

The background of the image is a futuristic city street at night. The scene is filled with glowing red and blue light trails that create a sense of motion and depth. In the background, a large, complex wireframe structure, possibly a building or a bridge, is visible, illuminated with blue light. The overall atmosphere is high-tech and dynamic.

bsi.

BIM perspectives: unlocking value

...making excellence a habit.™

The global built environment is increasingly adopting, and reaping benefits from, Building Information Modelling (BIM). Here, three very different organizations describe their BIM journeys.

Getting behind BIM

In this analysis, we begin by setting the scene of the digital transformation that is driving the built environment. We then present three perspectives, presenting three very different organizations' Building Information Modelling (BIM) journeys within the wider context of this digital transformation.

The perspectives presented here by organizations from around the globe describe the lessons learned from real examples and projects, supported where possible by evidence and statistics that demonstrate the benefits of BIM adoption – the “before and after BIM” – including cost and time savings, quality and efficiency improvements, risk reduction, and return on investment.

Both BSI and the organizations featured are firmly committed to BIM and value the benefits it can bring to the whole built environment. As well as spreading knowledge and best practice, therefore, this Ebook 'BIM perspectives: unlocking value' represents a call to action to organizations involved in the construction and operation of assets to get behind BIM.



Digital transformation in the built environment

Towards organizational resilience

In the contemporary built environment, projects are being designed, constructed and managed against a backdrop of powerful and complex pressures, from coping with COVID-19 to cutting carbon emissions. With the right digital transformation strategies and support in place, however, organizations will have the tools they need to achieve and maintain resilience. Digital transformation can help them meet multiple challenges, from commercial risks to regulatory compliance, while also enabling them to seize new opportunities presented by the fourth industrial revolution.

Fourth industrial revolution

The fourth industrial revolution describes today's automated/digital trend, one of the most rapid periods of change industry has ever experienced. Centred around the automated collection and sharing of data, digital transformation moves physical assets from static structures into connected ecosystems.

The fourth industrial revolution presents astounding opportunities for the built environment. Innovations such as Big Data, Internet of Things (IoT), artificial intelligence (AI) and BIM are improving the way buildings are designed, made and maintained, as they help enable communication between human and machine, and machines with each other.

This combination unifies a previously fragmented landscape – connecting building owners, designers, construction teams, facilities managers and occupants through shared asset data, while integrated workplace management solutions allow multidisciplinary teams to collaborate and communicate better, resulting in more efficient and profitable projects.



Digital transformation in the built environment

Meeting the challenge

The innovation predicted to have the greatest impact on the built environment in the next five years is BIM.

BSI's recent survey, 'Digital transformation of built environment and construction industries', conducted among over 100 built environment professionals, reveals that 81% of their organizations have invested, or are planning to invest, in BIM over the following 12 months.

Yet, despite their investment intentions, only 12% of organizations see themselves as leaders in terms of their digital transformation strategies. 32% feel unprepared and behind in delivering digital transformation standards.

The top three barriers to implementing digital transformation strategies are: budget limitations, overcoming preconceptions and mindsets from internal teams, and lack of external expertise/knowledge.

The global challenge for organizations is to overcome these barriers to create a common digital strategy and standardization that focuses on collaboration using structured data. With a strong foundation of data and information in place, organizations are one step closer towards achieving their digital transformation goals.

Digital transformation in the built environment

Embracing BIM

BIM is an information management process that unlocks value by collecting contextualized asset data across its lifecycle that can be used by multidisciplinary teams from across the supply chain in everything from project planning, design and construction to asset operation and management.

BIM is essentially a process to ensure all the right information is available to the right people, at the right time and in the right format. It brings together all the components that make up projects in the development stage, creating a common language, shared knowledge and increased transparency between all the parties involved, including developers, architect, main and sub-contractors, and facilities and asset managers.

By creating three-dimensional models (digital twins) and sharing accurate information, from drawings and specifications to materials, measurements and performance metrics, problems can be avoided throughout the supply chain. The advantages include improved design, decision-making, communication of ideas and quality of information, and reduced risks in relation to the cost, timescale, quality and environmental performance of projects.

BIM benefits

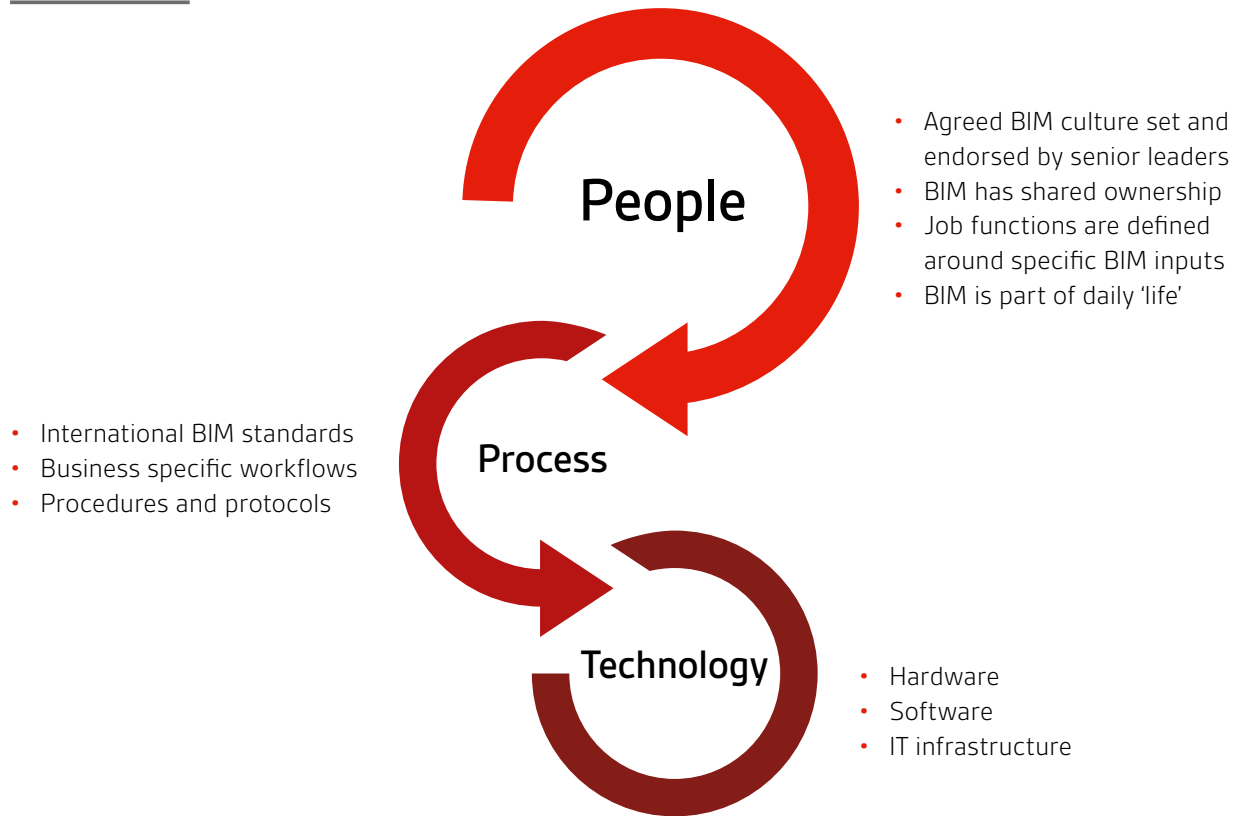
- BSI research suggests that using BIM processes to resolve issues contributes to an average project time saving of 15%.¹
- Dubai's Museum of the Future, known internationally as one of the most challenging construction projects ever attempted, "would have been an impossible task without parametric design and BIM," according to the lead consultant on the project.²
- For China's new stadium for the 2022 Hangzhou Asian Games, the Beijing Institute of Architectural Design's project team used a BIM methodology to assemble all the components for the planning and design stages, saving 100 resource days and reducing design time by 60%.³



- 1 2019 BSI survey results – Digital transformation of built environment and construction industries.
- 2 <https://www.bimcommunity.com/experiences/load/136/bim-has-been-used-to-design-and-build-the-new-nato-headquarters-in-brussels>.
- 3 <https://www.bbc.com/future/article/20191028-museum-of-the-future-the-building-designed-by-an-algorithm>.

Digital transformation in the built environment

Three fundamental elements for successful BIM delivery



Digital transformation in the built environment

A standards-based approach

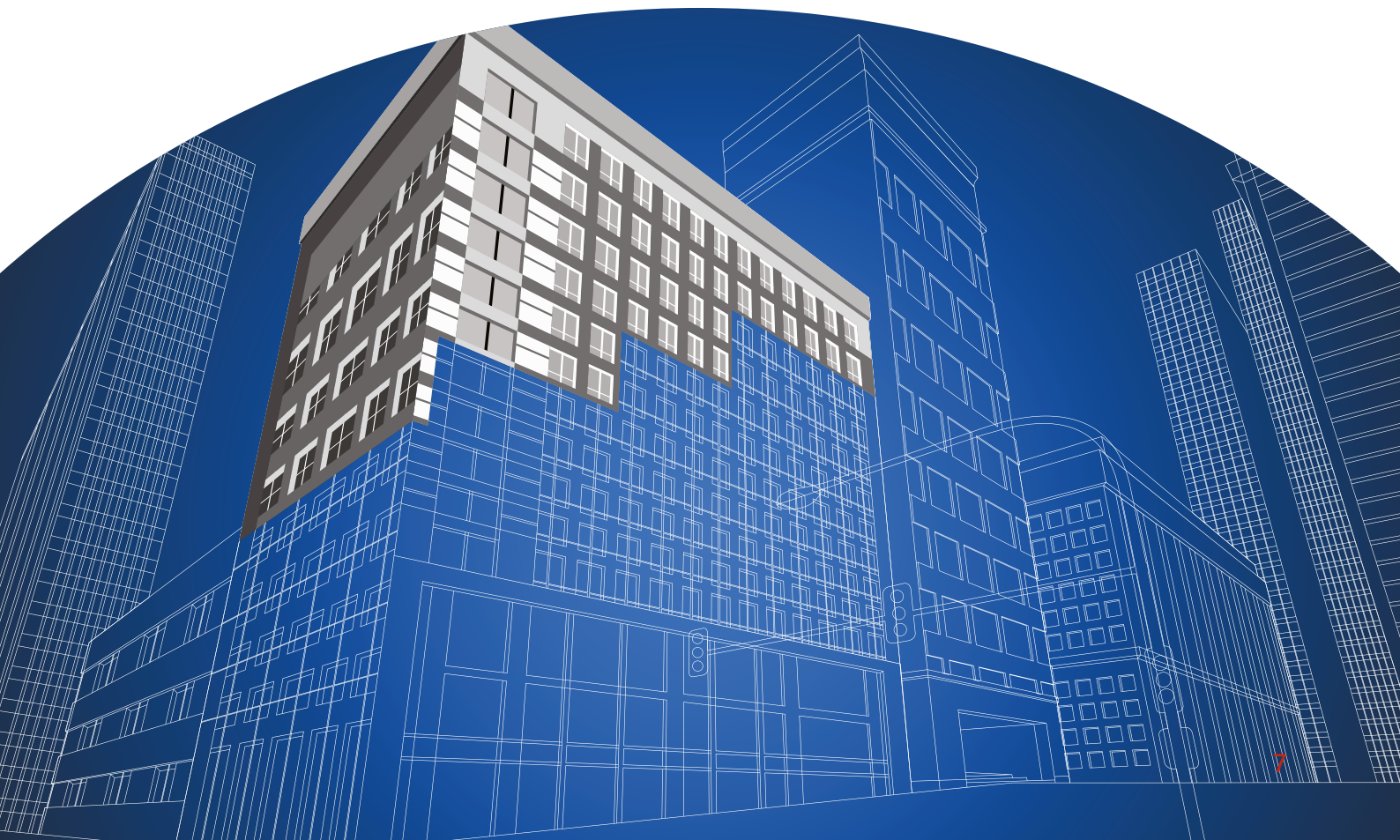
BIM is supported by a suite of standards that define the collaborative processes for the effective management of information when using BIM. These are the international ISO 19650 series and the UK's PAS 1192 series on which ISO 19650 is based, which collectively address the requirements and recommendations for information management during the briefing, design, construction, operation and decommissioning of an asset.

The first International standard for information management using BIM (ISO 19650 parts 1 and 2) was published in 2019, opening up more opportunities for companies in the built environment to go beyond borders and work worldwide.

The standard has inspired improved communication and trust across the supply chain, enabling both international and local projects to be managed consistently, as well as addressing the need to share information throughout the asset lifecycle.

Thanks to the introduction of ISO 19650, international standardization for BIM has levelled the playing field for organizations around the world. The next step is to create an open ecosystem where supply chain partners can easily collaborate across project delivery processes.

Taking a standards-based approach, coupled with good communication to break down barriers and build support, is a major stride towards the successful adoption of BIM and achieving digital transformation. The following three unique BIM perspectives explore these and other issues further.





Willmott Dixon



WILLMOTT DIXON

SINCE 1852

Willmott Dixon is a privately-owned contractor that carries out a wide range of construction in the UK, including public sector, commercial and residential building projects, as well as interior fit-out and refurbishment.

Founded in 1852, and now with around 1500 employees, the family-run company values innovation and partnership, working with government, local authorities, customers and supply chain partners to share knowledge and tackle construction industry challenges.

Today, the company is firmly committed to digital construction, being certified by BSI against ISO 19650 parts 1 and 2.

BIM perspective 1: Willmott Dixon

Early adopter

Willmott Dixon's collaborative, forward-thinking approach made it early to embrace the emerging concept of digital construction, but its journey has not been entirely smooth. Tim Carey, Director, whose responsibilities include BIM, explains:

"By 2012 we had already identified the benefits that could be generated through BIM and wider digital approaches and committed to its adoption, but to be honest we were probably forcing it a bit too soon. Neither the market nor the technology were really ready."

Carey continues, "There is still a danger of digital construction being oversold on process and technical issues. Whilst these are important, for me it's about breaking it down into core value propositions – and then ensuring that those benefits are delivered."

"You don't buy an iPhone because Apple has a great process for manufacturing, but for the benefits you get when you use the end product. Similarly, we have to constantly ask what the benefits of BIM are to the end customer and how these can be quantified."

In the early years of its digital journey, Willmott Dixon adopted a decentralized approach, empowering its regional operations to develop responses at a local level to the BIM agenda.

With about two-thirds of the company's business coming directly from the UK public sector, a further push came from the deadline of April 2016, by when companies looking to secure UK government building and infrastructure contracts were required to demonstrate BIM Level 2 capability or face exclusion from public sector tenders.

Strategy, process and people

As digital transformation has taken increasing hold in the built environment, BIM has moved back to the forefront of Willmott Dixon's strategy. The company has taken stock, evaluating regional processes and adopting the most successful centrally.

"Our aim is to consolidate and apply consistency in terms of the modelling protocols, the information we want, and the software platforms we use to deliver that," says Carey.

Alongside rationalized BIM processes, the company places great emphasis on promoting a 'fully digitally enabled business', investing in role-specific training to upskill its design managers, surveyors, estimators and planners to work effectively within a digital environment, with supporting digital managers then able to focus on training, mentoring and cutting-edge innovation.

Communication continues to play a vital role in embedding the cultural change needed to successfully implement digital construction, with the company carefully tailoring the right messages to its people to counter any scepticism and nurture a positive mindset. The aim has been to avoid being overly technical, instead focusing on the associated benefits for individuals, teams, and the company's customers and partners.

Customer benefits

Embracing virtual and augmented reality also enables design intent to be shared in a more collaborative and accessible environment, especially for those stakeholders from outside the industry who might naturally be unfamiliar with technical drawings.

“If we can use technology such as virtual reality to put our customers at the heart of their new buildings, it’s much easier for them to understand, engage and offer feedback on the intended designs.”

There are also significant technical benefits that can be realized through structured ‘COBie’ data and the use of digital twins (a digital representation of the final building) post-handover.

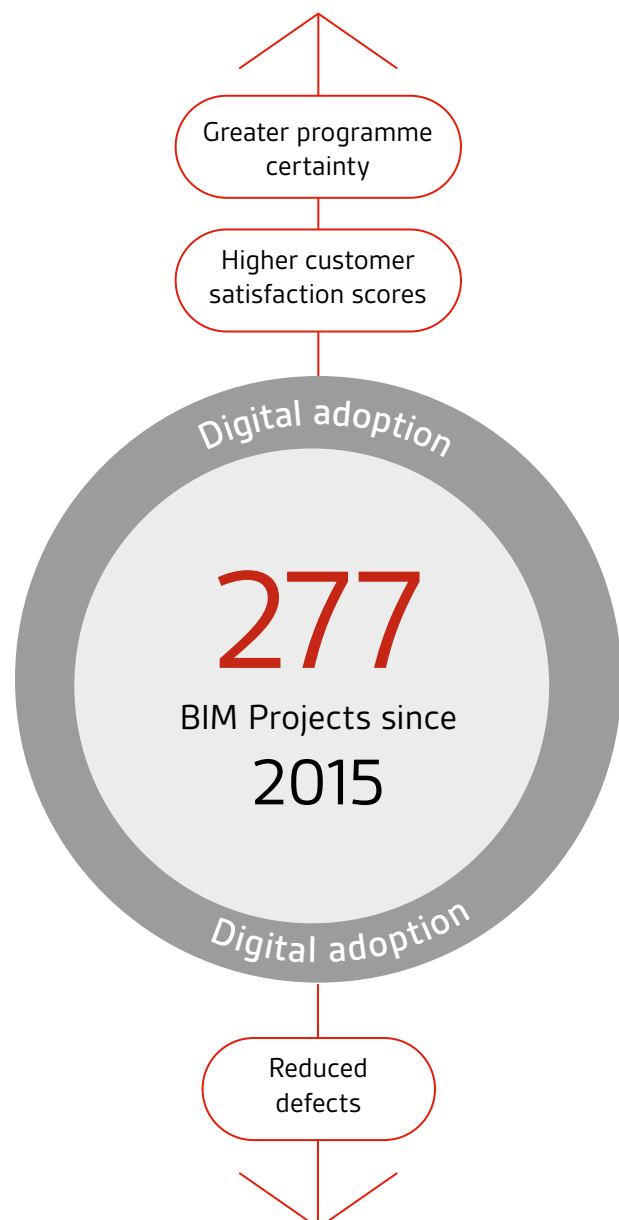
Delivery against COBie (BS 1192-4, a British Standard for the collaborative production of information) ensures the management of consistent and structured asset information useful to the owner-operator for post-occupancy decision-making.

“One of the major benefits of the digital construction revolution is the ability to drive more data-informed decisions, both during design and construction and after handover to our customers once the building enters its operational life.”

“We chose BSI Kitemark certification for design and construction with BSI, as they are the most well known and respected certification body in the market.”

Quantifying success

As part of its overall drive towards becoming a data-driven organization, Willmott Dixon is beginning to quantify and analyze the benefits of adopting digital construction, despite the challenges caused by the many variables involved in construction projects. This dataset, which now spans 277 BIM projects since 2015, has highlighted a direct correlation between digital adoption and a reduced number of defects, higher customer satisfaction scores and greater programme certainty.



BIM perspective 1: Willmott Dixon

Looking ahead

Willmott Dixon is constantly looking to promote its digital approach, to its customers, design consultants and supply chain partners. "There clearly remain barriers to adoption, especially for smaller organizations, with regards to the resources and investment levels required," observes Carey. "But our partners share the same intent – in some cases, they're pushing us, and in others we're pushing them. It's about the collective effort for improvement."

One current area of focus is to promote Design for Manufacture and Assembly (DfMA) approaches, including the use of standard components across multiple projects – both Revit families and their supporting metadata – developed in conjunction with Willmott Dixon's strategic supply chain partners.

"Our aim is then to combine our digital component library with AI-driven design and procurement to enable the impact of design and specification decisions on the project to be assessed in real time. This process will automatically take into account their impact on areas such as embodied carbon, lifecycle costs, assembly programme and cashflow," explains Carey.

He concludes, "Our goal is to change the way construction is delivered, permanently – adding value by enabling us to model and shape outcomes and make more collaborative decisions."





Ballast Nedam



Ballast Nedam is a Dutch construction and engineering company. Part of the large Turkish multinational construction and contracting company Rönesans Holding, it employs around 2,000 staff and delivers projects both in the Netherlands and internationally, notably in Turkey and Russia.

Ballast Nedam strives to be highly competitive, with a strong focus on operational excellence, cost efficiency, leading edge technology and global expertise. Through a forward-thinking approach and collaboration with customers and partners, it achieves ground-breaking built environment solutions, such as industrializing the construction process by using innovative modular concepts and standardized techniques.

This approach has led the company to invest constantly in innovation and digitization of its work processes, enabling it to build a solid foundation in BIM and to become a pioneer of BIM internationally.

BIM perspective 2: Ballast Nedam

Strategy and standards

As a result of proactively following market trends and responding to the further digitization of the sector, in December 2019 Ballast Nedam Building Projects became the first company in the Netherlands to receive the BSI Kitemark certification for ISO 19650, BIM Design and Construction.

Serkan Sen, Head of BIM, Building Design & Engineering, explains: “Our business strategy, endorsed by our parent Rönnesans, is to focus on the international procurement market. It is therefore only logical to want to align with international quality standards, and the BSI Mark of Trust is a quality mark that fits our strategy.”

He adds, “BSI Kitemark certification is the internationally recognized certification for ISO 19650, which means that in addition to Dutch quality standards, we also meet international standards.”

BIM benefits: Quality and efficiency

Sen emphasises how a key goal of working to ISO 19650 has been to enhance process efficiency at Ballast Nedam: “A conscious look at our processes, and how we can organize them more efficiently, is in our corporate DNA, so this is a key reason why we wanted to take this step.”

All Ballast Nedam’s working methods within its pre-existing processes for collecting, filtering and executing information are now digitized and standardized in line with the requirements of ISO 19650, increasing transparency, efficiency and quality in projects and processes. For example, BIM has enabled much improved detection of building design clashes, leading to fewer problems materializing as projects develop, and resulting in the saving of potentially large amounts of time and cost in rectifying such problems.

Implementation challenges

Frank van Empel, Ballast Nedam’s BIM Manager, recalls the company’s early involvement with BIM over ten years ago. “Even then, digital design tools were quite commonly used in Ballast Nedam projects,” he observes. “Since then, BIM has been used more and more.”

Van Empel says most of the challenges for the company in implementing BIM have been people-related. “We can switch to different software easily enough, but we can’t change our people, so we’ve focused on communicating the benefits of BIM to them to create the right mindset, and to give them good training and support.”

He continues,

“With our international ownership structure and strategy, we were early to operate information models in our supply chain, using digital collaboration in projects with Turkish and Russian clients and sub-contractors. We are industry leaders in this high level of cross-border BIM collaboration, which is not so common elsewhere in the construction industry.”



BIM perspective 2: Ballast Nedam

Van Empel explains that, in parallel with the increasing adoption of digital solutions internationally, Ballast Nedam's supply chain needed a consistent, standardized approach – offered first by PAS specifications and now by the new ISO 19650 standard – so that all parts of the supply chain could work together on projects using a common construction language.

Serkan Sen says Ballast Nedam has worked hard to encourage clients and sub-contractors to embrace BIM, supporting them as they strive for the same high level of BIM it has achieved. "Our biggest struggle has been to integrate BIM with our partners on projects," he says.

He offers a word of advice to other companies looking to start their certification journey: "Look for procedures that are well-established across the entire organization," he recommends. "We realized that BIM is more a matter of standardizing processes than modelling. For these processes to be sustainable requires procedures and standards that are accepted and embedded throughout the company."

BSI kudos

In this process, Ballast Nedam has appreciated the respect commanded by the BSI Kitemark certification in the construction sector, "because it validates the standard and allows actors in the supply chain to speak the same language for digitization," says Sen.

He adds,

"BSI gave us a lot of insight during the gap analysis. We were able to identify which current processes needed to be transformed into those required by, or recommended for, ISO standards."

With BSI Kitemark certification to ISO 19650 parts 1 and 2, Ballast Nedam demonstrate the quality and efficiency of the company's BIM design and construction processes to clients and the whole supply chain, reassuring all stakeholders. While it is still early days since the BSI certification was achieved, "I'm confident it will help us to win more business," he concludes.





Taylor Woodrow



Taylor Woodrow is the civil engineering division of VINCI Construction UK, which forms part of VINCI, a world leader in concessions and construction known for innovation, creativity and technological mastery.

The company delivers complex infrastructure projects across the highways, rail and energy sectors. It takes pride in being a partner of choice for its customers and supply chain, building long-lasting relationships that deliver the best approach and value for everyone and help shape the future of UK infrastructure.

Sustainability is at the heart of its approach, with projects delivered through collaboration and innovation. It promotes teamwork, openness and support, fostering an environment where everyone is encouraged to strive for excellence.

BIM perspective 3: Taylor Woodrow

Digital drivers

With its enlightened, collaborative, tech-savvy culture, Taylor Woodrow's adoption of BIM has been a natural progression over the last 10 years, but it was also a necessary commercial response to powerful trends in the built environment sector.

Scott Bennison, Digital Operations Manager, explains, "By 2012 BIM had already become a heavily marketed buzzword, having been given a big push in 2011 when the change to UK Government policy was first announced. It became clear we would have to use BIM to win business as a main contractor." He adds, "In truth, we would have continued down this route anyway, because we were increasingly utilizing data and working digitally, and seeing more and more benefits from this on a wide variety of projects."

Winning hearts and minds

Implementing any new way of working presents challenges, and for Taylor Woodrow BIM was no exception. "Technology has only been a small part of it – a massive part has concerned culture," continues Bennison. "People are naturally more comfortable sticking with familiar methods than adopting new ones. It's taken a big push to embed change, including leadership commitment, communication, training and BSI's support assessments on the certification requirements for the BIM standards ISO 19650 parts 1 and 2 and PAS 1192"

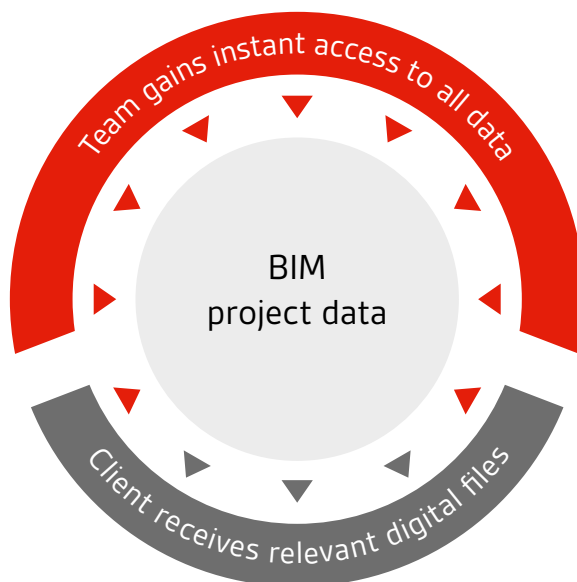
The key to success has been to persuade teams of the need to 'start with the end in mind', and to work with BIM consistently and conscientiously from project tender right through to completion and handover. That task is greatly assisted by seconding digital engineers from Bennison's information management team onto individual projects, where they can give hands-on support, for example, providing practical training on authoring and fixing onsite collaborative software connectivity problems.

BIM benefits

According to Bennison, the benefits of BIM include a host of technical advantages, bringing time and cost savings, for example, in areas such as quantification, validation of models and clash detection. Some savings are minor, others more substantial, and they vary both within and between projects.

But the really big win has come at the point where a project is handed over to the client. He describes how, historically, there have been handover problems across the industry, where contractors believe they have completed a project, but the client argues that there are still requirements to be fulfilled. It has then taken months, or even years, for the contractor to find and present the necessary information – in a format that the client will accept – to achieve final client sign-off and payment for the project.

"Through BIM, we have instant access to all the project data, so at handover we can simply pass the relevant digital files to the client to meet all their information management requirements. It makes for a much smoother process, resulting in fewer disputes and really significant time and cost savings."



BIM perspective 3: Taylor Woodrow

Ongoing improvements

Quantifying BIM benefits, however, either in terms of financial or time savings, remains a difficult task, not least because, “It’s not so much about making money as avoiding losing money,” observes Bennison. It has had more impact on some projects – and some areas within projects – than others, so putting a figure on the profit margin a project would have achieved without BIM is largely guesswork. However, he adds, “It is a valuable tool in helping to ensure that projects can achieve the profit margins that they have been tendered at.”

Similarly, he is reluctant to estimate how much new business has so far been won because of the ability to offer BIM working, when so many other variables, not least pricing, also influence tender outcomes. But one thing is certain: a high level of BIM capability, proven independently by the BSI Mark of Trust, has not only helped win UK public sector contracts, but also an increasing number of commercial tenders too. And that is a pattern that’s set to continue.

Another consequence of success is the increasing trend for Taylor Woodrow’s managers to ask for digital engineers to provide full-time support for BIM on their various projects, a process that is getting easier thanks to “two massive success stories in the last six months, which have highlighted the benefits,” he says. “It’s now company policy for many projects and rapidly becoming business as usual.”

Looking ahead, Bennison says he would ideally like to split his growing team of digital engineers into three roles: information managers who would specialize in governance and risk; BIM co-ordinators who would focus on training, technical activities and supply chain, and digital innovators who would advise project teams on new technology and tools.

Spreading the word

Taylor Woodrow is also keen to advance BIM among its supply chain partners. “It’s a mixed picture at the moment, with some firms much further ahead than others,” says Bennison. “As a main contractor, we need suppliers on board for us to be able to deliver, so we take a lead in supporting them with training and software support, for example. We have limited resources, and it’s not something we can do alone, so we’re very willing to collaborate with BSI on industry webinars and workshops.”

His advice to SMEs that are starting out on their BIM journey is to engage with their larger contractors.

“It’s important to talk to the right people. The best BIM contacts may be at head office, rather than on site or at project level. Also, have a look at the ISO standards and speak to BSI,” he advises.

“Just do it,” he urges.



Why BSI?

Inspiring trust for a more resilient world

BSI is your business improvement partner. We have shaped best practice for over 100 years, helping asset owners and organizations who design, build, operate or decommission buildings and infrastructure embed excellence, build competence and capability for sustainable growth. We play a key role in the transformation of cities and regions.

Through our expertise we transfer knowledge through ongoing training, information and performance tools; we help clients comply with regulations; assess client's processes, procedures and products; and advise clients on how best to respond to challenges.

Whether public, private, residential, commercial or infrastructure, our standards and services are designed to help you build resilience, embrace new technologies and be fit for the future.

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