IET The Institution of Engineering and Technology

Accelerating the adoption of Building Information Modelling (BIM) in the Built Environment

Background

The utilisation of Building Information Modelling (BIM) is becoming increasingly common on construction projects. This will accelerate as we approach the UK government's target for all government funded projects over £5m to be BIM enabled by 2016. BIM is increasingly being used to improve the specification, usage and delivery of information relating to construction projects and through to the operational life of the assets.

Implementing BIM should not be thought of as solely a technology/software activity – successful implementation relies upon application of change processes and strategic thinking, so organisations new to the use of BIM will need to carefully plan out their strategy before they start on technical implementation.

Motivation

Construction developments have historically made interpretations and assumptions about how data will be utilised throughout the project lifecycle. However, these approaches have not always considered the optimisation and realisation of benefits deliverable throughout the lifetime of the asset(s).

Asset information should not be captured just for the sake of collecting data for a specific project phase; rather, it is important to consider requirements to support the whole life of the asset. Due to the long lives of assets, it is also important that practitioners do not just focus on solutions that can be currently defined and quantified, but also ensure that enablers for future exploitation are considered.

Practitioners may have to review such considerations such as:

- Optimising Capital and Operating expenditure over the life of the asset
- Delivering Health and Safety
- Balancing social and environmental outcomes
- Providing Operation and Maintenance information to ensure assets are used as intended
- Maximising overall performance
- Allowing current performance to influence future standards and designs

Development

There are a range of tools and resources relating to BIM, but perhaps the most useful are the PAS 1192 series of standards and related documents, which outline how BIM can deliver outcomes using processes, data, systems and intelligent assets all working together as a system.

Built Environment

Information & Communications

Digital data for BIM

BIM is not just about software or analytics – processes, governance and interaction are key to all stakeholders BIM is a mind-set and not a toolset. Engaging with operators and end users is pivotal in these aspects, as Asset Information Requirements will need to support long term asset management objectives.

When implementing BIM solutions there are many considerations that need to be taken into account and numerous stakeholders to engage in order to ensure that the outcome delivers what the client requires and that the approach taken is both efficient and effective.
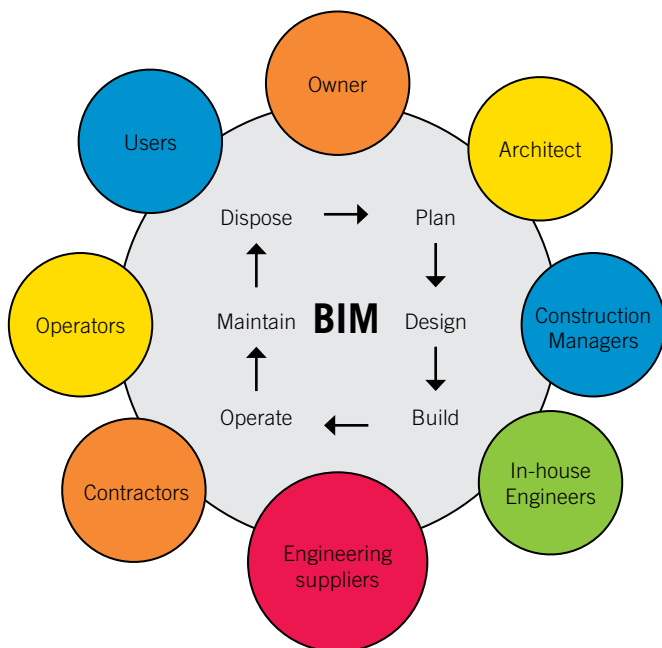

Illustration of BIM stages and key stakeholders

Implementation could include progressive adoption to reduce the overall project risk and allow practitioners to develop their knowledge and competence further.

BIM is also a key part of asset management in the built environment. The application of the ISO 55000 Asset Management standard uses this information through alignment with organisational strategies and to support optimisation of asset management systems.

Results:

BIM approaches are increasing in maturity – however, barriers to adoption often include resistance to organisational change. Whilst the costs of adoption may seem high, the forecast sustained savings of 15-20% of construction costs should provide a good incentive to asset owners to implement BIM methodologies which, in turn, will support future reductions in lifecycle costs. For more traditional Design & Build contracts where construction is the primary focus, failure to provide timely and good quality information can have a detrimental effect on future asset management activities.

To achieve optimal outcomes in the application of BIM, organisations should be clear about their Asset Information Requirements and how they support the overall Organisational Information Requirements. These should be defined to a level that supports consistent acquisition, storage and usage of information, with considerations including:

- how suppliers are able to interface information?
- how information will be supplied?
- how configuration control will be managed?

It should be recognised that existing information will not be 'perfect', therefore, organisations and solutions have to be both aware of actual data quality and include appropriate controls based upon that assessed quality.

BIM approaches bring greater volumes and sophistication of data together into one place, with a wider range of potential users, which increases the information security risks. The security of this information therefore needs to be addressed internally and externally:

- internally for configuration control data and protection of supplier intellectual property; and
- externally to reduce the risk of physical or cyber-attacks.

All of these issues have to be addressed by the practitioners to establish rationale, configure information control and access, and to assign appropriate system protocols.

Next steps:

The wider adoption of IoT approaches is a logical extension to BIM, but the consideration of short-term budgets and financial constraints need to be suitably balanced against potential long-term benefits.

During design and construction, it will be difficult to predict all of the required sensors and data storage to support both known and future unknown need. Financial approval processes should allow for potential future data uses, since the additional cost of including a few extra sensors and devices when equipment is installed will probably be minimal, they will certainly be a lot less than the cost of retrofitting sensors to existing equipment once 'clear purposes' have been identified. That said, it is important not to get carried away with fitting sensors etc. – it should be predictable what information and signals may be of use in future.

Adoption of BIM and IoT approaches also require effective interoperability of data. This includes considering the means of communication and security then ensuring that the meaning of data in different systems can be correctly utilised.

Government deadline to enable BIM by 2016

Establishing common and interoperable data formats and protocols for sharing information is one of the biggest challenges facing the IoT, with major issues on deciding and agreeing on semantic interoperability (i.e. no loss of meaning). The development and adoption of current standards based approaches such as ISO 15926, IFC (Industry Foundation Classes), COBie, and MIMOSA can contribute to the resolution of these challenges. In many cases, this will still need to be supported by effective governance and arbitration approaches for situations where agreement cannot be reached.

Acknowledgements:

Julian Schwarzenbach - Director of DPA and one of the country's leading asset information practitioners. He is on the Steering Group for PAS 1192-5 (*Specification for security-minded building information modelling, digital built environments and smart asset management*) and previously PAS 1192-3 and BS 1192-4 and is a member of the BCS and the Institute of Asset Management (IAM).

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Data and Process Advantage (DPA) specialise in increasing the benefits organisations are able to gain from their data, processes and systems. Clients are predominantly transport and infrastructure organisations wishing to use good asset information to support long term asset management objectives.
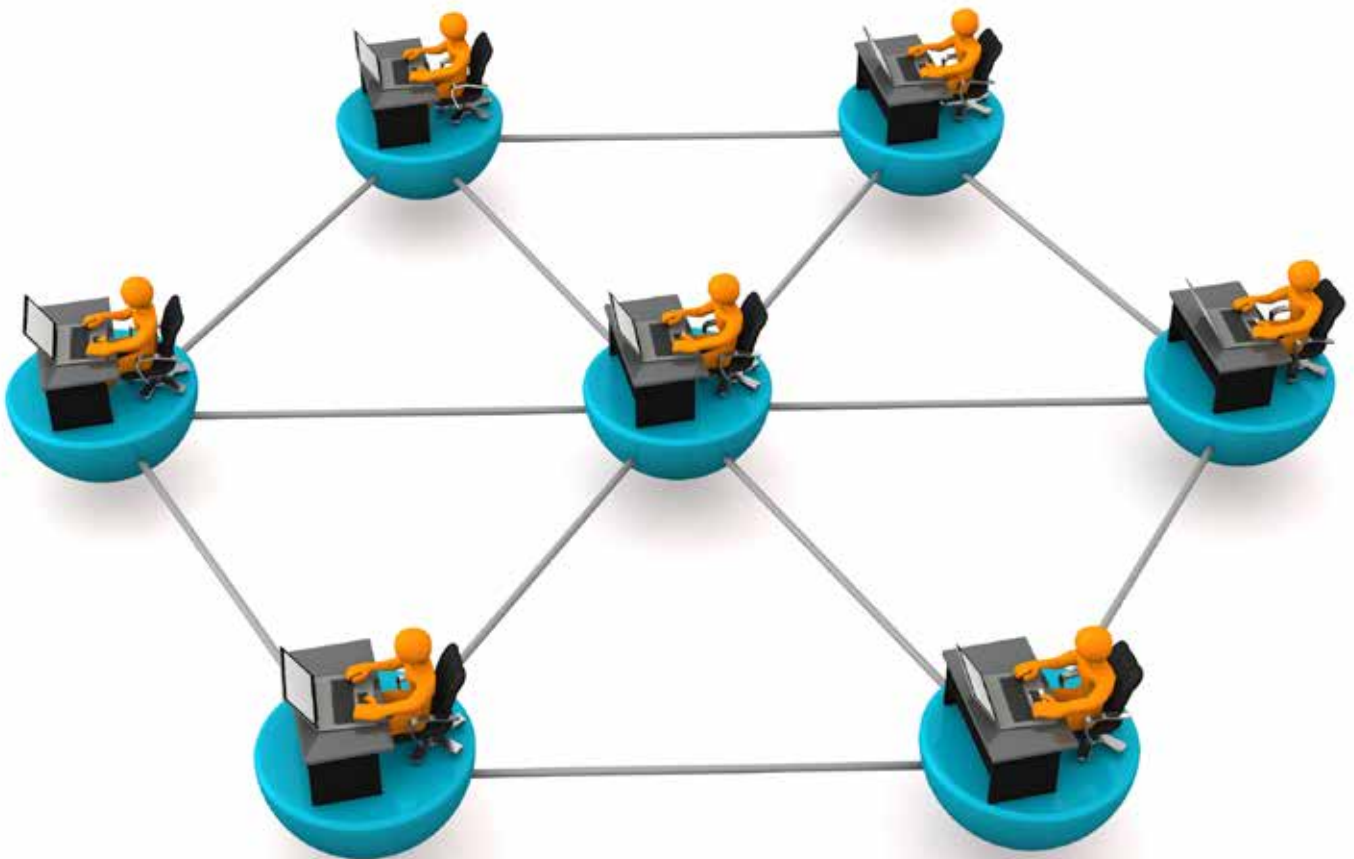
Networked collaboration on a single solution