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## INSIDE:

**INTERVIEW:** Malcolm Taylor, Head of Technical Information at Crossrail Ltd, explains what BIM means to Europe's largest construction project

David Philp, Head of BIM at Mace and the UK BIM Task Group details how BIM can aid collaboration

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# Introduction



**Lisa Carnwell**  
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**Designer**  
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**W**elcome to our Planning and Building Control Today supplement focussing on BIM.

For this edition I was thrilled to be able to interview Malcolm Taylor, Head of Technical Information for Crossrail Ltd. In the interview he outlines what BIM means for this huge project and praises the BS: 1192 as it set the scene for BIM as we know it today. It was wonderful to listen to his enthusiasm for this huge project and to get a real feel for how BIM is developing within the project.

David Philp of the UK BIM Task Group also makes a welcome return in this edition with an article outlining how BIM can help industry to collaborate and deliver better outcomes.

I'm also really pleased that we have articles from Steve Thompson, Chair of BIM4M2 discussing the support and advice available to enable digital product information to be exchanged with supply chain partners, and Dr Jason Underwood from Salford University providing a detailed overview of the challenges that remain in terms of education and training.

As ever, I hope you find the articles informative and I welcome any comments you may have.

**Lisa Carnwell**  
Publisher

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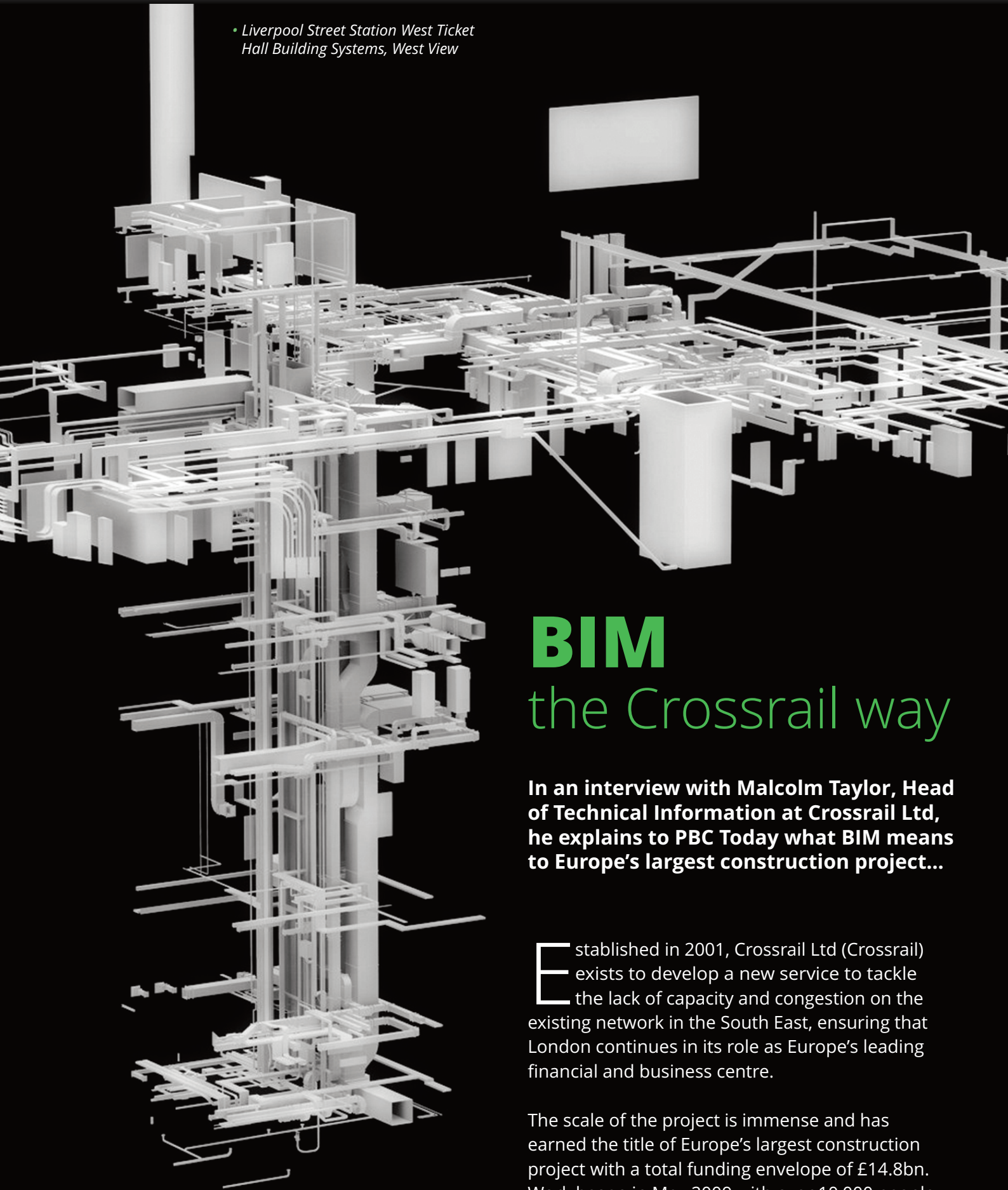
NBS have been awarded a contract to complete level-2 BIM for HM Government with a free-to-use toolkit as outlined here

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## **BIM** the Crossrail way

**In an interview with Malcolm Taylor, Head of Technical Information at Crossrail Ltd, he explains to PBC Today what BIM means to Europe's largest construction project...**

**E**stablished in 2001, Crossrail Ltd (Crossrail) exists to develop a new service to tackle the lack of capacity and congestion on the existing network in the South East, ensuring that London continues in its role as Europe's leading financial and business centre.

The scale of the project is immense and has earned the title of Europe's largest construction project with a total funding envelope of £14.8bn. Work began in May 2009 with over 10,000 people



employed on the 40 construction sites, clocking up an estimated 57 million working hours so far.

The man at the helm of technical information for Crossrail is Malcolm Taylor, responsible for BIM strategy and implementation; asset information management; technical data management; document control; GIS; and configuration management. A Chartered Engineer and former Rail Director for a major global consultancy, he has over 30 years' experience in the design, construction and maintenance of large-scale transportation projects around the world, with a particular emphasis on railway design, programme and project management.

Europe's largest construction project therefore has the most in-depth utilisation of technical information to date. Luckily, with a seasoned and enthusiastic veteran such as Taylor at the helm, Crossrail is exploiting, exploring and developing technologies that will be copied and built upon in future projects.

In a project that began in a pre-BIM world, Taylor has seen information technology develop to the point whereby the operation is already achieving around Level 2. With many contracts signed before the Government's BIM Strategy was released, Crossrail had already begun some of the construction projects and were working in a BIM environment.

The competency of contractors to understand 3D modelling and information sharing was key, with Taylor stating that:

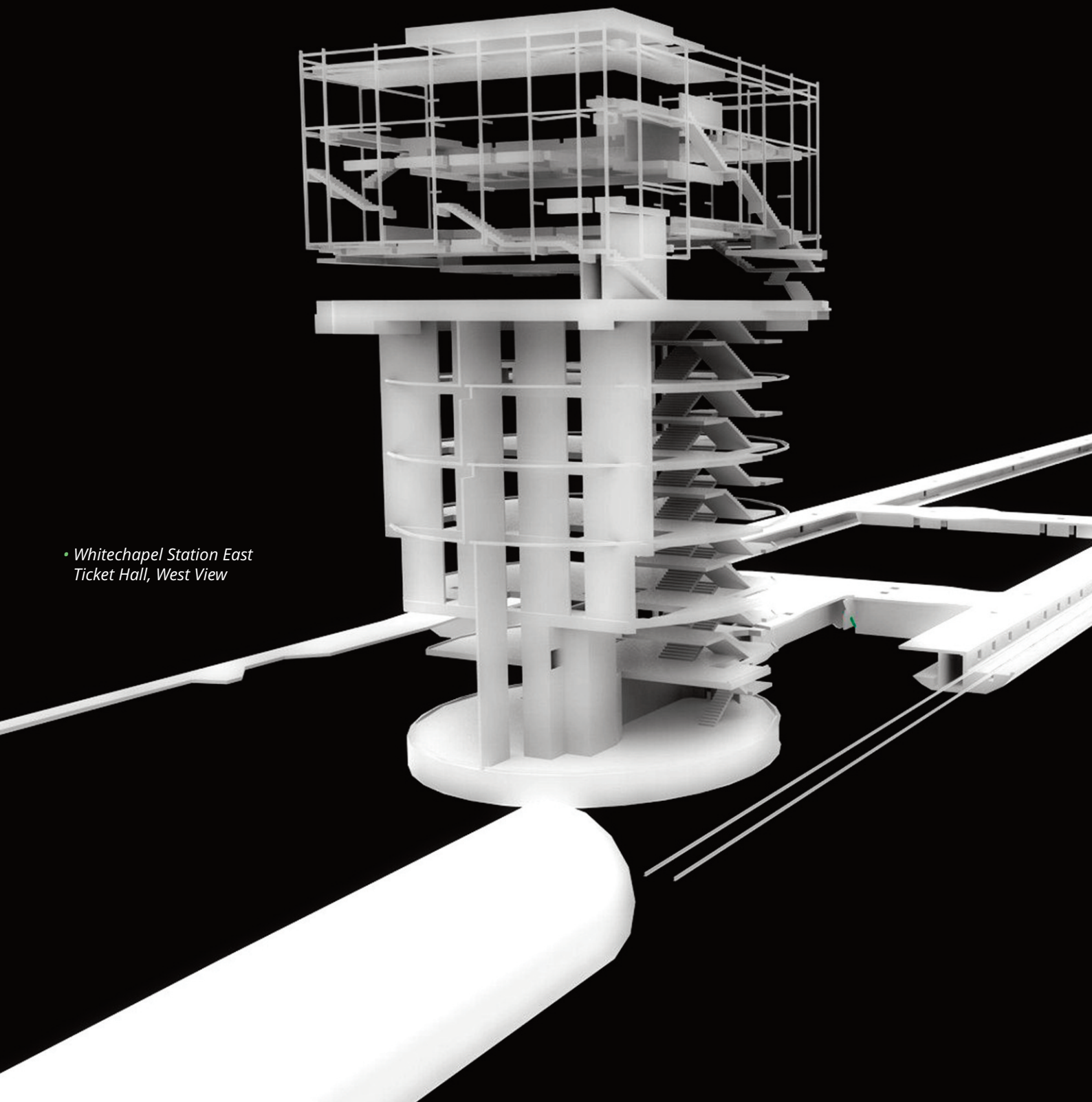
"We required designers for the main design work who were skilled in the art of 3D modelling. What takes basic 3D design into a level 1 BIM is pretty straightforward. Level 2 is more about the coordination of that design and merging together the various different types of models that one might have for civils, with architecture, mechanical and electrical, and bringing those together. We were confident that what we required our designers to do, was to work within our Common Data Environment (CDE) and that was something we set up very early on in 2008/9 within our CAD world."

#### **BS: 1192 – a single source of truth**

Creating the CAD CDE was made an easier task by following the BS: 1192 "to the letter" according to Taylor. He said that:

"The standard described everything that we needed to do to create the CAD CDE and the approach that we needed for collaboration in design. That document in 2008 really did set the scene for BIM, even though it wasn't called BIM at that time.

"This concept of a single 'source of truth' and one version of everything in one place that is owned by the client was, for us, a simple concept that meant it didn't matter whether we had 2 designers or 20, as the same principles and processes apply. Once you've captured that spirit of the concept of a CDE and collaborative working, the size of a project doesn't matter as long as everyone

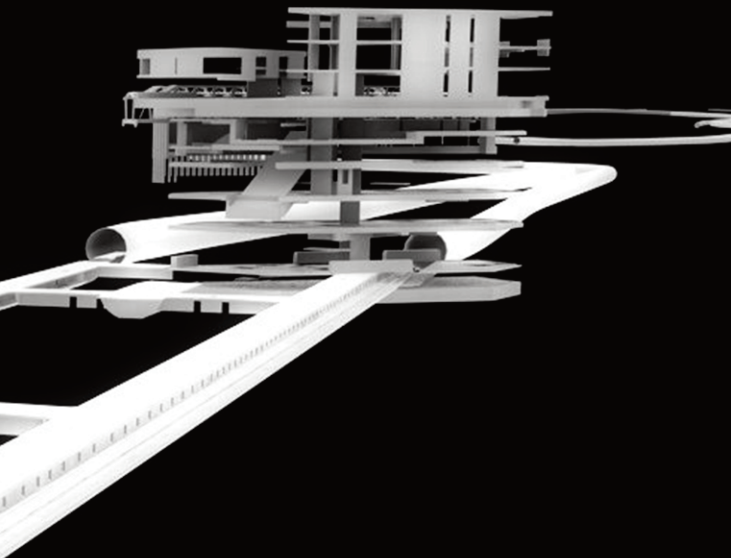


• *Whitechapel Station East  
Ticket Hall, West View*

follows the rules. BS: 1192 created the BIM environment for us meaning that contractors weren't requested to follow Crossrail's methodologies. Instead, it showed them how to comply with the British Standard.

"No one had really implemented BS: 1192 to the same scale as CRL before, but the same principles apply for a small or big project – the concept of a CDE with standard processes and standardised principles."

Achieving 'buy-in' from all contractors was made easier with the launch, in association with software supplier (Bentley Systems), of the Information Academy. It was set up to provide hands-on training



to the supply chain on the latest technology and software being used by Crossrail. The academy raises awareness in contractors about the way in which data is collected and managed, and also the processes and procedures. It really comes down to "awareness training" according to Taylor – not teaching people how to use 3D modelling, but teaching a standardised approach.

"People have bought into the idea. It's free. The great thing is that it isn't rocket science. People who can do 3D modelling can work in this new environment, and if you have good competent

technical staff who understand 3D, it is not a big leap" he added.

### **Common data**

According to Taylor, one of the biggest challenges in 2010 was the transfer of all records and documentation to a new CDE. The documents and data used to be on whole variety of IT drives – stored by different teams on different machines. When the main contract works commenced, they required all contractors to work in the document CDE as well as the CAD CDE. Taylor said that: "Contractors naturally want to do their own thing in their own systems, but the trick to getting BIM to work is to get everyone to work in one way."

This desire to work in familiar systems is understandable, but on a project of this scale, consistency across contractors has to prevail. Taylor understood the need to persuade contractors and explain the reasons for utilising the CDE's.

"Apart from telling them that contractually they are obliged to work within our CDE's, we have to show why, and explain the reasons. By explaining the benefits, we ensured buy-in. All the good ones have adopted it and are doing amazingly well."

To avoid any confusion in terms of legal ownership of the data, it remains firmly with Crossrail with a clear policy that contractors, as suppliers of data, are responsible for creating it correctly, and are liable if something should go wrong.

### **Lessons learned**

For Taylor, the biggest lesson learned in the world of information is the need to be prescriptive as to exactly what outcomes are expected. He explained:

"In an instance where you have a project with 1 designer, 1 architect and 1 contractor, you can usually just let them get on and do it the way they want. But where you have several dozen designers and many dozens of contractors, you need to be very clear regarding outcomes, or you as a client will need to sort all the differences at the end.

“We thought we were being prescriptive enough, but in the future I would be even more specific. When we talk about having particular levels in a CAD model for instance, we don’t mind how it’s created, but the output is what we are being prescriptive about. There is a subtle difference between us telling people how to do things, which we don’t like doing, or being clear about what you want produced at the end of day. We are interested in output – not stifling creativity.”

Again, the importance of BS: 1192 is emphasised by Taylor due to the “beauty of its simplicity”. With over 1.25 million CAD models filed and 1.5 million documents in the CDE (growing daily), ensuring consistency is key and this is where the standard proves its worth.

### **The challenges ahead**

There are still challenges to face in terms of ensuring all data can move through the different life-cycles – into operations and maintenance especially. The operator and maintainer are themselves trying to understand what the BIM world means to them.

This year, the PAS: 1192 part 3 was published and explains how the operations and maintenance world should work in a BIM environment. Crossrail is trying to make sure that the data created can not only work when passed over, but that the information is in the right place, of the right quality and at the right time. Taylor likens information to areas like plant, material and labour, which are a key resource in construction and design. He added that:

“The BIM environment, not just CAD, but data and documentation is changing project management significantly in the way in which we deliver major projects like Crossrail. Ultimately, the big challenge is getting it into the operation and maintenance world.”

However much information is seen as a key resource, it has to be the right information. It is important to be mindful of the amount of information used, or

“else you get into a world of really large big data. We are interested in creating a digital legacy here – using the best information that fits the job of operations and maintenance, and having information available for the user of the railway” added Taylor.

### **The software**

Different platforms are required for different intimations. For instance, one is required for CAD, for GIS, and for finance etc. Within BIM, this actually means different databases that are all linked together, enabling a user to extract information of any kind – even asset information whereby a maintenance manual could be retrieved. Having all this information connected changes the way in which projects are delivered, and if you know how to use databases, it’s not a difficult process.

By using a standardised approach in terms of file formats, the nightmare of data interoperability is eliminated. For Crossrail, the decision about which software to use was simple. Knowing what the operator and maintainer used, logically led to them using the same system.

For Taylor, an interesting area is one of work flows. He explained that by using simple transactional activities within the database, Crossrail did not need software for bespoke document management systems or contract administration systems. By using workflows within the databases, all valuable information is captured at source and stored immediately. “When we come to the end of Crossrail in 2018, we absolutely know where everything is. By having lots of drop down menus and templates we are automatically capturing information, thanks to the technology to hand.”

### **Benefits of BIM**

A successful BIM project relies on people that can collaborate and understand and utilise technology.

In the technology and project management world, another benefit is that it is possible to mix primavera schedules with CAD models and produce 4D sequences which show you in a visual way something being built. This is becoming amazingly important



as one can view the timeline for what is proposed for construction.

Having good records management skills is equally important. In terms of basic competencies, good groundings are required in IT and database management. Taylor outlined that: "the technologies are already there, the processes are already there, but the trick really is to make sure you have the right people."

Taylor talks of Crossrail as building two railways. One in the digital world, and one in the physical:

"We are building underground in a very busy city – the importance of being able to build it first of all in the virtual world to make sure all the pieces fit, is absolutely critical. We don't want to find problems when 30 metres underground. Getting it right in the virtual world means we will save very significant amounts of waste for example from clash detection, but there are really interesting softer benefits such as safety too. We have seen 4D models used for safety briefings showing staff, through the time sequence, what has to be done and when. So now imagine an interactive model being taken into the operations and maintenance sphere – a station manager can use it to show staff where to store plant or for evacuation training etc. This visualisation

world is already taking over the design and construction world, and ultimately it'll move into the operations and maintenance arena as BIM gets extended post 2016."

### **BIM level 2 by 2016 – are we ready?**

For Taylor, he believes that most of the supply chain is ready. But he posed another interesting question: are the clients ready?

"From a Crossrail point of view, we want the ultimate operator and maintainer – Transport for London – to use the information we're collecting in the best possible way. So one of our objectives is help the client to help them get ready. PAS: 1192 part 3, which came out earlier this year is a great help, but there's still a way to go yet for some clients. Across construction, asking if clients are ready remains an unanswered question."

.....  
**Malcolm Taylor**

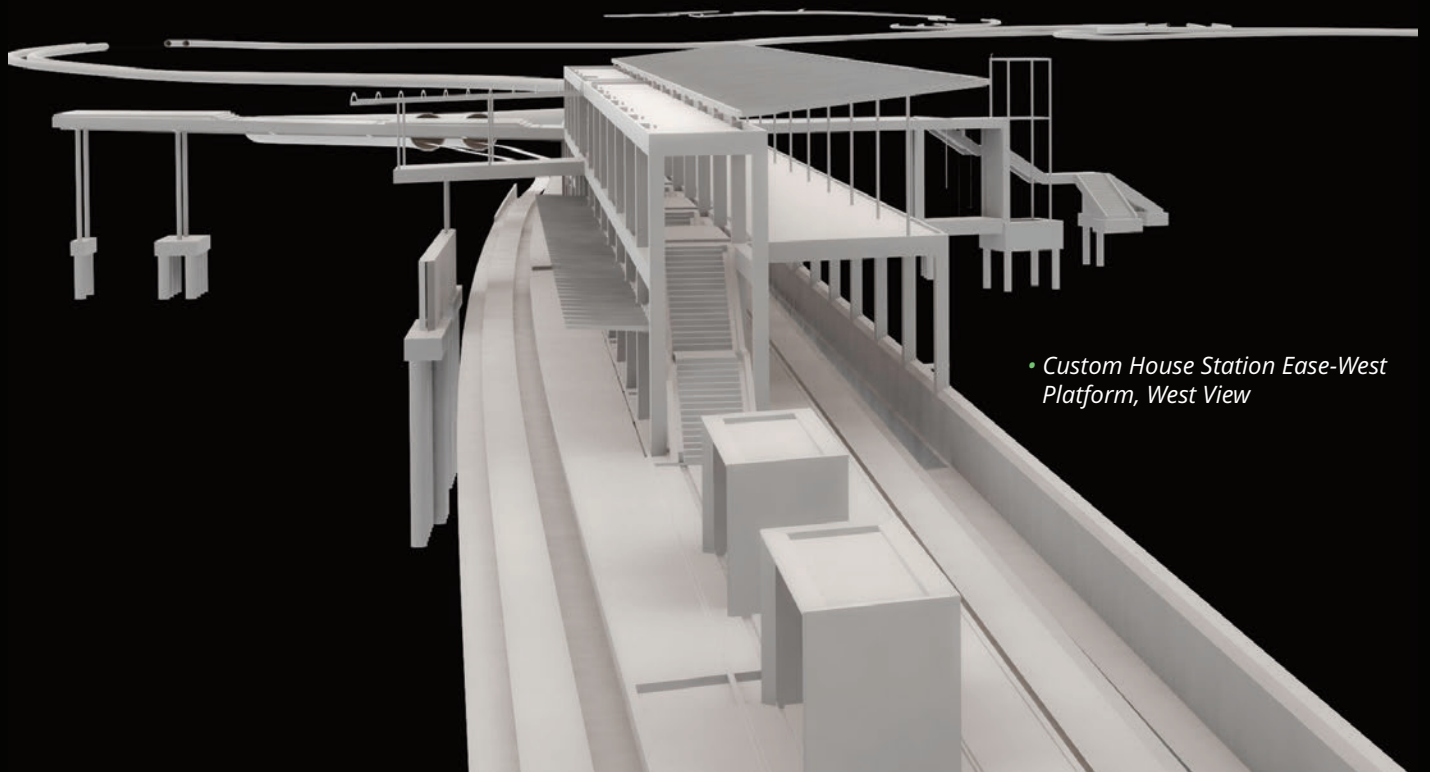
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# BIM, CAFM and Soft Landings

Property and cost consultant Rider Levett Bucknall is the first organisation in the UK to deliver an integrated BIM and Computer-Aided Facility Management (CAFM) approach to a construction project, delivering tangible benefits to the client and the scheme itself.

Combining BIM and CAFM is a pioneering approach and is underpinned by Soft Landings, the Government's construction strategy that aims to align design and construction with operational asset management.

The project in question is the £40m redevelopment of the Champion Hill Campus at King's College London. It is already being showcased by the Government as a successful case study for this cohesive approach and Rider Levett Bucknall was invited by the Government to present to industry and government leaders earlier this year (2014).

The Champion Hill scheme completed in September 2014. It comprises 720 student residences across four new-build blocks and the renovation of a Grade II listed building which accommodates the student social hub and support services.

Rider Levett Bucknall secured its role as project manager and cost manager by developing this revolutionary approach to BIM and CAFM which ensures that data generated during the design and construction phase is fully utilised to enable extremely efficient building commissioning, training and handover.

Traditionally the two information processes have remained separate silos with no direct

transfer of the data from the construction phase to the operational stage.

Results are achieved by seamlessly exporting BIM data into the CAFM system including maintenance information to create 'data rich' asset information such as planned preventative maintenance (PPM) schedules and enhanced help desk functions.

The process includes detailed energy monitoring; this data is fed back from the Building Management Systems (BMS) to highlight any variances there may be from the predicted energy use during the design stage. Full training of maintenance staff has also been programmed into the scheme to ensure that building operations are fully understood at handover. The planning of the commissioning process commenced 12 months before the project was due to complete.

David Quirk, partner at Rider Levett Bucknall said: "Robust processes have been developed as part of this combined approach to make sure that not only is the building is functioning fully at handover but that an on-going legacy is provided, with facilities management and everyday operations embedded from day one.

"The project is BREEAM Outstanding with an Energy Performance Certificate (EPC) A Rating.

"To deliver this outcome we facilitated numerous workshops with stakeholders to articulate their varied and detailed requirements, which formed the cornerstone of the project brief. Following public procurement rules, we secured a contractor fully committed

to delivering BIM and Government Soft Landing requirements. The contract was awarded to GB Building Solutions and we have worked with its team and the College to convert the strategy into a detailed delivery plan, covering the pre-commissioning, handover and post occupancy activities to ensure objectives are achieved.

"Many large projects delivered in the UK now have an element of BIM and we believe that there will be massive take-up of this integrated Soft Landings, commissioning and facilities management approach in the next few years. It is a Government backed initiative so by its nature has implications for both public sector projects and the wider construction market."

Rider Levett Bucknall is currently delivering six projects using Government Soft Landings (GSL) across sectors including education, healthcare and research, for both new-build and refurbishment projects, ranging from £2m to £100m.



**David Quirk**

**Partner**

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# Mindful BIM collaboration

**Collaboration is a key element in the successful execution of a BIM project and can help to share information across teams. David Philp, Head of BIM at Mace and the UK BIM Task Group details how BIM can aid collaboration...**

Building Information Modelling (BIM) is purported to aid collaborative working. Every conference or symposium marries these two themes together without really unpacking what this relationship looks like. Like BIM, collaboration has different meanings depending on your perspective and what lens you are looking through, indeed the Collins Dictionary defines collaboration as either:

1. The act of working with another or others on a joint project;
2. Something created by working jointly with another or others;
3. The act of cooperating as a traitor.

Most would say that one and two are the most commonly related meanings in the context of our industry, though some I am sure would recognize the third definition as a reality on some projects.

Hopefully we all identify collaboration as a key element in the successful delivery and execution of a project programme and as a lever to help break down silos and successfully share information across teams. The reality, as the author Morten Hansen points out is that “bad collaboration is worse than no collaboration” and that “the goal of collaboration is not collaboration itself, but results.” So how can BIM really help us collaborate and deliver better outcomes?

In this author’s opinion, the main pedal to ensure successful collaboration in a BIM environment is a clear ‘purpose’. High-performing teams are driven by a well-defined purpose (do not confuse this with a

vision statement) and if BIM (Level 2) is good at anything it is; a) lots of new acronyms, but also b) defining clear information requirements at all stages of the asset life-cycle.

Level 2 maturity begins with clearly defining the purposes of the model(s) and their uses. These are referred to as the organisational and asset information requirements and are articulated to the supply chain through an Employer’s Information Requirement (EIR).

Defined information requirements, defined processes (PAS1192-2 and 3) for information delivery and agreed data exchange standards (BS1192-4 COBie) create a strong foundation for collaboration, and when properly worked through with the entire project team, help create unifying goals. The wise client would also do well to additionally invest in BS 11000 Collaborative Business Relationships which defines roles and responsibilities and supports collaborative decision-making.

Level 2 BIM also ensures that collaboration extends beyond delivery, with the requirement for ‘Soft landings’ and the requisite for an operational champion to be involved throughout the plan of work for that project – starting with the end in mind and using the model as a basis to visualise and test the lifecycle solution at pre-construction stage. This is a great win in an industry where there is normally a large chasm between the delivery and operational lifecycles.

BIM is data rich in the context of both geometric and alphanumeric data which can be visualized in a 3D, or indeed an immersive environment. In terms of low hanging fruit, BIM allows all stakeholders in a project



**David Philp MSc BSc FRICS  
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Head of UK BIM Task Group**

to clearly understand and explore the project life-cycle – often now assisted by ‘gamification’ methods and augmented reality (AR) techniques. It is essential however that organisations avoid ‘lonely BIM’, where one solitary party sits staring at their exquisite model. Models need to be shared and used as a backdrop for decision making; if you like the modern virtual day camp fire but without marshmallows and bad singing. Projects using BIM should always consider as part of their strategy the creation of physical spaces where collaboration workshops can be undertaken, models reviewed and decisions made with screens such as short throw projectors. These are often referred to as ‘big rooms’ or Computer Assisted Virtual Environments (CAVEs).

It is also critical that rigor be given to managing information flow between the project stakeholders within the context of a common data environment (CDE) as set out in BS 1192:2007. In addition, the collaborative production of architectural, engineering and construction information Code of Practice, which establishes the outline methodologies for setting up the BIM project cannot be ignored. To exploit collaborative working processes, a common methodology for managing the data produced by, and between all parties, must be used. This should include the naming of data as well as a process for exchanging data. This common data environment is a key component of both level 1 and 2 BIM maturity.

Forms of procurement should also be considered as a lever to encourage collaboration. The Government Construction Strategy trialled the use of procurement routes which sought early contractor engagement. The value of this timely appointment should not be underestimated, however, it is essential that this

same strategy be considered in the early engagement of specialist contractors and manufacturers who are key to a joined up data hierarchy. This is as much a cultural change as it is a process change.

Open data standards which allow the transportation of information and support interoperability are also really important to the collaborative investment we need to ensure that everyone can play on a level field, especially SMEs. This is why the development of COBie and IFC are crucial to ensuring the uptake of BIM across the construction community.

We must also consider the danger of information overload in a collaborative network; it is therefore essential that the right amount of information, to the right level of maturity, at the right time, is established. It is crucial therefore that a well thought out Master Information Delivery Plan (MIDP) is established through a collaborative process before the information exchange process begins.

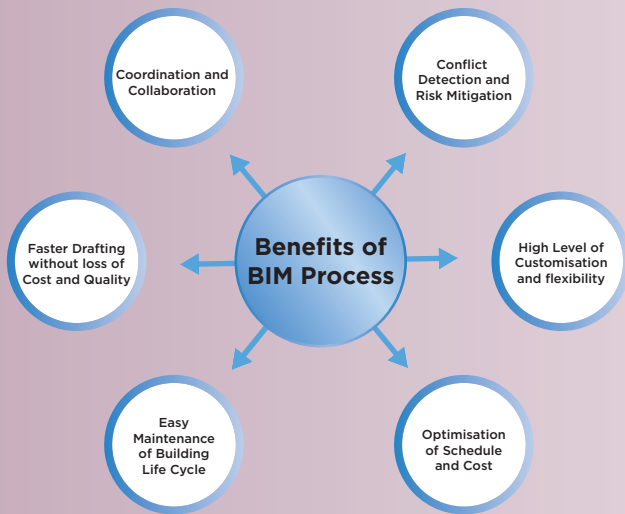
What we must always remember is that construction is a human endeavour and technology is there to support collaboration and not replace it. Indeed, the biggest danger is that we get bogged down in a technical discussion when BIM is a behavioural change programme more than anything else. ■

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### What is BIM?

Building Information Modelling is a work-flow process that uses modelling and software to create a digital model that will react and perform as it will in the real world.

This model is used throughout the construction and ongoing maintenance of the project.

The Government have introduced a BIM Mandate, where by 2016, all professional businesses and construction workers wishing to work with, or for the Government, must be BIM trained and compliant to level 2.





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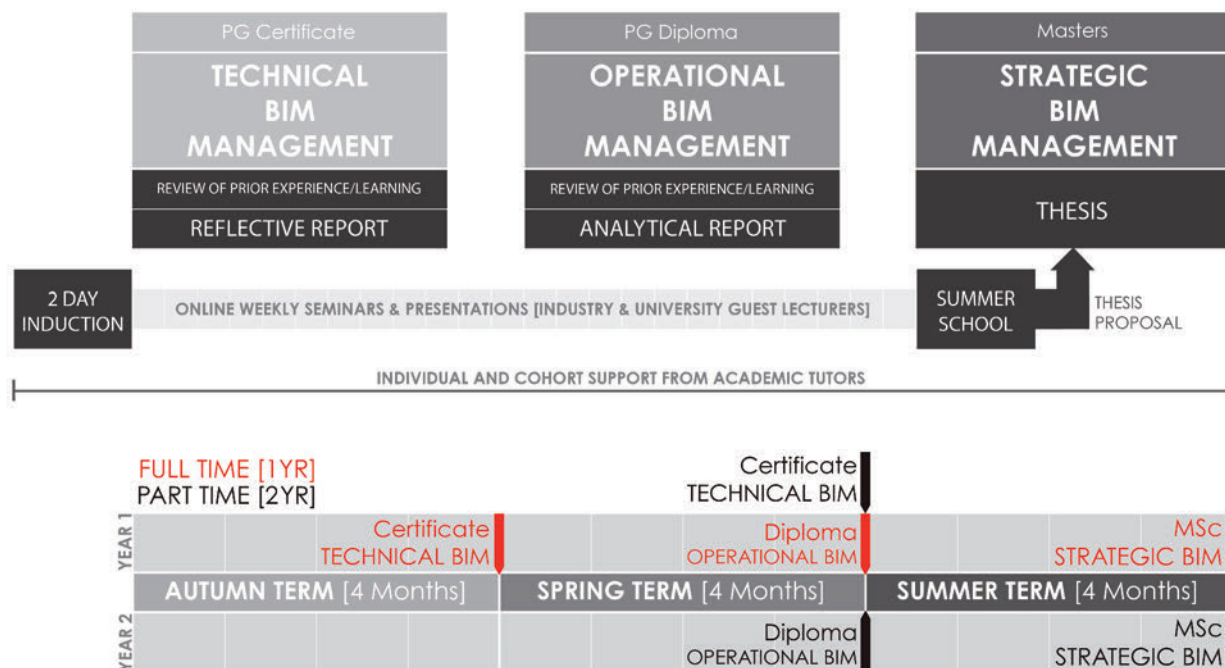
simulations which students have testified taking the benefit of straight to their workplace

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Building Information Modelling (BIM) reaches parts of an organisation other processes do not. It changes Technical, Operational and Strategic Management of organisations/projects needing restructuring. How all parties relate to each other changes, legal arrangements need rethinking, HR is impacted, organisational finances change: quality assurance and risk management procedures need reviewing and updating – nothing escapes!

There needs to be a fundamental change in relationships from adversarial to cooperative. By having diverse and multi-disciplined participants in each cohort, the knowledge sharing increases participants' understanding of all stakeholders' needs and requirements in a BIM environment informed by technology, research and management skills in standard and unpredictable scenarios..

## STRUCTURE & TIMEFRAME



The programme recognises three key areas in BIM Management throughout the whole construction lifecycle: Technical, Operational and Strategic Management. For those not wanting/needing to cover all these disciplines, the course is devised in three modules, following the three key areas, so that a certificate is awarded for the first, a diploma for the second and a masters for the third.

Since practitioners do not have the time to commit to full-time learning; the programme is set-up as distance learning over two years, with an option to do full-time in one year.

Cooperation and collaboration are key ingredients of BIM management and are encouraged amongst participants. Hence the programme starts with a two-day on-campus induction where everybody engages in group activities. So much so that we find the cohorts arrange "BIM" days themselves. The University helps facilitate these through campus facilities and academic staff attendance. Prior to the final module there is a week-long summer school to discuss the research proposals for the masters theses.

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Middlesex University



## Educating BIM: changing the face of construction

**The key to the success in transforming the construction industry to operate at Level 2 BIM by 2016 now lies very much with education and training providers. Dr Jason Underwood at the University of Salford provides a detailed overview of the challenges that remain...**

Within the UK construction industry, the last few years has seen momentum to transform the sector driven by the Government's commitment and mandate to digital information delivery and Building Information Modelling. While BIM is presenting a relatively new phenomena/concept for an industry that has operated predominately in the same way for over a century, academic researchers have been engaged with the concept for over 20 years.

Research, particularly in the area of construction ICT, has focused on exploring the facilitation of

collaboration through shared data models and exchange between commercial design, analysis, planning, estimating, etc. software. It has also focused on enabling processes, which has led to the concepts of BIM and 4D, 5D, 6D, and nD modelling, which facilitate the multidisciplinary 'information' perspectives of emerging projects/assets. Such research has been driven in response to government and industry initiatives, including the Latham (1994) and Egan (1998) reports, which highlighted that the industry was suffering from low productivity and inefficiencies. They also identified that substantial wastage could be driven out from the delivery of



assets through significant improvements in adopting a client focus, improving team work/collaboration and changing the culture. While previous government initiatives have also attempted to support a drive for change, these could be considered as paying lip service in terms of real commitment and there was an expectation that the industry would solely drive the change. While such initiatives and research focused on responding to the recommendations and on driving industry change, 12 years on Wolstenholme (2010) reported a lack of any implementation progress for the recommendations, pessimism about the future outlook for change, and a culture still very much engrained in avoiding or exploiting risk in order to maximise financial gain.

However, May 2011 brought about a real commitment from the UK Government to drive change and to transform the industry through the launch of its Construction Strategy. For over a decade, other national construction initiatives have taken the approach of mandating the use of BIM on public procured projects, particularly within the US, Scandinavia, and Singapore. The UK Government strategy, on the other hand, is also committed to working with the industry to facilitate the transformation through the provision of a set of standards, a classification system and documentation, etc. This Level 2 BIM suite is expected to be completed by 2015 and addresses:

1. Production of co-ordinated design and construction (CAPEX) information (PAS1192:2:2013);
2. Process delivery and use definitions for the operational phase of the asset (OPEX) (PAS1192:3:2014);
3. Interim data definition for information deliveries (BS1192:4:2014/COBie-UK-2012);
4. Suite of BIM commercial and contractual advice documents and standard forms (BIM Protocol);
5. Soft Landing policy and processes to ensure the effective involvement of users and operators in the development of the scope, design and delivery. This goes alongside ensuring effective training and handover into operations, and the structured

gathering of Post Occupation (Operational) Effectiveness data that enhance both the current and future assets (Government Soft Landings - GSL);

6. Structured and standardised information Classification System;
7. Industry standard method of describing geometric, requirements and data deliveries at key stages of the project cycle (Digital Plan of Works);
8. Learning Outcomes Framework to ensure the provision of consistent training/education in line with BIM Level 2.

The suite goes a long way to provide elements that help to define 'what' Level 2 BIM is; however the key to the success in transforming the industry to operate at Level 2 BIM by 2016 now lies very much with education and training providers who need to consistently support 'how' the industry now goes about implementing the suite. As the UK construction industry indirectly employs over three million people and is highly diverse with a range of discrete sub-sectors, educating, training and upskilling both the existing industry and future professionals presents significant challenges.

We are now well within the midst of the Digital Revolution with the emergence of personal computers, the internet, social networking, ubiquitous computing, etc. The pace of change is accelerating at an incredible rate and is significantly impacting on our daily lives. Each generation experiences life, including education and work, very differently in that they are influenced both by the social and cultural values of the society within which they mature and by the technologies available. The Digital Revolution significantly influenced those born after 1981 (Generation Y) and has continued to do so amongst those born between 1994 and 2004 (Generation Z). This differs compared to previous generations (e.g. Baby-Boomers, Generation X) and a generation gap is more pronounced between the digital natives, who have grown up with technology, have no meaningful memory of life without it, and have become fluent in it, and digital immigrants who have adopted it as adults, and have

gained proficiency but interact with it in a fundamentally different way, therefore remaining 'immigrants'. The generation gap has significant implications between educators and learners and between current industry decision-makers and new/recent entrants; this has to be considered in the education and training systems and the requirements of a transforming construction sector.

From an education perspective, parallels can be made between the challenges the industry is currently facing in beginning to transform, and those encountered within academia in the education and training of existing and future professionals with the necessary skills and competencies required in a changing sector. As is similarly evident in the industry, early indications from a BIM Academic Forum (BAF) survey, which is due for publication later this year, suggests that the understanding, acceptance and importance of BIM amongst Higher Education (HE) academics within built environment, engineering, architecture, etc. is still considerably low. BAF was set up in response to the Government Construction Strategy with the aim of creating a dynamic collaborative group to enhance and promote teaching and learning alongside the research aspects of BIM. As students enter and subsequently graduate from HE, the nature of education serves to reinforce the siloed mentality that remains entrenched within the industry. Changing such a culture and mindset that exists among many academics presents a huge challenge requiring the transformation of HE curricula from one that currently reinforces a silo mentality, and leads to the development of disciplinary-specific (siloed minded) professionals.

The current curricula also need to evolve to ensure that BIM becomes consistently but not prescriptively embedded and to ensure that HEIs maintain the flexibility and creativity in their delivery of education. A number of initiatives currently focus on facilitating BIM-embedded education and training. BAF have proposed an academic roadmap to a longer-term vision that embeds BIM learning at the appropriate levels within 'discipline-specific' undergraduate and postgraduate education. This also begins to break

down and establish the potential learning outcome requirements at each level of HE. The final part of the BIM Level 2 suite is aimed at third-party education and training providers and is currently under development with the Education & Training Working Group; this aims to enable the consistent capacity and capability of BIM Level 2 in the UK domestic market. However, adopting such learning outcome framework(s) within HE curricula will also require a change to the culture and mindset of academics to drive change in the current curricula and align with the needs of the next generations of learners.

Accreditation of HE programmes is important in externally demonstrating that course curricula meet the defined criteria and educational requirements set by the professional bodies to prepare students for their future careers. Incorporating relevant aspects of BIM within the defined accreditation criteria could also serve to further drive BIM to become embraced within HE curricula and thus help the shift from siloed mentalities. Many of the industry's professional institutes are embracing BIM through the delivery of BIM training in the form of CPD; however, in terms of HE, accreditation criteria that incorporates BIM is yet to receive any serious attention. This may be due to the previous lack of clear definition of Level 2 BIM or of industry uptake/demand, or a limited understanding of BIM amongst the professional bodies themselves.

As the industry continues to develop its understanding of BIM and gear itself for the 2016 mandate, the demand for graduates with not only disciplinary competences but also with some level of BIM knowledge and capability continues to increase. Potential students are also aware of the importance of BIM in further enhancing their employability potential and, along with accreditation, this is important in their choice of an appropriate programme of study. Professional bodies, HEIs, and other bodies, such as the BIM Task Group, BAF, etc., need to come together in order to begin to address the implications for a transforming industry and the accreditation of HE programmes that incorporate BIM. HEIs are presently in a fluid and transitional period; they need to educate graduates who meet the current needs of industry

*Continued on page 20...*

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*Continued from page 18...*

and are fit for purpose but also future-proof them for a transforming industry.

BIM is now becoming widespread across the various levels of HE education, albeit ad hoc and without consistency. In the main, this tends to be driven by individual academics or schools/departments that have a particular interest in the area of BIM and recognise its importance in the education of professionals. Over the last few years, a number of BIM specific programmes at Masters level have emerged in the UK. These programmes are experiencing an increase in student numbers and are providing the means by which current industry professionals are retraining or upskilling. Furthermore, graduates are undertaking such programmes in order to increase their knowledge-base in this area and thereby enhance their employability potential.

The construction industry still continues to suffer from a less than favourable professional and low tech image in comparison with other sectors, such as medicine, business, finance, law, ICT, etc. The Construction 2025 Strategy is committed to improving the image of the construction industry by inspiring young people. The industry transformation that is being driven in the UK presents an excellent opportunity to positively influence the perception of the industry. Inspiring young people through education will enable the creation of an image of an industry fit for the 21st Century, which is no longer considered dirty, difficult and dangerous but high-tech, highly professional, and a major contributor to the delivery and management of a built environment that significantly affects the everyday lives of society and to UK economic growth.

Initiatives such as that led by Class of Your Own, are focused on transforming the education of 16-19 year olds by targeting a technology savvy generation of learners through the application of pure subjects in solving real world challenges. A number of BIM-specific BTEC level programmes have also now begun to emerge. While these efforts are making great strides in aligning education with the industry transformation, they may actually be considered too

late. Therefore, attracting young people into the construction industry presents a key challenge and requires even earlier targeting (as young as 12 or possibly younger). Such a challenge has to be concurrent with reaching out to the parents of young people in order to influence their perspective of the construction industry as a positive professional career for their children to be encouraged to embark on.

The UK construction industry is at the early stages of a transformation driven by Government commitment and working with industry to provide the required enablers. Already the UK Construction/BIM strategy is attracting attention internationally and offers an opportunity to transform the UK industry to one that is world leading in the digital delivery and management of the built environment. At the same time, if the UK industry is slow on the uptake, the opportunity could not only be missed but exploited by external market(s). A key to the success of the transformation is educating and training both those in the current industry and future professionals. However, in a similar vein to industry, a number of challenges face education providers in changing the face of construction. ■

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# BIM – From Design to Demolition

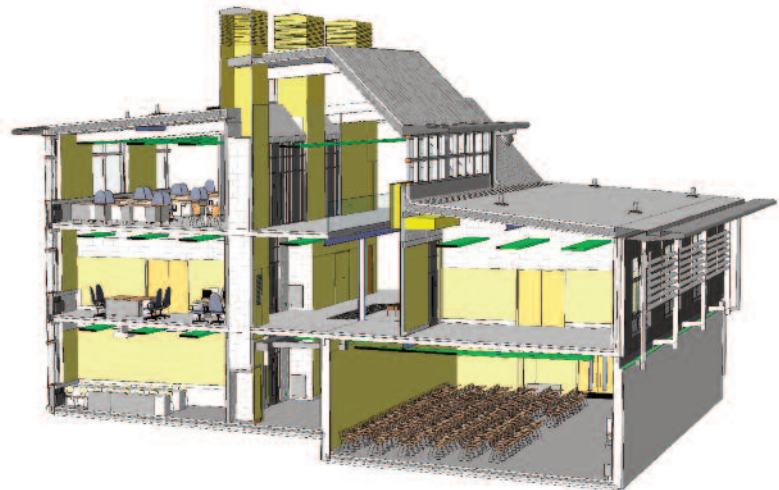
UWE Bristol launches new MSc in BIM to help meet stricter public construction protocol

Stricter government requirements on managing the building lifecycle for publicly funded projects are being met by the launch at UWE Bristol of a new MSc Building Information Modelling (BIM) in Design Construction and Operations. BIM is emerging as the industry standard approach to the modelling and management of a building’s lifecycle, from design and construction to maintenance and demolition. The UK government’s construction strategy has pushed forward the programme for adopting it – from 2016, all publicly funded projects will have to meet the BIM protocol. Public sector contracts are worth almost £37bn per year, making up a considerable proportion, 38%, of all UK construction output.

However, lack of education, skills and trained professionals are among the major obstacles to the adoption of BIM in the industry. UWE’s postgraduate certificate, postgraduate diploma and master’s degree courses in BIM in Design, Construction and Operations aim to respond to this challenge.

UWE Bristol programme leader Professor Lamine Mahdjoubi said, “Since BIM was introduced in the construction industry, it has become a worldwide focus of the construction industry. Many of the world’s leading architecture, engineering, and construction firms are on the way to adopting BIM. However the majority of the construction industry is in the hands of small and medium enterprises (SMEs) who are not ready for such a sudden change.”

What sets this programme apart is the context of inter-professional and multi-disciplinary approach and expertise that exists in UWE’s



Faculty of Environment and Technology. Unlike existing postgraduate programmes in BIM, which tend to focus on specific aspects of building information management, such as design or sustainability, this new programme is more holistic in its approach and deals with the whole built environment lifecycle, including design, construction, operation, maintenance, and sustainability.

This unique programme emphasises innovative sustainable and collaborative practices in building information modelling and management. It will be distinctive in offering more employment opportunities for our graduates through the opportunity for work placements with key partners such as Stride Treglown Plc who are currently leading the South West BIM hub, and BAM Construction Ltd.

Keith Wildin of BAM Construction Limited said, “UWE Bristol is unique among education establishments, having recognised that the BIM ‘process’ is more important than the ‘technology.’ This approach to teaching BIM will prepare students for working in a co-

operative environment that has the potential to transform the UK construction industry by questioning current practices and developing technological knowhow facilitating the BIM process.”

[Click here](#) to see the video.

Accreditations and partnerships:



University of the West of England

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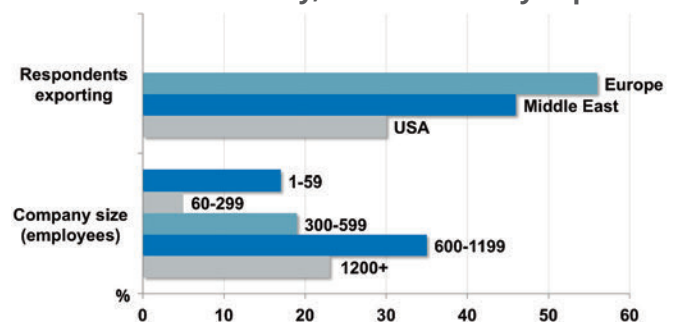
# Manufacturing for BIM

**Addressing the challenges faced by manufacturers in the BIM process requires that digital product information can be exchanged with supply chain partners. Steve Thompson, Chair of BIM4M2 discusses the support and advice available...**

Even before the UK Government announced its intention to require collaborative 3D BIM on its projects by 2016, the construction industry had been busy readying itself for the change to a digital world. Whilst it is clear that the creation, exchange and use of product data is crucial to the BIM process, a common understanding of the type of information that product manufacturers should provide to support BIM has been missing. In March of this year BIM4M2 was formed, with the purpose to support product manufacturers through the transition to a BIM-ready industry, and to provide a forum to share their knowledge.

For me, one of the most exciting aspects of BIM is the willingness of organisations and individuals across the industry to collaborate and work together to address the challenge. Manufacturers have been using digital information and processes for over half a century, but exchanging digital information with supply chain partners is a very different proposition, and one that the sector is eager to tackle. From the preliminary results of the survey of manufacturers that our Promotions Working Group are undertaking, 93% of those responding said they plan to invest in the process (41% already have, and 52% will have by 2016). So, for many the question is less about whether to develop their BIM capabilities, but more about how, in what format and on which platforms? This is where the real challenges lie for the manufacturer, and the answers can be different for every organisation depending on their product types, supply chain routes, markets, regions and scale. However, the basic principles remain the same, to provide structured digital product information that can be exchanged with supply chain partners.

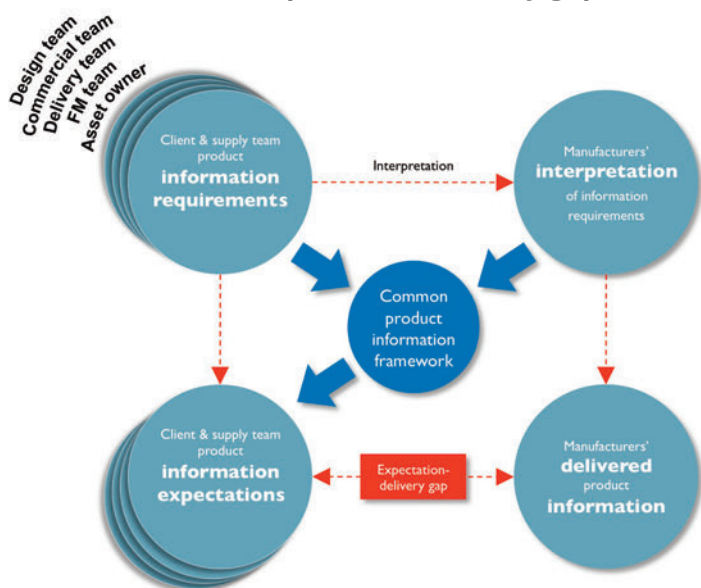
**Mix of manufacturer organisation size responding to the BIM4M2 survey, and where they export to**



Adding to the complexity is the different information requirements of members of the client and supply chain team on any given project. To find a way through the complexity, we need to work together as an industry and develop an agreed way of describing products and their attributes, both for the UK and internationally. Certainly BS1192:4 (COBie) forms part of the solution as the mandated exchange format for Level 2 in the UK, and the broader Industry Foundation Classes (IFC) are also crucial; but these need to be supported by further definition of what information supply chain partners need and how this can be presented consistently by product suppliers. I'll illustrate this using a customer satisfaction approach.

As we know, on any construction project the client has a set of requirements that need to be met through the delivery of the project, and to support their delivery is a set of information requirements. In the BIM process these are the Employer's Information Requirements (EIR). Added to this, members of the supply chain also need information to deliver the project effectively, and to share with others. In the BIM process these are described in the BIM Execution Plan (BEP).

### The expectation-delivery gap



Steve Thompson RIBA, Chair BIM4M2

Without close engagement and accurate definition of what information is required and the level of granularity (element, system, product), there is real potential for a gap between the supply team’s expectations on what information a manufacturer provides and what will be delivered: the expectation-delivery gap. With a common framework for product information, supply teams will know what to expect, manufacturers will know what to provide as a minimum, and the gap between expectation and delivery is reduced.

With the development of COBie, the Digital Plan of Work and BS 8541 parts 1-6 in the UK, the gap will certainly begin to close where they are applied. To reduce the gap further the BIM4M2 Data Templates Working Group are working closely with other BIM4 Community groups, clients, professional institutes, trade associations and content providers to develop and refine product data templates to enable suppliers to provide information in a consistent format. There should, and will always be the potential to go further, but the templates will look to set the baseline to support the requirements of a Level 2 BIM maturity.

For those supplying products internationally, a common concern is that in developing structured information or objects for the UK, they will need to create different information for use in every region they operate in. The good news is that with the development of an ISO standard for the BIM process,

there is the potential to reduce the differences that exist, and by structuring our information in a common digital format, it makes exchange of information across regions much more straightforward.

Furthermore, the BIM4M2 Education Working Group is developing guidance for product manufacturers on the implications of BIM, and how to develop and deliver a BIM strategy that is fit for their business.

If you would like further information on the group, or to get involved please contact us through our website or on the details provided. ■



**Steve Thompson RIBA**  
**Chair**

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# BIM – where will the product information come from?

The potential impact of BIM on all stages of construction is undeniable. Expectations on the part of clients and other stakeholders are great and growing all the time as experience accumulates and as case studies based on successful projects emerge.

Part of the reason for this is that BIM can best be seen as belonging to a suite of related technologies and new ways of working – such as off-site manufacturing, smart buildings, data management, higher performing buildings – which collectively have been called digital engineering. The impact on how the built environment is designed, constructed, maintained, operated and dismantled or rebuilt will be profound.

Such statements are becoming commonplace and almost taken for granted. Indeed, to illustrate this, the Construction 2025 strategy launched last year is to a large extent formed around the idea that properly implemented, digital engineering will be capable of supporting the industry's need and desire for transformation, to perform at an altogether higher level (33% lower cost, 50% faster delivery, 50% lower impact).

It is becoming clear that as an industry either we already have the necessary tools, or that tools will be developed in the foreseeable future. BIM itself will continue to evolve and we can expect the flow of innovation to continue, but it is also clear that we face a step

Products manufacturers, like Saint-Gobain, carry out extensive testing on their products, both in laboratory conditions and on-site. With access to all this test data, who is best placed to provide high quality BIM datasets?



change, or a discontinuity, initially as more of the industry gets on the first rungs of the ladder of this new way of working. It is easy to see BIM level 2, namely forming and using the digital libraries of core information, as representing these first steps. Having addressed level 2 we will need to embrace BIM level 3 and all that that might bring with it, which many observers are expecting to enable the real transformation of the industry which is ultimately sought.

However good and efficient the software tools are, it is easy to overlook the other elements which need to be in place to make the whole design and build process work to actually deliver the quality and benefits expected by stakeholders, supply chain and clients. Some of these elements, such as collaborative working and sharing of information, are touched on in the other articles in this supplement. One specific area, of interest to manufacturers and suppliers like Saint-Gobain, is to do with the data, especially that to do with products, materials and assemblies, which form one aspect of the information input into the building or construction model. A moment's reflection enables one to realise that the library of product information being used by the BIM design tool needs to be appropriate, accurate and up to date, or errors will be hidden only to emerge at a later date in say the build or assembly process, or during operation, which will potentially be very costly to resolve.

As the use of BIM progresses from level 2 to level 3 it is clear that the depth and range of product information required by the designer will continually grow – from dimensional data, to include performance (thermal, structural properties, acoustics, embodied carbon, recyclability etc). Since BIM is not just about working in a different way but it also includes the idea that ultimately the client expects it to contribute to higher performance at a lower cost, then competitive commercial pressures will be brought to bear and will help to shape how

BIM is used. To win work the designer will need to have confidence that the optimum design is being offered, in all senses, and that this design can be delivered in reality. This means that the task is not just about the elimination of errors and uncertainty in the raw data, but that the right products are being used and those products have the precise properties (and associated data) sought and assumed by the designer in assembling the solution to be offered to the client. As additional dimensions of data start to be integrated into the BIM model this challenge will only grow.

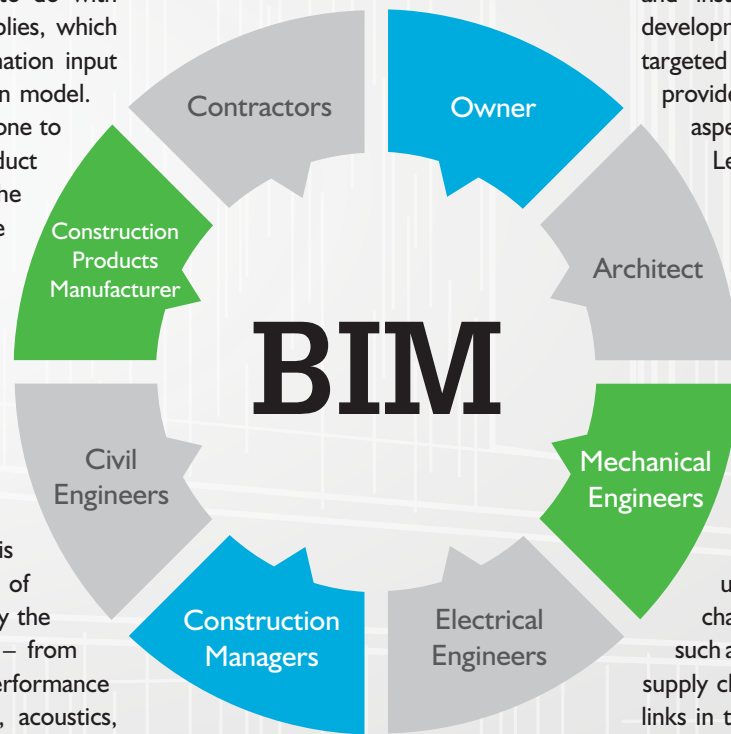
One solution offered is to use a library of generic product data – using average or typical data taken from across the market of a number of different versions of similar products (insulation, glass, wall linings, structural components, cladding etc). At first sight this solution may appear to offer a way through: a third party takes on the task of collating, interpreting and analysing the

data to form a set of typical numbers which the BIM model can then simply connect with and extract. But what are the disadvantages and is there a better way?

In any industry, manufacturers will vie with each other to develop and bring to market more competitive products and solutions. Construction is no exception. In the information-rich age of BIM, an integral part of this improvement process is the dataset associated with each product which will enable competent modelling and design optimisation. The use of generic or average data, of ill-defined ownership, would increase the risk of inaccurate data as well as resulting, in all probability, a sub-optimal design with the consequent risk of it also being less competitive commercially than one resulting from the use of better quality data relating to the actual physical solution being proposed.

Where does this higher quality, more useful, data come from? Manufacturers are in the best position to be able to offer this: they own the raw data for their particular product portfolio; they understand how to use their products in terms of design and installation; they invest in product development to bring to market solutions targeted to address specific needs; they provide technical support services on all aspects of their product or solution. Leading manufacturers, such as Saint-Gobain, are developing the delivery of this information in an on-line format for BIM so that the data is 'live'.

In the digital engineering age – where a building is built twice, once virtually in the BIM model and once on the construction site – product characteristics need to be captured in the form of electronic datasets which can be utilised and relied on by the supply chain. If a product feature is not in such a format its value is reduced. For the supply chain as a whole, and for individual links in the chain, to operate at maximum effectiveness and competitiveness the best quality data, namely the latest live data from the manufacturer, should be used. As digital engineering evolves, and demand for richer information grows, it will become even more critical to use manufacturers' live data.



# Ensuring accurate data for BIM projects

The use of BIM is increasing rapidly across the construction sector. By 2016 it will be compulsory for fully collaborative BIM processes to be used on all government projects greater than £5 million in value. The wider industry is adopting BIM as a way to more accurately predict and ensure performance throughout the life of the building; from initial design to operation and even deconstruction. It is suggested that by 2016 over half of UK projects will use the method<sup>1</sup>. In order to get the best out of BIM, accuracy of product and system objects is essential.

BIM can decrease waste, increase the efficiency of building operation and assist collaborative working throughout the design and construction process. The large amount of information which is compiled at the beginning of the project makes the management of the building easier after handover and improves the ability to recycle efficiently at the demolition/refurbishment stage.

Critical to the realisation of the benefits BIM can bring to the construction industry is the use of BIM objects that are current and updated in real time. To support this, British Gypsum launched the White Book System Selector in January this year, which is an online tool designed to help streamline the specification process for construction professionals. It allows specifiers to search and filter through tested British Gypsum plaster, drylining and ceiling system solutions to select the right specifications for the job. Building Information Modelling objects



(.rvt), CAD (.dwg) drawings, National Building Specification (NBS) Clauses and product and system datasheets (.pdf) are then available to download for the chosen solutions. This allows specifiers to retrieve important information in a few easy steps. Featuring simple and easy to follow search criteria, familiar to users of the White Book, this tool enables specifiers to filter by a variety of performance requirements, such as fire and acoustics, and be presented with a relevant solution for the job.

The holistic efficiency benefits that the use of BIM can bring to a construction project throughout its entire life can only be realised if accurate data is used, therefore it's vital to include high-quality product information,

and where better to get this than direct from the product manufacturer?

<sup>1</sup> Competitive Advantage, Adoption of BIM 2013



**Paul French**  
**Commercial Market Manager**  
 British Gypsum  
[www.british-gypsum.com](http://www.british-gypsum.com)



## White Book System Selector

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## NFB BIM survey reveals barriers to adoption remain

**The 2014 Contractor Survey from the National Federation of Builders indicates an increase in relation to BIM readiness and use, however a number of barriers still remain which preclude full adoption...**

In 2012 the NFB published its report BIM: Ready or not? The report was based on an industry wide survey which set out to assess the readiness of the contracting sector with a particular focus on SMEs. At the time, the survey confirmed that the industry had a giant leap to make if it were to achieve the government mandate of BIM level 2 by 2016. Specific barriers to adoption were identified as:

- A lack of information available for companies to make an informed decision about BIM;
- A lack of client of demand;
- A perception of prohibitively high investment costs.

The overall message of the 2012 survey findings indicated that there was a clear gap between the

appetite for BIM in terms of the commercial rationale on the one hand, and the knowledge and skills to take action on the other.

In 2013, the NFB launched a second survey to measure and assess the progress made by the sector. The interim results make comparisons with the findings of the 2012 survey.

Respondents were asked what they perceived the greatest barriers to adoption to be. The results indicated the greatest barriers to be a lack of education and training and an unwillingness of industry to collaborate. These were followed closely by the purchasing of software in not only the cost, but also confusion around compatibility across their supply chain. Client demand was still seen as a barrier, with almost half choosing this option. This was

<b>What do you perceive the greatest barriers to adoption of BIM to be?</b> (You can tick more than one box)	<b>Response</b>
Lack of industry collaboration	58%
Integrity of information	23%
Education and training	68%
Purchasing of software	49%
Forms of contract	18%
Cost	39%
Liability/ risk concerns	17%
Uncertainties regarding ownership of data	30%
Lack of clarification of roles and responsibilities	24%
Lack of expertise / experience	52%
Supply chain	48%
Client demand	44%
Lack of inter-operability between software solutions	28%
Clarity of client requirements	38%

BIM is now perceived to be more than 3D drawings and software amongst contractors.

In the 2012 survey, 43% of respondents stated they did not perceive BIM as a core competence within their business, however in the 2014 survey this increased to 76%.

A large number of contractors indicated in the earlier survey that they were not planning to train their staff or were waiting for BIM to standardise. Over half now stated that they had or would be organising training and a third that staff will be attending free events. This is a positive finding with only the minority waiting for practices to standardise or not train at all, again highlighting that industry are progressing with the adoption of BIM.

The picture generated overall from the NFB's 2014 Contractor Survey indicates that the industry is beginning to see an increase in relation to BIM readiness and use amongst the contracting sector. Many now perceive BIM to be a core competency within their organisation. However, a number of barriers still remain which preclude full adoption of BIM and there is still much work to do if the industry is to meet the 2016 deadline. ■

also one of the findings from the first survey which indicates that there is still a lack of client drive towards implementation which may be reflected in the willingness of the industry to adopt BIM. Significantly, regional public procurement is not included in the central government mandate for BIM. The public sector client is very much the driver of BIM at this level but a large proportion of public sector clients simply do not understand BIM and how adoption can be achieved. The NFB's Client Readiness survey, published earlier this year, identified that over 50% of public sector clients thought that BIM should be a core competency, but this lack of understanding provided a barrier to both demand and adoption of BIM within this sector of the industry. The lack of a mandate at this level is resulting in a slow and fragmented uptake and without the demand from clients, contractors can be reluctant to make the financial commitment to training or the development of a strategic approach to BIM.

In order to gauge general understanding of BIM, respondents were asked what they perceive BIM to be, and whether they understand what it means for their projects. Respondents provided answers to more than one option for this question, with 83% of respondents indicating that they understand BIM to be a collaborative process, clearly indicating that



.....  
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# BIM – defining better information management

**B**IM, despite being a small acronym, is a big word in construction. While there has been a lot of hype around BIM over the last few years we see the conversation is starting to shift toward companies asking – what’s really in it for me? However, the discussion needs to further evolve to start looking at how BIM can help define and create better business outcomes.

Models are important but they aren’t the be all and end of the information revolution – it’s the data that’s important, and for many in the industry that will still be shared in familiar 2D products like MS Word or Excel.

BIM allows clients, operators and maintenance teams to have all their data for an asset in one place. It allows for meaningful analysis across a wider selection of business information to be carried out rather than making business decisions based upon anecdotal guesses. By combining disparate data sets together – linked around a model of the asset – it becomes possible to review infrastructure data in a much more powerful way and as a result, manage assets better.

Implementing and using shared data sets with feedback of what actually works – proven by hard evidence – will improve design in the future. However, this shift of how we manage information requires more than just using software, it requires a behavioural change. This is the real change that BIM brings to businesses. It breaks down silos and enables individuals, groups and departments to share information openly and transparently. This

doesn’t mean that all information needs to be shared with everyone all the time – BIM provides the opportunity for relevant information to live in the model and only be accessed when needed.

While BIM has and is continuing to help evolve and change the construction industry the next big step will be harnessing remote sensing and telemetry. Real time feedback on the performance of structures such as bridges and tunnels will allow managers to understand how their assets are actually performing. Automating processes so that out of range figures trigger further analysis or inspections, creates the ability for pre-emptive maintenance to be carried out in a structured way rather than just having reactive or end of life strategies in place.

BIM can mean something different to everyone and that’s not a bad thing. But better data sets make for better decision making and help owners, operators, designers and installers work much more efficiently from a position of knowledge rather than ignorance.

## Tekla Structures BIM software

We constantly test and develop Tekla Structures and help you to get started with it.

Models created with Tekla BIM software carry the accurate, reliable and detailed information needed for successful Building Information Modelling and construction execution. Welcome smoother workflow to your company with Tekla Structures and constructable models.

Tekla works with all materials and the most complex structures – you set the limits. Our customers have used Tekla Structures to model stadiums, offshore structures, plants and factories, residential buildings, bridges and skyscrapers.

## Help with implementation

Tekla staff and our resellers help with implementation of the software. We work closely with our customers and offer local support, training and consultation.

## Open approach to Building Information Modelling

Although Tekla is ready to use, the software is also highly customisable. As Tekla has an open approach to BIM, you can run other providers’ solutions and fabrication machinery and still interface with Tekla. Extending and enhancing Tekla Structures is easy with Tekla Open API, the application interface.

Duncan Reed, Digital Construction Process Manager, Tekla



**Duncan Reed**

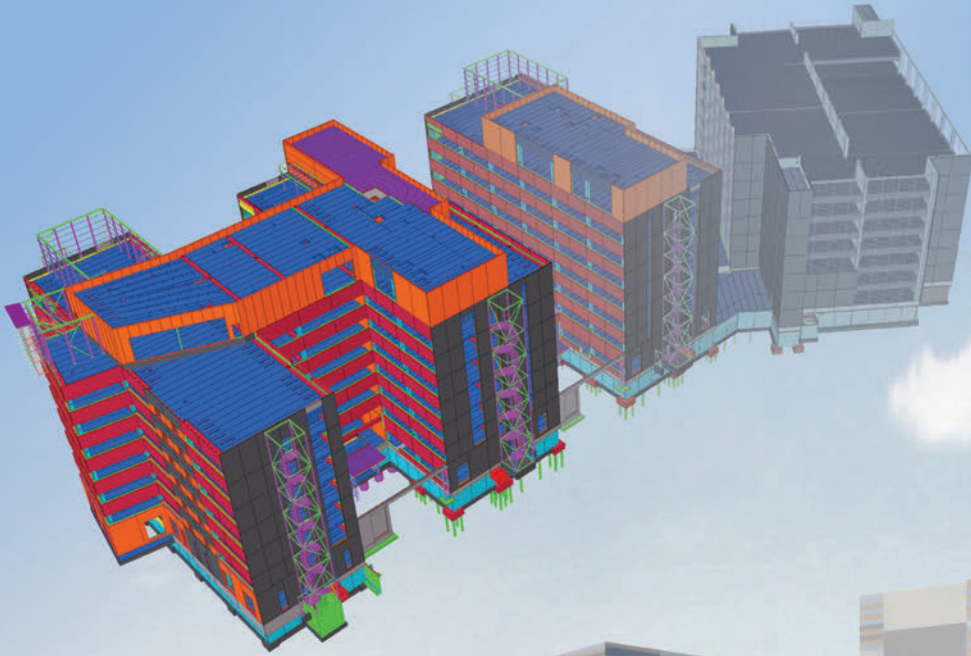
**Digital Construction Process Manager**

Tekla

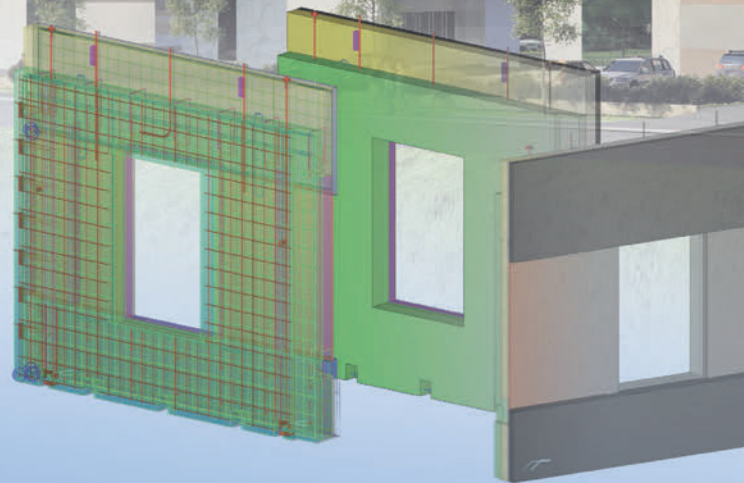
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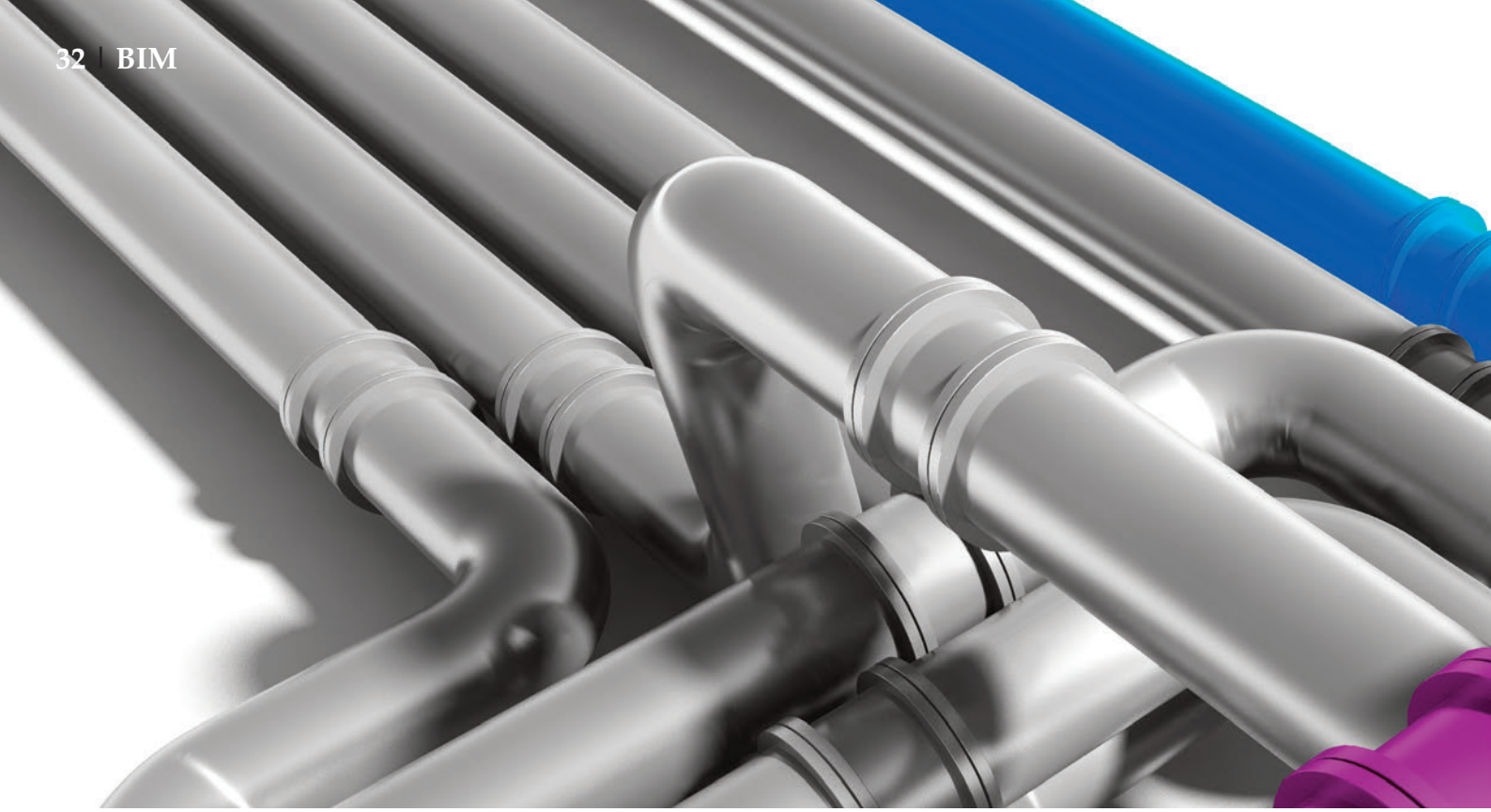
With the almost daily BIM announcements by clients, contractors and suppliers identifying their increased efficiencies and greater value by adopting BIM, not to mention the Government drive towards adoption by 2016, Tekla recognise that forming a BIM strategy alongside responding to CE Marking and ISO requirements can seem a daunting task.

We can help with the implementation of BIM within your organisation - advising on making the right business decisions, getting the most from your software and help with workflow procedures to ensure you are ready for the challenge ahead.

For further information on how Tekla can assist with BIM implementation and other consultancy services we offer, please call 0113 307 1200.

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## BIM for FM – are we there yet?

**Being involved at the beginning of a new project, and then maintaining this involvement through to eventual handover and post occupancy is key for FM in the BIM process. M J Packham, BIM/Soft Landings Champion at BIFM sheds light on the current situation...**

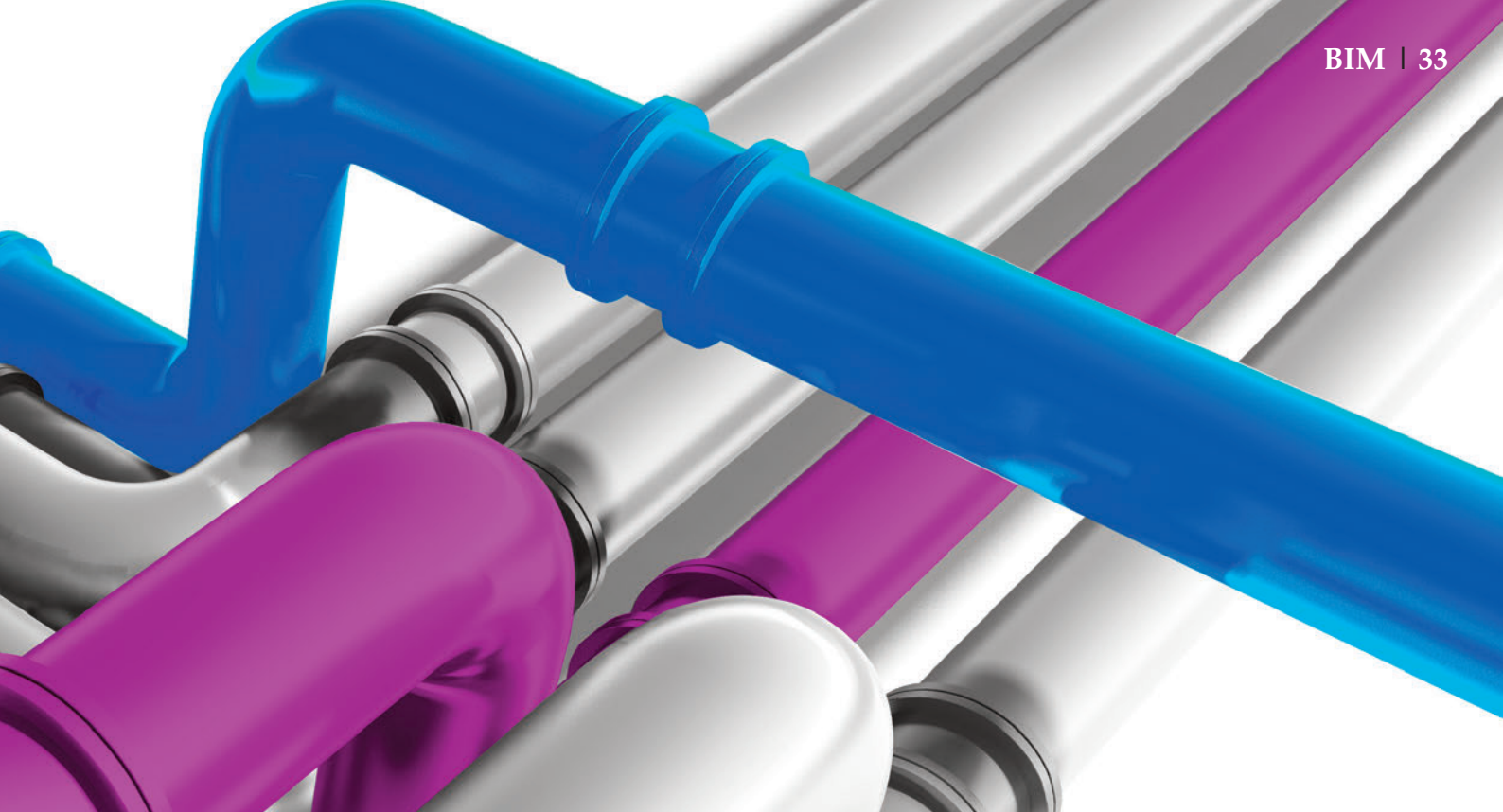
**B**IM for FM has a certain ring to it and I have to confess that it is very easy to get carried away by the groundswell of enthusiasm that the topic generally seems to engender – particularly amongst our designer/construction colleagues. However, before we get swept away by the BIM tide, it is perhaps appropriate to take a step back to give serious consideration to the potential benefits for FM and, more importantly, how we go about ensuring that these are realised.

Certainly I think that we will all recognise the operational benefits to be derived from BIM in terms of a co-ordinated structure and services installations design. Like me, I suspect that many FMs will have experienced problems with access and general maintenance activities as a result of the structure having “got there first” and the services installations having to be modified on an almost ad hoc basis as a result.

This scenario brings to the fore what I see as being one of the key benefits of BIM, i.e. it provides a mechanism for ensuring collaboration between the respective members of the design/construction supply chain. From a FM perspective we need to ensure that this collaborative ethos also extends to include the operational phase of the built environment that is being created.

This in turn brings into play consideration of the related, but entirely separate, Soft Landings initiative (otherwise known as Government Soft Landings – GSL – in the Public Sector). For those unfamiliar with it; “Soft Landings is the process for the graduated handover of a new building or refurbishment...” So essentially it is about FM getting involved up front in the genesis of a new project and then maintaining this involvement through the various stages of development of design and construction, through to eventual handover and post occupancy evaluation.





The idea being that, in this way, the operational/ occupational phase of the building life cycle – which is by far and away the most significant in cost terms – is always kept under review.

I have wandered somewhat off theme so to return to BIM, one of the other key benefits that I see it bringing to FM relates to the information that gets provided at handover. Again I think that most practising facilities managers will be familiar with the scenario whereby the information they are provided with on taking over new premises is less than perfect – with the net result that they are effectively “flying blind” until the gaps are closed. With BIM this should be a thing of the past. Thus on completion we will – in theory at least – be taking ownership of a fully populated building model that provides all of the asset and service run information required to operate the building at optimum efficiency. Of course all of this lovely information will be in the BIM system and not the CAFM system (or equivalent) which is probably where we really want it. So one of the issues we need to address is how do we get the two to talk to each other in a way that does not involve an undue amount of data manipulation (and hence time/cost). Equally we need to give thought to how frequently we are going to need to refer to the BIM model; once an asset register etc is up and running, I suspect that this will not be as often as some of the BIM protagonists would have us believe.



**M J Packham**  
**BIM/Soft Landings Champion**

I could go on but I suspect that by now you are starting to understand where I am coming from on BIM. Yes there are a lot of positives for us in FM, but we need to be a bit cautious and not get too excited as there are a number of hurdles we need to navigate before we can expect to fully realise the benefits that it potentially brings. ■

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.....  
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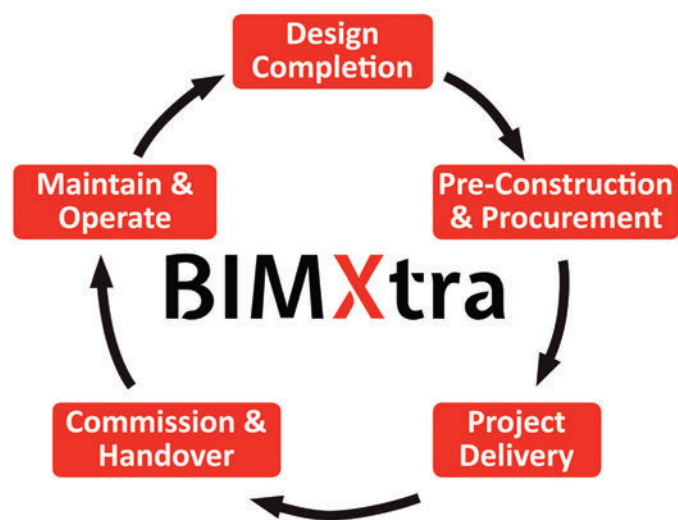
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# Bringing the simplicity and opportunity of BIM to all

**B**IM means lots of things to many people and risks being one of the most misused words in construction, however BIM represents the enabler to a transformation that is engulfing not only the UK but also the global design, engineering & construction market; and why, because BIM enables us to work together more easily, in a modern digital environment. Using BIM we are encouraged to share information bringing efficiency and visibility, to ultimately, reduce the risk and cost of our projects. In addition we influence and improve the ongoing operation of our assets, delivering a better more intelligent output for our clients and in doing so providing them with more value in their portfolio of assets.

BIM enables people to interact with their projects in a visual environment, but is increasingly focussing on “the I in BIM”, the INFORMATION, which is held within the modelled objects as data. With modern BIM tools, information previously held in separate and disconnected documents, can be created and held within the modelled objects as the central repository for core project information.

Like the automotive industry before us, the efficiency and simplicity of a managed information process contributed to the renewed success of manufacturing. The effect has been that we buy more cars, appreciate the fact that they are more reliable, last longer and cost less to use and maintain – vehicle manufacturing is in new health.



The expectation is the same for the construction industry, allowing us to define and communicate our requirements better, iron out issues before arrival on site, remove unnecessary waste in the process and provide, for the Client, a better service and an intelligent model that can help better manage the clients asset through its operational lifecycle.

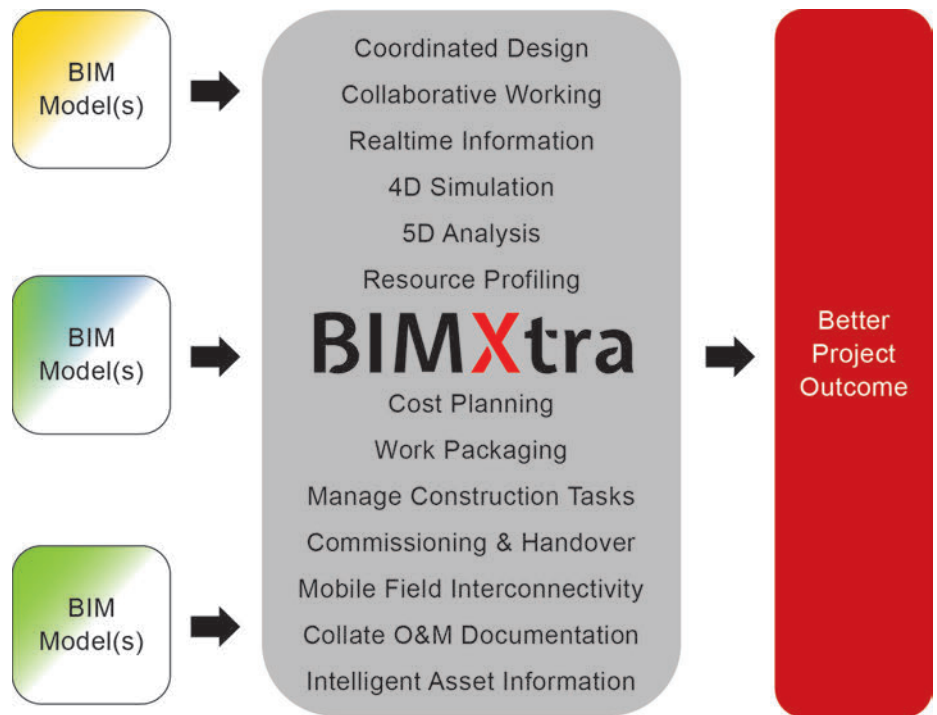
Not surprisingly achieving the utopia from this transformation, like all transformations has it's challenges, however, much has been done to address the needs of industry through new technology, and the guidance for the new BIM enabled project delivery process is established in the British Standard and PAS 1192 series, but to maximise the benefits of these new tools we need to consider the working practice changes that are also needed in many environments.

Driven by a focus on low cost procurement that can result in uncertain end out cost and, subject to your position in the supply chain, insufficient consideration of whole life operational cost, together with margins driven ever lower in a highly competitive market we are often faced with risk aversion rather than more proactive risk management.

However, in some parts of our industry suppliers and manufacturers are fully integrated with 3D CAD-CAM tools either direct to manufacture or through the creation of fully coordinated pre-assembled or pre-manufactured modules that dramatically reduce the onsite work and risks in installation and in doing so provide a higher quality product, manufactured and tested in a controlled environment.

The vision of BIM is that all parties in the supply chain collaborate across the same source of information, and make informed decisions based on better information with an improved awareness of the repercussions on others.

BIM delivers the maximum benefit when all parties take part, the leadership of key



Clients like Government, who acknowledge the benefits in project delivery and on-going asset management has been instrumental in establishing BIM as a modern working practice.

The prize for all of us is a better, more efficient, higher quality, world leading industry.

Providing a simple solution to the technology and workflow issues of BIM is where Clearbox can support the process.

**Clearbox**

Clearbox are a technology provider looking to bring the opportunity of BIM to all through their digital information hub BIMXtra which enables simple access to the information based around a true common data environment. BIMXtra addresses many of the issues of BIM by bridging the gap between the complexity of the BIM authoring tools and the plethora of project tools that characterise the current construction market. BIMXtra not only supports project delivery during the design and construction phase but delivers out the

intelligent asset information at handover to provide a new level of opportunity for Facility Management and Asset Management.

BIMXtra takes information from BIM and makes it available to all in the simplest of approaches. Each user has access to the information they need in the right format at the right time, allowing the influence of BIM to be shared out from the design through the entire project delivery phase. BIM in BIMXtra not only enables interrogation and exploitation of the visuals but also extends and enables the full digital information management of the project.

Developed by individuals with years of experience of delivering design and build projects, and who use BIMXtra tools themselves on their own projects, BIMXtra will help enable consultants, contractors, and SMEs alike to enjoy and benefit from BIM.

So if you are starting your journey or have uncovered some of the complexities of BIM then we can support you to meet the

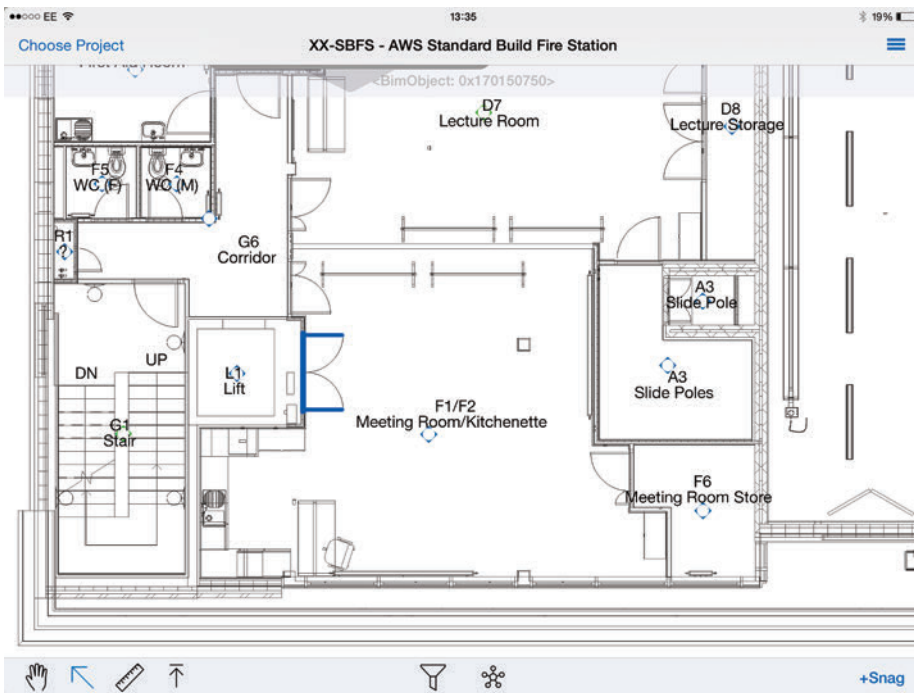
requirements of Level 2 BIM and beyond as a hosted solution. As 2016 approaches and the gap between the haves and have not's of the BIM world grows there is no better time to jump on board and benefit from the lessons learnt from some of the early adopters.

In this, the first of four articles leading to the 2016 deadline we aim to take you on a journey of the simple functionality that is now readily available, as well as reassure individuals of the benefits of BIM that can be realised in case studies. In the next papers

we will address the solutions and some case studies to allow users to appreciate the scale of the benefits and the simplicity and ease with which this can be achieved starting with the interface to programme.

### Graeme Forbes

Graeme Forbes is the Managing Director of Clearbox a technology and consulting business that brings years of experience in the BIM space through new collaborative tools that help to bring simplicity to the delivery of BIM based projects.



**Graeme Forbes**

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# Partnering for BIM

**Ensuring a smooth and profitable move to BIM relies on partner organisations that can understand requirements and aspirations believes David Dalton at CADSPEC Ltd...**

**B**uilding Information Modelling, depending on who you ask depends on the answer you get. But what is it really?

The RIBA, CPIC and BuildingSmart jointly proposed a definition of BIM for the UK construction industry:

“Building Information Modelling is a digital representation of physical and functional characteristics of a facility creating a shared knowledge resource for information about it forming a reliable basis for decisions during its life cycle, from earliest conception to demolition.”

In practical terms, this means that a virtual building model is developed and information is collated from manufacturers or through traditional decision-making process of design. This model is analysed, tweaked, tested and revised, before the real thing is built on site.

This cradle to grave physical and functional model workflow, whilst being new to the construction industry, has been widely adopted and very well established in the manufacturing industry as Digital Prototyping. Manufacturing companies, due to expanding global competition, were driven to adopt processes which delivered projects to far tighter timescales and at reduced cost, whilst at the same time needing to remain profitable.

The construction industry is now undergoing a similar revolution; projects are under pressure to deliver innovative and sustainable solutions, at far lower costs than ever before.

## **BIM in the private and public sector**

Building owners and operators are becoming increasingly aware of the technology, and given the



potential construction cost savings, are increasingly starting to stipulate the use of BIM workflows and deliverables, not only for the construction phase, but for the building's on-going life cycle and for forward management of assets.

The private sector is forging ahead with BIM adoption, but it is the UK Government's BIM mandate that is really accelerating the adoption of BIM across the UK.

There are many companies that can provide you with a full range of software, hardware, training and consultancy services to ensure a smooth and profitable move to BIM. It is an important aspect to partner with organisations to understand their requirements and aspirations, and this will inevitably result in a successful BIM project. ■

.....  
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**Director**

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# COBie in the UK

**Nicholas Nisbet, Lead Technical Author of the latest BIM standard developed by BSI, and director of AEC3 UK Ltd, talks about the standard's impact on COBie...**

COBie (Construction Operations Building information exchange) is a standard format for sharing facilities information. It is designed to ensure that the client gets all the information needed to own and operate the facility in a reliable form.

Informally one can think of COBie as a well-appointed suitcase that allows us to move information from the project team across to the client team. The sides of our suitcase are transparent: anyone can see what is and what isn't yet included: we see slots for all our essentials and lots of free space for our loose items.

So what are the essentials? It's the project, site and the facility itself, the list of visit-able spaces and locations (forget the cupboards), and a list of the manageable components (forget the reinforcement bars). These spaces are grouped into floors and locations, and into zones such as occupancy and activities. The components are organised by their specification (type) and by their functions (systems). Each of these needs a name, description and classification, and a note of by whom and when they were added.

These can then be supplemented with additional loose items such as attributes, document references, contact details, maintenance instructions, and cost and carbon impacts.

The "COBie for all" working group has run through a series of infrastructure scenarios, from simple stations through detailed track and motorway handover, right up to progressive handover of a whole new line. We have found that COBie can do

the job: in fact COBie helped resolve some of the casual ambiguities that creep into conventional practice. Some specifics such as the use of Linear Referencing Methods turned out to be not so different to building practice, such as the use of grids in large spaces.

But the importance of COBie lies in its efficiency: neither the client nor the designers/contractors need waste time designing suitcases, but instead can focus packing the correct information. If you want a packing list, then the Employers Information Requirements (EIR) and the forthcoming digital Plan of Work (dPoW) will give the detail. But given the base asset register, the content of COBie is driven by real purposes such as using or maintaining, or operating or monitoring, or repurposing the facility.

Like any good suitcase, you don't always have to fill it all at once: COBie has proved invaluable for client briefing and schedules of accommodation. Later it can contain the Room (and Zone) Data Sheets (RDS). As a progress report, COBie can be used to convey to and from the client, the state of his facility. Product manufacturers often offer COBie in preference over proprietary 3D objects, especially if their products are less likely to be modelled or selected in early stages. So although COBie's primary purpose is to deliver handover information, it can offer the whole UK facilities industry a step into a world of containerised information transport.

It is a required deliverable by 2016 in central government projects where information must flow into portfolio, asset planning and facility maintenance tools. Private clients are already seeing the same

value. Applications such as Revit, Xbim, Solibri and AEC3 are offering tools that help the supply side. Suggestions for generating, comparing and checking COBie are openly available ([www.bimtaskgroup.org/labs](http://www.bimtaskgroup.org/labs)). On the receiving side, UK CAFM tools are now catching up with US applications and offering COBie support.

Is COBie too difficult (like “long-division” as one critic claimed)? Hopefully not for a mature and accurate industry moving into a data-rich era. Our advice is to use a calculator! Is it too simple (“IFC-lite”)? COBie is 100% convertible with IFC and is entirely usable on every computer and smart device, so it is likely to be around for a while yet.

**“...although COBie’s primary purpose is to deliver handover information, it can offer the whole UK facilities industry a step into a world of containerised information transport.”**

Where can one learn to speak COBie? There are a number of 10-minute movies on YouTube (search “COBie east”). There are lots of free examples on the buildingSMART Alliance and BIM Task Group websites (search “COBie-UK-2012”) and shortly there will be the full British Standard.

In November 2013, a working group of the BSI construction information committee B555 began collaborating on a standard description of the UK use of COBie. The outcome is named “BS 1192-4 – Collaborative production of information – Part 4: Fulfilling employers information exchange requirements using COBie – Code of practice” with the draft for public comment completed at the end of July, when the group reconvened to assess the feedback and make any final adjustments.

Anyone familiar with the earlier “COBie-UK-2012”, and the training material available on YouTube will recognise the core content. It takes a holistic view of

the built environment, suggesting how facilities including infrastructure, environmental areas and buildings can use the COBie 2.4 schema. It addresses both new-build and refurbishment and so complements both PAS 1192 part 2 and PAS 1192 part 3. The standard offers a clear ‘lean’ approach to delivering information: first identifying the purposes for which the information is needed, then following through with the implications in terms of which objects, and which attributes. It expects the employer’s information requirements (EIR) to at least specify these purposes and allows for the nomination of a detailed digital Plan of Work (dPoW) which should become the acid test for completeness.

At the heart of the UK Government Construction strategy is substantial improvements in the efficiency of the industry. Comparability is at the heart and COBie offers a formal way of transmitting the costs and carbon effects (along with other environmental measures) for the whole facility and for the individual functional systems and occupancy zones. This moves asset data into the heart of strategic asset management and decision making. ■



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# The Leica Geosystems BIM Field Trip

**B**uilding Information Modelling (BIM) is about transforming how buildings and infrastructure are designed, constructed and operated. It has the potential to add value across all phases of a project, from design through to construction.

BIM exploits the potential of digital modelling technologies to provide a new way of designing buildings and infrastructure 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 an open data environment. BIM, during the design and construction phases of a project, has the potential to create an 'as-built' virtual model of the built environment, a digital asset that can be exploited throughout the operational life of the built environment.

BIM is a process that keeps projects on time and on budget reducing rework and increasing predictability and profitability. BIM has a solid return on investment with a 40% reduction in field changes, contract savings of over 10% and project time reduced by over 7%.

Whilst BIM adoption is growing positively, the actual level of BIM use is mostly limited to quantity take off, co-ordination of multi-discipline activities at the office, i.e. clash prevention. The use of 'BIM uses' is growing daily, including project management and construction sequencing. The full impact of BIM in the construction industry sector is yet to be realised. There is a clear trend appearing around the uses of 'BIM use' outside of the office.



Moving from 2D plan co-ordination to 3D model co-ordination is usually the first step, this allows contractors to spot and resolve potential problems. However to fully maximise what BIM can do, it is important to connect the digital world to the real world.

Leica Geosystems is a market leader in providing field solutions and is leading the way in helping to bridge this gap by taking BIM out of the office and into the field and vice versa. Leica Geosystems BIM Field Trip is a comprehensive solution with hardware, software, service and support components that increases the BIM benefits for owners, contractors, architects and the various trades involved in the BIM process.

With renovation and retrofit jobs on the rise, Leica Geosystems BIM Field Trip provides the cost-effective, complete and traceable georeferenced field data using a unique class

of "Survey-Grade" High-Definition Surveying Systems/3D laser scanners known as ScanStation to produce 3D point clouds that are consumed in a number of software environment through a unified workflow and data architecture. Where projects require the efficient capture and positioning of discrete points, Leica Geosystems family of measurements sensors – from high-end total stations to handheld distos come into play.

Within new construction the BIM Field Trip uses total station and multi-station technology to replicate BIM layout points in the field providing accurate real world implementation. You cannot achieve this kind of efficiency and accuracy with plumb bobs and tape measures, especially with today's complex designs and demanding construction schedules.

The Leica Geosystems BIM Field Trip technology offers a superior quality assurance



solution with innovative multi-station technology that continues construction layout and high definition as-built scanning in a single hardware solution. As-built quality assurance point cloud are compared to the model to assess systems like MEP providing insight critical to validate that buildings are being constructed as designed and evaluating potential issues at an early stage avoids rework in the field.

### 3D laser scanning/High-Definition Surveying (HDS) as the foundation of BIM

As the equipment and service costs of laser scanning continue to decrease, the opportunity for leveraging 3D scanning in the construction sector is becoming even more tangible. Ultimately the technology of High-Definition Surveying (HDS) changes the way many construction professionals work.

3D laser scanners help to streamline workflows across a number of diverse industries. By allowing critical surfaces and environments to be measured with a level of confidence and speed not possible with traditional tools, 3D laser scanners provide users with a way to deliver robust models that can be revisited digitally at any point in time.

BIM is a 3D parametric model, which means that the objects in the model have intelligence embedded (meta data) and understand a variety of parameters and relationships that are defined by the project team based on the BIM use for the project (level of development). Metadata can be automatically stored in the point cloud file format, or can be linked to the point cloud or the 3D model objects after the measurement process. With this approach BIM can offer virtually unlimited possibilities for integrating business intelligence with the project or asset management.



Today HDS and BIM are technologies that have moved beyond concepts to being proven and demonstrated in projects executed worldwide and the growing capability of technology, allow "BIM stakeholders" to realise further gains through the deployment of such capabilities.

What is most exciting is that we are at the beginning of a fundamental change and digitization of a very old industry and such change promises to deliver greater gains to the full cycle of construction and operations activities to come.

Whether you are a beginner, intermediate or an expert working with the BIM process, the Leica Geosystems BIM Field Trip will help

you lower waste, work more efficiently, reduce costs, increase profit margins and maintain greater project safety.

**Leica**  
**Geosystems**

**Tahir Sharif**

**EMEA Director Software Solutions**

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# Taking ownership of a BIM project

**Andera Al Saudi, Business Director for The BIM Hub examines the role project owners are taking in promoting the use of BIM...**

Building Information Modelling (BIM) is changing the way projects are conceptualised, designed and built. With the recent developments in hardware technologies and the emergence of cloud based computing, BIM adoption is gathering pace as owners, developer, designers, contractors, operators and others in the construction industry look to capitalise on the benefits of using BIM.

Owners are now mandating BIM on projects and though the construction industry is equipping itself with the necessary skills to adhere to BIM requirements, the immediate reaction is that implementing BIM would be costly and therefore outweigh the benefits. Designers add on the cost of building BIM that they need for their design processes, while contractors ask for added funds to recreate models from 2D or 3D models to meet their functional requirements.

Project Managers see managing a BIM project a huge investment in skill sets and time – to understand the BIM data exchange requirements between the project parties. There is an interesting debate within the industry on the amount and quality of data or information being passed on between partners in a project. In the new workflows defined by adoption of BIM processes, designers are often reluctant to offer their Design Information Models (DIM) to the constructors, and are in favour of offering just 2D information.

The industry views this reluctance as stemming from the increased risk related to the design and the fact that they are sharing critical design information. In projects where designers give the constructors the DIM model, the constructors complain about

the lack of flexibility and quality of data of the DIM and often develop their own models. Most of the modelling is done without keeping in mind the owner's motivation to use BIM on the project, but just the mandate to use BIM on the project. Ultimately the owner is faced with an inflated cost just to use BIM on the project, with disparate opinions on how BIM should be used. How does an owner confront the challenges and barriers to adopting BIM?

To seek a solution to this problem, owners should first understand the benefits of using BIM on a project. The owner should then identify key areas where his projects will benefit from the use of BIM. The owner cannot expect to gain the benefits of using BIM, by only mandating BIM on the project, but should take the initiative in leading the implementation of BIM on a project. Owners could examine their internal workflows and identify methods and tools that could deliver projects more efficiently.

Role specific training workshops will help designers, contractors, project managers and other project participants understand the specific goals of the project. Reviews of pilot projects could assist in internal data gathering and equip key members of the owner's team to understand BIM, so they can join in leading BIM on the project. Once the owner's team is set up to understand and deliver BIM, different contract types can be explored to achieve the maximum benefits to all parties involved. A trusted BIM advisor can educate the owner's team to understand the implications of using BIM on project team selection, streamline adoption processes and verify that the project team members deliver models in line with data and functional requirements that meet the

BIM specification. A BIM Execution Plan will set up communication and information sharing protocols for project participants, defining data required at various stages of the project.

Most owners try to use BIM to improve processes, both internal and external throughout the entire building life cycle. Owners often tend not to specify in detail the deliverable requirements and specifications. By developing requirements based on well-defined deliverables, owners can ensure that the stakeholders understand and deliver the BIMs to specifications. These deliverable requirements can include BIM Infrastructure requirements, coordination models, schedule simulations, model quality control requirements, protocols for coordinating BIMs, and also requirements of the facility management models. The owner can then basically control the data content and standards in the model, without having to engage in the process.

The owner can use available software to check the model for compliance to the deliverable requirements. The owner has to keep in mind that the data and information in the BIMs should be available in his facility management systems to obtain the benefit of using BIM during the operations phase. Intelligent Building information systems to monitor performance of the building via digital dashboards etc., will draw on the information in the BIM databases to enhance the operations and the performance of the systems. The data collected by these systems can be used to optimise the design of future projects. This ensures that other project participants meet data deliverable requirements while creating the BIMs, offering the owner a complete digital database, whilst also delivering the benefits of using BIM throughout the planning, design, construction and operation phases of the project.

Organisations like buildingSMART educate owners to understand BIM, assist with BIM specifications and work alongside owners as trusted advisors to ensure benefits and return on investment are 'truly' realised on their projects. Using Open BIM, we can ensure that the right project information is available in the right format at the right time to project members, while giving owners an insight into the project health

throughout the lifecycle of the project. Further, advice on the right type of contract ensures that project participants share the benefits and risks on the project, thereby creating a collaborative, open project environment. Integrated Project Delivery (IPD) could be one potential solution, with all partners in the project coming on board earlier and defining BIM requirements/specifications earlier in the process.

The industry is still seeking answers to the above problem of defining contracts which share risks and benefits to all involved parties, answering questions like what should be modelled by the designer, what is the level of detail required, and how much data can a constructor re-use from the DIM.

The BIM Hub develops the capacity of people to understand and implement improved policies, enhanced processes and overall a better way of working to shape the evolution of BIM. The BIM Hub showcases the work of leading companies involved in BIM, developing and enabling businesses to benefit from interoperable processes and technology.

Join the BIM community free at [www.thebimhub.com](http://www.thebimhub.com) today and help shape the future of the construction industry. ■

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**We are a consulting and recruitment company who specialise in providing subject matter expertise, resource and services to the digital design & construction industry.**

### **Consultancy**

*We have been helping clients de-risk their construction projects for nearly a decade by providing high quality consultancy services in the engineering disciplines of Building Information Modelling, Computer Aided Design and Project configuration and Information Management.*

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# Putting BIM to work

**B**uilding Information Modelling (BIM) has fast become an essential in today's construction industry. The challenge faced by management teams now is to integrate the vast amount of data available in the most useful, accessible way, so that it can support effective decision making.

Back in the 1980s, AceCad Software employed expertise gained in the oil and gas sectors to develop 3D modelling systems for steel fabrication.

The company has now put its sector expertise to use in BIMReview, a software tool that provides an integrated project hub bringing together data from multiple sources across a complete project lifecycle.

"BIMReview enables you to view all your 3D models simultaneously," explains AceCad's Technical Director Simon Inman. "By importing IFC, STEP, IGES, and CIS/2 models, along with API links, it brings together intelligence from all the major BIM authoring products."

BIMReview evolution delivers a range of practical benefits:

- Improved workflow through real-time access to BIM model content across multiple teams.
- Enhanced decision support through improved collaboration.
- Immediate identification of clashes and conflicts.
- Improve planning with 4D timelines for

engineering, procurement, suppliers and construction teams.

Because BIMReview enables more efficient working, it has the capability to shrink schedules and reduce the risk of overruns.

"BIMReview is proving to be an invaluable tool because it brings together everything you need to deliver a successful construction project in one easy-to-use desktop application," says Simon Inman.

## Low cost, immediate returns

One of the most appealing things about BIMReview is its low cost of ownership. It enables savings in materials, time and money because all of the information about a construction project is in one place. Because the application can be downloaded and installed within a couple of hours, the return on investment is effectively immediate. The intuitive interface means that users don't need onsite training, however, extensive support is available as well as online tutorial videos.

Cost savings from day one:

- Eliminate duplication and over-ordering.
- Better decision making through enhanced information.
- Immediate availability of essential data.

## Enhanced workflows

BIMReview is designed to facilitate collaboration across the project. Architects, owners, consultants, contractors, fabricators and engineers can work on a single process

through the same model with a level of accuracy not previously possible. When changes are needed, everyone involved has access to all the models and has the information necessary to make the most valuable input.

## Improved project efficiency

By providing real-time access to BIM model content and status throughout the supply chain and across dispersed teams, BIMReview enables more efficient working. Those involved in the project no longer have to locate and cross-reference multiple design models in order to properly understand and understand and resolve issues.

## Try BIMReview for free

It's easy to use. You can download a free trial of BIMReview or request a free demonstration from AceCad's dedicated website: <http://www.bim-review.com/en/bimreview>



**Simon Inman**

**Director**

AceCad Software

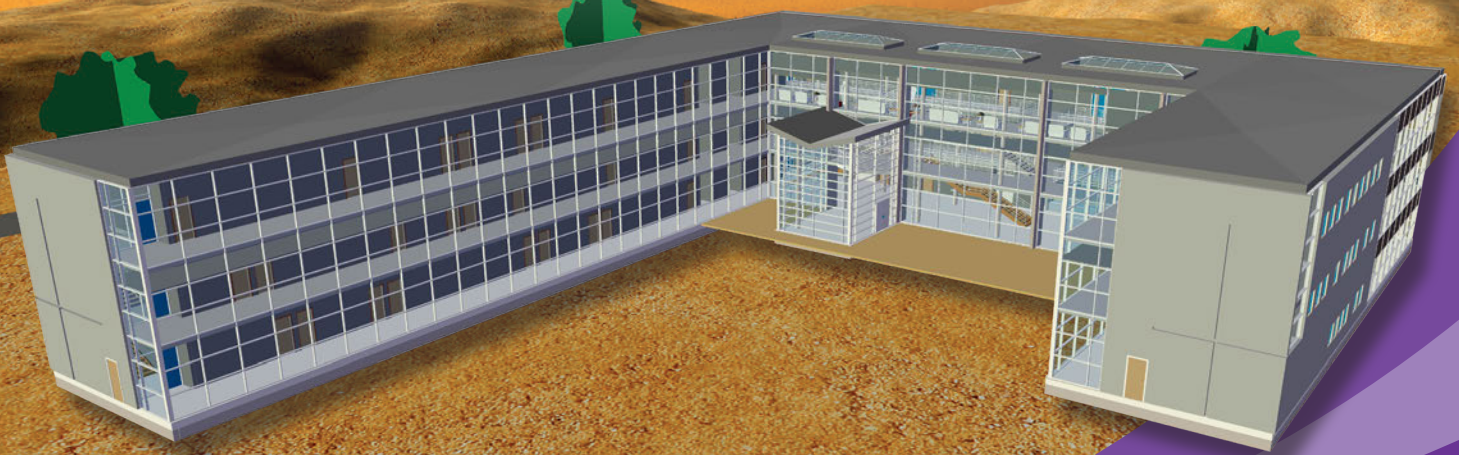
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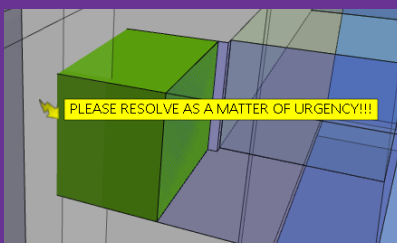
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# Visualise your project from concept to completion

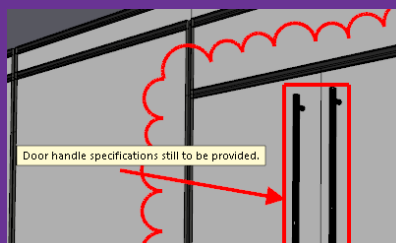
BIMReview, an affordable BIM collaborative review and visual communication tool from design to the construction site.



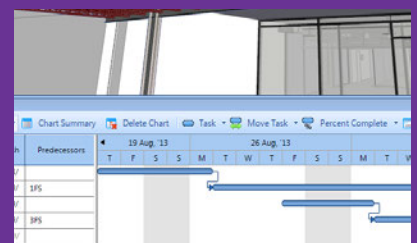
## 3D Clash Detection



## 3D Visual Mark-Ups



## 4D Planning



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# A best-in-class BIM Toolkit

**NBS have been awarded a contract to complete level-2 BIM for HM Government with a free-to-use toolkit as outlined here...**

A team led by NBS has won the £1m Technology Strategy Board contract to take forward development of the Digital Toolkit for Building Information Modelling (BIM). The BIM Toolkit has the potential to transform the procurement of buildings and infrastructure by defining and testing the BIM data required at each stage of the project.

The award follows a two stage competition to examine the feasibility of the project, which will deliver the final two elements of the standards and guidance being provided by the UK Government. This free-to-use BIM toolkit will make available a digital plan of work and a classification system which incorporates definitions for over 5,000 construction objects at each of the delivery stages throughout the life of a built environment asset.

The NBS team which includes BIM Academy, BDP, Laing O'Rourke, Microsoft and Newcastle University, conducted an in-depth research programme with the industry to test its proposals for a free-to-use digital BIM tool that will capture, validate and store information based on the publicly available Level 2 BIM standards.

A series of workshops and focus groups were held with leading manufacturers, clients, project managers, designers, constructors and operators to ensure that the design of the toolkit satisfied the cross-industry need.

A series of working prototypes have been produced which include a cloud computing demonstration harness and an IFC verification tool. The bid includes a commitment to complete Uniclass 2 which will be developed as the UK's unified classification system based on international frameworks.

Level 2 BIM, is made up of a number of components as defined by the BIM Task Group. Many of the standards and guidance documents have already been developed; now this project will deliver the final two pieces of the jigsaw. With the UK market for BIM-related services estimated to be an annual £30bn by 2020 and UK-based firms already exporting £7bn of architectural and engineering services, taking a leadership position in developing BIM will provide strong potential for further export growth.

Stephen Hamil, Director of Design and Innovation at NBS said:

"Delivery of a best-in-class digital toolkit that completes Level 2 BIM is a vital component of the Government's strategy for the construction industry which will deliver huge benefits.

"We are looking forward to working with the BIM Task Group to build on their achievements particularly with regards to industry engagement and thought leadership."

The project is anticipated to deliver the first phases of the toolkit in the spring of 2015. ■

For more information about the project and to register your interest in partaking in BETA testing or regular updates, visit [www.thenbs.com/bimtoolkit](http://www.thenbs.com/bimtoolkit).

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# The national planning and building control publication

**Adjacent Planning and Building Control Today** provides cutting edge policy analysis from experts combined with insight and opinions from trade associations and other professionals.

We welcome contact from all experts with an interest in making an editorial contribution.

## CONTACT

[editorial@adjacentgovernment.co.uk](mailto:editorial@adjacentgovernment.co.uk)



# GETTING READY FOR BIM

## A Cultural, Legal and Contractual perspective

by Greg Davies, Operations Director, Concerto Support Services

Having the tools, processes and procedures available and in place to allow you to collate BIM related data and information is one aspect of preparing for BIM. However, from an organisational governance, legal contractual and ownership basis is your organisation and project team really ready?

### KEY CONSIDERATIONS

- are the key people that work on your projects aware of the BIM requirement and prepared to consider this requirement whilst undertaking property related work?
- does your organisation and project team understand contractually, the level of BIM you need and are you prepared to communicate that information effectively and commercially to your supply chain?
- do you have the governance processes in place to validate that information and ensure that it remains consistent and up to date throughout the whole process?

### FOSTERING A BIM CULTURE

Based on our own experience, we have found again and again that there are often barriers in front of BIM enablement because BIM as a set of requirements is not understood early enough in the process.

In order for BIM to mean something, speaking specifically post handover, establishing the level of information needed must be discussed in the very beginning... and this information must come from the disparate groups that will not only deliver, but also operate the building. It must come from the Architects, it must come from the Mechanical and Electrical Engineers, it must come from the user of the building and it must come from the Facilities Management team. All this must be discussed and agreed upon at the business case stage of the project.

Having these types of conversations with the various teams involved in the whole life-cycle of the building allows you and your organisation to define what level of information needs to be collated to deliver the project successfully. For example, think of a scenario where there has not been any real communication between the Architect and the FM team in the early stages and what problems that could create during the operational life of the property.

Only from this process can the client really establish what BIM means to them and only then can the BIM data be captured as a project deliverable and conveyed in a robust legal and contractual framework.

### BUILDING BIM INTO THE CONTRACT

Building this requirement into contractual tender information is essential as it ensures the commercial framework is in place for the contractor to factor in a realistic price for BIM in their initial bid. As part of the submissions for that bid, there must be a section specifying the collation of BIM and delivery and management of BIM related data. It is also essential to ensure there are commercial definitions within the contract which makes it clear that the information collated is owned by the client commissioning the work.

When a contractor produces work which has been commissioned by a client, this information is of course owned by the client. However, a typical scenario demonstrating the lack of contract definition for BIM would be where the contractor may have collated a good level of BIM information and either A, they don't release it to the client or B, they want to charge the client for the release of that BIM data. This is a large and often overlooked area of why BIM isn't adhered to - because the client does not specify the BIM requirements as part of the tender phase or importantly, does not understand what level of BIM the contractor needs to adhere to.

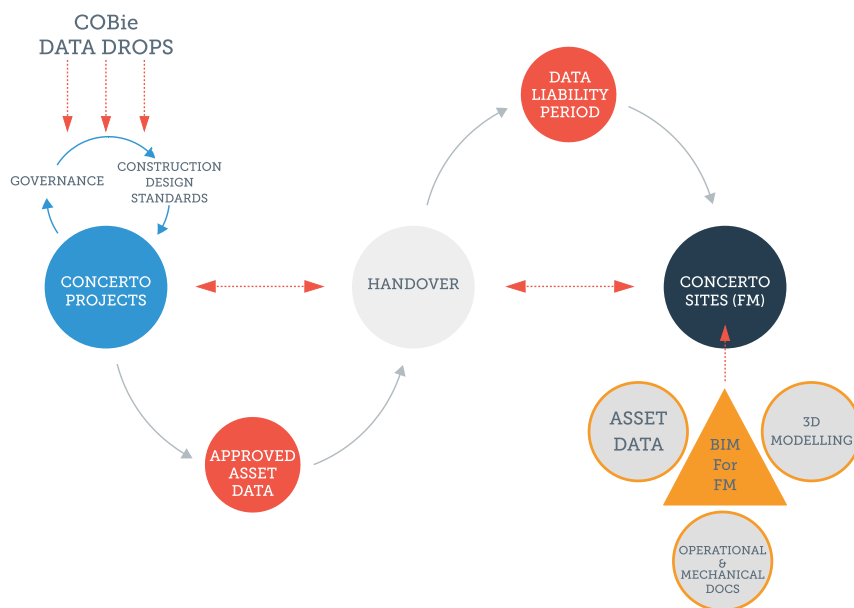
Feeding BIM into your legal and contractual framework with your contractors validates that the contractors are aware that there is a BIM requirement, they are aware of what that BIM requirement looks like and this allows them to ensure they can deliver it and more importantly ensure the costing to do that is embedded as part of their submission.

With a robust framework in place, having the correct platform to capture and manage data and validate it, will then facilitate its successful delivery long term.

# CAPTURING, MANAGING & GOVERNING DATA FOR SUCCESSFUL DELIVERY

Concerto offers intuitive property project, asset and facilities management solutions which facilitate complete integration and successful delivery of the BIM environment throughout this process.

## CONCERTO PROPERTY ASSET MANAGEMENT FOR BIM



### THE CONCERTO SOLUTION:

- 1** Supports the automated implementation of BIM data captured during the property design and construction phase into the property asset management solution
- 2** Defines a process/checklist which enables clients to understand what BIM actually means and also understand how the level of data to be captured during the design and build phase impacts on the building handover. In brief, helps a client become an 'intelligent client'
- 3** Aids the efficient hand-over of BIM related data to the end user of the building
- 4** Allows a 360 degree approach to the managing and updating of BIM related data supporting the approach to updating/editing BIM data outside of the design environment, whilst updating the design environment automatically
- 5** Allows the intelligent client the ability to define the BIM data required for operational use and automatically pushes the defined data into the operational management system
- 6** Allows the end user of the building to leverage the collated BIM data, in both data table and visual forms, served via web technology for use within a facilities management environment
- 7** Provides a software environment in which the engineering asset related BIM data can be linked to planned and reactive maintenance activities, enabling performance and financial analysis of the assets to be undertaken. This data can then be utilised for review against subsequent and/or similar property related projects, enabling lessons to be learned from project to project
- 8** Enables engineering asset related BIM data to be directly associated with property condition surveys, enabling condition scores related to property related engineering assets be reportable as part of a property condition 5 year rolling programme
- 9** Creates and presents a technology strategy in support of the requirement to adopt a modern technological infrastructure in order to leverage BIM as a whole regardless of building life cycle stage

# 4Projects by Viewpoint

## Collaboration solutions for building and infrastructure

Translating 38 years of intense focus and collaboration with the construction industry, Viewpoint offers best of breed AEC software solutions and is the leader in the provision of BIM collaboration software.

4Projects by Viewpoint is an award-winning secure online collaboration solution for the building and infrastructure sectors. The toolkit helps teams increase collaboration and project control at every stage of the construction lifecycle, whatever their role in a project.

Every major project relies on a complex network of architects, consultants, project managers, contractors, sub-contractors and suppliers and we understand the collaborative challenges that represents.

Drawings, documents, email and contracts need to be shared quickly among all stakeholders.

4Projects by Viewpoint was designed to make project management easier at each step of the way, from preconstruction, to building, to continued operation and maintenance.

Our product is defined by 3 distinct areas:

**Document Control** – Easily share and manage large quantities of construction documents whilst at the same time create workflows for their control, review and approval

**Project Controls** – Access powerful dashboard reporting features to give you maximum project insight alongside maintaining compliance with contractual and legal requirements

**BIM** – Providing the Common Data Environment required for BIM compliance, you can integrate all BIM-related data from multiple sources into one federated model.

It's simple really. We connect people, information and processes, helping our clients save time, money and lower risk.

To find out more or request a demo please call us on 0845 330 9007 or email [info@4projects.com](mailto:info@4projects.com)



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**Contractor**



**Client**



**Consultants**

*Winner of Collaboration Product of the Year – Construction Computing Awards 2013*

*Winner of Product of the Year – Construction Computing Awards 2013*



Without BIM,  
your projects  
could be in  
trouble. And  
so could your  
business.

## VIEWPOINT CAN HELP.

**The UK government has mandated that all public sector contracts to utilise BIM by 2016 - so if you're considering BIM, now is the time.**

4Projects® by Viewpoint with 4BIM is a collaborative software solution for building, infrastructure and energy. 4BIM makes it easy for clients, contractors, consultants and their full supply chain to manage and control their collaborative BIM requirements without expensive IT infrastructure or licenses - saving time and money.

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#viewpointcanhelp



# Construct your BIM future with NBS

At NBS we can provide you with specialist knowledge of BIM and how it can help you win future projects. From specification software specifically developed for BIM, to our NBS National BIM Library, we can support both specifiers and manufacturers and guide you to a successful and productive BIM future.

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BIM OBJECTS

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BIM SPECIFICATION

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PRODUCT INFORMATION

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INTERNATIONAL BIM

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EXPERT GUIDANCE

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INDUSTRY RESEARCH

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BIM REPORTS

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