

BIM Technology and its Present Situation

Jingxu LU

School of Material Science and Engineering, Chongqing Jiaotong University, Chongqing 400074, China

Abstract: Under the rapid development of economy, China's construction industry has undergone tremendous changes. In the field of engineering construction, BIM technology is undoubtedly the biggest craze. China's BIM technology started later than it did in Europe and the United States, the popularity of the concept of BIM technology also requires great efforts. So in this case, a full understanding of BIM technology, and recognize its application is particularly important. This paper introduces the concept of BIM and its development history, and explores the application status of BIM technology, which can be a reference for the study of BIM technology.

Keywords: BIM; Development; Application

1. Introduction

With the development of modern social economy, the construction scale is becoming increasingly large, many modern construction project with many participants requires large investment, the entire project contains massive construction information and management has become complicated. Therefore, the information of traditional project management mode cannot be communicated in a timely manner and often convey errors, disputes, claims also caused too many to count, large construction projects have been difficult to manage, BIM technology, which came into being. With computer and network information, BIM technology uses three-dimensional information on the work platform for multi integration transmission, provides advanced technology platform, can be the perfect solution to the current engineering field especially in large construction projects with disadvantages of decentralized management, fragmentation and so on which is difficult to coordinate.

2. Introduction of BIM Technology

2.1. Definition of BIM

BIM is building information model / building information modeling[1], BIM technology can simulate all the real information construction by computer information technology, not only the geometrical aspects of visual information of construction projects, more is the inclusion of material, technology, cost, chat, personnel and other important engineering non geometric information, digital on the performance of the construction project construction information. In the whole project construction period, BIM act as the information resources sharing center, each participating party can obtain the required information in it, and it can modify and update information, timely communicate to the demander[2]. BIM technology virtually construct the construction project by

computer simulation, and defects can be found in advance in the actual construction process to make adjustment on the need to modify and change places, to avoid a lot of time and economic loss in the process of construction.

2.2. The Origin of BIM Technology

On the origin of BIM, is widely accepted that Professor Carnegie of the University of Chuck Eastman Professor proposed "Building Description System"[3] in 1975. He is the first one who proposed that the information technology can be used to edit and manage the different architectural attributes. In the 80s of last century, Graphisoft company launched ArchiCAD software, VBM (Virtual Building Model), that is, the concept of virtual building model, carried out a preliminary study of BIM technology[4]. 2002, Jerry Laiserin did a detailed analysis and comparison about BIM and CAD, held that BIM is a product of the trend of the times. The term BIM was created after Autodesk acquired RTC in February 2002. And in the second half of 2002, Phil G. Bernstein proposed to the International Association of Architects (UIA) the word BIM for the first time, marking the BIM research into a hot stage.

At present, BIM is defined by the American National Institute of Standards and Technology as: BIM uses three-dimensional digital technology, and creates a model for a wide range of relevant information for integrated construction projects. BIM will be digital processing of the construction project of the facilities and functional characteristics[5]. At present China directly using BIM as the name, not on its translation. Although each country has not yet reached a unified organization and definition of BIM, but the BIM work as the role of architectural model and modeling is generally accepted, basically that BIM is a digital model of construction project geometry and non geometry information, and the model in the

whole process of construction project cycle of project decision-making plays the main role.

2.3. The Characteristics of BIM Technology

By creating contains the complete project information model, BIM technology can conduct a comprehensive and detailed description of the project construction, the participation of all parties will be linked on one platform, realizing that sharing and transferring information resources seamlessly.

I Real Time Editing Display

BIM technology includes the traditional two-dimensional plane expression information, three-dimensional display of information and a large number of non geometric information, which is a complete set of information, there is a high degree of correlation. If the BIM model is modified and edited, the information of the processed places will be updated in real time, which can reflect the latest information. In this way, the workload of the design changes is greatly reduced, and the work efficiency is improved greatly.

I Common Working Platform

In the whole cycle of construction project, the participation of all parties obtain and update the required data in the same model. Modifying data in the model can automatically update the data in the parties, so that the information conveyed to the fastest speed, to achieve interoperability of network communication. The participation of all parties through mutual exchange platform can quickly find all kinds of conflicts, such as space conflict, conflict of material procurement schedule, personnel arrangement conflict and so on, and allow the parties to communicate better, solve the contradiction.[6]

I Information Contained Completely

BIM technology includes not only the construction project of the 3D model information, 2D traditional drawing information, but also contains a complete description of the construction of information, such as the 4D, 5D and nD functions of construction management process. 4D is given construction schedule information on the basis of the 3D model, by considering the construction time of the project, the preparation of a reasonable construction schedule, the best way to coordinate the construction of all parties. 5D is based on the increase in the model of false information, real-time and accurate control of construction projects. ND is to extend the BIM model to a variety of performance levels, integrated schedule, cost, energy, quality and other aspects of information.[7]

3. Current Status of BIM Technology

BIM technology originated in the United States, other countries are also advancing this technology. 2003, the United States General Services Administration (GSA) launched the U.S. National 3D-4D-BIM program, and

then released a series of BIM related guidelines[8]. By the end of 2008, BSA has Industry Foundation Classes (IFC) standard, NBIMS, United States National CAD Standard and Journal of Building Information Modeling magazine (JBIM) and a series of standard application.

Up to now, many construction projects in the United States have begun to use BIM. McGraw Hill[9] research report released in 2012 showed that the proportion of BIM in the engineering construction industry in 2012 reached 71%. The British government in 2011 issued a government building strategy file :Government Construction Strategy[10], the mandatory use of BIM technology. The document clearly requires that by 2016, the government called for a comprehensive coordination of BIM, and will all documents to information management. Many countries in the world have developed BIM technology as an important strategic deployment, implementation of various systems to encourage the use of BIM technology, and take the initiative to implement clear many obstacles, the scope of application of BIM technology has been very widely. In Europe and the United States, the number of projects using BIM has exceeded traditional projects.

China introduced BIM technology in 2003. In 2010, Tsinghua University proposed a framework for building information model (CBIMS)[11]. 2012 Ministry of housing issued on the issuance of the engineering construction standards in 2012 to develop a revised plan notice announced the establishment of China's BIM standard work. BIM at this stage of the application is mainly in the design of the company, the construction unit, consulting unit BIM also began to get involved. But the government, universities and related industries hold more and more weight to its application, has carried out a variety of exchanges, forums, technical training, etc., it has become a boom.

China also has many large projects successfully applied BIM technology and achieved good results, such as BIM project management information system in the International Financial Center in Shanghai, the National Swimming Center adopts the construction technology of BIM software, the Shanghai World Expo most of the venues used BIM technology, the Beijing Municipal Service Center adopted BIM project management. After the development in recent years, the application of BIM in China has made some progress.

China's construction industry information development report (2014) - BIM application and development in 2014 reflects the latest situation of BIM application in China. A total of 223 samples were collected and distributed in East China (51.8%), North China (20.6%), central China (12.1%), Southwest (8.6%), and Southern China (6.9%), a total of 16 provinces and cities. The vast majority of research companies are construction units, part of the cost consulting unit and BIM consulting firm. Overall, the

current BIM application has been transited from the design stage to the construction phase, but the depth and level of application is far from enough. The BIM application in the construction stage is still in the exploratory stage, and the application of BIM is not too much. At the same time, the majority of construction enterprises on the value of BIM to be fully affirmed, but in the affirmative, while the majority of enterprises in wait-and-see, failed to invest enough funds to promote the application of BIM.

4. Recommendations of Promoting BIM Technology

As the basic technology of the next generation computer aided design, the importance of BIM technology is beyond doubt. As the largest country in the world, it is necessary to promote the application of BIM technology. However, the application of BIM technology is not as good as the previous CAD, the reason is that it is not only a tool to replace the drawing, BIM change is the design concept and thinking.

I BIM Standard.

BIM technology will promote global integration and the way of information exchange, the government and the whole construction industry should actively participate in establishing the BIM standards, improve the system, mechanism, construction industry norms. At the same time, in practice, BIM technology application process, not only need to formulate technical standard such as IFC standard, the need to develop a standard application of high level, such as the 3D building design standards, construction application and management standard, so as to better meet the needs of BIM technology.

I BIM Application Software.

European construction industry has the widespread use of Autodesk Revit series, Benetly Building series and Graphisoft ArchiCAD, and China local software development based on BIM technology is still in the primary stage of development, the BIM technology related software such as geometric design software, BIM interface for modeling software, visualization software, model checking software and management software basically a blank. Some China domestic research institutions and scholars on the research and development of BIM software to a certain extent, promote the development of China's independent intellectual property rights BIM software, but did not fundamentally solve the problem. Therefore, a comprehensive and systematic research and development of a set of BIM series of software without delay, the entire BIM technology participants to work together.

I BIM Application Talents.

If enterprises want to make good use of BIM technology, it is necessary to establish BIM talent team, especially the BIM modeling and model maintenance team. BIM team leader like BIM technology manager is responsible

for the selection and training. BIM technical manager can help and support the implementation of the project, the application of BIM technology to provide BIM solutions for the project. If the person in charge of the project team couldn't understand application process of BIM technology or have correct judgment, they cannot come to perform an appropriate plan, prone to making mistakes, led directly to the company decision-making and project team of designers of BIM technology misunderstanding.

I BIM market awareness.

Not only to allow more government departments, owners, companies from their own point of view to promote the development of BIM technology, but also to create a win-win situation. At the same time, the government and industry should actively formulate or recommend new design and construction technical standards and project management standards for BIM technology. At present in the China market, software companies (including related software sales company) is concerned about the sales and market share, not keen on products with the actual project application and Follow-Up Services design company, is often isolated and helpless situation in practical application. Therefore, the need for professional consulting companies to provide BIM technical support and management services, their customers are owners and design units, and then for different projects, proposed BIM integration solutions.

5. Outlook

BIM technology is the current trend of construction industry, not only in the construction industry, in many areas of civil engineering are beginning to emerge. BIM technology will soon become the mainstream technology of the construction industry, but because of China's construction industry system is imperfect, making the relevant standards of BIM cannot be introduced. At present, the BIM technology is mainly used in the design, the construction unit has not been used for a variety of reasons, and BIM technology in the full cycle of the project construction can fully reflect its advantages and value.

References

- [1] Ji Boya, Qi Zhengqiang. "Research status of BIM Technology in China". *Research of Scientific Management*. 2015, (6) : 184-190
- [2] Chen Qian, Zhang Yuan. "BIM Technology And Its Application". *Value Engineering*. 2012(23):61-62
- [3] Ji Boya, Qi Zhenqiang, Jin Zhanyong. "Research on the Application of BIM Technology in Construction Operation Management -- Taking Beijing Olympic Games Olympic Village as An Example". *Journal of Beijing Institute of Civil Engineering and Architecture*. 2014(1):68-72
- [4] ATUL P, HEWAGE K N. "Building Information Modeling - Based Analysis to Minimize Waste Rate of Structural Reinforcement". *Journal of Construction Engineering and Management*. 2012 (9) : 943 - 954

-
- [5] National Institute of Standards and Technology . [2009-4-13]. <http://www.nist.gov>.
- [6] Zhang Jianping. "Construction Optimization and Dynamic Management Based on BIM and 4D Technology". China Construction Information. 2010(1):18-23
- [7] He Guanpei. BIM General. BeiJing:China Building Industry Press,2011
- [8] General Services Administration (GAS) 3D-4D BIM Program. [http : //www.gsa.gov/portal/ category/21062](http://www.gsa.gov/portal/category/21062).
- [9] Mc — Graw Hill , The Business Value of BIM in North America, 2012.
- [10] Government Construction Strategy, Cabinet Office [EB/OL]. <http://www.cabinetoffice.gov.uk/>.
- [11] He Lingtong. "Application Status of BIM in the World". Focus Information. 2013(3).12-19.