BIM and Its Effects on the Project Managers

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Abstracts: This paper introduces definitions and characteristics of building information model (BIM), and analyzes its effects on the lifecycle management of construction project with a typical case. Based on BIM, the paper also discusses the new requirements of the abilities and qualities of the project managers. It researches some of the new demands required by BIM in new situations and finally it has drawn the conclusion.
Keywords: Building information model; Project management; Information

1 Introduction

BIM(Building information model) is widely applied and gets good achievements in the field of construction. It influents the management of construction project in many aspects and raises some new requirements of cultivating and training abilities for the project managers. This issue has already attracted some academics' attention to do some research, but now most of them focused on the design field. Through analyzing definitions and characteristics of BIM, this paper discusses and studies some effects on the project managers brought by it with a typical case.

The concept of building information model rising in the 1970s, it produced by accompanying with information technology using in the construction. Due to long time of the development, the concept of the presenter understood from several aspects related to this question. Therefore, it often appeared in different names, such as Single Building Model/SBM, Integrated Building Model/IBM, Generic Building Model/GBM or Virtual Building Model/VBM, Graph soft, etc. and had many concepts of building information model, for instance, AIA said that building information model is a kind of information model with project information database based on the model of the associated technology; AGC considered that building information model is a tool of object-oriented building development, which used 5D modeling concept, information technology and software to realize mutual operability of construction project design, operation, maintenance, and realized the communication of information. NIBS-Facility Information Council defined that an open industrial standards in the physical and function of facilities and characteristics of the project life cycle of information in the form of computation, to realize the better value of the project.

Summarizing related materials, building information model can be considered to have the following characteristics: the information contained in BIM involving the whole project life cycle; provide with supports for the collaborative construction project; involving information can be calculated, emphasize the digitized information completely; defined by parameter the interaction of the building component consists; the 2D / 3D real-time parameter display/and editor; complete the way of graphical data report. [1]

2 The Typical Case on BIM in Project Implementation

2.1 Introducing the case [2]

The project is the Hilton Garden Hotel, which lies in aquarium, Atlanta. It covers 484000ft^2 and costs $46,000,000, including a fourteen-floor hotel and a twelve-floor underground parking lot. In order to strengthen collaboration of the project team and reduce costs, general contractor Holder applied BIM into project management in the process of implementation.

2.1.1 Establishment of BIM and Ways of Sharing Information

At an early stage of design, general contractor uses varieties of 2D drawings (paper and electronic document) from architects, structure engineers and subcontractors, and adopts Graphisoft and ArchiCAD to design 3D building, structure and MEP model, including the general information of building, structure, facilities and interior decoration, etc. In this way, the team members can work effectively with traditional CAD software and it also reduces the risks of sharing information among different parties with 2D files. For those parties without BIMI, they are able to get Navisworks software to use visual model on the Internet for free.

2.1.2 Application and Management of BIM

The project team can quickly find and solve problems in systems with BIM. In the process of

project design and implement, about 590 mistakes are found and solved. For example, at an early stage of design, with BIM, the team finds many problems in the structure of facility pipeline and then they quickly solved them.

3D BIM provides a platform for parties to communicate. It is good for communicating and making decisions more easily for all parties through 3D coordinative meeting. Using various software tools, all members in the team can conveniently look and go through the model. They can get a better understanding of designs and achieve better results in building.

In the virtual site built with BIM, all members and logistics organizations are arranged coordinately before starting to work. It ensures that the project is implemented smoothly.

When the project is completed, general contractor hands over BIM to the owner, which reflected the projects achievements, to operate and maintain the project.

2.2 Costs and Profits of Application of BIM

2.2.1 Costs of BIM

The total cost of building and maintenance of BIM is $90,000(take up about 0.2% in project budget), and $40,000 is paid by the owner.

2.2.2 Profits of BIM

With BIM, the project team can find about 590 potential conflicts in advance. Therefore, about $600,000 additional expenditure can be saved, and at the same time, about one month's delay (1143h) can be avoided.

In the process of the project, all parties communicate with each other on the basis of BIM. After completing the project, all parties can find advantages of application of BIM and be familiar with its process so that they can cooperate with each other in the future.

Due to the success in the application of BIM, the project rewards BITS in 2007 granted by AGC.

3 Effects of BIM on Project Management

Some problems in the traditional management model and technology can be solved if the management of the implementation process of the construction entities with BIM can be carried out, and some fundamental changes, such as, delivery outlets, accumulating ways, etc. will be achieved. It can be shown in figure 1. [2]

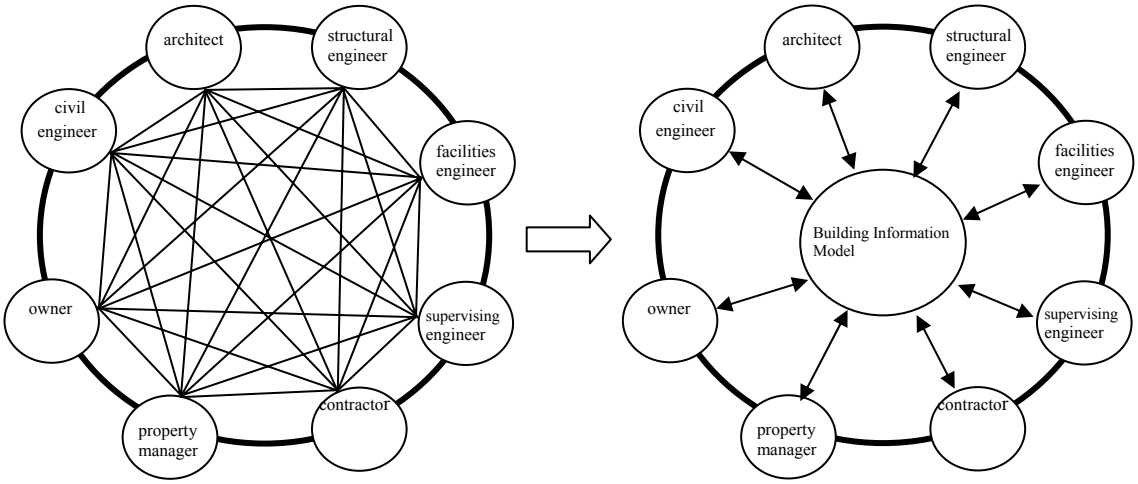

Figure 1 The Transition of Information Sources

Due to these changes, BIM makes new requirements for the project managers in abilities, qualities, etc. and has a far-reaching impact on all aspects of cultivating project management talents [3-4] as following:

It requires the project managers to set up the BIM-centered concept of information communication and know convenience and profits of project management brought by BIM. In the information communication of new projects (figure 1), BIM is the core and all delivery and communication of information is based on it. Under this situation, the project managers should set up the BIM-centered concept of information communication. The concept should contain two levels at least: Firstly, make

clear the functions of BIM; Secondly, be able to tell the differences and associations between BIM and traditional 3D model in order to make it effective. Meanwhile, the project manager should fully understand the benefits brought by BIM so as to function it well.

According to the standpoints of AGC, the effects of BIM on project management are as following: finding conflicts (such as the structure of pipeline, etc.), setting up visual model, judging the construction sit condition more reliably and protesting it with higher quality and less creative chances. What's more, it helps the managers to prepare more schemes, such as, different construction order, logistics organization, crane's location and costs, etc. It also helps non-professional members to see visual final products, so the number of re-examining and the costs of project guaranteeing are reduced [5]. Therefore, it is easy to find that the effects of BIM on project management are in all fields so that the project managers should recognize it.

Having good command of tools and technologies related to BIM. Because BIM becomes the core and basis of information communication, so the project managers should not only have a good command of BIM tools, but also fully understand some technologies related to project management. At the present, solutions of BIM are Autodesk's Revit, Bentley's MicroStation TriForma and Graphsoft's ArchiCAD, etc. These varied solutions are widely used in construction and they can be worked as a basis to guiding some managerial jobs and building models applied in management work, though they are mainly adopted to build construction, structure and MEP models and have some differences between models of the project management. In addition, some products can be used to build models that applied in the process of construction, etc. For example, some construction software like Autodesk's Naviswork, Garphisoft's Constructor are better adopted in the project management. In the case mentioned above, Naviswork is served as a basic tool for all parties in the project.

Fully understand some problems caused by BIM. The application of BIM has changed the project management work and procedures and the ways of communication for parties. Hence, the project manager should fully understand some problems caused by BIM. For instance, how to add items related to BIM in a contract? How to deal with some risks caused by it? How to get rid of the costs? And how to cope with some changes of the team structure? etc. Due to these complicated problems, on one hand, some research is needed to solve these problems; On the other hand, the project managers should keep a clear head when meeting with these problems. When they make full use of BIM, some potential risks should be concerned.

4 Conclusion

BIM is the new achievement when IT technology is used in construction field. It has a profound influence on construction. The paper mainly discusses the effects of BIM on information of the project management. And with the development of theory and technology of BIM, it will have a gigantic effect. As a project manager, it will push the project management forward in the future as long as he/she has a good command of theory and technology.

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