Chapter 2
A Review of Building Information Modeling Tools from an Architectural Design Perspective

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ABSTRACT

Building Information Modeling (BIM) continues to evolve and grow along with its respective application in practice. One of the key advantages of BIM is that it facilitates the development of detailed information and analysis much earlier in the building process to improve decision making and reduce downstream changes. This chapter provides a review on the BIM tools from an Architectural Design Perspective.

1 INTRODUCTION

The developments in computers and communication systems accelerated providing the most intensive computer services in architecture, systems offer great opportunities in terms of design and drawing in order to increase productivity and quality in design. The transfer of the complicated studies to paper in any desired scale, is an advantage that can only be obtained by using computers. Thanks to its features, IT provides more productivity, better quality and more economical design by facilitating studies that cannot be realized by using traditional methods. The use of Building Information Modeling on projects allows the information to be pushed upstream in the design development. The added details allows planners, designers and builders to better coordinate information amongst the multiple parties involved in the process of developing and executing construction projects. However, the challenge lies in bringing these knowledge bases together and carrying information from one stage to the next. The building industry is intrinsically fragmented and is often polluted with duplication of efforts that do not add value to the end product.

The utilization of every Building Information Modeling option available is not always the right application for every project or its respective stages. Organizational changes required in the utilization of BIM also provide hurdles in opposition to the successful utilization of Building Information Modeling tools. The use of Building Information Modeling

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also provides the increased opportunity for owners, designers and builders to collaboratively coordinate the overall supply chain of the building process which is a key element in optimizing its value stream (Manning and Messner, 2008).

2 BUILDING INFORMATION MODELING

Building Information Modeling (BIM) systems is the latest generation of Object-Oriented CAD systems in which all of the intelligent building objects that combine to make up a building design can coexist in a single 'project database' or 'virtual building' that captures everything known about the building. A Building Information Model provides a single, logical, consistent source for all information associated with the building.

A Building Information Model is a digital representation of the physical and functional characteristics of a facility. As such it serves as a shared knowledge resource for information about a facility forming a reliable basis for decisions during its lifecycle from inception onwards (Smith, 2007).

The concept of Building Information Modeling is to build a building virtually, prior to building it physically, in order to work out problems, and simulate and analyze potential impacts. The heart of Building Information Modeling is an authoritative building information model.

The reality is that all information for a building already exists electronically is the catalyst which makes implementing BIM a possibility. Therefore the challenge should be to pull all the information together for the specific building being developed. The creation of a building information model begins with the first thoughts of the project. From that point forward the model is used as the authoritative source for information about the building. When completed the model will be delivered to the operator and sustainer of the facility and any modifications or improvements will be recorded in the model. The model is the authoritative source and it will be used to plan and execute changes throughout the life of the facility (Smith, 2007). BIM includes continuous collection of data and building of knowledge at various stages of the building life cycle.

Building Information Modeling (BIM) refers to the creation and coordinated use of a collection of digital information about a building project. The information can include cost, schedule, fabrication, maintenance, energy, and 3D models which are used for design decision-making, production of high-quality construction documents, predicting performance, cost estimating, and construction planning, and eventually, for managing and operating the facility (FMI Research Report, 2007).

Building Information Modeling (BIM) is an innovative method to seamlessly bridge communication within the architecture, engineering and construction industries which is the power of BIM. With Building Information Modeling, architects and engineers efficiently generate and exchange information, create digital representations of all stages of the building process, and simulate real-world performance-streamlining workflow, increasing productivity and improving quality (Autodesk, Inc. Website, 2008). These are some descriptions of Building Information Modeling from different groups (Eastman, 2007):

- A computable representation of the physical and functional characteristics of a facility and its related project/life-cycle information using open industry standards to inform business decision making for realizing better value (NIBS - Facility Information Council)
- Information use, reuse, and exchange with integrated 3D-2D model-based technology, of which electronic documents are just a single component (AIA, 2008). A single repository including both graphical documents - drawings - and non-graphical documents - specification, schedules, and other data (ArchiCAD)