

03. Leveraging the Relationship between BIM and Asset Management

Current Situation

Purpose

The purpose of this paper is to explain the mutually-supportive relationship between Building Information Modelling (BIM) and Asset Management. In doing so it will enhance the ability of infrastructure owners and their suppliers to develop and implement processes, tools and collaborative working practices that optimise infrastructure asset costs and performance over the entire life cycle of assets.

The paper has been produced to:

- Help mitigate the danger of treating BIM and Asset Management as isolated practices.
- Reinforce the need to consider BIM implementation in the context of wider asset management policies, practices and systems and vice versa.
- Maximise the benefits from investments being made in the development and implementation of BIM and Asset Management.

Asset Management and BIM knowledge activities and standards have emerged in the UK construction industry as more or less parallel initiatives and have been crystallised in standards such as BS PAS 55¹ (and the soon-to-be-published ISO 55000) and PAS1192-2² respectively. This paper explains the relationship between these two disciplines and why they must be considered together if the full benefits of each are to be realised for both the asset owner and its service providers.

What is Asset Management?

Asset management is defined by ISO 55000³ as the 'coordinated activity of an organisation to realise value from assets'.

Asset management translates business objectives into asset-related decisions, plans and actions within a strategic framework using a set of processes, techniques and tools. It seeks to optimise the cost, risk and performance of assets over their life cycle at an individual asset, asset system and asset portfolio level.

Improved asset management practices are particularly business critical in asset intensive organisations where there are significant challenges to address in terms of increasing service demand, increasing stakeholder expectations, a deteriorating asset base and constrained funding.

Experience of several organisations has shown that significant improvements in asset/service performance, reduced risks and cost savings can be achieved by applying asset management systematically across the enterprise. The benefits of improved cross-organisational communication by adopting a common language and consequential increases in staff morale have also been reported.

What is BIM?

BIM is the management of information through the whole life cycle of a built asset. It delivers value by underpinning the creation, collation and exchange of shared models and corresponding intelligent structured data. This helps to avoid information loss when progressing between different life cycle stages and transitioning management responsibilities.

While BIM development and its application to date has largely focused on the design and construction phases of assets BIM has an important application across the entire life cycle of assets and is therefore a key enabler of improved asset management within the recognised ISO55000 framework discussed above.

BIM keeps the needs and overall purpose of the asset at the fore and prevents information loss when management responsibility for the asset changes. BIM tools are the technological and process successor to CAD and 2/3D drawings creating data files of physical components and spaces. They offer an integrated enterprise-wide system of working, which provides clear accessible information, for managing the construction and asset life cycle, and, if exploited correctly, can lead to significant efficiencies and improved asset value.

BIM is not a single software application, but rather, the use of software tools embedded in a process. Its use can be applied to all types of asset not just buildings.

1. BS PAS 55 – Asset management – Specifications for the optimized management of physical assets.

2. BS PAS 1192-2 - Specification for information management for the capital/delivery phase of construction projects using building information modelling.

3. ISO 55000 - Asset management - Overview, principles and terminology (FDIS, September 2013)

Relationship between BIM and Asset Management

How BIM Supports Asset Management

The availability of appropriate and reliable information about assets is vital for effective asset management as it supports decision making, planning and execution of activities on assets. By providing a structured framework for the creation, collation and exchange of information about assets, BIM supports effective asset management. However, to enable this BIM must provide information covering the whole life cycle of assets. Recognising this, a new standard BS PAS 1192-3 is being developed to extend BIM to cover the in-service phase of assets. This should be published by early 2014.

Benefits of an Integrated Approach

A report⁴ commissioned by the UK Department for Business, Innovation and Skills (BIS) and the Cabinet Office in 2008 suggested that the use of BIM:

- If extended to all major projects, then between £1 billion and £2.5 billion per annum savings within the UK can be realised in the construction phase alone.
- There is potentially even greater value in the post-construction in-service phase.

In-service phase benefits will arise through improved ongoing management of information about assets not only at individual, but also at portfolio and national level. A more comprehensive asset information model will enable optimisation of operation and maintenance costs. It will also facilitate better modelling of infrastructure resilience and identification of the most effective opportunities for improving energy efficiency and reducing carbon emissions.

More specifically, the benefits from an integrated, enterprise-wide and life cycle approach to BIM and Asset Management, will include:

- Greater clarity on long-term in-service performance expectations and the consequences of design-stage decisions over life cycle performance and cost.
- Reduced project start-up costs due to availability of better information at the beginning of the project.
- Reduced construction and operational costs as a result of reduced construction defects.
- Better life cycle management resulting from more readily available consolidated design and construction information as a single source of data.
- Reduced management process costs arising from incomplete data.

4. UK Department of Business, Innovation and Skills (BIS) and the Cabinet Office – Life cycle approach to BIM

03. Leveraging the Relationship between BIM and Asset Management (Continued)

Why me? Why now?

To understand the benefits to the industry, it is important to recognise the different drivers that the different industry players have in integrating BIM and recognised Asset Management processes:

Asset Owners and their customers will gain from a comprehensive asset information model that sits within a strategic framework for the management of their assets. Asset owners have a long-term accountability for asset safety and performance management. They must therefore be certain that the projects they commission will be delivered with information models that are interoperable with each other and with the enterprise-wide asset information system(s). Success in integrating BIM and Asset Management will significantly rely on client's ability to commission integrated BIM and Asset Management requirements from the supply-chain.

Designers commissioned on a stand-alone basis or as part of a design and construct entity may be central to helping clients establish the mutually supportive relationship between BIM and Asset Management. Clients may be definitive in their requirements for BIM systems or they may require consultants to advise them in this regard. In the case of the latter, consultants that succeed will be those that are able to offer advice on BIM to align with the client's Asset Management framework thus adding value to the life cycle management of assets.

Contractors will be commissioned to deliver new build and renewals projects with BIM systems governed by client's BIM and Asset Management requirements and standards. Contractors that succeed in this project environment will be those that can work with clients to add value to their whole Asset Management process whilst also using BIM to assure competitiveness amongst peers. Competitiveness will arise from streamlined construction activities and reduced errors and waste. Added value will be delivered by the improved quality of information to enable clients to make better whole life decisions and the interoperability of BIM systems with client's existing enterprise-wide systems.

Operations and Maintenance Service Providers are often charged with maintaining and adding to the existing information sets of existing assets. Where new assets are created there is likely to be an increasing introduction of BIM data to existing asset information systems. Operations and maintenance service providers are therefore likely to find themselves in the dialogue between clients, designers and new-build contractors concerning the quality and format of information models and their interoperability with existing systems.

Critically, the costly and time-consuming phase of as-built asset data capture at the start of a maintenance contract can be largely eliminated through the provision of a reliable, BIM-sourced suite of information. In turn, operations and maintenance service providers have their part to play in maintaining the BIM

model through subsequent configuration changes to maximise the value of an up-to-date "virtual" asset that always accurately mirrors the physical prototype. Service providers that are able to integrate new BIM and existing asset information and systems within an Asset Management framework will be able to add greater value to the client and hence improve their competitive advantage.

Software Suppliers will benefit from developing interoperable information tools that allow BIM and traditional Enterprise Asset Management systems to work together. If they do not, then it is likely that they will find themselves locked out of markets where clients have invested heavily in existing systems and also recognise the need to maintain supply resilience and competitiveness by having a range of system options available. Software suppliers that facilitate the integration of BIM and existing Enterprise Asset Management systems within a wider organisational Asset Management framework will be most likely to succeed in the new markets.

Recommendations

The following recommendations are made in order to maximise the benefits from the investments being made in implementing BIM and Asset Management:

Infrastructure and Building Owners

1. Develop asset policies that address BIM and Asset Management jointly to provide a common framework for the development of the two practices.
2. Communicate the importance of integrating BIM and Asset Management within their organisations and develop staff competencies in both disciplines.
3. Develop and embed enterprise-wide information systems and processes combining BIM and Asset Management in compliance with emerging BIM and Asset Management standards to ensure consistent application across all planning, projects, operations and maintenance functions.
4. Develop appropriate client requirements for BIM and Asset Management and communicate these to the supply chain. The requirements should cover data and information, business processes, information systems and staff competencies applicable to planning, project, operations and maintenance activities.
5. Take a phased approach to extending BIM for existing assets prioritised by asset criticality.

Government and the Engineering Profession (including professional bodies and standard developers)

6. Develop BIM and Asset Management standards to be mutually supportive taking into consideration the information needs over the life cycle of the assets.
7. Take a 'whole life – whole system – whole industry' approach in the further development of BIM and Asset Management standards; covering business processes, roles and responsibilities, competence and culture, data specifications and IT systems for asset information management.
8. Raise awareness of the need to develop BIM and Asset Management in organisations in an integrated way through established channels and promote training programmes and professional qualifications to develop the required competencies.

Software Developers

9. Develop information systems for BIM and Asset Management to allow maximum interoperability and ease of data maintenance.
10. Develop interim tools to enable information on existing assets in existing enterprise Asset Management systems to link-up with enterprise BIM systems.

04. Acknowledgements

Joint ICE - ICES - IAM Position Paper

Leveraging the Relationship between BIM and Asset Management

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