BIM: WHAT CLIENTS REALLY THINK
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The use of BIM is the backbone of a leaner, digitised built environment. The ability that BIM provides to design, construct and operate a building virtually is an important tool to increase productivity while at the same time improve the quality of work. But what’s becoming clearer is that digital working alone is not the only benefit of BIM. Being able to better manage and share data is improving collaboration across the design and construction phases, as well as seeing money and time savings and a reduction in disputes.

As this survey shows, while BIM is being gradually integrated into contracts and processes, uptake and confidence is still low. Almost half of respondents have scored themselves as having limited confidence or below on using BIM, while the numerous standards have little recognition among the majority of the industry.

This is why CIOB has stepped up to the plate. We have worked hard to put together subsidised BIM training for our members, giving them the ability to use their BIM skills to produce a better outcome for their clients. These courses are both affordable and flexible, and online solutions will also be coming down the track as our support builds momentum. Visit www.ciob.org/training for more information.

Construction is an innovative industry that uses technology and systems to overcome today’s challenges and to adapt. With the UK government recently backing BIM Level 3, there is a clear commitment and future for digital working, driving new job roles and long-term career prospects which can only help attract the next generation into this industry.

**Chris Blythe**
Chief executive, CIOB
Introduction

The UK government’s BIM mandate, once a distant prospect on a far horizon, is now fact. From 4 April, all central government departments will require tendering suppliers to operate to the consistent standards that make up Level 2 BIM. With consistency of data and process, the expectation is there will be better project outcomes, less risk and a future filled with more reliable buildings and infrastructure.

But the five years since the mandate was originally published in the Government Construction Strategy 2011-15 have been accompanied by intense debate around BIM. Would it really have the multiple impacts claimed, on project finances, on design development, on long-term asset management? Would BIM adoption be confined to the top tiers of the industry, or permeate the supply chain in a meaningful way? Would it fundamentally change relationships, or help the industry become more productive?

To address some of these questions and mark the arrival of the BIM mandate, the CIOB publications BIM+ and Construction Manager launched an online survey of industry opinion, accompanied by a qualitative research exercise focusing on BIM clients.

Detailed telephone interviews with 17 construction clients were conducted, covering individuals in the central government agencies, local authorities, the health and education sectors as well as private developers. In addition, we also interviewed key project management firms advising clients on BIM.

Meanwhile, the comprehensive online survey had 557 respondents across the industry, including a substantial response from industry clients – 82 individuals. Together, these clients were commissioning projects starting in 2016/17 with a total construction value of between £5bn and £10bn.

The survey’s findings are, in many ways, in line with previous industry surveys conducted elsewhere, and show a growing but still limited BIM adoption. Overall, 49% of respondents said they had not worked on a project, either current or in the past, that used Level 2 BIM. And, asked to rate their own confidence on applying BIM processes, 27% judged themselves to be “very unsure – we have no BIM experience”.

But some of the survey’s most interesting findings lay in the differences between clients’ responses and the supply side’s views. Asked about the impact of BIM on past or current projects, clients had seen less benefit from BIM in their own budgets or profits – 28% reported results in positive territory, compared to 40% overall.

Clients were less likely to perceive benefits in terms of reduced design time (versus 55% overall); 43% thought that it reduced time in the construction phase (versus 60% overall). However, in terms of operational efficiencies, 49% of clients reported positive signs or good results, higher than the 44% in the overall sample.

Clients were also, on the whole, marginally less optimistic than the rest of the industry that BIM would achieve the various targets set out for it in government strategies, on shrinking programmes times, cutting costs and reducing carbon emissions.

Likewise, the telephone interviews also depict a client group that is backing the BIM agenda with considerable commitment, but still waiting to see the full beneficial impact. And the interviews also threw up the surprising finding that many clients are in fact paying, or being asked to pay, a “BIM premium” – additional costs to cover the supply of BIM data.

So is a picture emerging of a BIM mandate where the benefits are being unevenly distributed – and residing more within the supply chain than the client side of the industry? That would be an ironic outcome, given the purposefully client-led nature of the government’s BIM adoption programme.

It’s impossible to draw any firm conclusions from the findings of the survey and interviews, but the evidence certainly raises interesting indications of an uneven spread of BIM benefits that future surveys and research may study in more depth.

But the overall conclusion is that the construction sector, on both the client side and supply side, has been on a major journey and “behaviour change” programme in the last five years. And while the mandate is likely to be implemented with inconsistencies and gaps, and the supply chain response will vary in capability and enthusiasm, it’s clear that the adoption so far has been sufficient to change the industry’s culture, and with enough momentum to bring further progress.

Elaine Knutt
Editor, Construction Manager and BIM+
Who will be implementing the mandate?

As a client, what will your requirements be on BIM from 4 April onwards?

Combining the online survey results (82 clients responded) with the views of our 17 telephone interviewees, the overall picture was that the Level 2 mandate would be patchily implemented.

One in four (24%) said that they will fully implement the mandate on all projects – this included one private sector client. However, a slightly larger group (28%) said that they would partially implement the mandate, with 15% indicating BIM Level 2 would be mandatory on more than 50% of their projects.

However, the largest group, 40%, said that they would not make BIM a requirement at all, although teams were free to use it.

This group included eight clients in the private sector, 19 in the public sector but outside central government, and three who described themselves as central government clients.

In addition, six central government clients skipped this question altogether.

Five years after the BIM mandate was launched to the world in the Government Construction Strategy 2011, the BIM+ interviews show there is still uncertainty as to what constitutes a central-government-funded project, and to what extent clients elsewhere in the public sector are expected to implement it.

For instance, as a quasi-public sector organisation, Transport for London is not strictly within the scope of the mandate, says John Downes, head of engineering governance and services. TfL will be requiring BIM Level 2 compliance on all new construction activity within its renewals and investment programme, covering rail and London underground, but will stop short of mandating BIM for its surface transport projects, which includes the capitals’ road and cycleway networks. He says:

“TfL spends a significant amount of government grant delivering renewals and new rail infrastructure, so we chose to chase the 20% added value possible by adopting the Level 2 approach. In May 2015 we put in place BIM Level 1 and some of the basic BIM tools and technologies and capabilities, now we are delivering the final tweaks and changes to BIM Level 2 contractual and legal clauses ready for the end of March.”

Likewise, High Speed 2 (HS2) is centrally funded, but is not obligated to apply the mandate because it is a non-departmental government agency and therefore subject to a different compliance regime. Jon Kerbey, director of BIM at HS2, comments that Level 2 BIM will be heavily specified in its Employer Information Requirements for Tier 1s, and expects the requirements to flow down the supply chain:

“We see value in what the mandate is trying to achieve, so we made the decision to try and be Level 2 compliant. April is more of a signpost or a line in the sand rather than a fait accompli, but as a client we believe we have done as much as is required to be compliant, including clearly specified Employer Information Requirements, the ability to receive...”
We will mandate BIM Level 2 for our contractors and consultants and signpost them through our dedicated ‘BIM technologies suite’ if they need help to comply."

Steve Massey
Supply chain development officer, Sandwell Metropolitan Borough Council

In the local government sector, with many councils being hit by government austerity measures and related staffing issues, some take the view investing in BIM training and processes is not a key priority. Wokingham Borough Council is fairly ambitious on BIM, but Arnab Mukherjee, capital programme manager, says that others are holding back - and greater clarity on the mandate would help:

"As a council, we still need a clear mandate from government, within a legal framework, for all projects above a certain threshold. That might be an extension of the current BIM Level 2 mandate, or something less ambitious. At present, as a local authority we have to justify our expenditure, so if there is no direct financial benefit coming from an expense why are we doing it? Most local authorities have lost so many staff there is not enough expertise within client services. It's a vicious circle and hard to justify using BIM when you don't have the staff to implement it."

Nevertheless, Wokingham Borough Council has an "aspiration" to meet the mandate and is currently working towards a "Wokingham BIM standard", broadly in line with Level 2 requirements, for new-build projects above £2.5m to £3m. Mukherjee adds:

"Wokingham is trying to make the best of a very unclear situation by moving forward with Level 2."

Sandwell Metropolitan Borough Council, an early adopter of BIM, plans to implement mandatory BIM, as it will access Homes & Communities Agency funding for a programme of around 2,000 new homes over the next three years, plus leisure centres, care homes, and other public buildings.

Steve Massey, supply chain development officer with the council, comments:

"We will mandate BIM Level 2 for all of our contractors and consultants, and signpost them through our dedicated ‘BIM technologies suite’ if they need help to comply. From April, we will invite companies to quote for our projects through virtual public viewing models, in BIM format. To do that they will need to be able to access, interrogate and respond through the models.

"As one of the early adopters at the forefront of BIM, we want to leverage the mandate to show that we can spend government money wisely and demonstrate 33% savings on whole-life costs, which will give them reason to assign us more funding."

Hampshire County Council operates the Southern Construction Framework on behalf of local authorities in London, the south east and south west. According to framework manager Nigel Midmer, one of its frameworks already incorporates Level 2 BIM requirements:

"We have a strategy of requirements to join that starts with the EIR. That's being progressed on a project by project scale and we are in the process of delivering live projects at the moment."

There appears to be confusion in the university sector over complying with Level 2 - while capital projects may attract funding from the Higher Education Funding Council (part of the Department of Business, Innovation and Skills), in practice many capital projects are partly or wholly self-funded.

Richard Draper, BIM process manager at Birmingham City University, says:

"We're not bound by the mandate because we are not a fully publicly funded organisation. Now the split between fee-paying students and public funding is leaning towards fee-payers, universities are starting to suggest that they don't have to follow these rules."

But the interviews show that the mandate is likely to have considerable knock-on impact in the private sector - over half the clients BIM+ surveyed said they were implementing BIM requirements on future projects. And, as Brian Churchyard of Asda puts it:

"I'm hoping that as we follow our Level 2 aspiration we get benefits off the back of the mandate as our large main contractors and architects doing government work move to comply with it. The mandate forces the issue of changing the language everyone speaks, which is key."
How will the mandate impact the supply chain?

Many public sector clients have issued Level 2 requirements, but the relative inexperience of large parts of the supply chain leaves uncertainty as how it will be implemented from Day 1 on projects - and against which criteria its success will be judged.

*BIM* interviews also revealed that many public sector clients had plans to mandate Level 2 on projects from April, but to varying degrees they anticipated shortfalls in industry capacity.

Nigel Midmer, framework manager for the Southern Construction Framework at Hampshire County Council, comments:

"We are ready for April. Where projects require Level 2, all contractors will be asked to deliver it. The challenge is that everyone has woken up now to try to deliver Level 2, therefore the mandate date is where people are starting from. There are people who know how to implement it, but for the majority... using collaborative information is a longer journey than was first anticipated."

The Environment Agency has already stipulated that all consultants and contractors in Lot 3 (engineering services) and Lot 4 (asset delivery) of its Water and Environment Management framework (which runs from 2013-17) must be compliant with Level 2 or they will be disqualified. On its minor work frameworks, BIM requirements will be introduced at the next stage of framework renewal.

Karen Alford, BIM and GSL programme manager at the Environment Agency, comments:

"From April we will see a process of bedding in. Having passed the hurdle of the basic EIR, we are going through BIM Execution Plan responses from suppliers and beginning to discover some of the complications. We are a bit ahead of the game and hoping that, with more clients asking for Level 2, firms will really get themselves into gear and realise that this is not just a requirement from one customer, but a group of customers asking for information in a consistent way."

Steve Massey, supply chain development officer, Sandwell Metropolitan Borough Council, comments:

"There are those that immediately see the benefits of doing it and those that are struggling. If suppliers want to supply one of our projects from April 2016 they will need to have capability to exchange data with us and access our public viewing BIM models and platforms to exchange data and drawings with us."

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Firms will really get themselves into gear and realise that this is not just a requirement from one customer, but a group of customers asking for information in a consistent way

Karen Alford
BIM and GSL programme manager, Environment Agency

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How many past and current projects has your organisation been involved in that use Level 2 BIM?

- None: 49%
- 1-3 only: 28%
- 4-10: 12%
- 10 or more: 10%
- Other (please specify): 2%

Level 2 BIM experience is still relatively rare in the industry: overall nearly half the survey sample (49%) said that they had not yet worked on a Level 2 BIM project, and 28% had delivered only 1-3 projects. Among design consultants, 44% said they had not yet worked on a Level 2 project.

As might be expected, the £100m+ turnover contractors had most experience – 36% had worked on 1-3 BIM Level 2 projects, 15% on 4-10, while 22% had notched up at least 10 Level 2 BIM projects. But that left 22% who had not yet worked on a Level 2 project.

Interestingly, the Tier 2 and 3 specialist sub-contractors had clocked up slightly more experience at Level 2 than the smaller, sub-£100m turnover main contractors. Among specialists, 27% had worked on 1-3, and 15% on 4 or more. For the smaller main contractors, those figures were 11% and 11%. But in both categories, the largest group of respondents had not yet worked on a Level 2 BIM project: 50% of the Tier 2 and 3 specialist contractors and 70% of contractors turning over less than £100m were inexperienced at Level 2.
After this year it will become a disadvantage not to do BIM. From a designer's perspective you are almost ruling yourself out of every project right now if you don't use it.”

George Mokhtar
BIM associate and associate director,
Turner & Townsend

To tackle this shortfall, Sandwell has set up a BIM learning framework that includes a team of BIM consultants who deliver a coaching programme of BIM awareness workshops and masterclasses in the council’s own BIM technologies suite.

But Sandwell is likely to an “outlier” on BIM training capacity. For instance, Terry Gough, BIM Champion for Peterborough and Stamford NHS Foundation Trust, says the Level 2 journey is likely to take five to seven years, before the whole industry, including consultants and contractors, manufacturers and supply chain SMEs fully understand what it means. Gough says:

“The mandate has given everyone the kick they needed to push them into using the software, which lays the foundations for every major developer to tap into. It has also educated designers into new ways of working.”

Matthew Richardson, architect and project designer, McCarthy & Stone south west region, comments:

And Mokhtar also believes that the BIM mandate will drive change in the private sector as much as in publicly funded work - and even spread its influence beyond the construction sector.

“Since the mandate was announced we expected to pick up a lot of government work, but instead we saw private sector interest rapidly escalate. We're working on a lot of property projects in London, including high-end residential, commercial and leisure projects, data centres in Europe and the US and some HQs for large global technology clients. We're seeing a lot of infrastructure work, particularly airports, such as Abu Dhabi Airport’s Midfield Terminal building, the sixth largest building in the world.

“We've started working with some mining and metals organisations, which is a bit of a first and it's interesting that BIM is now mature enough that it can start helping some of these other sectors.”
Clients and the mystery of the ‘BIM premium’

On projects you have worked on that use BIM, did it improve margins/fees/profits?

- We have seen no evidence
- We have seen some positive signs
- We have seen good results

Thinking about BIM’s impact across the industry from 2016 onwards, will it help achieve better margins and/or productivity?

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

The research revealed that a large number of public and private sector clients were being asked to pay a premium, by consultants or contractors, for delivering project information in BIM. In some cases this was viewed as a major barrier to BIM adoption: if project sponsors are only partially committed to BIM, or need to make the case to higher powers, an inflated bill could easily mean that BIM aspirations are shelved or watered down.

Trina Ratcliffe-Pacheco, building design manager at University of the West of England estates department, comments:

“...It is hard to justify to my bosses why we are implementing BIM to save money if we are simultaneously paying extra fees to deliver it. It doesn’t make sense.”

At Wokingham Borough Council, capital programme manager Arnab Mukherjee is very familiar with the phenomenon, saying:
“Despite all the rhetoric, there is an upfront cost element to BIM Level 2 for everyone involved and eventually, one way or another, that gets paid by the client. It starts with the architecture services – to transfer their Revit work to Level 2 compatibility it’s going to cost you X pounds extra, Mr Client. And if you want to use it as a tender document and issue it to the contractor then we have to tick certain boxes in terms of contractual obligations and liabilities, so we need Y pounds extra to cover that.

“For a £20m job, the premium attached might be an insignificant percentage of overall costs, but for a £5m job it could be a very high percentage. There needs to be an incentive and willingness, from all parties concerned, to use BIM otherwise the aim of reducing the cost of projects will not be realised. Part of the problem is everyone is thinking in terms of their own costs, but not the cost to the overall project.”

In one case, a university client said main contractors had offered savings to not have to deliver some aspects of a project in BIM, such as an as-built BIM model embedded with construction data relevant to asset management. As a result, the client hired an external consultant information manager to do the job for a lower fee.

Other clients have been able to rebuff requests for higher fees to cover BIM costs, but have still been surprised that the suppliers viewed BIM as an add-on cost, rather than an R&D opportunity and a learning journey. Karen Alford, BIM and GSL programme manager at the Environment Agency adds:

“Some have tried to charge us, but we knocked it back. We have made it clear we are not picking up the charges for the supply chain’s learning requirements – we are happy for them to work with us to learn how to implement BIM on projects, but not to pick up the cost.”

And Alastair Gourlay, director of asset management, at Guy’s and St Thomas’ NHS Foundation Trust, also summed up clients’ overall attitude:

“Paying a premium isn’t justified if consultants and contractors are keeping up with modern methods and technology they have to make those investments and include the provision in their pricing.”

At Transport for London, John Downes, head of engineering governance and services, and Paul Carr, business change manager, said that higher charges would exclude bidders from projects.

“If people see BIM as an opportunity to charge more they will almost inevitably not be a successful bidder for work London Underground is offering up. Because we often we will go to marketplace with a view to securing through competitive bid, we like to think those who understand what this means in terms of where money can be made will not be looking to increase prices, but genuinely increase value through collaboration, savings and efficiency.”

The reasons for loading extra charges on to the fee ranged from simple opportunism to real concern over the cost of technology, training and perceived extra workload. Some may be attempting to cover the costs of implementing BIM technology and processes they had no plans to implement before the mandate.

Brian Churchyard, senior manager for construction design standards at Asda, comments:

“There is a lot of noise around the higher level of detail you are asking for and the extra man-hours required to complete it. It harks back to when we moved to Revit in 2007 and people said they needed more money to upgrade hardware to run it and invest in training.”

But there was also evidence that a lack of standardisation in manufacturers’ BIM objects and building component libraries could be increasing the burden on designers who feel compelled to develop them from scratch. There may also be challenges related to overhauling legacy systems and procedures.

Despite these concerns, there was a general consensus that extra fees related to BIM will disappear once the industry gets to grips with the mandate and the process becomes “business as usual”. Churchyard comments:

“As we move to true Level 2 BIM, my gut feeling is we will start hearing the same types of noises around extra costs, but after a while it will bed in and become the normal way of working. Then there will be rich databases construction businesses can feed off, reducing duplication and effort, and therefore cost.”

At Waitrose, Andy Smith, general manager for future planning, is seeing attitudes start to shift, saying:

“I can’t see massive cost reduction at the moment. Some consultants and contractors are trying to charge a premium on projects, but most forward-thinking suppliers and consultants are starting to say it is more expensive for them internally to use AutoCAD or other non-collaborative tools rather than Revit, or equivalent software.”
BIM: WHAT CLIENTS REALLY THINK

Level 2 standards: consistency or complexity?

Thinking about BIM’s impact across the industry in 2016 and beyond, what is your reaction to the following statements?

Respondents to the BIM+ online survey threw their weight behind the statement that BIM would be a catalyst for more and better collaboration, where 64% agreed or strongly agreed – rising to 72% of Tier 1 contractors. They also believed the case for BIM in the design stage was already well proven (57%) and were optimistic it would boost margins and/or productivity (53%).

But the statement that drew most support was that “BIM projects will need experienced clients, otherwise the improvements will not materialise”, where 75% strongly agreed or agreed – suggesting that the client-led concept of Level 2 BIM has firmly embedded itself in the industry. Among Tier 1 contractors, 84% backed this view, and 80% of clients did as well.

But clients were more inclined to endorse the view that “BIM will add complexity without driving real improvements” – 42% agreed or strongly agreed, compared to the overall total of 37%.

Contractors backed the statement that “efficiencies in the operational phases are already materialising” – 41% agreed or strongly agreed, compared to 31% overall and just 26% of clients.

An essential premise of BIM is that it drives increased collaboration and creates a different set of behaviours within projects: in that sense, BIM is the inheritor of the Latham and Egan agendas. This view was clearly endorsed by the online survey respondents. But on top of this behavioural change, the BIM Task Group has laid a suite of standards documents designed to create a commonality of approach across the industry and ensure that everyone speaks roughly the same language on BIM.

But does the fairly prescriptive nature of the PAS suite and the rest of the “eight pillars of BIM” support the industry in its efforts to collaborate – or is it just too off-puttingly complicated?

The reality for many clients interviewed is that they have struggled to interpret the various documents and protocols. And others appear to be experiencing “Level 2 anxiety” – or the fear that they are not properly implementing Level 2.

Alastair Gourlay, director of asset management at Guy’s and St Thomas’ NHS Foundation Trust, feels that Level 2 BIM has been presented as more technically challenging than it need be. He says: “People like me are invited on seminars and conferences and sent papers on BIM, but the information isn’t easy to navigate. It is made to sound more complicated than it really is and I’m having difficulty understanding what it is I have to do that I am not already doing.”

The information isn’t easy to navigate. It is made to sound more complicated than it really is and I’m having difficulty understanding what it is I have to do that I am not already doing.”

Alastair Gourlay
Director of asset management, Guy’s and St Thomas’ NHS Foundation Trust

A B C D E F G H

14 23 13 36 38 23 6 34

23 25 38 35 9 22 24 30

13 18 7 6 26 13 11 23

8 18 22 4 6 21 9 9

• Strongly agree
• Somewhat agree
• Somewhat disagree
• Strongly disagree

A. BIM will be a tick-box exercise, with little real change underneath
B. BIM will add complexity without driving real improvements
C. BIM projects will need experienced clients, otherwise improvements will not materialise
D. BIM’s effectiveness in the design stage has already been proven

E. BIM is being fully exploited by most contractors in the construction stage
F. Efficiencies from BIM in the operational phase are already materialising
G. BIM will be a catalyst for more and better collaboration
H. BIM will help achieve better margins and/or productivity

The information isn’t easy to navigate. It is made to sound more complicated than it really is and I’m having difficulty understanding what it is I have to do that I am not already doing.”
“The problem is, who has the time to sit and read all the government standards and documents and make sure they have ticked every box? Because it is massively complicated. At present I’m confident we are achieving all the principles of Level 2, but I can’t be sure we are compliant with every last detail written in the government documents.”

Terry Gough, BIM champion at Peterborough and Stamford NHS Foundation Trust, is a believer in the standards-driven approach – but agrees they could be better co-ordinated and easier to grasp:

“The various PAS and BS 1192 documents are great, but we are still missing a piece of work – a roadmap of how all of these documents link together through all the RIBA Stages. It’s been left to project teams to work that out for themselves.

“what we need is a guide to how they all link together, which is something I have been working on over the last year or so. There are five key docs from BS 1192 to PAS 1192:5, but each refers to other BS standards, or they refer to other pieces of information you need to gather.”

And Trina Ratcliffe-Pacheco, building design manager at the University of the West England estates department, fears that the standards have not had the desired effect of unifying suppliers’ approach to BIM:

“One of the stipulations of government is that BIM will standardise procedures and the way that information is provided to the client, but what stands in the way of that is the fact that each design practice and contractor currently has a different setup.

“Basically everyone is at a different level of understanding and working differently. Until that is resolved, BIM Level 2 is not going to happen.

“This affects us at handover: we receive different models from different designers and contractors, with different levels of graphical detail and levels of component information. It’s not standardised and requires us to digest that information and carry out post-handover editing to achieve standardisation.”

Richard Draper, BIM process manager at Birmingham City University, feels that much of its success in BIM has been achieved in spite of the standards, not because of them:

“We have found we can work with teams, not necessarily to follow the PAS 1192 documents, but sitting down with them and deciding practically what it is we are going to do, what worked and didn’t work in the past, and how we can do it right.
To COBie or not to COBie – clients’ conundrum

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<th>Already embedded</th>
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In the survey overall, as many as 58% of respondents claimed never to have used BS 1192-4, the standard that describes the structure and usage of COBie. This included five respondents who worked for central government clients, 18 who worked elsewhere in the public sector, and 21 contractors turning over more than £100m.

Only 12% of the sample, or 48 individuals, claimed that its usage was “already embedded”. These included just two central government clients, three from elsewhere in the public sector, and nine contractors with turnover more than £100m.

Filtering the sample for these three groups, 40% claimed that Government Soft Landings was “already embedded” – compared to 8% in the sample overall.

Among interviewees, there was a general feeling that clients are starting to perceive the benefits of quality BIM data beyond the construction delivery stage, and how it can improve outcomes for future operational use. For instance, Terry Stocks, head of public sector at Faithful + Gould, comments:

“we are working with more and more clients with a multiple asset estate who are really seeing the benefit of taking the data they have and structuring it into an asset information model that increases their ability to do really effective asset management. When they have the data once, they can use it across a whole raft of projects going forward.”

Steve Massey, the supply chain development officer with Sandwell Metropolitan Borough Council, adds:

“Asset management is a fundamental aspect of Level 2 BIM. For example, our housing developments will require a full asset management data, rich with all the information on components and materials, maintenance schedules, manufacturer warranties etc.”

Data to support the management of a central government-funded building or asset must be delivered to the client in the COBie data format, as described in BS 1992-4, of the “eight pillars” of Level 2 BIM. In fact, COBie is a central premise in Level 2 BIM – the supply chain is working to BIM discipline, adding data to the model throughout, while the client has a valuable data asset.

Massey at Sandwell Metropolitan Borough Council underlined the importance of a full COBie dataset, rich with details on every component, which he said will cut the cost of maintenance engineers doing pre-site audits, or compiling a bill of materials of components that need replacing.

But other interviewees questioned the value of requiring full COBie spreadsheets from suppliers, when much of the data included would not be relevant to future operational needs.

Richard Draper, BIM process manager at Birmingham City University, says:

“You don’t have to deliver all of that stuff. When a client just says ‘give me COBie’ without identifying their specific requirements, consultants will be
When a client just says ‘give me COBie’ without identifying their specific requirements, consultants will be ripping their hair out

Richard Draper
BIM process manager, Birmingham City University

When a client just says ‘give me COBie’ without identifying their specific requirements, consultants will be ripping their hair out because that level of information is just not needed to manage buildings. It’s a big job for someone that will have to be paid for unnecessarily.”

David Walters, project manager at Argent responsible for developing and implementing its BIM strategy at its King’s Cross development, adds:

“Full COBie data drops were not the route we want to go down. We worked with existing asset managers and facilities managers, leaseholders and tenants, to understand what information they actually need. The result was quite a short list: mostly just spatial data needed to understand floor areas and demises, to ensure we are charging people the correct rent, and data for the maintainable assets in our buildings needed for warranties for kit like primary plant, chillers, boilers etc.”

Three interviewees – including two representing the higher education sector – highlighted difficulties in importing COBie data into existing CAFM (computer-aided FM) software.

Birmingham City University was seeking closer integration with the design and construction BIM tools that it was already using. Richard Draper, the BIM process manager at the university, explains:

“We are currently looking to develop a bespoke CAFM system. There are lots of systems available but they are not able to do it the way we want. So we are working with Autodesk on a project to build a system from scratch, looking at the workflows we need, and how technology can support that. The CAFM system will be a derivative of the Autodesk BIM 360 suite Field and Glue, and most probably SharePoint (a form of Common Data Environment in line with PAS 1192). Essentially we should end up with a combination of the two and development work will make them talk to each other.”

And Trina Ratcliffe-Pacheco, building design manager at the University of the West of England estates department, points out:

“Our existing FM tool doesn’t have a 3D interface to visualise the assets in 3D, so there is a limitation on graphical output. For example, if I am sending someone to change light bulbs in a double-storey space, they are not able to identify that from the plan view in the FM tool, which means adding additional pointers in an email, such as ‘mobilise a cherry picker’. Software providers are promising 3D functionality in their new versions, but I’m sceptical of whether they will be able to deliver it yet.”

BIM-to-CAFM COBie transfer was also a problematic area for Nigel Midmer, framework manager for the Southern Construction Framework at Hampshire County Council:

“We want to be able to transfer data into our CAFM systems after project delivery, but have not delivered that yet. At present there isn’t a proprietary software solution to enable that fully and we haven’t developed one. We don’t work on a proprietary system priority and are trying to do it as a performance-based specification, and working with vendors to understand how to move things forward.”

However, it was recognised that the Government Soft Landings process, recommended from April 2016 for all central government departments, should improve the quality of COBie data, by recognising the need for early end-user engagement in the design and construction process.

Stocks from Faithful + Gould comments:

“If you are running a GSL approach with an FM provider – or someone representing the FM provider – and the operator through the delivery process, at the end you should have a solid set of data that enables you to service your CAFM system. And going into operation, there should be a smoother handover process.”

Richard Draper
BIM process manager, Birmingham City University
The NBS Digital Plan of Work, released in beta in April 2015 and fully operational from October 2015, provides guidance for documenting what geometry, data and other information is required throughout the different stages of a project cycle. The toolkit is described by NBS as an “indispensable” means of delivering projects to meet the requirements of Level 2 BIM, but BIM+ interviews with clients and client advisers revealed limited take-up, while only 13% of the online respondents had used it on a live project. In addition, 163 survey respondents skipped this question entirely.

At bid stage, clients can use it to define their Employer Information Requirements (EIR), and potential consultants and contractors can use it to respond with details of their teams and services. When the project moves into design and construction, teams can continue to grow the Digital Plan of Work, providing information regarding tasks or deliverables to meet the client’s requirements.

Brian Churchyard, senior manager for construction design standards at Asda, suggests that it might have arrived slightly too late:

“we’re not using it. Our EIR was developed at the same time as the NBS BIM Toolkit ‘Beta’… One difficulty we experienced last year was the pace [at which] software becomes usable. It feels like that area is still developing, along with the consultant base around it. As much as we want to start adopting these types of tools that can become useful as we go into Level 2, my instinct is that some have a way to go before they become practical.”

But Alastair Gourlay, director of asset management at Guy’s and St Thomas’ NHS Foundation Trust, was supportive, saying:

“I’ve had a look at the Digital Plan of Work, which has limitations but as a first start it’s great. The structure is good, but it hasn’t been tested in court yet with wider-timescale, bigger projects, bigger experience - it’s early days. We’re trying to learn what is good and bad, but not take those as negatives but development opportunities. It’s a solution that has been created as a baseline with a big ambition to sit alongside the RIBA Plan of Works.”

In addition, the plan is designed to function as a data verification tool, offering the ability to check that a supplier’s project data, provided in open standards such as COBie spreadsheets or IFC files, meets the project’s requirements and the appropriate level of information or detail.

Data verification and validation will become a key concern for many clients from this October, when a BIM mandate stretch target is introduced.
I think the target is a bit smoke and mirrors... The reality is we will still be chugging along beyond October trying to ensure good quality data”

Terry Gough
BIM champion for Peterborough and Stamford NHS Foundation Trust

requiring all government departments to “electronically” validate BIM data from suppliers. BIM+ interviews revealed that most public sector clients were aware of this stretch target. Although speaking from a private sector point of view, Andy Smith at Waitrose was typical in recognising its value:

“The data assurance piece is very important and if you give a clear structure you should get a decent set of data back. Making sure data is correct is a huge task and what you don’t want is the first time you find out the data is wrong is when you try to maintain an asset.”

But few were convinced they had yet addressed it adequately. Karen Alford, BIM and GSL programme manager at the Environment Agency, comments:

“This is quite new to us, we are working with software specialist Asite to build a validation tool ready for the end of April, using COBie that includes must-have information we will be validating against.

“This is a very important aspect, we are trying to make it uncomplicated. At the moment we exchange documents so our validation will be integrated into documents.”

Clients that do not receive central government funding - and are not subject to the “stretch” target - were also aware of the need for robust data. Trina Ratcliffe-Pacheco, building design manager at University of the West of England Estates, says:

“It is very difficult as a client to include validation to check that information provided is correct - we usually relay the legal responsibility to quality assure information on to our designers and contractors. I’m not yet fully confident we have that in place; until we have all information linked to our CAFM tool we are unable to say it is 100% correct.”

Birmingham City University said it will aim to ensure that processes to validate the model become part of its EIRs. Richard Draper, the university’s BIM process manager, comments:

“The key is to make sure verification and validation processes actually happen onsite and that managers buy into carrying them out so we received completed validated models at practical completion, not six months later.”

Terry Gough, BIM champion for Peterborough and Stamford NHS Foundation Trust, however, felt that the target was insufficiently described - chiming with the majority of the online survey respondents:

“I think the target is a bit smoke and mirrors. Why introduce the April mandate then introduce another deadline saying when good quality

The BIM Task Group has announced a “stretch target on data validation” of October 2016. How do you think your organisation will respond?

- Our processes will be able to hit the target
- We will try to hit the target, but do not expect to do so fully
- We have not yet started to work towards the target, but will do so shortly
- We have not yet started to work towards the target and do not fully understand it
- It’s not applicable to our organisation
- Other (please specify)

Asked about meeting the government’s “stretch target” on data validation, the largest group (31%) in the overall sample said that “we have not yet started to work towards the target and do not fully understand it”. Among clients and client-side project managers, this response was selected by 35%. But a similar proportion of the overall sample and the client side of the industry (17% versus 16% respectively) said that “our processes will be able to hit the target”.

electronic data is required? The reality is we will still be chugging along beyond October trying to ensure good quality data.

“I’ve been tweeting a lot about how do we validate and what is the validation process, what should it look like and what is it we are validating? But no one had a satisfactory answer, there is nothing there yet to define what we need to validate. We need to draw a line in the sand to define a level everyone should be achieving as a base.”
In search of hard evidence on BIM’s benefits

On projects you have worked on that used BIM, how would you describe the impact?

- It saved time in pre-construction design: 45%
- It saved cost in pre-construction design: 45%
- It saved time in the construction phase: 39%
- It saved cost in the construction phase: 46%
- It helped cut the project’s carbon footprint: 62%
- It promoted safety and regulatory compliance: 51%
- It created efficiencies in the hand-over phase: 47%
- It created efficiencies in the operational phase: 55%
- It promoted collaboration and reduced ‘silo’ working: 60%
- It has improved our margins/fees/profits: 60%

Asked about the impact of BIM on current or completed projects, BIM’s ability to promote collaboration emerged as the clear winner in terms of impact – 63% of the sample reported “positive signs” or “good results”.

Clients, however, had seen less benefit to their own budgets – 28% reported results in positive territory, compared to 40% overall. Clients were less likely to perceive benefits in terms of time savings: 32% experienced reduced design time (versus 55% overall), 43% thought that it reduced time in the construction phase (versus 60%). But in terms of operational efficiencies, 49% of clients reported positive signs or good results – higher than the 44% in the overall sample.

Interestingly, the construction phase was in close step with the operational phase in terms of benefits. In total, 55% reported either positive signs or good results on reducing time in the design phase, versus 60% in the construction phase; on cost, 55% reported savings in design, almost matching the 54% with savings in construction.

The public and private sector client interviews carried out by BIM+ revealed little tangible evidence of reductions in overall project outturn costs or project delivery times. This was viewed as being due to the difficulty isolating the specific impact of BIM on projects, versus other factors, and the relative infancy of many projects utilising BIM.

As David Walters, project manager at Argent, responsible for developing and implementing Argent’s BIM strategy on the King’s Cross site in north London, summarises:

“It is very difficult to measure the benefits and savings exactly. A lot of it is anecdotal and there are only certain points where you can measure those savings – and many are confidential, which makes things very tricky to report on.”

The key benefit of BIM, expressed by most clients, lay in its 3D modelling aspect, which provided greater visual clarity on projects to enable key decision makers, end users – and in some cases the general public – to understand the finished asset and its impact on the local context. In addition, most agreed that BIM’s ability to improve collaboration and data sharing has made construction design and delivery phases more effective and efficient.

There was also general consensus that the technical accuracy of a federated BIM model, and related functions such as clash detection, have helped achieve a higher level of clarity faster on projects, eliminating remediative or abortive works during construction.

For instance, Karen Alford, BIM and GSL programme manager at the Environment Agency, says:
We can see that the benefits of BIM are tremendous, but we have taken a cautious approach to make sure we don’t jump in and find we need to change our approach.

Matthew Richardson
Architect and project manager, south west region, McCarthy & Stone

“On projects carried out with a fully integrated model, key advantages were clash detection – we expect suppliers to do that at detailed design stage – and having visualisation fly-through models, to make publicly available to show what is going to happen on schemes such as the Shoreham flood defences or Boston barrier. These make detailed engineering solutions understandable by a wide range of people.”

Argent also reports that BIM has helped drive more space-efficient buildings, tighten up designs for floor areas, cores and riser spaces, translating into more lettable space.

And one development, project managed by Turner & Townsend, running optioneering exercises in BIM to optimise and reconfigure spaces, helped free up an extra 10% of lettable space for the client.

But George Mokhtar, BIM lead and associate director, Turner & Townsend, points out that the financial benefits to the client mainly lie in shrinking risk exposure:

“Generally speaking, basic BIM processes will provide quality coordination and clash detection – as a result we have seen a significant reduction in the risk pot. And when it is time for contractors to bid for a project, when we demonstrate that reduced risk, they in turn reduce their fee, which can be significant, in the millions of pounds.”

At Waitrose, Andy Smith, general manager of future planning, perceived value that was hard to measure in financial terms:

“I can’t see massive cost reduction at the moment. Even so, there is so much value in the data we get from the BIM process. There is productivity value for the consultant design team, information value for the FM team.”

But most clients viewed themselves as still establishing the foundations of a BIM approach, with a view to reaping the benefits at a later date.

For instance, Matthew Richardson, architect and project designer for McCarthy & Stone’s south west region, says:

“We can see that the benefits of BIM are going to be tremendous, but we have taken a cautious approach to make sure we don’t jump in and find we need to change our approach.”

And the Environment Agency’s Karen Alford says:

“We will be learning a lot this year, and our suppliers across industry will be gaining an understanding of what it really means and the opportunities they can bring to projects. We are seeing positive responses from suppliers and evidence of them thinking about and doing better integration of modelling and data management. I anticipate us seeing savings coming through next year, but it is difficult to say at what level.”
The road ahead leads to Level 3 BIM

How likely is it that BIM will achieve the following targets?

In the BIM+ survey, levels of confidence on achieving the BIM Level 3 target by 2025 were slightly higher than confidence that BIM would cut project timescales by 50% by 2025, but it was deemed slightly less likely than reducing whole-life costs by 33% by 2025.

On achieving Level 3 BIM by 2025, contractors turning over £100m+ were more confident than average, with only 15% rating it “highly unlikely” or “fairly unlikely”, although 59% were neutral.

Public sector clients’ views on Level 3 BIM were broadly in line with the overall sample, but private sector clients’ views were less optimistic.

But the client side of the industry was, on the whole, less confident that long-term targets would be achieved than the overall sample. Among public and private sector clients, and project managers advising clients, the weightings on four out of the five targets shifted towards a more sceptical view. The only target where there were shifts of a few percentage points towards “fairly likely” and “highly likely” was in the historic question of whether or not BIM had reduced out-turn costs in 2011-2015 (18% versus the overall average of 15%).

The government’s strategic plan for Level 3 BIM, launched in March 2015, sets out a broad vision for “Digital Built Britain” and an environment where technology and digital data-sharing are second nature in construction. It sees construction as one element in a step-change towards Smart Cities and data-driven public services, exploiting sensor data and the Internet of Things (IoT) to drive efficiencies and cost savings.

The strategy is due for implementation by 2025, with the BIM Task Group outlining a five year preparation period (2016-20) and a five year implementation period (2021-25). The Digital Built Britain document breaks the challenge down into Stages A, B, C and D, split into commercial, technical and cultural streams. This is more specific, however, than the Government Construction Strategy 2016-20, which says only that government targets for 2017-20 are to “increase maturity of BIM Level 2 to a point that supports development of BIM Level 3 with a view to government adoption at a later date”.

However, the broad consensus among clients interviewed by BIM+ was that the 2025 target was realistic and achievable. Terry Gough, BIM champion for Peterborough and Stamford NHS Foundation Trust, comments: “The goal of reaching BIM Level 3 by 2025 is achievable as long as the industry is given a clear brief on what it will “be” and “contain”. The current outline within Digital Built Britain is just a representation of a thought process of what could be the Level 3 strategy. It needs to be fleshed out and a number of parties will be coming together over the coming years to give a clear steer on what will be required.”

Some client interviewees already have Level 3 on their radar and are working towards it. Steve Massey, supply chain development officer at Sandwell Metropolitan Borough Council, says: “We’re aiming to implement it by 2018, well in advance of the target. We plan to put all our projects on public viewing platforms, so they can be regularly updated.”
However, some clients felt looking to 2025 was a bit optimistic given that Level 2 compliance is still patchy at best. George Mokhtar, BIM lead and associate director at Turner & Townsend, comments: “Right now there is a common view that we have already reached Level 2 BIM, but we really haven’t when you look into the detail. We have the principles of working on a shared data platform, the relevant documents and processes, but many people haven’t got to grips with every standard on the list, and until it is entrenched in the way people work, as best practice, we are not really at Level 2.”

BIM Level 3 will implement the very different process of all project participants updating a single, shared integrated building model in real-time, possibly in the cloud. Brian Churchyard, senior manager for construction design standards at Asda, has a clear view of what it will offer and says that the transition should be less painful than the adoption of Level 2: “The holy grail is having a single integrated building model that can be updated in real time, then projects became all about efficiency and pace, and replacing resource to reduce the operating cost of the business. That in turn will help us reduce prices for shopping customers.

“If your organisation is not doing anything now to establish solid foundations for Level 2 it will be difficult to catch up. If we get the naming protocols around Level 2 right and the level of information and data is robust, you could argue that the move towards Level 3 will be easier than moving from Level 1 to Level 2, assuming the software catches up!”

But real-time collaboration on a shared model will raises concerns related to copyright, intellectual property and liability, which might be resolved by using new forms of appointment and software with different levels of permissions. In this respect, Digital Built Britain calls for the establishment of a new contractual framework for projects procured with BIM to ensure consistency, avoid confusion and encourage open, collaborative working.

Trina Rautcliffe-Pacheco, building design manager at University of the West of England Estates, summarises: “Level 2 BIM doesn’t pose an issue in terms of the security of intellectual property or identifying people’s responsibility for data within the model. But moving towards Level 3 will require a big shift in the way the industry works. It could require different forms of contract that protect clients and the supply chain from others tampering with their models.”

BIM Level 3 aims to ensure that 3D models and intelligence created in design and construction can be fully leveraged by building and facilities management teams. To be effective, teams will exploit intelligence from a multitude of connected IoT devices, including sensors, able to talk to each other in real-time.

Karen Alford, BIM and GSL programme manager at the Environment Agency, believes the target is essentially a realistic one: “In the next four years we are going to see a considerable change in the ability of the industry to work together, co-ordinate and deliver more efficiently using BIM. We are not fighting a technology battle we were before, now it is about us harnessing the benefits and cross-industry working will be essential to achieving the 2025 goal.

“The key benefits for us will be around asset management, having the ability to bring in data from other asset owners in a structured way, onto a shared platform with management authorities and third-party asset owners, running analysis and being able to incorporate new technologies, like sensors, to provide better intelligence on asset performance.

“We have done some initial experimental work and through just eight lines of code we determined how many days an embankment in a location will be exposed to frost. That level of analysis, the growth in open data, and knowledge-sharing worldwide, the search for information and bringing it back to analyse and build intelligence about how assets perform in different conditions, could transform our operations.”

Level 3 BIM was also very much in the sightlines of HS2, where Jon Kerbey, director of BIM, says: “The 2025 target for BIM Level 3 will come during [our] lifespan, it’s another complexity we had to build on top of so we can make sure we are almost future proofing our contracts. We are essentially procuring with Level 2 in mind, but how can we make sure take advantage of Level 3 concepts, principles and objectives when we reach that date?”

And although the private sector clients in our online survey were less convinced than their public sector counterparts about the achievability of Level 3, Matthew Richardson, architect and project designer at McCarthy and Stone, viewed it as perfectly possible: “Trying to implement it for all public sector building types could make it a tall order without the very firm support of government. For the private sector, working on a much smaller scale with a smaller palette of building types, it should be easily achievable. As a developer, I don’t see why you couldn’t exceed that target very easily.”

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Many people haven’t got to grips with every standard on the list, and until it is entrenched in the way people work, as best practice, we are not really at Level 2.”

George Mokhtar
BIM lead and associate director, Turner & Townsend
With thanks to:

David Walters  
**Project manager, Argent**

Brian Churchyard  
**Senior manager for construction design standards, Asda**

Richard Draper  
**BIM process manager, Birmingham City University**

David Benson  
**Director of estates and facilities, Cardiff Metropolitan University**

Karen Alford  
**BIM and GSL programme manager, Environment Agency**

Terry Stocks  
**Head of public sector, Faithful + Gould**

Alastair Gourlay  
**Director of asset management, Guys and St Thomas’ NHS Foundation Trust**

Nigel Midmer  
**Framework manager, Southern Construction Framework, Hampshire County Council**

Jon Kerbey  
**Director, BIM, HS2**

Matthew Richardson  
**Architect and project designer, McCarthy and Stone, South-west region**

Terry Gough  
**BIM Champion, Peterborough and Stamford NHS Foundation Trust**

Steve Massey  
**Supply chain development officer, Sandwell Metropolitan Borough Council**

John Downes  
**Head of engineering governance and services, Transport for London**

Paul Carr  
**Business change manager, Transport for London**

George Mokhtar  
**BIM lead and associate director, Turner & Townsend**

Trina Ratcliffe-Pacheco  
**Building design manager, Estates department, University of the West of England**

Andy Smith  
**General manager of future planning, Waitrose**

Arnab Mukherjee  
**Capital programme manager, Wokingham Borough Council**

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The respondents to the CM/BIM + online survey comprised:

- Central government clients - 20
- Other public sector clients - 39
- Private sector clients - 33
- Project managers (public sector clients) - 38
- Project managers (private sector clients) - 56
- Tier 1 contractors turnover above £100m - 67
- Tier 1 contractors turnover below £100m - 47
- Tier 2 and 3 specialist sub-contractors - 28
- Design consultants - 129
- Cost consultants - 36
- Other - 74