



A benefits realization management building information modeling framework for asset owners



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ABSTRACT

An asset owner's decision to implement Building Information Modeling (BIM) can enable strategic business outcomes. For an asset owner the implementation of BIM should not be seen as a discrete information technology project, but a business change program that can potentially impact their 'value proposition'. Benefits realization recognizes that technology alone cannot deliver business outcomes and that the process of its implementation is proactively managed to ensure that the organization obtains the results it expects. This paper presents a novel framework that asset owners can use to ensure that they can obtain 'value' from investing in BIM. It is proffered that the benefits realization process should be viewed as a learning process that enables the asset owner to constantly question and measure the benefits of BIM.

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1. Introduction

"Nowadays people know the price of everything and the value of nothing"
[(Oscar Wilde, 1891)]

Building information modeling (BIM) is an emerging technology focused methodology that can be used to improve the performance and productivity of an asset's design, construction, operation and maintenance process [1]. The benefits of implementing BIM processes and technologies have been widely espoused and include: a reduction in construction costs, improved quality of design information, integration of project systems, data and teams, a reduced propensity for change orders, improved interoperability, and whole life-cycle asset management [2–5]. While the benefits of implementing BIM during the design and construction process have been readily observed in practice, particularly in terms of its use by contractors to control and manage projects cost and schedule [3], such benefits are marginal when the duration of asset's life cycle is considered. The benefits that can be acquired during design and construction process albeit as a result of technology, has been the impetus for BIM adoption rather than those that can be acquired during an asset's operation and maintenance. This scenario is vitally critical as there is significantly growing evidence linking BIM benefits to Facilities Management (FM), not least demonstrated through the recent United Kingdom (UK) government's mandate for its use in

public sector projects [6]. Moreover, governments such as those in the UK are driving to define BIM standards for the handover of facilities management data in the form of Construction Operations Building Information Exchange (COBie) and the Facilities Management (FM) Handover Model View Definition (MVD) [7]. Nonetheless, many asset owners are still skeptical about the value of adopting and integrating BIM technologies and processes into their existing organizational infrastructure and operations. Such view deserves exploring as it is the asset owner who is ultimately best positioned to realize the benefits that can be derived by implementing a BIM strategy.

An asset owner's decision to implement BIM can enable strategic business outcomes [1]. Such outcomes are not possible without technology, although its cost constitutes only a fraction of the total investment the organization must make to achieve their desired outcomes [8,9]. For an asset owner the implementation of BIM should not be seen as a discrete information technology (IT) project, but a business change program that can potentially impact the organization's 'value proposition'. Thus, simply identifying and estimating the benefits of BIM are not sufficient as attention should focus on 'how' benefits will materialize and over what period of time. Benefits realization recognizes that technology alone cannot deliver business outcomes and that the process of its implementation is proactively managed to ensure that the organization obtains the results it expects [10–12].

So, 'how' then can an asset owner obtain business 'value' from investing in BIM? Resolving the question of 'value' is a business imperative for asset owners' executives and managers. The implementation of BIM is far more complicated than simply implementing an IT project. Most of the issues associated with BIM implementation from an asset

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owners' perspective are akin to those that are faced with enterprise management systems such as Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) [1]: it is essentially a process of change management. The construction of an asset to Level of Development (LOD) 500, for example, and the subsequent transfer of the developed model by the project team to the asset owner is the point where 'real' implementation commences. Fundamentally, the integration of the developed model into the asset owners business will require changes to existing strategic management methods and practices to ensure that benefits are realized. In fact, the model may need to be run in parallel with existing processes unless it is the first asset the owner has ever managed, or they intend to create retrospective BIMs for all their existing stock. While emerging handover standards such as COBie and FM Handover MVD provide a structure for how information should be gathered over the project lifecycle, they do not support the asset owner with what to populate this structure with in order to leverage benefits. With this in mind, this paper presents a benefits realization approach that asset owners can use as a framework to ensure that their BIM contributes to commercial outcomes in concert with their overall business system.

2. Benefits realization management

Definitions of benefits realization management (BRM) that have been propagated in the normative literature vary [13]. For example, Farbey et al. define benefits management as the process that realizes the benefits that are achieved and manages the unexpected ones [14]. Similarly, Bradley [15] defines BRM as "the process of organizing and managing, so that potential benefits arising from investment in change are actually achieved" (p.23). Fundamentally, BRM is a process that is enacted to ensure that the expected benefits of capital investments, such as BIM, are realized [16–18]. During the investment appraisal process many benefits associated with technology are overstated to ensure its adoption [16–18]. According to Peppard et al. [18] many of the benefits described in the business case are often not expected to materialize as the success of an IT project is invariably measured on whether the system is delivered on time, within budget and meets technical

specifications. This viewpoint negates the notion of whether the organization is effectively utilizing the technology and if its delivering expected business benefits [18]. To ensure that the benefits of IT can be realized several approaches to BRM have been developed (Table 1). A common concept that is central to all approaches that have been developed is the inclusion of the Plan-Do-Check-Act (PDCA) cycle where feedback provides the impetus for a process of evaluation and learning [19,20]. Moreover, all the approaches identified in Table 1 acknowledge that benefits change over time and that they are determined by business and strategic contexts. Thus, all outcomes of an IT investment represent a potential source of value to which an organization must be proactive in ensuring that considerable benefits are realized [16–21].

Peppard et al. [16,18] analysis of the normative literature revealed five underlying principles for realizing the benefits of implementing IT. Consequently, it is suggested that such principles underpin the process of realizing the business value of BIM as:

1. *BIM technology has no inherent value*: Having BIM technology in place will not confer any benefit or create value for an asset owner. The adoption of such technology is a cost, not only to an asset owner but also to the project team, and benefits only arise from its effective use. However, the typical BIM workflow that is often adopted by asset owners, presented in Fig. 1, is deemed to be inefficient and ineffective for the purposes of FM. Generally, asset owners do not engage in the design and engineering of a new project and therefore the operations and management of the facility are not considered in the formative stages. Instead, asset owners tend to focus on the location of their site and its actual construction costs rather than those that arise during operations and maintenance. The initial engagement of a design and engineering consultant is made with the combination of a quantity surveyor to undertake a feasibility study and propose a cost of the project. Then, a lead consultant is appointed and a consulting team is employed to design the asset. At this point they consider design and engineering requirements that are directly attributed to the asset (e.g., size, shape, and building system performance) not its operation and maintenance requirements. A three dimensional (3D) model is typically created (for example, LOD 300), though the quality of this information provided by

Table 1
Benefits management realization approaches.

Approach	Key features	Reference
Active Benefits Management (ABM)	<ul style="list-style-type: none"> • Establishes ABM in the context of business change • Business change needed to address strategy • Relationship between change and benefits 	[22]
Cranfield Process Model	<ul style="list-style-type: none"> • Potential benefits are identified, plan devised for their realization, plan is executed and results reviewed and evaluated • Diagnose why some projects are successful in delivering benefits • Monitoring and feedback 	[10]
Benefits Realization Approach (BRA)	<ul style="list-style-type: none"> • Shift from a sole focus on project management to business program management, disciplined portfolio management, and governance • Success of BRA depends on measurement, accountability and proactive change management 	[23]
Process of Active Benefits Realization	<ul style="list-style-type: none"> • Process of managing information systems development through a continuous process of evaluation (i.e. iterative process of evaluation) • Active participation of stakeholders • Direct and continuous focus on benefits 	[24]
Benefits Management Life Cycle	<ul style="list-style-type: none"> • Planning alignment between IT and business strategy • Systems analysis • Identifying and managing change • On-going review of benefits 	[25]
Benefits Realization: Best Practice	<ul style="list-style-type: none"> • Continuous process that focuses on capabilities and learning • Process of benefits planning, delivery and review 	[26]
Benefits Breakdown Hierarchy	<ul style="list-style-type: none"> • Management and monitoring of benefits during the initiation and execution • Value path relationship between benefit and project forms a hierarchical benefits structure • Creation of capabilities to deliver projects 	[20,27]
Benefits Realization Management	<ul style="list-style-type: none"> • Identifying and engaging stakeholder • Establishment of vision and objectives • Management of expectations • Using measures to track performance 	[15]
Benefits Realization Capability Model	<ul style="list-style-type: none"> • Capability is enacted through and defined by the realization of competencies • Competencies are enacted through and define by practices which are underpinned by knowledge, skills, experience and behaviors 	[16]

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