

## **The 20 key BIM terms you need to know**

With the sheer volume of new technical terms and keywords being used in connection with BIM, the average construction industry worker could be forgiven for being confused by the jargon. With that in mind, The [NBS](#) has created the following list of the 20 need-to-know BIM terms, and their definitions.

### **1. 4D, 5D, 6D**

First there was 2D CAD, then 3D CAD – now there are extra dimensions to refer to the linking of the BIM model with time-, cost- and schedule-related information (although the precise order hasn't to date been agreed across the whole industry).

### **2. Asset Information Model (AIM), Building Information Model (BIM), Project Information Model (PIM)**

Not only is there the 'Building' information model, but the 'Asset' information model – which is the name given to the same model post-construction, i.e. supplemented with the data needed to assist in the running of the completed asset. Note that 'asset' can also refer to civil engineering and infrastructure work (see also Uniclass, below).

Conversely, the 'Project' information model is the name given during the design and construction stage, i.e. what's commonly known as the project among the design team.

### **3. BIM execution plan (BEP)**

PAS 1192-2 (see below) proposes that a BIM Execution Plan is created for managing the delivery of the project. This in turn is split into a 'pre-contract' BEP, in response to the Employer's Information Requirements (in other words, comparable to 'contractor's proposals' in a Design & Build contract) and a 'post-contract' BEP which sets out the contracted delivery details.

### **4. CIC BIM protocol**

A supplementary legal agreement which is designed to be used by construction clients and contractor clients. It is incorporated into professional services appointments and construction contracts – an amendment to standard terms, creating additional rights and obligations for the employer and the contracted party to facilitate collaborative working, while safeguarding intellectual property ownership and liability differentiation between those involved.

### **5. Clash rendition**

Referred to in PAS 1192-2, rendition of the native-format model file is to be used specifically for spatial coordination processes. Used to achieve clash avoidance or for clash detection (between, for example structure and services) between Building Information Models prepared by different disciplines. The key benefit is in reducing errors, and hence costs, pre-construction commencement.

### **6. Common Data Environment (CDE)**

This is a central information repository that can be accessed by all stakeholders in a project. Whilst all the data within the CDE can be accessed freely, ownership is still retained by the originator. Cloud storage is a popular method of providing a CDE, although it could also be a project extranet. The scope and requirements for a CDE are defined in PAS 1192-2 (see below).

### **7. Construction Operations Building Information Exchange (COBie)**

COBie is a data schema which is delivered in a spreadsheet data format, and contains a 'subset' of the information in the building model (all except graphical data, and hence a subset of IFC; see below), for FM handover. It was originally devised by the US Army Engineering Corps. Over the

course of a project, data can be added to it from a range of sources (besides CAD programs), relating to brief, design, construction, operation, refurbishment or demolition, as the case may be. The Government's Level 2-mandated requirement is for COBie-compliant information exchange (see above). BS 1192-4 documents best practice for the implementation of COBie.

### **8. Data drop**

A key information delivery stage, referred to in the BIM Industry Working Group's Strategy Paper for the Government Construction Client Group, and also the CIC BIM Protocol. PAS1192-2 refers instead to 'data delivery' and 'information exchange'. These match common project stages, as set out in the RIBA Plan of Work 2013, but they are to be made electronically. Level 2 compliance requires these to be to the COBie standard (see below).

### **9. Data Exchange Specification**

A specification for electronic file formats that are used for the exchange of digital data between different BIM software applications, thereby facilitating interoperability. Examples include IFC and COBie (see above). PAS 1192-2 outlines information exchange activities.

### **10. Federated model**

This is, in essence, a combined Building Information Model that has been compiled by amalgamating several different models into one (or importing one model into another; i.e. 'collaborative' working). For example, an architect can import a structural engineer's model data into their spatial model. This is the basis of the UK government's Level 2 BIM mandate, whereas Level 3 will result in all stakeholders working on one shared model ('integrated').

### **11. Government Soft Landings (GSL)**

A UK government-initiated handover protocol to champion better outcomes for built assets during the design and construction stages. Its objective is to reduce costs (capital and running) and improve performance of asset delivery and operation, and can be assisted through the use of a Building Information Model. Two notable features are that:

- BIM is intended to be used increasingly as a data management tool to streamline the briefing process
- Post Occupancy Evaluation is carried out, to measure and optimise performance of the asset, and learn lessons for the future.

### **12. Industry Foundation Class (IFC)**

IFC is an object-based format, to enable exchange of information between different software. Developed by 'buildingSMART', a global alliance specialising in open standards for BIM, IFC is an official standard, BS ISO 16739, and contains geometric as well as other data.

### **13. Information Delivery Manual (IDM)**

To make BIM effective, information needs to be:

- made available when it is needed and
- to a satisfactory quality.

This can be achieved by using an Information Delivery Manual, that identifies the various construction processes, and the information required at each stage. ISO 29481-1 specifies a methodology for the format of the IDM.

IDM also forms one part of the BuildingSMART interoperability model; the other two parts being the

Data Dictionary (mapping alternative terms for common elements) and IFC (see above). Note that this is beyond the scope of Level 2 requirements.

#### **14. Information Manager**

The CIC BIM Protocol (see above) refers to and provides for the appointment of an 'Information Manager' by the employer. This is, in essence, a project manager, who is responsible for managing the delivery of the asset using BIM procedures and methods. This is expected to form part of a wider set of duties under an existing appointment and is likely to be performed either by the Design Lead or the Project Lead.

#### **15. Level 0 BIM, Level 1 BIM, Level 2 BIM, Level 3 BIM**

The move to 'full' collaborative working via distinct and recognisable milestones, in the form of 'levels'. These have been defined within a range from 0 to 3, and, whilst there is some debate about the exact meaning of each level, the broad concept is:

- Level 0 – no collaboration. 2D CAD drafting only. Output and distribution is via paper or electronic prints, or a mixture of both.
- Level 1 – a mixture of 3D CAD for concept work, and 2D for drafting of statutory approval documentation and Production Information. CAD standards are managed to BS 1192:2007, and electronic sharing of data is carried out from a common data environment (CDE), often managed by the contractor. There is no collaboration between different disciplines – each publishes and maintains its own data.
- Level 2 – collaborative working – all parties use their own 3D CAD models. Design information is shared through a common file format, which enables any organisation to be able to combine that data with their own in order to carry out interrogative checks on it. Hence any CAD software that each party used must be capable of exporting to a common file format. This is the method of working that has been set as a minimum target by the UK government for all public-sector work, by 2016.
- Level 3 – integrated working between all disciplines by using a single, shared project model which is held in a common data environment (see above). All parties can access and modify that same model, removing the final layer of risk for conflicting information. This is known as 'Open BIM' (see below), and the UK government's target date for public-sector working is 2018, although the precise requirements have yet to be determined.

Note that the definition of BIM maturity Level 2 was originally developed as part of the UK Government strategy in 2011. It is also defined in PAS 1192-2, with reference to best practice and the adoption tools and standards. It is also worth noting, though, PAS 1192-2 acknowledges that, given the early stages of adoption of managed methods of working in BIM at the time the PAS was drafted, it can be expected that Level 2 practices will continue to evolve, and that the scope of information sharing and exchange will vary from project to project. Therefore, PAS 1192-2 anticipates that the definition of Level 2 BIM will continue to evolve around the core principles of the shared use of individually authored models in a CDE.

#### **16. Level of detail (LoD), Level of information (LoI)**

'Level of definition' is defined in PAS 1192-2 as the "collective term used for and including 'level of model detail' and the 'level of information detail'". 'Level of model detail' is the description of graphical content on models at each of the stages defined, for example, in the CIC scope of services. The 'level of model information' is the description of non graphical content in models at each of these stages. BS 8541 defines level of detail for BIM objects as:

- Schematic

- Concept
- Defined

BS 8541-3 is the code of practice for the shape and measurement of BIM objects.

Level of information defines how much detail is required at each of these stages – i.e. whether spatial, performance, standard, workmanship, certification etc. [Click here](#) for details on the BIM Toolkit currently under development.

### **17. Life-Cycle Assessment (LCA)**

Life-cycle assessment (LCA, also known as life-cycle analysis) is a cradle-to-grave environmental impact assessment for built assets, in terms of materials and energy. The energy and materials used, along with waste and pollutants produced as a consequence of a product or activity, are quantified over the whole life cycle; the result representing the environmental load of that asset. ISO 14040 defines LCA methodology.

### **18. Open BIM**

An open-source approach to collaborative design, realisation and operation of buildings, based on open standards and workflows. Open BIM is an initiative of several leading software vendors using the buildingSMART Data Model, which incorporates data to ISO 16739 (via the IFC file format), terms to ISO 12006-3 (using the International Framework for Dictionaries, which maps different technical terms that have the same meaning) and process to ISO 29481-1 (the Information Delivery Manual; see above).

### **19. PAS 1192**

The PAS 1192 framework sets out the requirements for the level of model detail (the graphical content), model information (non-graphical content, such as specification data), model definition (its meaning) and model information exchanges:

- PAS 1192-2 deals with the construction (CAPEX) phase, and specifies the requirements for Level 2 maturity; sets out the framework, roles & responsibilities for collaborative BIM working; builds on the existing standard of BS 1192, and expands the scope of the Common Data Environment (see above).
- PAS 1192-3 deals with the operational (OPEX) phase, focussing on use & maintenance of the Asset Information Model (see above), for Facilities Management.
- BS 1192-4 documents best practice for the implementation of COBie.
- PAS 1192-5 is currently under development, and will cover security of data.

### **20. Uniclass**

Classification system used in the UK and owned by CPIC, which groups objects into numerical headers to allow things to be arranged or grouped according to a type or class applied throughout the asset life and may be used as part of the categorisation used in BIM models. Uniclass 1997 tables are referenced by PAS1192 part 2. The classification categories are:

- Complexes or collections of buildings – such as a university campus or an airport
- Entities, which comprise individual buildings
- Activities taking part within different parts of those buildings
- Spaces, or rooms
- Elements such as walls, floors and ceilings
- Systems, for example door and window systems, or wall lining systems

- Products such as sheet materials, or fixings.

Uniclass is more sophisticated than the Common Arrangement of Works Sections (CAWS), in that:

- it encompasses the entire life cycle of a built asset
- it can cater for assets of any scale, so can be used for planning as well as design and construction
- it can accommodate infrastructure and civil engineering projects, in addition to buildings.

Note that a revised version of Uniclass is currently in development as part of the BIM Toolkit project (see above), to improve table alignment for mapping.

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