How to Get a Satisfactory Score in the Governance of Digital City in the Test of the "Epidemic"

It was pointed out in the Fourth Plenary Session of the 19th CPC Central Committee that China needs to attach importance to the use of modern ITs. such as AI, the Internet, and big data to improve governance capabilities and modernization levels. The outbreak of the novel coronavirus pneumonia (NCP) epidemic is a big test of the national governance system and capability. In the face of the tough test, many problems emerged in city governance, which is an important part of the modernization of national governance systems and governance capabilities. How to more effectively use digital technologies such as big data and AI to improve the efficiency and level of city governance has become a test paper that every city must answer. Based on the analysis of phenomena and causes, this paper aims to build up a preliminary framework of digital city governance system and propose development suggestions.

I. The insufficient capabilities in digital city governance become more eye-catching under the epidemic situation.

After the outbreak of the epidemic, many deep problems have emerged in the collection and integration of urban data resources, their development and utilization, and supporting mechanisms. Data, as a factor resource, has failed to play its driving role in decision-making, command & control, and grassroot management of digital city governance.

First, the ability to collect data in real time is insufficient, and the IT application capabilities of grassroot communities lag far behind. The data collection at the grass-root level still relies too much on system filing and reporting, registration by grid staff (people working at the grassroot level), and new technologies such as IoT sensing and automatic acquisition are underutilized. There is a serious problem of "data only going up and never coming down". Various types of collected statistical data is submitted and reported, and the integrated and consolidated data seldom comes down. The governance services at the grassroot level lack data support.

Second, cross-level, cross-region, cross-system, cross-department, and cross-business data resources are poorly integrated and consolidated, resulting in insufficient business collaboration capabilities. In the development of smart cities, the following areas are still weak: cross-level operational command and control, cross-region transport and logistics data integration, cross-system connectivity, cross-department data sharing, and

cross-business collaboration and support, which has led to confusions in command and control in the face of major epidemics.

Third, urban data are insufficiently developed and utilized and the quality of data greatly restricts the level of data utilization. At present, the quality and abundance of urban data is not enough and the problems of "relying primarily on static data and lacking dynamic data; relying primarily on basic data-based and lacking business data; relying primarily on government data and lacking social data" exist, leading to insufficient data utilization. In addition, due to data security, it is difficult to open government and enterprise data in both directions, and the data value cannot be fully released.

Fourth, the data supporting mechanisms and systems are not sound, and the "headaches", such as "data silos" and "fragmentation", are still serious. Due to the inconsistent data interface standards and data management specifications, it is difficult to specify the ownership and responsibilities of data management departments, and consolidate the data collected from multiple sources, which leads to discrete segmentation and insufficient integration of urban operation data.

Fifth, the foundation of data processing tools needs to be consolidated, and the supporting systems of city brain fail to respond to emergencies. At present, the components and tools, as the foundation of city brain, have weak supporting abilities, making it difficult to quickly use existing data resources to form systematic service platforms and ensure the city's operation. In addition, the city brain mainly displays urban operations, lacks deep learning and simulation & prediction capabilities; it focuses on top-level support capabilities, and lacks governance tools at the grassroot level.

II. The digital city governance system showed its power in the fight against the epidemic.

City governance is an important part of advancing the modernization of national governance systems and capabilities. Its basic connotation is to coordinate planning, construction, and management, to make overall plans for production, life, and ecology, and to make overall arrangements for economic, social, and cultural aspects.

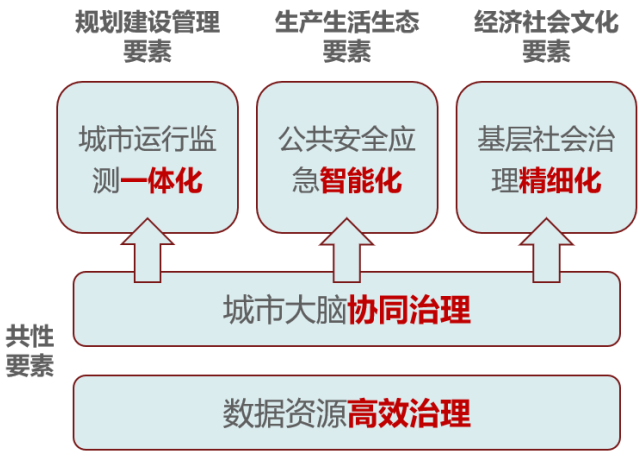
Digital city governance is an important support and main development direction for the modernization of city governance systems and capabilities. It is based on data governance and relies on the city brain. It is a new type of city governance model that aims to promote the digitalized, network-based and smart development of various aspects of the city in an orderly manner, including urban planning, construction, management, production, life, ecology,

economy, culture and society. Compared with the traditional experience-based city governance model, the digital city governance presents many new features in terms of governance subject, governance form, organizational structure, governance mechanism, and governance means.

Classification	Traditional governance model	Digital governance model
Governance subject	Government-oriented	diversified subjects, including government, market and public
Governance form	Localized, discrete, fragmented	Integrated, systematic and fine-grained
Organization structure	Hierarchical architecture	Cross-level network architecture
Governance mechanism	Independent processing by industry authorities	Multi-department collaborative governance
Governance means	Focus on manual governance	Internet and big data

Figure 1 Comparison between traditional governance model and digital governance model

In terms of the basic connotation of digital city governance, a digital city governance system mainly includes five key elements. **First, the efficient management of data resources.** Data has become an important production factor for economic and social operations, and is the means of production to build a digital system. **Second, collaborative governance of the city brain.** The city brain is an important basic supporting platform for the city, a comprehensive carrier of the "three integrations and five crosses" of smart cities (technology integration, business integration, data integration; cross-level, cross-region, cross-system, cross-department, and cross-business) and the technical cornerstone for enabling digital transformation of businesses. T**hird, the integrated urban operation monitoring**. It aims to effectively promote the coordinated development of all links of urban planning, construction and management. **Fourth, the intelligent emergency response and public security.** It aims to effectively promote the coordinated development of all areas of urban production, life, and ecology. **Fifth, fine-grained social governance at the grass-root level.** It aims to comprehensively support the integrated development of urban economic, social, and cultural aspects.



Common elements	**Planning, construction, and management elements**	**Production, life, and ecology elements**	**economic, social and cultural elements**
	Integrated urban operation monitoring	Intelligent emergency response and public security	Fine-grained social governance at the grass-root level
	Collaborative governance of city brain		
	Efficient governance of data resources		

Figure 2 Five key elements of a digital city governance system

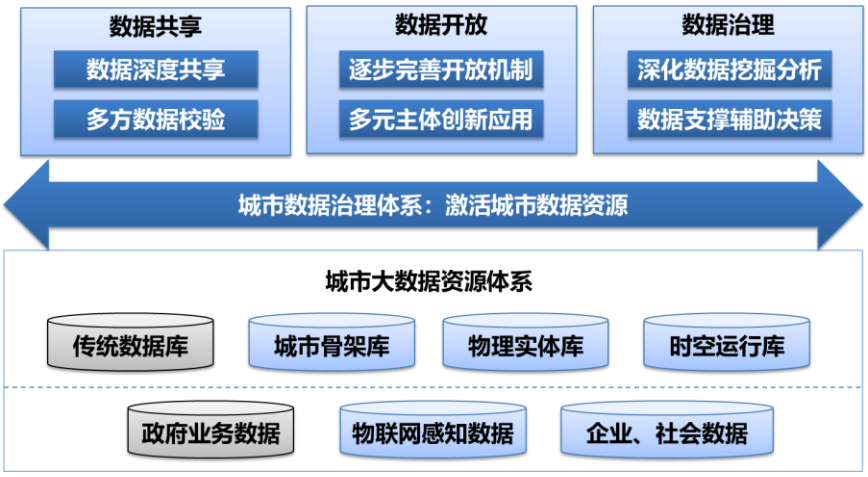
1. The integration and circulation of data resources is the basis of governance.

Data resources are the foundation of smart city construction and the basic element of digital city governance. We will fully promote the "three integrations and five crosses", unleash the value of data in city governance, and always have "data" in mind.

Data integration and sharing enables precise epidemic control. In the face of the epidemic, the National Health Commission shared the information of the confirmed and suspected cases, the Ministry of Transport looked for the information of the accompanying people, and the Ministry of Industry and Information Technology locates them based on mobile phone signaling data and timely feedback information to government departments and individuals. Based on multi-source data integration and sharing, the dangerous personnel will be quickly detected and quarantine measures will be taken to effectively prevent the spread of the epidemic.

The openness of data is conducive to the joint efforts of government and enterprises to prevent and control the epidemic. On the premise of protecting the privacy of patients, governments disclose the machine-readable and structured data such as the patient's onset date, journey and location in an orderly manner. On the one hand, it protects the public's right to know, eliminates public panic, and helps prevent and control the epidemic. Based on open data, social enterprises have developed public platforms such as the "co-passengers query system" and "infection self-assessment evaluation system" to reduce the pressure of governments in their prevention and control work.

Data mining analysis assists government and enterprises in decision making. When the epidemic started, the epidemic information spread rapidly on the Internet. The government can analyze public sentiment and the severity of the epidemic based on the big data of Internet public opinions, and make prevention and control decisions in an early instance. When the epidemic situation improves, the telecommunication big data can be used to prove employees' journeys; power generation big data can be used to monitor the power resumption index of enterprises; health big data can be used to form personal "health codes". Decisions can be made based on data. Policies on resumption of production and work can be developed based on local realities in phases and by types in an orderly manner.



Data sharing	Data opening	Data governance
Deep data sharing, Multi-party data verification	Gradually improve the data opening mechanism, Multi-player innovative applications	Deepen data mining and analysis, Decision-making supported and assisted by data
City data governance system: activating city data resources		
Urban big data resources system		

Traditional database, Urban skeleton database, Physical entity database, Spatiotemporal database, Government business data, IoT sensing data, Enterprise and social data

Figure 3 Urban big data resource system

2. The city brain is the technological cornerstone of collaborative governance.

As the city's digital infrastructure and open innovation platform, the city brain has played a role in comprehensive monitoring of epidemic, optimization of resource allocation, epidemic forecast & analysis, and macro decision-making support in epidemic prevention and control, and has become the key to improving the level of coordinated governance in cities.

The city brain shortens the time for the launch of new applications, and helps win the time to fight the epidemic. The epidemic developed rapidly in the early stage, and new applications such as epidemic monitoring, population screening, and prevention and control command & control are urgently needed. The city brain can quickly build a new platform for epidemic prevention and control based on basic support platforms, mature application and component libraries, and basic databases. Hangzhou, based on the city brain, has rapidly developed an health code platform, with the development cycle shortened from 4 weeks to 16 hours; Beijing Haidian District, based on "spatiotemporal map", "AI computing platform" and other capabilities of the city brain, has rapidly launched epidemic prevention and control platforms.

The city brain builds up a flat and efficient dispatch system to improve the efficiency of epidemic prevention and control. Using traditional processing methods, it takes about one day for the epidemic data to be collected, sorted, screened, reported, and released. The city brain changes the malady of slow data collection, difficult integration, and time-consuming sorting, avoids multi-level data collection and order transmission, and forms a fast, flexible and comprehensive dispatch system. The intelligent command & control platform for epidemic prevention and control of Haikou's city brain establishes a three-level ("city, district, and community") prevention and control system, which allows the personnel at the grassroot level and the public to directly report data to the city brain, the order from the city brain can be sent directly to the working clerks. It forms a fast closed-loop covering all links from giving orders, implementation tracking, screening and reporting, to mass prevention and control.

3. Digital technology solves public security and emergency problems

"Hardcore technologies" such as AI, big data, digital twins, and Beidou positioning can empower urban public security and emergency management, achieve security monitoring and control featuring “full coverage, no blind angle and no blind spots” and help the government to efficiently and intelligently respond to public security and emergency problems.

Digital technologies help advance the awareness and prediction of major public security events. In the early stages of the epidemic, doctors at the grassroots level were the first to grasp the situation and the Internet channel was the fastest to disseminate information, and the epidemic situation was first felt and warned in cyberspace. For example, before the outbreak of H1N1 in 2009, Google used the public opinions on the Internet to forecast the epidemic situation in advance. The accuracy rate compared with the health data of the CDC a few weeks later reached 97%. During the outbreak, the railway 12306 platform used real-name ticket sales data to cooperate with local governments to quickly trace the people in close contact with the confirmed patients from various places according to the trip information.

The digital twin city facilitates the rapid allocation, transportation and remote monitoring of emergency supplies in emergency situations. In the virtual-physical integrated digital twin city, data, such as city information model, Internet of Things sensing, Beidou positioning, can be fully integrated. Combined with the inbound and outbound records of materials, the location of emergency supplies can be tracked remotely and in real time and the type and quantity of supplies can be monitored. Based on the demand of each region for supplies, emergency supplies can be allocated orderly. The chaotic management of materials and uneven distribution of supplies can be improved.

The network platform greatly facilitates the acquisition of urban public services in an emergency and helps prevent the spread of the epidemic. Faced with the epidemic situation, local governments have developed APP platforms, where citizens can take the initiative to report information, provide clues to the epidemic situation, or consult and inquiry the epidemic situation. Large-scale Internet platforms have set up epidemic columns, providing functions such as real-time epidemic information, dispelling rumor, patients asking for help, and online free consultation. A number of hospitals have launched functions such as online consultation and 5G + remote consultation.

4. New facilities enhance city operation monitoring capabilities

Along with urban renewal and transformation of old cities, cities are proactively deploying new infrastructure such as clouds, networks, and devices to accelerate the digital transformation of traditional infrastructure such as energy,

transportation, and municipal services, with the aim to build holographic cities and improve the monitoring and awareness of cities' daily operation.

New infrastructure can "read and write" the state of the city in real time, and improve the ability to monitor the epidemic. In the face of this epidemic, AI facilities can conduct rapid and effective body temperature screening for the people on the go in public places and quickly sense dangerous people; the widely-deployed IoT devices, such as vehicle recognition and face recognition checkpoints and access control, can avoid personnel contact and collect city operation data in real time. 5G has promoted epidemic monitoring, visualization of remote consultation, and intelligent material distribution.

Accelerating the upgrading and digital transformation of traditional infrastructure and building new advantages in urban operation and management. In recent years, the intelligent upgrade of traditional infrastructure such as urban energy, transportation & logistics, and municipal water resources, has become the focus of smart city construction in various places. In the face of this epidemic, smart power meters, smart water meters, multifunctional information poles, connected cars and other intelligent facilities have provided valuable resources such as power generation big data, water big data, telecommunication big data, and traffic big data for city operation and management, which are a strong foundation for decision-making of cities and enterprises.

5. Smart community promotes joint governance, construction and sharing

The community is the peripheral carrier that carries the operation of the grass-roots society, and is the front line of the joint prevention and control of the epidemic. The Ministry of Civil Affairs has called on for Internet companies to develop community public software. The smart community has played an important role in this epidemic prevention work, empowering joint prevention and control at the grassroot level.

Smart community includes both hardware and software, which enables contactless supervision and screening. Communities deploy smart facilities such as face recognition checkpoints, access control, contactless human temperature measurement, and smart door locks to block possible sources of infection, achieve contactless, safe and efficient community management, and create a "safe island" to prevent epidemic. Community epidemic prevention software has been launched in many places across the country, providing functions such as contactless distribution of materials, entrance through code scanning, temperature recording, information reporting, and property

management service notification push, and real-time monitoring and tracking of personnel information.

The community digital cockpit is based on the grid to achieve fine-grained management and trend prediction. Relying on grid staff (people working at the grassroot level), the smart community can realize that no household is missed in the check and nobody is missed in epidemic prevention and control. Hangzhou Changqing Street Office has established the "three indexes" for digital epidemic prevention on each community grid: correlation index of people in key epidemic areas, vacant house index, and return peak index, showing the severity of each grid and future epidemic trends. The epidemic information is summarized in the digital cockpit in real time. Once suspicious people or vehicles appear, the warning signals will pop out on the big screen. The staff can immediately inquire, register and conduct pre-checks.

Governments and enterprises work together to develop smart communities of joint construction, governance and sharing. Guangzhou Yuexiu Community purchased home care services from social institutions. With online and offline interactions, the community provides emergency help, epidemic prevention and control consultation, psychological comfort, and living care for the elderly in need. Chengdu Wuhou District deployed an AI self-service machines to build a contactless self-service system of "government services + public services + convenience services".

III. Practical suggestions for promoting digital city governance

1. To strengthen digital top-level design and actively explore reforms and innovations in systems and mechanisms

First, we should take a problem- and result-oriented approach and develop a digital governance blueprint. Focusing on the main line of daily operation and management of the city, we should coordinate planning, construction, and management; focusing on main line of urban public security and emergency response, we should make overall plans for production, life, and ecology; focusing on fine-grained social governance at the grassroot level, we should make overall arrangements for economic, social, and cultural aspects. **Second, we should explore and build innovative mechanisms and systems consistent with the big data governance thinking.** We should further strengthen the abilities of the city's big data organizations to coordinate and channel city data and avoid frequent occurrences of "data walls" and "data dormancy".

2. To build up urban big data resource system and promote efficient governance through orderly circulation

First, we should accelerate the integration and utilization of urban big data resources. We should coordinate multi-party resources such as government data, operational sensing data, Internet data, and corporate data, improve mechanisms for data sharing, data circulation, and data openness, encourage diverse entities such as government departments, social enterprises, and scientific research institutions to develop data resources, improve data governance capabilities and explore innovative city governance model. **Second, we should accelerate the establishment of standardized and reasonable data management systems.** We should consider the balance between data development and utilization and personal information protection, gradually define and refine data development and utilization rules in special scenarios, strengthen the standardized connection of data directories and data interfaces and enhance data availability.

3. To build up virtual-physical integrated digital twin cities, and promote visualized collaborative governance

First, we should build a technology and application support platform for digital twin cities to ensure the rapid development of new applications. We should make overall arrangements for the construction of common basic components such as electronic licenses, non-tax payments, identity authentication, and social credit and build up a technical support platform to provide basic capabilities such as face recognition, natural language processing, video intelligent analysis, and situation prediction. **Second, we should take the business requiring wide collaboration and joint coordination as the main line of governance, and improve such abilities as traceability, comprehensive display, and deep learning.** Taking major epidemics as an example, we should quickly form the trajectory maps of people and vehicles, establish a three-dimensional epidemic tracking prevention and control system, and implement population screening and monitoring of key populations; we should comprehensively display distribution maps, delivery maps, and demand heat maps of scarce supplies such as face masks and improve the ability to optimize the allocation of materials.

4. To build grid-based smart communities and promote fine-grained governance at the grassroots level

First, we should promote the new model of "grid + community brain". We should develop a unified grid management platform for cities, establish a grid team of "grid chief + full-time grid staff + community grid law enforcement forces + social forces" to improve the intelligence and collaboration capabilities

of the grid. In addition, the ability of the city' brain should be extended down to the community, and we should establish virtual-physical interactive digital twin community platform to realize virtual management of all elements of the community and real-time awareness of the community's operating situation. **Second, we should attract the extensive participation of social forces and create a 15-minute smart life circle for residents.** We should promote the "Internet + government service" into the communities, develop AI-based smart visits, and government services consulting; establish community electronic voting platforms, improve community residents' participation in online voting, democratic elections, and other affairs; enrich social services, develop online and offline integrated services such as home care, volunteer management, and services for special group.

5. To deploy new infrastructure and promote high-quality urban renewal

First, we should accelerate the deployment of new infrastructure such as 5G, AI, industrial Internet, and the IoT to consolidate the "hard foundation" for city governance. We should take all needs into consideration, including public security, transportation, environmental protection, urban management, and people's livelihood, deploy IoT sensing facilities in an intensive manner, and make overall planning for the construction of city-level IoT access management platforms; we should comprehensively promote "edge-cloud-supercomputing" collaborative computing facilities to enhance computing capabilities; we should speed up 5G network deployment and build "gigabit cities". **Second, we should accelerate the smart "renewal" of urban space infrastructure.** In conjunction with urban renewal, we should upgrade urban roads and bridges, pipe networks, lighting, buildings and other facilities in an intelligent manner and promote the deployment of intelligent facilities such as multi-function information poles, smart pipe networks, connected cars facilities, and all-in-one meter devices.

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