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Key Success Factors for Smart City Construction

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Abstract

The Smart City is not a new concept. In fact, the digital city appeared in the information era and the wireless city emerged in the Internet era, but the Smart City had not been clearly defined until the digital era. Unlike traditional informatization, a Smart City is not simply the combination of informatization in all industries. Not only is a smart city a top-leadership project, it reshapes the digital capabilities of all industries in a city, while also addressing systematic challenges.

This paper presents Huawei perspective on Smart City development, including the conceptual framework, governance, type, connectivity, structural enablers. The paper also describes the strategic vision and a Smart City construction path, from the strategic planning, solution design and implementation.

Keywords: Smart City, Digital Administration, IdeaHub, WiFi 6, Digital Power

1. Introduction

According to a U.N. report, by 2030 two-thirds of the world's population will be living in cities, the urban population in developing countries will double, and the area covered by cities could triple. This rapid urbanization is increasing pressure on city infrastructure and services, forcing many cities to rethink how they operate [1]. The urban population predicted to grow to 66 percent of the global population in 2050. Cities already generate over 70 percent of an average country's GDP, more than 70 percent of energy consumption, and over 50 percent of global greenhouse gas emissions.
Worldwide demographic and technological trends are driving the need for cities to rethink how they use ICT, existing infrastructure, and core resources like government workers, citizens, and community and business groups [2].
This paper presents an ICT infrastructure provider perspective on how a Smart City shall be deployed to address the various challenges and to be successful in solving the citizens and administration needs.

1.1 Digital Economy

We can define 4 main eras in the human history:

- Agricultural era where the main pillars was the family and geographical relationship being centered on the families and organized in clans of natural economy.
- Industrial era where the business relationship were enabling companies of commodity economy
- Digital era 1.0 was based on the network relationship which have supported the communities of digital economy 1.0
- Digital era 2.0 is based on a scenario relationship which have created the digital economy 2.0, inclusive and sustainable

In the Digital era 2.0 the Digital Economy becomes a consensus among countries. According to G20 definition, Digital economy refers to a broad range of economic activities that use digitized information and knowledge as the key factor of production, modern information networks as an important activity space, and ICT as an important driver of productivity growth and economic structural optimization.
Among the new social and economic values that digital economy brings are the creation of new jobs, convenient public services, public safety, environmental protection, and better healthcare services.
Resuming, the Smart City and digital administration is about efficient governance based on a professional and efficient city management, enhanced livelihood supported by livable environment, improving the living experience and vibrant economy that aims to increase the competitiveness, attract talents and financial investments.

1.2 Insights

1. Dig more value out of the data: about 90% of the total data has not been widely sensed, collected, aggregated, and analyzed. These data come from various sources of the physical world such as urban life, tourism, weather, traffic, construction, manufacturing, production, business, services and communication. In the digital world these data could be stored in the internal IT systems or Big Data.

2. Break the barriers for deeper collaboration: the legacy systems can be transformed to a new system?

3. Build a smart environment that supports creativity: The city has resources such as things, people and data that can create an eco-system for co-creation based on investment, urban development, research and development, test-bed, collaboration and trade market which shall output back to the city invention and innovation.

4. Enable intelligence for faster services rollout: There is always a gap between stakeholders "next week" expectation versus the technology departments six-to-nine-month reality. As Peter F. Druckner was

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mentioning, "Enterprises will never have enough gifted people. The purpose of an organization is to enable ordinary human beings to do extraordinary things." The technology purpose is to be one of such enablers for the cities.

2 The Huawei Smart City concept

A Smart City shall be integrated, data-driven and intelligent. There are several elements such as applications, AI, big data, Internet of Things, Geospatial Information System, Cloud, Data Centre, connectivity and devices that are forming a layered structure for the Smart City as in figure 1.

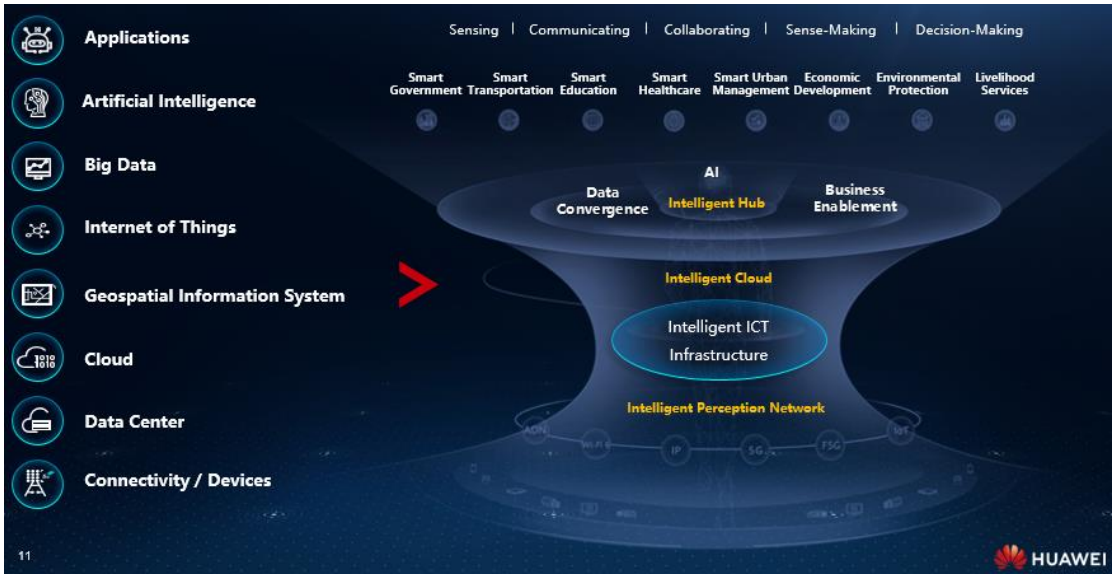


Figure 1 – Smart City layered structure

Like a living organism, a Smart City has a nervous system that comprises a "brain" (the control centre), the Intelligent Operations Centre and "peripheral nerves" (the network, terminals and sensors) gathering real-time information about the health and status of the city, its environment and infrastructure [1]. The conceptual framework for a Smart City is defined as in figure 2.

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Figure 2 – Smart City conceptual framework

Smart is about the data – the data strategy contains three components in a cycle.
The first is the data monetization and the expected values from data: to reduce data associated costs and operating costs, to streamline processes and improve customer experience, to increase staff and partner satisfaction, to reduce risks, to develop new products and services. Data shall be considered as assets and create a data ecosystem
The data governance is considering ensuring efficient quality of data throughout its lifecycle.
The data architecture is the "how's" question in managing data lifecycle.

According to IDC the data generated in average by cities will reach in 2025 a volume of 175 ZB, a 5.3 time increase comparing to 2018. Connectivity becomes a critical service to assure the traffic of such a data volume.
Different means of connectivity to meet different needs of the city. For example, sensors can provide data on the transportation system performance enabling the brain to manage congestion, smooth demand and safely reduce delays for citizens [1]. The technologies to be consider are ideally both fixed and mobile such as 4G/5G, NB-IoT, all optical network and Wi-Fi 6.

The digital platform creates a "fertile land" where the applications flourish. A Smart City develops into a living organism featuring sustainable growth and self-evolution. It provides an open and inclusive platform to enable all solution providers to participate in the development and enables new ICT technologies to be easily used by wide spectrum of users and developers.

The structural enablers from the framework are:

The strategic communications – The key Stakeholders
The governance – the Structure, Enterprise Architecture, and funding mechanism

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The Operations & Maintenance – the policies and standards, the organization, the ICT Platforms and the team roles
The Cyber Security – the strategy and the technology
The ICT capability development – The digitally-ready professionals and the digital inclusion
The digital ecosystem – the framework

An important part of the digital platform is the end-to-end security that shall contain the data security, the application security, the big data analysis, the ICT infrastructure security (cloud, IoT and network) together with the security management.

Last but not least a "privacy by design" policy shall be considered having a clear purpose, processing, retention and disposal mechanisms, using solid encryption and watermark and being auditable. A strong Cybersecurity policy is also required.

3 The Huawei Smart City solutions

From the Huawei Smart City solutions and products portfolio several ones are relevant especially considering the new pandemic reality and challanges:
IdeaHub, a key productivity tool for smart education and administration that can be used for distance class learning. The main purpose is to transform the classrooms into smart-terminal-equipped, interactive, collaborative, creative and engaging environment. There are several scenarios as following:

- Digitalize the classroom, improving the in-class efficiency in order to be more interactive and engaging
- Promote the usage of digital contents and multimedia tutoring

Among the technical features it worth to be highlighted:

- WiFi 6 tri-band, support more than 50 concurrent users connection
- Multicast protocol optimization, avoid disconnection and latency
- The Classroom Management Software supports screen sharing, group teaching, files dissemination or collection, poll and survey, digital testing, and screen lock.

The digital City Hall solution enables the local administration transformation by digitalization: resource sharing, eliminating information silos and platform based, solving the informatization requirements. It provides mobility, allowing working anytime and anywhere with a unified portal for mobility and having end to end security protection for mobile office. It is intelligent by achieving efficient administration via intelligent process that facilitates collaborative linkage together with the intelligent data analysis and smart decision-making algorithms.

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The digital power solution helps building a low-carbon emissions city enabling photovoltaic green energy to be main power source.

4 The Huawei Smart City strategic vision and values

4.1 The strategic vision: Platform plus Ecosystem

The strategic vision for Smart City focusses on customer requirements and provide a holistic set of Smart City solutions. The platform strategy is based on open, elastic, flexible and secure. The ecosystem strategy is based on co-existence, mutual growth, and regeneration.

The Smart City construction path shall include the strategic planning, the solution design, and the implementation phase. The stages are the feasibility analysis, the conceptual design, the high-level design, the bidding and procurement, the low-level design and the construction and operations.

5 Conclusions

A Smart City shall be treated as an ongoing program and not a one-time project. The key success factors for Smart City construction require top-leadership projects, strong execution teams, industry leading digital partners and solid investments.

As a leading global ICT company, Huawei has helped urban authorities across the world to create digitally-connected ecosystems that have transformed the way cities function – improving connectivity between people and things to generate innovation, economic growth and social progress. Huawei's Smart City solutions have been deployed in more than 120 cities across 40 countries [1].

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