NBS

National BIM Report **2016**

We would like to thank the following organisations for supporting this report:

Introduction

Richard Waterhouse
CEO, NBS and RIBA Enterprises

We are releasing this report just as the UK Government's BIM mandate has come into force. From 4 April 2016, centrally procured construction projects now need to achieve BIM Level 2. This is a significant milestone in the UK's BIM journey, and in this report we show the industry's assessment of its own readiness to reach this milestone.

In some ways we are well set. In the five years since the former Chief Construction Adviser, Paul Morrell, set the course for BIM Level 2 as part of the Government's Construction Strategy, BIM usage has moved from a niche practice to the norm. BIM adoption is now at 54%, up from 48% last year. Eighty six percent of respondents intend to have adopted BIM by this time next year, and 97% within five years.

However, concerns remain. A significant number tell us that they are not clear on what they have to do to comply with the BIM mandate, and only one in ten believes that the construction industry is ready to deliver on it. Aligned to this is a broader skills gap in BIM, with a quarter feeling they lack the skills and knowledge that they need.

As a collaborative practice, BIM requires a shared ownership of the design and construction process. Through this shared ownership will come shared learning, as well as the iterative development and implementation of improved practice. This level of collaboration opens up new possibilities to design teams: coming together on a project-by-project basis to collaborate in clearly defined and described ways, with information pooled, rather than hoarded.

Like BIM, the future is collaborative and digital. By working together, in a digital environment, we may address these issues.

BIM is presently being led by the design and construction community. Other parts of the industry are behind. BIM's broader adoption among clients and managers of buildings will come through using the information within the models to better and more efficiently commission and use buildings.

This fits with the Government's broader digitisation goal. The digitisation of the UK construction industry will bring with it rapidly improving levels of innovation and productivity: improvements we can see in other sectors. The Government's construction strategy for an industry delivering:

- Lower costs;
- Faster delivery;
- Lower emissions; and
- Improvement in exports

will, and can only be, delivered through BIM.

We are already part of the way there. The UK has a world-leading design community that contributes very positively to our balance of payments. We are delivering world-class construction projects, such as the 2012 Olympics and Crossrail. BIM is playing a significant role in increasing the efficiency of government construction spending. In 2014/15, the Government saved £855m on existing schemes, allowing for investment in new ones. The UK is leading in providing standards and descriptions of BIM, and other countries are using these as a template for best practice in BIM.

But there is still much work to do and the journey continues. For BIM to realise its transformative potential, investment and change is needed across the sector. At NBS, we are investing in this global opportunity for UK construction. The NBS BIM Toolkit, the NBS National BIM Library and NBS Create are all designed to support best design practice using BIM. We look forward to providing the knowledge that the UK construction industry needs to realise the potential of BIM.

NBS and RIBA are members of the BIM Technologies Alliance supporting the UK Government's Construction Strategy BIM Working Group

BIM – the wider landscape of infrastructure, and the convergence with geospatial

Dr Anne Kemp
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Vice Chair of buildingSMART UKI; Convenor of ISO 19650; Chair of ICE's BIM Action Group; Chair of BIM4 Infrastructure; Director of AGI

ice
Institution of Civil Engineers

As we move forward in our progression of BIM implementation across the infrastructure industry, I am realising that some of our most useful insights are occurring within the overlap and disruptive influences occurring at the boundaries with other sectors, whether that be with asset management, the IT, system engineering, gaming or geospatial industries. How often do we hear the charge that we all operate in our silos and are too inward looking? So I thought I would take the opportunity to share here a key theme of AGI's Foresight 2020 Report (www.agi.org.uk/news/foresight-report, Kemp et al, November 2015) – BIM, Asset Management and Future Cities, which examined the increasing convergence of geospatial and BIM technologies and approaches.

If BIM is about the purposeful management of information throughout the project life cycle – for infrastructure as well as buildings – then geospatial data will become a significant aspect of that, particularly as we move towards Digital Built Britain and the management of entire estates and portfolios. I would observe that the geospatial industry has been operating in the asset management space for many years, while BIM, with its roots in 3D modelling, has emerged from the domains of construction and architecture. It is clear that there are opportunities to take the best of both to achieve better outcomes for everyone.

Just as there is a conception that GIS (geographic information system) is just about mapping, so there is a misconception that BIM is just about 3D modelling. Wrong on both counts. If we think of BIM as 'Better Information Management' – entailing the whole life cycle of the whole built environment integrated with the people and the services it delivers – you can understand that this complements and converges fundamentally with geospatial. Ultimately this will take us to the 'Digital Earth' which embraces gaming technologies, semantic ontologies, on a scale which we can only just start to comprehend, but which will require issues of data quality, security, and clarity of use, interpretation and enhanced decision-making to consider not only technology, process and data, but more importantly the human dimension at a behavioural and psychological level. To do this requires a fundamental and deep understanding of our relationship with digital data, and how we can draw out intelligence from that data, to inform better dialogue, and derive better decisions, setting the context for whole life cycle information management and improved asset performance management.

To be frank, this has to be one of the biggest latent and untapped opportunities for the geospatial industry, and this was a key conclusion of the Foresight 2020 Report. Not maps, not 3D – but recognising the latent possibilities of the data and the value-add services that can and should be delivered. What a phenomenal opportunity.

But how can this be achieved? Looking at this more closely, geospatial and geomatic data can have a major impact on all aspects of construction. Professional surveyors are able to accurately map existing site conditions, using laser scanning approaches such as Scan 2 BIM to create BIM models. Point cloud geomatics data can be used during construction to record what has actually happened on site, as opposed to ambiguous as-built drawings. Equally, with the help of drones, regular surveys during construction, operation and maintenance may monitor conditions and developments on site, including in restricted or hazardous conditions.

Data taken from sensors installed during construction can be used to control or intelligently monitor the condition of buildings, and set within a locational context. Sensors can also be used to monitor the public and building users to understand indoor navigation or levels of occupancy, and so streamline designs to reduce the footprint of buildings. The huge convergence of 'Big Data' with BIM and more traditional geospatial data is enabling and informing more comprehensive predictive, behavioural and responsive analytics, influencing how buildings and infrastructure are able to respond to changing conditions.

This leads to a dilemma and a challenge for the open standards community which, until recently, were functioning to a large extent separately. Now, however, buildingSMART International is working closely with the Open Geospatial Consortium (OGC), the open standards body for the global geospatial community, to develop converged open standards and the overlap in activities of those two organisations is very indicative of how the industry is shifting. OGC and buildingSMART are working with a mix of IFC et al, CityGML and LandXML, and testing whether there is a need to merge them with protocols from other sectors that could help going forward. The Integrated Digital Built Environment Working Group has been set up to look into the challenges, whilst not disrupting continued development of the open standards that are required in the here and now. There is a keen awareness that one of the big challenges is the lack of consistency of sensor data and, with the number of sensors globally set to expand from around 2 trillion to 30 trillion over the next couple of years, it is vital we are able to make sense of that data in a consistent way.

The need for accurate asset information for large infrastructure managers (e.g. utility companies, Highways England, Network Rail, Environment Agency) is an essential enabler for the safe and efficient operation and maintenance of those assets and for decision support. However, owing to the nature and scale of the asset base in large infrastructure sectors, the asset object geometry held in these registers (often in GIS) is fairly simple. With the UK Government BIM mandate taking a whole life cycle portfolio approach across the sector, a significant opportunity exists for asset managers of large physical infrastructure to improve information management.

The difficulty that needs to be overcome is that a significant amount of legacy infrastructure assets already exists. Where not captured, changes to the existing infrastructure slowly degrade the quality of any data kept and its reliability for use in operations and maintenance planning. The approach of delivering and updating data directly from the construction process into asset systems through BIM should increase the trust in the data. But other initiatives, such as defining a consistent approach to effectively record and share information on buried assets, are important to ensure that this can occur[1]. The continuing challenge is to get industry to back these initiatives and help to fund and resource the activity required.

Top: *Use of drones for survey in difficult terrain conditions to create informative 3D environments*

Bottom: *Improving visibility and resilience of buried services... 'How can a city be smart if it has no idea what is buried underground?'*

[1] *ice.org.uk/news/knowledge/october/improving-visibility-and-resilience-of-buried-serv*

There is a connection between Smart City data and BIM data, both providing data about our built environment for further use in operations, maintenance and performance management[2]. The ability to measure 'in service' performance and compare it to 'as briefed' and 'as delivered' assets is the single biggest opportunity to improve both asset cost and carbon performance, e.g. through condition-based maintenance.

Quite rightly, for the construction industry, the digital asset is becoming as important as the physical asset. This paradigm shift is in the process of transforming the sector. The data cannot be regarded as proprietary but needs to be passed on as accessible and trusted – cities won't become smart if the data is not treated as such. Data handover should be considered as a life cycle component like any asset – 'Would you handover an asset without an operating manual?' For a geospatial professional, in the data sense this means handing over the semantics and metadata, ideally mapped to an ontology. This is no different to any data time series. A city cannot be smart if it can't let the maintenance contracts which will keep it be smart.

The Internet of Things and Internet of Everything will play a major part in the way autonomous technologies will gather and use data to allow their operation. To be truly effective, these sensors will need to have a sense of place. Jim Plume refers to this combination of proprietary tools and open standards as the Integrated Digitally-Enabled Environment (IDEE), which affords us a comprehensive way of holding information about the natural and built environments in which these autonomous technologies will operate.

In this short essay, we propose an information framework to support the digital enablement of the built and natural environments. In doing that, we envision an inevitable shift towards a world in which our interaction with the physical world is increasingly facilitated through digital technologies that rely on data and information either to inform the decisions that we take or, where appropriate, form the basis for the autonomous response of entities acting for our benefit in the physical world.

Excerpt from the IDEE paper in AGI's Foresight 2020 Report (www.agi.org.uk/news/foresight-report, Kemp et al, November 2015)

[2] Department for Business, Innovation & Skills, 2015: p.14

For the IDEE to be of value to us, we need a way of accessing that information as and when we need it. That leads to a set of facilitating technologies to enable the IDEE to operate:

- the Internet to transport the information;
- the semantic web to enable smart ways to find and retrieve information;
- geolocation technologies to enable searching based on geographic context;
- RFID[3]s with sensors to facilitate the Internet of Things to realise a sensate environment.

This may be the way in which the world of BIM could interact with the autonomous world of smart cities to create, for example, the future transport networks that can support autonomous vehicles, and indoor navigation that facilitates a better and safer experience for people moving through the urban environment.

Finally, there is a very human dimension to the rapid transformation of our lives into a more digital world. Evidence suggests that we are adapting more quickly than might be expected[4,5], and there will be undoubtedly both good and bad ramifications to this. For those involved in how the real world is represented in a virtual sense, this represents a serious responsibility over the next few years which must not be overlooked.

[3] Radio Frequency Identification
[4] 'Mind Change', Susan Greenfield
[5] 'The Shallows: How the internet is changing the way we think, read and remember', Nicholas Carr

Working towards a unified approach to BIM in Europe

Adam Matthews
Chairman of the EU BIM Task Group and Head of International for the UK BIM Task Group

Europe is now host to the greatest regional concentration of government-led BIM programmes in the world. Finland and Norway were first to set standards, followed by procurement policies from the UK, Netherlands and Italy; and most recently joint government and industry initiatives from France, Germany and Spain. Europe's central policy and governance function, the European Commission, endorsed BIM as an enabler for delivering public works by encouraging its use in the EU Public Procurement Directive (2014).

The newly-formed EU BIM Task Group is co-funded by the European Commission to bring together these national initiatives into a common and aligned European approach to develop a world-class digital construction sector.

This unusual public collaboration raises several questions: why are governments and public sector organisations taking a leadership role to encourage BIM and, more broadly, the digitalisation of industry? What is the value proposition for collaboration and alignment across European member states? And how might this alignment affect the European construction sector and global markets?

Before looking at governments' interest in BIM, what does BIM mean to public authorities? Building Information Modelling (BIM) can be thought of as 'digital construction'. It combines the use of 3D computer modelling with asset and project information to improve collaboration, coordination and decision making when delivering and operating public assets. It is a technology-based approach to construction that makes the complex understandable, and outcomes more predictable.

Why are governments encouraging BIM?

Three trends are focusing public sector minds on finding new ways of working. Firstly, governments and public agencies across Europe are adapting to the new norm of increased pressure on public spending. This is being driven by macro issues such as bearing the cost of an ageing population, rising social welfare and national debt concerns. These issues are far from unique – governments around the world are facing similarly tough budgetary constraints.

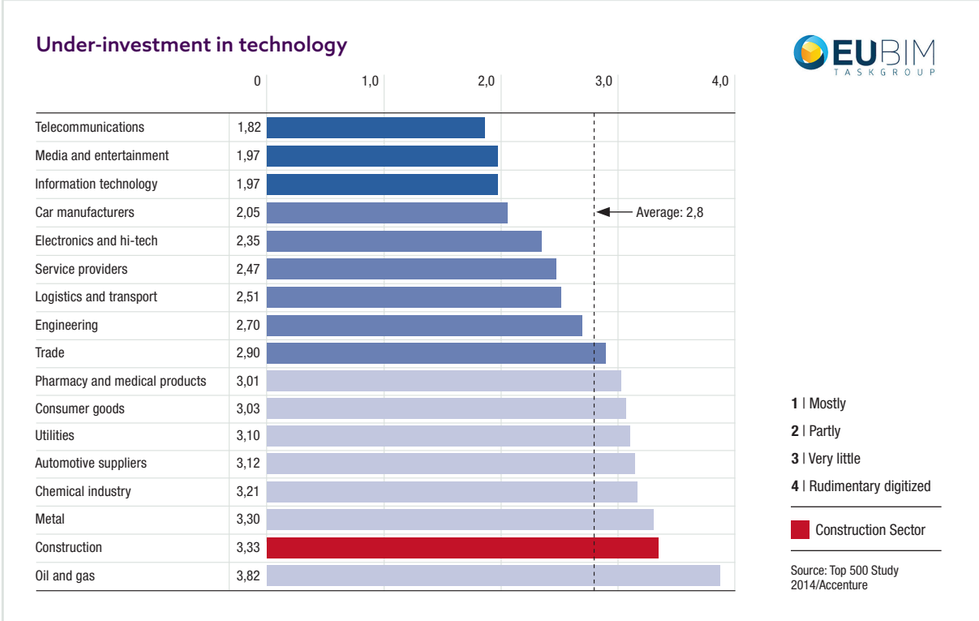
Secondly, despite the fiscal challenges, governments still need to build and fund national infrastructure for the future. Putting infrastructure development on hold harms the future prospects of a region or country as inadequate infrastructure limits prospects for growth or inward investment. Clearly, the 'do nothing' option for governments is not an attractive one.

Thirdly, to compound the public challenge, increasing regulation and policy drivers to reduce consumption of natural resources, including fossil fuels, are creating an acute need for public procurers to find new ways to address this three-sided conundrum: spend carefully, build more, and build to a higher, more sustainable quality standard.

The construction sector holds the promise of a significant contribution to all of these three challenges.

The sector represents a significant slice of budgets under scrutiny; therefore it is of interest to government agencies to extract greater value. Also, the built environment is widely recognised to be one of the largest consumers of natural resources and producers of carbon emissions. It accounts for approximately 40% of the world annual resource consumption, and emits approximately the same proportion of carbon.

The sector rightly has a self-interest to maintain and attract capital flows of investment from the public and private sector to continue with public infrastructure plans; therefore it is motivated to help solve the challenges of 'build more for the same or less' and to sustainable standards.



In addition to the clear opportunity the sector holds to address public drivers, it is burdened with stubbornly low (and falling) productivity rates and high wastage. The UK's National Audit Office (*Modernising Construction [2001]) estimates that 30% of construction costs are wasted in unproductive activities. This figure is evident in the global construction market – it is not a solely UK or European problem.

The Economist (in its report 'Rethinking productivity across the construction industry') lays part of the blame for this low productivity on poor coordination between the sector's many and fragmented stakeholders. Inadequate information management is also identified as a root cause of the sector's unsustainable performance.

Accenture's 2014 Top 500 Study places construction at the bottom of the league table for investing in and adopting technology. This lowly position is in stark contrast to technology take-up in other traditionally labour-intensive sectors such as manufacturing, retail and aerospace, where productivity rates have climbed.

The message is clear: the convergence of 'digital' with construction holds the promise of getting more from reduced budgets by increased productivity and getting a more sustainable built environment. BIM provides greater clarity and certainty of project delivery, thus helping to minimise cost overruns and improve timely delivery of public projects, helping to address the squeeze on public budgets.

As a decision support system, BIM can act as a powerful tool to address sustainability challenges; it helps to optimise energy and resource efficiency; and can perform an enabling role in the evolving circular economy agenda. These are key sustainability policies for Europe's governments and public procurers.

Given the value of BIM to the public agenda and the sector's systemic under-investment in technology, it is little surprise that governments take the view that the sector is well overdue an upgrade. Governments are recognising that policy and public procurement can act as a catalyst for this digital transition in a fragmented and diverse sector.

Rapidly evolving national digital programmes

Germany	planen bauen 4.0	Norway	STATSBYGG
Finland	Senaatti	Spain	es.BIM Implantación del BIM en España
France	Plan Transition Numérique dans le Bâtiment	UK	BiM Building Information Modelling (BIM) Task Group
Netherlands	Rijkswaterstaat Ministry of Infrastructure and the Environment	Denmark	BYGNINGSSTYRELSEN

Why are public agencies collaborating?

In the past four years a surge of government-led BIM and digital programmes have launched across Europe. The argument on whether governments can benefit from BIM and help lead the sector's digital transition appears well and truly answered: it does benefit and it can lead.

With multiple countries initiating digital programmes, the possibility of nationalism and with it protectionism through proprietary national approaches is raised. This scenario could lead to competition barriers across the European Single Market. Would we want to see a French, Spanish, German or UK engineer have to re-skill, re-tool and re-invest in a bid to work across borders complying with member state specific 'BIM requirements'?

Governments want to increase productivity and reduce the costs of the construction sector – not to add a cost burden of compliance to country-specific methods.

What are the benefits of cross-border collaboration? On the positive, a pooling of intellectual horsepower and normalising of common practices can reduce individual member state costs for developing digitalisation policies and strategies. Hence, learning from each other will reduce waste and accelerate digitalisation and increase shared benefits.

Collaboration also makes for more robust and proven programmes, which in turn increases the likelihood of implementing successful and impactful policies. Furthermore, adoption levels within member states are likely to be greater when a regional 'competitive' effect operates. For example, an engineer, architect or contractor will not want to fall behind the capability level of a neighbouring 'BIM ready' country. In this case, if a unified BIM policy is introduced, it would be more likely that the supply chain would be inclined to invest and re-skill than if it were a different type of approach.

EUBIM TASKGROUP

Co-funded by the European Union

To make this vision of a common approach for BIM a reality, the EU BIM Task Group is bringing together national initiatives to an aligned and common approach for the use of BIM in Europe's public works. The group is comprised of public clients and policy makers and nominated industry advisers.

The vision of the group is to increase the value for public money on the delivery and operation of public assets to improve whole-life cycle performance of public assets and to foster a world-class digital, open and competitive construction sector.

The group is co-funded by the European Commission (EC) for two years (2016-2017) to deliver on its promise of a common European approach. The EC is in support of its vision as part of a wider ambition to improve competitiveness of the construction sector, especially SMEs, and related policy actions to digitalise the sector.

The Task Group aims to normalise the use and specification of BIM by European public clients and policy makers to deliver shared benefits for Europe's public realm and construction sector. To achieve this it will develop a handbook describing the common practices and principles for 'European BIM'. This may lead to a minimum performance level for BIM across many European states.

The handbook will describe common practices and principles for three areas:

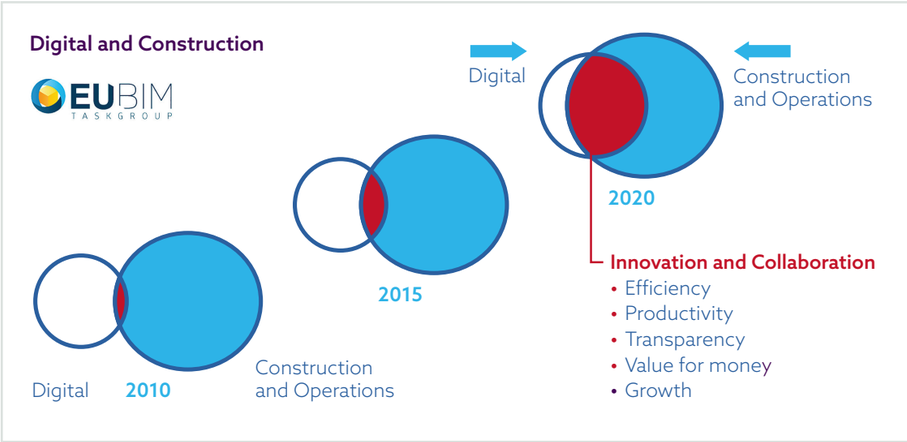
- Procurement procedures for tendering and contracting
- Technical considerations for the collection, processing and use of information
- Skills and role development principles

The task group has a programme for collating and identifying best practice and performance criteria. It will engage with public clients across Europe to spread its message, and will be consulting with standards bodies and industry.

The EU BIM Task Group held its first official steering committee meeting in Brussels on 19 January 2016. At its Launch Reception on 29 February, attended by Brussels-based European construction sector and product associations, the group announced its aspiration to grow a digital single market for construction and to build a world-class sector on the world stage. How might this affect the future of the European industry and international markets?

"The market is missing a consistent view on BIM from Europe's public clients; the EU BIM Task Group can fill this void by becoming the single authority for public clients and policy makers for the consistent introduction of BIM. This will help to inform outcomes for industry standards and will open new markets for the digital construction era both domestically and internationally."

Mark Bew MBE
Chair of the HM Government BIM Task Group



How will this unified 'EU BIM' affect the future of the industry?

Assuming that 'EU BIM' national digital programmes continue to increase and normalise BIM adoption across Europe, it would be reasonable to expect that the industry will move up Accenture's league table of digital adoption. Given that a number of national programmes are stating a target between 2016 and 2020, within five years we can expect a significant proportion of the European industry to move from digitally naïve to 'digital natives'.

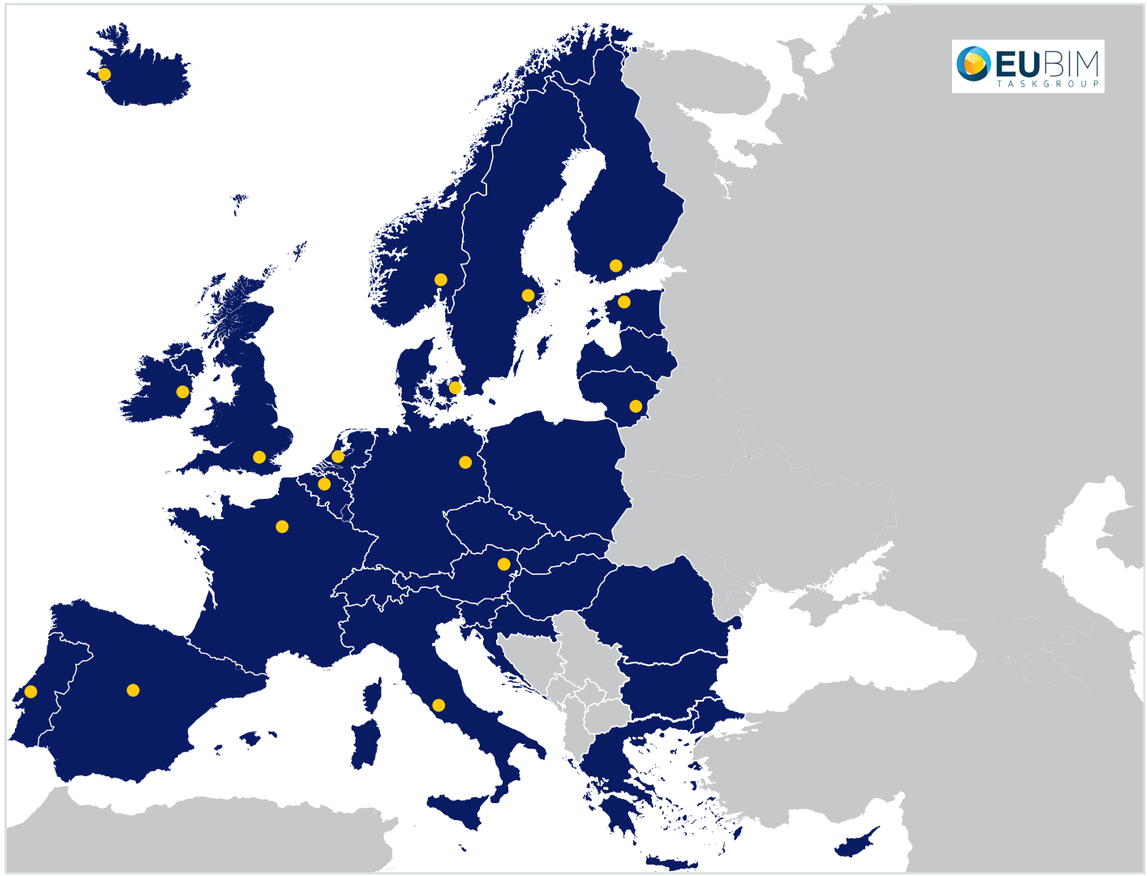
But digital is a means to a goal and not the end itself.

The benefit to the public community will be higher productivity, resulting in greater output for the same spend; higher-quality public assets leading to social and environment goods being delivered, such as improved social outcomes from hospitals, schools and infrastructure; and more sustainable choices on operating energy demands and carbon cost. Addressing the European three-sided problem of squeezed budgets, the need for public infrastructure and sustainable decisions is the prize for the public sector 'built environment'.

This increasing digital convergence (see diagram above) will present opportunities and threats for the private sector. As seen already in early adopter countries, Europe-wide competition for digitally skilled professionals is likely to increase. A competition to up-skill and develop new services will be difficult for some, while others forge ahead in an inevitably messy and unpredictable free-market process.

Getting the other side of this transition offers the prospect of a modern 21st century industry attracting fresh talent from the tech and manufacturing sectors.

A European centre of excellence in digital construction will inevitably permeate to international markets – as already seen in the Middle East and Asia, where clients are demanding digital deliverables as standard in contracts.



The EU BIM Task Group brings together national efforts into a common and aligned European approach to develop a world-class digital construction sector

Digital is set to become the global lingua franca for designing, building and operating the world's built environment. This will create new opportunities for growth from the global export market, which is forecast to outstrip the European domestic market performance over the next decade.

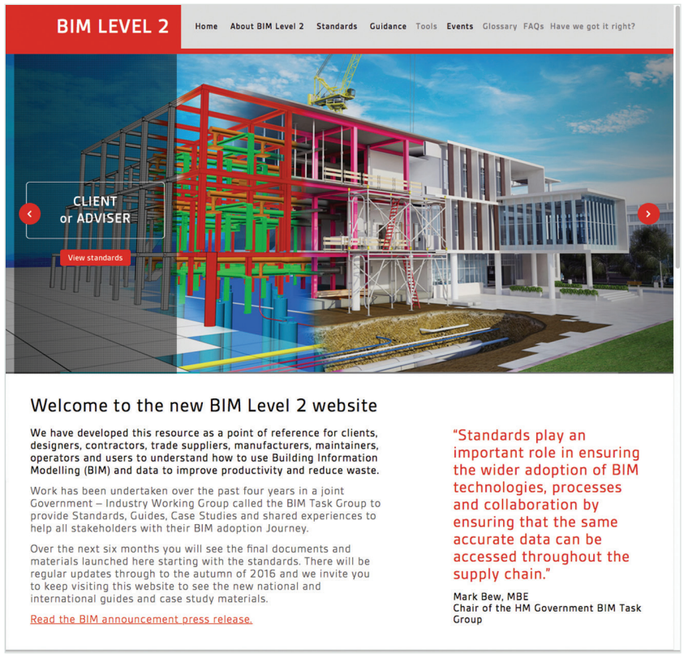
BIM has become a proxy for digital information exchange and better ways of working; it looks set to augur in a new world order of digital construction based on who can mine and use information to the greatest effect.

By working towards a unified European approach for digital construction we can grow the size of the sector and position Europe to compete and win in the global market.

Within five years we can expect a significant proportion of the European industry to move from digitally naïve to 'digital natives'.

BIM Task Group - April 4 mandate an 'internationally unparalleled achievement on our BIM journey'

Mark Bew MBE
Chair of the HM Government BIM Task Group



The website at www.bim-level2.org contains a wealth of information about BIM Level 2.

The successful delivery of the Government Construction Strategy (GCS) Level 2 BIM objectives represents 'an internationally unparalleled achievement on the journey towards the digitalisation of the built environment sector'.

Published by the Cabinet Office on 31 May 2011, the GCS – as well as the Low Carbon Construction Innovation & Growth Team: Final Report by Paul Morrell – outlined the key target of reducing the cost of Government construction projects by 15-20%.

Critical to reaching these targets ahead of the 4 April 2016 deadline was that all central Government departments achieved the milestone and now require tendering suppliers to demonstrate collaborative 3D Level 2 BIM maturity through defined and compliant information and data on projects.

With Government departments now committed to achieving BIM maturity – the outcome of the BIM Task Group's four-year collaboration with industry, Government client departments, private sector, institutions and academia – BIM is driving greater value at home and significant growth opportunities overseas, through improved delivery and operation of built assets.

Achievement of the mandate has allowed the BIM Task Group, together with the Government Construction Board and the Client BIM Delivery Group, to reaffirm its unwavering commitment to encouraging, supporting and enabling full BIM adoption across the industry.

This has been supported in the recent Budget which announced the development of the next generation of digital standards for the construction sector –Level 3 BIM – under the 'Digital Built Britain' Programme.

The £15m investment over three years is designed to maintain the UK's global leadership in the use of this technology and will save owners of built assets billions of pounds per year in unnecessary costs as well as setting the infrastructure for the Smart Built economy.

Reflecting the industry's ongoing transition from mobilisation for Level 2 BIM to creating 'business as usual', the BIM Task Group unveiled a new bim-level2.org website on 4 April.

Hosted and developed by the British Standards Institution (BSI), the site will continue to evolve from launch, providing a common and clear point of reference for BIM documentation, standards and guidance created in partnership with the BIM Task Group.

These documents will continue to be available free of charge in order to encourage all businesses however large or small to take part.

To look at how far we have come in four short years is to understand how far we can and need to go in the next four and beyond.

From a standing start, the UK is now leading the global race towards digitalisation of the construction industry and we will not let it slip. The hard work starts here.

BIM is now very much business as usual. Our Level 2 programme is driving efficiency and creating a competitive supply sector with our businesses in demand internationally.

BIM will become a required UK standard across the entire built environment and our message to all stakeholders is: join us and grasp this incredible opportunity to reduce cost and waste while driving productivity and competitiveness.

We have demonstrated that a partnership between Government and industry can deliver dramatic changes in the sector. This has been made possible by having a clear shared plan and commitment – the challenge now is to embed these techniques across the whole of the market to grow capacity and become business as usual.

We have, at Level 2, improved the industry. Level 3 BIM and the realisation of Digital Built Britain will create a new industry to service the challenges of the future.

For more information visit www.bim-level2.org or www.bimtaskgroup.org

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Meeting the mandate – the Mott MacDonald story

Andrew Moulds
Associate at Mott MacDonald

Mott MacDonald

Such is the strength of market forces and competition, there is an unrelenting quest to streamline process, minimise waste and promote effective working to drive positive change in how organisations function, assets are managed and projects are delivered. Like many in the industry, Mott MacDonald has long identified BIM (Building Information Modelling) as a differentiator to achieving it, with the UK Government lending its significant weight and influence through the Level 2 mandate to give focus and direction across the industry.

Owners of all classes of asset around the world, both existing and new, need to achieve greater performance from them to meet the increasing social need while reducing inefficient use of resources and expenditure. It has been vital that we can be on hand to make it happen. Delivering an approach that accords with the mandate is now a pre-requisite for working with the UK's public sector, but many aspects of it have also proven good practice for how we function as an organisation of 16,000 people operating across 150 countries.

We recognise a need that our business must continually find ways of staying at the forefront while our people want to work effectively with leading technology to be efficient and avoid duplication of effort. As global engineering, management and development consultants, our solutions need to be optimised to deliver sustainable outcomes. BIM is integral to delivering it all.

The times of early exploration a decade ago saw varied success, but the advent of our vision in 2010 where it would become an integral part of the way that we do business has proved to be accurate.

More recently our efforts have focused on accelerated change through implementing strategic actions as an integral part of good practice and management policy in all parts of the Mott MacDonald Group, and to develop an enhanced service offering to help customers and asset owners realise the full potential benefits of BIM through better outcomes.

Internal endeavours

A continual programme of technology improvements has been critical to deliver the step change required by the mandate. Led by a central Project Technologies Group, under the stewardship of our Group BIM Steering Committee informed by direct input from champions from across the business, 2015 marked the completion of two corporate technology solutions. The Mott MacDonald Common Data Environment (MMCDE) and the Digital Component Catalogue (DCC) are aimed at cementing our capability of delivering projects to meet Level 2.

After over seven years of developing, implementing and operating BS1192 compliant CDEs on some of the world's biggest engineering projects, we have used this experience to develop a standard corporate approach that is available group-wide for immediate project mobilisation.

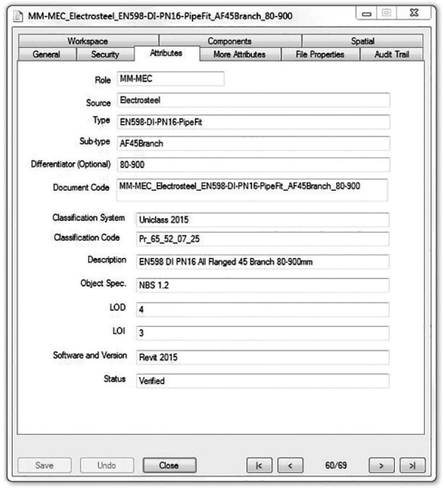
Throughout the development of the MMCDE we have engaged senior, leading personnel to shape our approach to information management across our core technical sectors that result in superior outcomes. Hosted on Bentley's ProjectWise, these requirements have focused on balancing the needs of our integrated management system for quality, environment and safety and for projects that use our globally diverse Autodesk and Bentley user communities.

NBS

This approach required an understanding of the needs of many CDE 'stakeholders' including client, corporate, business sector, project, end-user and support staff. Once we had captured the high level requirements, we used our leading examples of CDEs from across the business to understand strengths, weaknesses, opportunities and known issues to create a standardised set of features that have been aligned with the Mott MacDonald Group's 'Common Way of Working', called STEP. With the CDE now complete, this approach allows the rapid deployment of pre-defined templates to projects anywhere around the global business, which has greatly reduced project start-up time and represents efficiencies that can be directly passed on to our clients.

The Digital Component Catalogue (DCC) is a technology solution aimed at efficiently producing high quality digital deliverables. Again using ProjectWise to support all of our users, we have developed a system for making our digital content, such as BIM object families, available to all users through a single location.

Adoption of the NBS BIM Object Standard has been important as it defines requirements for both graphical and non-graphical information and can consistently be applied across multiple sectors, regardless of the authoring package. This was seen as a key requirement for having a standard approach for digital components that will add long-term value to the business to service thousands of international users.

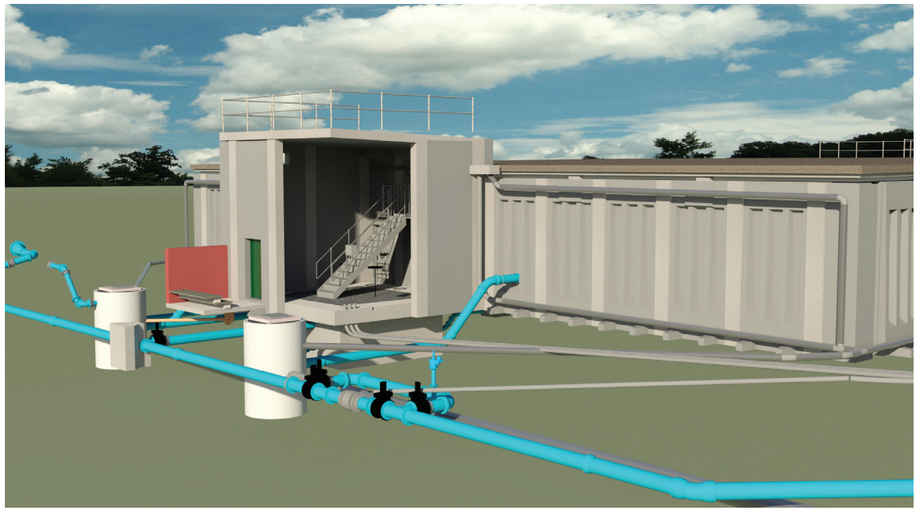


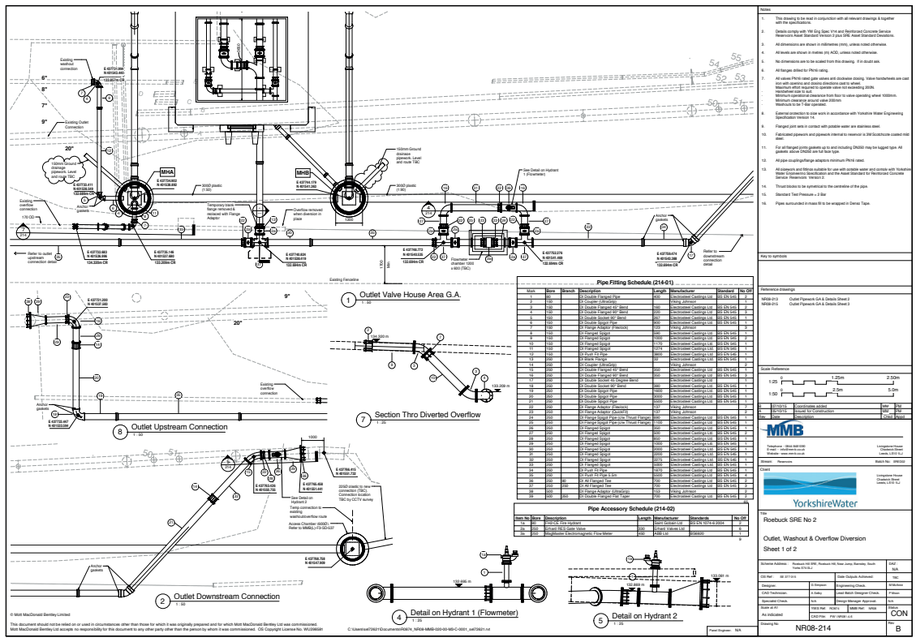
Example of standard ProjectWise attributes for all elements in Mott MacDonald's DCC using the NBS BIM Object Standard, Uniclass 2015 Classification, and separate Level of Detail (LOD) and Level of Information (LOI)

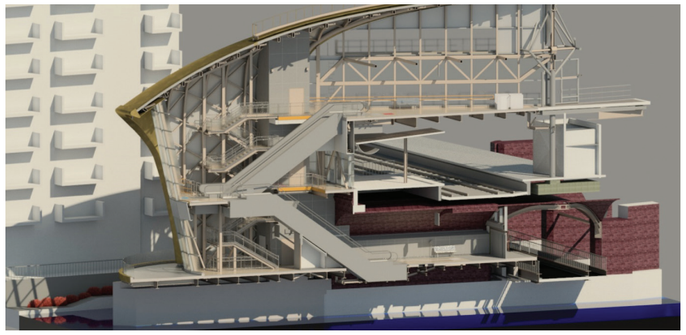
The DCC already contains over 4000 objects which can be used by any project, and the content is continuing to grow as more is created on projects. This centralised and standardised approach to objects is resulting in higher levels of consistency in deliverables and more efficient production of BIM deliverables.

Find out more about the NBS BIM Object Standard at **nationalBIMlibrary.com/nbs-bim-object-standard**

Roebuck Service Reservoir: rendered 3D model and 2D drawing that uses content from the DCC. The drawing output includes schedule tables that are created using only object metadata, demonstrating the efficiency of adopting the NBS BIM Object Standard through the standardisation of the data structure.







Leeds Station Southern Entrance: rendered 3D section

''The job looks fantastic and our stakeholders were delighted. A few commented to me what a challenge it must have been to build.''

Rob McIntosh,
Network Rail Route Managing Director

Leeds Station Southern Entrance

Mott MacDonald's BIM story is one of continual evolution that is founded on a reputation for technical excellence and commercial success delivered consistently across most of our markets and geography. Our award-winning heritage grows ever stronger, having won international accolades including those awarded by Fiatech and the National Construction Computing Awards.

The new Leeds Station Southern Entrance (LSSE) is one of our latest, leading engineering projects. It is a landmark scheme designed to improve access to the station from the south of the city. Managing the complexity of the over-river site environment, adjacent tower blocks, the structural form, interfaces and stakeholder liaison process was only really possible through the effective use of BIM tools and processes.

From commencement the scheme aimed to maximise the use of a model-based environment with a variety of targeted interventions throughout planning, design and construction. Existing asset information was captured in a point cloud, which was essential to obtaining thorough and accurate survey information within the operational train shed and immediate proximity above the river. This was augmented and enhanced with record information and targeted surveys. An asset model was created from the point cloud, which was used for gross coordination with the new build elements; detailed coordination and setting out was undertaken using the point cloud directly, all of which was hosted on a Common Data Environment.

Models across all disciplines were federated and used to generate clash reports which were used to replace the traditional paper workflow used in Network Rail's Integrated Design Check (IDC) process. This offered a significant reduction in the time required for this process, allowing key issues to be identified and resolved in an expedient manner rather than via a paper-based review of deliverables. Network Rail's asset managers were a key consultee, given their requirement to be able to undertake a touching distance inspection of all bolted connections every five years, meaning careful consideration had to be given to all details to allow access. The model was used as a visualisation tool for allowing virtual reality walk-throughs to clearly communicate issues and obtain project sign off.

The federated approach also proved critical in managing the construction interface. Model information was exchanged with the fabricator and cladding subcontractor who augmented and enhanced the level of detail to construction status. Rebar was modelled in critical areas and the construction sequence animated to communicate the design intent and buildability to the site teams, and regular health and safety workshops were held to explain how elements were to be erected on the constrained river deck site.

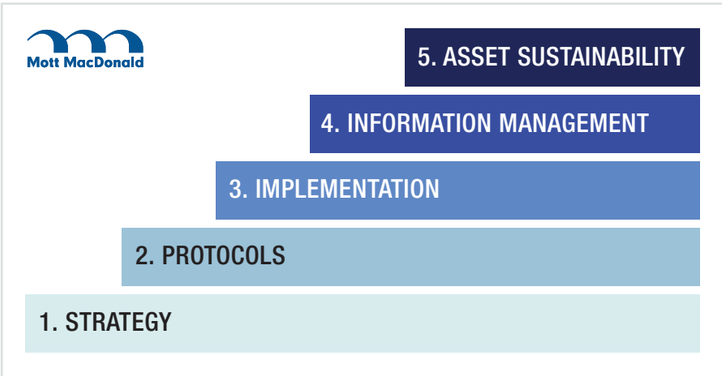
BIM Consultancy

Our own journey has made us acutely aware of the business process and technology change management BIM requires and the benefits it brings. It is these direct experiences, alongside our capability in delivering technical projects with BIM, that has given rise to helping unlock targeted benefits for others.

We look beyond the simple convention of models as purely 3D representations of an asset and instead focus on layering BIM into existing business processes, optimising them to deliver business plan targets that instigate positive behavioural change, resulting in better information management. Our five step process - underpinned by a strategy that acts as the guiding principle throughout - enables a measured approach to implementation. There are many organisational drivers for BIM, though many of the main themes are common, enabling us to share our best practice across a diverse range of clients.

Our portfolio of clients has grown markedly since 2012, with opportunities coming the world over. Many want to 'buy British' as they look at the leadership and best practice developed here with a view to applying it to their respective organisations, assets and projects. Closer to home, the level of interest from local authorities and other public bodies in particular has grown markedly this year in the run-up to the April milestone.

The current hunger for 'BIM Level 2' is at the forefront of how clients home and abroad articulate their burgeoning BIM aspirations, with the desired progression to Level 3 inevitable in the next ten years. We need to be ready and on hand to help make it happen.



Mott MacDonald's five step approach

Better performance and outcomes are achieved when assets are easy and enjoyable to use – workers are more productive, hospital patients heal faster, school children learn better, travellers get to their destination on time. BIM must be targeted to make this happen.

NBS

NBS BIM tools and content support your BIM workflow – individually effective and powerfully connected

You can use our BIM tools individually. But use them collectively and harness their full power and potential to deliver informed decisions, more efficient processes and reduced risk across your Level 2 BIM projects.

BIM Management & Classification

NBS BIM Toolkit provides step-by-step guidance to define, manage and validate responsibility for information development and delivery at each state of the asset lifecycle.

theNBS.com/toolkit

Standardised BIM Objects

NBS National BIM Library is the UK's fastest growing resource of BIM objects and home to the **NBS BIM Object Standard.**

nationalBIMlibrary.com

BIM Specification & Guidance

NBS Create is the leading UK standard specification tool, built for BIM and linked to guidance from the **Construction Information Service.**

theNBS.com/Create

BIM Co-ordination with Geometry Model

NBS Plug-ins co-ordinate your specification and CAD models, improving the synchronisation of your project information.

theNBS.com/plugins

BIM Knowledge

Our NBS subject specialists author a wide range of articles and offer expert insight and analysis on BIM.

theNBS.com/BIM

Standards & Regulations

The **Construction Information Service** provides expert knowledge and instant access to current regulations, standards and technical advice.

theNBS.com/CIS

Find out more about our suite of tools to support you throughout the BIM workflow at **theNBS.com/BIMworkflow**

Introducing the Periodic Table of BIM

Stefan Mordue
Architect and NBS Business Solutions Consultant, NBS

Taking inspiration from the traditional periodic table of elements, NBS recently launched a visual guide to the key terms and concepts you're likely to encounter along the road towards BIM implementation.

In the Periodic Table of BIM, we document the stages necessary for closer collaboration (of process and people) by way of the technology, standards and enabling tools that will underpin your efforts.

The original table, published by Russian chemist Dmitri Mendeleev in 1869, managed to organise 112 named elements (and acknowledge several unnamed ones) using strict rules and hierarchy. Our version sticks to a few guiding principles but is a less rigid affair – broken down into nine groupings with a number of elements in each.

The table is designed to be a useful reference, ideal to print out and stick on a wall or share digitally, and should prompt thinking about areas of BIM-readiness that may need your attention.

You can find out more and download the Periodic Table of BIM at www.theNBS.com/knowledge/periodic-table-of-bim. You'll also find articles looking at particular table groupings.

Strategy

At the head of the table lies the STRATEGY grouping, home to the BIM Strategy (Bs) element. With strategy at the heart of any successful BIM implementation it's no surprise to find this at the very top of our table.

Thinking about what you want to achieve from BIM and how and why you might implement a strategy (and, in turn, the underpinning foundations, processes, technology, tools and people) is fundamental to your success.

Your strategy is likely to be unique, heavily reliant on your own key drivers – whether they are to improve decision-making or efficiency, deliver better coordinated information, or simply to reduce paper usage. Drivers acknowledged, what will success look like?

The table is designed to be a useful reference, ideal to print out and stick on a wall or share digitally, and should prompt thinking about areas of BIM-readiness that may need your attention.

Foundations

Strategy in place, it's time to implement the FOUNDATIONS – the bedrock of efficient systems for communication, information exchange, and data transfer that allow advanced BIM processes to be delivered.

In order to develop strong foundations, you'll also need to consider your approach to managing the production, distribution and quality of construction information in a common data environment (Cde), ensuring everyone can access the same data.

Consider, too, the right procurement routes to set the best environment for collaboration – what approach will you take when it comes to model management, intellectual property rights and data management, responsibilities for errors (given the reliance on supplied data), liabilities and ownership?

Assessing your current BIM capability and capacity (Ca) will allow you to determine your BIM-readiness status and work out what still needs to be done.

Collaboration

BIM and collaborative working go hand in hand, and the COLLABORATION grouping is about developing better and more efficient ways of working.

You'll need to consider the digital tools (Di) that will allow you to collaborate effectively (and how data might flow between them without loss), as well as people's attitudes, which may require cultural and behavioural changes (Cu). Ensuring you can use the outputs that someone else within the project team has produced by understanding Interoperability (St) will also be key.

Process

Understanding your current PROCESSES will allow you to determine where improvements can be made. This grouping shows what a best-practice workflow might look like with information that is universally structured, regardless of author.

This ideal is achieved by understanding information requirements during the whole project life cycle – from Assessment and Need (As) and Delivery (De), through to Maintenance and use (Ma) – so that best value is achieved through the whole project timeline.

The Common Data Environment (Cde) is at the very centre, providing the means to collect, store and distribute information among the whole project team, ensuring everyone is working with the same information. Consider information exchange (In) – how, when and in what form is the client requesting it?

NBS

The Periodic Table of BIM

- Strategy
- Foundations
- Collaboration
- Process
- People
- Technology
- Standards
- Enabling Tools
- Resources

1 Bs BIM Strategy												2 Su Surveys and Reports
3 Fr Framework	4 Cu Culture and behaviour								5 Bt BIM Toolkit	6 Lod Level of detail	7 Loi Level of Information	8 Vi Videos
9 Co Common methods	10 Po Process	11 As Assesment and need	12 Eir Employers info requirements	13 Cm Communication	14 In Investment	15 Sf Software	16 Cd Capital delivery phase	17 Cl Collaborative business relationships	18 Li Library objects	19 Cs Classification	20 An Analysis tools	21 Ev Events
22 Pr Procurement route	23 Fo Forms of procurement	24 Ex Execution	25 Bep BIM execution plan	26 So Soft skills	27 Ch Change process	28 Ha Hardware	29 Op Operational phase	30 Po Protocol	31 Pe Prequalification questionnaires	32 Cafm Computer-Aided Facilities Management	33 Ct Cost tools	34 Fo Forums and user groups
35 Ca Capability and capacity	36 Di Digital tools	37 De Delivery	38 Midp Master information delivery plan	39 Cp Cooperation	40 Sh Share success	41 Tr Training	42 Fm Facilities management	43 Qu Quality management systems	44 Bsdd buildingSMART data dictionary	45 Pg Programme tools	46 Ad Administration tools	47 Sc Social media
	48 St Standardisation and Interopability	49 Ma Maintenance and use	50 Cde Common data environment	51 Ch Champion	52 Av Availability	53 Fi File storage	54 Dg Digital security	55 De Design managment systems	56 Ifc Industry foundation classes	57 Au Authoring tools	58 Mo Model viewers and checkers	59 Bl Blog posts
		60 Dpow Digital Plan of Work	61 In Information exchange	62 Su Support	63 En Engage	64 In Infrastructure	65 Br Briefing	66 As Asset management	67 Idm Information delivery manual	68 Sp Specification tools	69 Fl File sharing and collaboration	70 Bo Books

Digital Plan of Work stages

71 Sr Strategy	72 Bi Brief	73 De Definition	74 Ds Design	75 Bu Build and commission	76 Ha Handover and closeout	77 Oe Operation	78 En End of life

People

PEOPLE are often overlooked when it comes to BIM strategy. As with any process of change management, you need to provide clear communication to your colleagues as to why and how you intend to implement BIM. You'll need support from senior management and will likely benefit from a series of 'BIM champions' to help oil the wheels.

Ideally BIM should be embedded within current workflows and not as a separate entity – given the impact on 'business as usual', your comms should be clear and timely. You need to take care to understand the impact of any changes and not to throw out the best bits of current process and procedure.

Make sure that you share success among the team and provide individuals with the support and training that they may require, bearing in mind that some will require more support and encouragement than others. Lead by example, and give reassurances and support to those that need it.

Technology

Ensure that you have the right TECHNOLOGY to support your BIM aims and objectives. While BIM is more than just cool technology, it is nevertheless an important factor for successful implementation. Alongside software and hardware deliberations, as you move into a digital environment, consider how and where data is stored and the best way to share and publish information in a security-minded way.

Standards

Get to know the STANDARDS, procedures and supplementary documents available to you that will assist with your strategy and help achieve collaborative BIM.

An increasing number of countries are embracing BIM – either as a top-down approach such as mandating BIM at a government level, or a bottom-up approach such as a demand from the supply chain.

Elements in this grouping are supported by robust supporting documents, standards, frameworks and protocols, many of which the UK Government has made available in mandating BIM in the UK.

Try to start with the end result in mind and have the needs of the client and Facilities Management (Fm) team to the fore.

The Briefing (Br) element considers BS 8536-1:2015 and matters relating to projects for the delivery of assets/facilities according to defined operational requirements. BS 1192:4 defines the methodology for transferring COBie information – for example, between the various parties involved in a project.

Enabling Tools

Consider the ENABLING TOOLS that will help design, develop, deliver and maintain the built asset. You may require a number of different tools for specific tasks and functions as no one piece of software will meet all your needs, so think carefully. Ensure that the tools you use are interoperable and allow you to exchange information with existing or new systems and for information to flow from one party to another.

Resources

Before you make any investment, it is worth considering what tools are available to you for free.

The final grouping in the table acknowledges the RESOURCES that are available to you and access to information. Complementing paid-for Books (Bo) are free-to-access Blog Posts (Bl), Video (Vi) content from file-sharing sites such as YouTube, and also Surveys and Reports (Su) such as the annual NBS National BIM Report.

The internet and social media have created a valuable online community of support. There are many online forums and user groups, all sharing helpful hints and guidance as well as a range of face-to-face events.

Element-ary:
Your guide to the table's building blocks

12
Eir
Employers info requirements

Grouping:
Process

Atomic number:
12

Element Symbol:
Eir. Two, three or four letters. The original periodic table uses one or two letter symbols. Many three and four letter acronyms are currently well established within the construction industry and therefore it would have caused confusion to shorten them, 'BIM' being a prime example of this.

Element Name:
Employers info requirements

An increasing number of countries are embracing BIM – either as a top-down approach such as mandating BIM at a government level, or a bottom-up approach such as a demand from the supply chain.

BIM Survey: Summary of findings

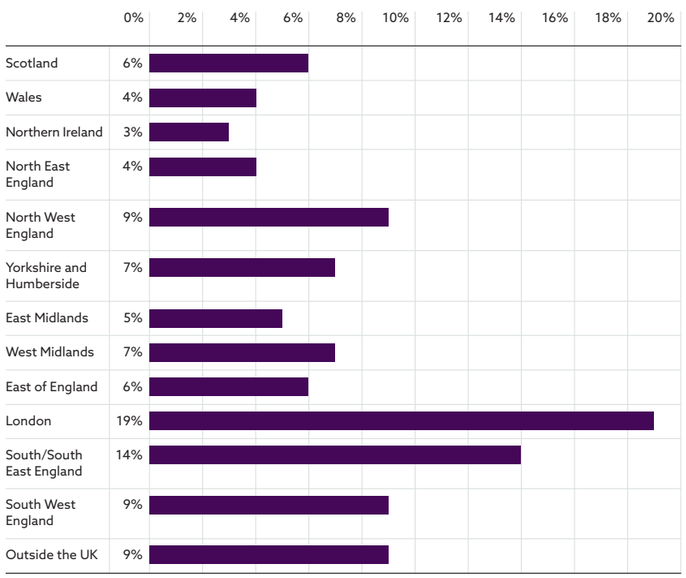
Adrian Malleson
Head of Research, Analysis and Forecasting, NBS

Welcome to the sixth NBS National BIM Report. It comes at a critical time for the UK construction industry; the survey was conducted shortly before UK Government implemented its BIM mandate in April this year.

In this report, we examine the themes of BIM adoption, BIM usage and people's attitudes towards BIM. We also take the opportunity to look more closely at the design community's assessment of the UK Government BIM mandate and its implementation. The mandate is coming, but does the industry welcome it, and is it ready?

We hope you enjoy reading the findings. We would like to take this opportunity to thank all those who took the time to complete the survey, without whom there would be no report. Thank you also to the professional bodies and institutes who publicised the survey to their membership. This helps makes sure that the findings cover the breadth of the design community. As collaboration is at the heart of BIM it is encouraging to see a broad range of bodies coming together for this report, to provide a holistic view of BIM.

Respondents by region

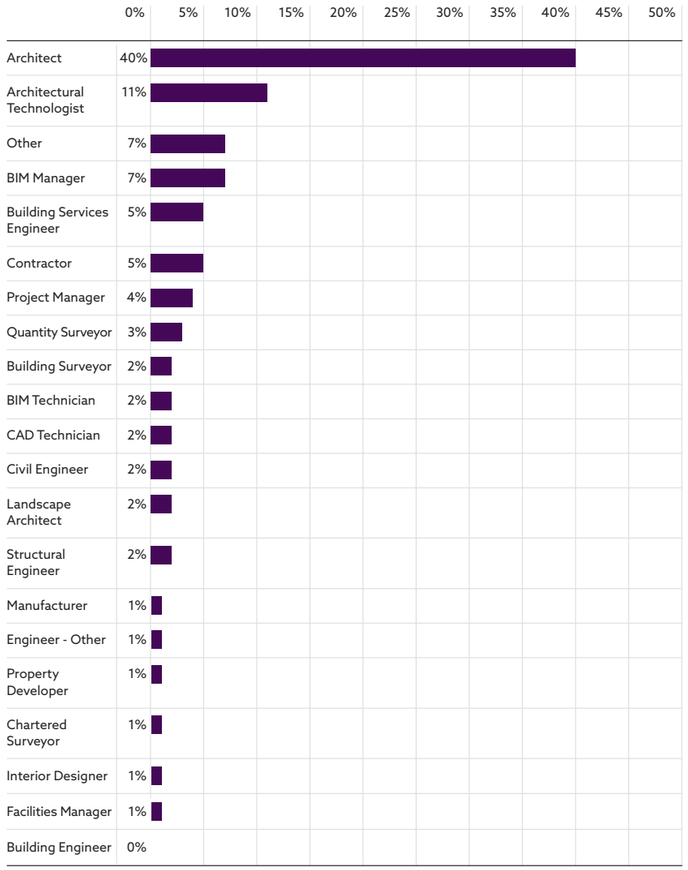


Findings in this report are based on just over 1,000 responses to the survey. Architects are the most strongly represented group. However, there is significant representation from other groups. These include, among others, Architectural Technologists, Building Services Engineers, Building Surveyors, Contractors, Project Managers and Landscape Architects. The number of BIM Managers who took part is notable. Six years ago, when we first ran this survey, the role barely existed. The representation is indicative of how embedded BIM has become.

For the first time we also asked about respondents' geographical location; so, for the first time, we are able to provide analysis of BIM adoption by the nations and regions.

As in previous years, we need to apply a little caution to the findings. As different people come to participate in the survey, and as roles change within the industry, our sample varies. Response to the survey is, naturally, voluntary. Therefore, we ought to remember that the findings are indicative rather than definitive. Nevertheless, this survey is the most comprehensive analysis of the state of BIM within the UK construction sector. Indeed, running this survey over six years, with a set of core questions that remain consistent, allows us to present a unique year-on-year comparison.

What is your main discipline?



The number of BIM Managers who took part is notable. Six years ago, when we first ran this survey, the role barely existed. The representation is indicative of how embedded BIM has become.

BIM usage and awareness

Firstly, let us turn to the headline figures of BIM adoption and usage within the UK. Last year we saw a slight, and unexpected, dip in BIM usage. This year we see that a majority of participants are using BIM.

Fifty-four percent of those who took part in the survey tell us that they are currently using BIM in some of their projects. Forty-two percent are aware of BIM, though are not using it. A mere 4% are unaware of BIM. This is significant. BIM has become a routine way of designing and constructing buildings. When we look back to 2011, only 13% of people were using BIM, 45% were just aware of it, and 43% did not know what it was. Whilst the rate of adoption has moderated, we have come a long way.

We went on to ask what those who were aware of BIM (whether using it or not) would do over the coming years.

We can see that BIM adoption is set to increase. Within one year, 86% of people expect to be using BIM on at least some of their projects. Within three years, 95% expect to be using BIM. Within five, that number increases to 97%. Should these projections be realised, then BIM will have become near universal and routine. The UK construction industry will have been transformed, in this respect at least. Again, we might wish to apply a little caution to these projections; intentions are not always realised. But it is clear which way it is going.

Aware and currently using BIM	54%
Just aware of BIM	42%
Neither aware nor using	4%

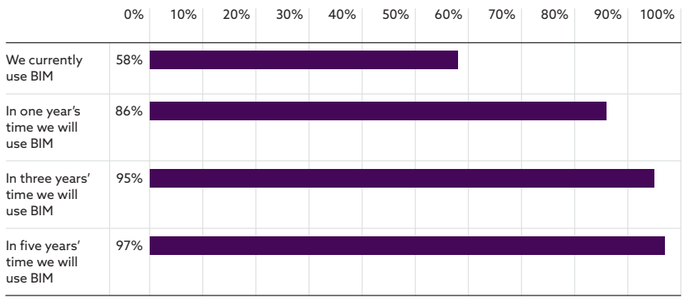
We can see that BIM adoption is set to increase. Within one year, 86% of people expect to be using BIM on at least some of their projects.

NBS

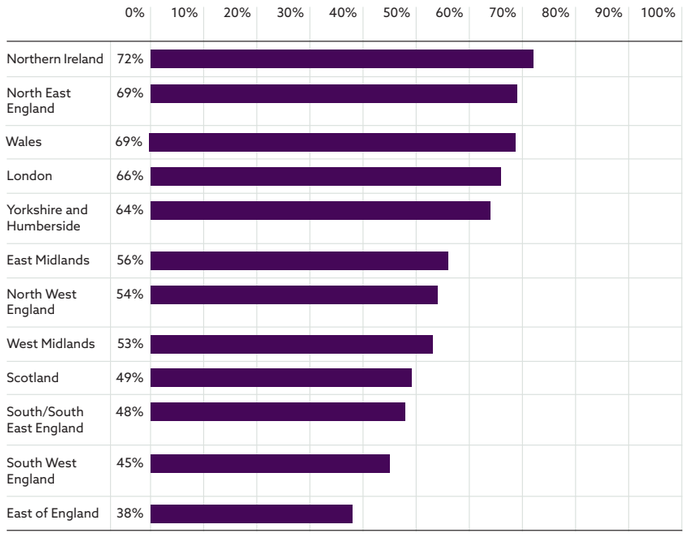
"BIM is the future. It is the way the coming generation will work. It will radically change the way we would go about doing our roles. Every effort must be made to implement it."

Asking people's work place location allows us to give a geographical breakdown of BIM adoption. For some regions, the number of respondents was relatively small, so the graph (below, right) needs to be taken as just indicative. It suggests that BIM is prevalent in London and the North East, as well as Northern Ireland and Wales. The area with the lowest rate of BIM adoption seems to be the East of England.

Projection of BIM usage among those aware of BIM



BIM adoption by nation/region



Finding out about BIM

"More work is needed in helping companies adopt BIM methods."

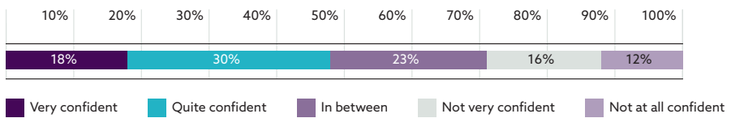
BIM requires new ways of working and, often, the adoption of new technology. Those looking to adopt BIM need to acquire the skills and knowledge to do so. We asked about people's knowledge and skills in BIM. It is a mixed picture. Whilst almost half (48%) tell us that they are 'very' or 'quite' confident in their knowledge and skills in BIM, there is still a majority who are not. Nearly a quarter (23%) describe themselves as 'in between', whilst 28% tell us that they are either 'not very' or 'not at all' confident in BIM.

People need reliable and readily available sources of information to acquire BIM knowledge and skills. We asked participants where they were likely to turn in order to find out about BIM. As we have seen in previous years, the most likely source of information is the one that's most readily available: professional colleagues. Seventy-one percent of people are likely to turn to immediate colleagues, while 57% turn to other professionals outside their organisation. Professional collaboration in action.

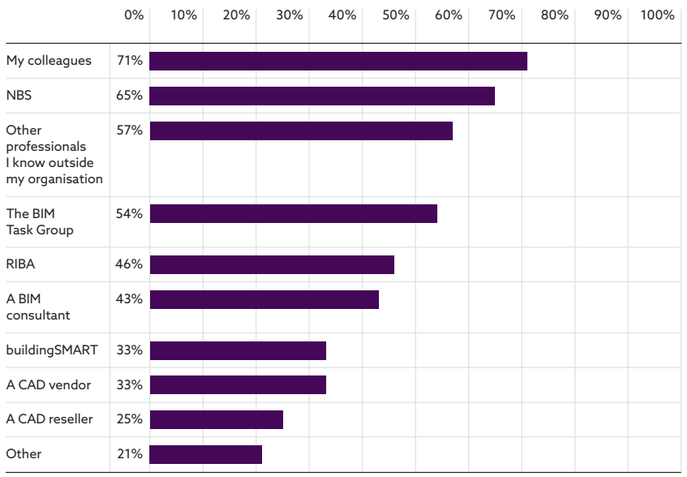
At NBS, we are pleased that 65% of people are likely to turn to us for information about BIM. This report forms just a small part of the range of tools and information we provide to assist with BIM adoption and usage.

Other notable sources of information include the BIM Task Group and the RIBA. BIM consultants and vendors also feature, but less markedly.

How confident are you in your knowledge and skills in BIM?



How likely are you to turn to the following sources of information about BIM?



Use of standards

"The current standards and documentation are a fantastic set of resources."

Collaboration is at the heart of BIM. Effective collaboration requires the adoption and use of a shared set of standards; they provide the common environment within which collaboration can take place. They also protect against the anecdotal 'BIM wash'. Saying something 'is BIM', whether a project, a model or an object, isn't sufficient for it to be BIM. Adherence to relevant standards, on the other hand, is.

"The continued development of formal standards (BS / EN / ISO) should be driven forward."

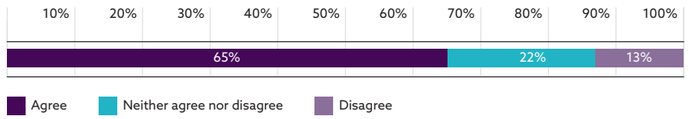
The industry is not yet convinced that BIM is sufficiently standardised. Sixty-five percent of respondents agree with the statement 'BIM is not sufficiently standardised yet'. Twenty-two percent 'neither agree nor disagree' and only 13% disagreed.

Whilst much work has been done on the creation and implementation of new standards, there is clearly more work to do. The data does not tell us if the perceived lack of standardisation is due to:

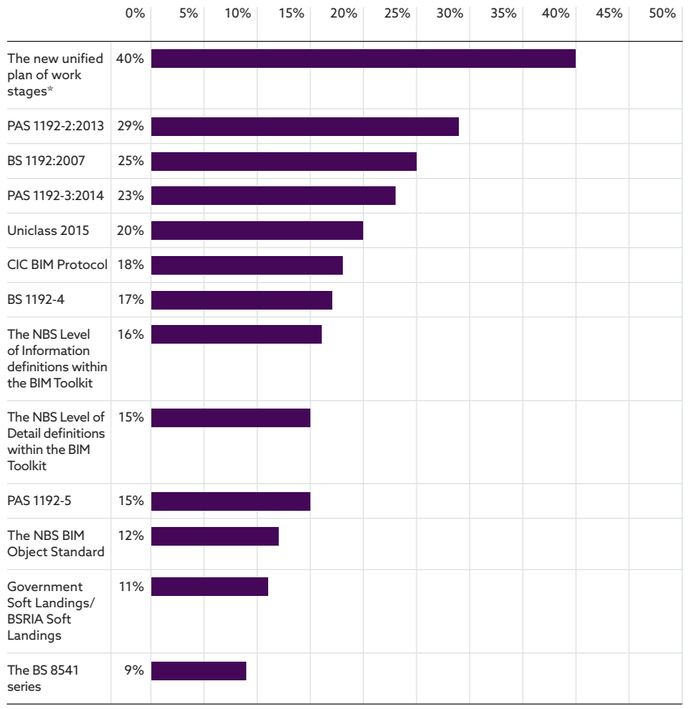
- a lack of adoption of existing standards
- existing standards not being fit for purpose
- our needing new standards to cover unstandardised areas

We asked about the standards being used. Forty percent use the new unified plan of work, such as the RIBA Plan of Work 2013. Twenty-nine percent use PAS 1192-2:2013, which gives the requirements for achieving BIM Level 2. Twenty-three percent use PAS 1192-3:2014, which describes using BIM for the operational management of buildings. Twenty-five percent use BS 1192:2007, a standard for the collaborative production of architectural, engineering and construction information. People are using standards, but fewer use the range of standards than have adopted BIM.

Agreement that 'BIM is not sufficiently standardised yet'



Which of the following standards/publications does your organisation use?



*e.g. the RIBA Plan of Work 2013

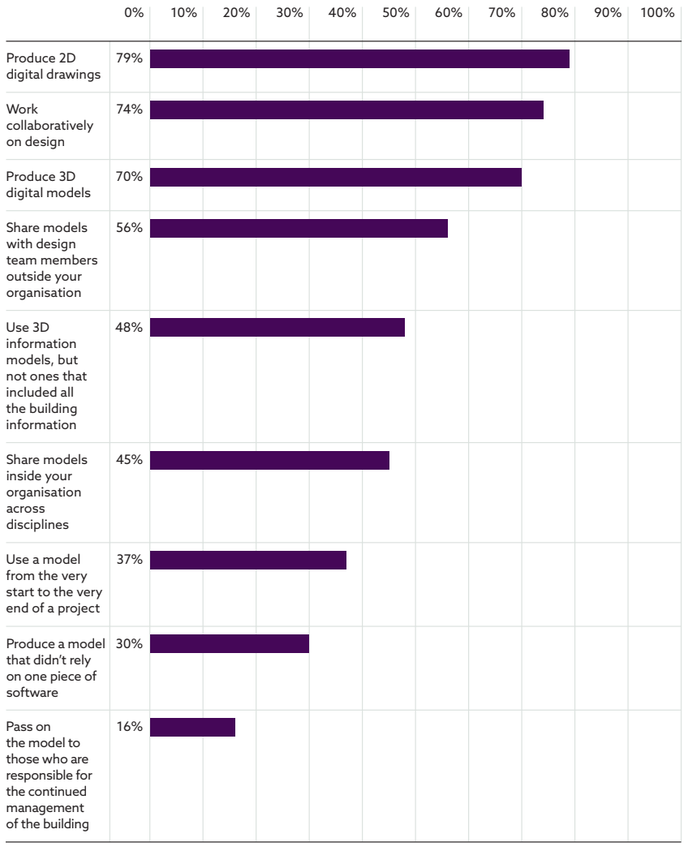
BIM practice

In this section, we look at how people are carrying out their design practice. We wanted to get a sense of the methods people use to create designs. The graph below shows that both newer and more established techniques have their place. Nearly 80% of people produce 2D models, though almost as many (70%) produce 3D models. These figures are very similar to last year.

As BIM is a collaborative process, it is good to see that almost three quarters of people have adopted collaborative techniques in the last year. This collaboration extends to sharing models: 56% of people share them with the design team members outside their organisation and 45% share across different disciplines.

"Enhance collaboration as a principle within the construction industry; reduce adversarialism."

Thinking about the projects you were involved in last year, did you...



A minority (37%) use models from the start of a project to the very end of the project, suggesting that, for most, using BIM is restricted to the design stages. Thirty percent produce a model that is software independent. Only 16% pass on the model to those who are responsible for the management of a building. We hope to see growth here; in principle BIM makes significant savings in the whole life costs of buildings possible through better, more clearly described maintenance and replacement schedules.

When producing drawings, Autodesk Revit is the most popular tool, followed by ArchiCAD, then Vectorworks. The range of tools used shows the need for a standardised non-proprietary format, and we look at this later.

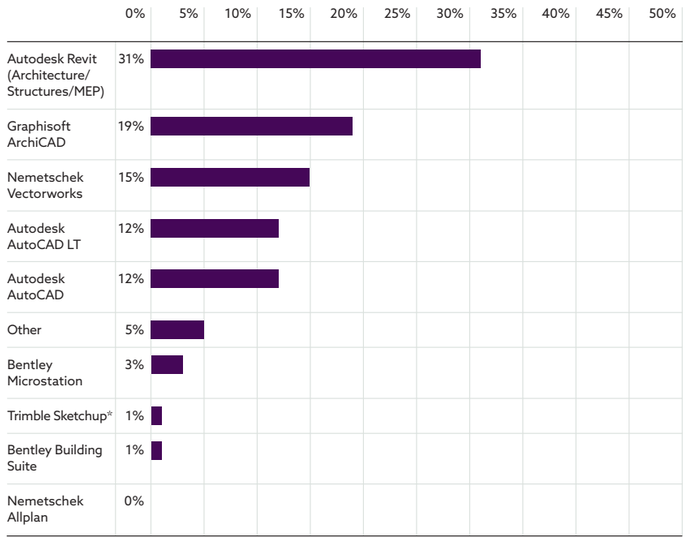
We also wanted to get a sense of what kind of buildings people design, and whether BIM is being used in some project types more than others.

The graph on the right needs to be read carefully. We asked BIM users what kinds of project they were involved in. We can see, for example, that 55% of BIM users were involved in private housing, 26% in public housing and 48% in education. We then went on to ask those involved in such projects whether they used BIM in them. So, to take private housing as an example, 55% of people were involved in private housing last year and, of those, 78% used BIM.

Taking the graph as a whole, we can see that people are generally more likely to use BIM in public sector projects, such as health, education and public housing. However, BIM is not restricted to the public sector. We see significant BIM adoption in private housing, private offices and private leisure, as well as other private sector projects. Even among those using BIM, it is not used in every project but it is used widely.

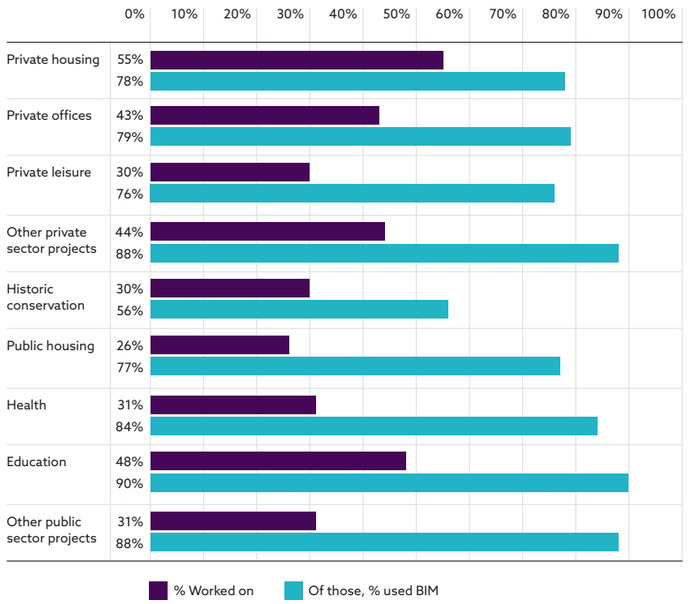
The government strategy of a BIM mandate for publicly-funded work that will go on to influence work in the private sector seems to be working.

When producing drawings, which of the following tools do you mainly use?



*Formerly Google Sketchup

Please tell us about BIM and the project types you were involved in over the last 12 months



Attitudes towards BIM

Since 2011 we have been monitoring people's attitudes towards BIM; whether they have adopted BIM or whether they intend to. People have been, and remain, positive towards BIM. Nearly three quarters see it as the future of project information. That said, within the free text comments we do also consistently find that there are a relatively small number of people who are resistant to BIM and do not see its benefits.

"Designers just keep getting more complexity pushed upon us. There needs to be clarity and value in the adoption of BIM for medium to small projects."

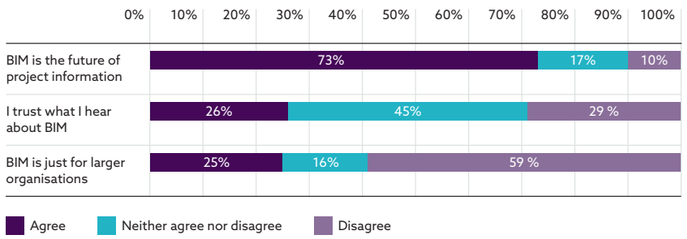
There is some ambivalence about how trustworthy information about BIM is, with less than a third saying they trust what they hear about BIM. A significant minority (though it is a minority) feel that BIM is just for larger organisations.

"BIM is great and it forces engineers and design teams to communicate properly."

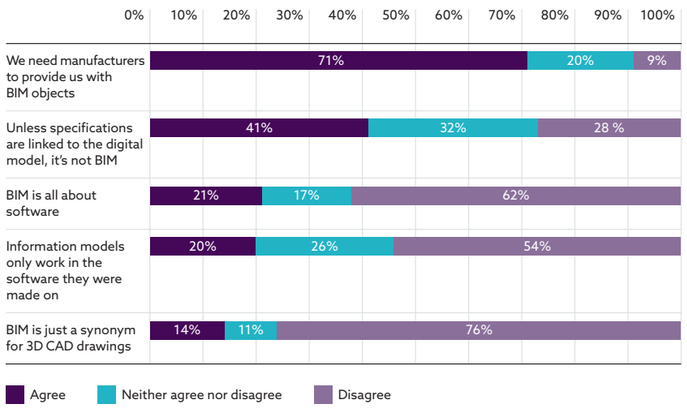
We have moved a long way from the time when BIM was often, and incorrectly, seen as being synonymous with software; 76% of people disagree that 'BIM is a synonym for 3D CAD drawings' and 62% disagree that 'it's all about software'. BIM tools are essential to successful BIM implementation though.

One set of tools the industry seems to lack is manufacturers' BIM objects. Seventy-one percent want manufacturers to provide them.

Do you agree or disagree with the following statements?



Do you agree or disagree with the following statements?



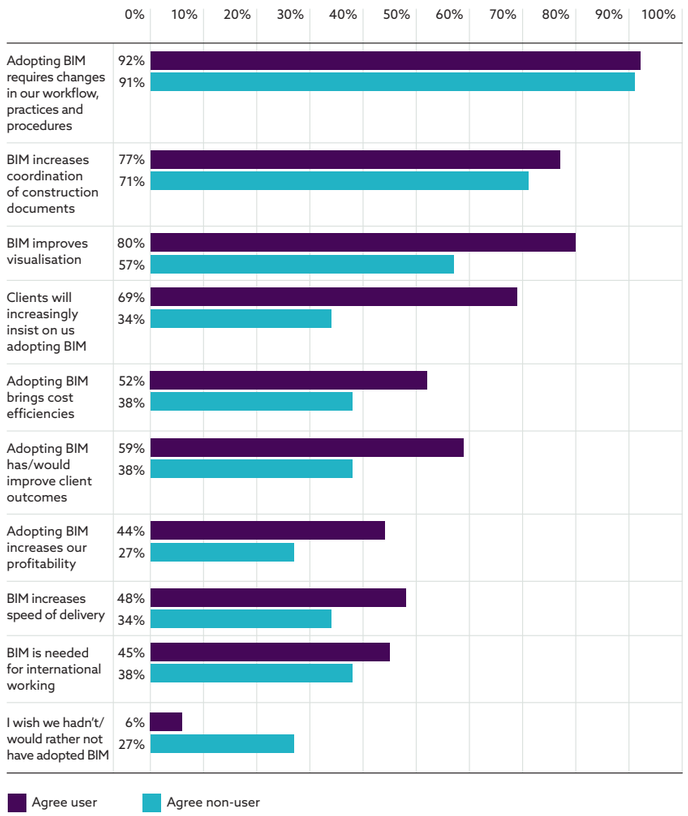
Earlier in this report, we spoke about those who had adopted BIM and those who had not done so but were aware of it. We asked these two groups a similar set of questions to find out whether there is a difference in their attitudes towards BIM.

We found near universal agreement that the adoption of BIM requires significant changes in how design is carried out; more than 90% of both users and non-users of BIM agree that it requires changes in workflow practices and procedure. Adopting BIM is not an easy thing. But the rewards are evident. BIM improves the coordination of construction documents and project visualisation, a clear majority tell us.

When we look at the graph in a little more detail we can see a striking feature; those who have adopted BIM are more likely to be positive towards it than those who have yet to. The majority of BIM users feel that it brings cost efficiencies and improves client outcomes. Indeed, 69% of those who adopted BIM tell us clients will 'increasingly insist' upon it. This contrasts with those who have yet to adopt BIM; here we can see that it is a minority, albeit a significant one, who feel BIM delivers these things.

More striking yet is the mere 6% of those who have adopted BIM and tell us that they wish they hadn't; once people have been through the BIM adoption process, they do not want to turn back. But those who have not used BIM are more cautious; 27% of those who have yet to adopt BIM tell us they would 'rather not'.

Attitudes towards BIM: A comparison of those who use it and those who don't



The majority of BIM users feel that it brings cost efficiencies and improves client outcomes.

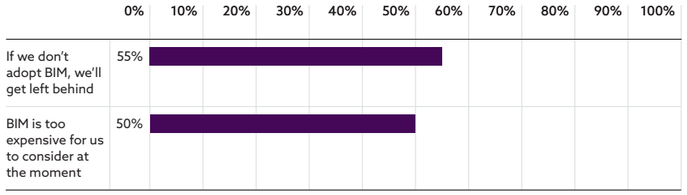
BIM experience

For BIM to flourish, its advantages need to translate into business benefit for design practice. Non-users see they will be 'left behind' if they don't adopt BIM, but the capital investment in software, training and changes in business process, leave a significant number feeling it is 'too expensive'.

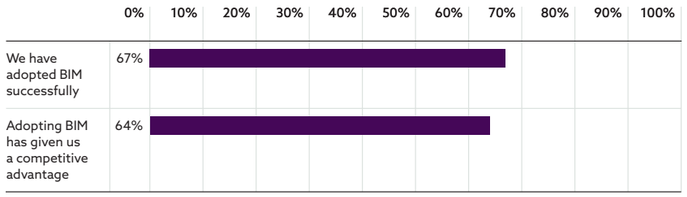
"Small businesses are very worried about being able to afford BIM."

On the other hand, those who have adopted BIM tend to feel that they have done so successfully, and nearly two thirds feel that it gives them a competitive advantage.

Do you agree with these statements? Non-users



Do you agree with these statements? BIM users



There is clearly still a need for learning about the defined BIM levels and what they entail, but we might read these findings, overall, as good news for the government strategy.

BIM and government policy

"This is a crucial moment for BIM as the number of full BIM Level 2 projects will start to increase with the government mandate coming into force very soon."

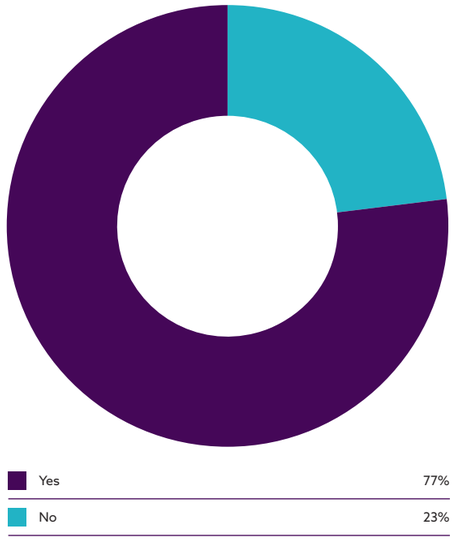
The survey was conducted at an important time - shortly before the UK Government mandate for BIM Level 2 to be used on all centrally-procured public sector projects came into force. We took the opportunity to look at people's assessment of the government policy and its implementation.

Firstly, let us look at the different levels of BIM. If BIM Level 2 is mandated, we might hope there is a wide understanding of what it means. Our first question was whether people were aware of these different levels. We found that over three quarters were. Of those who were aware, we went on to ask the highest level their organisation had reached on any project in the last year. Thirty percent had reached Level 1, and 65% Level 2.

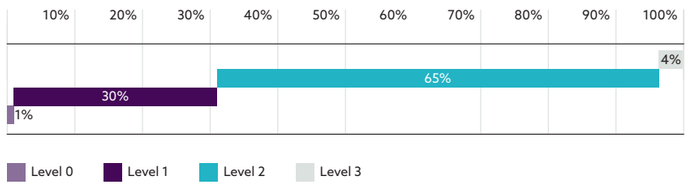
Very few said they had reached Level 3. BIM may come to deliver great benefits at Level 3, but for now it is, at best, imprecisely defined.

There is clearly still a need for learning about the defined BIM levels and what they entail, but we might read these findings, overall, as good news for the government strategy. If three quarters of those who are aware of the BIM levels have already reached Level 2, the industry was already in a good starting position before the mandate came into force.

The Government has described there being different levels of BIM. Are you aware of these different levels?



For those aware of the different levels of BIM, what level would you say is the highest level your organisation has reached on a project?



BIM is collaborative. The file format that supports collaborative working, independent of software vendors, is IFC (Industry Foundation Classes). As collaboration takes place between broader groups within and among different organisations (perhaps geographically dispersed), an open, non-proprietary data environment becomes more important. We have seen strong growth of IFC use this year. In 2014 50% used IFC; now it's 63%.

COBie, however, remains less well used. In the last report we noted that if BIM is to deliver efficiencies throughout the life of a building, and not just in the design stages, we need to see a higher adoption rate. We wondered whether this was because COBie, when used, was not proving useful. This is not the case.

Of the small number who do use COBie, two thirds find it useful. The slow rate of adoption may be more a reflection of BIM models not being used through the life of a building and being restricted to the design stages.

"BIM has to be taken forward into the 21st century by everyone. Not just the designers, but the builders, users and maintainers. There is a real lack of skill set across the board as to people who know what to do with a COBie spreadsheet."

"We have not yet been asked to use COBie - most clients (even government departments) are barely up to speed with CAD drawings let alone COBie."

Do you use IFC on projects you've been involved with?

Yes	63%
No	20%
Don't know	16%

Do you generate COBie output for projects you've been involved with?

Yes	27%
No	54%
Don't know	19%

We also wanted an assessment of the Government's role in BIM adoption.

Overall we can see that people are clear that the Government is committed to BIM. Three quarters of people believe that the Government will make people use BIM for public sector work. Almost two thirds believe that the Government will require 3D BIM on its projects by 2016. Nearly half (48%) think the Government is on the right track with BIM.

"The Government's plan for BIM Level 2 on all projects was an ambitious target, and I feel the industry is slightly behind the curve."

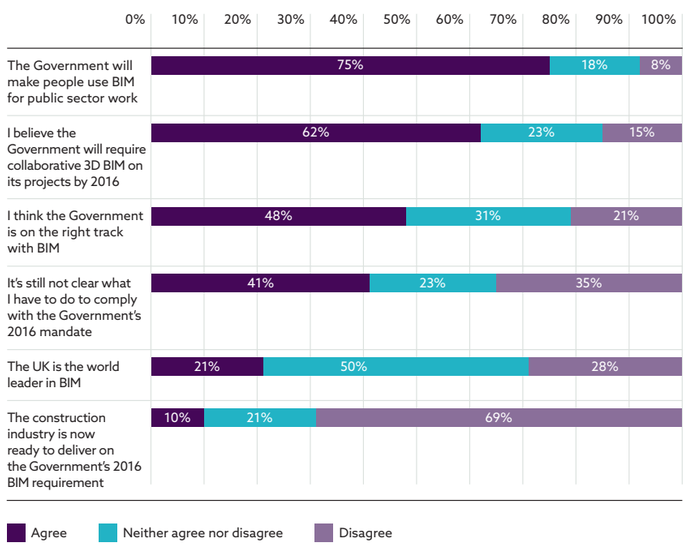
However all's not rosy. Forty-one percent tell us that they're not clear on what they have to do to comply with the BIM mandate, and only 10% tell us the construction industry is now ready to deliver on the Government's requirement. Whilst many governments, practices and individuals are looking from across the world for UK guidance on national BIM implementation, we do not see ourselves as world leaders. Just over one in five see the UK as a world leader in BIM, and over a quarter don't; half neither agree nor disagree.

So the assessment is mixed. The industry is clear that the Government will see through on its mandate, but perhaps the construction industry is not entirely ready for it.

How useful did you find COBie for delivering information about the management of the facility?

Useful	66%
Not useful	34%

Do you agree or disagree with the following statements?



Let us now turn to the specifics of the government construction strategy. At its heart are four important targets:

- Lower costs;
- Faster delivery;
- Lower emissions; and
- Improvement in exports.

We asked whether people feel that BIM will help in our reaching these targets. A majority believe that BIM will for two of them:

- Lower costs: 63% tell us BIM will help bring about a 33% reduction in the initial cost of construction and the whole life cost of built assets
- Faster delivery: 57% tell us BIM will help bring about a 50% reduction in the overall time, from inception to completion, for newbuild and refurbished assets

Fewer (39%) believe that BIM will help achieve a 50% reduction in greenhouse gas emissions in the built environment, and less than a third believe that BIM will help create a reduction in the trade gap between total exports and total imports for construction products.

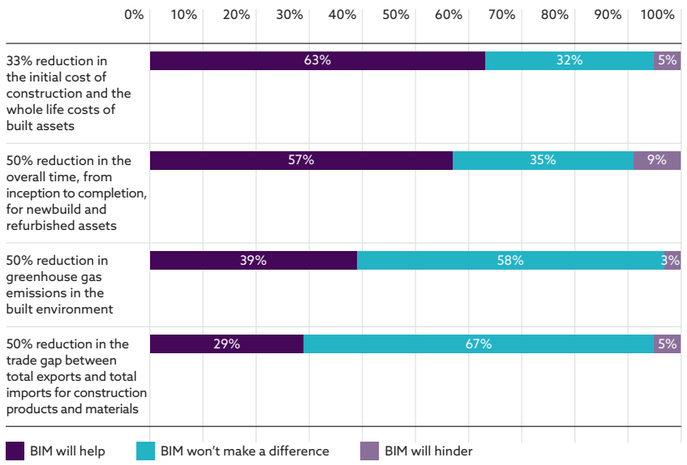
But the overall picture is clear. Very few believe BIM will hinder the realisation of the government strategy; BIM will help.

End note

For the last six years we have seen that people see BIM as the future of design practice. As we see increasing use of BIM, and as we move close to the implementation of the BIM mandate, we increasingly see the future now.

2016 will be a pivotal year for BIM, not just for the UK, but for other parts of the world too, as they monitor our BIM journey. I look forward to next year's report, when we will be able to assess the mandate's success.

Please tell us the role you think BIM will have in our achieving the following:



Building on BIM, diversity and change

Rebecca De Cicco
Director,
Digital Node

Looking ahead to a positively shaped future within the construction industry

As we move into the future it is important to try to understand how our industry will begin to evolve, learn and create opportunities for ourselves and our businesses. BIM has become a critical component in facilitating this growth and will continue to do so. Not only have we seen incredible force move through our industry in terms of adoption due to an aggressive government mandate, but we've also seen a community and culture adopt a change worth discussing. The BIM debate no longer exists; it is rather a discussion on how organisations are embedding BIM-related activities within their current practice, rather than 'starting from scratch', and implementing how this will be achieved.

Many supply chain members are already on board, yet the need for the client to fully understand how BIM can provide positive results in regard to the way they manage their assets is still a critical area of importance and one to be addressed. This is becoming more important via adoption of the Level 2 BIM process and the need for the intelligent client representative, which forms an important part of the role requirements in regard to BIM. It is critical that this role, or roles, will help support the client during all stages of a project and into occupation, whilst the need for management of information and the BIM process must continue to be monitored at all times.

There are many areas we need to address that may not be at a point where industry is able to work within a BIM environment. Not only are these areas focused on our current skills shortages but also on the need for an industry focused on the future, and 2025, as well as the ambitions of the industrial strategy and our future workplace. 2025 is only nine years away and to ensure we have a smart industry, engaged with technology and fuelled by young people passionate to drive it, we won't succeed. It should be seen as the responsibility of every individual involved in construction to drive this approach.

A diverse and openly-engaged workforce, focused on technology and innovation, will see a positive increase in terms of skills and knowledge in regard to BIM. It is critical that the younger generation are engaged, and that our schools and universities approach this in a way that allows this growth to flourish. We must be promoting a diverse work culture within the UK and globally, not only to create opportunities for future professionals but also to promote the UK stance on diversity and engagement with minority groups. Groups such as Women in BIM and BIM2050 will help to sustain and grow this area and promote change, all of which I am very passionate about being involved with and supporting.

2011 and the delivery of the Government Construction Strategy was some time ago, and the result of the subsequent released reports, standards, research and network of individuals created in the last five years has seen a very positive change in the way we previously approached BIM and digital construction. As a result, a diverse, capable and technology-fuelled workforce is just around the corner.

Contributions

Kath Fontana
Managing Director,
Technical Services,
ISS

Rebecca Hodgson-Jones
Head of BIM, Sir Robert McAlpine

Historically, many Facilities Managers have been distant from the early stages of a construction project, mirrored with minimal designer and constructor involvement post-handover. BIM (including Soft Landings) has the potential to finally achieve the long-held aspirations of many working in the Built Environment, including Facilities Managers. It offers the tantalising opportunity to completely integrate FM with Construction. The benefits of the new way of working are now being demonstrated in real projects. Fundamentally, though, there is still a need for the Facilities Manager to be accepted as a key part of the team. To enable this, our next steps have to be to put in place new procurement models and invest in skills development, to enable us to reap the full benefits of digital operational management enabled by BIM.

The progression I have witnessed in the construction industry during 2015-2016 has been even more staggering than previous years, and having returned from maternity leave in November 2015, I am perhaps better placed than many to comment on the change.

Perhaps the most prominent development I have observed is actually from our clients. Employer's Information Requirements have now become commonplace and conversations have shifted to focus on organisational requirements rather than solely about de-risking at project level.

I've always seen BIM as an opportunity to deliver improved surety of cost and programme, and provide safer, more sustainable projects (irrespective of phase), but it is exciting to think we are now starting to move past that to see how the data we develop during the project can enable more efficient, safer and more sustainable organisations.

David Shepherd
Lead Construction Consultant, Autodesk

Perhaps the most significant indicator of full technology adoption is when its acronyms become a part of everyday speech. For instance, even without detailed understanding, while most people can't decode the abbreviations, they generally know what PCs are used for, what IT Managers do and that 500MB of data is not nearly enough for their monthly phone usage.

By comparison, the general public remains blissfully unaware of what BIM is, or of the UK Government's mandate for its adoption in 2016. This suggests that, despite our admirable leadership here in implementing viable national standards for capital works information management through BIM, now is not the time to relax into complacency.

Before we can declare 'mission accomplished', we must remain on our charted course; all the way through to Level 3 and beyond. We also need to harness our best and brightest in a collaborative drive which so realises the full benefits of unifying model-derived data as to make ordinary citizens sit up and take notice.

Jill Guthrie
BIM Manager, Willmott Dixon Construction Limited

We have seen a huge increase in BIM adoption from consultants over the past couple of years, and in terms of meeting the Level 2 requirements it's really encouraging to see. We have found that consultants are using technology which isn't traditionally associated with the construction industry to realise the benefits of BIM.

The main areas where we are finding the shortfalls are with both the supply chain and public sector clients. The supply chain have the desire to integrate BIM into their business; however, there are still fundamental knowledge gaps which need addressing, and with lack of funding this has fallen to industry groups to take the lead on.

BIM impacts and benefits all aspects of the building life cycle and we have found that with many public sector clients, CAPX and OPEX are approached separately. For the full benefits of BIM to be realised, the asset life cycle from engagement through to operational use need to be considered as one.

As an industry, we've made fantastic progress in our BIM journey but we need to keep the momentum going to address these issues.

Alison Watson
Managing Director and Founder, Class of your Own

Young people – that's those that are still in school – possess all the attributes to make Level 2 BIM a huge success. Most have a 'can do' attitude, technology is child's play, and collaboration comes naturally – they do it every day on Snapchat and Instagram.

And get this: contrary to popular belief, there is no skills gap; the children I work with already possess a heap of transferable skills that makes them good to go with BIM. Our big problem is that they don't aspire to join us because they don't know this spectacular 21st century industry exists. And no wonder. Whilst the Government's drive towards Digital Built Britain is impressive, the rope around its neck is an education system where construction is represented by the spade rather than the mouse, and where good brains are still directed towards traditional academic destinations.

The full potential of BIM can only be realised if there is a next generation to continue the good work that has already been done. There is still a long way to go, and until there is a consistent, corresponding effort to educate the educators – resulting in an education fit for the 21st century – this will be the industry's greater challenge.

Fiona Moore
BIM Consultant, Cirrus Consultant Services/ Client Engagement Leader, BIM Task Group Core Team

When I started my BIM journey I had the advantage of a client who understood the value they wanted from BIM: not only project de-risking through improved design coordination, but also data that could be used to better inform and help manage their decision-making process, throughout both Capital and Operational stages of their asset's life cycle. As a result I quickly moved away from an architectural designer's point of view, understanding the wider context of coordinated/assured information and the potential value of this to all involved in the construction process.

As a BIM Consultant I still come across organisations that believe BIM is something that can be bought from external experts. Although it's true that an expert will be needed to help with strategic implementation, provision of technical/IT solutions, training etc., the best way forward is to aim to eventually embed BIM in everything that we do, so that ultimately it becomes 'business as usual'. This requires good change management and an understanding of which benefits are key to an organisation's success.

The use of digital construction methods and the resulting assured data will be very disruptive to our industry; the improvement and value that this offers us all is what excites me.

Dale Sinclair
Director of Technical Practice, AECOM

It is great to see the Level 2 tools solidifying, being brought into use, facilitating a tentative start of the transition to a digital built environment industry. When I see comments and observations on the Level 2 suite of documents, or browse the agendas for many BIM conferences, I realise that the single biggest challenge for our industry is communicating the breadth and scale of change that will occur. Many people frame BIM as a transition from CAD whereas the reality is significantly different. Emerging digital environments enable a profoundly different way for project teams to work. More intelligent geometric models linked to many different forms of data sources that will give the designers access to rich data via cost, programme, health and safety or other 'real time' dashboards with links to big data, and data analytics will inform and drive profoundly different new evidence-based design processes. The gap in perception against the realities and possibilities underlines the communication challenge during this period of substantial change, and the importance of developing new whole-life learning environments that will enable us all to engage with this exciting new world.

Jennifer Macdonald
Lecturer in Construction Project Management, UTS and BIM Specialist at Professional Construction Strategies Group (PCSG)

BIM, to me, really means adopting best practice information management in construction. Many companies and project teams seem to lose sight of the need to develop proper strategies for managing their information, aligned to their key business goals. We want to work smarter by harnessing digital technologies and processes effectively, but for the industry to do that we need people with the right skills. These include the ability to work effectively within multi-disciplinary collaborative teams, as well as more technical, software and discipline-specific skills.

So far, education providers (and particularly universities) have been struggling to catch up with the needs of industry in this area. We continue to educate our different professional disciplines in silos, when instead we should be aiming for T-shaped graduates (those who have breadth of knowledge across the other disciplines, together with in-depth knowledge of their own discipline). The UK BIM mandate has sometimes been referred to as a sort of 'Trojan Horse' that is triggering a huge shake-up in the way our traditionally conservative industry works. While this has somewhat negative connotations, I think that the need to meet industry demands for graduates in this area provides our educational institutions with a great opportunity to rethink how we educate our future construction professionals. As they say, the future belongs to the integrators!

Richard Lane
Director and Lead Consultant, Creonova Consulting, a KnowledgePoint Brand

I believe that we have a once-in-a-lifetime opportunity to transform the whole construction industry – and that BIM will have a key part to play in that transformation. The challenges that BIM addresses are far from new. Many of the problems identified by The Simon Report of 1944: from the tendency of clients 'to simply accept the cheapest price' to consequent issues with quality, to the need for 'a more collaborative approach' have remained stubbornly the same ever since.

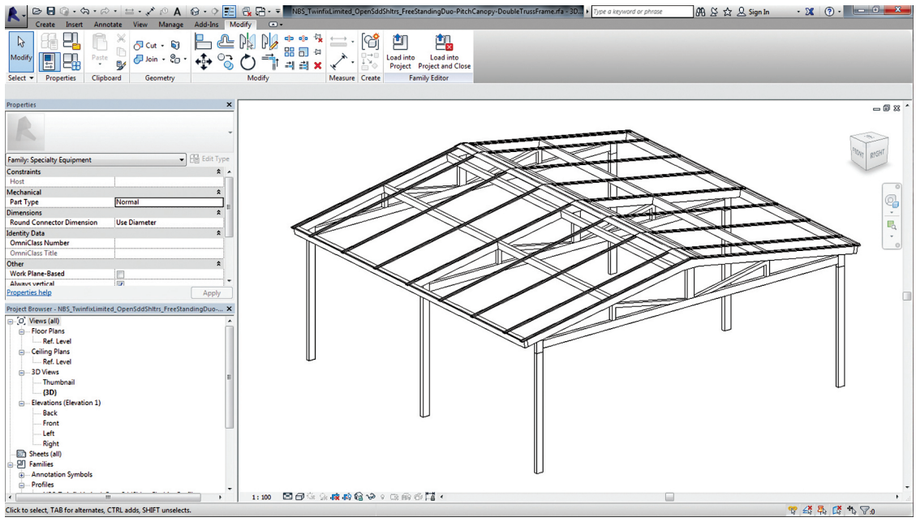
Today, however, for the first time for over 70 years, the chance to achieve genuine change is within our grasp. BIM has created the momentum. The technology to support it is largely in place. Standards have been set to drive consistency of adoption. Critically, too, government is committed to working with industry to drive the change agenda. We are seeing that in the UK but also more broadly across Europe and the wider world. The newly-formed EU BIM Task Group, for example, is focused on aligning working practices across Europe and developing a project environment where clients are defining clear requirements based on their business needs and outcomes and where there is clarity of roles and responsibilities and the process of managing information.

So, as we look to the future, the success of BIM so far has given us a unique opportunity to drive change by working towards these common objectives and ways of working that improve efficiency, that support health and safety and that give value for money and better outcomes for all stakeholders.

BIM and the manufacturer

Vicky Evans
Managing Director,
Twinfix

Embracing the future with BIM



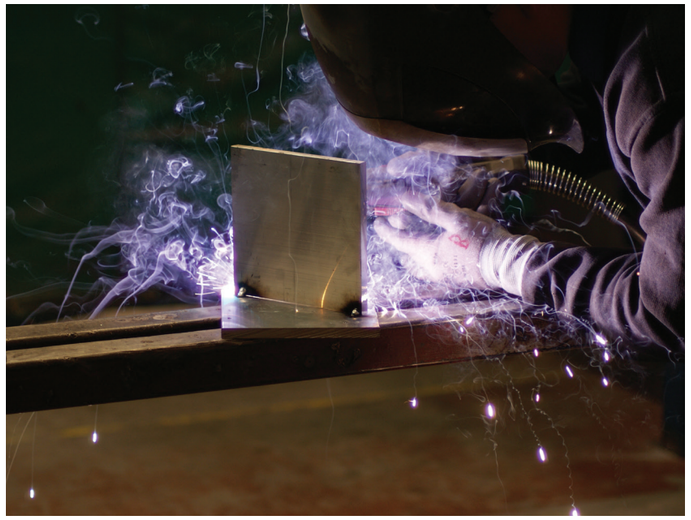
My first thoughts on hearing about BIM (Building Information Modelling) were: how is this going to work? A great concept in theory, but how will the practicalities work and will it help drive efficiencies, or will it just be more work? We all work in high-pressure environments where time is money, and we must look at which activities add value and which do not. Certainly for a relatively small manufacturer like ourselves, we need to be careful when deciding what we sign up to, so my initial thoughts on BIM were somewhat reserved.

The idea of a model showing every detail of a building which can be manipulated seemed very science fiction. It led me to wonder how it would work in practice and whether specifiers and the industry will actually use it.

Our BIM journey began with the BIM day in Manchester and embracing the BIM challenge. I embarked on the two-day conference with mixed feelings. However, it was soon apparent that BIM was exciting and, although challenging, was fundamentally an efficient and forward-thinking way of constructing a building. I began to feel excited by this new and challenging prospect.

So, as I began to learn about this new concept, terms like COBie (Construction Operations Building Information Exchange) began to make sense. I quickly started to understand how BIM could benefit us, both at specification stage and throughout the whole design process. I felt assured that the upfront work needed for BIM would have long-term gains. Preparing the objects that contain the information you need means less rework, less duplication and a much smarter way of working. As we all know, working smarter is the sensible way forward.

Canopy in situ at a school

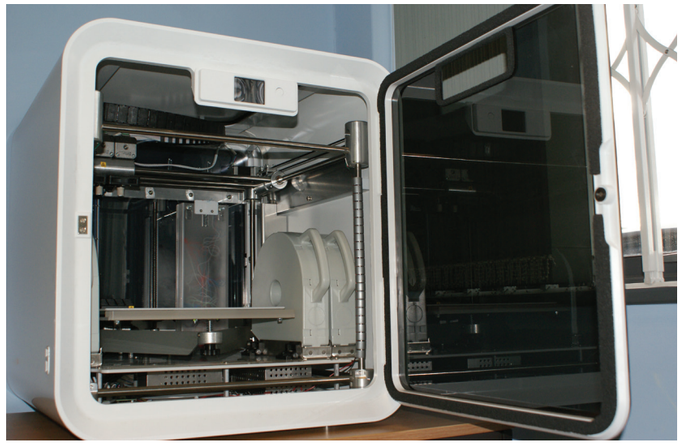


In-house manufacturing

So we embraced the concept and commissioned NBS to author our canopy products. They worked with one of our in-house designers to construct our rather complex models, understanding how our canopies worked. Once completed, I went into the webinar where NBS demonstrated our products with bated breath, concerned about how they would look. I need not have worried as they worked better than anticipated. In fact, the result was a good-looking, rather clever object that was easy to understand and manipulate.

I believe we are the first canopy manufacturer to have these objects and I'm very proud that Twinfix took this bold step.

The future is here. We have BIM. We have a 3D printer. And most importantly, we are a British manufacturing company embracing the future... How exciting! The science fiction that I believed BIM to be is now very much a reality.



3D printer

I quickly started to understand how BIM could benefit us, both at specification stage and throughout the whole design process.

Andy Duck
Marketing and Communications Manager, Bruynzeel Storage Systems

bruynzeel
storage systems

Our route to BIM

Compactus Mobile Shelving SHADE by Jacob Jensen - one of five Bruynzeel products available as BIM objects - installed at Coventry University, September 2015. Photo: Simon Hadley

Bruynzeel Storage Systems is a Dutch manufacturing company with sales offices in nine European countries, and more than 30 dealerships worldwide.

Although a relatively small part of Bruynzeel's global operations, when it comes to BIM development, the UK office is leading the way. This is not so surprising. Our largest markets in mainland Europe – Germany, France and Scandinavia – are a couple of years behind us in terms of BIM adoption. They do not have the same imperatives that the UK construction industry is facing thanks to the deadlines and structural imperatives imposed by the Government's BIM task force.

Bruynzeel's existing processes for creating specifications and drawings are set centrally and rolled out to all territories. We use an integrated system for drawing, specification and billing. Altering this system was not practical in the short term to create BIM models in Revit, so Bruynzeel looked externally for the expertise to provide BIM-ready models that met the relevant object standards.

In the UK we wanted to make the design and configuration of our systems more accessible for architectural practices and other third parties. We believe BIM objects are a good route for practices to configure systems within our current product standard specifications. Our thinking in the UK office is that by investing in BIM now – testing the waters with a few products – we can help to influence the Bruynzeel Group and gradually draw the company towards fully integrating BIM into Bruynzeel's systems over the next few years. Ultimately, we see BIM as having a significant impact on internal processes in the medium term.

It was against this background that we approached NBS in the latter part of 2014 to begin the process of creating our first BIM objects for five of our most popular shelving products.

NBS

Process

Bruynzeel's Craig Rumbold explains: "I created a 2D AutoCAD drawing of all standard sizes applicable to the models – for five of our most popular products – and a walk-through of our approach to configuring a system from scratch. In essence this included the length of the base, the height, and then the additional details such as number of loaded levels and bay types." These details were sent to NBS, who then began work on transforming our guidelines into the finished BIM objects.

Bruynzeel products are not simple, discrete objects. Originally we were talking about patching the complex object together from its component parts. However, during the process NBS suggested we could have one configurable model which included all the essential variables for a complete object. This speeded up the process of object creation, and meant our financial and time investment at early stages was kept to a very manageable level.

Bruynzeel systems are pretty much bespoke. We can offer almost limitless configurations, so by condensing – or consolidating – the objects a few sacrifices had to be made. For example, in our BIM objects shelves are always equidistant within a bay and do not contain individual configurable clearances.

"The idea was to have accessible 'placeholder' models for architects to use in existing project plans that are Level 2 BIM compliant," said Rumbold. "Although our models carry the necessary information for creating NBS tender specifications, ultimately a designer or architect will still need to contact Bruynzeel for finalising specifications and pricing."

We chose to keep the models 'white' in order to keep them as 'light' as possible for end users adding them into larger project files. Keeping the models white also means designers have the option to select colours and designs from our standard colour charts or add specialised finishes in keeping with their overall project concept.

Looking to the future

To date, we have only created BIM objects for a selection of our mainstream products. They lack a large number of accessories and some of our specific options, plus unique products like our racking and double decker systems are yet to be added to the NBS National BIM Library. So we're a long way away from offering BIM objects on our complete range. "Our BIM endgame would be to have every element of every product as a BIM object, provided computer processing speeds can continue to improve to enable any large-scale architectural plans that result to be sufficiently portable and managable..." said Rumbold.

Overall our BIM objects provide a level of detail that was previously unavailable in 2D AutoCAD 'blocks'. The new objects contain stoppage distances between mobile shelving, for example.

"When an architect or designer uses our BIM objects, the result is a much greater level of accuracy at early design stage," said Rumbold. "This undoubtedly corresponds with increased efficiency of process – one of the outcomes BIM has always hoped to achieve."

In the UK we wanted to make the design and configuration of our systems more accessible for architectural practices and other third parties. We believe BIM objects are a good route for practices to configure systems within our current product standard specifications.

Edward Rose
BIM Project Leader,
Ecoprod

Ecoprod Technique

URIMAT Waterless Urinals as specified by McDonald's Restaurants Ltd

Miscea CLASSIC 3 in 1 touch-free sensor tap with two integral dispensers - available as a BIM object on NBS National BIM Library

Towards the end of 2014 and into early 2015, the team here at Ecoprod became increasingly aware of the 'BIM Movement', as I like to call it, primarily through our contact with architects and specifiers but also other influencers such as M&E consultants and contractors.

Although there was, is and continues to be much discussion around BIM, we quickly realised that we needed to take this change seriously, as it was being driven by a clear mandate from the UK Government in relation to public sector projects from 2016. The government mandate was a deciding factor for us, regardless of what others were saying about BIM; plus subsequently the May 2015 elections proved that this was unlikely to change, at least until 2020. A lot of specification of products would happen within this period! Change was clearly happening or about to happen in the specification of products and we needed to align ourselves with it or our products were unlikely to be included in live projects.

We also realised that this would become the standard for all projects, both public and private sector, as the benefits of BIM are the same, no matter who the end client is or who they are employing. As an importer and distributor, we come under the classification of a 'Product Manufacturer'. The UK was clearly leading the field globally as a direct result of the UK Government's mandate. Given the fact that we were representing the leading brands of URIMAT and Miscea within the UK, we decided that if we expected those products to be specified for all types of projects going forward, and not just within the UK, we needed to be on the platform before the train arrived!

Therefore, I was tasked with researching 'all things BIM' and given a target of being 'BIM-ready' for all the main products before the end of 2015. This included both the creation of BIM objects, the datasets that go along with them and the hosting of these for public and professional use.

Having researched a number of options it became clear that NBS were leading the field with their NBS BIM Object Standard and appeared to be the most closely aligned with what the Government was trying to achieve. This was an easy decision for me as I had already worked with RIBA Insight/NBS for the inclusion of our products in the RIBA Product Selector, NBS Plus and NBS Create. This may have been why the BIM project was delegated to me too!

I liked the way NBS products worked together not only for us as a manufacturer, but more importantly for the end user. This included the plugins for software platforms so that specifiers and designers didn't have to exit their design software to find and include our products. Also, they weren't just selling me a product for the sake of a sale, as they were somewhat impartial in their following of the Government's objective and their BIM standard is widely being adopted globally. The development of the free-to-use NBS National BIM Library and the BETA and then final release version of the BIM Toolkit that came along during 2015 showed that they were committed to a movement and change that was bigger than NBS themselves.

Ecoprod went live with 30 BIM objects in December 2015 including Miscea LIGHT 2 in 1 touch-free sensor tap with integral soap dispenser

The other deciding factor was that, because NBS were setting the standard, they also knew how products should be represented to meet that standard. I didn't have time to oversee the creation of objects and datasets that met what architects and specifiers were expecting to find. I also wasn't prepared to entrust someone with creating those objects and datasets if they didn't know how they should be presented for all to use.

NBS carried out the bulk of the work including the 2D and 3D representation of the products as objects, but I did need to check and fill in missing data. Because BIM includes data that will go through to the Facilities Management company that manages a building after the initial build project, I was also concerned to include enough data to make their job easier. It could be that O&M manuals become a thing of the past with data so I wanted to make sure that every necessary detail was included. This is why I am so enthusiastic about BIM. Unlike CAD it is more than just the initial build project. The ongoing life cycle of any product is better managed and the Facilities Management role has got to be far easier!

Ecoprod went live with 30 products in the NBS National BIM Library on 2nd December 2015. "Initial mission accomplished but the BIM movement doesn't stop – get onboard!"

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Lee Jones
BIM Manager
Ideal Standard

BIM Technology makes specification simple for Ideal Standard

Since May 2015, leading UK provider of innovative and design-driven bathroom solutions, Ideal Standard International, has partnered with NBS to host its Building Information Modelling (BIM) objects on the NBS National BIM Library.

This means that Ideal Standard, Armitage Shanks and Sottini brands all have a complete portfolio of BIM products available for commercial and residential housebuilder projects. From April 2016 all government-funded construction projects will need to incorporate BIM in their plans.

With its long history and extensive experience, the company is keen to invest in advanced technology to help improve the building and planning process.

Ideal Standard has committed to hosting 3,000 products within the library, which is the primary source of BIM content in the UK. Before submitting its initial objects for cataloguing, Ideal Standard conducted extensive research into the key points needed in order to successfully create BIM objects. It found that structured data and geometry in the simplest form possible were the main priorities, along with keeping file sizes small.

Products are rarely manufactured based on BIM models, so there is no need for them to be as detailed as production models, in most instances. The object is used only for the client to aid specification, layout planning and operation through the data it holds. Ideal Standard has used Revit and Inventor as its software options for geometric perfection.

All manufacturers, of course, already have extensive data. The challenge is structuring this in a way which is BIM-compliant, as different amounts of information are needed at each stage of a project. Ideal Standard uses COBie to cover the main brand and product-specific data, while IFC is used to outline the most basic data. NBS Create, which will eventually supersede the current building specification system, is incorporated for specification purposes.

Since Ideal Standard first worked with BIM, the process of structuring data and geometry has been improved immeasurably by the support offered by NBS, including the provision of free downloads and criteria, such as the NBS BIM Object Standard, which outlines every requirement needed to achieve Level 2 BIM compliance.

The process of submitting the finished object is also ultra-simple: Ideal Standard simply submits the object which is checked against relevant criteria by the NBS and awarded a pass or fail. Clear feedback is also provided so that corrections can be easily and efficiently made.

Ideal Standard has found that working with BIM has provided a high reward for a relatively small investment; an ideal scenario for any business when working with planning and specification.

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