

# Chapter 23

## Building Information Modeling in the Australian Architecture Engineering and Construction Industry

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### **ABSTRACT**

*Building Information Modeling (BIM) is a modern approach to the design, documentation, delivery, and life cycle management of buildings through the use of project information databases coupled with object-based parametric modeling. BIM has the potential to revolutionize the Architecture, Engineering and Construction (AEC) industry in terms of the positive impact it may have on information flows, working relationships between project participants from different disciplines and the resulting benefits it may achieve through improvements to conventional methods. This chapter reviews the development of BIM, the extent to which BIM has been implemented in Australia, and the factors which have affected the up-take of BIM. More specifically, the objectives of this chapter are to investigate the adoption of BIM in the Australian AEC industry and factors that contribute towards the uptake (or non uptake) of BIM. These objectives are met by a review of the related literature in the first instance, followed by the presentation of the results of a 2007 postal questionnaire survey and telephone interviews of a random sample of professionals in the Australian AEC industry. The responses suggest that less than 25 percent of the sample had been involved in BIM – rather less than might be expected from reading the literature.*

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*Also, of those who have been involved with BIM, there has been very little interdisciplinary collaboration. The main barriers impeding the implementation of BIM widely across the Australian AEC industry are also identified. These were found to be primarily a lack of BIM expertise, lack of awareness and resistance to change. The benefits experienced as a result of using BIM are also discussed. These include improved design consistency, better coordination, cost savings, higher quality work, greater productivity and increased speed of delivery. In terms of conclusion, some suggestions are made concerning the underlying practical reasons for the slow up-take of BIM and the successes for those early adopters. Prospects for future improvement are discussed and proposals are also made for a large scale world-wide comparative study covering industry-wide participants.*

## **1 INTRODUCTION**

Every technological advance brings potential benefits and risk (UNDP 2001). One such technological advance that has the potential to have major impact on the Architecture, Engineering and Construction (AEC) industry is Building Information Modeling (BIM). The concept of BIM is relatively simple yet revolutionary as its success requires a whole new approach to the design and documentation of buildings (Thomson & Miner 2006). Its emergence presents a paradigm change in the industry.

The concept of BIM was first developed in the 1970s with the advent of computer aided drafting (CAD). It has since been the basis for much research. In particular, recent advances in technology have made the realization of the concept possible through more powerful computer hardware and software.

BIM has evolved from the concept of object-based CAD which has the ability to store information for each of the objects in the model. The entity-based CAD that has been widely used throughout the industry, predominantly for drafting purposes, can produce a 3D model through the projection of lines and arcs; but this is where its capabilities end and typically limit the user to drafting purposes. For example, object-based CAD, in which objects such as doors, windows, stairs, walls, etc. which can also be represented in three dimensions, has the ability to store non-graphical information relating to the objects including specifications and design constraints. This information is stored in a logical sense and becomes the basis for the

building information model. Thus, BIM involves the integration of all the building information in a central repository. Each object is described only once and a change of one object is reflected in all views of the model which reduces the associated potential for inconsistent design documentation and the associated difficulties and costs. A Building Information Model is not merely a 3D graphic representation of design intent; rather, it is a comprehensive information management tool based on the simulation of design and construction (Campbell 2007). BIM has its roots in Computer-Aided Design (CAD) development from decades ago, yet it still has no single, widely-accepted definition in the AEC industry.

The objectives of this research are to:

- review the development of BIM;
- assess the extent to which the Australian AEC has already adopted BIM;
- determine whether the benefits achieved by the current users of BIM are consistent with the claims made by the promoters of BIM; and
- identify the factors that have inhibited the uptake of BIM.

## **2 BIM – A BRIEF LITERATURE REVIEW**

There has been a significant increase in the attention academics and industry professionals have directed towards Building Information Modeling

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