

Design of an intelligent management and construction system for intelligent water conservancy projects

Tao Yang¹

¹ Shenzhen Kerong Software Co., Ltd
zty_urb_iot_3@163.com

Abstract. Water conservancy project is the foundation and top priority of each country's development. China's Pearl River Delta water resources allocation project (Pearl River Delta Project) is an important water resources allocation project approved by the State Council, which has received great investment in both attention and investment. In addition, countries around the world have also paid high attention to water conservancy projects. This paper analyzes the structure and characteristics of the water conservancy project, analyzes the requirements of the most important intelligent management system in the application management link of the project, and puts forward a very complete intelligent management and construction system that can be applied to the intelligent water conservancy project.

Keywords: Water conservancy project, Intelligent management system design, Engineering design.

1 Introduction

As an infrastructure project developed by various countries, water conservancy project has received extensive attention and resource investment in recent years, and intelligent water conservancy project has become the research focus and development core in related fields. The design of smart water conservancy projects often aims at building ecological smart water conservancy projects in the new era. It is necessary to promote the construction of smart projects in an all-round way, pay attention to the top-level design of smart projects, and realize "smart design", "smart construction" and "smart operation".

At present, the development of management system should not only maximize the value of the system and meet the needs of users, but also fully consider the multi-level extension of system function expansion, application expansion and integration expansion in the future. At the same time, it also takes into account factors such as cost control and project cycle control, so it is forward-looking and practical. Through advanced management concepts, technologies and methods, the competitiveness of enterprises can be improved. But we should also pay attention to the maturity of software products and systems, and find a balance between the advanced and mature, so as to maximize the value.

2 Overall architecture design

The overall structure of the Pearl River Delta smart water conservancy project mainly includes a network, a brain and seven smart applications. A network is mainly composed of the Internet of things and high-speed interconnected information networks connecting various monitoring equipment. A brain is mainly composed of Engineering cloud, big data and engineering middle platform. Seven smart applications mainly include smart construction and management, smart supervision, smart decision-making, smart scheduling, smart emergency, smart operation and maintenance and smart experience. See the Fig. 1 below for details.

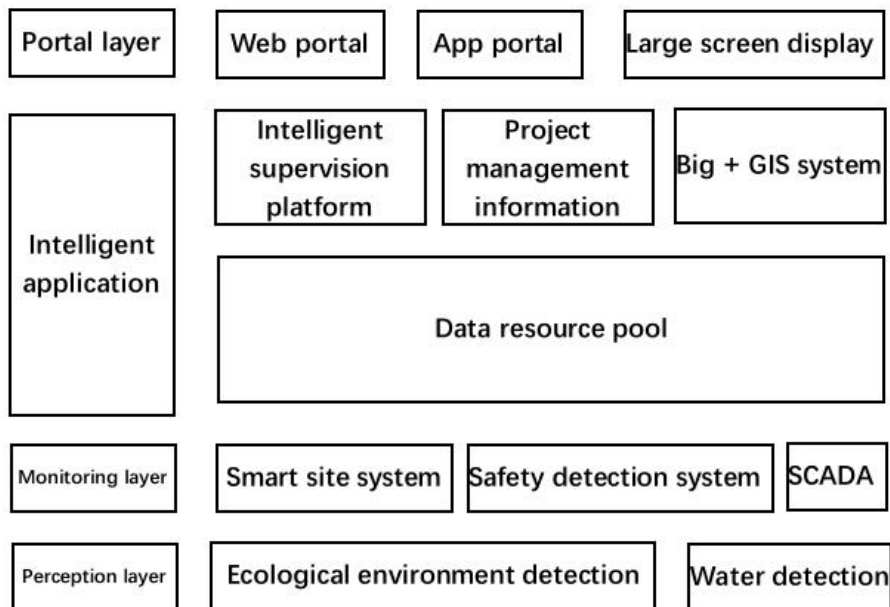


Fig. 1. Overall architecture.

3 Main construction tasks

The main content of this section focuses on the construction of intelligent construction and management applications and the construction of water injection management.

The smart construction system of smart water conservancy project mainly includes three aspects: Project Management (i.e. PMIS), project archives management and land acquisition and resettlement management, from macro control to micro display, from project startup to project acceptance, from project progress to project investment, from quality detection to safety monitoring, from project surface to deep buried

tunnel, It covers the whole elements and process of project construction management during the project construction period, and comprehensively serves the project management personnel and relevant business departments; In addition, it also needs to complete application integration with engineering digital portal, supervision platform, decision-making system, digital signature system of the Ministry of water resources, OA, legal affairs, finance and other systems of Yuehai water. Its functional architecture is as Fig. 2.

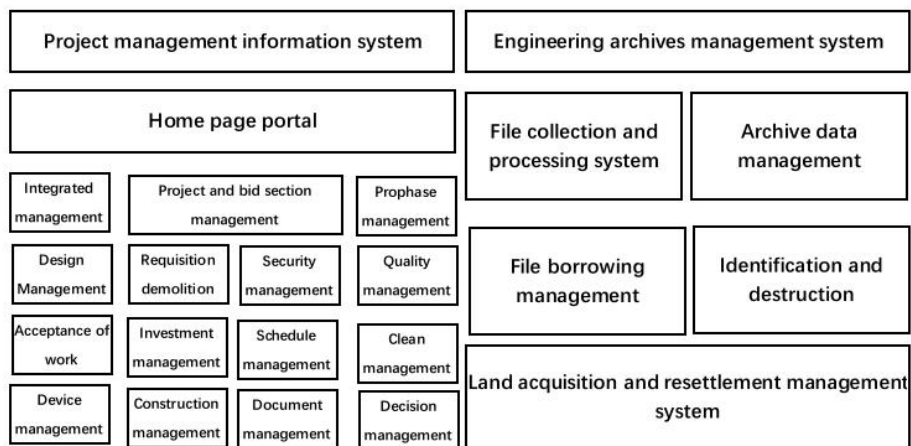


Fig. 2. Functional architecture.

Project management system. Project management information system (PMIS) is an important part of smart water conservancy project and a project management coordination platform for the whole line of projects. It takes the engineering entity as the main line, deeply integrates the five control systems of project safety, quality, investment, progress and integrity, and constructs a multi-level control system covering the whole process and all fields to provide a basis for project construction, project control Providing a support platform for leadership decision-making can be regarded as the information housekeeper of water resources allocation project.

Based on SOA architecture, PMIS integrates new technologies such as BIM, GIS, cloud computing, big data, Internet of things and artificial intelligence, gathers information such as smart site, safety monitoring, quality monitoring, schedule and cost control, integrates information such as BIM construction model, 3D, GIS and tilt photography, and refers to 5 management processes, 10 knowledge fields and 40 management processes of project management, At the same time, it integrates information such as smart construction site, quality monitoring, safety monitoring, digital signature of the Ministry of water resources, Guangdong water OA, finance, legal affairs, etc., and constructs comprehensive business applications including project preliminary design, land acquisition and resettlement, safety, quality, investment, progress, integrity, equipment, construction, documents, final accounts

and fixed assets transfer, so as to finally realize "online management, operation trace, whole process sharing Information, refinement, trace and benefit objectives of "real-time query and seeking benefits from investment".

As the core application system of engineering informatization, PMIS must have "five Realizations":

- Realize "centralized control": Build a management information system covering the business process of project management, realize the purpose of "centralized control", and enhance the standardization, informatization and transparency of management. With the project as the main line, pay attention to the project implementation process, take the project coordination and order as the starting point, assist in the management of the whole process of project management such as investment plan and project implementation, meet the needs of different business levels and improve the efficiency of collaborative work;

- Realize "seamless connection": realize the seamless connection between enterprise level and project level business and basic data, meet the project management and control needs of enterprise level and project level, and realize the online management and control, data and information sharing of project business. Achieve standardized management and maximize the utilization of information resources, and promote the improvement of collaborative work efficiency and management level of projects in the Pearl River Delta;

- Realize "decision support": using the function of (BI) data analysis, establish a management decision data panel to summarize and display the business data of the Pearl River Delta Project in a rich chart style. The data can be mined and penetrated layer by layer to facilitate leaders' query;

- Realize "data connection": realize the integration and integration with other systems, closely connect the business process, data flow and capital flow, and open up the data transmission of each department;

- Realize mobile office: provide the function of mobile office, realize the integration with Kingdee cloud and enterprise wechat, and meet the needs of mobile office

The home page portal is a fast, accurate and efficient system application and data statistical analysis platform for management, project managers at all levels and users of all participating parties. It directly obtains data from the bottom business documents of the business system. Based on the first-hand data generated in the project management process, it uses the most direct, intuitive and The most accurate way to display and manage key element information. We have designed and implemented the home page portal with the following functions.

- Information release: release the project progress, news, notice, announcement and other information in real time, so as to facilitate the project personnel with authority to consult, download and learn;

- Data classification and summary: classify and summarize all kinds of data according to data attributes (such as independent contract engineering projects), and establish a centralized, standardized and unified project information display;

- Realize personalized login interface: according to management levels and job responsibilities, build personal centers with different management levels and job

responsibilities, configure users' personalized login home page, guide users to use the system quickly, conveniently and accurately, and improve business processing, communication and work efficiency;

- Project Plan Association display: according to the time attribute of business data, the dynamic tracking, monitoring, early warning and analysis of business data and key nodes, as well as historical data tracing and query are realized through the combination of business and time for the contents of preliminary work plan, project multi-level progress plan and personal work plan;

- Query and analysis of dimensions and multiple perspectives: fast, efficient and accurate statistical queries can be made according to different levels and attributes of business data, and user-defined reports are provided. Users can personalize report styles and query conditions according to the content of the project information base;

- Management decision cockpit: it provides a management decision cockpit for business monitoring and decision analysis. Through visual instruments and charts, it realizes the centralized summary, statistics, analysis and multi-dimensional data display of various structured data (including design, investment, progress, quality, safety, integrity, etc.), and supports the drilling of data layer by layer until it is traced to the source document, Provide better and faster decision support and business insight for managers at all levels

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The project management information system of water resources allocation project is to provide collaborative support for "building an ecological and intelligent water conservancy project in a new era". The system uses each other, including the owner, the construction unit, the supervision unit, the design unit and other participating units. On the premise of ensuring the security authority, the project information is shared to the greatest extent, so as to achieve efficient collaboration of information and improve communication Work and management efficiency.

- Information release, review and download, including but not limited to news trends, notices and announcements, project memorabilia, policies and regulations, weekly project report, monthly project report, etc;

- Bulletin board, including but not limited to: red and black list, weather forecast, safe production days, important project information, etc;

- Experience exchange, communication and interaction: build the system user experience exchange, communication and interaction plate to realize user communication, experience exchange, data circulation, evaluation, etc;

- Work task management: realize the management of key work tasks of departments and individuals, release key work tasks through minutes of meetings (including monthly, weekly and departmental meetings), clarify the person in charge of the task, the responsible department and the required completion date, feed back

and track the completion of the task, summarize and count the completion rate from multiple dimensions and angles, and give early warning of task delay;

- Supplier management: manage system suppliers by category (such as province, level, type, etc.), record supplier basic information, take suppliers as the source, realize business data series connection, summary, statistics and mining, establish supplier evaluation system, and conduct system scoring and user supervisor evaluation according to supplier performance (such as contract performance), It is graded according to the scoring status. It supports multi-dimensional and multi angle summary, statistics, analysis and query, and alerts according to the set conditions

4 Conclusion

To sum up, the intelligent water conservancy project construction system proposed in this paper has certain practicability and solid foundation. Therefore, we believe that the construction project has strong applicability in the direction of intelligent water conservancy.

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