smarter planet

⁵ www.amsterdamsmartcity.com

The similar message from all the definitions is that a smart city integrates different technologies, infrastructure and services to improve the quality of life of the inhabitants of the city.

3 Why

The why must be so important that no arguments against the implementation of smart city concepts can hold up. This section will highlight the “why”, by describing the benefits of a smart city.

a. Efficiency benefits

The first benefit can be described as the betterment of efficiency of the workings of a city with infrastructure as the first aspect that can be made more efficient with reducing cost.

Examples of reducing costs can be to make refuse collection bins “smart”. This will ensure that only the full bins are collected which will save cost by optimising collection routes. This principle can be applied to other services rendered by the city.

b. Environmental objectives

Environmental objectives must form part of any smart city initiatives because the city has an important role to play in the sustainable living of humankind. One question to be answered is how can a smart city impact on climate change? These can include renewable energy, waste recycling and water conservation.

c. Increasing social inclusiveness

A smart city needs to increase social inclusiveness through promoting positive interaction between the city and its citizens. One example can be to open data sources of the city/municipality. Communication from the city can be through social media, billboards, etc.

By making the city more attractive will have a positive impact on the city.

4 Smart City Strategies (Angelidou, 2014)

The following strategies can be followed for the implementation:

a. New vs existing cities

Built a smart city from scratch or invest in an existing city.

b. Hard vs soft infrastructure oriented

This category refers to whether the smart city strategy will focus on the efficiency and technological advancement of the city’s hard infrastructure (water, waste, energy) or the soft infrastructure and the people of the city (social and human capital, knowledge, inclusion, participation etc.) (Angelidou, 2014)

c. Economic sector-based vs geographically based

A sector-based foresaw the transformation of key economic sectors: including government, education and learning, financial services, manufacturing and logistics, etc.

Geographically based focus on geographic areas in a city. CBD, University Campus, technology districts, airport etc.

(Lee, Hancock, & Hu, 2014)

5 Goals

The implementation of a smart city must have goals. These goals can include:

- Reduction in the use of scarce resources through renewable energies and resource efficiency;
- Reduction/minimisation of the negative side-effects of living in a densely populated urban environment, stress and diminished feeling of personal safety;
- Creation of a lead market for innovation applications;
- Strengthening of the resilience of urban infrastructures;
- Long-term securing and optimising of public services through public administration, municipal enterprises and social bodies;
- Open data and
- Smart leadership and smart staff.

6 Pillars

A smart city has specific pillars on which it must stand. These are:

- Social
 - Smart cities must aim to foster more aware, educated and informed citizens but also can involve the community by providing mechanisms for people to supply information.
- Management
 - Move to digital or e-governance is important for management of a smart city.
- Economy
 - The economy is a major driver of smart city initiatives. For a city to be smart it must be able to innovate and capitalise economically.
- Legal
 - Policies must exist to support the development of smart cities. Rules and regulations must be developed.
- Sustainability
 - Cities must become more efficient, more livable and provide a better quality of life, business opportunities and security to ensure social sustainability.

7 Success factors/ KPA's

A smart city has specific key areas that they must be successful in.

- Management and organisation
- Technology
- Governance
 - Leadership
 - Collaboration
 - Participation and partnership
 - Communication
 - Data-exchange
 - Service and application integration
 - Transparency
- Policy context
 - Interaction of technological components with political and institutional components
 - How can government innovate?
- People and communities
 - Participation in governance and management and become active citizens.
- Economy
 - Major driver through innovation, entrepreneurship, productivity and flexibility of the labour market.
- Built infrastructure
 - The availability and quality of ICT infrastructure
- Natural environment
 - Increase sustainability using technology

8 Framework

Figure 1 shows a framework for a successful smart city. These elements have been drawn from KPA's discussed above.

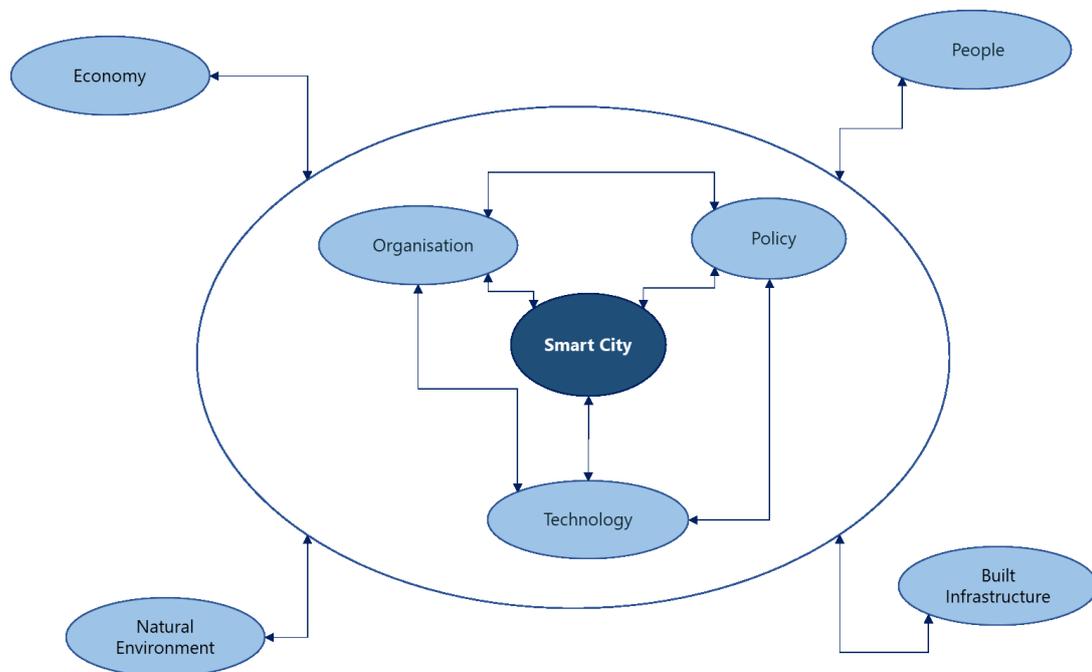


Figure 1: Smart City Framework

Figure 1 shows the framework for the implementation of Smart City Initiatives.

9 Smart City Strategies (Angelidou, 2014)

A few smart city strategies exist. A strategy determines how smart city initiatives be implemented.

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Geographically based focus on geographic areas in a city. CBD, University Campus, technology districts, airport are examples of geographical areas.

10 Conclusion

The aim of this paper is to highlight very important aspects of the implementation of smart city initiatives. It is not about the implementation of smart water meters, smart buildings, etc but the holistic planning framework in which the implementation must take place. This will ensure a successful and sustainable existence of a smart city.