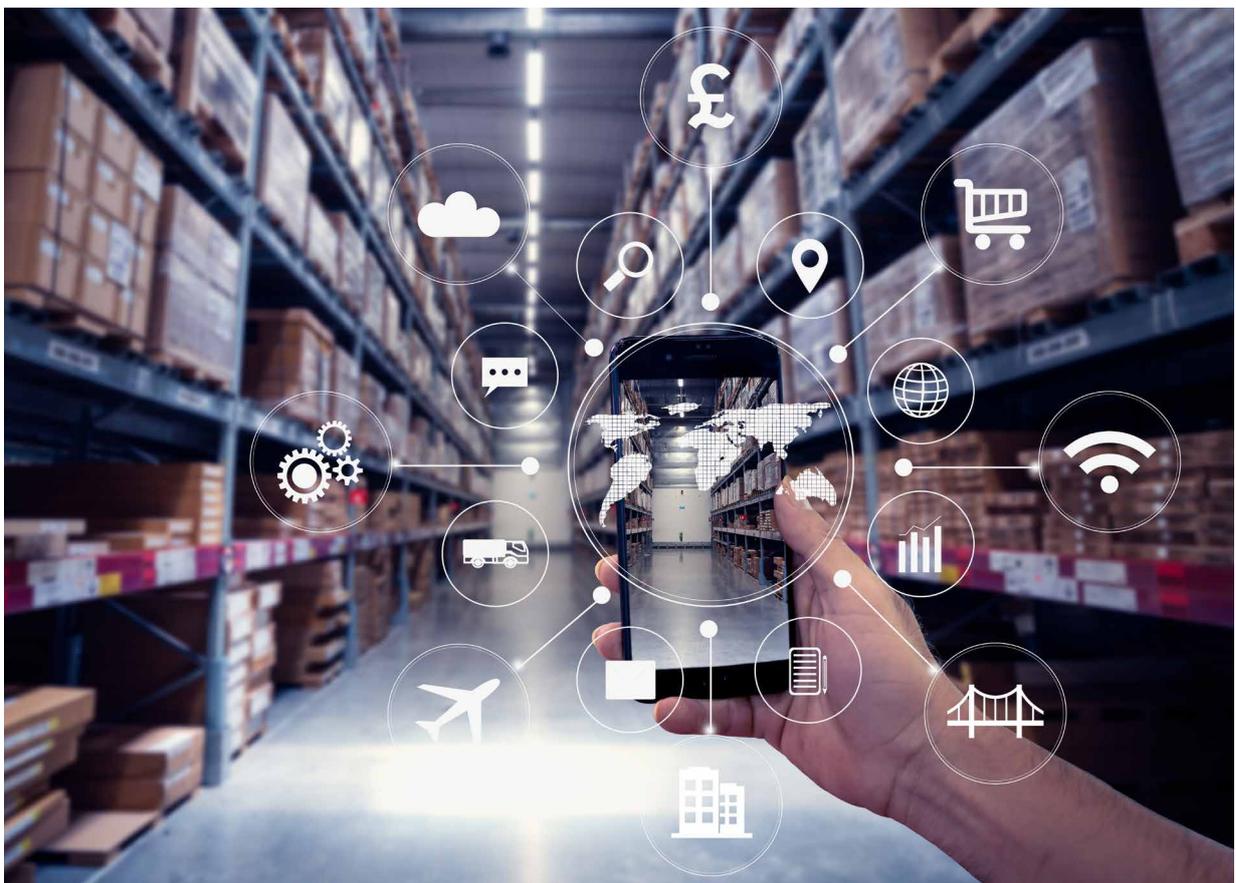


Digitisation for construction product manufacturers: a plain language guide

How manufacturers can structure and
share data safely and sustainably.

theiet.org/built-environment



Digitisation for construction product manufacturers: a plain language guide is published by the Institution of Engineering and Technology (IET).

Please note that the views expressed in this publication are not necessarily those of the IET. The guide only intends to identify the relevant issues and to inform a public policy debate around the topic, rather than to provide a definitive solution.

The IET Built Environment panel would welcome any comments you may have on the contents of this guide and your ideas for future publications. Please get in touch by emailing sep@theiet.org.



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1. About this guide



Manufacturers of construction products produce a significant part of the information required to bring about a safer construction industry, but currently, this information isn't structured or shared in a consistent way.

An ever broadening and more complex digital landscape, together with a plethora of solutions providers and a growing regulatory framework, is pushing the sector to act. However, it must do so intelligently, and with an understanding of both the risks and benefits of a future that's constantly evolving.

International context for this work is important, as products are sold across borders. Work in Europe is moving ahead at pace, from digital building logbooks¹ to unified frameworks for digital services². Harmonised, digitised product information will be essential for these initiatives to succeed.

If UK construction is to meet the challenges of a digital future and respond to the requirements of a new building safety regulatory system, it needs manufacturers to structure and share their data safely and sustainably.

There's no need to wait to digitise your product information. Making the correct changes now will bring immediate benefits to your business and a long-term competitive advantage. This guide will help you identify what those changes are.

This plain language guide has been produced to help decision-makers in manufacturing identify:

- **Why supplying structured data is important.**
- **How to avoid poor investment decisions.**
- **How to set priorities and implement information management.**
- **Safe ways to share this information about your products across the supply chain.**

This guide is independent and impartial, and free to access and use. While full of recommendations, the guidance doesn't promote a specific platform or service. Manufacturers can use this independent guidance to make their own commercial decisions, suitable for their own specific circumstances and markets.

¹ Definition of the digital building logbook - Publications Office of the EU (europa.eu).

² Building logbook state of play - Publications Office of the EU (europa.eu).



What are digitisation, digitalisation and digital transformation?

Digitisation is turning your analogue and disconnected data into connected, digital form. It's about connecting your sources of information so they can work for your business more efficiently and effectively. This guide is about digitisation.

Digitalisation is making this digitised information work for you in your existing business – benefiting from things like e-commerce, product tracking (object identifiers), or contributing to a digital twin, golden thread or building logbook.

Digital transformation is about creating new business applications for data – new business models. These include artificial intelligence (AI) powered predictive maintenance, 3D printing and custom manufacturing, Internet of things (IoT) or Platform Design for Manufacturing Assembly (DfMA)³.

Editorial board

The four-person editorial board were all members of the working group that wrote the UK BIM Alliance publication, A Fresh Way Forward for Product Data: State of the Nation in 2018⁴. That document set out the challenge for the whole industry, this one focuses on manufacturers.

In the autumn of 2020, the team produced a set of articles about key issues facing the industry and hosted a series of open Zoom conferences about each one. Hundreds of people attended these events and others met with us privately. We would like to thank all those who have contributed to this guide.



Su Butcher, Just Practising Limited

Su trained as an architect and managed three successful architects' practices during the '90s. She then set up her consultancy in 2011 and supports product manufacturers and trade associations to improve their online communications and implement digital strategies. Su chaired the UK BIM Alliance Product Data Working Group and is the project manager for BIM for Housing Associations.



Rick Hartwig, IET

Rick is the built environment lead at the IET and is responsible for thought leadership and policy. He first learnt of the importance of product data whilst coordinating an EU funded FP7 project CILECCTA, which developed a life cycle cost plus analysis tool. It worked in part as marketing product data was readily available. The challenge was environmental data, it was not available.



Patricia Massey, BEAMA

Patricia is digital and technology manager at BEAMA, the UK trade association for manufacturers and providers of energy infrastructure technologies and systems. She contributes to many areas of guidance, directive and standards development including the new data ISOs and standards relating to product testing, export, data, digital transformation and environmental challenges. She is a B/555 and CEN/TC442/WG4 member and a proud UK BIM Alliance Ambassador.



Paul Surin, IBM

Paul is a proactive and results driven digital disruptor in the construction industry with an exemplary track record working for manufacturers and tech companies alike. Currently global built environment lead at IBM, he also chairs the Construction Products Europe Digitalisation and BIM Task Group and has served as BSi expert (B/555 and IOT/001) at various CEN and ISO standardisation works. Paul is also a proud member of the IET Built Environment Panel and a chartered engineer.

³ Platform approach to design for manufacture and assembly - Designing Buildings Wiki.

⁴ UKBIMA A Fresh Way Forward For Product Data.pdf (ukbimalliance.org).

2. Recommendations

The challenge of restoring confidence in the construction sector is a complex one, but it needs to be achieved through simple steps. This plain language guide sets out a straightforward way in which construction product manufacturers can comply with regulations, demonstrate integrity and transparency, and help make buildings safer.

For manufacturers

Why should manufacturers implement digitisation? Because it makes sense for compliance, commercially and for the future.

Firstly, regulation is coming post-Grenfell and digital transparency will be key. It's only through this digital transparency that industry and society can differentiate between compliant and non-compliant manufacturers. Making structured information available to the supply chain is an essential step in this process.

However, there are other benefits beyond compliance. The commercial benefits are set out in the following pages, with more likely to come in the future. For example, zero-carbon initiatives will require traceability of products and evidence of conformance. Information will need to be presented to customers in a more structured form.

- **Read this guide.** This guide sets out a simple process to implement internal digitisation as a first step to compliance and commercial benefit. Section 3, Introduction and methodology, provides more context for this change.
- **Make a commercial decision.** Manufacturers can make commercial decisions about how to proceed in line with the standards to ensure compliance.
- **Work with your trade association.** Ask your trade association to support this work for your sector and talk to your fellow manufacturers. If you'd like us to talk to your trade association, please get in touch. Further details are available on page 36.

For the UK Government

Manufacturing represents 36.2% of all UK construction output and much of this work is carried out by small and medium enterprises (SMEs)⁵.

In a confusing landscape of siloed initiatives, construction manufacturers and SMEs, in particular, can find it difficult to engage and may lack expertise and resources. In an uncertain climate, they're also susceptible to being misled and making poor decisions.

With a strong record of digitisation and the commitment to a digital economy, the UK Government is in an ideal position to take the lead in encouraging manufacturers to digitise.

- **Understand the sector.** The current landscape of construction product manufacturing, while innovative and profitable, is also complex and messy. Understanding the nature of the sector will help the Government to support initiatives that manufacturers can implement. The Government should encourage those working on policy initiatives to engage with SMEs directly through their trade associations.
- **Support the digitisation agenda.** Manufacturers are the originators of much of the key data in construction and are therefore crucial to a digital construction economy. By taking a digital-first approach to its policy initiatives, regulation and guidance, UK Government can encourage manufacturers to digitise.
- **Communicate digitisation to manufacturers.** The Government needs to take the lead on communicating that digitisation is necessary, that it's easy to implement – even for SMEs – and set out in simple terms the ways in which manufacturers can do this.

3. Introduction and methodology

3.1 Avoiding failure: product data post Grenfell

The Grenfell tragedy shocked everyone and challenged us to think again about how our industry works.

Let's begin with a story, told two ways.

A data journey, version one

1

- A **building control** officer signed off a building based on reference to approved drawings. They didn't know a product had changed and had no way of telling there had been an incorrect specification or substitution.
- The **installer** worked according to approved drawings, but installed a different product. They'd relied on the distributor to supply what was suitable.
- The **distributor** supplied an alternative product. They checked for suitability against the contractor's order and believed it a suitable substitution based on the product's declared conformance.
- The **contractor** tendered for the project and chose materials based on previous experience, conversations with the product's sales team and distributor prices.
- The **salesperson** offered their product alternatives based on design and performance requirements. As far as they were aware, all the products they offered were suitable.
- The **architect** used the manufacturer's website to choose a suitable product and obtained approval for the design based on test certificates and building regulations.
- The **manufacturer's marketer** obtained the test certificate and placed it on the manufacturer's website. They weren't to know that the test certificate was out of date, fraudulent or obtained by deception.

Everyone in this story acted with integrity to the best of their ability, but there was still a fire and people still died. So, what was missing?

A data journey, version two

2

- The **manufacturer's marketer** places secure links to the test records and declarations of performance (DoP) for their products in their website. These are held on a secure, independent third-party website. All the product marketing material links to this source for evidence. The manufacturer's website provides secure information about compatibility, obsolescence, suitable alternatives and other performance-related information.
- The **architect** chooses a suitable product and obtains approval, checking against – and referencing – the independent source in their details.
- The **salesperson** wants to change the specification because they have a cheaper alternative. The architect, manufacturer and building control officer approve and amend the design, which is recorded.
- The **contractor** tenders for the project knowing their competitors won't be substituting products without an approved design change. This ensures compatibility and prevents undercutting by unsafe or inappropriate substitution.
- The **distributor** checks the product meets the specification and can offer alternatives with transparent approval back through the chain.
- The **installer** is confident that the correct product has been supplied and checks against the secure record. They install it according to the manufacturer's up-to-date instructions, making a record of the installation on the project log before covering it up.
- The **building control officer** signs off on the building as before, but this time, the product is correct and this can be verified.

All the actors in this second version are still behaving competently and with integrity. Essentially, they've carried out the same procedure, but this time the outcome is completely different. Why is that?

Since the Grenfell tragedy new legislation and government-supported initiatives are emerging that seek to prevent similar failures in the future.

To avoid tragedies like Grenfell, manufacturers – like all other actors in the supply chain – need the following four characteristics:



Integrity

The Construction Products Association (CPA) has drafted a *Code for Construction Product Information (CCPI)*, which aims to ensure the integrity of marketing information. A consultation on the code was carried out in Spring 2021 and the CPA intends to launch the CCPI in Q3 of 2021⁶.

Manufacturers will be invited to sign up to the code and declare that all information they provide about a product will be accurate, accessible, up-to-date, clear and unambiguous. The CPA argues that this will ensure that users can rely upon this information when making key decisions.

Story one shows that an unsafe building can still be produced even when all actors in the supply chain, including manufacturers, act with integrity.

While a code of conduct is to be welcomed as a declaration of integrity, it cannot of itself ensure safe buildings, and fraudulent misrepresentation cannot be prevented by adherence to such a code.

We published a response to the CCPI consultation, which is available on our website⁷. It shares our concerns that the code in its current draft form has confused the market and has the potential to cause harm⁸.

When you think about ensuring integrity in your business dealings, you also have to think about data integrity. Data integrity is the maintenance of, and the assurance of, data accuracy and consistency over its entire lifecycle. It is a critical aspect of the design, implementation, and usage of any system that stores, processes, or retrieves data⁹.

Individual people can act with personal integrity in their work, but they won't be able to be effective if they are not working with data that also has integrity.

The ideal place to encourage integrity and transparency is your trade association. We talk more about this in the section on how trade associations can help on page 35 of this guide.

Competence

Ensuring competence in construction professionals is a key initiative of the post-Hackitt reforms. A UK cross-industry competence steering group was established in 2018 by the Construction Industry Council (CIC) and has produced two reports: *Raising the Bar* in August 2019¹⁰, and *Setting the Bar* in October 2020¹¹.

The new Building Safety Regulator will include a national suite of competence standards, which are being developed by the British Standards Institution (BSI)¹² and arrangements for assessment and governance.

Story one shows that competence isn't a silver bullet. Competence is irrelevant where there is a lack of integrity. Where there is no clear, guaranteed and unadulterated information to work with, it doesn't matter how competent you are.

Nevertheless, manufacturers should monitor this emerging requirement for competency. How will it be met? How will it be enforced? Will it be effective? What competency is required to install your products?

Compliance

At the core of the Building Safety Bill is the Building Safety Regulator, who will oversee a rigorous new regulatory regime for the design, construction and occupation of higher-risk buildings¹³.

⁶ Homepage - Building Safely.

⁷ Code For Construction Product Information (CCPI): IET Responds To The Consultation - IET Engineering Communities (theiet.org).

⁸ The Code for Construction Product Information (theiet.org).

⁹ Data Integrity Definition (en.wikipedia.org).

¹⁰ Raising the Bar - Construction Industry Council - Construction and fire industries set out sweeping proposals (cic.org.uk).

¹¹ Setting the Bar - Construction Industry Council - Built environment and fire industries set out blueprint (cic.org.uk).

¹² Built Environment Competence Standards | BSI (bsigroup.com).

¹³ It is worth noting that the scope of 'higher-risk buildings' may change. The current definition is set out in the factsheet "Buildings included in the new more stringent regulatory regime" published on 05 July which confirms that the scope of the new regime could change in the future. "Guidance: Buildings included in the new more stringent regulatory regime: factsheet" – GOV.UK (www.gov.uk).

The regulator will have three main functions:¹⁴

- To oversee the safety and standard of all buildings.
- To directly assure the safety of higher-risk buildings.
- To improve the competence of people responsible for managing and overseeing building work.

The regulator will have teeth, too. The Bill will create new civil penalties and criminal offences for breaches, and the regime will have enforcement powers.

In January 2021 the UK Government announced¹⁵ that alongside the Building Safety Regulator, there will be a Regulator for Construction Products, housed within the Office for Product Safety and Standards. The Government also commissioned an independent review into the current testing regime in April 2021¹⁶.

A robust regulatory system is a crucial part of the effective control of safety in buildings. However, it will only be effective if it also relies upon clear, accurate and unambiguous information and professionals' abilities to implement its requirements.

Information

The importance of information is at the core of the post-Grenfell reforms. One example of this is the concept of the golden thread.

*The Explanatory Notes to the Draft Building Safety Bill*¹⁷, published by the Ministry of Housing Communities and Local Government (MHCLG) on 20 July 2020, defined the golden thread of information as:

"Fire and structural safety building information held digitally to specific standards. These standards will include requirements around robust information management and keeping the information up to date. The golden thread will ensure that those responsible for the building have the required information to manage building safety during and throughout the lifecycle of the building."

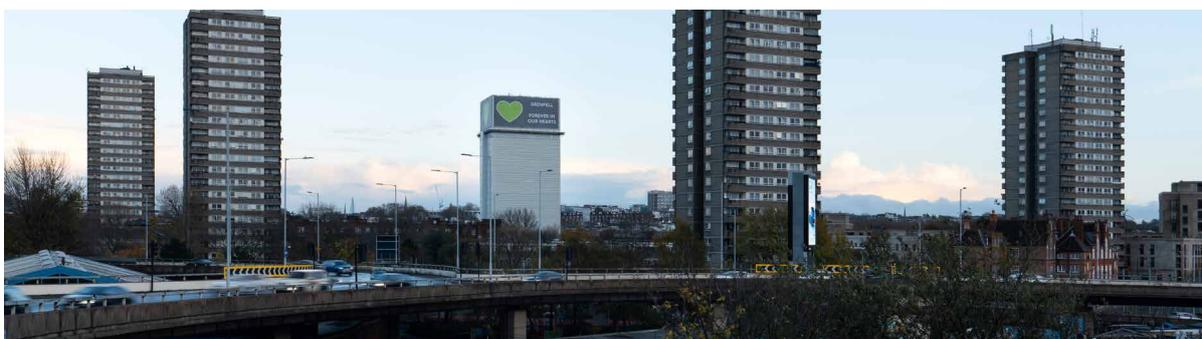
An updated version of the Building Safety Bill was published on 05 July 2021¹⁸ and on 21 July 2021 the MHCLG Building Regulations Advisory Committee published a golden thread report¹⁹ setting out the definition and principles of the golden thread and how digital standards will underpin it. Part 4 of the Golden Thread Definition states:

"4. The golden thread information should be stored as structured digital information. It will be stored, managed, maintained and retained in line with the golden thread principles... The government will specify digital standards which will provide guidance on how the principles can be met."

The new golden thread – an accurate and up-to-date record of the building data – will be required to be digitally traceable. This means that information about products will have to be digitised and manufacturers will have a legal requirement to comply.

If manufacturers don't digitise their product information, they won't be regulatorily compliant. As digitised information becomes a requirement for the golden thread it will also become the standard in construction, including from the early stages of any development.

The key to an effective golden thread is data that's structured, secure, verifiable and interoperable so that it can survive the process and be accessed with confidence.



¹⁴ Explained: The Draft Building Safety Bill - GOV.UK (www.gov.uk).

¹⁵ New regulator established to ensure construction materials are safe - GOV.UK (www.gov.uk).

¹⁶ Independent Review of the Construction Products Testing Regime - GOV.UK (www.gov.uk).

¹⁷ Draft Building Safety Bill PART 2.pdf (publishing.service.gov.uk).

¹⁸ Building Safety Bill, 5 July 2021 – GOV.UK (www.gov.uk).

¹⁹ Building Regulations Advisory Committee: golden thread report – GOV.UK (www.gov.uk).

How should product data be organised?

- **Structured.** Organised according to a predefined schema, data becomes machine readable and easy to analyse.
- **Secure.** Only available to those who are authorised to view it yet available in an emergency.
- **Verified.** Confirmed to be accurate by being traced back to the source.
- **Interoperable.** Able to be transferred accurately between software platforms, such as those used by different actors in the supply chain.
- **Dynamic.** To be effective some data needs to be dynamic, not static, that is regularly updated so that it remains live, accurate and relevant to its users.²⁰

Structure your data

As the regulatory environment evolves over the coming years, manufacturers can prepare for compliance in a way that not only makes buildings safer, but that's also more efficient for them to execute.

The integrity of their information is secured to the benefit of not only themselves but also the whole supply chain. Structured data is at the core of this process.²¹



3.2 Benefits to manufacturers of structured data

In 2020, IBM carried out an analysis for a major UK construction product manufacturer prior to a programme of digitisation. The following statistics are from an unpublished internal IBM study. The benefits forecast 12 months after its implementation was a 1.56% increase in turnover and a predicted further increase in sales of 6-7% over the following three to five years.

While the actual cost benefits to a manufacturer will vary according to size and other circumstances, the study shows the range of ways in which digitisation can benefit a manufacturers' business.

The manufacturer's benefits can be segmented into three areas:

Increased revenue and margins 66%

Reduced costs 23%

Brand improvement 11%

²⁰ Dynamic Data - Wikipedia.

²¹ An earlier, more detailed version of this article can be found on the blog: Avoiding Failure: Product Data Post Grenfell - IET Engineering Communities (theiet.org).

Increased revenue and margins

A manufacturer providing structured product data is more profitable.

Improved trading margin

21% of total saving

Structured data helps manufacturers improve promotional targeting of different offers and supports volume selling, better brand messaging and positioning. It also reduces exposure to less profitable customers and consumers. The study estimated 0.3% trading margin improvements to the company's core products.

Gain market share over competitors

15% of total saving

A structured data approach enables better and more proactive sales management, improved campaign processes and responses, improved targeting and increased revenue per customer. More efficient digital marketing – 10% of total saving - and e-commerce make products more accessible and automated processes more efficient. Online interoperable tools support the specifier and customer and enable cross-selling.

Get involved earlier in projects

10% of total saving

Digitising product data helps businesses move to a solutions-based delivery option, focused on systems and technical support. This positions the manufacturer earlier in the design process, delivering concept solutions rather than competing on price at a value engineering stage. Information requests come earlier, as does the opportunity to contribute to design and value discussions.

A more holistic approach to value

5% of total saving

Market intelligence from structured data informs product development, improves customer service and increases repeat business. Sales are enabled to discuss products and systems from the lifecycle and environmental point of view, and improved product choice reduces servicing and warranty costs. Making environmental data available contributes to environmental impact calculations, lifecycle value and circularity.

Faster product launches

4% of total saving

Market intelligence informs research and development, optimising product development and identifying new opportunities to reduce costs. The availability of structured data provides a quicker route to market for products, extending the number of selling days.

Improved reach and conversions

1% of total saving

When manufacturers understand which features drive sales, they can sell more products. Better and more complete product information improves the effective reach of campaigns, increases conversion rates for leads and improves the pipeline.



Reduced costs

A manufacturer working with structured data is more efficient.

Improved productivity

15% of total saving

Compared to manual methods, updating property values for products in a single source results in at least 50% time saving. Sharing data to third-party data pools accurately and automatically provides additional savings as well as ensuring consistency.

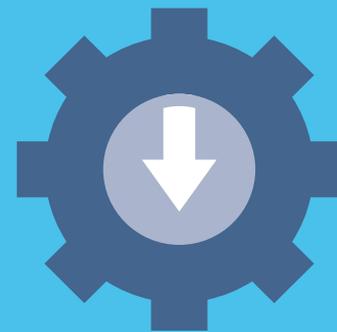
Reduced marketing and selling costs

8% of total saving

Structured data reduces the cost of lead generation and improves campaign targeting and visibility – and consequently market effectiveness. Better data control reduces reputational risk and sales channels become more efficient with reduced churn. Spend less time communicating about your products while improving results. Provide information more quickly, more accurately and with integrity.

More efficient:

23%
of savings from
reduced costs



Improved
productivity

15%

Reduced marketing
and selling costs

8%



Brand improvement

A manufacturer supplying accurate, structured data is perceived as stable and reliable.

Reduced returns, fines and chargebacks

5% of total saving

Tracking products through the supply chain provides many benefits alongside removing the cost of errors. Direct customer feedback is improved and actors are more knowledgeable and confident about products. This fosters a better relationship with the supply chain, right through to the end user.

Improved pipeline

4% of total saving

A smoother flow of sales, marketing and technical information reduces silos within the business, improving decision-making. Supporting the flow of information enables manufacturers to become market disruptors, developing new products or processes and driving change in the market.

Improved data quality and consistency

3% of total saving

A single source of structured data is more accurate and consistent. It supports the customer, the company and senior management.

Safety and regulatory benefits

When this exercise was undertaken, the emerging legislative landscape wasn't clear, but these changes offer other benefits to manufacturers.

Structured data will enable manufacturers to provide information reliably and with confidence to all actors in the golden thread, including the duty holder and the accountable person at gateways two and three, as set out in the Building Safety Bill (2021).

Manufacturers can also comply with existing and emerging standards around digital construction more efficiently and with greater accuracy. Good digital management becomes a company-wide culture that benefits everyone.

What are gateways?

The Building Safety Bill sets out how duty holders will be required to show that they are managing risks at new gateway points before they can continue with the different stages of the building process.

These are:

Gateway 1: Before Planning permission can be given.

Gateway 2: Before construction can commence.

Gateway 3: Before anyone can move into the building.

Plans for Gateway 1 were introduced on 10 May 2021.²²

Stable and reliable:

11%

of savings from brand improvement



Reduced returns, fines and chargebacks

5%

Improved pipeline

4%

Improved data quality and consistency

3%

²² Building safety: planning gateway one – GOV.UK (www.gov.uk).

3.3 Why is product data important?

Types of product data

Below are some examples of the wide range of data generated around products. Some will be required for design, construction or operation, some only internally.

Structuring data will improve efficiencies in your business and protect you against error, misunderstanding and prosecution.

When products are made for construction projects, a vast amount of data about them is created within your organisation. The box below illustrates an example of the range of this information.

Some of this data is needed for the manufacturing process, some for design, construction, operation and end-of-life disposal. However, getting the information needed about construction products isn't easy for designers, contractors, building owners or demolition operatives.

The way that product data is managed in construction creates huge risks in the supply chain, but also for the manufacturer.

The 2018 report *A Fresh Way Forward for Product Data: State of the Nation*²³ set out some of these problems. It identified how information doesn't pass smoothly between the manufacture, design, construction and operation stages.

For example, a designer looking for information about a product can't know for certain that what they're looking at is current, or accurate. This creates risk.

If the product information created were to be made secure, verifiable and interoperable, the designer/contractor/building owner wouldn't have to guess. They could access accurate information about available products all the time, with confidence. As a manufacturer, you wouldn't have to provide more information than you already do, but you could do it accurately and efficiently.

In this guide we set out how your company can take the first steps to address this.

Data	Information
Manufacturing data	The information that's required to make the product, such as bills of materials (the ingredients), the manufacturing process and information about tolerances.
Dimensional data	Information about product length, width, volume, capacity etc.
Performance data	Information on test standards, environmental performance (including certification), hazardous materials data, and also data on compatibility. For example, which other products it's compatible with, and can or should be used with.
Sustainability data	Information on how the company is performing in terms of its own or government targets, but also information that users of products will want to have about your ethical and environmental, sustainability and governance (ESG) procedures.
Cost data	Information about procurement and purchasing.
Logistics data	Information about storage, warehousing and materials handling, packaging and unitisation, inventory, transport and control information to enable the product to be supplied and delivered.
Identification data	Information to identify the product and relate it back to specific information about that product, such as globally unique identifier (GUID) barcodes and other unique product identifiers. There can be identifiers that specify the exact type of product or the individual product itself – identifying where and when it was made for example.
Maintenance data	Information identifying how often the product needs to be maintained, how it's maintained, when it was last maintained and details regarding replacement parts.



Information and data

Data is the raw information. When it's properly structured, it becomes machine readable and interoperable. Data can't usually be easily interpreted by a human, it needs to be processed.

Information is data that's been refined and processed so that a human can read, understand and use it.

Structured data has been defined and organised in such a manner that it's searchable, immediately identifiable and machine readable within an electronic file. It must be:

- Defined in a standardised way, for example, identified by naming conventions.
- Presented in a standardised format.
- Transferrable and translatable between users of the data and their software choices.

Why does structured data matter?

In the past, it was acceptable to provide unconnected information without an audit trail, but to meet the needs of modern construction, this is no longer the case. Structuring data will enable a manufacturer to meet the needs of the post-Grenfell environment, but it also reduces risk and improves customer relationships.

Data sources are unconnected

You will probably be holding data about products in several different, unconnected places such as spreadsheets, databases, SAP/ERP, accountancy programs and manufacturing records. One manufacturer we worked with had over 100 different places where they stored product information.

If sources are interlinked, they create a single source of truth about your construction products. Because there is a single source, you can't make mistakes and risk is reduced.

As structured data requirements increase post-Grenfell and become part of the new building safety regulatory regime, structuring and connecting your product data becomes even more attractive and beneficial.

Traditional method	Risk	Modern method	Benefit
Website product database updated manually.	Time consuming and error laden.	Website fed directly from company PIM through API ²⁴ .	Always the latest information for the customer increased productivity.
Sample request emailed, printed out and actioned.	Lost requests, no link to CRM ²⁴ system and no follow up.	Sample request handled through connected CRM and product databases.	Business intelligence, handling efficiencies, better customer service, and repeat business.
Certificate emailed from Salesperson's computer.	Wrong certificate provided (out of date).	Certificate downloaded from the verified website with change history.	Reduced risk of error, fines or prosecution.

²⁴ PIM: Product Information Management. API: Application Programming Interface. CRM: Customer Relationship Management. See Acronyms section on page 38 for definitions.

3.4 The role of standards

The minimum common specifications, methods and procedures which should be used for construction products are defined by standards.

Standards create a level playing field for all; a benchmark that all companies can adhere to. By complying with British, European and international standards, manufacturers can demonstrate that the industry can specify, buy and sell their products with confidence in those markets.

For example:

- **Production.** A manufacturer makes a product.
- **Testing.** The product is tested in an accredited laboratory to ensure it conforms to relevant product standards (for example BS 1363 plugs and sockets). This means the manufacturer can place the product on the UK market with a UKCA mark.
- **Specification.** When designers and contractors create or modify a building in the UK, they must comply with building regulations²⁵. By specifying compliance with national and international voluntary standards and by following guidance in the Approved Documents, designers or contractors can more easily demonstrate compliance with the building regs.
- **In the EU.** If the product is also tested to comply with a harmonised standard (at EU/regional level), this produces a declaration of performance (DoP)²⁶, or where applicable, a declaration of conformity (DoC). These declarations mean the manufacturer assumes legal responsibility that the product complies with the harmonised standard across several countries. Once this has happened the manufacturer can CE Mark the product and market it in the EU, in accordance with the *Construction Product Regulation (CPR)*²⁷.

Certification and confidence

When a product has been tested, a manufacturer can make a self-declaration about the product's performance or apply for additional third-party certification for environmental or other performance by another body such as the British Board of Agrément (BBA), Building Research Establishment Environmental Assessment Method (BREEAM) or National House Building Council (NHBC).

These certifications give specifiers, contractors and clients confidence in choosing your products, and can also help them comply with funding applications for example.

Connecting products and standards

The problem of disconnect between products and standards was recently revealed during the Grenfell inquiry but has been with us for some time.

- **Incorrect product choice.** While a specifier may require certified performance when choosing a safety-critical product in a new building, if the product later in life needs replacing, those working on the substitution will need that performance information to avoid inappropriate substitution and potential loss of life.
- **Inadequate maintenance.** Adequate maintenance of installations is essential for many products and systems and is often set out in standards. However, this information doesn't always transfer through the development of a built asset to its operational staff.

While manufacturers make a great deal of effort to comply with strict and often complex standards about their products, there's no continual connection between products and the standards they meet, with a reliable governance system that would give users confidence. Instead, they have to rely on unverifiable information and can fall prey to unsubstantiated, untestable marketing claims.

If manufacturers were required to connect product compliance information in a way that was verifiable throughout its life, there would be significant improvements in safety, which would benefit everyone.

How can interoperable product data help?

Two international standards have been developed to help with product selection and standards compliance. These are *ISO 23386:2020* and *ISO 23387:2020* and are described in section 4.3, How to approach standards on page 31.

These ISOs and their accompanying UK specifications will make the test standards transparent. The information about how a product must conform and perform, what the constraints are for its use and more, can be securely accessed throughout its life.



²⁵ Guidance provided by the Approved Documents - GOV.UK (www.gov.uk).

²⁶ Declaration of Performance (DoP) and CE marking | Internal Market, Industry, Entrepreneurship and SMEs (europa.eu).

²⁷ Construction Products Regulation (CPR) | Internal Market, Industry, Entrepreneurship and SMEs (europa.eu).



How could standards be connected to products?

Standards and construction products could be connected using the following elements:

- **Digitised product information** would be produced using the two new ISOs to ensure the information is genuinely interoperable.
- This information would include **test standards** and **compliance information**, such as a DoP, together with other useful information such as maintenance, compatible products and so on.
- A **governance process** would require the standards information to be provided. Only one data template could be produced per product and all manufacturers would be required to use it.
- The compliance information would be accessible through unique **digital identifiers** on the product itself, which would enable anyone to access this information when required.

This process would primarily require that the information provided would be genuinely interoperable.

In an increasingly transparent world, traceability is becoming more and more important. Construction products should be traceable too.

Digital object identifiers (DOIs) are already being used by some manufacturers, such as SmartCE Marking in the EU only, QR codes and GS1²⁸, but the information isn't currently used to its full potential.

²⁸ Digital object identifier - Wikipedia; Smart CE marking concept: Construction Products Europe AISBL (construction-products.eu); Homepage | GS1.

3.5 Comparing construction products: dispelling the myths

Product comparison is an essential part of the specification process, yet construction manufacturers can seem reluctant for their products to be compared with those of their competitors. Why is that?

If you want to ensure your products can only be used in situations where they're compatible, the first step is to digitise your product data and make it available for product comparison. This makes sense from a safety point of view but is also profitable. Read an article expanding on these ideas on our blog post *Comparing Construction Products: Dispelling The Myths*³¹.

Myth number one – specifiers don't want to compare products

Myth. Specifiers are creatures of habit: they're busy and time is tight. If you can stick with the brand you know, why change things?

Fact. Sooner or later products change, become obsolete or unavailable, aren't suitable for the project or a cheaper alternative becomes available. Specifiers need accurate, up-to-date information or they'll make mistakes.

Myth number two – product comparison is about relationships

Myth. Traditionally the relationship between manufacturer and specifier has been a very human one. Numerous recent surveys show that websites, including those of manufacturers, are increasingly important sources of information²⁹.

Fact. Human contact is important, but not always necessary. As buildings become more complex and regulated, standardised digital data exchange will be the interaction process of choice. We need to prepare for that.

Myth number three – it's difficult to genuinely compare construction products

Myth. Some may feel that comparison of construction products is difficult or impossible, particularly when it comes to price, which varies, or sustainability characteristics, which can be oversimplified.

Fact. Comparison can be secure, verified and reliable. If information is provided directly by, and sourced back to, the manufacturer, they can own their statements and comparison can occur with confidence.

Myth number four – e-commerce means comparison by price

Myth. Many manufacturers think of Amazon as a classic example of an e-commerce platform. However, Amazon is heavily cost-biased because it's a commodifier.

Fact. Specifiers aren't only cost motivated; they need reliable information to make other choices. To truly compare products, we need to provide a breadth of credible attributes.

²⁹ Construction Product Information Survey (constructionproducts.org.uk) – 41% of respondents had seen product substitution on at least a quarter of their projects in the previous year. The same survey is littered with quotations from specifiers describing how difficult it is to get accurate information that they can compare. Respondents gave manufacturers websites as the second most important source of information, after technical literature. 3 Traits of Modern Specifiers to Consider in Your Building Product Marketing | LinkedIn - In 2017 SpecifiedBy surveyed over 800 respondents and 98% said they look for products online.

Myth number five – there's no protection against illegal imports of construction products

Myth. The concern about fake products and CE marks may lead to thinking that you can't protect a market from illegal imports. However, a properly digitised construction product sector is possible and has already been achieved in logistics³⁰.

Fact. Transparency of manufacturers' product data is a key component to protect the supply and distribution chain. It might not prevent illegal imports, but will help identify them for what they are.

Myth number six – we can't control our brand's online presence

Myth. Controlling the use of your brand online has become an ongoing war of attrition and enforcement bodies can't police this battlefield.

Fact. Secure, digitised and interoperable product information is the only way to protect against misuse of your brand. It can expose fake products, track breaches in the supply chain, reassure the specifier and prevent unauthorised substitution.

Myth number seven – supplying product information to platforms is expensive

Myth. Supplying product information to platforms in a manual fashion is expensive and risks errors.

Fact. You already have the product information, you just need to structure it into one set of connected, secure information. After that, providing it in a secure, accurate and updateable digital form through API is simple.

Read an article expanding on these ideas on our blog post [Comparing construction products: dispelling the myths](#)³¹.

3.6 Manufacturers should host their own product data

Who should own your product data?
Who should control it?

Product data is an asset

Construction product data, the information about your products, is an asset of huge value to everyone in the supply chain. In 2017, data surpassed oil as the world's most valuable resource³².

- **Data has value to the manufacturer.** It can help you provide the right product for the right job, manage risk, reduce returns and waste, and decrease calls to your technical support.
- **Data has value to the users of your products.** If you implement healthy processes, you will derive functional benefits, and suppliers, vendors, designers, contractors and asset owners can work collaboratively with a single, reliable source of information.

The physical assets of your stock, materials, buildings and equipment are matched by the digital assets of your data, not just about your products but where they are, how they're used and who by.

People are competing to control your product data

The market for data has fuelled the development of organisations whose business model is managing your data and making it available to others in the supply chain.

Traditionally these companies offered this information through print product catalogues, then software platforms and now cloud-based services. As the built environment and its needs become more complex and demands more stringent, new services are springing up which promise a one-stop-shop for distributors, architects etc.

³⁰ About TradeLens | TradeLens - In the logistics industry, TradeLens provides an instant record of what is in a shipping container throughout its journey, protected by a permissioning model encrypted by Blockchain.

³¹ Comparing Construction Products: Dispelling The Myths - IET Engineering Communities (theiet.org).

³² The world's most valuable resource is no longer oil, but data | The Economist.

³³ Digital influencers - An exploratory study of the organisations contributing to the digitalisation effort in Europe - In 2017 Construction Products Europe analysed the third-party data services supporting European product companies and concluded there were 400 different services in operation. Four years later there will be many more making the case for standardisation and digitisation of product information to make sharing of information affordable for manufacturers.

³⁴ What is an API? - YouTube - a short video explaining the principles behind an API.

Whoever controls your data and collects the information about how it's used also controls the asset and can make you pay to manage it.

Risks of using third-party data services

If you choose a third-party service to manage and control your product data separately from your own data systems, there are a number of potential risks.

- **Walled gardens.** If the information you provide isn't updated in real-time against the information in your own systems, the user can't have confidence in its accuracy. This was one of the problems with the development of BIM objects.
- **Limited understanding.** If the service provider manages their data needs based on a particular audience, they may be unaware of the data needs of those further up and down the supply chain.
- **Lacking interoperability.** If the data framework isn't compliant with data standards, then connecting the data through the supply chain isn't possible.
- **Disproportionate cost.** If the service provider operates outmoded pricing models, charging you for populating the space or providing promotional services that restrict genuine comparison, the cost can become prohibitive and data sets will be partial as manufacturers can't efficiently service all the platforms.

The cost of servicing multiple platforms can become prohibitive. In 2017, Construction Products Europe analysed third-party data services supporting European product companies and concluded there were nearly 400 different services in operation³³.

However, if manufacturers could provide their data in a structured, interoperable way to any service of their choosing, there shouldn't be an additional cost to the manufacturer in supplying various different services.

Paying for API integrations

After you purchase an app, it's the app owner who pays for the cost of updating their apps on your smartphone, and it's their responsibility to ensure the update works for all users, without them being charged extra.

The same should apply for data services, but some data services in construction use a business model that charges product manufacturers to integrate into the data service's API (equivalent to using their app), including charging consultancy.

If both parties use harmonised standards, surely developing integrations should be paid for by the data service?

All the above challenges increase the risk of inflated costs with no return on investment (ROI) when disconnected data becomes, in effect, dead and

useless. Meanwhile, the emergence of new players and the adaptation of old players into this data market is a potential, yet completely unnecessary, money sink for manufacturers.

What is an API?

An application programming interface (API) is a mechanism that enables controlled data transmission between one software product and another. Used throughout the internet, APIs set up rules and automate the process of data control and sharing³⁴.

Control your data: control your risk

If as a manufacturer you can own and control your own interoperable and machine-readable data model, several things happen.

- Each actor in the supply chain can choose what subset of data it needs.
- You can provide data to third parties (such as a distributor or media company) who can publish it to others, while you only pay for the display, keeping control of the source data. If you provide the information via an API and the publisher provides the integration, this process can be automated to connect with your own systems in real time, removing waste and reducing errors to a minimum.
- These third-party publishers can compete for your data, using metadata to add value and prove the return on investment of their service. For example, information on what products are most seen, what properties are most compared, and information about audience relationship with your products.
- If the publisher is monetising your data by collecting this metadata for example, they should pay you a commission.
- Because you own the data, you can secure and keep it verified and interoperable, demonstrating your credibility by providing a direct link back to your maintenance instructions, conformity certificates and information about lead times or replacement products.

The imminent arrival of the Building Safety Regulator, who will require building owners/operators to evidence safe construction, will require a much more joined-up process. Owning and controlling your own interoperable and machine-readable data model will place your company in a good position to respond to this need.

Read our guidance on working with third parties on page 32.

3.7 The future of construction is not 3D BIM objects

Did your company commission proprietary 3D building information modelling (BIM) objects in the last five years? How did that turn out? This chapter looks at how 3D BIM objects became a very expensive failure for manufacturers and what we can learn from the process.

You might be under the impression that:

- "Being in the BIM model" means you are tied into the specification.
- Commissioning 3D BIM objects is all that manufacturers need to do about digital.
- If you have 3D BIM objects you are BIM ready.
- Manufacturers without 3D BIM objects won't be specified on projects.

None of these above statements are true.

A BIM object is a 3D digital representation of a construction product, material or system, with associated data attached. Over the years BIM for manufacturers became synonymous with 3D, and 3D BIM objects became the be-all and end-all of BIM.

They weren't. This is what happened.

Aggressive selling

The misconception that BIM was 3D was fuelled by a rapid and aggressively targeted campaign by several BIM library businesses (who make and host 3D BIM objects). This told manufacturers that having 3D BIM objects, or even multiple objects representing various systems and use of their products, was essential to operating in the new construction world.

Manufacturers were told that whereas before being in the spec was the thing, now you had to be in the model and BIM compliant.

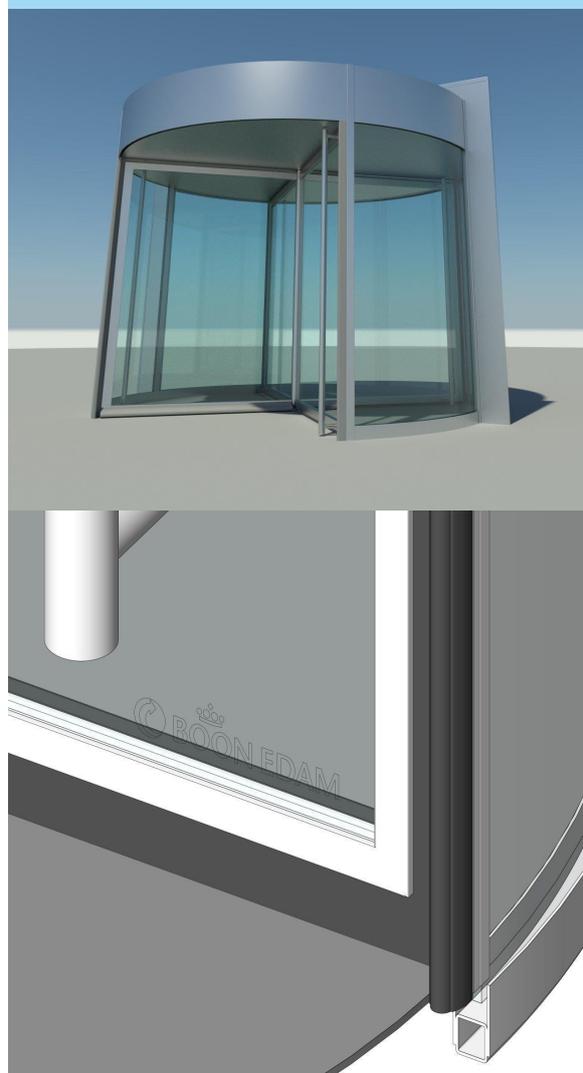
Marketing, not data management

Many manufacturers saw BIM as a marketing opportunity, not a data challenge. They diverted part of their marketing budgets, rather than data management budgets, to pay for it. 3D BIM objects have a tangible attraction in themselves, and many were produced for their aesthetic appearance rather than for the data they held.

This resulted in huge, overly intricate 3D BIM objects being created. These aren't created to hold necessary data, but to market the concept to architects who are perceived to like 3D renders. The objects' size and geometric complexity were totally unnecessary and could even cause designers' models to crash.

Beautifully rendered 3D representations of products are appropriate for catalogues and architectural renders, but not for models of complex buildings in BIM. These are information models, not architectural renders, and objects with large wasteful file sizes just make them heavy and unstable. BIM software tools like Revit weren't developed to produce 3D renders; they contain more than geometric data and there are other, better tools for rendering.

In 2012 Dave Light reviewed the new Boon Edam BIM objects for his blog. He was concerned about the level of detail and size of the families. The objects appear to have a manufacturing level of detail entirely unsuited to a model of an entire building, except for rendering purposes³⁵.



The phenomenon of over-rendered BIM objects continues to this day.³⁶

³⁵ Revit: boonedam - BIM objects (autodesk-revit.blogspot.com).

³⁶ Here is an example from May 2021: Robin Deurloo on Twitter: "Hey #MEP people out there. Do we really need the safety instructions modeled on the side of this pump?".

Paying for multiple formats and classifications which are not comparable

Manufacturers believed that they had to produce objects in several formats. Revit, ArchiCAD and IFC were the common ones, even though IFC is not a format or a software application, but actually a standard for data exchange.

Many manufacturers paid third-party providers to produce these different versions, each with associated product attribute data attached to geometry in the appropriate format.

Larger manufacturers who used several different third parties (not always by their own choice) for their BIM object providers discovered that when comparing objects from different providers, their data was organised in a different way with the same attributes given different names. This meant that specifiers wouldn't even be able to compare identical products produced by different BIM object providers. Some of these providers were mandated by contractors as a condition of a commercial relationship.

Part of the reason for the mistakes outlined above was that the standards *EN ISO 23386* and *EN ISO 23387* weren't there to create a single digital data language. The result was that manufacturers were paying for various complex versions of one product at huge expense.

Industry Foundation Classes (IFC)

IFC is a standardised schema for data exchange, allowing information to be extracted from the model at a particular time and used for other purposes, such as asset management, cost or energy calculations.

It's an open, international standard (*ISO 16739-1:2018*³⁷) and promotes vendor-neutral, usable capabilities across a wide range of hardware devices, software platforms and interfaces for many different use cases³⁸.

Being in the model isn't being in the spec

So how did this situation affect designers? Did it mean that once you had made your objects, you were 'in the spec'? No, it didn't.

With the focus on 3D objects rather than data, the emphasis was primarily on geometry and coordination. Designers were encouraged to seek out 3D objects from a variety of third-party providers.

The problem for a designer is that they may be making a model early in the process before detailed product decisions are made. A designer may therefore use products (and their BIM objects) that they have used before, but only as a placeholder for later replacement. The requirement for placeholders led to the emergence of generic, non-specific to a manufacturer, BIM objects.

The specification for a project often develops outside the 3D model, where designers can begin with performance specifications rather than specific products. Depending on procurement processes, the choice of actual products may happen very late in the process, and rather than being fixed in the model, is still subject to change.

Meanwhile, the model contains a mixture of proprietary and generic objects that may not be aligned with the emerging specification, with some adding considerably to file size.

More importantly, the objects could be embedded with incorrect information that may not align with defined project requirements or the emerging specification. Updating that information is time consuming and difficult.

This dilemma was set out in the 2018 report, *A Fresh Way Forward for Product Data: State of the Nation*,³⁹ which argued that:

"Embedding data in objects means updating data is difficult once it is placed in a model, particularly with so many sources of objects on the market. For large projects, objects may exist in a model for several years and products may have changed through that timescale, making the information unreliable."

An expensive mistake we can learn from

A great deal of money has been, and in some cases, still is being wasted producing 3D objects that are unnecessary, overly complex and don't even go in the model.

This is embarrassing for people who were mis-sold BIM objects, and it's difficult to admit such a mistake. But we mustn't blame the actors in this game – they were misinformed or misunderstood. Perhaps we all were.

There's a reason why the rear-view mirror is so small, and the windscreen so big. Where we are heading is so much more important than what we need to leave behind. The landscape is changing, and it's important that manufacturers know they don't need to make 3D objects to provide for a transition to BIM.

³⁷ ISO - ISO 16739-1:2018 - Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries — Part 1: Data schema.

³⁸ Industry Foundation Classes (IFC) - buildingSMART International.

³⁹ A Fresh Way Forward for Product Data – UK BIM Alliance.

The challenge we face is not unique, it's mirrored in other industries. The videotape format war between Betamax and VHS videocassette formats in the 1970s and 80s is an example. Betamax was considered a higher quality format, but VHS was cheaper, simpler and did the job the market required. It would be great to have a completely integrated 3D modelled BIM world, but what we have is a series of little BIMs for different purposes, with 3D when it's required.

Many products don't even have a reason for proprietary geometry. For example, with insulation, plasterboard or paint, the difference is in the performance attributes, not in the geometry.

The emphasis on 3D modelling has neglected the real value – that of data itself. Leaders in the drive to digitise construction have recognised the failure of the 3D BIM object campaign and have begun to talk about the acronym BIM as representing building information management rather than building information modelling.

Geometry is only a subset of data

Designers have always incorporated geometry into their design processes. Precise geometry allows us to design in 3D and locate objects in a coordinated way. It can help with clash detection for example – to identify when objects in a model aren't coordinated spatially.

A 3D model also has the potential, if properly done, to take its place after construction, and serve as a 3D representation of the built asset.

Geometry also has its place for the geolocation of objects such as hidden services. This enables a maintenance engineer to identify where services run behind a finished surface; which could be a

plasterboard wall or a tarmac road. However, these scenarios can only work if the model is an actual representation of the asset and not a superseded version. Even then, it doesn't have to be complete, with all the screws and fasteners, to have a purpose. It can be a partial picture, as long as it's an accurate one.

Geometry is only part of the value of information management, as geometrical data is only a small part of data. 3D objects are still relevant but not always; objects are optional, but information is not.

Focus on information, not geometry

The information required to construct a project, and the information required to operate an asset, is collected by the contractor in order to comply with the client's requirements as set out in their exchange information requirements (EIR) – in accordance with *ISO 19650*.

That information can then be used by clients in their asset management and computer-aided facilities management (CAFM) systems to manage their buildings. The contractor has to collate this information as it's installed and cannot rely on the BIM model to do this.

It's no surprise, therefore, that back in 2017 Nick Tune reported⁴⁰ that contractors like Skanska had publicly stated that they don't want BIM objects from manufacturers, they just want the product data.

By structuring their product data and making it available in a secure, verified and interoperable way, manufacturers are able to meet the needs of designers, contractors and their clients, and asset managers, without the need to produce 3D objects with data that is ultimately inaccurate and unreliable. The power lies in the data, not in the geometry.



⁴⁰ Manufacturers: BIM objects don't make you BIM ready - BIM+ (bimplus.co.uk).

4. How to digitise construction product information



This section of the guide sets out the steps to take to structure your product data.

4.1 Why connect your data sources?

Many manufacturers hold their data in several different places such as spreadsheets, databases, ERP systems, accountancy programs and manufacturing records. The first step to digitisation must be to connect these sources.

There are many risks to holding several unconnected data sources. When information is added and updated in several disconnected places at the same time, there's a high likelihood of duplication, errors and waste.

The objective of digitisation is that if any employee is asked about a product or its characteristics, they can access and provide the same correct answer, every time.

What follows is an example procedure for developing a data strategy that you can adapt to suit your own

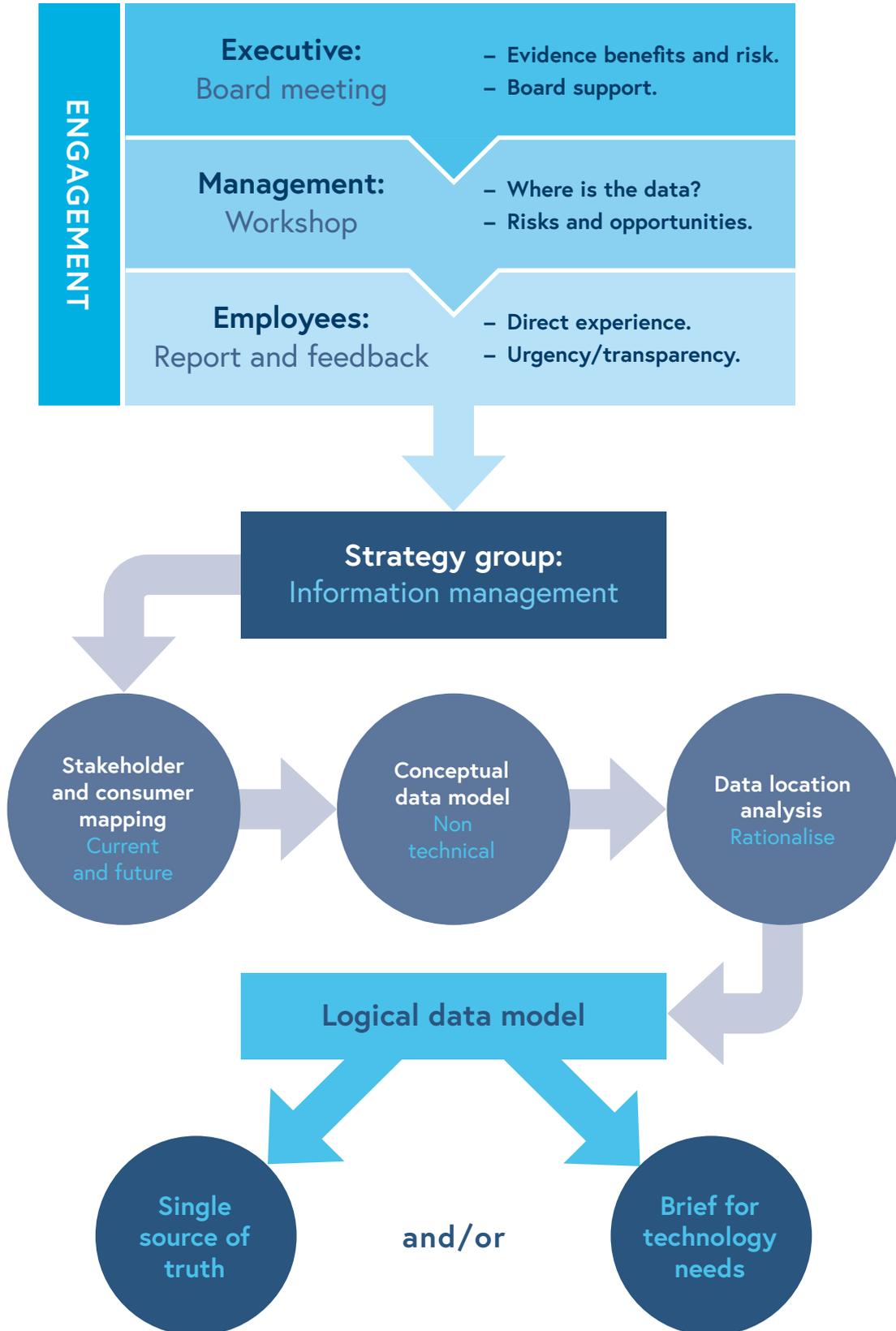
business structures. Whether you're an SME, mid-level company or a major international corporation, all companies will encounter similar issues and the principles will be the same.

This outlined process has the benefit of ensuring support from all levels of your organisation. While board level support is essential, so is support from those responsible for generating and managing your existing data sources.

Remember that structuring your data is an ongoing improvement challenge; you may identify problems that will take time and resources to resolve, or the process may be relatively simple.

Either way, data management is a continuing process, not a one-off event.

4.2 Steps to digitisation





1 Step one: executive buy-in – board meeting

The company leadership must first recognise there's a problem with product data management so that they become sponsors of the initiative.

- Gather examples of how poor data management is generating unnecessary risks and waste in the organisation, and examples of positive improvements by data-driven companies.
- Present the initial findings to the board and allocate a board-level key project sponsor and resource for the next stage.

2 Step two: management buy-in – management kick-off workshop

This workshop helps second-level management identify the nature of the problem within your business, selling the need for change.

Participants should be second level management across the company from departments including IT, product data management, product management, sales, marketing, quality, HR and R&D.

Choose a facilitator who'll encourage participation by all attendees. Take notes on a flipchart or whiteboard so people can see ideas as they're generated; this will prompt them to add their own.

The workshop tasks could follow this type of sequence:

Where do we store our data?

List all places where data about products is stored, existing and legacy. For each source, identify what data is stored there.

Consider enterprise resource planning (ERP) software, printed documents and PDFs, websites, local hard drives, customer relationship management (CRM) software, server files, calculation tools, object identification databases, emails and any other databases the company holds or that are held by third parties on their behalf.

Does your security team know where your critical data resides and who has access to it?

Who decides my name?

Select a product that you know has different names within or outside your organisation. Ask the participants to name the product and then ask who decides the name of the product. You may find it useful to begin this step by introducing an everyday item⁴¹ which has several names to explain the principle.

You'll find that many people have a say in what the product is called, from the originator to competitors, standards, customers and more. You may also discover differences in how you define products and systems. For example, your company may produce different products with different environmental performance, but sell them as the same product commercially.

How do we start to become accessible, transparent and secure?

Ask the participants how they currently store product data.

Do they feel it's stored in a secure, yet accessible way? How do they think it could be done better?

Ask them to suggest ways in which information could be shared within and outside your organisation in a more secure way.

Focus on real examples and practical ideas that relate to your current working practices. Remember to also ask about transparency. How could you improve accessibility and promote it?

Don't be afraid to bring up security. The aim is to make it possible for people to access information in a secure way.

Data security

Protecting sensitive data includes automating visibility, controlling access policies and implementing ongoing monitoring to discover vulnerabilities and risks before they become breaches.

Risks and opportunities

Split your whiteboard into two areas – risks and opportunities – and ask the following two questions:

- What will happen to our business if we make no change to how we create, use, store and structure our data?
- What are the opportunities if we organise our data better?

⁴¹ For example, Cobs, buns, baps or barm cakes: what do people call bread rolls? | YouGov.

Allow the participants to put their thoughts in their own words. You may be surprised by the list of problems that arise. Some may be specific to your business, some may be more general. All will provide motivation to take the next step.

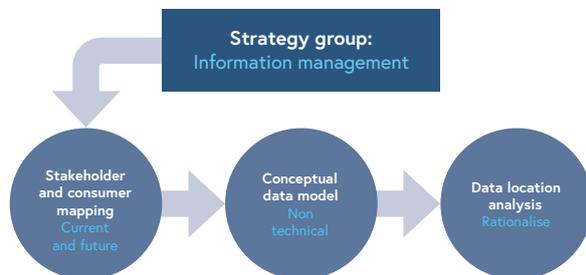
At the end of the session collate ideas from all four of the above steps into a short document and share it with the attendees.

3 Step three: employee buy-in – share with your employees

Second-level managers are tasked with sharing the outcomes of the workshop with their colleagues using the document you've produced and invite feedback. This has two purposes.

- To instil a sense of urgency and that change is coming.
- To generate additional information from colleagues that may have been missed during the workshop, such as a database you forgot you had.

These first three steps in the process create an understanding across your business of the depth of your product data management problem. At this point, you should be ready to set up a strategy group to move forward.



4 Step four: strategy group – conceptual and logical data model

The strategy group should include representatives from all departments who are responsible for product information management. Find out where people go for answers and make sure they're included. This could include IT, R&D, planning, sales, marketing, transportation, finance or operation managers.

The strategy group will require resources to support its activities, which will include analysing your current data sources and developing a solution.

The first task of the strategy group is to create a conceptual data model for the business' product data, and then create or commission a logical data model.

Data models

A data model⁴² is a diagram or other form of representation that organises elements of data and standardises how they relate to one another and to the properties of real-world entities. There are three main types:

- A **conceptual data model**⁴³ is a high-level description of the information needs of a business, focusing on the main concepts and key relationships. Because the conceptual data model describes the semantics of an organisation without reference to technology, it can be used to discuss the initial requirements of the business with stakeholders that aren't data specialists.
- A **logical data model**⁴⁴ represents the abstract structure of the information. Based on the conceptual data model, it seeks to capture things of importance to an organisation, and how they relate to one another, in the form of data structures such as relational tables and columns. It sets out the processing flow and relationships between the data.
- Once validated and approved the logical data model can become the basis of a **physical data model**⁴⁵ and form the design of a database.

It's also worth noting that an **enterprise data model**⁴⁶ is an integrated view of the data produced and consumed across an entire organisation.

Who needs your data? Consumers and stakeholders

When pulling together a conceptual data model make sure you identify all internal and external consumers of your data, based on current and future needs.

Consumers of your data are all those who use it, and can be digital and non-digital.

- Current internal consumers may include sales and marketing teams, your CRM system, plant operation team or logistics.
- Future internal consumers may be a content management system on your website, marketing automation tools or a product information management (PIM) or digital asset management (DAM) system.
- Current external consumers may be third-party data hosts, marketing agencies, contractors, merchants and specifiers.

⁴² Data model - Wikiwand.

⁴³ Conceptual schema - Wikiwand.

⁴⁴ Logical schema - Wikiwand.

⁴⁵ Physical schema - Wikiwand.

⁴⁶ Enterprise Data Modeling - Wikiwand.

- Future external consumers may be the golden thread, asset owners and end users, circular economy, environmental performance regulators and other legal obligations.

Stakeholders of your product data are the internal actors who are responsible for or have an interest in the data or its use. Map your stakeholders to understand what their needs and responsibilities are and how they fit into the product lifecycle. Stakeholder mapping will allow you to develop a governance process for your data and review your operational procedures.

Stakeholders and consumers – data mapping examples

Three examples show how mapping internal stakeholders and consumers of your data can efficiently allow you to supply data to the supply chain, and potentially receive data from it.

The principle is that data only needs to be entered into your systems once but can be used many times. This is what produces efficiencies and reduces errors.

Stakeholder examples	Use cases for data	Phases of product journey
Research and development Laboratories Purchase/lead buyers Production and quality managers Operation managers Supply chain managers Marketing Sales Product managers Customer and technical service desk Stockyard managers Transporters Facility management Finance Customers/contractors Other external stakeholders	General data Specification Aesthetics Environmental, sustainability and governance (ESG) requirements Purchasing Supply chain management Performance data Logistics Certifications Financial accounting and controlling Sales Solutions Standards requirements Marketing information Technical helpline	Production development Initial type testing Purchase Production Warehousing Marketing and pricing Sales Shipment Installation Value added service request Aftersales Disposal End of life

1. Regulatory Compliance - WEEE

Manufacturers who supply electrical equipment have a legal obligation under the Waste Electrical and Electrical Equipment (WEEE) regulations to submit quarterly returns of their product placed on the UK market to an environmental compliance scheme.

- This information is often requested by the product manager (stakeholder) from the sales team (stakeholder) based on accurate information on the weights of product, by product category.
- This means that accurate data about product weight and category for any product within the scope of the regulation needs to be entered into your system before a new product is put on the market.
- Under the principle of enter once, use many times, the same weight information can be used for a number of things, including logistics.

WEEE is a legal requirement. Other environmental performance metrics aren't, but the same principle applies. Metadata about all of the related metrics can also be useful for marketing purposes, for example for environmental certifications such as BREEAM, LEED and WELL.

2. Living data – fire doors

Safety critical products like fire doors and door sets must be correctly specified, delivered, installed, maintained and inspected. This involves generating and providing information over the life of the product.

- The architect specifies a third-party certificated fire door and requires certification information for evidence.
- The merchant requires the certification information to communicate with and supply to the installer.
- The installer needs to ensure that the correct, compatible components are supplied and must comply with fitting instructions.
- The building control officer will need to assess that the fire doors are correct and correctly installed.
- The building owner, accountable person or facilities manager will need to check fire doors regularly, maintain them according to your recommendations and have information available to obtain replacement parts and have them correctly installed.

All products are dispatched with documentation, but much of this is still paper-based. The manufacturer is the originator of this data, which begins in product development, is ratified by certification and then used in your systems by sales, marketing, your service desk, warehousing and logistics.

A reliable, single source of this data is already essential, but will also enable the manufacturer to fulfil the requirements of the golden thread, both for the duty holder during design and construction, and the accountable person during the occupation of a building.

With object identifiers connecting your fire doors and door sets back to the certification, maintenance manuals and service desk, the manufacturer can supply the necessary information at any time in the door's lifecycle to the accountable person and at the same time obtain useable metadata about how products are used in the field.

3. Collected data – sample requests

While some of the data your company uses is generated internally, much is sourced externally. Customer enquiries and sample requests are good examples of where digitisation and integration with your other systems can bring benefits all around.

For example, if you supply data about your products to your website through a connected database and a well-designed user interface:

- The specifier can see accurate information on your company website and order multiple samples from there, all in one go, and get a quick turnaround.
- The request is flagged to the specification manager for their region, who can look the specifier up to see if this is an existing lead and get back in touch with any questions.
- The production team is quickly informed and can send out the samples in one package on the same day, recording dispatch in the system.
- All the information is recorded in a CRM system so the team can follow up and see the contact history when a member of staff gets back in touch. The sales team can manage any project leads right through to order.
- Information about live leads and their likelihood can inform a wide range of business decisions. The company also gets intelligence about their sample request system. It can see which samples are worth sending, and when, how well campaigns are working, and how much business is associated with the samples system.

Is this how your sample request process works now? Or is there paper involved, or emails that go missing?

Different people have different ideas about the data they need. This is because their perspective is based on their own needs. You may find yourself asking, why do we need all this stuff? If it's information that someone in the company needs or uses, it's likely to be necessary.

It is important to encourage your strategy group to look at the data more broadly from a company perspective. Make a conscious decision on what's useful, or could be useful, for the future and focus on the key properties. When you start mapping your data sources you can build on this and add more detail.

5 Step five: data location analysis

Now that you've located all sources of product data in the company, and the needs of all stakeholders and consumers, you can interrogate and rationalise these sources to identify and resolve issues.

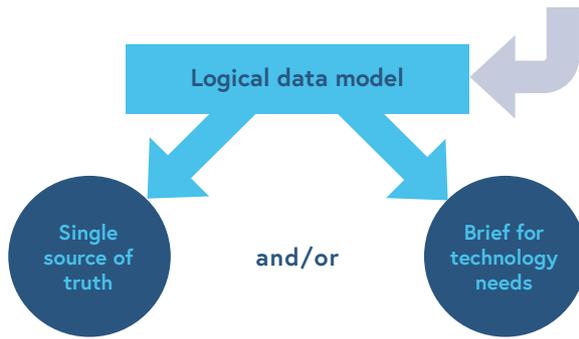
This process is the first step to producing a logical data model. You can produce this in-house, or you may need assistance from a data specialist.

Here's an example procedure:

- Map the essential properties within each source of data.
- Identify the most reliable sources of information.
- Delete common or duplicated elements to rationalise your sources.
- Develop a set of fields (attributes) required for each product according to stakeholder and consumer needs.
- Feed the data from the most reliable source of information into these fields. This could be a large Excel spreadsheet or a simple database that allows analysis.
- Use the collated data to identify issues with the information, and then solve those issues within the data sources themselves.

In the process remember to identify and focus on every need for data across the company and be influenced by the users' search terms when deciding on names. What would a user search for?

Carrying out this exercise helps you identify areas of waste, duplication and error. You may identify data processes that have been independently developed within the company but aren't, in fact, used elsewhere in the company. You may discover products that no one is looking after or pricing structures that haven't been updated for years.



6 Step six: solution development

Decide how your data sources will be connected internally. The principle is to aim for a single source of truth, but this may not be possible if you have existing internal systems that cannot be changed. If that's the case, make sure they can be adapted to feed into a single source, or between them, provide one.

There are several ways to create linked data. One is a PIM system⁴⁷. This is a useful solution if:

- The company has the IT expertise to develop it, or can use external providers.
- You need a single system that legacy systems feed into.
- You plan to draw information from the PIM into other systems such as e-commerce, or the company is geographically spread and needs a cloud-based solution.

Where a PIM system isn't appropriate there are alternatives. For example, creating a data hub view within your ERP system and making the data interoperable, or for a small company with a few products, a cloud-based relational database with templates.

Have you got a PIM system? If you have several systems, you don't have a PIM system. Do you need one?

Companies often have multiple systems, but is there one place people can go to as a reliable source?

If you need to have other systems, ensure they're not relied on for key technical and reliable information.

Do you need technical support?

The logical data model and the process of data location analysis combine to form a brief that, should you need external technical support, will help you choose it. The process of analysing your data may also identify resource and skills needs that you may not have in the business and want to recruit for.

Alternatively, you may find that your current systems, and evolved processes, can meet your current (or even future) needs and this process has helped you identify and resolve any issues.

Manage your own product data

We've described the essential steps to set you on the right path to digitising your product data.

These are only examples and suggestions. Within a diverse industry, there's no one-size-fits-all for data management. Each company is different, with different structures and products, and must find a solution that works for their needs.

Managing your own product data may seem like a daunting prospect, but remember you already have this information – all you need to do is structure it.

There's a movement to encourage manufacturers who already own data to be able to provide it themselves directly. For example, directly through your core data and information management systems and an API – rather than through third-party walled gardens.

It's worth having a discussion within your company about how you plan to provide product information in this context, as a way of informing short and long-term strategies for investing in platform hosting of all sorts.

Have a data and information strategy in place for your business. Work towards having your own logical data model. Agree on what type of information should be provided to who, and how. Think about how best you can monetise your data and make sure the third-party services you use will support this strategy.

Make sure you involve your senior information, operations, technical, sales and marketing colleagues. To benefit from structuring your product data, you need to get all their perspectives as they'll all be using parts of the same system.

4.3 How to approach standards

Standards describe the best practices, using a common technical language that aligns with regulatory requirements. They're essential for effective information management, both between organisations and between countries.

Using product data standards:

- Ensures product information is comparable and useful across the supply chain.
- Ensures interoperability at an international level.
- Provides a governance structure that everyone can comply with.
- Is essential to the effective development of data sharing software.

What are the product data sharing standards?

Two international standards have been developed that will help with product selection and standards compliance by enabling the process of creating interoperable data dictionaries. As international standards, they provide a data interoperability guarantee for trade between the UK and the rest of the world.

- *BS EN ISO 23386:2020*⁴⁸ establishes rules for defining **properties** (descriptive fields) used in construction together with a methodology for how they should be written and maintained.
- *BS EN ISO 23387:2020*⁴⁹ sets out principles and structure for **data templates** for construction objects.

Also of relevance is *ISO 12006-3*⁵⁰, which describes a language independent international framework for data dictionaries.

Do I need to read the standards?

These standards are complicated but a necessary and critical element of the evolving landscape. They set out a system of control that allows an interoperable data dictionary to be produced, and once this process is established, manufacturers need to comply with it.

Ask your trade association to support the process of understanding how the standards apply to your sector.

Each country is developing their own data dictionaries according to new ISOs. Scandinavian countries have funded the process, Spain's national construction products association has developed one, and in the UK the LEXICON project is an example of a data dictionary

that will be following the principles of *PAS 14191*⁵¹, which is the UK's interpretation of the standards.

Definitions

A **property** is an inherent, or acquired feature of, a construction object, such as thermal efficiency or colour.

A **data template** is a subset of properties about a construction object. Once a data template is agreed upon for a product, it allows information about any similar products to be compared and shared as machine readable data, and by translation through a user interface (for example, a web page), by a human being.

It's worth noting that the term "product data template (PDT)" is no longer defined in the standards. Data templates apply to products, systems and assemblies etc.

A **data dictionary** is a dictionary of properties relating to construction products and methods, standardising the terms and enabling machine reading of properties. Effective data dictionaries are compiled by a process of agreement with industry.

What can manufacturers do?

- Structure your product data internally (as described in section 4.2 on page 25, Steps to digitisation, of this guide).
- Align the terminology for properties and attributes when agreeing on what things should be called. For example, the essential characteristics set out in the construction product regulation.
- Help your trade association by collaborating to develop a template of properties for products in your sector.
- When national structures are agreed upon, your properties can simply be mapped across to them.



⁴⁸ ISO - ISO 23386:2020 - Building information modelling and other digital processes used in construction — Methodology to describe, author and maintain properties in interconnected data dictionaries.

⁴⁹ ISO - ISO 23387:2020 - Building information modelling (BIM) — Data templates for construction objects used in the life cycle of built assets — Concepts and principles.

⁵⁰ ISO - ISO/DIS 12006-3 - Building construction — Organization of information about construction works — Part 3: Framework for object-oriented information.

⁵¹ PAS 14191:2020 Requirements for management process and construction data dictionaries (bsigroup.com).

4.4 Using third-party data services – who can you trust with your data?

Questions to ask third-party data hosts, consultants and tech/software companies

The demand for data services is expanding dramatically as manufacturers recognise the need for expertise and traditional catalogue and listing companies move into a data-focused market.

You'll already be using third parties in some form as software providers, and you may provide your product information to distributors and customers through third-party sites. Whether you stick with the same providers, source new ones or bring in consultancy support will depend on your own business needs.

But before you make any investment decisions there are some risks that you should evaluate.

Be aware of the Wild West

As the demand for data services expands, many new businesses are forming to meet that demand and established businesses are adapting.

Tech start-ups by their nature need to rush to market so they can begin to monetise; much of their beta testing will happen with customers. However, as a manufacturer, you may be adopting liability for any failure.

Established companies adopting digital information management may also lack understanding of the security implications of their solutions and may not have the security infrastructure in place.

- See your information management journey as a marathon, not a sprint. You might not need those templates in two or three years once your data structure process is complete.
- Be aware that companies making self-certification statements about their products or services are doing just that: making statements. There's a growing trend by third-party service providers to state that they are BS EN certified or CEN/TC442 certified – there's no such certification, just unsubstantiated marketing messages.

Avoid putting all your eggs in one basket

You'll be aware of the risk of making a financial commitment to one solution to a point where it's too expensive to leave. Many information management companies will offer long-term agreements and discounted bundled services.

- Beware of jumping onto a technology before you have fully fleshed out your requirements. Otherwise, you may end up limiting your requirements to the tech rather than the other way around.
- Remember that you own the data. It should be put to work for you in multiple ways over time.
- Look for companies that offer an agile approach to development rather than a waterfall one. Interrogate their pricing structure.
- Your structured data is the base ground over which agile processes can develop various applications quickly as required. If the app doesn't work, it can easily be improved or replaced with a different approach, while the data remains in place.

Waterfall methodology:

- A traditional sequential approach.
- Resource heavy, long term, difficult to change.
- Not suitable for a fast-moving environment.
- Tend to offer long term contracts and service bundles.

Agile methodology:

- Development is iterative, fast, and low cost.
- Strongly connected to customer feedback.
- Able to adapt easily to changing circumstances.
- Tend to offer low-commitment pricing models.

Competency

Is your tech provider competent and certified, and if so, by who?

Certification schemes are springing up all over the industry and this is likely to increase with the introduction of the UK Ministry of Housing, Communities and Local Government's (MHCLG) competence framework.

- Don't rely on the claims of certification programmes without investigating their credibility.
- Check if your certification scheme is accredited by the United Kingdom Accreditation Service (UKAS). This is the gold standard of certification, provided by a not-for-profit independent body supported by the Department for Business, Energy and Industrial Strategy (BEIS).
- Make sure that any accreditation schemes you sign up to are also UKAS accredited, genuinely useful to your customers and don't saddle you with additional liabilities.

Data ownership

You own your data. Read the terms and conditions and avoid working with providers who can't be clear about data ownership and control.

- Is your ownership of the data you provide clearly confirmed? Who has permission to use your data?
- Who will be charged to access your data? Aim to make the data you choose free to access.
- Does the contract allow you to monetise your data and metadata?
- Can you take your data out of the system and use it elsewhere?
- Beware of foreground intellectual property (IP) which you cannot use.

Monetising product data for manufacturers

Manufacturers can gain measurable economic benefits from data about product data (metadata). This can be simple things like understanding which products are popular for which type of audience, or which products bring the best margins and why.

Some of the sources of this metadata may originate outside their organisation. For example, who looks at its products on third-party websites, where they are purchased and installed, how they perform in buildings or even just where they are in buildings. All this knowledge has the potential to produce commercial benefits for the manufacturer.

Once a manufacturer has got its data in order (digitised) it can use these insights to improve its own processes (digitalisation) and even adapt its business model to profit from the insights (digital transformation).

Background and foreground intellectual property (IP)

- Background IP is owned by you.
- Foreground IP is created by the third party using your background IP.
- Foreground IP belongs to the third party. Do you have a license to use it?

Data security and resilience

Interrogate the data security and resilience plans of the provider. Security is about preventing breaches; resilience is about managing breaches if they occur.

- Robustness of authentication methods?
- Encryption of data in transit and at rest?
- Data location – where are the servers?
- API documentation – where is it hosted and by whom?
- Don't forget to consider the use of third-party data services and their security arrangements.

Also consider business continuity planning:

- What happens when the service is down? Any data service you use should be insured and protected with 24/7 support and backup servers. Interrogate the guarantees.
- What happens if the provider goes out of business? Does the provider offer a source code escrow agreement?

Source code escrow

- The source code of software is deposited with a third-party escrow agent.
- Should the company producing the software fail to fulfil their obligations, for example due to insolvency or abandonment, access to the code is protected.

Interoperability

Interoperable data can be transferred between software platforms rather than being tied to one platform. Interoperability is key to ensuring that your data remains alive and useful to the business and to actors in the supply chain.

Lack of data interoperability is a major issue in the construction industry. However, some software companies in the sector rely on the non-interoperability of their systems as part of their business model. A commitment to interoperability is a key characteristic of agile providers and will help you identify them.

Interrogate your provider about their attitude to interoperability and how it stacks up against their terms. Consider:

- Do their applications integrate with other common applications, such as facilities management software?
- Can the end user configure software to support their processes?

- Is the software future-proofed? Can it scale? Can it adapt easily to future requirements?
- Does the provider supply open APIs in line with common industry protocols such as SOAP and REST?
- Is the organisation a member of associations dedicated to interoperability such as The Open Group or Building Smart International?
- Does the provider have an effective process to verify the information it hosts?
- Does the provider host third-party certificates?
- If so, how does the provider verify the authenticity of the certificates?
- Does it provide a link back to the original source/certifier?

SOAP and REST

Web service access protocols like SOAP and REST enable software systems to interact over the Internet.

Simple object access protocol (SOAP) is an independent platform recommended by W3C. Representational state transfer (REST) is said to be simpler and more efficient.

Both SOAP and REST support interoperability and independence between parties.

Verification of product information is a win-win. It protects specifiers and manufacturers from unscrupulous competitors, and also improves the credibility of the third-party provider.

Check your liability

Many third-party providers of data services absolve themselves of any liability for the manufacturers' information they provide. They may also limit liability for any other losses such as loss of service, the effects of using your data, data corruption or any consequential or indirect losses.

Data quality

If you're providing data to a platform that allows comparison with other manufacturers' products, you should be concerned with the quality of data presented by others as well as your own.

Interrogate the provider about their data verification processes.

- Interrogate the providers' terms and conditions against your requirements, particularly on data ownership, security and liability. What do you find of concern? Don't be a passive recipient of terms. Present your requirements to the provider and ask them to meet those terms.



4.5 How your trade association can help

Trade associations are uniquely placed to support the evolution of product data management.

They're the voice of their sector and often represent both manufacturers and installers.

In this role, they can lead their members away from analogue and towards an open digital culture.

An analogue culture:

- Takes a siloed view of information sharing.
- Sees marketing as information control.
- Is reactive to safety issues, apportioning blame after an event.
- Protects its dwindling field of influence.

An open digital culture:

- Encourages innovation in information sharing.
- Sees openness of information sharing as a competitive advantage.
- Is proactive about safety, encouraging discussion of risk and opportunity.
- Has an ever-growing field of influence.

Collaborative template development – an example of a proactive approach

Trade associations can support their manufacturer members to prepare for digitisation by encouraging awareness and taking up proactive initiatives. One example is developing templates of key product information aligned to data standards.

Associations don't need to wait for data dictionaries such as LEXiCON to happen in the UK, they can do it themselves for their own sector. The association knows your products and is in the best position to create compliant technical digital language. It's the association's responsibility to carry out this process in a collaborative way and avoid the temptation to listen only to the loudest voices.

Here is a suggested process for trade associations:

- Become familiar with the principles of *ISO 23386* and *7*, and *PAS 14191*.
- Work collaboratively with the manufacturer or manufacturers and installer members to develop templates of properties for the products your sector represents.
- Base these templates on the essential characteristics and the requirements within the regulated standards and legislation.

- Add in the MHCLG requirements through their golden thread initiative. This helps cover client requirements.
- Speak to installers, designers, asset managers and other users of the information to ensure their needs are met.
- Liaise with other players in your sector to combine efforts and avoid overlap.
- Ensure you take advice from official sources. Be aware of other initiatives that may take you down a blind alley.
- Make data templates part of your guidance documents on relevant products and systems.
- When national structures are agreed upon, template properties can simply be mapped across.

Encouraging integrity and transparency

Trade associations can play a role in encouraging integrity amongst companies and transparency for test results and accreditations for their products. They have seniority over the sector area and can bring companies with similar needs and requirements together. These companies can gain integrity by pitching themselves against their competitors in an open, collaborative environment.

As the source of expertise, respect and authority over their sector area, trade associations could consider hosting a portal of compliance information for their sector, encouraging transparency and acting as a source for information for third parties.

Working with Government

As the voice of their sector, trade associations can work with Government departments such as the Office for Product Safety and Standards⁵², home of the Construction Product Regulator, to help them develop:

- A transparent, properly funded, genuinely independent test regime.
- A system that ensures all completed test results, including failures, are published by the accredited test centre and accessible to all. This will protect not only the public and our colleagues but all honest professionals.
- A golden thread framework that's based upon structured data provided about products throughout the supply chain.

Share this document with your trade association and ask for their help to start the process.

⁵² Office for Product Safety and Standards - GOV.UK (www.gov.uk).

5. Conclusion



This independent and impartial plain language guide has been produced to inspire and guide decision makers in manufacturing, journey towards a digital future.

An ever broadening and more complex digital landscape, together with a plethora of solution providers and a growing regulatory framework, is pushing the sector to digitise. However, it must do so intelligently with an understanding of both the risks and benefits of a future that's constantly evolving.

Digitisation is turning your analogue and disconnected data into connected, digital form. Once digitised, structured, secure, verified and interoperable, data can work for you in your existing business. For example, through e-commerce, product tracking (with object identifiers), or contributing to a digital twin, golden thread or building logbook - all initiatives that support a future digitised built environment. It also makes good commercial sense.

If UK construction is to meet the challenges of a digital future and respond to the requirements of a new building safety regulatory system, it needs manufacturers to digitise, structure and share their data safely and sustainably.

The international context for this work is important, as products are sold across borders. Work in Europe is moving ahead at pace, from digital building logbooks to unified frameworks for digital services. Harmonised, digitised product information will be essential for businesses to succeed in this context. Getting your data right once is enough; it will allow you to compete in the UK, Europe and internationally.

We are at the beginning of a transformational journey in the construction industry and manufacturers are expected to play their part. There is no need to wait to digitise your product information. If you are waiting for the right time to act, there is no time like the present.

Your next steps

We hope that you've found this guide useful; please share it with colleagues and let us know what you think.

We have a blog⁵³ where we've been discussing these topics and will continue to share information and advice. Visit the blog and register to be notified when we post new content by clicking on the login button on the top right of the page.

We've also set up a LinkedIn group, which we invite people to join to share views about the guide and discuss the issues it raises. This can be joined by visiting Digitisation for Construction Product Manufacturers⁵⁴.

We also post on LinkedIn and Twitter using the hashtag #ManufacturersPLG.

The IET Built Environment Panel is happy to present the guide and talk about the digitisation of construction product information to your organisation, trade association or conference. Contact us at sep@theiet.org to discuss further using the subject line: Plain language guide.

⁵³ Manufacturers' Product Data: A Plain Language Guide - IET Engineering Communities (theiet.org).

⁵⁴ Digitisation for Construction Product Manufacturers LinkedIn Group.

6. Acknowledgements



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7. Acronyms

AI – Artificial intelligence.

API – Application programming interface: a mechanism that enables controlled data transmission between one software product and another. Used throughout the internet, APIs set up rules and automate the process of data control and sharing.

BIM – Building information modelling: a very broad term that describes the process of creating and managing digital information about a built asset. Often mistaken for 3D modelling.

BRE – Building Research Establishment: a research, training, testing and certification centre, formerly a UK Government research body privatised in 1997.

BREEM – Building Research Establishment's Environmental Assessment Method: a voluntary sustainability assessment and certification method owned and operated by the BRE.

BS – British standards are the UK national standards.

BS EN – A European standard adopted as a British standard.

BSI – British Standards Institution is the national standards body for the UK.

CAFM – Computer-aided facility management: the use of computer software to assist in the management of facilities.

CCPI – Code for Construction Products Information: a proposed code of conduct for construction product manufacturers produced by the Construction Products Association.

CE – Communauté Européenne: CE marking signifies that a product complies with relevant safety, health or environmental regulations across the European Economic Area (EEA).

CEN – Comité Européen de Normalisation: the European Committee for standardisation, an association that brings together the national standardisation bodies of 34 European countries.

CPA – Construction Products Association: an umbrella group representing UK manufacturers and distributors of construction products and materials with a primary role to influence government policy.

CPR – Construction Products Regulation (2011): an EU regulation harmonising performance information for construction products across the EU. Responsible for the mandatory CE marking of regulated products.

CRM – Customer relationship management: a database-based technology or software used to manage interactions with customers and potential customers.

CSG – Competence Steering Group: a cross industry group established following the Grenfell tragedy to develop proposals for oversight of competence in design, construction, inspection, maintenance and management of buildings.

DAM – Digital asset management: a system that stores, shares and organises digital assets in a central location. Assets include images, videos and documents such as PDF files.

DfMA – Design for Manufacture and Assembly: a design approach focusing on ease of manufacture and efficiency of assembly. Often includes offsite manufacture and standardised products. Platform DfMA is a Government supported approach to increasing prefabrication and other offsite construction methods on public projects.

DoC – Declaration of conformity: the declaration means the manufacturer assumes legal responsibility that the product complies with the harmonised standard across several European countries.

DoP – Declaration of performance: products placed on the EU market under the CPR must be CE marked and accompanied by a DoP where the manufacturer provides performance information according to a common technical language and assessed using consistent methods.

ERP – Enterprise resource planning: the integrated management of main business processes, often in real time and mediated by software and technology.

EU – European Union.

GUIDs – Globally unique identifiers: large numbers that are virtually guaranteed to be unique that are used to identify many objects. ISBNs are GUIDs for books, VINs are GUIDs for cars.

GS1 – a not-for-profit organisation that develops and maintains global standards for business communication. Over 100 million products carry GS1 barcodes and they are scanned more than six billion times every day.

HR – Human resources: the department of your organisation that looks after the personnel.

IET – The Institution of Engineering and Technology.

IFC – Industry foundation classes: a standardised schema for data exchange, allowing information to be extracted from a BIM at a particular time and used for other purposes, such as asset management, cost or energy calculations.

IP – Intellectual property: the form of property that includes intangible creations of the mind.

ISO – International Organisation for Standardisation: produces international standards.

IT – Information technology.

ITT – Invitation to tender.

LEED – Leadership in Energy and Environmental Design: a voluntary environmental sustainability system developed by the US Green Building Council in 2000.

LEXiCON – a project to produce a data dictionary to be used in the UK.

MHCLG – Ministry of Housing, Communities and Local Government.

PAS – Publicly available specification: a fast-track standardisation document documenting best practice, aimed at speeding up standardisation in a time of urgent need.

PIM – Product information management: the process of managing customer facing product information required to market and sell products in one place to a range of channels.

QR code – Quick response code: a square format matrix barcode which forms a machine-readable optical label. Smart CE marking uses QR codes to connect CE marks to DoPs.

R&D – Research and development.

REST – Representational state transfer: a web service access protocol that enables software systems to interact over the internet, supporting interoperability.

SAP – Systems applications and products: a widely used ERP software platform.

SCM – Supply chain management: the design, planning, execution, control and monitoring of supply chain activities with the objective of creating net value, for example.

SME – Small and medium enterprises: defined by the Companies Act (2006) as those with two of these three characteristics: fewer than 250 employees and annual turnover below £25m and gross assets of less than £12.5m. Can be divided into medium, small and micro businesses.

SOAP – Simple object access protocol: a web service access protocol that enables software systems to interact over the internet, supporting interoperability.

VHS – Video home system: a standard for consumer level tape cassette video recording. Won a format war against Betamax in the early 1980s, but is now largely obsolete.

WEEE – Waste Electronic and Electrical Equipment regulation.

WELL – The WELL building standard is focused on human health and wellness, founded in 2013 and third-party certified by the same organisation that administers LEED.

8. About the IET



We are the IET – a charitable engineering institution with over **158,000 members in 150 countries** – working to engineer a better world.

Our mission is to inspire, inform and influence the global engineering community to advance technology and innovation for the benefit of society.

As a diverse home across engineering and technology, we share knowledge that helps make better sense of the world in order to solve the challenges that matter. It's why we are uniquely placed to champion engineering.

We bring together engineers, technicians and practitioners from industry and business, from academia and research, and from government and the third sector. We are member-led, independent and impartial.

We cover engineering across industry from design and production, digital and energy to healthcare, transport and the built environment. We champion engineers and technicians by offering networking, volunteering and thought leadership opportunities.

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