Frame-based Conceptual Model of Smart City’s Applications in China

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Abstract: Starting from the development path of modern cities, this thesis expounds the conceptual-based framework of application as well as the development background and overall status of "Smart City". Specifically, it focuses on analyzing basic applications in three major areas (smart health, smart transportation, and smart community), studies some innovative practices of smart construction in China, and prospects the challenges and trends of smart city development in China.

1. Introduction
With the rapid development of Chinese society as well as the accelerating process of urbanization, the disorder caused by environmental pollution, traffic congestion and resource shortage has an adverse impact on urban environmental governance, public safety, and basic social and recreational activities. Meanwhile, it has hindered the process of urban sustainability [2]. As the latest model of society management method, "Smart City" was originally transformed from the concept of "Smart Earth" released by IBM Company in 2008. It is a successful application of "Smart Earth"[1]. Currently, this emerging governance concept is accepted and practiced by more and more countries and regions. Accordingly, it has also become the latest trend in China's urban management.

By utilizing wired and wireless communication technologies to combine physical infrastructure and IT infrastructure [2], smart city has realized the perfect combination of "Internet of Things" and "Internet". Simultaneously, big data analysis is widely applied in urban management. With the help of big data, "Internet of Things", and "Cloud Computing", cities can be made smarter and more advanced. These concepts are widely applied in road traffic construction, communication infrastructure, commercial equipment management, medical equipment management, telemedicine services, and community management thus creating the embryonic form of a "Smart City"[2].

This is a project that perfectly combines three dimensions ("basic", "pivotal", and "intensive"). It is similar to a "smart hub" in terms of the operation of a city and provides citizens with a digital interface for urban life. As a result, citizens can better touch the pulse of the city, feel the city temperature, and enjoy city services, at the same time, city councils can also rely on the "City Brain" to rationally allocate public resources, make scientific decisions, and improve the effectiveness of urban governance.

2. Framework of Smart City System
In recent years, with the support of the government and the participation of enterprises, the construction of smart cities has also made phased progress [5]. By March 2017, 95% of sub-provincial cities and 83%...
of prefecture-level cities in China (more than 500 cities totally) have clearly proposed or are building smart cities. In the long run, the construction of smart city is significant for optimizing urban resource scheduling, improving urban operations efficiency, and enhancing citizens' life quality.

2.1. Three Basic Causes for Building a Smart City
The rapid increase in the urban population in China has led to conflicts between the urban scale and the traditional governance model [2]. The following three factors are main causes for the fact that the city's resource carrying capacity cannot match the rapidly growing urban population. It is also an urgent reason to accelerate the construction of smart cities:

- A Large Influx of Population in Core Cities
- Rapid Increase in Urban Population
- Continuous Rise of the Urban Population Density

2.2. Three Application Fields of Smart City
On the basis of policy support as well as completing infrastructure, the application scenarios of smart city are becoming more and more abundant, the most famous of which are smart health, smart transportation and smart community.

As a new service system, "Smart Transportation" serves smooth public travel and sustainable economic development, which is an important part of smart city. With the gradual introduction of Big Data technology in the transportation and communications industry, "Smart Transportation" breaks through the boundaries of traditional traffic monitoring, further integrates with IT, telecommunications, construction and environmental protection, and expands the industry content around the theme of safety, showing the benefits of industrial pattern in terms of complementary advantages and coordinated development [2].

"Smart Health" can build the underlying infrastructure for the construction of smart city. As a new concept of community management, it is committed to achieving intelligent medical care and intelligent services, which is an indispensable part of the development of smart city [3]. As a newer method, "Smart Health" can promote the internal communication of medical staff as well as the communication and coordination between patients and hospitals. Consequently, it can serve the citizens, increase efficiency, and bring closer relationship between medical staff and patients.

The community is the "cell" of the city. As an important part of the smart city, "Smart Community" is a new model and new form of community management. It provides core service for community residents, and uses the "Internet of Things", "Cloud Computing", mobile Internet and other new generations as the integrated application of information and communication technology, providing residents with a safe, efficient, comfortable and convenient living environment so as to fully meets the demands of residents' life and development [6]. The smart community covers various services in and around the community. The community mainly includes many infrastructure services, including smart home, smart property, smart lighting, smart security, smart parking, etc. The services of the surrounding area mainly including smart elderly care, smart medical care, smart education, and smart retail, smart finance, smart housekeeping, smart energy, etc [3].
2.3. A Conceptual-based Framework

The construction of smart cities in my country is gradually moving from the single mode to the diversification. The participation of the society's all sectors in the construction makes the overall framework of smart city become more stable and complex. This conceptual-based framework shows the three major applications of smart city. In real life, the real framework is more complex and intertwined. The concept of smart cities has penetrated every side of our lives, which focuses more on the evaluation from urban residents on the service experience of smart city [6]. It is exactly the meaning of the existence of smart city.

3. Conclusion

Smart cities are facing the following three major challenges: improving economic efficiency, ensuring information security, and achieving cross-regional information sharing. The most important challenge is how to ensure information security. Smart city relies on digital infrastructure, information systems, and data resources. At the same time, the integration and sharing of smart cities is the integration of the normal operation of smart cities. In this way, human intervention and natural disasters may cause the collapse of local or regional digital infrastructure [3]. Therefore, the improvement of the ability to establish information security is also the key factor for the construction of smart cities. Meanwhile, a smart society will become the future prospect of the construction and development of a smart city.

Currently, the overall smart-city construction still focuses on the smart construction of urban information systems, and the people-oriented "Smart Society" will become the future "Smart Society" on the construction and development of smart cities. We should adhere to the concept of "People's city is for the people", make smart cities truly "used by the people", and realize the vision of "city as a service".
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