# Application of Bim Project Management in Complex Systems

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**Abstract:** In the context of fierce competition in China's construction industry, the introduction and wide application of BIM technology has realized great changes in information-based management of construction projects. Due to the large scale of the project and the great difficulty in information data management, it has realized the informatization of construction project management supported by a number of technologies, which has improved the efficiency and benefit of project management. Based on the advantages and values of BIM technology in project information management, this paper studies the application of BIM in project management in complex systems.

## 1. Introduction

Building Information model, referred to as “BIM, is physical and functional characteristics of a facility of digital expression way, is the construction project with various relevant Information data as the basis of the model, the integration of all kinds of Information related to construction project engineering data model, through simulation the real Information of Building digital Information. As a new computer software technology, BIM has expanded from CAD to more software program fields, such as service potential in project cost, schedule and equipment management. BIM has added more intelligent tools for software application in the construction industry, featuring five characteristics: visualization, simulation, optimization, coordination and graph ability [1].

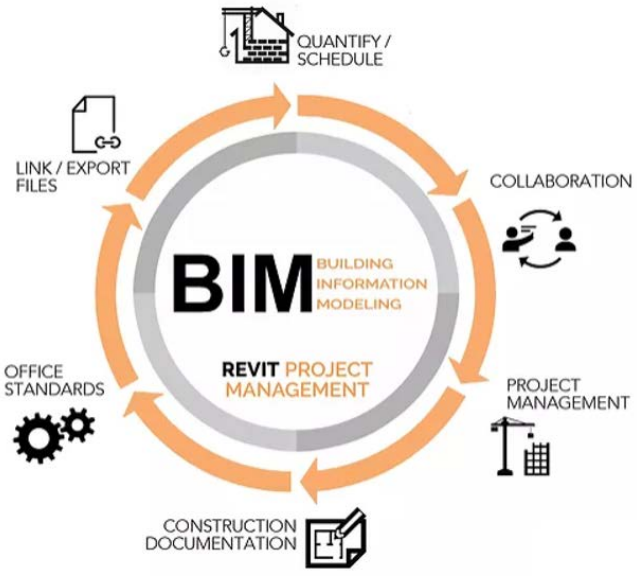


Fig.1 Building Information Model

## 2. Engineering Project Management Information System Based on BIM Technology and Its Advantages

In the analysis of the disadvantages of traditional information management, we found that the design blueprint, information interaction and cost control for the whole project lack of global characteristics, seamless management of the whole life cycle of the project is difficult to achieve. Therefore, in order to strengthen seamless management, it is necessary to introduce BIM project

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management information system in order to change the shortcomings of traditional information management. The construction of engineering project information management model is based on the comparison technology, which fundamentally changes the obstacles of project information management under the traditional mode, and integrates and utilizes the information of the whole life cycle, main key indicators, organizations and projects [1]. At the same time, it promotes the internal resources of the project system, so as to achieve unity and coordination. The information flow network of the project information management is easy to realize, and the realization of this mode plays a very important role in promoting the optimization and improvement of the information management of the project.

### 2.1 The Realization of a Central Database Based on Bim as the Hub Provides a Platform for Collaborative Communication between Project Parties

Project information management model based on BIM technology, the traditional information management mode, the BIM central database, not only makes the traditional mode of drawing design of “professional” collision caused by the difficulty of the project construction to strengthen by solving the shortcomings, the most mainly through intelligent and parametric methods, for each stage of integration of resources and data for effective connection, through the results show that the intelligent and parametric methods originally extremely complex information and digital way of expression [2]. In the key integration index, it is very effective to the inaccurate project cost under the traditional information management mode. In addition, the project cost precision calculation is also realized. In addition, in the whole life cycle of project information management, BIM is used to manage, update and share the data parameters related to the project, so as to realize the unity of information.

### 2.2 The Project Management Information System Based on Bim Technology Can Realize the Dynamic Control of the Whole Project

For the realization of the BIM technology project information management mode, can optimize the traditional drawing design, from the coordination and optimization of energy conservation and emissions reduction, improve the construction schedule, engineering cost control as well as the construction safety management and pipeline collision problems involving important parameter data and information, thus the realization of simulation management improvement, in order to ensure the whole dynamic control management of construction projects, to draft the quality of the engineering design, construction and maintenance management efficiency and the level of scientific management, information dynamic optimization project service [2].

### 2.3 The Project Management Information System Based on Bim Technology is a Self-Renewing System

With management continuously shortening the project cycle, information will be more and more of the project, in the process to reflect, the end of the project at some stage will get some information out of date, must be to an optimized processing of information, when otherwise accumulate more, will make the information become more and more difficult to manage, BIM technology project information management model can fundamentally solve the problem [3]. Since BIM information management model is not a hard model, the intelligent system can be constantly updated with the change of data parameters in the process of project progress, so as to realize effective follow-up for the whole life cycle of project progress and optimize for the whole life cycle management service [4].

## 3. Application of BIM Project Management in Complex System

In the process of construction engineering project construction schedule control, the use of BIM technology, can to each project for effective supervision, control, coordination, construction process, BIM technology visualization features, can be intuitive understanding complex construction technology, construction personnel using 3D model display technology solutions, effectively improve the construction of people's understanding of technical difficulty and key, so that we can

effectively speed up the construction progress and quality [3]. Secondly, using BIM technology construction progress simulation, can clearly presents the construction schedule and process, the relationship between the complex changes in the structure of the straightforward, technicians use BIM technology to the traditional information into three-dimensional model, can accurately calculate the construction data, materials and machinery for the project schedule control of complex systems and specific implementation plan to provide reliable basis [5].

### 3.1 Application of Decision Management Stage

As a key stage of construction project management, the decision-making stage has a direct impact on the follow-up construction of the construction project. In the effective application of BIM technology in the decision-making stage, relevant decision-makers can import important information according to BIM technology. It mainly includes the natural conditions, climate types, topographic conditions and geological characteristics of the site of the construction project, etc. [4], which simplifies the complicated work, so as to accurately analyse the safety factors related to the construction of the construction project.

### 3.2 Application of Bim Technology in the Design Stage of Engineering Projects

The design stage is a key stage in an engineering project. If there are problems in the design work, it is likely to have a serious impact on the subsequent construction and even cause some engineering accidents. Therefore, it is necessary to strengthen the rationality of the design work [2]. In the design stage of an engineering project, BIM technology can be used to input various project information into THE BIM software to form a three-dimensional model. Through the observation of this model, the designer can effectively find the defects in various design schemes, so as to carry out more targeted rectification work. In the actual engineering project, contains many contents, various systems in the architectural design for easy to conflict, the use of BIM technology of images simulation function, can be more intuitive analysis of various systems, including water and electricity, vac, fire protection, and other system, each system designers can realize qualified sharing real-time information transmission, through the design of the same building model, can effectively avoid the conflicts existing in the design of a variety of systems, the rationality of the design plan will get obvious improvement [5]. This DATA model based on BIM technology can be transmitted at any time, and every professional designer can open the program to design it at any time.

### 3.3 Build a Professional Team and Optimize the Organizational Structure

Management of the construction company needs to have a professional management personnel to complete the construction work, construction process, so in the current whole need to reasonable development of related management work, to the greatest extent to meet the demand of the current overall management, comprehensive and effective complete relevant management measures, at the same time in the management of the whole process needs comprehensive building management, through to the relevant construction the most professional team, carefully selected for each management personnel management work to ensure smoothly, related training for the related personnel, ensure the actual effect of the construction work to improve the overall quality of the relevant personnel, to complete the relevant management work to the maximum extent [6].

### 3.4 Coordinate Construction Management through Bim Technology

In the construction site, it is difficult for managers to make scientific management decisions regarding human resource allocation, operation connection, material selection and other operations. To solve this problem, construction units can use BIM technology to assist construction management. For example, in high-rise buildings, it is difficult to accurately determine the degree of solidification of concrete, and ineffective preparation will increase management costs [5]. With the help of BIM technology and weather forecast information, the construction unit can synchronously input the beam-column thickness, concrete data, temperature data and humidity data into the computer. With the help of the calculation program, the concreting degree and strength will be accurately predicted, and the preparation work can be more reasonable.

In electrical construction, construction units can refer to the overall construction information design operation process, so as to obtain more efficient construction planning. For example, the overall project schedule is restored according to BIM technology [4]. The electrical construction unit can complete the pipeline laying and cable laying simultaneously. In order to prevent cable loss, the construction unit can connect the line joint in advance and appoint a special person to patrol and manage. Through such measures, the rationality of electrical construction will be improved. Moreover, BIM technology can also be applied to construction site management. Construction site management mainly includes personnel allocation, material transfer, equipment use and building generation. Before the construction starts, the construction unit may input all elements into THE BIM 3D graphics. In the figure, the cooperation and coordination of various elements will be scientifically designed, and possible problems in the construction will be prevented in advance. In a word, BIM technology can simulate the construction site and operation [6]. By using this technology, the construction unit can predict the challenges in the construction management in advance, and the construction management will be more reasonable according to the predicted results.

### 3.5 Operation and Maintenance Stage

In contemporary housing construction, there are many functions, especially in the intelligent building, but also reflects the style of modern architecture. The realization of these functions requires reasonable operation and maintenance management so that people can better enjoy various practical functions of housing construction [7]. In this stage, can use BIM database, construction monitoring and analysis on the whole, if the system fails, can immediately determine the fault location and the staff can immediately to the scene, rule out the fault in time, ensure the normal operation of housing construction in the system can maintain the status, give people would create a high-quality living environment.

### 3.6 Optimize Building Quality Management

Relevant data survey shows that the traditional management mode still occupies an important position in the quality management of construction projects, and the current unitary management mode often reflects a certain lag behind, unable to meet the development needs of the current construction industry [7]. However, the application of BIM technology in the construction management stage makes up for the deficiencies of the traditional management mode. The specific content is mainly reflected in the following aspects: First, when construction enterprises carry out actual construction, the selected technical specifications shall be compiled according to the reasonable work of BIM technology. Secondly, in the construction process, many building models are often involved. In the specific implementation process, BIM model can be used to effectively control, and the collision detection of BIM model can be used to find out some unsafe factors and unreasonable conditions in the entire construction process [7].

## 4. Summary

To sum up, engineering project management is a very important work, which covers all aspects of the project. The realization of scientific construction project management is of great significance for enterprises and even for the entire construction industry. By combining BIM technology with complex project management, the scientific management of complex system can be effectively realized, and the optimization of various resources can be realized. On the premise of ensuring the quality of engineering projects, the profits of enterprises can be improved. Meanwhile, the investment time of enterprises in engineering projects can be reduced to achieve comprehensive improvement.

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