A definition of ... Building information modelling (BIM) exploits the potential of digital modelling technologies to provide a new way of designing buildings and managing the design and construction processes. This approach brings together geometry (lines and surfaces) and rich non-geometrical information (intelligent descriptions of components, materials etc.) in a single data environment. BIM during the design and construction phases of a project has the potential to create an ‘as-built’ virtual model of the building, a digital asset that can be exploited throughout the operational life of the building.

While, as yet, the impact of BIM in the commercial office sector has been limited, early adopters are realising benefits through leveraging the capabilities of the powerful tools that are available, and these benefits are being realised within the context of existing contractual arrangements.

The UK Government has recognised the potential for BIM to transform the construction industry as a whole, and is pursuing a strategy to ensure that this takes place. Government support for BIM is acting as a catalyst, providing an impetus to the development of the common standards and protocols that are an essential part of the BIM process. Suppliers are already investing in their BIM capability in response to the government strategy.

The findings in this report are based on interviews with a large number of individuals across all the stakeholder groups in the industry and a detailed analysis of how BIM has actually been used in a series of case studies.

If BIM is to create value, the right decisions need to be taken at the right time. The interlinked series of decisions and actions needed to be taken to unlock value can be considered as a Pathway. In this report five distinct areas of potential value creation, and hence Pathways, have been identified and explored.
WHERE BIM IS ADDING VALUE

At present the greatest value resulting from BIM in the commercial office sector is through de-risking construction. The BIM process delivers fully coordinated design at an earlier point in the process, significantly reducing uncertainty in the construction phase and allowing faster construction with less waste of material and time. At the moment much of the value being created is being captured by contractors. Developers need to invest in design to ensure full coordination is achieved before tendering if they want to capture a share of this value.

BIM is also making a significant contribution to improving building performance in at least two respects. Accurate modelling of MEP (mechanical, electrical, plumbing) requirements, plant rooms and risers is allowing developers to reduce the amount of space allocated to meet these needs, and therefore to improve the net-to-gross efficiency of developments. Investment in the MEP design to accurately understand requirements for plant space and risers is essential if building efficiency is to be maximised. Developers should see a direct return on this investment in a better net-to-gross ratio.

Increasingly sophisticated modelling of energy requirements and thermal performance is allowing more accurate sizing of plant, reducing capital costs in some cases, and better energy consumption, potentially reducing operating costs. Reductions in capital costs should be of direct benefit to the developer and therefore support the case for investment in design. However, pressure from occupiers and government for more energy-efficient buildings is needed to ensure that the full potential of BIM is leveraged in this respect.

Over the longer term, BIM’s greatest impact may be on the operation and maintenance of commercial office buildings, with the translation of the information created during the design and construction phases into an Asset Information Model (AIM). As demonstrated in the case studies, benefits are starting to emerge, with savings being realised in commissioning buildings and populating facilities management (FM) systems. As yet there are few data available on the scale of benefit that can be leveraged over the long term. The benefits of lower commissioning and operating costs are realised by the occupier, as the costs tend to be passed through from the owner or developer. Evidence from case studies strongly suggests that developers are responding to tenants’ requirements and are trying to leverage BIM to deliver value post-construction. To gain value from BIM post-construction, processes must be in place to ensure that as-built models are accurate and complete, and that appropriate standards for model creation are defined in the BIM strategy. Relatively little additional investment in the BIM process from the developer is needed to secure this value.

The potential for BIM to add value in transactions between agents and potential tenants was explored. Little attention has been focused on how benefits could be leveraged in this area, and to date no systematic attempts to exploit BIM with respect to this area have been identified. From an occupier’s perspective, access to a digital model of a prospective property, in an easily manipulated form, is an attractive proposition, and could simplify the process of evaluating a property. As occupiers’ knowledge and understanding of the potential advantages of BIM becomes more widespread, developers who are willing, and able, to provide occupiers with access to this information should enjoy a competitive advantage.

Finally, the potential for BIM to improve access to finance for developers was also explored. While one of the case studies provides evidence to suggest that modelling can strengthen the presentation of a business case, there is little evidence to suggest that BIM will have a significant impact in this respect.

THE GAP BETWEEN CURRENT PRACTICE AND FUTURE POTENTIAL

Our research demonstrates a significant gap between current practice and the potential for BIM to create value. Figure 1 provides an overview of where value is already being realised with respect to the five Pathways in the commercial office sector, and the potential for value to be realised in the future. The green portion of each bar shows where significant value is being created (or will be created), the orange portion shows where research suggests that there is some value creation, and the red portion shows where there is very little evidence of value being created.

RECOMMENDATIONS FOR STAKEHOLDERS

BIM capability is potentially a strategic competence for developers, one that can deliver competitive advantage. Developers need to find the right balance between early investment in design, with its attendant benefits, and risk. BIM has the potential to shift where this balance lies. Developers need to develop strategies that allow them to exploit this shift.

1. Care must be taken to ensure that efficiency is not pushed to the detriment of future flexibility.
The level of knowledge regarding BIM in the investor community is low and there is little understanding of how BIM might deliver value. Investors should develop an understanding of the broad principles of BIM and its impact on development post-construction to ensure that the value of AIMs is not eroded.

BIM has the potential to create powerful marketing tools for commercial office developments. These tools would enable potential tenants to proactively explore a building in order to understand its potential. Letting agents should be in the forefront, working with occupiers and developers to develop these tools.

Broad use of BIM can only take place when the legal implications of its use are clearly understood and resolved. Lawyers have a vital role to play in clarifying to their clients what these implications are and providing advice such that all parties can move forward without fear of adverse legal consequences.2

Occupiers are potentially the ultimate beneficiaries of the value created by BIM. The level of understanding of these potential benefits varies widely. The supply side of the industry is very keen to demonstrate how BIM can create value. Occupiers should take advantage of this and develop strategies for how they will capture this value.

As yet BIM has had relatively little impact on the FM providers. However expectations among some occupiers, including the government, are high. The rich data flowing from the BIM process have the potential to transform the FM industry. FM providers need to develop the capability to maintain and then mine that data in order to unlock value.

BIM presents huge challenges for quantity surveyors, both as individuals and as a profession. As BIM is more broadly adopted it will fundamentally change how the profession will deliver services and offer value to clients. Quantity surveyors will need to be able to interrogate and analyse models and to validate data that have been extracted from them.

As yet only a minority of commercial office projects are utilising BIM in an integrated cross-disciplinary manner. Project management experience of BIM is, therefore, quite limited. BIM has a direct impact on the way that projects are managed and on how construction is procured — key responsibilities for project managers. Project managers need to gain understanding of the processes, protocols and standards that are needed for effective BIM, and have the capacity to view and manipulate models if they are to be able to manage projects effectively.

Design professionals are facing a steep learning curve as they make the transition from 2D design to BIM. Again, as to be expected, capability varies widely across the industry. Most leading consultancies have made the first step in the transition to BIM through investing in BIM authoring and analysis software. To ensure that the full potential of BIM is realised, designers need to take a further step to reassess how they exchange information and collaborate with other professionals and stakeholders.

With the current state of market maturity, contractors with a strong BIM capability are able to capture a significant share of the value BIM is creating. Leading contractors have invested heavily with their supply chain in BIMs and are reaping the rewards. Contractors that fail to invest will struggle to compete in the future as the early adopters gain more and more experience and learn to extract more value from BIM.

2. It should also be stressed that this report does not consider the Level 3 BIM environment, which raises very different legal issues that will need further consideration. It should be noted that, simply because two or more parties are working together, this does not mean that this extends into Level 3 BIM territory, provided that the resultant models are still ‘federated’.
BUILDING INFORMATION MODELLING FOR COMMERCIAL OFFICE BUILDINGS

FURTHER INFORMATION

The full report is available at: www.bco.org.uk.

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COVER IMAGE

3D city computer chip
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ABOUT THE BCO

The British Council for Offices’ (BCO) mission is to research, develop and communicate best practice in all aspects of the office sector. It delivers this by providing a forum for the discussion and debate of relevant issues.

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ACTIONS BY THE BCO

If the benefits of BIM are to be realised the commercial office sector must take concerted action. As the office sector’s representative body, the BCO will:

- Define what a core BIM capability for developers should consist of.
- Advocate the benefits of shareable asset information via BIM as a means of improving product performance and tenant benefits. This advocacy should be focused on developers, agents and asset managers.
- Articulate the long-term BIM proposition for owners and occupiers; identify who has to deliver what and when in order to deliver long-term asset and performance value.
- Articulate the standards and processes that should be adopted to effect best-practice outcomes. This could take the form of a BCO specification for BIM and AIM.

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