

A Study on Information Construction in Tuha Oilfield

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Abstract—This paper has reviewed the problems in information construction in Tuha Oilfield and introduced the new information construction planning for the “digital Tuha”. The scheme has elaborated the overall information framework, the infrastructure framework and the detailed deployment of the project. The risks have been analyzed and the protective measurements are proposed in the end. After the preliminary construction, this planning has proved to be effective and achieved positive results in Tuha Oilfield.

Keywords: Information construction, digital oilfield.

1. Introduction

With the scientific progress and improvement in management level, information construction plays a vital role for the development of oilfield. The producers, the administrative staff, the developers and the designers are all faced with a large amount of complex information, which includes not only figure information such as the logging data and disposition charts, but also dynamic and static information concerning management reports and exploration data. On studying the existing problems, the information department of Tuha Oilfield has developed a series of projects to improve its information construction. This paper has introduced this new information construction planning and its implementing scheme in Tuha Oilfield.

2. The Weak Points in Informaiton Construciton in Tuha Oilfield

The information construction in Tuha has already achieved some positive results since 2006. It has altered the traditional working methods to some extent, and improved working efficiency and business management, but some deficiencies still exist.

First, there is lack of standard workflow and management system to ensure information quality and safety in information management. Second, the business department and its affiliated units have built part of the application system in accordance with their own demands, but these systems lack unified design and standard, which results in a repeated data introduction and acquisition, and difficulties in data sharing. This in turn leads to data disconnection and isolation within each segment. Third, the information security system has not been set up effectively, and network bandwidth and topology remain to be optimized. In terms of infrastructure, the information network is still at its primary stage in database construction and application, the disadvantages being that there is no unified planning in database establishment, and low efficiency in data sharing and utilization.

3. The Overall Design Plan of Informaiton Construciton in Tuha Oilfield

The overall object of information construction is to establish a secure, unblocked, and advanced information processing platform within 3-5 years to ensure the accuracy, timeliness, integrality and efficiency of information process and that the information construction will reach the leading level in Chinese oil system. This will offer strong support for oil exploration and management development, increasing the competitiveness in engineering operation, and improve the living standards of residents of the oilfield.

2.1 The Concept of “Digital Tuha”

“Digital Tuha” is the generalization for the highly information-based Tuha Oilfield, and its goal is to enable people to search, gather and interact with the natural and humane information freely within the oil system to improve the production, management, and sustainable development in the oilfield. To reach the goal, we will use the information technology synthetically (such as GIS, GPS, remote sensing, telemetry,

high-speed computation, broadband network, multimedia and virtual simulation and so on). All the information about natural resources and activities in Tuha (eg. oil exploration and development, human resources, environment, economic status and etc.) will be collected, updated, integrated, and analyzed to realize high-speed transmission and information sharing. The construction of digital Tuha falls into two categories: the digital oilfield and the digital community. It will be implemented by the headquarters and the oil company collaboratively according to “the common development outline”.

2.2 The Framework of Information Technology

Information framework is the foundation for a company to manage the information and make fast decisions. The different layers of the company need different information, so the key point is to have information integrated. The information framework in Tuha will be constructed in three layers, namely, the oilfield headquarters, the subordinate units, and the basic teams and groups. The basic groups offer the raw data, which will later be gathered and combined to produce the specialized integrated data by the subordinate unit. The company and the headquarters can then draw the information from the database for decision-making. The overall information framework design is shown in Fig.1.

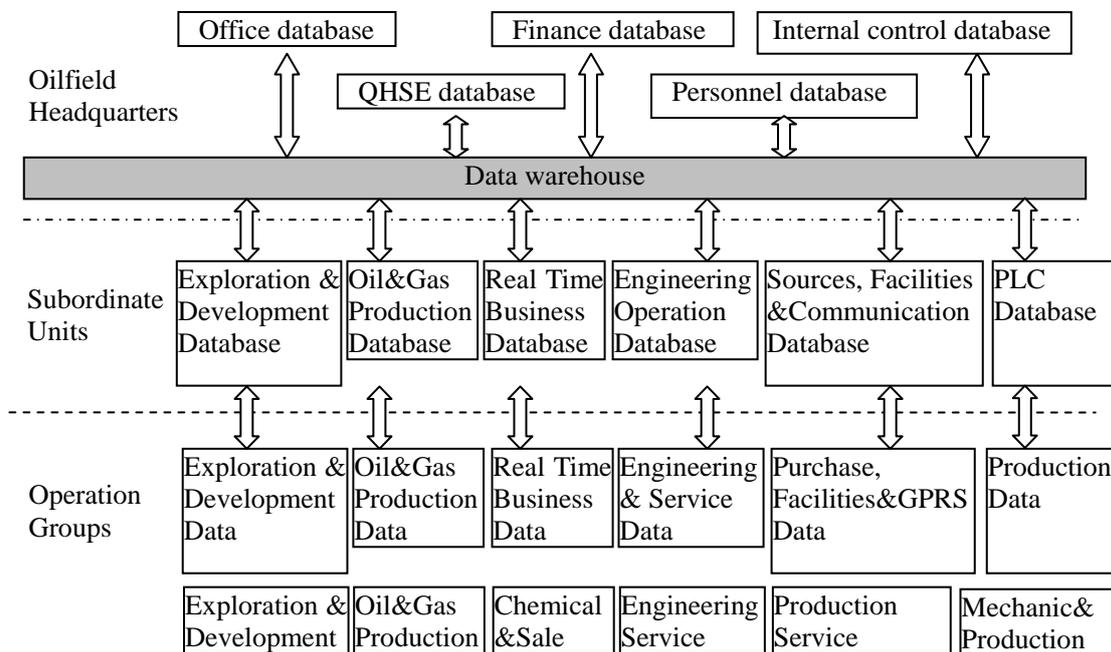


Fig.1 The overall structure of information technology of Tuha Oilfield

2.3 The Framework of Infrastructure Construction

The infrastructure offers the running environment for different kinds of application software. So it should be stable, maintainable, expandable, and satisfactory to different business demands. During the eleventh Five-Year Plan period (2005-2010), the focus is to expand and optimize the wide area network of the company, to standardize the information center and enhance its storage, backup and damage-tolerance ability to build the information security system, to strengthen the construction of domestic and international telecommunication facilities, and to provide remote command and technical support for these projects. Fig.2 shows the framework of infrastructure construction. Fig 3 shows the net topology of Tuha oilfield.

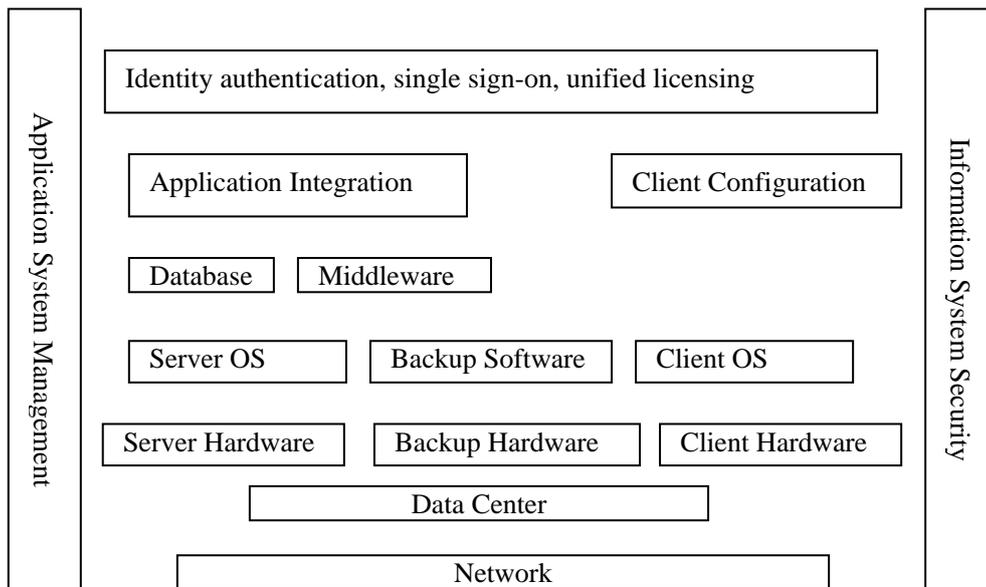


Fig.2 The framework of infrastructure construction

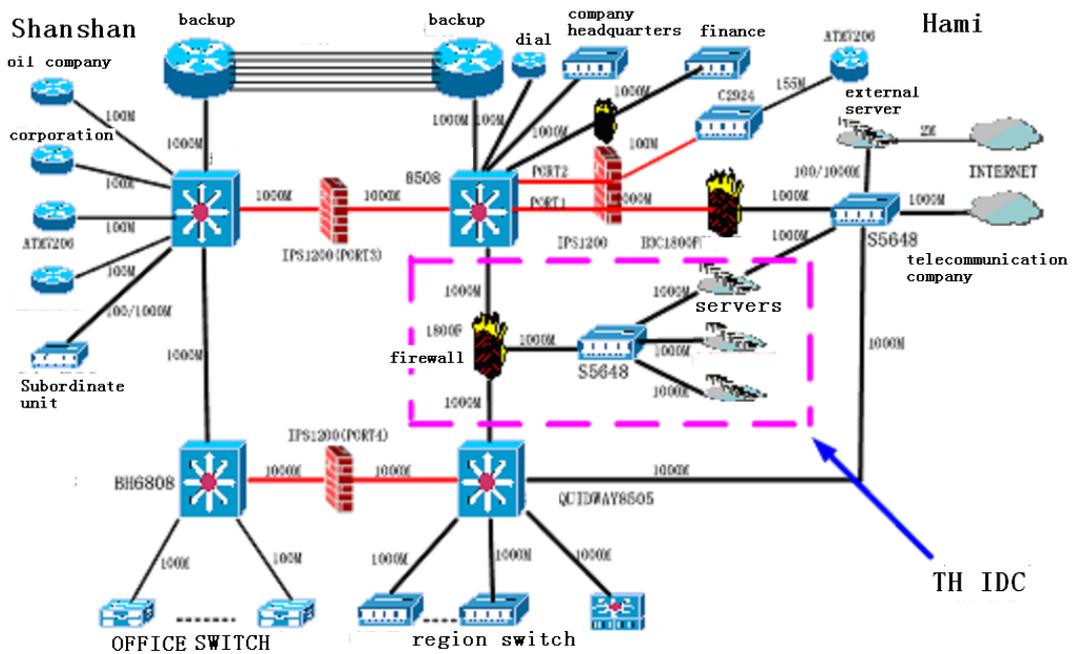


Fig 3 The net topology of Tuha oilfield.

4. The Specific Deployment of Informaiton Construction Project

To achieve the overall goal of information construction, 31 projects have been planned in the oilfield construction which can be divided into 6 categories: digital oilfield projects, ERP (Enterprise Resource Planning) and information management projects, comprehensive projects, community service projects, infrastructure projects, and organizing and securing projects. These projects are launched around the following aspects:

1. Strengthen the network infrastructure and security system construction, and establish an unobstructed, secure, unified and practical information platform that supports the business development of Tuha.
2. Unify the criterion and norm in oil exploration, drilling and building comprehensive management databases. Set up integrated and efficient Tuha information center.
3. Accelerate the application system construction of digital oilfield. Build a real sense digital Tuha Oilfield that includes digital surface engineering, digital pit shaft, digital oil reservoir, digital basin, digital pipe network, and digital community.

4. Further optimize and combine the business procedure of headquarters and the oilfield company. Strengthen construction and integration of comprehensive administration system. Gradually set up an ERP system that is based on financial audit and includes production, logistics, material, purchases, supply, sale, supplier, customer, project cost, budget, actual cost and production process management. This system will support the business operation of every unit, as well as the administrative decision in the oilfield.

The 30 information technology projects are shown as the following:

- A. Oil and gas field projects:
 - A1 exploration and production technology data management system,
 - A2 oil- gas well production data management system, A3 geographic information system,
 - A4 surface engineering management system, A5 digital basin system,
 - A6 engineering technology service management system,
 - A7 real-time new production capacity releasing system, A8 single well automation system,
 - A9 real-time large-scale equipment monitoring system
- B. ERP and information management projects:
 - B1 digital warehouse system, B2 personnel, labour, and capital system,
 - B3 project bidding and contract management system,
 - B4 internal control management system
 - B5 digital archives system,
 - B6 office automation system,
 - B7 enterprise information portal system
- C. Comprehensive projects:
 - C1 logistics management system,
 - C2 transportation security management system,
 - C3 health, security and environmental protection system
- D. Community service projects:
 - D1 intelligent community system,
 - D2 hotel management system,
 - D3 digital television system,
 - D4 social security information management system
- E. Infrastructure projects:
 - E1 enterprise network improvement,
 - E2 data building centre,
 - E3 information security system construction,
 - E4 disaster recovery plan
- F. Organizing and securing projects:
 - F1 establishing and perfecting the function of information department
 - F2 training in information construction,
 - F3 setting information standards

5. Risks Analysis and Defense Methods

The risks of information planning include:

It's difficult to gather enough manpower, suitable skills and abundant experience in the oilfield to implement IT strategy in the short period of time.

It takes time to accept and adjust to the new business procedure and application techniques.

Conflicts may arise in the information construction as it will alter the relationships of the responsibility, the right, and the obligation in the company.

The high demand for the maturity of information system in the information construction increases its difficulties in implementation.

According to the planning, there will be large investment in IT for the future 3-5 years, so there are problems of budget exceeding or how to protect the existing investment.

To the risks that may be faced in project investment, it is necessary to take the following protective measures:

The company leader should support the construction projects of the IT organization and make use of the external resources (business associates and aggregators, for example) if necessary. Train the key IT staff, develop and support their career planning.

IT organizations should work closely with business sections to support the important business strategies, value delivery and daily operations.

Adopt the advanced commercial software package and to minimize the customized development so as to save time and increase efficiency.

Make every means to reduce the cost. For example, use the modularized application system and middleware to increase system expandability; take industry standards into account when choosing the technology — advanced and mature techniques are preferred; protect the existing investment, and follow the principles of gradual improvement, step-by-step implementation, and promotion after trial.

Set up a coordinating mechanism and communication line for IT multi-project management.

6. Conclusion

The information construction is a long-term, complex project, involving the headquarters and all the sections in the oil company. Under the guidance of CNPC and the cooperation of the headquarters and Tuha oilfield company, by the end of the eleventh Five-Year Plan period, the digital Tuha has begun to take its shape. Tuha has achieved its informatization goal, the infrastructure being mature and advanced, the management system covering all business, information management completed and data application efficient. All these have laid a solid foundation for future decision-making and intelligent management of the enterprise, and improved management level and productivity in Tuha Oilfield to a great extent.

7. References

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