

Building Information Modelling and collaborative construction



How technology is transforming construction

For today's CEO in the construction industry, the drive for faster, more efficient delivery of infrastructure or building projects has never been more challenging. Efforts to improve efficiency are difficult in a market that is too often defined by low margins, aggressive procurement, skills shortages, uncertain work pipelines and complex supply chains.

In the construction and asset management industry the use of a Building Information Model which is shared by partners is becoming more and more commonplace. The adoption of Building Information Modelling (BIM) requires organizations and individuals to change the way they work. They must accept that traditional roles within the supply chain and client organizations may need to be redefined to successfully implement the new processes and information management requirements of BIM. However this approach offers multiple benefits including faster, safer and ultimately more efficient solutions for clients. As the construction industry is being revolutionized by the increasing adoption of BIM it's crucial that CEO's are aware of this opportunity and what it may mean for their organization.

92%

expect to be using BIM within three years, and 95% within five¹.



In terms of BIM maturity, less than a third use one model through the life of a project, or produce a format independent model².

BSI has played a key role in the development of BIM standards:-

- **BS 1192:2007+A1:2015** – Collaborative production of architectural, engineering and construction information. Code of practice.
- **PAS 1192-2:2013** – Specification for information management for the capital/delivery phase of construction projects using building information modelling. Pioneering the Building Information Modelling Standard.
- **PAS 1192-3:2014** – Specification for information management for the operational phase of assets using Building Information Modelling.
- **BS 1192-4:2014** – Briefing for design and construction. Code of practice for facilities management (Buildings infrastructure) Collaborative production of information. Fulfilling employer's information exchange requirements using COBie. Code of practice.
- **PAS 1192-5:2015** – Specification for security-minded Building Information Modelling, digital built environments and smart asset management.
- **BS 8536-1:2015** – Briefing for design and construction. Code of practice for facilities management (Buildings infrastructure).

As a Royal Charter company with 80 offices worldwide, we have a global reach to help any organization involved in the construction supply chain. This will help them to have robust supply chains, manage assets effectively, and operate efficiently.

What is BIM?

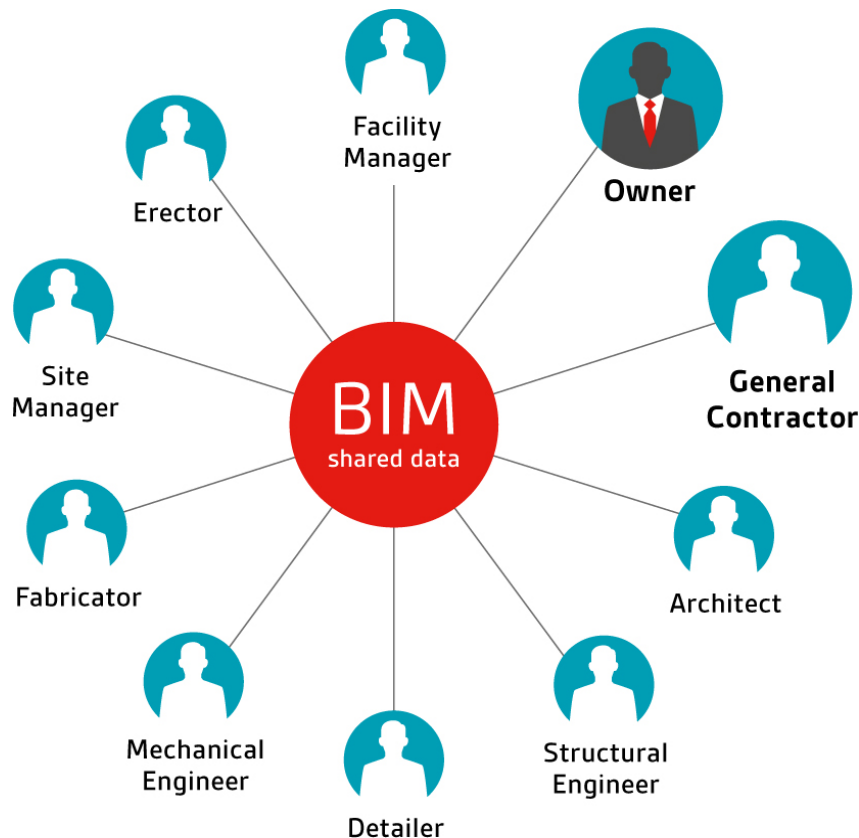
Building Information Modelling (BIM) is a collaborative way of working underpinned by digital technologies, which allow for more efficient methods of designing, delivering and maintaining physical built assets throughout their entire lifecycle.

In essence, BIM is the management of information through the whole life cycle of a built asset, from initial design all the way through to construction, facility maintenance, and finally de-commissioning. It can be used for a wide range of projects such as a new buildings or other infrastructure projects.

It's all about collaboration - between engineers, owners, architects and contractors in a three dimensional environment, and it shares information across these disciplines. BIM allows design and construction teams to

communicate about design and coordinate information across different levels that has been unseen before. This information remains with the project throughout its lifetime.

BIM is now becoming the standard of the construction industry. It is relevant for the majority of organizations working in the architectural, engineering, construction and infrastructure sectors, whatever their size, as well as contractor's clients who require their supply chain to use BIM processes and tools.



BIM and its global context

Megatrends such as demographics and urbanization have driven the need to adopt BIM, as has the need to transform and make construction more efficient. BIM is now at the heart of the future strategy for construction in many parts of the world.

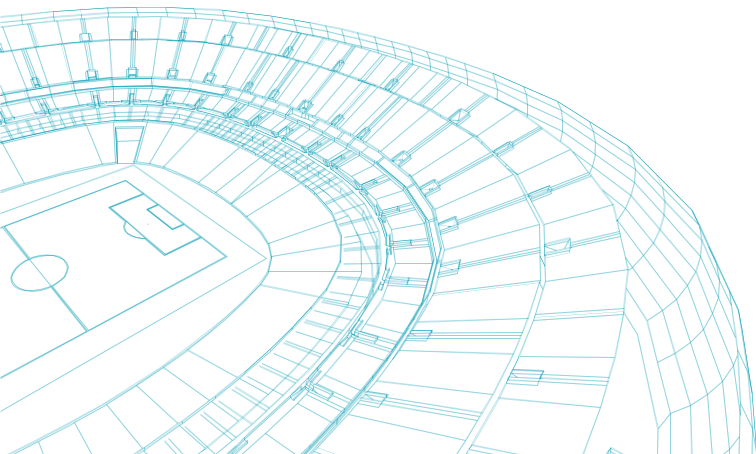
Leaders from Europe's architecture, engineering and construction industry expressed their support of the European Parliament's decision to modernize European public procurement rules by recommending the use of electronic tools such as building information electronic modelling, or BIM, for public works contracts and design contracts.

- The adoption of the Directive, officially called the European Union Public Procurement Directive (EUPPD) means that all the 28 European Member States may encourage, specify or mandate the use of BIM for publicly funded construction and building projects in the European Union by 2016.
- In the use of UK, Collaborative 3D BIM will become mandatory for government projects in 2016.
- In the USA the General Services Administration (GSA) has mandated that buildings designed through its Public Building Service (PBS) use BIM at the design stage as a minimum. In the USA BIM adoption is currently estimated at being in the region of 70%*.

* Constructionmanager.co.uk, March 2015

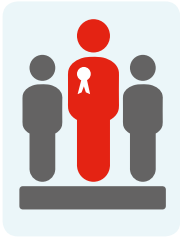
- Singapore has one of the most advanced construction industries in Asia and a 2013 survey found 76% of firms were using BIM. In 2015 BIM becomes mandatory for new building projects over 5,000m².
- Public sector BIM standards or requirements are already in place for Norway, Denmark, Finland and Sweden. BIM is in place for the Statsbygg government property agency in Norway. Finland's Senate Properties, a state-owned enterprise requires IFC/BIM in its projects and intends to have integrated model-based operation in future.
- In China, BIM has been included as part of its most recent National Five Year Plan and China is formulating a BIM framework.
- Brazil's National Department of Transport Infrastructure is embracing BIM in the hope of making 30% cost savings. Elsewhere in Latin America, Panama's ongoing project to add a new set of locks at either end of the Panama Canal has adopted BIM from the start, and a new airport for Mexico City will also use it.
- Dubai has had a BIM mandate since 2014 which applies to all buildings of 40 stories or higher, buildings of 25,000sqm, all hospitals, universities and public buildings.

The adoption of BIM by the construction and asset management industry requires organizations and individuals to embrace change and new roles within the supply chain. The BSI services outlined in this brochure address how building information modelling can be implemented within an organization and help you to demonstrate BIM capability down through to the supply chain and also BIM Level 2 Compliance to the 2016 UK mandate.



The benefits of BIM

Enhance your reputation and win more business



- It can help mitigate risk, avoid fines, delays and damage to brand reputation.
- It helps deliver better customer service – proposals are better understood through more accurate visualization.
- It can be used as a differentiator as part of the tendering process, by promoting the value of information regarding the asset at handover stage.
- It can be used as a strategic tool which helps organizations gain future projects.

Save time and money



- It can be used to invigorate a positive culture of collaboration between departments and the supply chain delivering greater efficiency for the client at reduced cost.
- Controlled whole-life costs and environmental data can be calculated which mean that environmental performance is more predictable and lifecycle costs are better understood.
- It is faster and more effective as information is more easily shared which can be value-added and reused.

Improve quality and deliver efficiencies



- Better production quality is achieved and documentation output is flexible and exploits automation.
- Better design may be achieved as building proposals can be rigorously analysed, simulations can be performed quickly and performance benchmarked which enables improved and innovative solutions.
- It can assist automated assembly as digital product data can be exploited in downstream processes and used for manufacturing or assembling of structural systems.
- Improved lifecycle data such as requirements, design, construction and operational performance can be used in facilities management to help make efficiencies.



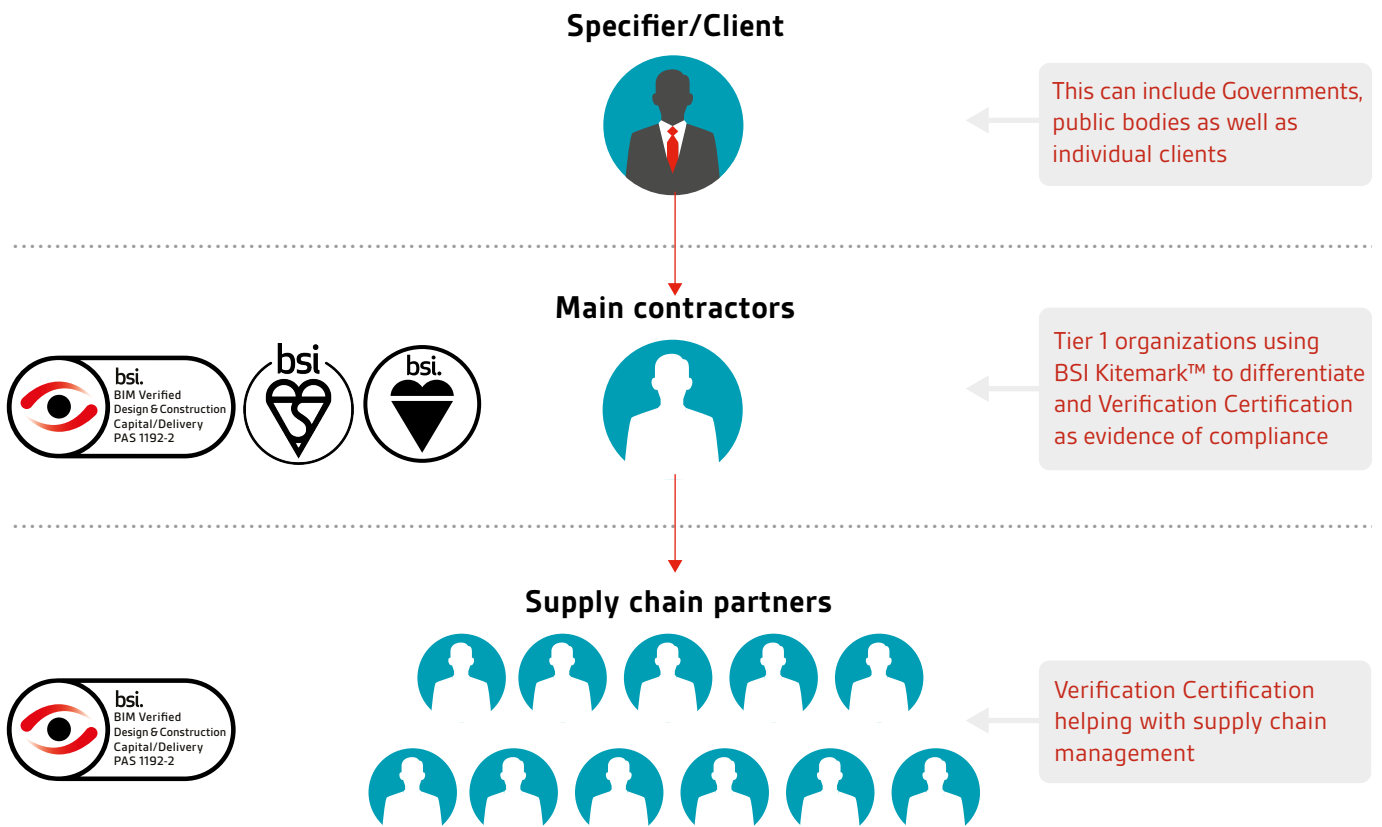
BSI BIM solutions

BSI's certification schemes have been developed collaboratively with industry utilizing existing industry and international standards as the core foundation to successfully implement BIM. These will help you to demonstrate your BIM capability which could help you to win business and keep your competitive edge.

The UK government has mandated that all centrally-funded work is to be undertaken using BIM by 2016. To help demonstrate this we have developed a verification solution for contractors and their supply chains to show BIM capability through certification to PAS 1192-2. For main contractors looking for evidence of successful completion and final

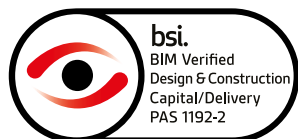
delivery of projects using BIM, a BSI Kitemark certification will also be available, using management system standards, such as BS 11000 Collaborative Business Relationships and ISO 9001 Quality Management as well as PAS 1192-2 and assessment of completed projects.

BIM Supply Chain Solution Certification Model



BSI BIM solutions

Verification



Developed for any contractor involved in using BIM to deliver new buildings or infrastructure projects. It will help you to demonstrate your BIM capability

through independent and impartial third party verification. The BSI Verification service for BIM has been developed for;

Tier 1 Main Contractor

(These are contractors and/or lead designers with a direct commercial relationship with the client)

Verification will require evidence of the main contractor's capability to adopt processes identified in PAS 1192-2.

Tier 2 Sub-contractors and suppliers

(These will typically have a direct contract with the Tier 1 main contractor.)

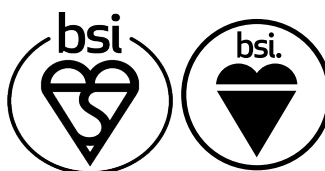
Verification for Tier 2 sub-contractors and suppliers offers evidence of the sub contractor's capability to work adopting processes identified in PAS 1192-2, in order to be eligible to supply the main contractor services as part of the supply chain for Level 2 BIM mandated projects.

Tier 3 or 4 Sub-contractors and suppliers

(This group includes specialist contractors, sub-contractors and suppliers working for sub contractors.)

Verification offers evidence of the Tier 3 sub contractor's capability to work adopting processes identified in PAS 1192-2, in order to be eligible to supply Tier 2 services as part of the supply chain for Level 2 BIM mandated projects.

BSI Kitemark™ for BIM Design and Construction

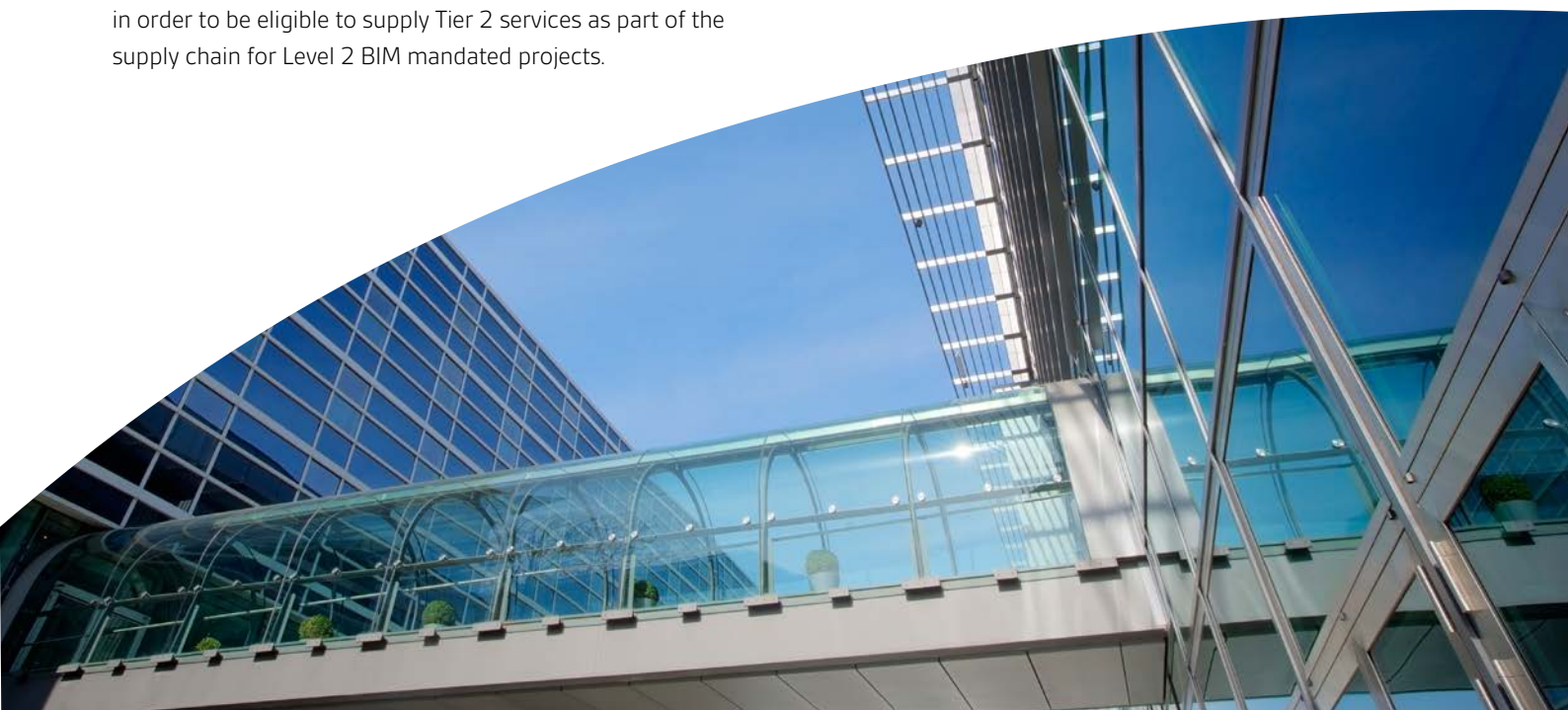


Developed for **Tier 1 Main Contractors** (Contractors with a direct commercial relationship with the client)

To achieve the BSI Kitemark evidence is required of the main contractor's capability to deliver projects in compliance with PAS 1192-2, incorporating BS 11000 Collaborative Business Relationships or ISO 9001 Quality Management systems and assessment of completed projects. Evidence will be required to show the ability to deliver efficiency savings to the client for future tenders.

Training

We've helped shape and develop many of the world's leading standards, and our expert knowledge is highly valued. Our BIM training courses are suitable for those involved in all tiers of the supply chain and who are required to show application of BIM Level 2. The courses will help you to understand the requirements of PAS 1192-2 so you can ensure they are effectively implemented by your organization.



Support from BSI

We have a range of services that can help you to optimize your use of Building Information Modelling and add value to your organization.

- **Standards and subscription services** through our portal <http://shop.bsigroup.com>, provides access to an enviable source of knowledge on standards and publications
- **Training** introduces you to standards and explains how to implement and audit against them
- **Independent certification and verification** proves you're compliant to your stakeholders
- We have a range of **Supply Chain Solutions** to help protect your suppliers performance
- **Business Improvement Software** powered by Entropy™ helps you effectively manage your systems and processes to drive performance.

Standards to support you

ISO 9001:2015 Quality Management System has recently been revised and can be used by organizations of all sizes to optimize business improvements, ensure customer satisfaction, and implement a process approach to ensure better collaboration and increase efficiency.

BS 11000-1:2010 Collaborative Business Relationships. This provides a framework for collaborative business relationships to help companies develop and manage their interactions with other stakeholders and the supply chain for maximum benefit to all.

ISO 55001:2014 Asset Management. If good asset management is critical to delivering your products and services, or if your business manages assets on behalf of other organizations then ISO 55001 is right for you.

ISO/IEC 27001:2013 Information Security Management. This can help ensure that data is safe and secure which can help manage the risks associated with the sharing of data which is part of BIM.

Supply Chain Solutions BSI offers a complete risk management suite to help manage global supply chain security.

Speak to one of our experts today or visit our website for more information.

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