Chapter 6
Towards City Information Modeling:
A Multidisciplinary Platform for Urban Planners

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ABSTRACT

In the past two decades, building information modeling (BIM) has been widely adopted by architectural, engineering, and construction firms. Its technology is based on the integration and coordination of different disciplines and professions. It involves creating three-dimensional models containing data that can be organized and manipulated to serve design, construction, and operational phases. This raises the debate over how the existence of a platform that enables urban planners and decision makers of different disciplines is so crucial. Several research studies have recently been done to integrate BIM with geographic information systems (GIS) for numerous purposes, as illustrated by several case studies. This chapter comparatively analyzes different cases, given general acknowledgment of each. Problems and potentials of the existence of such integration will be defined, in order to estimate the need for such a platform. Finally, a model of integration between different disciplines was illustrated as a motivation for further studies in the future concerning this topic.

INTRODUCTION

Different firms are experiencing dynamic changes due to technological developments that introduce a frequently high amount of software, making wider controllability and manageability for different disciplinary (Fosu, 2015). As the industry rises, there is more need to stabilize the relationship between people and process (Isikdag & Zlatanova, 2009a). Lately, new technology was introduced to the archi-

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tecture, engineer and construction industry, named Building Information Modeling BIM. The reason behind its widespread is the need for a platform or software that is specifically developed to coordinate and integrate the different electrical, mechanical, plumbing, and structural designs with the architectural model, giving a chance for the coordinator to track fatal faults that are hard to appear in 2D construction documents. This rapid expansion was a reason that it was yet possible to see a complete integrated model that has all construction details, drawings, and tables, including the work of all people in various disciplines, decreasing the risks due to lack of coordination and its related costs.

Geographic Information System (GIS) is software that is widely used by urban planners, due to its ability to present, analyze, and model spatial data. The software's main, reliable features of interest to GIS developers is its integration of planning models, visualization, and the Internet (Fosu, 2015). GIS obtains detailed spatial data indicated for a certain defined location or area defined by a border. Recently, there have been many attempts to integrate BIM software (and the amount of building information that it carries) with GIS software (and spatial characteristics that can provide environmental spatial information).

Ever since urban planning as a discipline has generally agreed on the need to propose courses of action based on massive data stores collected from different disciplines and professions. Such actions mainly aim to fulfill public interests throughout evidence-based analysis. These sets of actions are responsible for reshaping and reimaging communities' lives in a spatial scale and are immediately reflected in terms of their built environment (Altshuler, 1965). In this chapter, we introduce different approaches illustrated with case studies, each done for its own purpose and using its own method of integration. A comparative analysis of such approaches is achieved; and a new model is extracted from all previous models. This could be the motivation for developers to develop such a coordinated and integrated model of City Information Modeling Technology for the use of urban planners, urban designers, regional developers, and other stakeholders.

BACKGROUND

Building Information Modeling (BIM)

BIM is a multidisciplinary technology introduced to the world through a range of computer software options. Its aim is that of providing an integrated and coordinated 3D visual model of a building, its site, and geographical information. It facilitates the manageability of project phasing from a project's conceptualization through to its implementation and future development (Azhar, Khalfan, & Maqsood, 2012). It provides the ability to provide detailed construction documentation, coordination plans, and a phasing management plan (Arayici, 2008). BIM models are generally considered to be very rich with model information which it carries at the building scale, as it includes a number of elements (windows, doors, beams, columns, etc.), and their materials (area, volume, etc.). Such data can be used in cost estimation, in construction sequences, in forensic analysis (Azhar, 2011), and even (in the case of highly detailed models) in some analytical techniques relative to the assessment of energy consumption.

The concept of BIM arises firstly from its ability to save time for the architects using it. Unlike 2D software, BIM has the ability to conduct 2D construction drawings (elevations, sections, and plans; etc.) from a 3D model; and unlike similar 3D software, it provides detailed drawings. When architects are dealing with BIM software, the elements are identified regarding their discipline, where commands are defined at the very beginning by the developers as architectural elements. Walls, windows, and doors,