



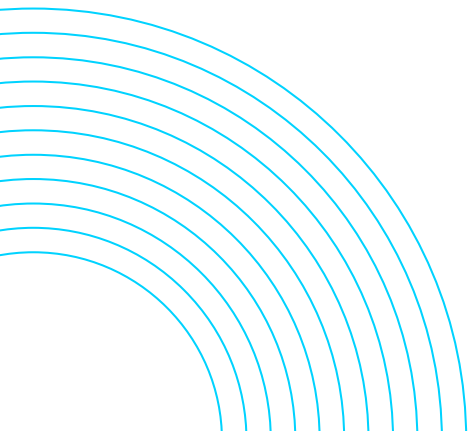
PIM and Building Information Modeling (BIM):

Why PIM is Essential to Creating BIM-Ready Content



Table of Contents

The Future of Building Construction is Building Information Modeling (BIM)	3
Chapter 1: What is Building Information Modeling?	6
Chapter 2: Who Uses BIM?	8
Chapter 3: Why Should Building Product Manufacturers Care About BIM?	12
Chapter 4: The Road to BIM is Through PIM	19
Chapter 5: Producing BIM-Ready Content	26
Summary	30
Resources	31



The Future of Building Construction is Building Information Modeling (BIM)



The architecture, engineering and construction (AEC) industry is moving towards more cost-effective and sustainable ways of building, due to a host of reasons, including:

Climate change

Buildings and constructions account for **32%** of global energy expenditures and are responsible for **19%** of greenhouse gas emissions (9 GtCO₂e/year or around **30%** of all energy-based CO₂ emissions) (UNEP)

Continuous depletion of natural resources

Energy and other industrial metals are in danger of running out in the next 20-30 years (VisualCapitalist)

Increased migration into cities

Sixty-eight percent of the world's population is projected to live in urban areas by 2050 (UN)

Rise of megacities

The number of megacities (currently at 29) with more than 10 million inhabitants is expected to grow to over 40 by 2030 (Allianz)

Demand for green buildings

There's a **\$25 trillion** investment opportunity associated with green buildings in emerging-market cities by 2030 (IFC)

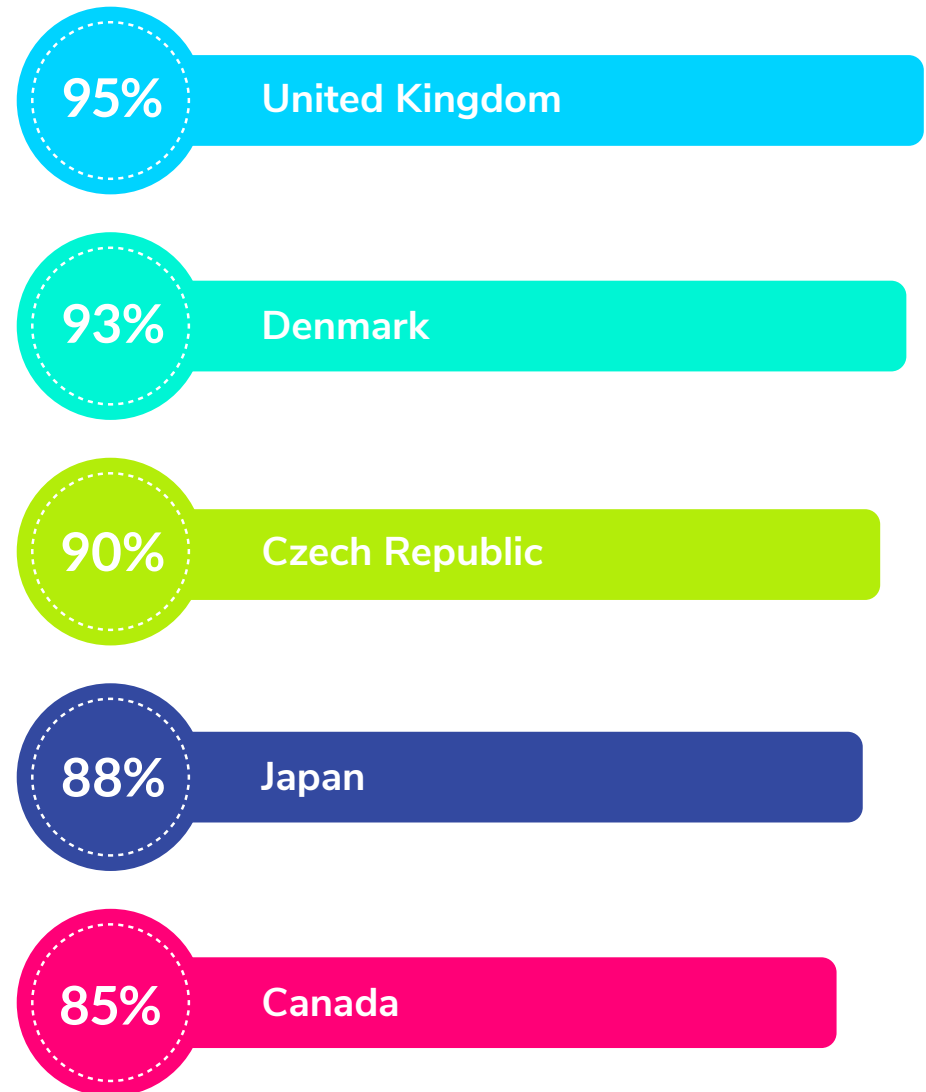
To meet these challenges and explore the opportunities they present, AEC companies have turned to **Building Information Modeling (BIM)**.



According to Autodesk in 2016, 82% of AEC professionals worldwide said that BIM is the future of project information and predicts its adoption rate to be almost complete by 2021:

In the US, where BIM originated, the adoption rate is currently at 70%, with architecture firms reporting that 71% of their revenue comes from BIM projects. With the UK leading the way, BIM is poised to become a standard or a requirement for centrally procured public and private sector projects worldwide.

This soon-to-be new reality has created a new challenge for both AEC professionals and building product manufacturers. Building product manufacturers will need to supply AEC professionals with BIM objects to be considered for building projects, and in turn, AEC professionals will have to manage and integrate all the information contained in these BIM objects.

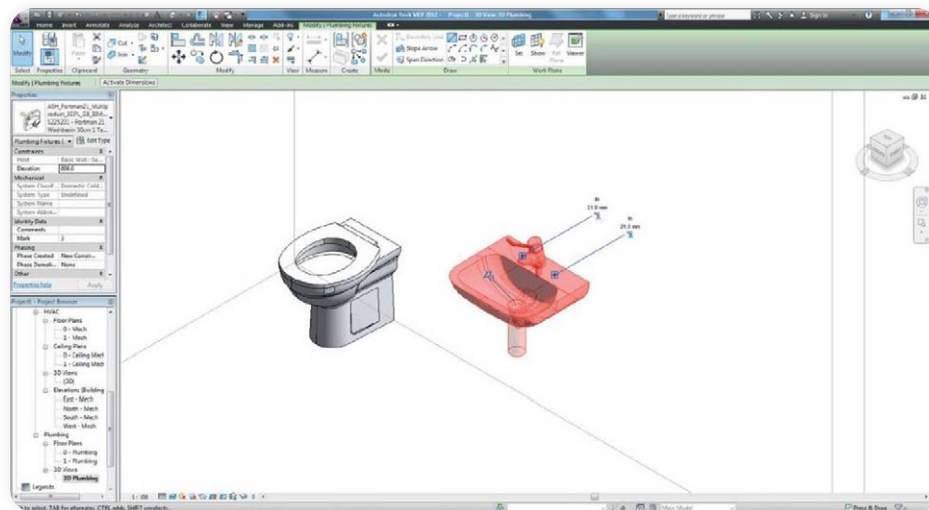


Chapter 1: What is Building Information Modeling?



BIM is an intelligent 3D model-based process that enables AEC professionals to collaborate, create and manage building and infrastructure projects such as buildings,⁷ bridges, highways or tunnels⁸ in a faster, more economical and environment-friendly manner.⁶

It involves creating and simulating prototypes in a virtual space. For example, building a comfort room within a facility requires layers (such as floors and walls) and components (such as a toilet bowl and sink), as illustrated here:



[Figure 1] (Source: NBS)

With BIM, users can add information to each object (as tags) such as properties (e.g., materials, components, etc.) and functions (what it does or expected behavior and its relationship to other objects and space).

Information on these tags give designers and architects insight on costs (total and breakdown), carbon footprint, design conflicts, etc. These insights enable them to analyze a building or infrastructure's cost and sustainability, as well as the ability to alter its design or the project's direction as needed — all in collaboration with stakeholders before the actual construction.



Chapter 2: Who uses BIM?



As building projects grow more complex, AEC professionals use BIM to simplify these complexities through information exchange and collaboration.

A BIM project has multiple stakeholders, including designers, building owners, contractors, sustainability specialists, etc., and they have specific uses for BIM:

Designers, architects and engineers

- Creating 3D visualization and communication with owners
- Evaluating design options and automatically generating accurate 2D drawings from the 3D model
- Transferring information quickly between different design disciplines to promote collaboration.
- Automating the development of construction documents (e.g. fabrication details and shop drawings)¹⁰





Using BIM helps reduce inaccuracies and omissions in documents, minimizes rework and shortens design time.

According to Dodge Data & Analytics:¹¹

88%

of architects and engineers say that BIM enables better design insights

74%

say BIM tools enable more predictive performance of completed projects

67%

say that BIM helps teams to achieve the “best possible” — as opposed to “best practical” — design solutions

Engineers also identified reduced material waste and fewer safety incidents as significant BIM benefits.

Contractors

- Coordinating building systems
- Detecting conflicts
- Communicating problems/errors with responsible parties
- Calculating quantity take-offs
- Estimating costs for bidding purposes
- Planning project schedules¹⁰

Through visualization, contractors can discover design errors and detect conflicts early on in the project and report them to the right parties to correct, thus effectively reducing rework. Order planning and subcontractor scheduling can also be improved, resulting in cost and time savings.

Additionally, visualization helps contractors market to building owners, helping them picture how the project would look like in reality. All in all, for 50% of contractors, greater BIM engagement results in higher ROI (25%) and 40% say BIM reduced costly rework.⁶

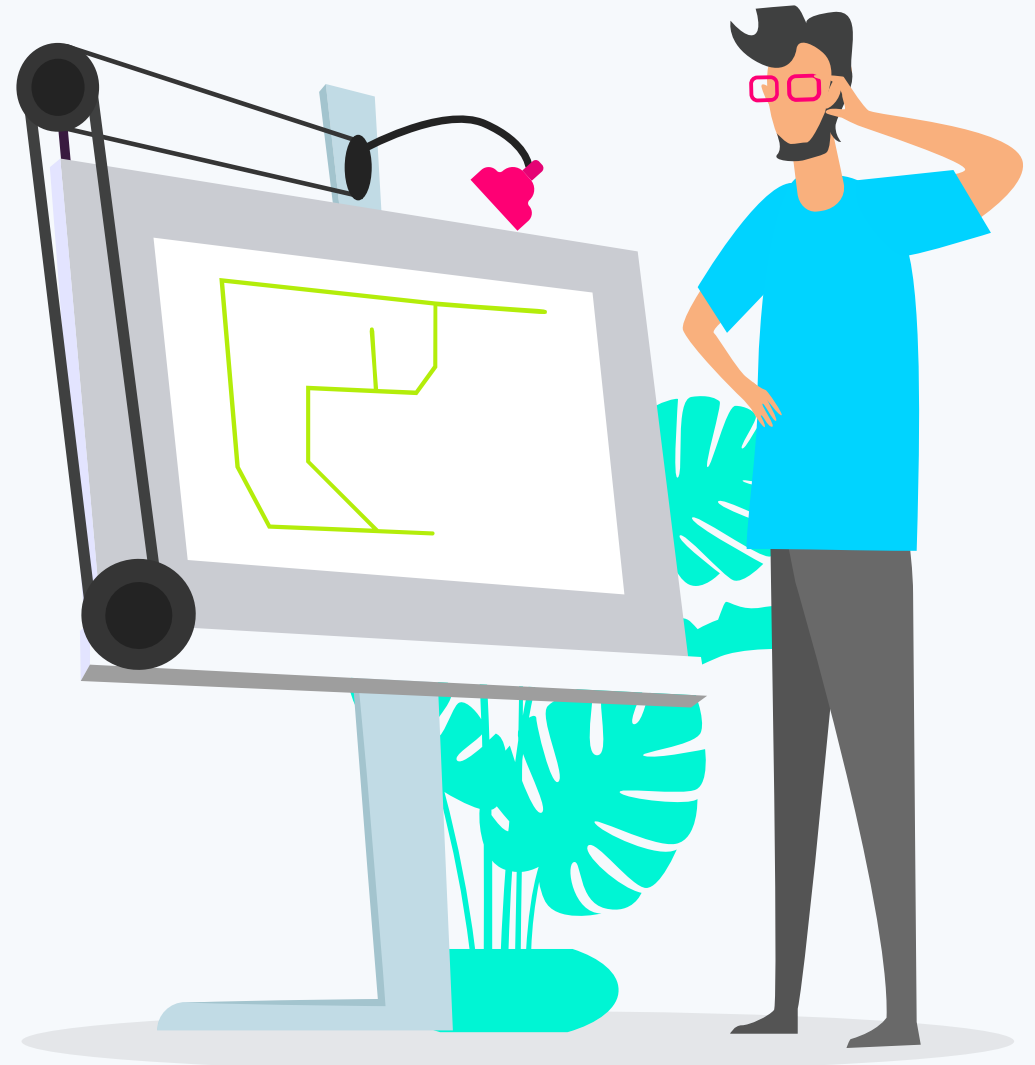
Building Owners

- Improving building quality
- Significantly reducing building lifecycle costs
- Better understanding design projects from beginning to end
- Optimizing operational efficiencies
- Increasing occupancy and use rates
- Fewer litigation claims

BIM can also have important implications for government. Building owners such as those in the US capital facilities industry lose \$15.8 billion yearly due to unmet schedule and cost targets, rework and reactive maintenance.¹² With BIM, they can save time and money in different phases of building: design, construction and management.



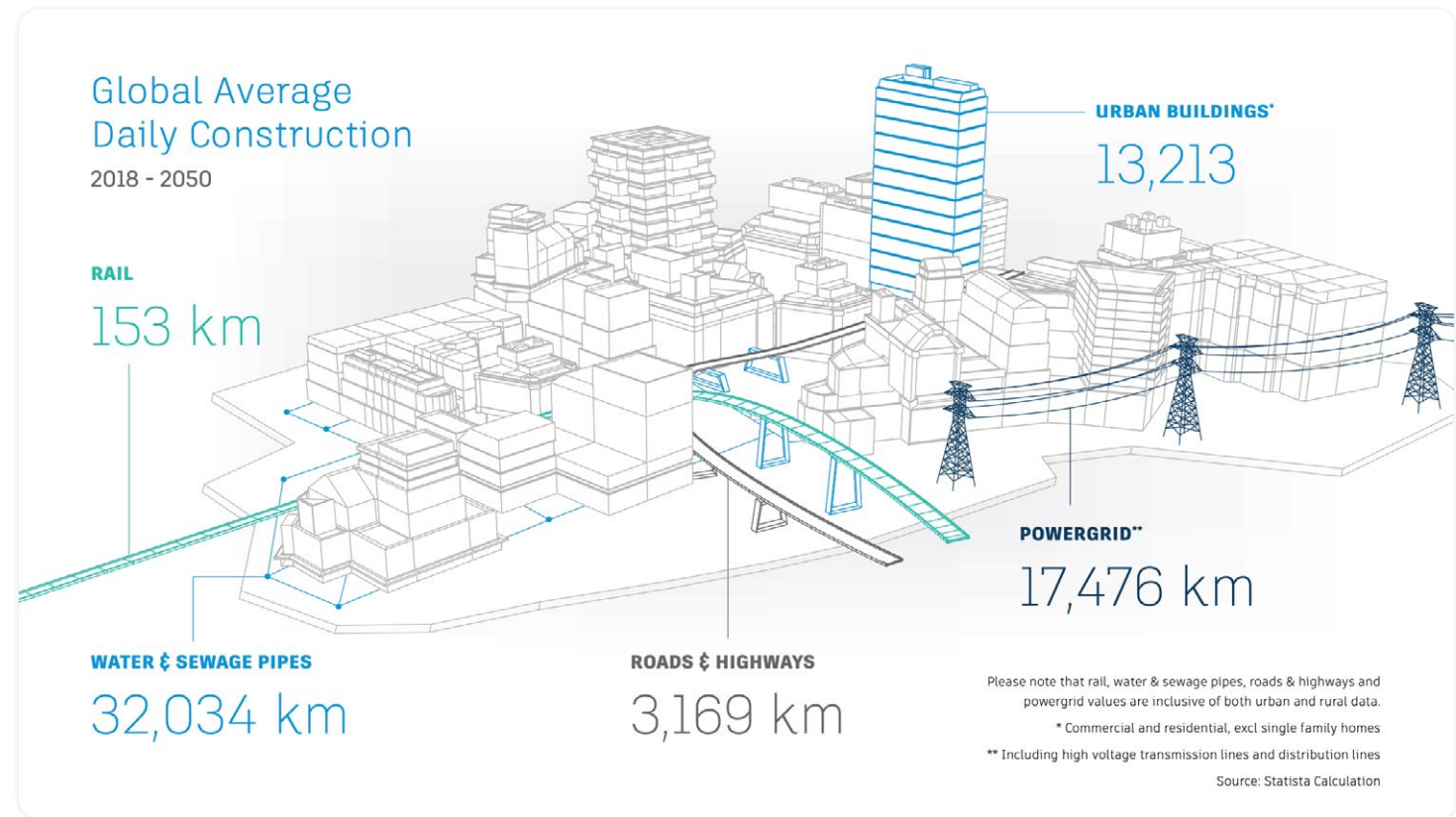
Chapter 3: Why Should Building Product Manufacturers Care About BIM?



Why should building product manufacturers care about BIM?

As more and more people live in the cities, the AEC industry must build 13,000 buildings a day from 2018 through 2050.¹³

Most of these housing and infrastructure projects are going to use BIM. According to Autodesk, 75% of BIM users said they need building product manufacturers to provide them with BIM objects.¹⁴ Given the increased adoption of BIM worldwide, building product manufacturers who want to be chosen for projects must then be capable of providing the AEC industry with BIM objects.



[Figure 2] (Source: Autodesk)

So, what are BIM objects?

BIM objects are data files containing detailed product information such as:

- Geometry or physical characteristics (e.g., height, length, width)
- Visual information (e.g. rough/soft, opaque, transparent)
- Functional information (e.g. opens/closes, dips/pops, slides)

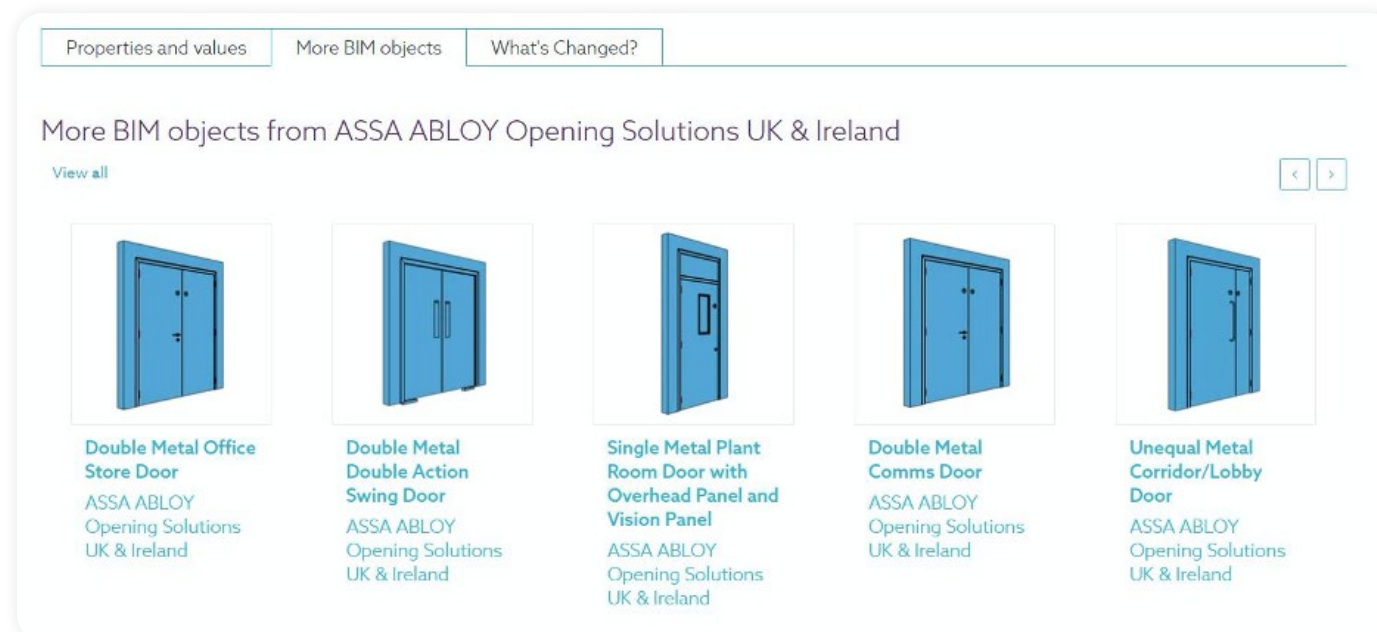
Simply put, **BIM objects are the actual product's digital twin or 3D representation.**

BIM objects are composed of two types:

- Component objects or building products that have a fixed geometrical shape(e.g., a window, sink or toilet)
- Layered objects or those with no fixed shape or size (e.g., flooring, roof, walls or ceilings)

These components are further categorized into two:

- Generic or library objects, which are used as placeholders during the initial design phase
- Specific or manufacturer objects used for actual construction¹⁵

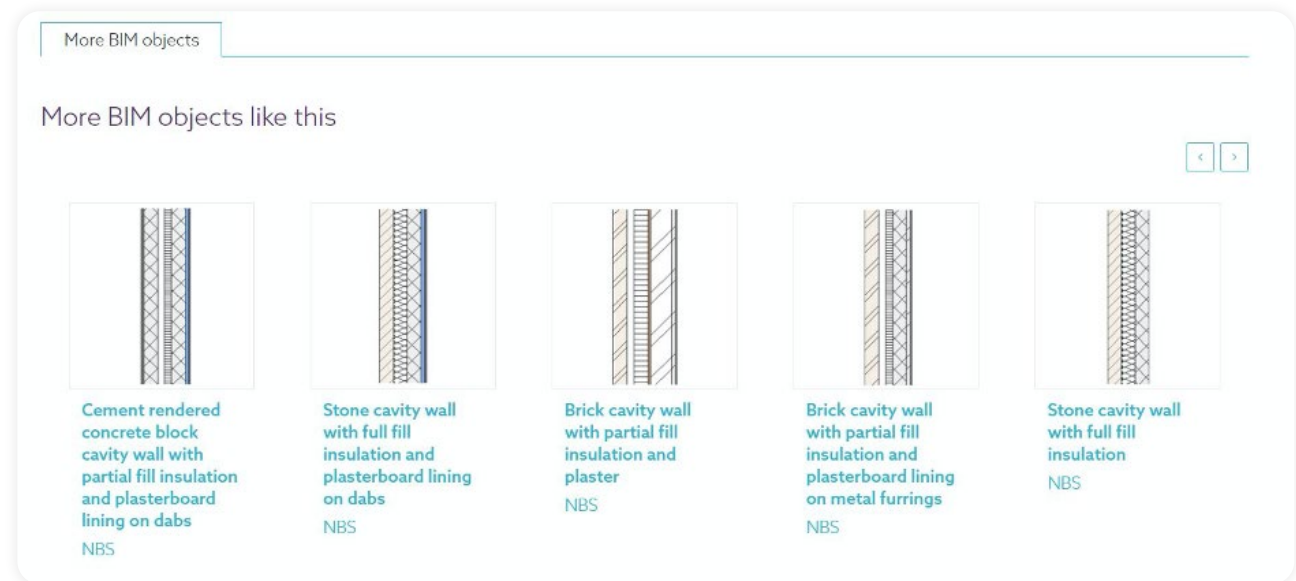


[Figure 3: Sample component object: Specific or manufacturer object > Door (from ASSA ABLOY)] (Source: NBS)

BIM objects need to be in formats suitable for BIM software such as:

- Revit Architecture
- Bentley AECOsim
- Nemetscheck Vectorworks
- Graphisoft ArchiCAD

Additionally, BIM objects must also be in open exchange formats such as Industry Foundation Classes (IFC), which is a global standard developed by buildingSMART to describe, share and exchange construction and facilities management information.¹⁶ Open standards are essential because they enable interoperability, as multiple stakeholders may use various platforms.



[Figure 4: Sample layer object: Generic or library layer: Wall (from the NBS National BIM Library)] (Source: NBS)



BIM object standard

One of the reasons why the UK is leading in BIM adoption is the National Building Specification (NBS) standard for BIM objects. **NBS published the NBS BIM Object Standard in 2014, which defines what a high-quality BIM object should be for Level 2 BIM.**¹⁷ This standard was already in place in 2016 when the UK government mandated that all centrally procured public sector works use Level 2 BIM.



BIM levels – at a glance¹⁸

Level 0

- No collaboration
- Use 2D CAD drafting
- Output and distribution is via paper and/or electronic prints

Level 1

- Comprises a mixture of 3D CAD for concept work, and 2D for drafting of statutory approval documentation and production information
- Electronic sharing of data is carried out from a common data environment (CDE), often managed by the contractor





Level 2

Emphasizes collaborative working and requires “an information exchange process which is specific to that project and coordinated between various systems and project participants.”¹⁹ Level 2 defines what, when and how information should be created, shared and managed.²⁰ It also covers the creation of the following:

- Individually authored models²¹
- A federated model (or a central reference model consisting of connected but distinct individually authored models)²²
- Common classification of data
- Employer's information requirements
- Information exchange methods

Level 3

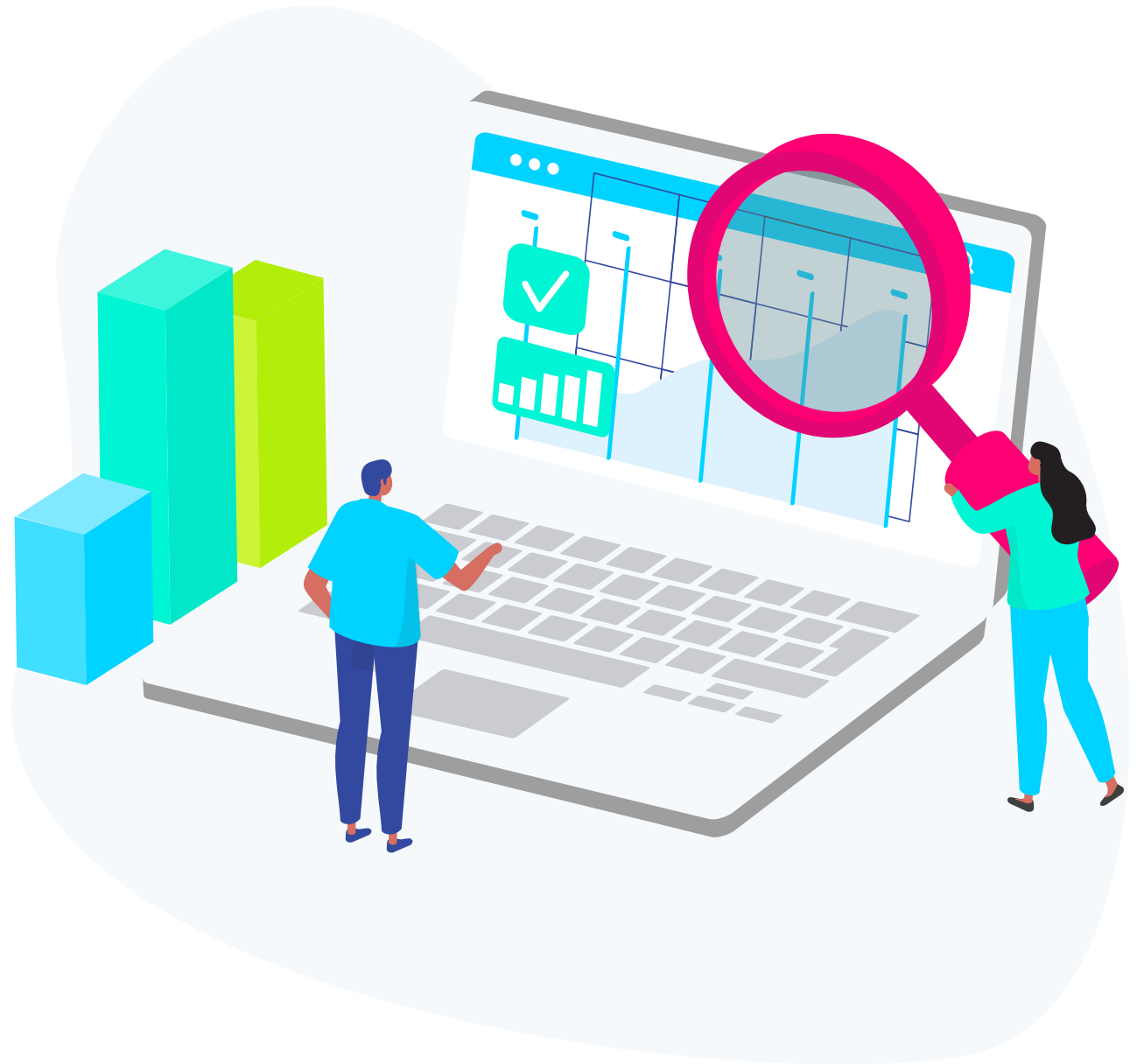
Level 3 has not yet been fully defined; however, its vision is outlined in the UK Government's Level 3 Strategic Plan,¹⁸ which involves the following:

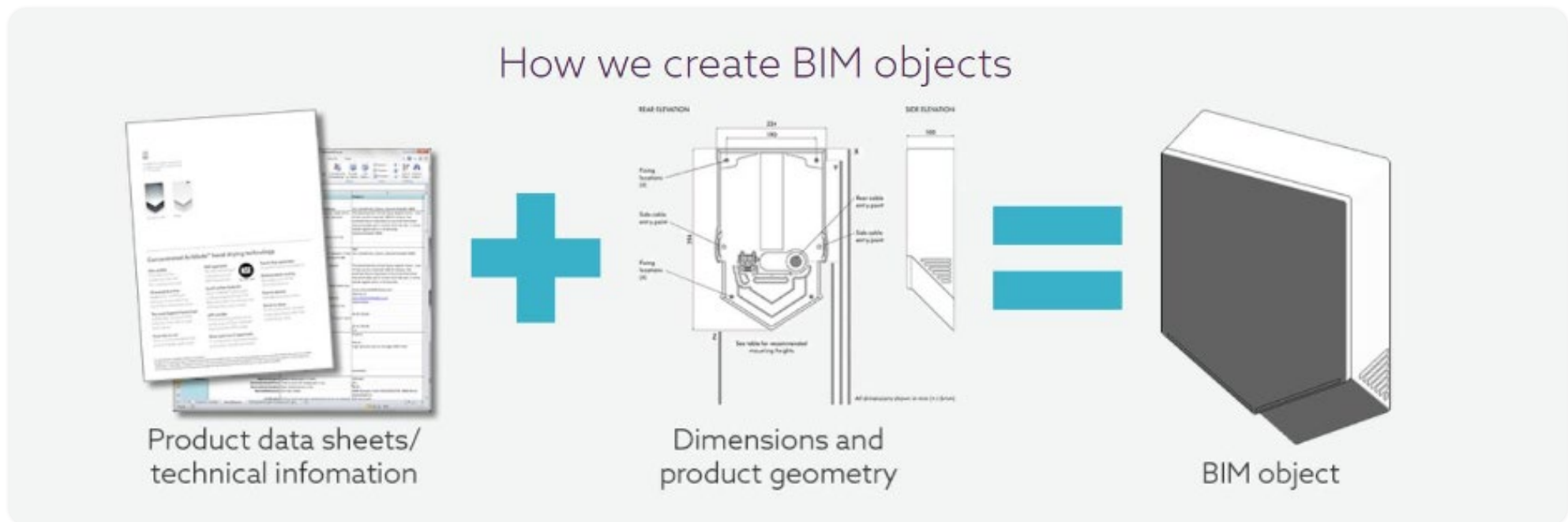
- Creation of a set of new, international “open data” standards
- Establishment of a new contractual framework for projects
- Creation of a cultural environment which is cooperative — seeks to learn and share
- Training the public sector client in the use of BIM techniques
- Driving domestic and international growth and jobs in technology and construction

Chapter 4: The Road to BIM is Through PIM



“Information” is at the heart of BIM projects. Building designers and contractors need geometrical information embedded with metadata and critical product information, such as installation instructions, operational guidelines, warranty and service data, as well as connection points to give a clear picture of how the product will fit and perform within the overall system.²⁴





[Figure 5: How NBS makes BIM objects] (Source: NBS)

How building product manufacturers should approach BIM

Manufacturers can create BIM objects in-house or use third-party providers such as NBS. To create BIM objects, NBS combines the product's geometrical aspects and its associated data, then identifies its relevant specifications and IFC properties.²⁵

Regardless of whether building product manufacturers create their BIM objects in-house or through a third-party provider, they must get their product data in order as BIM objects require both precise and vast amounts of data.

Why building product manufacturers need a PIM

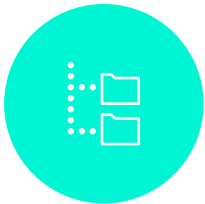
Only through a Product Information Management (PIM) solution can building product manufacturers efficiently manage the data required for BIM object creation. PIM has been key to the digitization of the manufacturing industry, resulting in improved time-to-market and increased sales. Building product manufacturers aiming to get into lucrative building projects can expect the same results by adopting PIM solutions.

A PIM is a one-stop solution that helps building product manufacturers by:



Centralizing data

BIM object creation starts with collecting data from all sources across an enterprise. Often, data is in silos and managed in multiple systems resulting in inaccurate, incomplete and outdated data. Building product manufacturers must consolidate their product data into a central repository where everyone can access them.



Modeling and categorizing data

BIM objects contain complex and detailed metadata and product information. PIM allows building manufacturers to create categories and classifications to suit their needs. This way, not only is information grouped neatly, but they are also connected, making it easier for any user to find what they need. Furthermore, PIM tracks versions and authors, which is critical for building product manufacturers that will outsource their BIM object creation to third parties.



Improving data quality

To eliminate inaccuracies and duplicates, as well as ensure data is complete and up-to-date, building product manufacturers must create a single source of truth and a 360-view of their products. This requires collaboration among internal stakeholders, established data governance policies, and streamlined workflows to guide the whole process along.



A PIM is a one-stop solution that helps building product manufacturers by:



Managing digital assets

Designs require drawings, plans and rich digital assets (e.g., 2D, 3D images) that's why to create BIM objects, designs must be linked to product data. PIM solutions that include Digital Asset Management (DAM) make digital assets easy to manage, discover and access.



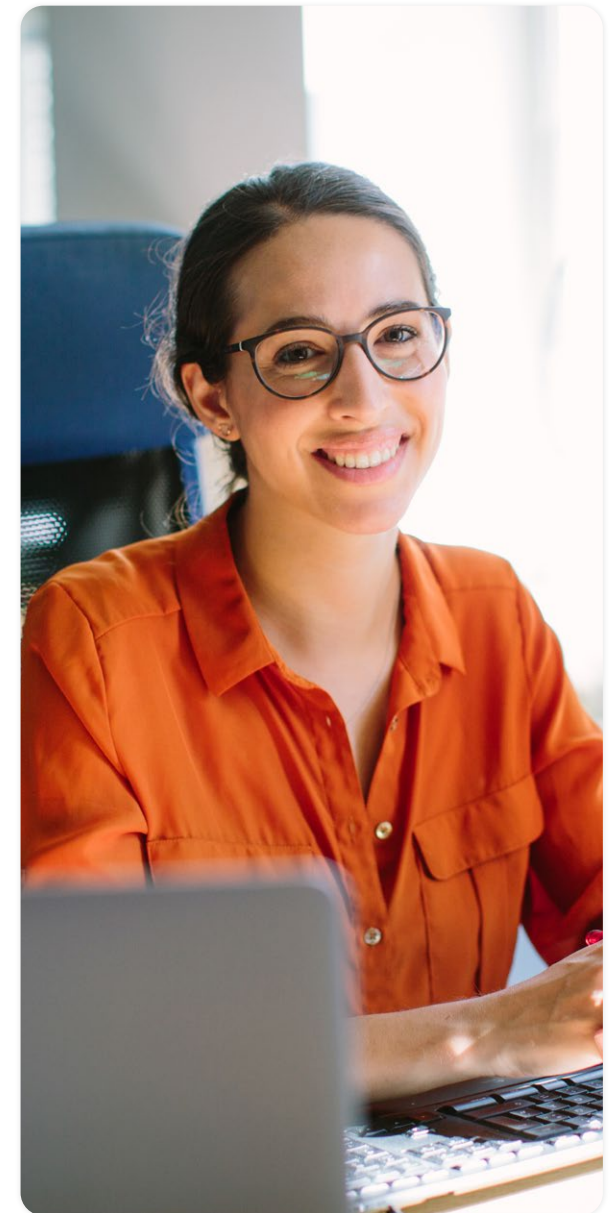
Enhancing translation and localization

BIM objects have complex information, but it becomes more complicated when that information must be localized and translated for the benefit of multinational stakeholders. With PIM, these activities are automated and, therefore, convenient and quick.



Improving content publishing

When product content is BIM-object-ready, building product manufacturers share in-house to create a BIM object or send it to a third-party creator. Either way, PIM allows for publishing to different systems or channels; may they be a website or another database, mobile, print, etc.



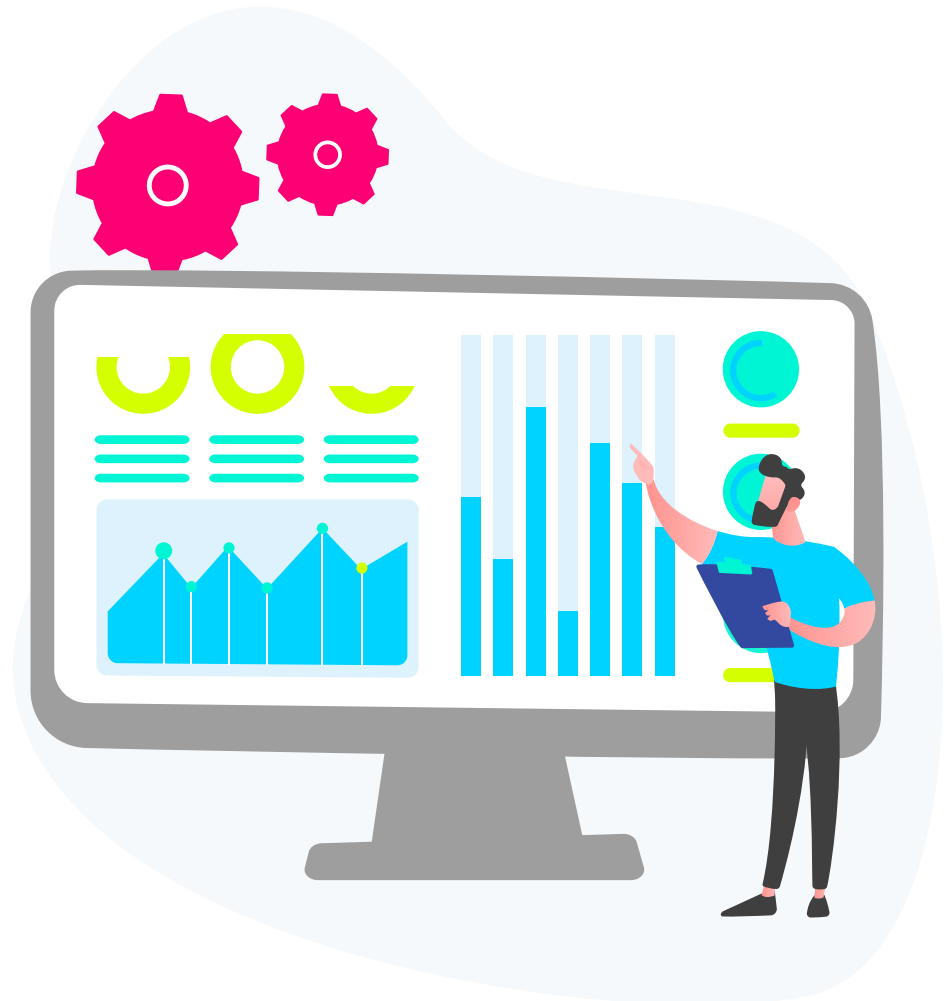
Why AEC professionals need PIM

Yellow folders

Most companies in the AEC industry rely on yellow folders, simple structures used to contain project and business documentation, to store and file projects and business-related documents. This antiquated practice, although easy to create and modify, is impractical and dangerous since it provides unsecured viewing, editing and distribution of critical business documentation and project information. Moreover, it causes inconveniences and poses risks due to:

- Lack of drawing or document metadata, making searching an onerous task
- Missing or inaccurate files, making it extremely difficult to locate drawings, documents and contracts
- Confusion and doubt as to which is the final version or the pertinent revision relative to a specific inquiry
- Absence of audit trails of drawings and document changes, leaving nothing for reference or traceability
- Omission of security and access controls, leaving files open to everyone
- Lack of standard procedures for archiving, giving individuals nothing to work with in terms of filing or archiving project documentation

Although functional, yellow folders are not a sustainable, long-term solution, mainly because they do not promote collaboration across key stakeholder teams. Hence, the need for a modern approach.



Why AEC professionals need PIM

AEC professionals must manage volumes of information generated by BIM projects. Specifically, they need to collect, organize and manage product information related to BIM objects.

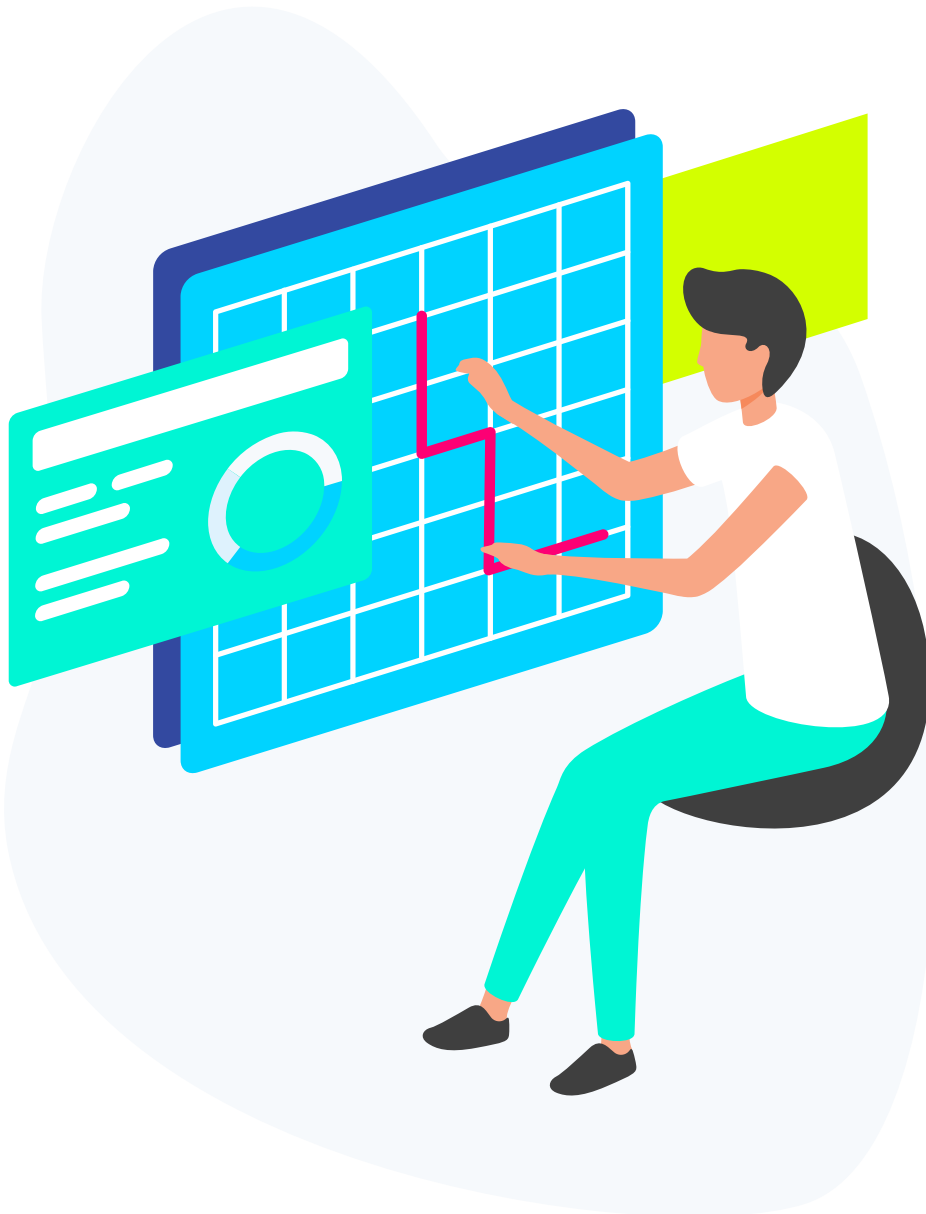
While projects are underway, engineers, architects and designers need easy access to usable information to be efficient at executing project plans. Besides, information must also be accurate and traceable to prevent errors that might hinder project development.

Out with the old, in with the new

A PIM solution helps AEC companies solve a multitude of information management-related challenges, as it can enable secure collection, management and distribution of BIM object information by ensuring that:

- All BIM object data is in one place
- Data is always complete and accurate
- Information is accessible to the right people with clearance
- Data is not redundant
- Versions and revisions are logged

In addition, PIM solutions enable AEC professionals to focus on optimizing internal business processes and strategies and improving collaboration, which results in better and more effective decision-making.



Chapter 5: Producing BIM-Ready Content





Building product manufacturers need to provide high-quality and BIM-ready product content to third party BIM object creators to then pass it on to AEC companies if they want to increase their chances of getting into projects and create lasting and positive impressions.

In turn, AEC professionals need to efficiently manage volumes of project-related information to ensure content accuracy, completeness and compliance. They need this information securely stored in one place and available to anyone with the right clearance.

Contentserv's Product Information Management (PIM) solution offers a streamlined approach to enterprise data management ensuring product data accuracy, quality and completeness.

It enables building product manufacturers and AEC professionals to create, master, manage, enrich and translate and localize content.

This enriched content can then be shared internally and published across channels – including BIM object libraries.

Furthermore, Contentserv dramatically improves operational efficiencies by establishing streamlined workflows and serves as an essential foundation to enhance collaboration across any organization.



Core functionalities that are key for BIM-ready content:



Import

Product data usually comes from different internal and external sources and systems, such as suppliers, third party content aggregators or data pools. Quickly onboard and consolidate data in a single repository.



Validate

BIM produces high volumes of complex data that needs to be managed. Reconcile differences, inconsistencies and irregularities, and enable the creation of rules for standardization, accuracy, completeness and overall quality.



Manage

There are several processes and multiple stakeholders involved in the development of BIM objects. Streamline activities by defining tasks and roles and model data as well as create hierarchy, data quality and localization standards.



Publish

Automated syndication and publication capabilities enable internal teams to share data across the organization, and ensure accurate, complete, consistent and timely product content distribution to relevant recipients, at any time.

BIM is the future

BIM is going to be the standard, not the exception for the AEC industry. Building product manufacturers and other AEC organizations that want to get ahead must start investing in BIM object creation as early as possible to secure and succeed in their new projects. Producing and managing BIM objects may seem complex, but a PIM solution can help simplify the complexity.



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