Structuring the Business Case for Building Information Models

Thomas Froese, Guillermo Aranda-Mena, Agustin Chevez, John Crawford

This article was originally presented at the:

Congrès annuel 2008 de la SCGC / CSCE 2008 Annual Conference

Québec, QC

10 au 13 juin 2008 / June 10-13, 2008

https://csce.ca/en/publications/past-conferences/

Congrès annuel 2008 de la SCGC
CSCE 2008 Annual Conference

Québec, QC
10 au 13 juin 2008 / *June 10-13, 2008*

Structuring the Business Case for Building Information Models

Thomas Froese[1], Guillermo Aranda-Mena[2], Agustin Chevez[2], John Crawford[2]
[1] Department of Civil Engineering, University of British Columbia, Vancouver, Canada
[2] School of Property, Construction and Project Management, RMIT University, Melbourne, Australia

Abstract: Building Information Model (BIM) technology has received much attention in research, commercial software, and industrial practice. Yet its use in practice represents only early adopters, as most potential users remain unaware, uncertain of its meaning, or unconvinced of its value. This research examined the business case for BIM adoption. It conducted several detailed case studies of projects that had adopted BIM, and developed a business case structure for analyzing the broad range of issues identified. This business case structure, described in this paper, derived from an initiative called Val IT, was further used to propose a tool that individual companies can use to develop business case analysis of their own BIM adoption opportunities.

1. Introduction

Perhaps the most significant development currently underway in information technology (IT) for the Architecture Engineering and Construction (AEC) and Facility Management (FM) industry sectors is the emergence of Building Information Modeling (BIM). BIM is "a digital representation of 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 life-cycle from inception onward." (Smith 2007). Proponents suggest that with BIM, "risk is reduced, design intent is maintained, quality control is streamlined, communication is clearer, and higher analytic tools are more accessible" (Davis 2003). BIM technologies have been increasing in commercial software and BIM practices are beginning to enter AEC practice[1]. But this BIM usage still represents only early adopters—it has yet to enter mainstream usage as most industry practitioners remain unaware of BIM, unclear about what it means, uncertain about how to do it, and unconvinced about the strategic business benefits of changing their current practices.

A research project was carried out to address these final issues of understanding the strategic business case for implementing BIM technologies. The project, entitled "Business Drivers for BIM" was sponsored by the Australian Cooperative Research Centre for Construction Innovation and was carried out by researchers from RMIT University, Queensland University of Technology, and the University of British Columbia (Aranda-Mena et al. 2008). The project was aimed at providing a better understanding of the business drivers and barriers to the adoption of Building Information Modelling (BIM) in the Architecture Engineering and Construction (AEC) and facility management (FM) industry sectors. The objectives of the project were to investigate the nature of economic, process and industry constraints to BIM adoption and then—if possible—to identify business strategies that may support adoption of BIM in AEC/FM industry.

[1] For example, all major CAD vendors in the AEC sector have BIM supporting applications, and a recent survey of AECBytes subscribers (Khemlani, 2007) showed that 12% of those respondents had used or evaluated BIM solutions (Kiviniemi et al. 2008, pp. 17 and 19).

The research collected data from five detailed case studies of projects that had implemented BIM technologies in varying degrees. Business leaders and users of BIM applications on the projects were interviewed and the results were analyzed to find evidence relating to the business case for BIM. One aspect of the research involved the development of an analysis framework to structure the business case investigations. This framework (based on a formal, standardized business case model called the Val IT Business Case, ITGI 2006a) was then used to structure a business case tool—a proposed approach that any company can use to help make strategic decisions about investing in BIM implementations by assembling their own specific business case. This paper describes this business case analysis framework and the proposed business case tool.

2. A Business Case Approach to Assessing IT Strategies

A company adopting BIM must consider and plan the move from many different perspectives: the technology perspective focusing on the specific IT systems to be implemented; the internal operations perspective focusing on changes to the company's work processes; the external operations perspective focusing on the interactions with markets and clients, with project collaborators (suppliers and users of information), with regulators; etc.

Preceding all of these, however, is the business strategy perspective: should a company implement BIM, and how does it decide? This issue can be framed as a situation in which the company has an opportunity to make an investment in an IT system—it must carry out a process of considering this investment opportunity and arriving at a strategic business decision as to whether or not to proceed. The implications extend beyond the IT system itself into a range of changed business practices that may be enabled by the system. At the heart of this process is a consideration of the potential benefits, costs, and risks of the investment in comparison with the alternatives (e.g., the status quo). This strategic decision-making process is complex and must consider a wide range of issues, therefore it will benefit from having a well-defined structure or framework.

Within this research project, the investigation of suitable approaches for strategic analysis found that the Val IT initiative provided a comprehensive and appropriate business case framework for evaluating IT investments. Val IT is an initiative from the IT Governance Institute intended to support organizations to maximize the value realized from IT investments (ITGI 2006a). Val IT is motivated by the recognition that IT systems have the potential to provide huge rewards to organizations, but that they often fail to do so. "The value can be realized only with the right governance and management processes and the full commitment and engagement from all management levels" (ibid, p. 7). Val IT's goals are to assist boards and executive management understand and carry out their roles with respect to IT investments. The focus is on the investment decision (are we doing the right things?) and the realisation of benefits (are we getting the benefits?). This complement's the IT Governance Institute's COBIT initiative which supports managers with an IT management framework that focuses on the execution (are we doing them the right way, and are we getting them done well?).

To meet these goals, Val IT provides a framework consisting of a set of IT investment governance processes, supported by associated guidance principles, management practises, and performance metrics. The processes are organized into three main groupings of value governance, portfolio management, and investment management. These processes are described in detail in the Val IT Framework document (ITGI 2006a), and they will not be discussed further in this paper. In carrying out these processes, the primary vehicle or document that records all of the facts, analysis, and decisions is the business case, which is described in the Val IT Business Case document (ITGI 2006b). Val IT provides a structure for business cases, and a description of the steps for developing the business case and carrying out the associated analysis. To apply the Val IT business case approach for a specific IT investment situation, users would follow the Val IT steps first to build up a set of facts organized according to the business case structure (the "Fact Sheet"), and then to carry out the business case analysis based upon these facts. As discussed in this paper, this research has drawn principally on the business case structure portions of the Val IT initiative.

3. Case Study Data Collection and Assessment

3.1. The Case Studies

The specific projects studied included a small, low-rise mixed-commercial development in inner Melbourne; a prominent high-rise commercial redevelopment in central Melbourne; an innovative large high-rise commercial/residential development in Hong Kong (involving a mix of local and international consultants); a medium-rise office redevelopment of an entire city block in central Sydney; and a characteristic government police and watch-house complex in rural Queensland. The stakeholders were mostly Australian designers, engineers and builders (with a mixture of small and large firms).

A detailed case study question protocol was developed and used to interview several participants from various companies involved in each of case studies. The resulting detailed case study reports present a wide range of issues and opinions regarding the BIM implementation experiences on each of the projects, and they constitute a major contribution of the research project (although they are not the focus of this paper). The entire body of results was then analyzed to assess the overall evidence and conclusions that could be drawn regarding the business drivers for BIM.

3.2. Development of the Theoretical Propositions

To begin the cumulative analysis, the researchers carefully reviewed each of the case studies and identified all of the significant issues raised by interviewees relating to the business case for BIM. These issues were then formulated as a series of theoretical propositions (TPs), i.e., statements expressing assertions regarding the adoption of BIM. An example of a TP is as follows: "TP01 - BIM requires a significant organizational re-structure." A total of 47 TPs were developed and organized according to the business case framework. Next, the detailed case study results were reviewed again and every comment made by an interviewee to either support or refute any TP was noted. These occurrences were tabulated to produce a relative "weight of evidence" score for and against each TP.

It is important to correctly interpret the meaning of these "weight of evidence" values. The case study methodology was not set up to provide a statistical data set, and thus the weight-of-evidence ratings produced from the analysis should not be construed to provide any statistically significant evidence about the relative importance or relative degree of agreement for each TP. Never-the-less, it was appropriate to make the connection that where an interviewee made a comment that agreed (or disagreed) with a TP, it provided evidence that, in the interviewee's opinion, the TP was (or was not) valid for that case study. If many different interviewees all made confirming statements about a TP, this was interpreted as providing a greater weight of evidence to claim that the TP was valid, whereas if very few interviewee's made confirming statements regarding a TP, then this was interpreted as providing relatively little evidence to support the validity of the TP. In this way, all of the TP's were given a rating indicating the relative weight of evidence provided by the case studies to confirm that the TP was valid. Statements for and against the TP were not averaged, but are listed separately, providing an indication of the uniformity of opinion regarding each TP. The weight of evidence ratings (as applied in this paper), were normalized such that the highest amount of evidence for any single TP (combined agreement and disagreement) was 1.0. For example, "TP01: BIM requires a significant organizational re-structure" received a rating of "Agree 0.2 / Disagree 0", meaning that there was a small amount of evidence from the case studies that this statement was true, and no evidence to the contrary.

3.3. Using the Results from the Combined Analysis

Initially, it was thought that the results of the case studies might provide evidence to support the creation of an overall business case to establish the "universal" case for or against the adoption of BIM. However, it was soon realized that this approach was infeasible. The business case is far too specific to the context

of the individual companies, the individual project, and the individual BIM technologies for a universal business case to be meaningful. For example, even if one holds a firm conviction that BIM technology represents the future for the AEC/FM industry, this does not imply that it would be a sound business decision for all AEC/FM firms to immediately switch their current technologies. The significance of the contextual (i.e., contingency) issues was borne out by the degree of variability of the opinions expressed across the five case studies. Furthermore, we were not able to develop a specific business case for each of the individual case study projects because, although we had access to a great deal of information and opinion regarding each project, there was a significant amount of critical business data that was not at our disposal.

However, it was found that the overall form of the analysis—the business case structure and most of the TP issues—did translate very well across all of the cases studies and, we believe, would apply equally well to any situation where a company was analyzing their own business case for adopting BIM. This finding led to the final form of the research outputs as follows:

1. A tool—consisting of the overall business case structure—that individual companies can use to organize the business case for their specific BIM implementation opportunities.
2. A set of high level assertions supported by the case studies (the TPs) which are widely relevant to any BIM implementation and which can inform individual companies when preparing their own business cases.
3. The detailed case study reports which provide extensive, detailed, context-specific information and opinion that can provide useful input to companies considering BIM implementations in very similar contexts.

4. Structuring the Business Case

4.1. The Business Case Fact Sheet

Val IT proposes an overall process for developing the business case that involves collecting and tabulating all critical information into a fact sheet, carrying out various analyses, concluding the final appraisal of the investment opportunity, documenting the case, and maintaining the case over time. The first step, developing the fact sheet, introduces the core structure that carries throughout the entire business case process, and it is our primary focus here. The structure, presented in this section, is largely as provided by Val IT, but we have modified and reorganized it slightly to suit the specific context of BIM implementation business cases.

A very wide range of information can be considered to feed into the business case which can be classified and decomposed in several different ways, yet it all needs to be captured in a single, linear document. To achieve this, we have organized a single breakdown structure composed of several levels arranged into a hierarchy. Each item at any level can be subdivided into the items at the next level, as appropriate (in many cases, however, the lower levels are only relevant to some of the higher-level items).

Level 1: Analysis Components

At the top level, the information is organized according to the main components that make up the overall flow of the analysis, as follows:

- Outcomes: The starting point for the business case is the definition of the goals or the outcomes that are expected to be achieved as a result of the BIM implementation opportunity.
- Initiatives: The analysis next drills down to the main action items (initiatives) that will be undertaken to achieve the defined outcomes. These include the business processes, people,

technologies, and organizational actions/projects associated with the BIM implementation. It may identify the contributions of each initiative to the individual outcomes (where appropriate).

- Alignment Issues: The analysis then addresses the interactions between the BIM implementation efforts and all of the related external business systems and procedures. This considers the degree to which the program aligns with existing (legacy) systems and practices, regulations, policies, and business strategies.
- Benefits: Next, the analysis considers the benefits of the BIM implementation opportunity. Val IT arranges the benefits into the categories of financial benefits and non-financial benefits. We found that many of the potential benefits had both financial and non-financial aspects, so we did not find these categories to be useful. On the other hand, the benefits associated with BIM did seem to cluster into a few primary categories, and we found it useful to decompose the analysis into these different types of benefits:
    - Efficiency Benefits: Improvements to the efficiency of designing and managing building projects.
    - Design Functionality Benefits: Issues that lead to better building designs.
    - Collaboration Benefits: Improved support for collaboration among project participants.
    - Other Benefits: Other project and corporate benefits.
- Resources and Expenses: Val IT defined the two analysis components of resources and expenses. Again, we found that most resources had direct expense implications and vise-versa, so that it proved more effective to combine these into one item. This section identifies the resource requirements for delivering the BIM implementation program, and the expenses incurred to provide the necessary resources, from reduced efficiencies, etc.
- Risks: Critical risks associated with the BIM implementation are considered next, including risk quantification and mitigation information.
- Assumptions, Constraints, Conditions: Finally, and issues describing assumed preconditions or constraints for BIM implementations are identified.

Level 2: Capability Layers

Val IT considers that the impacts of an IT investment affect three interrelated streams of activities (or layers of capability) within a company. Indeed, Val IT uses these three layers as its top level breakdown for the business case fact sheet. We also found this decomposition to be useful, but that it worked better as a second level breakdown.

- Technical Capabilities: The specific technological capabilities delivered by the BIM implementation program.
- Operational Capabilities: The operational capabilities that are supported or enabled by the technological capabilities.
- Business Capabilities: The overall business capabilities enabled by the improved operational capabilities.

Level 3: Life cycle phases

BIM implementations, like all of the IT investment programs, follow a life cycle of specific sequential phases over time. Some of the business case issues apply across all life cycle phases, while other issues are relevant only at specific phases. Therefore, some sections of the business case (but not all) may be further decomposed according to the main life cycle phases:

- Build/Acquire: Issues relating to the identification, design, development, and/or procurement of the BIM technology.
- Implement/Deploy: Issues associated with establishing the BIM solution throughout the company's work processes.
- Operate: Issues relating to the ongoing operation of the BIM technology.
- Retire: Issues that arise when it comes time to retire the technology to be replaced with future systems.

Level 4: Stakeholder

Val IT business cases are prepared from the perspective of an individual company considering the adoption of an IT solution for its own use. In AEC/FM, however, most business activity occurs at the level of the project, and each project involves many stakeholders from different companies. Since collaboration issues are central to BIM technologies, the business case inevitably involves multiple stakeholders.

The value propositions become considerably more complex since the parties that reap the benefits may differ from those that incur the expenses and risks. Thus, although not considered in the Val IT framework, it may often be relevant to define specific stakeholders' interests in each element of the program.

Level 5: Outcome Range

Often, the expected results of the program cannot be forecast with much precision, but can be described in terms of the best case and worst case extremes from a range of probable outcomes. This level of decomposition may be particularly relevant for items that identify quantitative data such as predicted costs or risk likelihoods.

4.2. Business Case Analysis

Having collected all of the relevant information in the fact sheet, structured as above, a business case process can proceed to analyze the information to arrive at a final assessment of the opportunity (in fact, it is likely that the process will not be strictly sequential but will iterate between identifying and recording the business case data and conducting the corresponding analysis). The analysis techniques are not likely to be particularly complex, being largely based on overall assessment of the benefits relative to the costs and risks. The overall analysis process suggested by Val IT includes Alignment analysis, financial benefit analysis (based on incremental discounted cash flows), non-financial benefit analysis, risk analysis, and final optimization and assessment of the risks and returns. Further details can be found in (ITGI 2006b).

5. The Business Case Analysis Tool

The business case structure described above is intended to provide a well defined technique (i.e., a tool) that individual companies can use to prepare their own business cases for any specific BIM implementation opportunities that they are considering. This can be used in conjunction with the lessons learned from the case studies, both the high-level TP results, and the detailed case study reports. Although a full example of the application of this tool is beyond the scope of this paper, Table 1 illustrates the tool by providing a typical breakdown of business case sections, along with the relevant case study TP results and typical items that might be included within each section (these are not intended to be comprehensive).

Table 1. Example of Business Case Framework (continued over following pages)

Business Case Sections	Example Issues and Case Study Technical Propositions
Outcomes	
Technical Capabilities	*Ability to produce drawings and documentation from the BIM model.* *Ability to exchange BIM models with consultants (structural, building services, and quantity surveyor).*
Operational Capabilities	*Ability to design in a 3D environment throughout the entire design process.* *Ability for BIM to support design collaboration / information exchange with consultants.* *Ability to reduce error in documentation through better coordination between consultants.*
Business Capabilities	*Ability to complete larger design projects with greater efficiency than present – this is particularly important for the smaller practice.* *Improved design outcomes through better understanding of design alternatives by clients and designers. Measured by client satisfaction levels and designers qualitative opinions of design outcomes.* *Reduced risks associated with information-related errors. Associated with information consistency in drawings, errors introduced during information exchanges, etc.*
Initiatives	*TP01: BIM requires a significant organizational re-structure* — *Agree 0.2 / Disagree 0* *TP02: BIM must be clearly understood throughout the organization* — *Agree 0.4 / Disagree 0* *TP03: BIM requires appropriate training* — *Agree 0.6 / Disagree 0* *TP04: BIM success is dependant upon selecting the correct software* — *Agree 0.3 / Disagree 0* *TP05: BIM requires a coordinator role* — *Agree 0.2 / Disagree 0* *TP06: BIM requires a significant process re-structure (internal and external)* — *Agree 0.4 / Disagree 0*
Technical Capabilities	*Acquire BIM software.* *BIM customisation / libraries.* *Required IT infrastructure.* *BIM data exchange capabilities.*
Operational Capabilities	*Develop / implement revised in-house manuals and design procedures* *Conduct pilot project*
Business Capabilities	*Position firm as technological leader* *Pursue new market segments* *Seek strategic partnerships with compatible consultants / contractors*

Business Case Sections	Example Issues and Case Study Technical Propositions
Alignment	*TP07: BIM has compatibility difficulties with legacy software systems* — *Agree 0.2 / Disagree 0*
	TP08: BIM requires interoperability standards — *Agree 0.8 / Disagree 0*
	TP09: BIM requires all project stakeholders to exchange and use the information — *Agree 0.4 / Disagree 0*
	TP10: BIM will be required as a prerequisite for future government projects — *Agree 0 / Disagree 0*
	TP11: BIM provides a foundation for FM processes — *Agree 0.3 / Disagree 0.1*
Technical Capabilities	*Data integration with existing systems* *Data interoperability with key standards (IFC)* *Interoperability with key partners.*
Business Capabilities	*Alignment with corporate strategy issues. Match the technology aggressiveness / conservativeness; Target markets / segments; Growth / size; Risk attitudes*
Efficiency Benefits	*TP12: BIM allows the small practitioner to successfully participate in larger projects* — *Agree 0.1 / Disagree 0*
	TP13: BIM reduces rework — *Agree 0.4 / Disagree 0*
	TP14: BIM improves efficiency — *Agree 0.9 / Disagree 0.1*
Technical Capabilities	*Reduce errors and rework. Aim to reduce errors and rework through early detection of potential clashes between services and the structure - in advance of actual construction*
Operational Capability	*Deliver on time. Aim to increase ability to meet project deadlines in an efficient and timely manner* *Reduce number of RFI's.*
Business Capability	*Access to larger / more complex project. Become involved in larger projects through better and more efficient information management on projects*
Design Functionality Benefits	*TP15: BIM enhances confidence in the design outcomes* — *Agree 0.5 / Disagree 0*
	TP16: BIM improves design — *Agree 0.5 / Disagree 0*
	TP17: BIM improves buildability — *Agree 0.4 / Disagree 0*
	TP18: BIM improves creativity — *Agree 0.2 / Disagree 0*
	TP19: BIM increases ability to make changes throughout design — *Agree 0.3 / Disagree 0*
	TP20: BIM improves risk management practices — *Agree 0.1 / Disagree 0*
Our Firm	*Increase ability to make changes throughout the design phase* *Provide improved design innovation and creativity*
Our Partners	*Improve buildability for contractor (ensure smooth transition from design through to constructed facility)*
Our Clients	*Enhance confidence in the design outcomes*
Collaboration Benefits	*TP21: BIM improves information management/sharing* — *Agree 0.9 / Disagree 0*
	TP22: BIM helps to align stakeholders expectations. — *Agree 0.3 / Disagree 0*
	TP23: BIM improves co-ordination with consultants — *Agree 0.5 / Disagree 0*
	TP24: BIM improves co-ordination with contractors / fabricators — *Agree 0.3 / Disagree 0.1*
Our Firm	*Improve information management and sharing*
Our Partners	*Improve coordination between consultants – more timely and accurate information* *Improve coordination with building contractors, etc.*
Our Clients	*Improve client collaboration with 3D visualization*

Business Case Sections	Example Issues and Case Study Technical Propositions
Other benefits	*TP25: BIM attracts innovative staff* *Agree 0.1 / Disagree 0*
	TP26: BIM enhances company profile *Agree 0.2 / Disagree 0*
Our Firm	*Heighten staff morale through working with innovative approaches to projects*
	Ensure firm is perceived as leaders by other designers, engineers
Our Partners	*Maintain and improve high standard of accurate data and timely interchange of data with partner firms*
Our Clients	Strengthen perception by clients of firm as technological leaders
Resources and expenses	*TP27: BIM is more labour intensive in earlier stages of the project than 'traditional' systems.* *Agree 0.2 / Disagree 0.1*
	TP28: BIM requires the employment of additional specialist staff (designers/IT) *Agree 0.2 / Disagree 0.1*
	TP29: BIM requires a high economic investment *Agree 0.2 / Disagree 0.3*
	TP30: BIM's implementation and maintenance costs (including underlying IT) outweigh its usefulness *Agree 0 / Disagree 0.2*
	TP31: BIM requires specialized software *Agree 0.5 / Disagree 0*
	TP32: BIM requires specialized IT hardware/infrastructure *Agree 0.4 / Disagree 0*
	For each resource/expense, list cost (dollars) under best case and worst case scenarios…
Assessing	*Staff time to evaluate, acquire, & customise hardware, software, & communications networks*
Implement	*Cost of initial training (Include loss of productivity):*
	Cost of on-going training (include loss of productivity):
Operate	*System not in productive use while periodic software updates (or unscheduled software patches) are installed and tested*
	Software updates (6; 12; 18 months ?)
	Loss of productivity (During pilot / first projects)
	Re-balance labour requirements at different phases than pre-BIM
Retire	*Maintain access to BIM model (neutral, or proprietary format ?):*
	Retain *previous copies of software (& hardware) if back-up is in proprietary* format, or on obsolete media
Risks	*TP33: BIM reduces risks to individual stakeholders* *Agree 0.1 / Disagree 0.1*
	TP34: BIM reduces risk in the project *Agree 0.2 / Disagree 0.1*
	TP35: BIM requires that a fall-back system be in place since it is not yet sufficiently mature *Agree 0.1 / Disagree 0.1*
	TP36: BIM-trained people are scarce *Agree 0.3 / Disagree 0*
	TP37: BIM introduces new issues regarding ownership of information, IP, payment of information, etc. *Agree 0.4 / Disagree 0*
	For each, indicate: Likelihood ( ) X Impact ( )
Our Firm	*Inability of software to perform as required*
	Difficulty of staff to learn / adopt new practices
	Difficulty of recruiting staff already trained in BIM
	Counter lack of understanding of BIM's capabilities within firm
Our Partners	*Problems with technical capabilities of project partners.*
	Unresolved issues regarding ownership of information, intellectual property, and the like
	Un-resolve legal issues with information sharing (IP)
Our Client	*Change in fee structures*
	Inability to deliver project on time

Business Case Sections	Example Issues and Case Study Technical Propositions	
Assumptions, Conditions, and Constraints	*TP38: BIM adoption is hindered by legal frameworks*	*Agree 0.3 / Disagree 0*
	TP39: BIM adoption is hindered by fee structures	*Agree 0.1 / Disagree 0*
	TP40: BIM is simply an extension of traditional CAD and will be a short-lived trend (vs. BIM is inevitable)	*Agree 0 / Disagree 0.3*
	TP41: BIM's Long-term advantages will outweigh any short-term disadvantages	*Agree 0.2 / Disagree 0*
	TP42: BIM-developer/coordinators increase their role, influence, and risks on the project	*Agree 0.2 / Disagree 0*
	TP43: BIM requires leadership within the company	*Agree 0.4 / Disagree 0*
	TP44: BIM capabilities must be understood by other stakeholders	*Agree 0.5 / Disagree 0*
	TP45: BIM is only a software approach rather than a management one	*Agree 0 / Disagree 0.1*
	TP46: BIM adoption is hindered by lack of specialised library content	*Agree 0.1 / Disagree 0*
	TP47: BIM does not improve documentation	*Agree 0.1 / Disagree 0.2*

6. Conclusions

This paper presented an approach for structuring business cases used to help individual companies assess potential investments in BIM technology. This represents one result of a larger case-study research project to explore the business case for BIM. The business case structure presented here is based largely on the existing Val IT initiative. As such, it does not represent a significant innovation, but it does represent an identification of a best practice approach for evaluating IT investment opportunities, it discusses the results of applying this approach to the BIM case study results, and it presents a methodology or tool that individual companies can use to structure their own business case analysis of potential BIM adoption.

7. References

Aranda-Mena, G., et al. (2008). Business Drivers for BIM, Project 2005-033-C. Cooperative Research Centre for Construction Innovation, Brisbane, Australia. 109 pages. Jan. 2008.

Davis, D. (2003). "BIM (Building Information Modeling) Update", Article, The American Institute of Architects Website, http://www.aia.org/tap_a_0903bim. Sept. 2003.

Enterprise Value: Governance of IT Investments – The Val IT Framework. IT Governance Institute (ITGI), Illinois, USA. 2006

Enterprise Value: Governance of IT Investments – The Business Case. IT Governance Institute (ITGI), Illinois, USA. 2006

ITGI (2006a). Enterprise Value: Governance of IT Investments, The Val IT Framework. IT Governance Institute: Rolling Meadows, Il, USA. <http://www.isaca.org/Val IT/>. ISBN 1-933284-32-3.

ITGI (2006b). Enterprise Value: Governance of IT Investments, The Business Case. IT Governance Institute: Rolling Meadows, Il, USA. <http://www.isaca.org/Val IT/>. ISBN 1-933284-33-1.

Khemlani, L. (2007), Top criteria for BIM solutions – A survey conducted by AECbytes, http://www.aecbytes.com/feature/2007/BIMSurveyReport.html (2007-10-25).

Smith, D. (2007). "Building Information Models (BIM)", web page on the site, Whole Building Design Guide (WBDG), available at: http://www.wbdg.org/resources/bim.php, Updated July 2007, accessed Feb. 2008.