NBS
BIM
Object
Standard

ACKNOWLEDGEMENTS

The NBS BIM Object Standard

Richard Waterhouse
CEO, RIBA Enterprises

At NBS we recognised that the lack of an industry-wide standard for BIM objects was a barrier to the successful adoption of BIM. Therefore, by defining what constitutes a high quality BIM object and providing consistency in the content and structure of these objects, the new NBS standard will play a major role in assisting UK-based organisations take BIM to the next level.

The construction industry needs access to BIM objects that can be used freely, safe in the knowledge that they contain the right levels of information with the appropriate geometry, all wrapped up in a consistent, yet structured and easy to use format.

The BIM landscape is rapidly evolving and NBS is at the forefront of this evolution. We understand that the market needs good quality BIM objects and the introduction of the new NBS BIM Object Standard means that designers creating their own objects for practice and project-specific purposes can now do so to a common standard, enabling greater collaboration, efficiency and more meaningful information exchange.

Client groups, as well as project managers will also feel the benefit as they can be confident in the quality of the BIM objects used within their project models.

This is an important step, not just for NBS, but for all those who author BIM objects as we can now build objects using a common data environment. BIM objects that meet the requirements of the NBS BIM Object Standard will help to realise the true benefits of digital construction resulting in better value across the whole life of the built asset.

The UK is at the forefront of BIM and the introduction of this standard is yet another indication of how we, as a nation, are demonstrating our knowledge and expertise throughout the entire digital plan of work.

I have no doubt that this new NBS BIM Object Standard will transform the future of BIM, not just in the UK, but in the global construction market.

RIBA Enterprises is a member of the BIM Technologies Alliance supporting the UK Government Construction Strategy BIM Working Group

Contents

Contents:

Standardising
BIM Objects
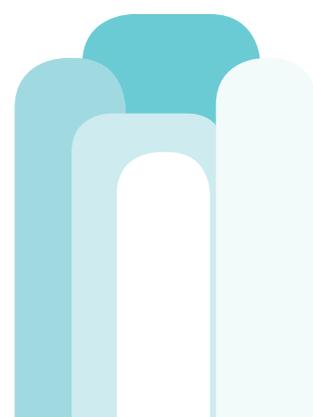
Standardising BIM Objects

There are many definitions of Building Information Modelling (BIM) but it is simply the means by which everyone can understand a building through the use of a digital model. Modelling an asset in digital form enables those who interact with the building to optimise their actions, resulting in a greater whole life value for the asset.

Through BIM the UK construction industry is undergoing its very own digital revolution. BIM is a way of working; it is information modelling and information management in a team environment, all team members should be working to the same standards as one another. BIM creates value from the combined efforts of people, process and technology.

The UK Government's **Construction 2025: Industrial Strategy for Construction** is targeting lower costs, faster delivery, lower emissions and improvements in exports to position the UK at the forefront of international construction. The UK Government's **Construction Strategy** 2011 is a framework for a range of work streams, all of which contribute to the 2025 strategy. This framework forms the basis of the government's BIM hypothesis:

> *"Government as a client can derive significant improvements in cost, value and carbon performance through the use of open sharable asset information."*

The objective of the **Construction Strategy** 2011 is to accelerate the adoption of BIM throughout the UK construction supply chain. The requirements by 2016 are for all centrally procured Government projects to be a fully collaborative 3D BIM (with all project and asset information, documentation and data being digital). Since the publication of the **Construction Strategy** in 2011, the following have been implemented:

- A network of regional BIM hubs was established to act as the first point of contact for BIM advice to industry
- The **BIM Task Group** website was set up to provide precise and comprehensive BIM guidance
- A standard for the information management of construction projects was published (PAS 1192-2)
- A standard for the information management of the operation phase of assets was published (PAS 1192-3)
- A **BIM Technologies Alliance** was established to foster collaborative development
- BIM enabled digital plans of work were prepared by the professional institutions such as the **RIBA Plan of Work 2013** (www.ribaplanofwork.com)
- A Technology Strategy Board (TSB) Research Project was initiated for the development of a free-to-use digital tool kit that exploits these standards for BIM
- An information exchange format was selected

This chosen information format was **Construction Operations Building information exchange (COBie)**.

COBie was selected as the container for non-graphical information and the reasons for its selection were pragmatic. It is cheap to implement with tools readily available and has forward compatibility with international open standards such as ISO 16739.

More and more assets are being 'built with BIM' and this provides a fantastic opportunity to revolutionise the way in which users interact with the information contained in those assets.

To achieve this the digital building blocks that are used to create virtual assets needs to be standardised. These building blocks are commonly known as BIM objects.

The availability of manufacturers' BIM objects is an important factor in achieving success with BIM. The number of manufacturers engaging with BIM is rising but not quickly enough. The construction industry needs a comprehensive library of **manufacturer BIM objects.**

These objects need to be of the right quality, and connect with **generic objects** and associated technical specifications to support the digital plan of work. Achieving standardisation between generic and proprietary information is what NBS has been doing for over 40 years, and its entire product range is geared towards supporting the digital plan of work.

This standardisation of information is at the heart of the UK BIM strategy. The information exchange facilitated by the staged COBie data drops is fundamentally concerned with collecting information that can be compared in various ways. With COBie, construction data can be compared across project stages: has the cost changed or has the delivery time improved or reduced? These are typical stage-to-stage questions.

On a broader scale, being able to compare construction data across numerous built assets will help to assess greater whole life value. By comparing projects, data optimisation becomes possible; lessons can be learned from what works well, and this knowledge can influence future projects, refurbishment works and maintenance activities.

A BIM object is a combination of many things:

- Information content that defines the product
- Model geometry representing the product's physical characteristics
- Behavioural data such as detection, maintenance and clearance zones, that enables the BIM object to be positioned in, or function in the same manner as, the product itself
- Visualisation data giving the object a recognisable appearance

For each of these BIM object essentials, it is important that a standardised approach is taken, as creating digital assets using a consistent kit of parts will yield all of the benefits that standardisation brings.

Objects will be efficient to use, more easily comparable and will be interoperable.

From the outset, the NBS National BIM Library set an industry standard. It created each object with a core **property set** that:

- Aligns with COBie-UK-2012
- Adopts a consistent approach to classification
- Provides a simple integration with NBS **Create**
- Applies a standard naming convention for ease of use
- Standardises approaches to the *level of detail* and object *presentation*

All of which support efficient workflows and enable the creation of high-quality, digital building assets.

By standardising the information recorded within objects, they can be compared and an appropriate selection made for the project. Common approaches to the modelling of the physical characteristics of products make the BIM objects simple to use, affording the designer a reliable, consistent and intuitive experience. The hard work is in the detail, for example BIM objects in *Industry Foundation Class (IFC)* format; these IFC files are manipulated so that they have their information properties consistently grouped and organised. This makes their use in various *BIM platforms* straightforward and consistent. Another example is the use of standardised properties. The benefits of this become obvious when using objects from more than one manufacturer in the same project. When creating schedules that span products from many manufacturers, the use of a standardised *property set* enables information relating to each of these products to be displayed in a single column. This is the start of the common data environment.

With each *BIM platform* vendor having their own approach to information handling, the importance of setting minimum requirements for information transfer is vital to achieving collaboration and interoperability.

Scope and Purpose

Scope and Purpose

Scope

This standard defines the information, geometry, behaviour and presentation of BIM Objects to enable consistency, efficiency and interoperability across the construction industry.

Words in bold (and others) are explained in the Terms and Definitions section of this document.

Purpose

This standard is intended for construction professionals, manufacturers and other BIM content developers to assist in the creation of BIM objects that operate in a Common Data Environment (CDE).

It is a quality standard for BIM objects and is a benchmark by which objects can be consistently assessed.

Through the use of a common standard, the integration of building information and its effective use becomes possible.

The NBS BIM Object Standard draws upon, refers to, complements and aligns with a number of documents. It refers heavily to the BS 8541 series, a code of practice that takes the form of guidance and recommendations for library objects for architecture, engineering and construction as well as COBie and the buildingSMART IFC schema..
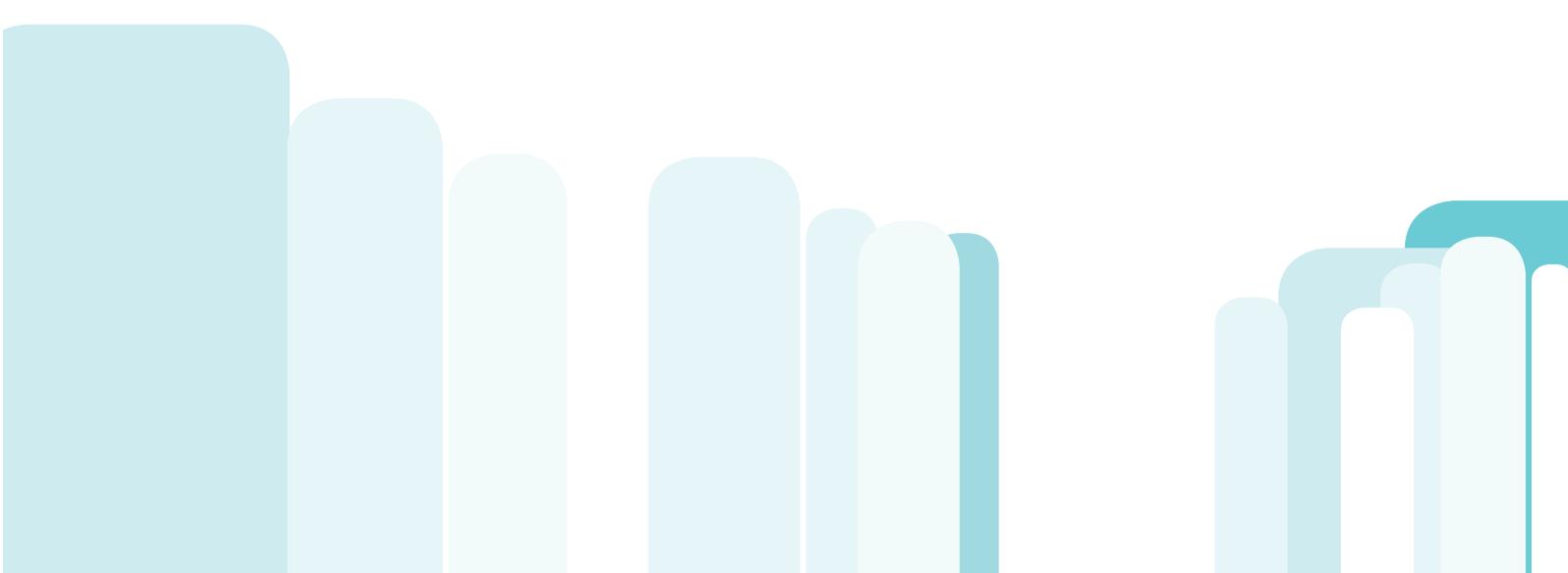
About NBS

About NBS

NBS is the trusted source of specification, product information, BIM and practice management solutions for the UK construction industry. Its specification system is already recognised as the UK's preferred standard.

NBS products and services are at the heart of coordinating information about an asset. **NBS Create** is the latest specification system which has been developed for BIM. The award-winning **NBS National BIM Library** is the primary source of free-to-use BIM content in the UK, and is also now used internationally.

The **NBS National BIM Library** website enables construction professionals to locate, download and use thousands of high quality, data-rich generic and manufacturer's BIM objects, all of which have been authored to the trusted NBS format.

NBS BIM objects have direct connectivity with the key BIM 3D design tools and can be directly integrated into **NBS Create** software, which places NBS in a unique position not just in the UK but worldwide.

NBS is at the very forefront of BIM development, and its experts hold key positions in groups and organisations that are shaping the UK BIM landscape and starting to attract interest on a global stage.

NBS is a member of the **BIM Technologies Alliance,** which supports the Government's Construction Strategy **BIM Task Group,** and is also represented on key groups such as the **BSI B/555** BIM standards committee, **CPIc, ICIS** and **BuildingSMART.** It also publishes the internationally respected **NBS National BIM Report.**

A wealth of free BIM information can be found on thenbs.com/bim

Section 1
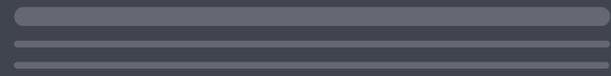
GENERAL REQUIREMENTS

Section 1: General Requirements

This section describes the general requirements for BIM objects.
The scope of this section includes general requirements such as object categorisation, IFC object type and predefined type requirements.
In addition, this section defines the *level of detail* within the BIM object.

1.1   General

1.1.1   The word 'shall' is used to express requirements of this standard. The word 'should' is used to express recommendations. The word 'may' is used in the text to express permissibility, e.g. as an alternative to the primary recommendation of the clause. The word 'can' is used to express possibility, e.g. a consequence of an action or an event. Terms in bold are defined in the Terms and Definitions.

1.1.2   The BIM object shall be presented as either a *generic object* or *manufacturer object*.

1.1.3   The BIM object shall be modelled as one of the following types and presented as such:
   • *Component object*
   • *Layered object*

1.1.4   The BIM object may, where relevant, be part of a larger collection of objects that form an *assembly*.

1.1.5   The BIM object may be collected within an *assembly* to represent the context in which the object is used. Accompanying objects forming the *assembly* shall have a minimum 'schematic level of detail' as defined by BS 8541-3.

1.2   Level of detail

1.2.1   The BIM object shall have as a minimum:
   • A 'Schematic level of detail 'for *generic objects* as defined by BS 8541-3'
   • A 'Schematic level of detail 'for Mechanical, Electrical, Plumbing, Civil Engineering Infrastructure *manufacturer objects* or a Coordinating Level of detail' for *manufacturer objects* in other domains as defined by BS 8541-3

1.2.2   Generic BIM objects shall include nominal or expected levels of measurement as defined by BS 8541-3 where actual dimensions are unknown. Manufacturer objects shall include actual dimensions of the *construction product*.

1.3   Object Type

1.3.1   The BIM object type shall be identifiable within the associated *BIM platform* and assigned using the appropriate *IfcTypeObject,* and *IFC predefined type* from the *BuildingSMART* International IFC 2x Edition 3 Technical Corrigendum 1 (IFC2x3 TC1) *schema.*(ISO/PAS 16739)

   If an appropriate type does not exist, the following shall be used:
   • *IfcBuildingElementProxyType*
   • USERDEFINED predefined type, in upper case. The type name shall follow the IFC naming convention, CamelCase with IFC Prefix

1.3.2   The BIM object can include additional information from IFC4 (BS ISO 16739) in addition to IFC2x3 (see clause 2.8, 'Supplementary').

1.3.3   The BIM object shall include all necessary IFC properties to allow complete export to IFC from the *BIM platform*.

1.3.4   The BIM object shall be publishable in a format that enables the transfer of information from person to person, application to application as BS 8541-1.

Section 2

INFORMATION REQUIREMENTS

Section 2: Information Requirements

This section defines the requirements for the information contained within a BIM object.
The scope of this section includes general requirements such as *property sets,* properties and values, as well as COBie and IFC properties.

2.1   General

2.1.1   The BIM object shall contain properties that are appropriately assigned as type or component. Common properties shall be assigned to type and not component.

2.1.2   The BIM object shall contain minimum information sufficient to identify a *construction product* and its use in the BIM environment as a *construction resource* (see subsection 2.7, 'NBS_General').

2.1.3   The BIM object shall use information properties to represent aspects of construction products that are not modelled geometrically.

2.1.4   The BIM object shall include properties derived from COBie Version 2 Release 4 en-UK (COBie-UK-2012) or properties derived from BuildingSMART IFC2x3 Basic FM Handover View (PAS 16739:2005). Properties shall be consistently selected from the chosen source.

2.1.5   The BIM object shall have completed values where known and shall not include unset or undefined values. Where the information is unknown, not applicable or not available a default value 'n/a' shall be used. If the datatype restricts the use of an alphanumeric value, the appropriate value to that property shall be used e.g '0'.

2.1.6   The BIM object may include supplementary properties from other sources, e.g. BuildingSMART IFC, NBS specification and the product manufacturer (see 2.8, 'Supplementary').

2.1.7   The BIM object may include information concerning all objects forming the *assembly,* as well as the *assembly* itself.

2.1.8   The BIM object shall use units of measurements that are appropriate to its type, intended use and specific domain. The BIM object shall use the *Système international d'unités (SI)* protocols for dimensions and units generally; the only exceptions are where the construction industry has (without dispute) retained imperial terms, e.g. bar as a unit of pressure or where a specific unit has been required by an information schema such as COBie, IFC.

2.1.9   Information shall be provided for characteristic functional measures and quantities of service life planning to BS ISO 15686-4. If no measure is given then a unit count should be assumed. In the case of materials and layered constructions, a unit volume or area should be assumed e.g. m^3.

2.1.10   The BIM object values should use base unit symbols to BS ISO 80000-1.

2.1.11   Where the BIM object property unit has not been given or is not stated within the value, e.g. IFC and COBie properties, it shall be implied by the value type, e.g. length = mm.

2.1.12   The BIM object shall retain *hard coded* properties within the specific *BIM platform* which allow for tasks such as performance analysis and calculations of specific functionality. Each property should be completed with a value if known.

2.1.13   The BIM object shall contain properties providing dimensional information limited to that necessary to define unambiguously the nominal model geometry of the *construction product.*

2.2   Values

2.2.1   The BIM object property value shall be controlled such that completion of the value facilitates information accuracy. The BIM object shall include, where appropriate, pre-determined sizes, multiple sizes, and configurations that are accurately represented and easily available for selection within the *BIM platform.*

2.2.2   The BIM object can represent product *variants* using a property with a value comprising of an alphanumeric or numerical single value, list value, a range value, enumerated value, reference value or bounded value.

    2.2.2.1   The BIM object property can be assigned a single value where a value has a single selection. The value shall be predetermined and completed where the value is available and known.

    2.2.2.2   The BIM object property can be assigned a list value where several unique values of the same type are given in an ordered list, the order of which is significant e.g. 200, 400, 600, 800.

    2.2.2.3   The BIM object property can be assigned a range value where a value has an upper and lower limit (bound). The lowest bound shall be presented first followed by the highest bound. Where the range uses positive and negative signs, the numbers are separated using 'to'. If the value is not given, it indicates an open bound (all values to be greater than or equal to LowerBoundValue, e.g. <nil> - 175 kW.

    2.2.2.4   The BIM object property can be assigned an enumerated value where a value has a choice of fixed values selected from a defined list of enumerators. Individual items shall be separated from each other using a comma and a single space, e.g. a, b, c, d.

2.2.3   The BIM object property value shall be assigned an alphanumeric datatype where the property has no restrictions, to allow both numbers and characters to be entered.

2.2.4   The BIM object property value can be expressed as a formula where the value is dependent upon other properties.

2.2.5   The BIM object value shall be separated from its units by a space, with the exception of degree Celsius, percentage and angular degree where the unit is expressed within the value.

2.2.6   The BIM object property shall be complete with values that are capitalised consistently using sentence case without text formatting. Conjunctions, acronyms, model numbers and units of measure shall adopt common practice.

2.2.7   The BIM object properties shall have values that do not end in a full stop.

2.3   Property groups and usage

2.3.1   The BIM object shall include properties that are organised so that they are easily viewed and retrieved, and consistently located within the *BIM platform* where possible. Properties shall be grouped as follows:

Property Group	Autodesk® Revit®	IFC, ArchiCAD, Vectorworks & AECOsim
IFC	IFC Parameters	Pset_
COBie	Other	COBie
NBS_General	General	NBS_General
NBS_Data	Data	NBS_Data

Note: Where COBie properties are used instead of native IFC2x3 Basic Handover MVD properties then these shall be grouped under 'COBie'.

2.3.2   The BIM object shall include only one occurrence of a property.

2.3.3   The BIM object shall include a single property occurrence based upon the following order of selection where a property exists in multiple sources.

Selection Order	Property Set
1	IFC
2	COBie
3	NBS_General
4	NBS_Data
5	User defined

2.3.4   Where properties have different names but the same definition and value requirement, they shall be used based upon the order of selection in clause 2.3.3.

2.3.5   The BIM object shall map *hard coded* properties that do not conform to naming conventions in section 5 'Metadata Requirements' to a correctly spelt property based upon the order of selection in clause 2.3.3, e.g. 'Fire Rating' (*hard coded*) should be mapped to the IFC property 'FireRating'.

2.3.6   The BIM object type property shall take precedence where a property exists with the same name at type and component level.

2.4   Property naming

2.4.1   Property names shall be entered as CamelCase and, where a parent-child relationship occurs, the child shall be prefixed with the corresponding parent property so they sort logically.

2.4.2   Properties with values having boolean (Yes/ No) data types shall be named so that they clearly imply that they require a Yes/ No value, e.g. HasHandle.

2.4.3   Property names shall not include units.

2.5   IFC

2.5.1   The BIM object shall include IFC 2x3 common *property sets* (Pset xxxxCommon) that are relevant to the *construction product* and associated *IfcTypeObject* where available.

2.5.2   The BIM object may include Pset BuildingElementProxyCommon if no IFC common *property set* (Pset xxxxCommon) exists for that object in IFC 2x3. Where Pset BuildingElementProxyCommon is used, the BIM object shall include a 'Reference' property completed with an alphanumeric value acting as an identifier for the specific object type.

2.6   COBie

2.6.1   Type Properties

2.6.1.1   The BIM object shall include a 'Name' property completed with a unique human readable alphanumeric name that begins with the product type.

2.6.1.2   The BIM object shall include a 'Category' property (or corresponding IFC2x3 property) completed with a classification code, e.g. Uniclass. The value shall be a single text string with the classification number, a colon, and the classification name. If the value is not known or not available, the property shall be completed with 'n/a'.

2.6.1.3   The BIM object shall include a 'Description' property completed with an alphanumeric value giving a concise description of the *construction product* represented by the BIM object. *Manufacturer objects* shall include factual information only and may include the manufacturer's trade and catalogue name.

2.6.1.4   The BIM object shall include an 'AssetType' property (or corresponding IFC2x3 property). The property shall be completed with an alphanumeric default value of:

- 'Fixed' to indicate fixed equipment and products attached and integral to the buildings function, e.g. heating, plumbing, elevators
- 'Movable' to indicate standalone equipment and products, e.g. a chair, table, lamp

2.6.1.5   The BIM object shall include a 'Manufacturer' property completed with a valid email address for the organisation responsible for supplying or manufacturing the construction product. If the value is not known or not available, the property shall be completed with n/a'. For *generic objects* the value shall be completed with 'n/a'.

2.6.1.6   The BIM object shall include a 'ModelNumber' property (or corresponding IFC2x3 property) completed with an alphanumeric value representing the product, item or unit number assigned by the manufacturer of the construction product. If the value is not known or not available, the property shall be completed with 'n/a'. For *generic objects* the value shall be completed with 'n/a'.

2.6.1.7   The BIM object shall include a 'WarrantyGuarantorParts' property completed with a valid email address for the organisation responsible for the parts warranty. If the value is not known or not available, the property shall be completed with n/a'. For *generic objects* the value shall be completed with 'n/a'.

2.6.1.8   The BIM object shall include a 'WarrantyDurationParts' property completed with a numerical value representing the duration in years of the parts warranty. If the value is not known or not available, the property shall be completed with 'n/a'. For *generic objects* the value shall be completed with 'n/a'.

2.6.1.9   The BIM object shall include a 'WarrantyGuarantorLabor' property (or corresponding IFC2x3 property) completed with a valid email address for the organisation responsible for the labour warranty. If the value is not known or not available, the property shall be completed with n/a'. For *generic objects* the value shall be completed with 'n/a'.

2.6.1.10   The BIM object shall include a 'WarrantyDurationLabor' property (or corresponding IFC2x3 property) completed with a numerical value representing the duration in years of the labour warranty. If the value is not known or not available, the property shall be completed with 'n/a'. For *generic objects* the value shall be completed with 'n/a'.

2.6.1.11   The BIM object shall include a 'WarrantyDurationUnit' property (or corresponding IFC2x3 property) completed with the value 'year'. For *generic objects* the value shall be completed with 'n/a'.

2.6.1.12   The BIM object shall include a 'ReplacementCost' property completed with a numerical value representing the cost to replace the product in Pounds (GBP). If the value is not known or not available, the property shall be completed with 'n/a'.

2.6.1.13   The BIM object shall include an 'ExpectedLife' property (or corresponding IFC2x3 property) completed with a numerical value representing the service life, in years. If the value is not known or not available, the property shall be completed with 'n/a'.

2.6.1.14   The BIM object shall include a 'DurationUnit' property (or corresponding IFC2x3 property) completed with the value 'year'.

2.6.1.15   The BIM object shall include a 'WarrantyDescription' property (or corresponding IFC2x3 property) completed with an alphanumeric value providing a description of the warranty content and any exclusions. If the value is not known or not available, the property shall be completed with 'n/a'. For *generic objects* the value shall be completed with 'n/a'.

2.6.1.16   The BIM object shall include a 'NominalLength' property completed with a numerical value of the nominal length (typically the primary or horizontal dimension of the product) in millimetres. If the value is not known or not available, the property shall be completed with 'n/a'.

2.6.1.17   The BIM object shall include a 'NominalWidth' property completed with a numerical value of the nominal width (typically the secondary horizontal dimension of the product) in millimetres. If the value is not known or not available, the property shall be completed with 'n/a'.

2.6.1.18   The BIM object shall include a 'NominalHeight' property completed with a numerical value of the nominal height (typically the vertical characteristic dimension of the product) in millimetres. If the value is not known or not available, the property shall be completed with 'n/a'.

2.6.1.19   The BIM object shall include a 'ModelReference' property completed with an alphanumeric value for the name of the manufactured item as used by the manufacturer. If the value is not known or not available, the property shall be completed with 'n/a'. For *generic objects* the value shall be completed with 'n/a'.

2.6.1.20   The BIM object shall include a 'Shape' property completed with an alphanumeric value representing the characteristic shape of the product. If the value is not known or not available, the property shall be completed with 'n/a'.

2.6.1.21   The BIM object shall include a 'Size' property completed with an alphanumeric value representing the characteristic size of the product. If the value is not known or not available, the property shall be completed with 'n/a'.

2.6.1.22   The BIM object shall include a 'Color' property completed with an alphanumeric value representing the primary colour of the product. If the value is not known or not available, the property shall be completed with 'n/a'.

2.6.1.23   The BIM object shall include a 'Finish' property completed with an alphanumeric value representing the characteristic primary finish of the product. If the value is not known or not available, the property shall be completed with 'n/a'.

2.6.1.24   The BIM object shall include a 'Grade' property completed with an alphanumeric value representing the standard grading(s) to which the product corresponds. If the value is not known or not available, the property shall be completed with 'n/a'.

2.6.1.25   The BIM object shall include a 'Material' property completed with an alphanumeric value representing the characteristic or primary material of the product. If the value is not known or not available, the property shall be completed with 'n/a'.

2.6.1.26   The BIM object shall include a 'Constituents' property completed with an alphanumeric value with details of the features, parts and finishes of the product. If the value is not known or not available, the property shall be completed with 'n/a'.

2.6.1.27   The BIM object shall include a 'Features' property completed with an alphanumeric value representing the primary features or other important characteristics relevant to the product specification. If the value is not known or not available, the property shall be completed with 'n/a'.

2.6.1.28   The BIM object shall include an 'AccessibilityPerformance' property completed with an alphanumeric value representing the accessibility issue(s) which the product satisfies. If the value is not known or not available, the property shall be completed with 'n/a'.

2.6.1.29   The BIM object shall include a 'SustainabilityPerformance' property completed with an alphanumeric value describing sustainability issue(s) which the product satisfies. If the value is not known or not available, the property shall be completed with 'n/a'.

2.6.1.30   The BIM object shall include a 'CodePerformance' property completed with an alphanumeric value representing the code compliance requirement(s) which the product satisfies. If the value is not known or not available, the property shall be completed with 'n/a'.

2.6.2   Component Properties

2.6.2.1   The BIM object shall include a 'SerialNumber' property completed with an alphanumeric default value 'n/a'.

2.6.2.2   The BIM object shall include an 'InstallationDate' property completed with the default value '1900-12-31T23:59:59'.

2.6.2.3   The BIM object shall include a 'WarrantyStartDate' property completed with the default value '1900-12-31T23:59:59'.

2.6.2.4   The BIM object shall include a 'TagNumber' property completed with an alphanumeric default value 'n/a'.

2.6.2.5   The BIM object shall include a 'Barcode' property completed with an alphanumeric default value 'n/a'.

2.6.2.6   The BIM object shall include an 'AssetIdentifier' property completed with an alphanumeric default value 'n/a'.

2.7   NBS_General

2.7.1   The BIM object shall include an 'Author' property completed with an alphanumeric value of the name of the person, organisation or library provider that authored the object.

2.7.2   The BIM object shall include a 'BIMObjectName' property completed with a unique alphanumeric text name that identifies and represents the BIM object within the *BIM platform*.

2.7.3   The BIM object shall include a 'ProductInformation' property completed with:

- A valid uniform resource locator (URL) hyperlink to further product information, such as technical documentation, installation guides, certificates, product catalogues or literature
- An alphanumeric value of a description of the location, where the document can be found

If the value is not known or not available, the property shall be completed with n/a'. For *generic objects* the value shall be completed with 'n/a'.

2.7.4   The BIM object shall include a 'ManufacturerURL' property completed with a valid uniform resource locator (URL) hyperlink to the manufacturer's website. If the value is not known or not available, the property shall be completed with 'n/a'. For *generic objects* the value shall be completed with 'n/a'.

2.7.5   The BIM object shall include a 'NBSDescription' property completed with an alphanumeric value of the appropriate NBS clause title from http://www.nationalbimlibrary.com/api/. If the value is not known or not available, the property shall be completed with 'n/a'.

2.7.6   The BIM object shall include a 'NBSReference' property completed with an alphanumeric value of the appropriate NBS clause reference from http://www.nationalbimlibrary.com/api/. The clause reference shall be in the format xx-yy-zz/nnn where xx-yy-zz is the NBS section code and nnn is the 3 digit NBS clause number.

2.7.7   The BIM object shall include a 'Revision' property for completion within the project environment set with the default value 'n/a'.

2.7.8   The BIM object shall include a 'Uniclass2015Code' property. The value shall be completed with an alphanumeric value of the appropriate Uniclass 2015 classification code. If a suitable Uniclass 2015 classification is not available, the value shall be completed with 'n/a'.

2.7.9   The BIM object shall include a 'Uniclass2015Title' property. The value shall be completed with an alphanumeric value of the appropriate Uniclass 2015 classification title. If a suitable Uniclass 2015 title is not available, the value shall be completed with 'n/a'.

2.7.10   The BIM object shall include a 'Uniclass2015Version' property. The value shall be completed with an alphanumeric value of the appropriate Uniclass 2015 classification version. If a suitable Uniclass 2015 title is not available, the value shall be completed with 'n/a'.

2.7.11   The BIM object shall include a 'Version' property completed with a numerical value, stated as a whole number, representing the sequence of the object publication.

2.8   Supplementary

2.8.1   The BIM object may include characteristic selection and performance properties to BS ISO 15686-4.

2.8.2   The BIM object may include *property sets* relevant to the `IfcPredefinedType` where applicable.

2.8.3   The BIM object may include additional properties derived from the relevant NBS clause and completed with the appropriate property name and value. Property names shall be entered as CamelCase and, where a clause item parent-child relationship exists, the child shall be prefixed with the corresponding parent property. If the value is not known or not available, the property shall be completed with 'n/a'.

2.8.4   The BIM object may include additional properties derived from the *construction product* manufacturer. If the value is not known or not available, the property shall be completed with 'n/a'.

2.8.5   The BIM object may include additional user defined properties. If the value is not known or not available, the property shall be completed with 'n/a'. Properties that do not fall under the groupings outlined in clause 2.3 shall be clearly named to aid understanding (see section 5, Metadata requirements).

2.8.6   The BIM object may include properties to assess economic and environmental impacts of a product as BS 8541-4.
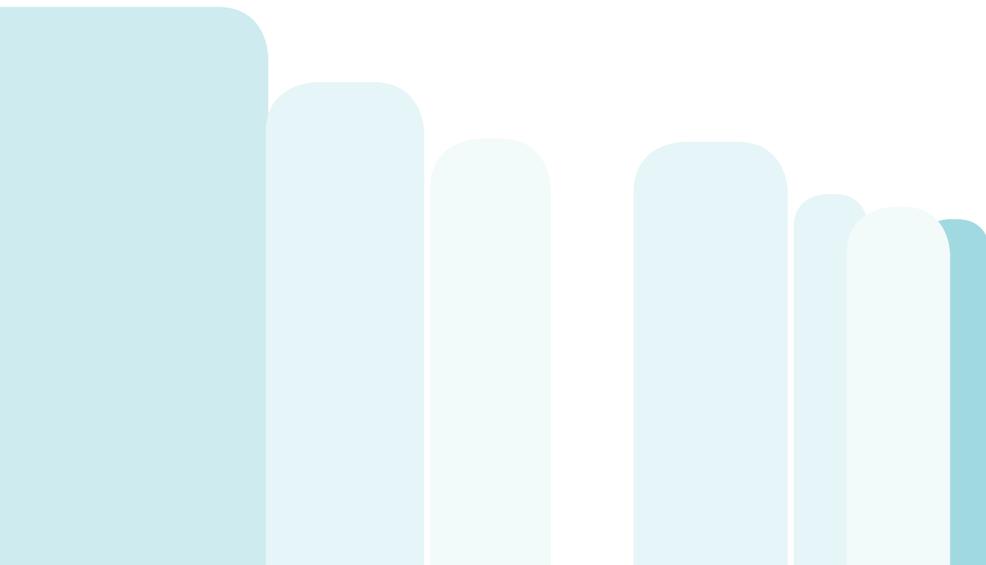
Section 3

GEOMETRY REQUIREMENTS

Section 3: Geometry Requirements

This section defines the minimum geometry requirements of the BIM object to describe the physical form of the *construction product*. How detailed the geometry is depends on a number of factors such as the type of object and how it is intended to be used; together with the practicalities of working with contemporary BIM platforms.

The scope of this section includes general requirements such as level of geometric detail. In addition, this section defines dimensional and measurement requirements.

Geometric information is divided into:
- General geometry data
- Shape data
- Symbolic data
- Space data
- Surface/ material data
- Connection data

3.1   General

3.1.1   The BIM object geometry and graphical detail shall not compromise the performance of the project model in which it is placed.

3.1.2   The BIM object shall have geometry produced at scale 1:1.

3.1.3   The BIM object shall include an insertion point that is suitable for its intended use.

3.1.4   The BIM object shall minimize the use of temporary modelling information such as construction lines and reference material.

3.1.5   The BIM object shall have *parametric geometry* where supported by the BIM platform and where appropriate, that is locked and aligned to appropriate reference elements such as planes, *lines,* levels and points.

3.1.6   The BIM object shall, where appropriate, include dimensions and labels that are *constrained* to reference planes.

3.1.7   The BIM object shall use metric geometry with units of millimetres.

3.1.8   The BIM object shall include geometry with a defined purpose.

3.1.9   Layered BIM objects shall represent the actual thickness of a layer unless unsupported by the BIM platform, in which case the minimum thickness supported by the BIM platform shall be used.

3.2   Shape data

3.2.1   The BIM object shall include *geometric representation* of the space defined by the construction product's external boundary.

3.2.2   The BIM object shall include essential openings and geometric details from which meaningful information can be gained.

3.2.3   The BIM object shall have fixed geometry where the *construction product* is not intended to be modifiable, has a fixed form or is available in one size and shape only.

3.3   Symbolic data

3.3.1   The BIM object shall include a means of displaying a graphical BS 8541-2 *convention* at scales 1: 20, 1:50 and 1:100. The *level of detail* and *convention* shall be appropriate to the *construction product* and scale. The BS 8541-2 *conventions* shall be a *representation,* a *simplified representation* or a *symbol.*

3.3.2   The BIM object may include *information devices* or *supplementary geometry* to show abstract items and convey geometric information that would not otherwise be modelled such as directional arrows and opening directions.

3.3.3   The BIM object shall include default *lines, line types*, hatching and fill patterns, as appropriate to the *BIM platform,* to distinguish between geometric features such as depth of field and construction product parts.

3.3.4   The BIM object may include 2D *lines* where required to convey relevant geometric details that are not otherwise modelled in 3D.

3.4   Space data

3.4.1   The BIM object may include 2D and 3D space data such as:
- Minimum operation space
- Access space
- Placement and transportation space
- Installation space
- Detection zone space

3.5   Surface and material data

3.5.1   The BIM object may include colours, hatching, fill patterns or texture image files to an appropriate scale to reflect the construction product material and appearance in the relevant graphical view , e.g. elevation, section, isometric and animation views.

3.5.2   *Generic objects* may use representative colours for the *construction product,* or white if it exists in a variety of colours.

3.5.3   The BIM object shall provide individual control and selection of textures and colours for a material's constituent parts where functionally possible within the *BIM platform.*

3.5.4   The BIM object may include default materials provided by the *BIM platform.*
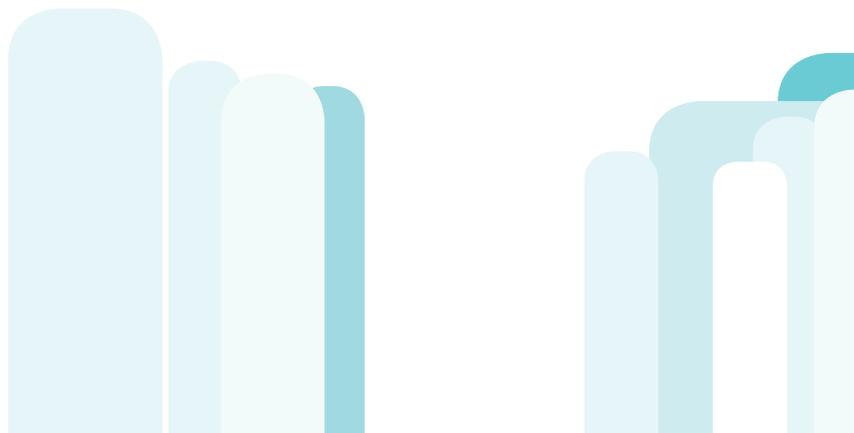
Section 4

FUNCTIONAL REQUIREMENTS

Section 4: Functional Requirements

This section describes the functional requirements that can be embedded within the BIM object, to represent behavioural characteristics, constraints and connectivity.

4.1 General

4.11 The BIM object shall behave in an appropriate manner that reflects its relationship with associated objects within the *BIM platform*.

4.1.2 The BIM object functional behaviour shall not compromise the performance of the project model in which it is placed.

4.1.3 The BIM object shall be configured so that its use is not reliant upon a host object, unless placement on a host is a specific requirement of the *construction product*.

4.1.4 The BIM object shall be modelled so that its behaviour is easily controlled.

4.1.5 The BIM object may include *constraints* that limit selection criteria to those *variations* or *accessories* that are available in the construction product. *Constraints* shall not have a detrimental effect or confuse or limit the object's use.

4.1.6 The BIM object shall be modelled so that it can be associated and connected with other objects where the association is appropriate to the project model and its analysis.

Section 5

METADATA REQUIREMENTS

Section 5: Metadata Requirements

This section defines *metadata* requirements for BIM objects.
The scope of this section includes naming conventions for files, objects, properties, materials, values and images.

5.1   Naming conventions

5.1.1   The BIM object shall use spellings that respect the approach taken by the parent resource, e.g. NBS uses the Shorter Oxford English Dictionary (SOED) as the default spelling guide, COBie and IFC use North American English.

5.1.2   Names shall be composed of alphanumeric characters without text formatting (e.g. a-z, A-Z, 0-9) and single spaces. Names shall be limited to a maximum of 50 characters. *Fields* shall be separated by the underscore character (_).

5.1.3   The BIM object shall include properties and values that are consistently named.

5.1.4   Where the *BIM platform* has file name character limitations, the values within the *fields* can be abbreviated. An abbreviation can be created using no more than 7 characters, using upper-case lettering without full stops and spaces. The same abbreviation shall be used for its singular or plural contexts.

5.2   File and BIM object naming

5.2.1   The BIM object name and file name shall be unique.

5.2.2   Names shall be composed of only alphanumeric characters without text formatting (e.g. a-z, A-Z, 0-9). The naming *fields* shall use the underscore character (_) as a delimiter and the dash character (-) within phrases. Information within each *field* is to be CamelCase (capitalized first letters to words and no spaces). No spaces or other punctuation shall be used.

5.2.3   The file and BIM object name shall be composed of:

<Role>_<Source>_<Type>_<Subtype/ product code>_<Differentiator>

Field	Type	Description
1	Role	Used to convey the library object author by a 3 – 6 digit code.
2	Source	Used to identify the library object manufacturer. The manufacturer name shall not be abbreviated. For a *generic object* this *field* may be omitted.
3	Type	Used to identify the object type.
4	Subtype/ Product code	Used to convey additional information to further define the construction product such as the product range. The manufacturer product range shall not be abbreviated. This *field* can also be used to identify the predefined (Sub)type.
5 (Optional)	Differentiator	Used to convey additional specialist information not captured in *property* data.

5.2.4   The BIM object file name shall include the default file extension for its respective *BIM Platform* or file format.

5.3   Naming of individual layers within a multi-layered object

5.3.1   A multi-layered BIM object shall include individual layers that are named to clause 5.2

5.4   Naming of materials within the BIM platform

5.4.1   The material name shall be unique.

5.4.2   The material name shall be composed of:
<Role>_<Source>_<Material>_<Subtype>_<Differentiator>

Field	Type	Description
1	Role	Used to convey the library object author by a 3-6 digit code.
2	Source	Used to identify the material manufacturer. The manufacturer name shall not be abbreviated. For *generic objects* this *field* shall be omitted.
3	Material	Used to identify the material type, e.g. plastic.
4(Optional)	Subtype/ Product code	Used to convey additional information to further define the construction product such as the product range. The manufacturer product range shall not be abbreviated. This field can also be used to identify the predefined (sub)type.
5(Optional)	Differentiator	Used to convey additional specialisation information not captured in attribute data, e.g. blue.

5.4.3   Objects in Autodesk® Revit® format shall include properties for material objects that are named with a suffix '_mtrl'.

5.5   Naming of image files for materials

5.5.1   The material image file name shall be unique.

5.5.2   The material image file name shall be recognisable as being intrinsic to the object.

5.5.3   The following naming convention shall be used:
<Source>_<Type>_<SubType>_<Differentiator>_<ImageType> + file extension

Field	Type	Description
1	Source	Used to identify the material manufacturer. The manufacturer name shall not be abbreviated. For *generic object* this *field* shall be omitted.
2	Type	Used to identify the material type, e.g. PileCrptTile.
3	Subtype/ Product code/ Product Range	Used to convey additional information to further define the construction product such as the product range. The manufacturer product range shall not be abbreviated. This *field* can also be used to identify the predefined (sub)type.
4 (Optional)	Differentiator	Used to convey additional specialisation information not captured in *attribute* data, e.g. 2921, Matte.
5	Image type	Used to convey the image type, e.g. bump, cutout, render.

5.5.4   The material image files shall be in bmp or jpg format.

5.6   Image tiling

5.6.1   Where the material image file is to be repeated, it shall be either square or rectangular in shape to allow the image to be repeated and tiled with no overlaps or gaps.

5.6.2   The material image file shall be a minimum
- 512 x 512 pixels for square images
- 512 pixels on its longest side for rectangular images
- 150 dpi

References

References

The following referenced documents apply to this standard.

BS 1192:2007:	*Collaborative production of architectural, engineering and construction information – Code of practice.*
PAS 1192-2:	*Specification for information management for the capital/ delivery phase of construction projects using building information modelling (PAS).*
PAS 1192-3:	*Specification for information management for the operational phase of assets using building information modelling (BIM) (PAS).*
BS 8541-1:2012:	*Library objects for architecture, engineering and construction – Identification and classification – Code of practice.*
BS 8541-2:2011:	*Library objects for architecture, engineering and construction – Recommended 2D symbols of building elements for use in building information modelling.*
BS 8541-3:2012:	*Library objects for architecture, engineering and construction – Shape and measurement – Code of practice.*
BS 8541-4:2012:	*Library objects for architecture, engineering and construction – Attributes for specification and assessment – Code of practice.*
BS EN ISO 80000-1:2013:	*Quantities and units – General.*
BS ISO 15686-6:	*Buildings and constructed assets – Service life planning – Part 6: Procedures for considering environmental impacts.*
BS ISO 16739:2013:	*Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries.*
ISO/PAS 16739:2005:	*Industry Foundation Classes, Release 2x, Platform Specification (IFC2x Platform)*
BS ISO 15686-4:2014:	*Building Construction - Service life planning - Part 4: Service life planning uSi-S Building Information Modelling*
Building Information Management	A standard framework and guide to BS 1192. Mervyn Richards, 2010.

Useful website links:

www.bimtaskgroup.org
www.BuildingSMART-tech.org/ifc/IFC2x3/TC1/html/index.htm
www.BuildingSMART-tech.org/ifc/IFC4/final/html/index.htm
www.cpic.org.uk
www.nationalbimlibrary.com
www.nationalbimlibrary.com/bim-explained
www.nationalbimlibrary.com/about-bim-objects
www.nationalbimlibrary.com/what-is-nbs-national-bim-library
www.nibs.org
www.omniclass.org
www.thenbs.com/bim

Terms and Definitions

Terms and Definitions

Terms and definitions used throughout the NBS BIM Object Standard are generally as defined in PAS 1192-2 and PAS 1192-3. In addition, the following apply:

Term	Definition
Assembly	A collection of objects to form a system. PAS 1192-2: A group of components or types to enable the reuse of standardised design or specification elements improving productivity of design and delivery as well as providing a location to hold specifications and lessons learnt in a simple and useable way.
BIM platform	Application that is usually used in design for generating data for multiple uses. Examples include Autodesk® Revit®, Bentley AECOsim, Graphisoft ArchiCAD, Nemetscheck Vectorworks and Tekla Structures.
COBie (Construction Operation Building information exchange)	A subset of BS ISO 16739 IFC documented as a BuildingSMART model view definition (MVD) which includes operational information. The definition of COBie is maintained by **BuildingSMART Alliance** and BuildingSMART UKI. See also **FM Basic Handover Model View Definition (MVD)**.
Code (BS 1192)	Sequence of characters, often a mnemonic, having a defined meaning when interpreted in the context of the field in which it is entered; used to convey metadata concisely.
Component object	An individual object that has unique geometry and does not rely on any other objects to be understood. It carries information about its identity, appearance, performance and usage. Can also carry behavioural information. The object has unique geometry ranging from simple to highly complex. A component may contain a number of variants to its parameters; however, any variation to the geometry of a component constitutes a new object. For example, a door, chair or light fitting. Note: A component object: • Can be aggregated together with construction material objects to form an assembly, e.g. a room • Is an individual building element that can be reused. For example, doors, stair cores, furniture and internal room layouts, façade panels Component objects are typically inserted and moved/rotated into the required position. The term component is sometimes referred to as instance, occurrence or element.
Components	Specific instances of each type, that may require management such as inspection, maintenance, service or replacement during in 'in-use' phase.
Constraint	Can be: • A 'Geometric constraint' whereby geometric properties are limited and controlled e.g a dimension can be constrained by fixed length or by range, or two lines can be constrained to be parallel • An 'Information constraint' whereby non graphical properties are limited, e.g. product value can only be 'blue' IFC: Restriction for a specified reason.

Construction entity (ISO 12006:2)	Consists of elements defined by technical function, form and/or position such as walls and roofs, ventilation and electrical power supply. Construction entities are the basic units of the built environment and together form, e.g. buildings, landscape, roads and dams. See also Object.
Construction information (ISO 12006-2)	Information resource of interest in a construction process. Includes general reference information as well as project information, e.g. BIM, scale models, drawings, diagrams, calculations, specifications.
Construction object (ISO 12006-2)	Object of interest in the context of a construction process. See also Object.
Construction product	ISO 12006-2: A product intended to be used as a construction resource. IFC defines a product as a physical object (manufactured, supplied or created) for incorporating into a project. It may be physically existing or tangible. A product may be defined by shape representations and have a location in the coordinate space.
Construction resource (ISO 12006-2)	A construction object used in a construction process to achieve a construction result.
Container (BS 1192)	Named persistent set of data within a file system or application data storage hierarchy including, but not limited to, directory, sub-directory, data file, or district sub-set of a data file, such as a chapter or section, layers or symbol.
Container file	Repository used to compile assemblies and components for specific purposes, including export and publication.
Convention (BS 8541-2)	Accepted way of drawing an item which may have the nature of a representation, a simplified representation or a symbol.
Datatypes (defined, enumeration and select) BS ISO 29481-1	Named types of data that may be used, including labels, text descriptions, identifiers, enumerated ranges of possible values from which a selection should be made for alternative routing through a schema.
Document View	'Documentation View' includes, tabular, schedules, cost estimations, thermal calculations, performance reports'. See also view type.
Digital Plan of Works	Digital Plan of Works (dPoW) Schedule of phases, roles, responsibilities, assets and attributes, made available in a computable form. See also RIBA Plan of Works 2013.
Enumeration (IFC)	Construction that allows an attribute value to be one of multiple predefined values identified by name.
External reference (IFC)	Link to information outside the data set, with direct relevance to the specific information the link originates from inside the data set.
Field (BS 1192)	Part of a container name reserved for metadata.
FM Basic Handover Model View Definition (MVD)	An IFC View Definition, or FM Handover Model View Definition, MVD, defines a subset of the IFC schema, that is needed to satisfy one or many Exchange Requirements of the AEC industry. The basic FM hand overview definition developed by BuildingSMART exchanges facility management information among building models.

	The COBie spreadsheet is a mapping of the **FM Handover Model View Definition (MVD)** of the current IFC 2x3 scheme as documented in the COBie responsibility matrix. http://projects.BuildingSMARTalliance.org/files/?artifact_id=4093
Generic object	BS 8541-1: Type object intended for use in stages of design when the object is not resolved in a product. Or Object type intended for use in stages of design when the finalised solution has not yet been completely resolved. Example: Generic – Hand-Drier 285x200x250 (electric device).
Geometric representation	Geometric representation of the space defined by a products external boundaries. Also referred to as *product shape* or *shape representation* in other documentation.
Graphical view	Includes elevation, plan, section, front, side, isometric and animation views. See also **View type**.
Hard coded	Fixed data or property in a **BIM platform** that cannot be altered.
Identification (ISO 16739)	Capability to find, retrieve, report, change, or delete specific instances without ambiguity.
IfcBuildingElementProxyType	This defines a list of commonly shared **property set** definitions of a building element proxy and an optional set of product representations. It is used to define an element specification (i.e. the specific product information that is common to all occurrences of that product type).
IfcPredefinedType	Defines the particular type.
IfcTypeObject	The object type defines the specific information about a type, that is common and shared by multiple object occurrences. The object type is represented by a set of **property set** definitions. Similar to class, template and type.
Industry Foundation Class (IFC)	Open vendor-independent neutral file format that defines an extendable set of consistent data representing building information for exchange and interoperability between AEC software applications. The IFC specification is developed and maintained by BuildingSMART International as its "Data standard". It is registered with ISO as ISO16739.
Information device (BS 8541-2)	Convention indicating an abstract item.
Instance	BS 1192: An occurrence of an entity at a particular location and orientation within a model. Synonym for *occurrence*. Similar to the term instance of a class in object oriented programming. See also **component**.
Layered object	A composite layered object with simple to medium geometry and a range of parameters. A layered object may consist of one layer e.g. waterproof membrane, insulation, metal decking or consist of a number of layers combined to for a multi layered object. A multi layered object is often used where it is more practical to model multiple layers together rather than model each separate layer individually.

Level of detail (BS 8541-3)	Completeness and accuracy of a virtual shape representation compared to the physical and functional characteristics of the actual object.
Level of measurement (BS 8541-3)	Completeness and accuracy of a virtual measurement compared to the physical and function characteristics of the actual object.
Line (ISO 128)	Geometrical object, the length of which is more than half of the line width and which connects an origin with an end in any way, e.g. straight or curved, and without interruptions. The term *line width* is also synonymous with *line weight* or *pen weight*.
Line types	A collection of **lines**. Synonym for *line pattern*.
Manufacturer object	Type object intended to represent an obtainable product, either as a requirement or exemplar or as-built, as defined by BS 8541-1. Note: The term *manufacturer object* is also synonymous with *proprietary object* or *product object*.
Material (object)	May carry information regarding identity, performance and appearance. Material may be assigned a specific colour, surface pattern or designated render appearance and specific line work for 2D representation to control the outward appearance of the **construction product** or geometrical representation in **graphical views**. Materials can be used on their own as finishes and coatings, as building products within an object, or to represent an option within an object. The term material is often synonymous with building material, *construction material* and *surface*.
Metadata (BS-1192)	Data used for the description and management of documents and other containers. Note: Each item of meta-data resides in a field. Codes are the values allowed for fields.
Object	ISO 12006-2: Any perceivable or conceivable word. Or PAS 1192: Item having state, behaviour and unique identity – for example, a wall object. The term object is also synonymous with *entity, construction entity* and *construction element* as defined by ISO 12006-2.
Occurrence object (BS 8541)	Representation of an actual occurrence (**instance**) of an object in a building See also **component**.
Parameter	See **property**.
Parametric geometry	Geometry is that is defined and controlled by its parameters.
Placeholder	A simplified or generic representation of a 3D object (as defined by PAS 1192-2).
Presentation (BS EN ISO 13567-2)	Information which may relate to particular elements or to the model or drawing, and which may need to be switched on or off. Note: Presentation in formation is related primarily to the graphical appearance on screen and paper, as opposed to element information which is related to the physical structure.

Product object (BS 8541)	See **Manufacturer object**.
Property	The generalisation of all characteristics (either types or partial type, i.e. **property sets** that may be assigned to objects. Shared among object instances, it reflects the specific information of an object type, but it may also represent the occurrence information of the actual object in the project context, if it is assigned only to a single object instance. Properties are used to represent technical data and functions for designing, calculating and simulating the product. They can be: ISO 16739: Unit of information that is dynamically defined as a particular entity instance. ISO 12006-2: **Construction objects** have construction properties. Properties are represented as **attributes** in **construction information**. Note: The term **parameter** is often used by **BIM platforms** to describe the property information type that has been used to define a BIM object.
Property set	Collection of characteristics associated with an object and grouped together that can comprise of parameters and attributes.
Representation (BS 8541-2:2011)	Scale view of an object. Note: a) Representation is often also referred to as **visibility** or display. b) The terms 'Low/ symbolic/ simple/ Course, Medium, High/ detailed/ fine/ realistic' are often used to as a substitute for 1:20, 1:50 and 1:100.
RIBA Plan of Work 2013	The RIBA Plan of Work 2013 comprises eight work stages, each with clear boundaries and details the tasks and outputs required at each stage. Further information can be viewed at http://www.ribaplanofwork.com
Type	Common characteristics shared by multiple object occurrences. The named specification for equipment, products and materials. Similar to object class, template, style, category, subcategory, functional type, library part, or subtype in other publications.
Schema	Data model in a formal machine-readable notation. The IFC specification consists of such a schema and associated informal human-readable semantic definitions. The schema describes a set of data types and their possible relationships.
Section (ISO 10209-1:1992)	A representation showing only the outlines of an object lying in one or more cutting planes. Synonym for *cut*.
Selection property (BS ISO 16757:1)	Used to select a single product from a catalogue which often contains more than a million products of a similar kind.
Simplified representation (BS 8541-2	Scale view incorporating only the essential shape, size or features of an object.
Specification	Description of the quality of, and requirements of, the construction product.
Supplementary geometry (BS ISO 16792)	Geometric elements included in product definition data to commutate design requirements but not intended to represent a portion of the manufactured product.

Symbol (BS 8541-2)	Graphical device without scale used: a) on a drawing to indicate the occurrence and/or location of an item b) in an annotation to indicate one or more of the attributes of that item.
System	Systems consist of products defined by technical function, form and/or material such as masonry, insolation and blockwork. IFC: organised combinations of related parts, composed for a common purpose or function or to provide a service. System is essentially a functionally related aggregation of products.
Système international d'unités (SI) (International System of Units) (BS EN ISO 800000-1)	System of units, based on the International System of Quantities and adopted by the General Conference on Weights and Measures (CGPM). Comprises names and symbols, including a series of prefixes, with rules for their use.
Value(s)	Information given against a property. Example: Text, Boolean, Length, Look up table, Real, Units, Volume.
Variations/ Variants	A form or version that differs in some respect from other forms of the same things or from a standard.
View types	Collective term used for and including graphical view and document view.
Visibility	See representation.

Contact

NBS welcomes feedback and encourages all parties from the construction industry to comment on the NBS BIM Object Standard and help shape future editions.

Send your feedback to:

Email: info@thenbs.com
Telephone: 0345 456 9594, option 1
Telephone overseas: +44 191 232 9594

NBS telephone lines are open Monday to Friday 9am to 5pm

Please note: calls may be recorded for quality and training purposes and to ensure we deliver the best possible experience for our customers.

Revision History:

1.0   First Edition

1.1   Non-technical amendments for enhanced downloadable pdf document

1.2   Further acknowledgements added. Typographical correction to clause 2.6.1.22 made. Hyperlinks added to references section for enhanced downloadable pdf version.

1.3   Section 2 updated to remove the Uniclass 2 property and properties added relating to Uniclass 2015.

NBS

The Old Post Office
St Nicholas Street
Newcastle upon Tyne
NE1 1RH
T. 0345 456 9494
E. info@theNBS.com
W. theNBS.com

NBS would like to thank the following for their support in formulating the NBS BIM Object Standard

AUTODESK.   Bentley   buildingSMART   GRAPHISOFT.   National BIM Library   NEMETSCHEK Vectorworks