



Intelligent Water Scheme Design Based on Artificial Intelligence, Internet of Things and Big Data Technology

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Abstract. The implementation of this project can effectively solve the problem of water shortage in urban economic development, change the single water supply pattern of Nansha District of Guangzhou drawing water from shawan waterway in the lower beijiang River and Shenzhen and Dongguan drawing water from Dongjiang river, and improve the water supply safety and emergency reserve capacity.

Keywords: Water supply · Safety · Informatization · Intelligent design

1 Introduction

In The Pearl River Delta project aims to optimize the allocation of water resources in the east and west of the Pearl River Delta, diverting water from the Xijiang River system in the west of the Pearl River Delta network to the east of the Pearl River Delta. The main water supply target is the water-deficient areas in Nansha District, Guangzhou, Shenzhen and Dongguan. Implementation of the project can effectively solve the water shortage problem in the development of urban economy, the change of guangzhou nansha district water from shawan waterway downstream beijiang river and shenzhen, dongguan city, from the single water supply pattern of dongjiang water, improve water supply safety and emergency support capability, improve downstream dongjiang river flow, water ecological environment, appropriate to the maintenance of nansha district, guangzhou, shenzhen and dongguan city water supply security and sustainable economic and social development plays an important role. After the completion of the project, the average water supply for many years was 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 back-up water supply to Hong Kong Special Administrative Region, Panyu District and Shunde District.

The project consists of one main line, two branch lines, a branch line, three pumping stations and a newly built regulating reservoir. The project draws water from Liushou of Xijiang River, pressurized by Grade 3 pumping stations of Liushou, Gaoxinsha and Luotian, and transports water to Gaoxinsha Reservoir, Dongguan Songmusshan Reservoir and Shenzhen Gongming Reservoir in Nansha District. The designed diversion flow rate is 80 cubic meters per second, and the total length of the

water transmission line is 113.2 km, of which the trunk line is 90.3 km long, including the Dongguan sub-trunk line.

With a length of 3.6 km, shenzhen branch trunk line is 11.9 km long, nansha branch line is 7.4 km long, and gaoxinsha Reservoir is newly built.

The storage capacity is 4.82 million cubic meters. And don't for I, such as the project, project size is large (1) model.

Pearl river water resources allocation project investment in the history of guangdong province is the largest and longest water, the water area of the most widely water conservancy project, is a large bay area of guangdong water security strategic project, is the world's highest water pressure and shield tunnel is the longest water diversion project, is the pearl river delta core area long distance water conveyance project of deep tunnel, and the water distribution along the pearl river delta.

2 System Design

Overall plan with reference to the preliminary design review, follow the “wisdom water resources overall plan” and “water net letter level action plan for three years relevant requirements, the use of the Internet of things, cloud computing, big data, artificial intelligence, 5 g, such as a new generation of information technology, focusing on engineering construction, water regulation, project operation, emergency disposal, such as the core business, optimize the overall structure, optimize the platform construction, strengthen the construction of data, deepen the resources integration, expanding application of wisdom, provide scientific decision-making, fine management and comprehensive regulation of effective support, organization science, advanced technology, quality control, process can be traced back to the wisdom of the project objectives, as shown in Fig. 1:

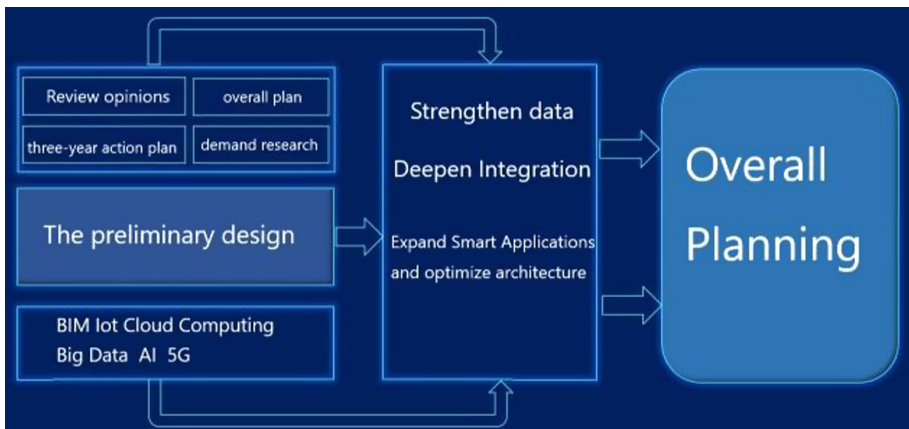


Fig. 1. Planning ideas

Combination of overall planning of the pearl river delta engineering actual demand, reference the advanced practice of related engineering experience, from the pearl river delta of engineering design, construction and whole life cycle of operations, focusing on senior management decision-making, combining various business management of engineering construction control, the safe operation of the project schedule, engineering science, engineering, emergency command, engineering intelligent maintenance and the actual need, provide a full range of intellectual support.

3 System Implementation

3.1 Overall Architecture

The pearl River Delta Intelligent Water Conservancy Project mainly includes a network, a brain and 7 intelligent applications. A network is mainly composed of the Internet of things and high-speed Internet connected information network connected with various monitoring devices; a brain is mainly composed of engineering cloud, big data and Taiwan in the project; seven intelligent applications mainly include intelligent construction and management, intelligent supervision, intelligent decision- making, intelligent scheduling, intelligent emergency response, intelligent operation and maintenance, and intelligent experience. See Fig. 2 for details:

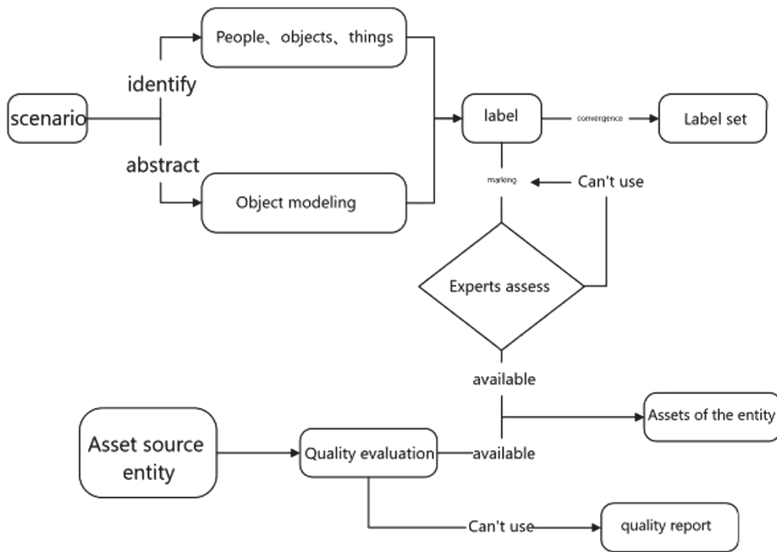


Fig. 2. The specific process

3.2 Data Resource Model System

Expression of engineering object model organization according to the data resources, reduce data redundancy, improve the ability of flexibility and easy connection between

data structure, the object is divided into identity and attributes of object id only express ontology, the existence and uniqueness of the attribute is the ontology of possible related information, such as basic attributes, spatial and attribute, BIM properties, as well as logo or attributes are possible when phase characteristics, etc. As shown in the Fig. 3 below:

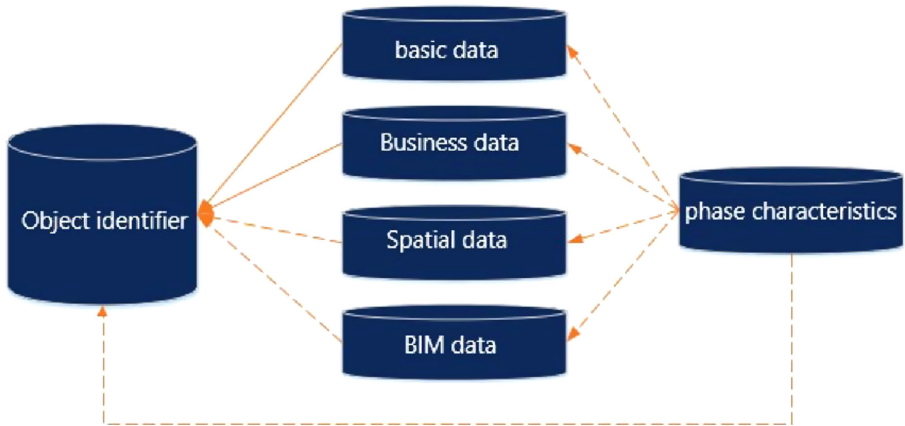


Fig. 3. Data resource model architecture diagram

4 Conclusions

In terms of time series, it covers all stages of the whole life cycle, such as project planning, construction, operation and maintenance, with a large time span. In terms of content composition, it covers IoT perception, automatic control, network communication, physical environment, basic hardware facilities, data center, intelligent platform, application system, etc. In terms of technology, IT includes monitoring technology, communication technology, industrial control technology, IT hardware network technology, physical environment construction technology, cloud computing/big data/artificial intelligence technology, BIM + GIS and other technologies, software development technology, water conservancy professional business and other technologies. In terms of system integration, it includes data integration among industrial control network, business network and Internet, data and process integration with Water Resources Department and Ministry of Water Resources, security authentication and process integration with provincial government affairs, data sharing and exchange with other departments, etc. From the point of construction units: including a number of different professional types, with different technical expertise, different section of the construction units.

How to ensure the home series, multiple unit construction technology, construction content to plan as a whole class for an organic whole, forming a joint collaborative community, can realize the seamless joint between each site content, several construction units to wrangling, harmonious coexistence, each other, to achieve high

quality division of Labour cooperation, to ensure that the project, the Ministry of Water Resources and the provincial water resources bureau, the other part of the integration between integration, can guarantee the construction entity shall, according to the general technical requirements, the overall schedule, the overall goal all tasks efficiently and orderly organization work, must need to have a comprehensive ability to fall to the ground the total integration of units, Under the overall command of the owner, under the supervision of the supervisor, under the requirements of the design program and route, cooperate with all participating units to participate in the project construction.

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