Chapter 6
Building Information Modeling and Professional Practice

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ABSTRACT

The practice of architecture is changing rapidly due to an influx of new technical, procedural, and organizational innovations in the building delivery process. Building Information Modeling (BIM) is a key technical component of this evolution in practice, encompassing newly available modeling, fabrication, and communications technologies. BIM represents a key enabler of other innovations, by creating value and incentives for rethinking aspects of conventional practice, from contractual roles and responsibilities to the format and content of project information.

INTRODUCTION

In this chapter we consider the general trends of computational applications to design from the specific vantage of practice – the methods, activities, and conventions beyond the designer or engineer’s office and outward to the collaborative enterprise of realizing built projects. These are the core considerations of Building Information Modeling (BIM) – a set of advances, founded on technological developments but broadly pointing to new ways of working. BIM is specifically concerned with the activities of documenting and communicating aspects of the design throughout the processes of project execution. These include the development of building permit and contract documents, engineering solutions, instructions for fabrication and placement of components in the field, and a host of other activities.

BIM is about tools, but more significantly about how building projects are developed and the role of information in these activities. Rather than consider the topic from the emergence of specific tools sets, it is perhaps more appropriate to consider the topic from the vantage of activities – how new tools enable new ways of working, what tools must be developed to allow alternative means of production, and how production and technology are likely to evolve given advances in both.

The term Building Information Modeling itself covers a broad territory of inter related advances and as such is somewhat ambiguous, referring to both the tools themselves as well as the overall processes, and new techniques in conjunction with...
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existing methods. Over the many overlapping attempts to define BIM, the most succinct may be the best. The AIA contract documents state:

“A Building Information Model … is a digital representation of the physical and functional characteristics of the Project … which term may be used … to describe a Model element, a single Model or multiple Models used in the aggregate. “Building Information Modeling” means the process and technology used to create the Model” (AIA, 2008).

Building information Modeling is, roughly, the tools through which project documents are developed and the collaborative processes by which this documentation is developed and used. It is specifically applied when we consider project descriptions and delivery processes centered on three dimensional, information rich models of project geometry and systems. But by nature of the data driven approach to developing such information, the term potentially encompasses not only the three dimensional artifacts directly developed through BIM processes, but also by implication all other data that can be derived from or linked to 3D.

BIM’s impact on the profession of architecture assumes the level of significance that it does, in part because of the fundamental layer at which its impacts occur. Because BIM impacts the substrate of architectural communications – the graphical and geometric structures of instruments of service - its implications are broadly felt across architectural work and the overall building enterprise. These impacts are profound due to the subtle and myriad ways in which the conventions of practice are interwoven with those of two dimensional project descriptions, and the ways in which practice must retool to support fundamentally new descriptive techniques.

In “pre-bim” practice, many aspects of 3D and even information intelligent models and drawings exist. 3D software has been used for rendering and animation for over twenty years, while three dimensional models have been used for analyzing the performance of structural systems for a similar time period. Two dimensional CAD systems have, for over two decades, supported the ability to develop drawing symbols with attributes that can appear on a plan and also be extracted to tabular schedules (for example doors and windows, room names and sizes, etc). By in large, however, design information is communicated through disaggregated two dimensional drawings, and it has been up to the diligence and intelligence of designers to maintain the coordinated view between different drawings and other documents. This process of red lining and quality control – a process of immense intellectual labor on even the simplest projects – is one of the areas of practice that BIM most substantially impacts. The state of BIM in practice is still a long way away from what is believed to be promised – a unified view of the project and all its descriptions and uses. But simple and profoundly beneficial utility is available through current BIM capabilities for automating the coordination of information across different subsets of the project description. Drawings – still a foundation of much of inter-and intra firm communication – can largely be generated from the 3D model. Automated annotation is largely available and used, as is the ability to selectively render objects on a given drawing and affect the linework associated with different building systems. Additional effort is required to create the initial project model versus developing a two dimensional drawing set, but the efficiency benefits over time – in updating drawings and quality controlling – already outweigh the costs.

The second fundamental characteristic of BIM of great impact on project delivery is that BIM takes formerly static drawing information and makes it operative. Traditionally, project documents are developed to convey specific information content within a specific context and with stated or implied limitations of use. As project descriptions become increasingly operative—where design descriptions have the capacity to impact project decisions far beyond the specific intent under which they