A planning structure of water conservancy management based on Artificial Intelligence

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Abstract. The implementation of the project can effectively solve the contradiction of water shortage in urban economic development, change the single water supply pattern of taking water from Shawan channel in the lower reaches of Beijiang River in Nansha District of Guangzhou and Dongjiang River in Shenzhen and Dongguan, improve the water supply safety and emergency standby guarantee capacity, appropriately improve the ecological environment flow in the lower reaches of Dongjiang River in dry season, and contribute to the maintenance of Nansha District of Guangzhou Shenzhen and Dongguan play an important role in water supply security and sustainable economic and social development.

Keywords: Water conservancy, AI, Structure.

1 Introduction

The Pearl River Delta water resources allocation project (hereinafter referred to as the "Pearl River Delta Project") is an important water resources allocation project proposed in the comprehensive planning of the Pearl River Basin (2012-2030) approved by the State Council. It is also one of the 172 major water conservancy projects for water saving and water supply determined by the State Council[1]. The project aims to build an ecological and intelligent water conservancy project in the new era[2].

In order to optimize the allocation of water resources in the East and west of the Pearl River Delta, the Pearl River Delta Project diverts water from the West River System in the west of the network river area of the Pearl River Delta to the east of the Pearl River Delta. The main water supply objectives are the water deficient areas in Nansha District, Shenzhen and Dongguan City of Guangzhou. The implementation of the project can effectively solve the contradiction of water shortage in urban economic development[3], change the single water supply pattern of taking water from Shawan channel in the lower reaches of Beijiang River in Nansha District of Guangzhou and Dongjiang River in Shenzhen and Dongguan, improve the water supply safety and emergency standby guarantee capacity, appropriately improve the ecological environment flow in the lower reaches of Dongjiang River in dry season, and contribute to the maintenance of Nansha District of Guangzhou Shenzhen and

Dongguan play an important role in water supply security and sustainable economic and social development. After the completion of the project, the annual average water supply is 1.708 billion cubic meters, including Nansha District

531 million cubic meters, 330 million cubic meters in Dongguan and 847 million cubic meters in Shenzhen. The project also provides emergency standby water supply conditions for Hong Kong Special Administrative Region, Panyu District, Shunde District and other places.

2   Objectives and ideas

Guided by ensuring project safety and water supply safety[4], and meeting the needs of comprehensively improving the construction management and service level of water resources allocation project in the Pearl River Delta, we will realize scientific organization, advanced technology, controllable quality and traceable process, and strive to build it into a leading and exemplary project of national intelligent water conservancy.

The master plan focuses on the project construction goal of "ecological intelligent water conservancy project in the new era" and combines the characteristics and difficulties of water resources allocation project in the Pearl River Delta, and applies new generation information technologies such as digital engineering, blockchain, Internet of things, cloud computing, big data and virtual reality to build a sky ground integrated engineering Internet of things, Integrating 5g / Beidou / optical fiber / industrial wireless engineering information network, covering the whole life cycle of Engineering big data, building an engineering cloud with elastic expansion of on-demand services, an engineering middle platform integrating BIM + GIS, professional model, big data analysis and artificial intelligence, creating horizontal coordination and vertical linkage, integrating intelligent construction and management, intelligent supervision, intelligent safety, intelligent dispatching, intelligent maintenance, emergency command The intelligent application integrating decision-making assistance and digital experience improves the fine management and intelligent construction ability of engineering construction

Improve the intelligent decision-making and accurate control ability of water dispatching[5], improve the accurate diagnosis and collaborative maintenance ability of the project, and improve the all-round guarantee ability of the safe operation of the project.The Pearl River Delta smart project should establish unified technical standards to ensure the unified standards of facilities and equipment, application systems, data transmission and information storage, fundamentally solve the problems of equipment communication difficulties, inconsistent information coding and non interoperability of functional interfaces, solve information islands and support comprehensive interconnection, sharing and collaboration.

At the same time, adhere to independent innovation in the construction process, and ensure data security, information security[6], system security and engineering security.
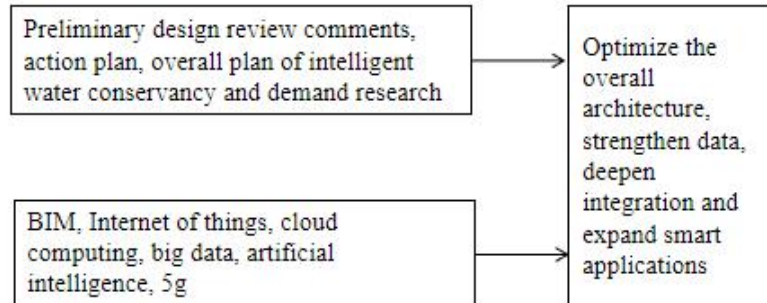
Fig. 1. Planning ideas

The overall plan fully combines the actual needs of the Pearl River Delta project, refers to the advanced practical experience of relevant projects, starts from the whole life cycle of design, construction, operation and maintenance of the Pearl River Delta project, focuses on senior management decisions, and takes into account the actual needs of project construction management and control, project safe operation, project scientific dispatching, project emergency command, project Intelligent Maintenance and so on, Provide all-round intelligent support.

3   Overall demand analysis

At the 2018 national network security and informatization work conference, a comprehensive deployment was made for the implementation of the network power strategy, emphasizing the need to keenly seize the historical opportunity of informatization development, make independent innovation and promote the construction of a network power. In 2018, No. 1 central document explicitly put forward the implementation of intelligent agriculture, forestry and water conservancy projects.

In January 2019, Minister e Jingping of the Ministry of water resources clearly put forward the general tone of water conservancy reform and development of "making up for the shortcomings of water conservancy projects and strengthening supervision of water conservancy industry" at the national water conservancy work conference, requiring to make up for the shortcomings of informatization as soon as possible, upgrade the construction of water conservancy informatization, analyze the needs of water conservancy industry, pay attention to the top-level design of intelligent water conservancy, and build a safe, practical Intelligent and efficient water conservancy information system to realize water conservancy modernization driven by water conservancy informatization. In the overall plan of smart water conservancy, for water conservancy projects, it is clearly proposed to strengthen the safe operation monitoring of water conservancy projects, comprehensively use satellite remote sensing, video monitoring and other Internet of things technologies, develop the project operation safety assessment and early warning model, and improve the ability

of risk identification, risk diagnosis, safe operation and emergency disposal of water conservancy projects. We should strengthen the whole lifecycle management of water conservancy projects, and make use of new technologies such as "Internet plus" to actively promote the use of technologies such as BIM, GIS and electronic signatures, and build intelligent site system and water conservancy construction management information system, so as to improve the level of meticulous management of water conservancy projects and realize the whole life cycle management of water conservancy projects.

In December 2019, the Ministry of water resources organized and carried out the national water conservancy project informatization innovation demonstration activity. Vice Minister Jiang Xuguang pointed out that it is necessary to promote the application of water conservancy construction informatization technology from all links of project construction, so as to ensure the implementation of innovative development ideas, specific projects and practical work. In the preliminary design and approval stage of major projects, we should fully consider the needs of project construction and operation management, actively apply BIM based information management technology, and ensure that the information construction content and construction investment are included in the project budget. In the project implementation stage, actively establish a BIM based management platform, actively apply electronic archives, signatures and other information means, and promote the upgrading of construction quality and safety information management level. In the operation management stage, actively construct

Build the operation and maintenance mode based on BIM, strengthen the real-time monitoring, analysis and control of project operation, and ensure the safety and benefit of project operation.

Internet plus modern water Internet is the requirement of digital Guangdong. Its main task is to implement the Internet plus modern water conservancy plan with the aim of developing digitalization, networking, cloud computing, intelligence and ubiquitous development, and promote the wide application of Internet plus in water conservancy business. The Internet plus modern water conservancy system. Guided by Internet technology, four new modern water conservancy patterns of water security, water ecology, water management and water service are formed through concept renewal, technological innovation, management innovation and process reengineering.

4   Overall architecture design

According to the new requirements of intelligent water conservancy, the Pearl River Delta water conservancy project brain is an artificial intelligence system based on engineering cloud, combined with data processing, intelligent algorithm, water conservancy model and other capabilities to realize large-scale computing and intelligent decision-making on an open platform. The core of Engineering brain is composed of "one cloud, one number and one middle platform". The first cloud refers to the private cloud of the Pearl River Delta water resources allocation project, which

provides large-scale storage and computing power for the engineering brain; One number, two pools and one center refers to the data resource pool in the construction period, the data resource pool in the operation and maintenance period and the big data center in the whole life cycle, which constructs massive heterogeneous and diversified engineering big data by collecting all relevant data inside and outside the Pearl River Delta water resources allocation engineering system; The first middle platform refers to the middle platform of the Pearl River Delta water resources allocation project, which forms the support for the application system by depositing the basic capacity.

Build a private cloud for water conservancy projects in the Pearl River Delta, establish computing, storage and network service capabilities, and realize the centralized sharing, on-demand service and on-demand expansion of computing, storage and network resources of intelligent projects in the Pearl River Delta.

Build a data resource pool based on the massive data storage and management system on the engineering cloud, and form a data resource pool during construction, operation and maintenance and a big data analysis resource pool throughout its life. Through distributed resource scheduling, distributed storage management and distributed data service technology, the unified management and service of structured, semi-structured and unstructured data are completed. The data resource pool collects the data of the water resources allocation project in the Pearl River Delta. Through data fusion, data asset management and data standard services, it breaks through the data barriers between businesses, extracts the data value, constructs the data resource system of the whole project, reduces the calculation and storage cost, increases the business efficiency and greatly improves the innovation ability, It provides a data basis for thinking and decision-making for the brain of water resources allocation project in the Pearl River Delta.

Build an engineering platform, use models and tools, focus on data mining, knowledge application, business modeling, fusion analysis and rule application, realize the precipitation of application basic components and public service capability, realize the development and capability output of BIM + GIS, hydraulic engineering professional model, big data analysis and artificial intelligence capability, and form business support, service support, auxiliary decision-making Comprehensive public services in operation and maintenance, so as to support the intelligent application of the upper layer of the Pearl River Delta water resources allocation project.

5 Conclusion

Based on the above objectives, the preliminary design of the water resources allocation project in the Pearl River Delta has prepared a "special report on Informatization (smart Pearl River water)", which has been approved by the Ministry of water resources. However, in the preliminary design review comments, it is proposed that "in the implementation stage, we should further optimize the overall information architecture and technical parameters of each system, optimize the configuration of engineering data center and dispatching monitoring center, optimize

the design content of model algorithm analysis support and data support platform, and strengthen the engineering digital model.

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