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## **BIM for Construction Clients: driving strategic value through digital information management. RIBA Publications 2016.**

### **Chapter 1. Introduction and executive summary**

These are tremendous times to be a construction client. The old ways of the construction industry, which so often disappointed clients by underperforming and by putting the client under pressure to manage uncoordinated team members, is being replaced by a twenty-first century approach. Since about 1990 retailers and product manufacturers have been adopting digital working methods with resultant leaps in speed, productivity, accuracy, quality and value for customers. Construction as a sector has lagged badly behind as it was so fragmented and lacked dominant buyers to pull through change. Now the UK government has stepped up to play this dominant buyer role and the whole industry is moving forward quickly. The construction version of what manufacturers call 'Product Lifecycle Management' or PLM is dubbed BIM for 'Building Information Modelling'. Don't worry about the words Building and Modelling: they only serve to limit the perceived value of the concept. Concentrate on the middle word, Information, and the potential of its transformation from analogue to digital where it becomes structured, sharable and infinitely re-usable.

**What is BIM?** Instead of clients and members of their team exchanging drawings and reports which are inevitably prone to ambiguity, incompleteness and error, they can now share a totally trustworthy, multi-dimensional model of the evolving project in a 'common data environment', a server which manages access, contributions and changes and also supports all communications. The structured, shareable information in BIM allows contributions to be coordinated easily, greatly reducing the risk of error and defect. The early design process is accelerated, with potential for better stakeholder engagement through 3D representation and the simulation of operation. Technical design is supported far better, with suppliers' contributions filling



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in the model's detail, element by element. Cost management can get closer to the design process and avoid late 'value engineering'. Construction sequences can be rehearsed, logistics optimised and site communications improved, taking out risk and time. Finally, the as-built version of the model can provide vastly superior support to occupiers and facility managers, pulling down the cost of operation and maintenance whilst raising the performance of the occupier and the asset.

**How did BIM emerge?** BIM is the result of an international, unpaid effort by enthusiasts, backed by vendors of software first used in other industries. It has taken over two decades to reach its present level of maturity. Whilst underlying principles are agreed and used worldwide, the recent leap forward has a UK badge. 'UK BIM' is defined by a government funded Task Group set up to implement that element of the Government Construction Strategy of 2011. The Task Group developed the tools it saw as necessary to enable mainstream use of the BIM concept and set a date five years ahead, April 4<sup>th</sup> 2016, for all central government clients to require BIM to be used on their projects. By October 3<sup>rd</sup> 2016 all departments are to be able to validate BIM information they receive. The expectation was that local government would follow the central lead and that the private sector would use the free toolset for its obvious advantages, once it was available. Both of these expectations are being fulfilled.

UK BIM is not just the application of computing technology to the existing working approach of the construction industry: clients, consultants, contractors, specialists, product makers and all their regulators. It addresses most of the trenchant criticisms made of the British way of working over decades by a succession of reports into the industry. These reports note that the cost of construction consistently rises faster than general inflation whilst those of manufacturing and distribution continue to fall. They point to a lack of integration in the team, with major waste and risk arising as its members conflict with each other instead of collaborating. They identify the lack of continuity over the asset lifecycle, with operation and maintenance, usually a larger cost over time than the original construction cost, isolated from the design and

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construction process and comparatively poorly managed. The failure of most buildings to work fully as they were designed to do is evidence. The industry is also not operating sustainably, with tiny profit margins leading to weak research and innovation and to a defensive stance rather than a customer-focussed one. The UK BIM Toolkit is designed to support more successful design, project and asset management, enabling many of these and other criticisms to be addressed.

**What is BIM Level 2?** The mandated 2016 version of UK BIM is described as ‘Level 2’. This term arises from the idea that BIM has developed through stages and that it will continue to do so as relevant technologies and the commercial context mature. Project information management based on 2D CAD and contemporary document management is termed ‘BIM Level 1’ and has been in use for about 20 years. Level 1 used quality assurance methods in exchanging information but was based on 2D CAD drawings and conventional electronic documentation, often shared on a ‘collaboration tool’ website. The computer facilitated work but did not ‘understand’ what it was handling. Level 2 however expects each team member to work in a ‘object model’ environment, using computer-recognised objects, both for their 3D geometry and associated data. All contributors work in their own models which are shared through a web-based server and ‘federated’ by software to show needed coordination and to support design and client decisions. Level 2 working leaves all the current commercial and contractual ‘furniture’ in place so that there need be no change there at this stage. Draft standards are in circulation to define best practice.

Level 2 further improves its life-cycle support by including a tool called ‘Soft Landings’. This was developed for the University of Cambridge in 2004 and adds consideration of operation and facility management to the initial brief, carrying this through design, construction and commissioning to early-occupation ‘sea trials’ to ensure that performance is as intended. A completed ‘Asset Information Model’ will be part of this handover support, converting the project BIM into O&M terms.



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**How does BIM benefit clients?** The biggest beneficiary of BIM can and should be the client. Whilst consultants, constructors and product makers can all benefit by reduction in their risk and increase in their delivered quality, the client benefits in many ways: rich, multi-dimensional concept simulations can engage stakeholders to define their needs earlier and better; suppliers can pass on reduced risk to clients in the form of lower prices and faster programmes; clients can expect less management workload as the team can collaborate far better with trustworthy information; client decision points can be far better supported so that late changes can be reduced; the client's brief for information required can be held in the process with compliance checked automatically; the completed building can be handed over twice, once as a real artefact and a second time as its virtual doppelganger, loaded with information on how to operate and maintain it. Benefits delivered can be enhanced and costs reduced, both in capital and operating terms, leading to a jump in value to clients.

However, being a client on a BIM basis is not yet straightforward. Many clients start by being a 'passive' user, leaving it to their supply team to apply BIM as they see fit. There is a learning curve to being an 'active' user as business change is required in the client's approach and methodology. The facilities and asset management functions need to become better connected to project leadership. The effort required is minor compared to that facing the supply team, but it is significant. This book is written to assist clients in taking up BIM, or in moving on from passive to active engagement. It also steers clients toward procuring more collaborative teams.

**The structure and scope of this book.** The next chapter sets out the client's business case for using BIM and the need for a strategy on its use. The legal and contractual questions which often arise are answered. Then there is a chapter on the active client role in a BIM project and the differences from conventional practice. Aligning client internal processes with the BIM project process is discussed, as are the differing aspirations and capabilities of client types.



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Case study chapters follow, from varied types of BIM-using clients in the public and private sectors: a developer, a local authority, a university and a contractor-client. The voices of the passive and active client are heard, setting out their experience and view.

The book then takes clients through a generic project, following the eight-stage RIBA Plan of Work 2013 which is written to support BIM use. The full UK BIM Toolkit developed by and for the BIM Task Group between 2012 and 2015 is demonstrated ) and the client actions are set out in chapters on each stage to inform the setting up of a project. Clients will see how to prepare, set up and execute the project to optimise returns from BIM usage.

Finally, as the concept of UK BIM is still evolving, the likely next steps, towards what is now called Digital Built Britain are explored.

Clients are the drivers of their own projects. Clients have to pull though the performance they require from all suppliers. They can be advised and supported and can delegate, but the tone and tempo is set by the client. BIM is a powerful new tool for clients to get more value from the project process and to realise better buildings in use. It is hoped that this book enables many more clients to use BIM confidently and successfully.

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