

# DEVELOPMENT AND APPLICATION OF NATIONAL WESTERN MAP SURVEYING PROJECT MANAGEMENT PLATFORM SYSTEM IN NATIONAL WESTERN MAP SURVEYING PROGRAM

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## ABSTRACT:

The National Western Map Surveying Project on 1:50000 Topological Maps Blank Area is a complicated systemic one. In order to realize scientific management of the project, and achieve reasonable utilization resources, saving production cost, sampling production progress and increasing production efficiency, we establish Western Map Surveying Project Management Platform System which combined classical method of surveying and mapping project management with modern advanced management theory is necessary. The paper expatiates principle, constitution, architecture and critical technique of western map surveying project management platform system.

## 1. INTRODUCTION

Nowadays, owing to the development of modern surveying and mapping technique, which characteristic contain multi-information source, multi-information collecting method and multi-source information fusion and processing, operators can't use the traditional engineering management method to manage acquisition information. Because the traditional one can bring out problems, such as information sedimentary, weak accuracy, information couldn't be shared and historical data couldn't be found easily, information confusion and lag, operators would be seriously affected when they make decisions. Whereas, Modern ERP contains more new production management thoughts and theory method, also, it is expanded into different oriented production types and multi-planning mode management organization. Furthermore, it is a comprehensive computerization for all kinds of effective management method [3].

The topic is launched under national western map surveying program, which belongs to national key project. Considering the particularity terrain environment and widely adopted advanced surveying and mapping technical in the national western map surveying project on 1:50000 topological maps blank area, it has been figured that it widely different from traditional map surveying project. At present, the rules of the traditional one can't coordinate with the new project, especially, there is no experience can be used for reference in respect of project management. In such a manner, modern ERP theory and technical measure are used in building the platform. In the forth place, different kinds of management information is conformed into the management information system of the project. Then, information can be integrated and exchanged and shared with others. Finally, it not only can supply decision-making support for manager, but also can define service flow through analyzing the demand of suppliers and buyers, and achieve reasonable utilization resources, sampling production progress, saving production cost and increasing production efficiency. Besides,

the system will promote the management means of surveying projects based on the high technologies, and work out relevant project management rules. Therefore, the system will play a significance role in spreading and applying the surveying projects based on the high technologies, and will reach a new stage of automation, standardization and scientific management for surveying project.

## 2. TARGET AND COMPONENT

### (1) System target

The general target of the topic is as follows: Firstly, modern ERP theory and technology method are utilized and the principle of OA and MIS is integrated in the system. Secondly, the basic flow of surveying project should be identified. Then, the situation as organization overlapping and resource waste exist in traditional project management which is in the form of straight line can be solved. Meanwhile, according to the production management rule of traditional surveying project and taking the chance of the national western map surveying project on 1:50000 topological maps blank area, we establish project management database group, which primarily lies in production management database, financial management database, quality management database, electronic office database and so on. The systematization of the management mechanism of national western surveying and mapping project and the foundation of the normative, scientific and advanced surveying and mapping project management platform will provide reference for other project.

### (2) Component Module

The topic is composed by ten module:

- 1) National Western Map Surveying Project production management subsystem

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According to the management process of map surveying engineering, we make use of intelligence report and full-text retrieval and other advanced technical to auxiliary manage related part in production planning and producing implementation process of the project.

#### 2) National Western Map Surveying Project technical management subsystem

Taking the management of technical design as the core and according the technical design flow of map surveying engineering, we make use of intelligence report, full-text retrieval and other advanced software to auxiliary manage technical design and technical problem in producing implementation process of the project.

#### 3) National Western Map Surveying Project data management subsystem

The subsystem of national western map surveying project for all sorts of original data and production data management, relying on the large mainstream database platform in computer industry (ORACLE), integrating several of data, establishing western mapping data database, is the important means to present production of the project.

#### 4) National Western Map Surveying project resource management subsystem

The designed subsystem in national western map surveying project is just for the management of materials and equipment, mainly including vehicles, surveying and mapping instruments, field surveying telecommunications equipment, data processing and field map surveying, etc. Meanwhile, this one provides management of purchase and maintenance to major materials and equipment.

#### 5) National Western Map Surveying Project financial management subsystem

The function of this part is to manage the financial of national western map surveying project, and its accounting method is based on related national surveying and mapping financial and accounting rules. Besides, the management objects of this subsystem contain budget, final accounts and financial statistics.

#### 6) National Western Map Surveying Project quality management subsystem

A quality management database, including the management of the construction supervision and the inspection of the submission production, is founded to implement quality control management in the national western map surveying project.

#### 7) National Western Map Surveying Project secretary management subsystem

In order to ensure the national western map surveying project went to town, we build a security database. Also, it offers safety protection mainly in two aspects: human and material resource.

#### 8) National Western Map Surveying Project electronic office subsystem

In this part, we establish the electronic office database, which can help administrative department to manage affairs, such as

document transmission, personnel, administrative, conference, secretary and archival work, etc.

#### 9) National Western Map Surveying Project information publication subsystem

Through the subsystem, internal information notifies and public information publication which is about information and news and progress in the process of national western map surveying project can be offered. Then it would enhanced propagandistic task about national western map surveying project.

#### 10) National Western Map Surveying Project management platform operation and maintenance subsystem

This part mainly include authority management, log management, data backup and recovery, network exchange data encryption and intranet and internet security management, etc.

### 3. DESIGN AND STRUCTURE

#### (1) Design Idea

The general design idea of the system is to establish database group about project management information, and the database group contains not only surveying and mapping engineering management information database but also surveying and mapping engineering information knowledge library. Moreover, the database group is considered as a central tie in the resource supply chain, so that all of the behaviors of engineering management are depended on management information database group to implement source acquisition and result delivery. After knowing the action of management information database group, we recognized that management information database is necessary as one of suppliers and buyers in the resource supply chain. Hence, we have decomposed the engineering management operation process into supply process between several branches of management framework and management information database. Finally, we can achieve predigesting operation process and increasing production efficiency.

#### (2) System structure

The multi-layer architecture is adopted in national western map surveying project Management Platform System. It is composed of three hierarchies: data storage layer, application service layer and presentation layer. Data storage layer contains database group, which can store data and offer ones that the system needed. Application service layer includes several of application servers, which can provide application tools for data processing. Presentation layer is mainly for user's special application. The general structure is shown in figure 1.

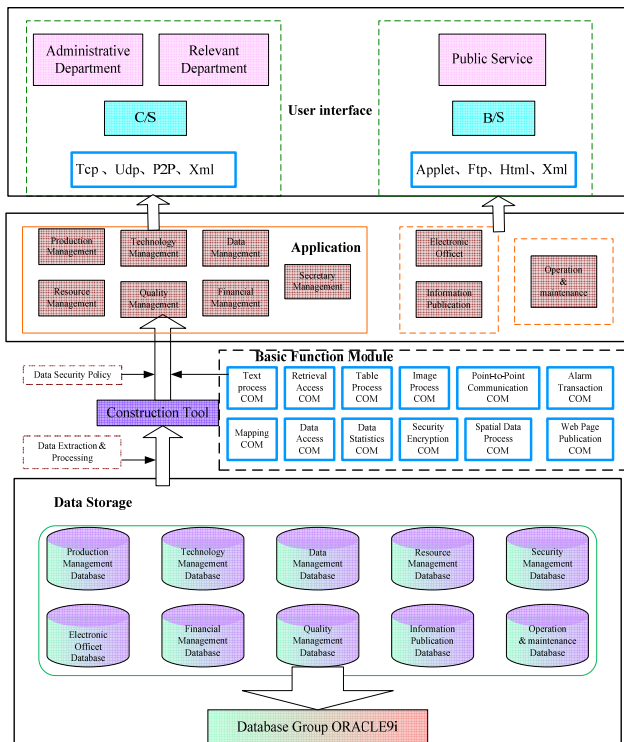


Figure 1 National Western Map Surveying Project Management Platform System general structure

#### 4. KEY TECHNOLOGIES

##### 4.1 Management model based on the enterprise resource planning (ERP), workflow mapping engineering

Enterprise resource planning (ERP) is a kind of management ideas that facing supply chain. The main purpose of ERP is manage and balance power, financial, material, information, time and space resource, and to coordinate the management department, develop activities surround project requirements. With ERP management ideas for the soul, it is a product of integration management concept, business process and basic data, manpower, computer hardware and software resources management system.

Western Map Surveying Project widely used modern hi-tech, many of them in high-tech is the first large-scale production of surveying and mapping in the actual application, the traditional mapping engineering management standard are not suitable. In modern management of surveying and mapping engineering, append modern technology and theory of ERP to get a purpose of scientific designing business processes, reasonable utilization of resources, high project implementation. Through the Western Map Surveying Project Management Platform's Construction to new and high technology conditions of surveying and mapping engineering management system, work out relevant arrangement of standardized management. This is very meaningful to the new and high technology of surveying and mapping.

##### 4.2 Business oriented intelligence reports

In the production practice of Western Map Surveying, many occasions will need the data stored in the database showing in

the forms of reports and these reports were submitted to the leadership to instruct or sent down to primary production unit to operate. These are the report output data includes not only the daily papers, documents, schedules, assignments, but also cost budget, financial analysis and quality evaluation, material achievements statistics etc all kinds of data report. How to get data and create different specifications of various levels formed report output automatically and intelligently can greatly improve the level of automation management, save the time to prepare financial statements and ease management organizers workload. The report forms produced can show project managers project status from different angles and levels. It is the necessary means of the project status analysis, planning and decision-making.

##### 4.3 Personalized full text retrieval technology

Western Map Surveying project has been produced and will produce a huge number of all kinds of documents, although adopted the management information system database for data archive storage and management, however, because of the different source document, these documents have different storage format and organizations format. If only depends on the level of database searches methods for management, these works can only rely on document metadata. But retrieval for large hidden and valuable information in the document relies on efficient full text retrieval technology.

Full text retrieval is an information retrieval technology that put text data as the main processing object, the whole text document as retrieval object. This retrieval mode has wide application value in the laws and regulations, data library, online search engine, office automation.

The core function of design and develop full text retrieval based controls, which is a powerful, high performance, flexible text indexing and retrieval platform, is to carry out full text retrieval and uniform storage of structured and unstructured information.

##### 4.4 The foundation of Mapping cost auxiliary budget model

Western Map Surveying projects surveyed and mapped 5032 blank relief map of 1:50 000 which cover 5032 200 million square kilometers of land area of western China. Both the extremely complicated terrain conditions of these 1:50 000 blank relief map and difficulty of surveying which undulate tempestuously by the complexity of the terrain conditions directly affect the scientific and complexity of cost budget.

In accordance with surveying difficulty classification method and related production costs price standard and combine the actual situation of Western Map Surveying project headquarters organize experts group classify 5032 relief maps of western blank area according to surveying project including control survey, field surveying and mapping, indoor mapping, cartography, digital photogrammetry, etc. At the same time, project headquarters also classify and make a price to each working procedure and task of each surveying project. It is the factors difference of sheet range distributing, difference of each project level, difference of each task level while assigning some surveying task of some sheets of some area to some units in actual cost budget, that make the factors that get the cost of a task too many and complex. It is almost impossible if use traditional artificial means to cost budget.

In the project in allusion to too many factors of cost budget and complexity of work flow , using the database technology and also integrate visualization of office based on GIS, the project department manage and import all kinds of difficulty level information of surveying projects, surveying task information, classification cost information, surveying task distribution information and surveying units management information to the database and make the task of distribution work totally viewable. So all the factors and the relationships are maintained by the database and it is real-time and viewable accomplishment of costing work according task distribution conditions which make cost budget scientific, reasonable and automatic. Fig.2 shows auxiliary budget model of All kinds of data flow interactant :

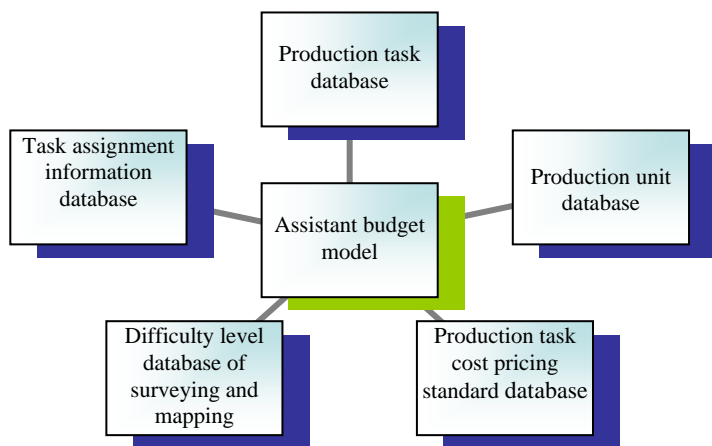


Figure 2 Auxiliary budget model

#### 4.5 Intelligent achievements filing technology based on workflow

The whole Western Map Surveying project products a lot of intermediate results data and documentation from project investigation , overall design of project and actual exploration, the purchase of image data , field surveying control, shooting in the plane, construction of GPS station site, level monument mark burying, gravity surveying, indoor work surveying and producing, and mapping production, and these results data and documentation include production material, periodic surveying and mapping results, the production process control documents etc. These results data is crucial to the whole work of surveying and mapping production, and need to filling and management appropriate and share in the production and management units effective. However, due to the differences of specifications and uses of the achievements and the large quantity of data, it will affect the safety of filing and management efficiency if using traditional methods to manage.

According to the above-mentioned problems in the process of filling, the project department adopt the relational data technology and computer network technology and GIS viewable office technology, make workflow of accomplishment filling, intelligent classify all kinds of accomplishment and import them to database to management. The project department adopt abundant retrieval, management and effective safety control measure which offered by GIS technology to accelerate the sharing level and safety level of results data and data management efficiency. And this make that user can access and update authorization data anytime and look over the time

state ,space state ,production state, related production unit state of results data in a more intuitionistic way.

## 5. DEMONSTRATION

### 5.1 System deployment

This system uses C/S and B/S mixed structure, the server terminal is installed in management platform operation and maintenance center which is responsible for platform operation and maintenance and data update, office, resource management, and security. The client terminal subsystem can have their custom installation according to their needs; As a result of the units that in charge of Western Map Surveying are too many and separate, and considering the current regional network operation conditions, the client subsystem are designed to be offline; The information exchange design of the client terminal and the server terminal are divided to be internal network and external network; In internal network condition, the information are exchanged real-time and on-line; And in external network condition, after encrypted by commercial E-mail encryption system, information is exchanged through email.

The project department of Western Map Surveying runs ten subsystems of the whole management platform, and installs task plan, schedule reports, list of results finishing, technology consultation, document circulation, quality management, etc according to the requirement of project management in units that undertakes project.

Western Map Surveying project management platform using grading privilege management mode to manage and divide privileges of system users, and insure system security according to user accounts and passwords, user post authorization, system logs, etc . Only through the user account/password can user make allowed operations.

### 5.2 System application

After the design and development in 2008, this system is deployed and used in Western Map Surveying project department, units of undertake the project of each province, and take good effect.



Fig3 Western Map Surveying project management platform main interface

## 6. CONCLUSION

" Western Map Surveying project management platform " is an important part of management and innovation of Western Map Surveying project management, by constructing orderly, flexible, powerful, high-powered Western Map Surveying project management platform and creating normative, scientific, advanced surveying and mapping engineering management means, it fishes out a set of effective information-based project management mode for surveying and mapping engineering technology in conditions of modern management, and establish a good foundation for the purpose of safety, quality, innovation of Western Map Surveying project. This system analysis and processing large, dynamic and complex data and information produced in Western Map Surveying project timely and accurate, then plan, control, feedback each activities in project management, and try to change project management from experience management to scientific management indeed. In the future, project department will further closely combined with new business needs and problems in Western Map Surveying project , improve the construction and the application of system.

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