AEC (UK) BIM Technology Protocol

Practical implementation of BIM for the UK Architectural, Engineering and Construction (AEC) industry.

Version 2.1.1	June 2015	Updated to align with current industry protocols, specification and documents.

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Contents

1 Introduction

1.1 Background

The AEC (UK) Initiative was formed in 2000 to improve the process of design information production, management and exchange. Initially the initiative addressed CAD layering conventions as the primary concern for users of design data. As design needs and technology has developed, the initiative has expanded to cover other aspects of design data production and information exchange.

The committee was re-formed in 2009, including new members from companies and consultancies highly experienced in BIM software and implementation, to address the growing need within the UK AEC industry for application of UK standards in a unified, practical & pragmatic manner within a design environment.

The AEC (UK) BIM Protocol was first released in November 2009.

Version 2.1 represents the first part of a major update to align with current UK (and relevant International) protocols, standards and documents. Updates to the platform-specific supplements will follow in due course.

1.2 The Committee

The group has representatives from architectural, engineering and construction companies in the UK, large and small, hence the adoption of the AEC (UK) moniker. The BIM committee is working together to realise a unified, usable, co-ordinated approach to Building Information Modelling in a project environment.

Committee

Lewis Wenman	J. Murphy & Sons Ltd	lewiswenman@murphygroup.co.uk
Nigel Davies (*Chair*)	Evolve Consultancy	nigel@evolve-consultancy.com
Paul Woddy	White Frog Publishing	paul@whitefrog.co
Ray Purvis	Atkins Global	ray.purvis@atkinsglobal.com
Rob Jackson	Bond Bryan Architects	bim@bondbryan.co.uk

Contributors

CANBIM	Canadian BIM Council
Chris Senior	Revit Factory
Gary Ross	Capita
Gavin Skidmore	Mott MacDonald
Joe Stott	Aedas Architects
Michael Bartyzel	Buro Happold
Mike Johnson	JohnsonBIM
Scott Grant	Soluis

1.3 Disclaimer

All the advice outlined in this document is for information only. The authors and contributing companies take no responsibility for the utilisation of this protocol. The suitability should be considered carefully before embarking upon any integration into your current working practices.

None of the recommendations in this document are intended as a replacement for companies who already have an approach in line with industry protocols, specifications and documents.

1.4 Scope

The AEC (UK) BIM Technology Protocol v2.1 builds on the frameworks defined by the UK (and relevant International) protocols, specifications and documents listed in section **1.6 Reference** as well as existing, proven internal company procedures to:

provide consistent platform-independent guidance for implementation and use of project BIM technologies.

The objectives are:

1. To maximise production efficiency through adopting a coordinated and consistent approach to working towards the UK Government levels of BIM maturity.

   Refer to PAS 1192-2:2013 fig 1 BIM Maturity Levels.

2. To define best practices that ensure delivery of high quality information and uniform information exchange across an entire project.

3. To ensure that digital BIM files are structured correctly to enable efficient working in a collaborative environment across all project participants.

The AEC (UK) BIM Technology Protocol forms the “hub” of a complete technology-based solution. This generic document provides a platform-independent guide, which is further enhanced by the software-specific supplements. The supplementary documents provide the additional detail and enhancements required to implement these protocols using specific BIM software. The following supplements are currently available:

- AEC (UK) BIM Technology Protocol for Autodesk Revit
- AEC (UK) BIM Technology Protocol for Bentley AECOsim Building Designer
- AEC (UK) BIM Technology Protocol for Graphisoft ArchiCAD
- AEC (UK) BIM Technology Protocol for Nemetschek VectorWorks

1.5 Update Procedure

Proposed changes and additions to this protocol should be submitted in writing with accompanying examples, discussion, or other supportive material to committee. Feedback will be gathered and continuously reviewed; they will be collated to form new revisions at appropriate intervals.

It is expected that this protocol will undergo a relatively rapid evolution process, as the industry adapts to the implications and advantages of BIM methodology.

1.6 References

This protocol is written with reference to the following documents:

- AEC (UK) Layer Naming v3.0 2011
- BS1192:2007 Collaborative production of architectural, engineering and construction information
- BS8541-1:2012 Library objects for architecture, engineering and construction. Identification and classification
- BS8541-2:2011 Library objects for architecture, engineering and construction. Recommended 2D symbols of building elements for use in building information modelling
- CIC BIM Protocol
- CIC Outline Scope of Services for the Role of Information Management 2013
- CPIx Protocols
- PAS1192-2:2013 Specification for information management for the capital/delivery phase of construction projects using building information modelling
- RIBA Plan of Work 2013
- Uniclass 2015

1.7 Definitions

The following terms define the concepts of BIM and data structures used in this protocol only.

Component A component is an individual element that can be reused in a number of situations. Examples include doors, stair cores, furniture, façade panels, columns, walls etc. Components are typically inserted and moved/rotated into required position.

Assembly A collection of components and/or modelled elements arranged to define part or all of a building model such as groups or sub-

	models. An assembly typically contains information that can be referenced without repositioning.
Container Model	An optional repository, which can be used to compile assemblies and components for specific purposes including export and publication. A container can exist for each individual profession/discipline or for multiple disciplines, for buildings or for a complete project.
Views/ Output files	A generated rendition of graphical or non-graphical information (a plan, section, elevation, schedule, or other view of a project).
Iterative Model Exchange	The exchange of models & data between employer's decision points and suppliers' information exchange points. Required for the collaborative development of the project design.

2 Best Practice

To achieve technical excellence and a successful outcome to a project, it is essential that BIM working and subsequent information and drawing production output is carefully planned. This must involve explicit attention to management, display and quality of the design data. Below are a number of best practice key principles that will aid efficient, high quality working.

2.1 BIM

- Determine project requirements for BIM, Refer to PAS1192-2:2013 section 5.3 “Contents of the employer’s information requirements (EIR)”. Regardless of the existence of an EIR, key is **what** graphical (Level of Detail (LOD)) and non-graphical (Level of Information (LOI)) information is required and **when**.

- A Project BIM Execution Plan (BEP) appropriate to the project stage shall be put in place that identifies **who** is responsible for key project tasks, outputs and model configuration and **how** project requirements are to be met.

- BIM project reviews should be agreed and take place regularly to ensure model integrity and project workflow is maintained, to achieve the project requirements, and that the BEP is being followed and maintained.

- It is imperative for smooth information exchange that clear guidelines are developed for internal and external collaborative working which maintain the integrity of electronic data. This is equally important for employer’s decision points, suppliers’ information exchange and the iterative model exchange of design data between these more formal deliveries. Refer to PAS1192-2:2013 figure 2 “The information delivery cycle”.

- Identify clear ownership of model elements through the life of the project.

- Sub-divide models between disciplines and within single disciplines to avoid file sizes becoming too big or slow to operate within the agreed project volume strategy as per PAS1192-2:2013 section 7.6 “Volumes”. For further guidance, refer to Section 6 Model structure(s).

- Understand and clearly document what is to be modelled and to what Level of Detail (LOD). Do not over model. Refer to Section 7 Modelling Methodology.

- Define clearly the data (Level of Information (LOI)) to be incorporated into the BIM relevant to the stage.

- Together, the LOD and LOI help to better communicate the expectations of BIM content and clarify the Level of Definition at any point in the design and construction process.

  Level of Definition = LOD + LOI

- Avoid disconnect between the main 3D model and 2D views or output. Revisions to the project should be made “at source” (i.e. in the model) to rather than editing

the 2D to ensure the integrity of the model and coordination between the BIM and its output.

- Outstanding warnings shall be reviewed regularly and important issues resolved.

2.2 Drawing Production

Where drawings are a product of the BIM, traditional drawing conventions still apply, for example:

- A drawing shall contain design information solely for the purpose of the intended use of the drawing.
- To maximise efficiency, a policy of minimum detailing without compromising quality and integrity shall be adopted and repetition of details should be eliminated.
- Numbers of drawings should be kept to an absolute minimum and organised in a logical manner.
- Avoidance of duplication is essential to ensure drawings maintain their integrity as the iterative design process progresses and amendments are made.
- All drawing symbols used should be in line with industry standards, particularly BS8541-2:2011.

3 Implementation Planning

3.1 Roles and Responsibilities

NOTE: This section is in process of being redefined.

The objective is to encourage better collaboration with a practical, inclusive, easy to understand and easy to adopt common language for job titles, descriptions and responsibilities. To create a clear vision, descriptions need to be agreed on key components of the BIM and whose responsibility they are.

The grid in Fig. 1 below has been based on the three primary functions of any successful process:

- Strategic
- Management
- Production

Rather than give a fixed title and job description, the table lists the tasks which must be undertaken under each primary function. These task must be delivered by someone, and on a small project or in a small practice, the majority may be undertaken by one person, whereas at the other end of the scale, the tasks may be divided up between teams of people.

Indicative job titles have been provided with a guide as to the content of each role, with overlap accounting for *Management of*, and *Application of* a particular task. For example, defining the training strategy is a **Strategic** task, whereas providing training to staff is a **Management** task.

	Strategic						Management				Production	
Role	Corporate Objectives	Research	Process + Workflow	Standards	Implementation	Training	Execution Plan	Model Audit	Model Co-ordination	Content Creation	Modelling	Drawings Production
BIM Management	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N
Coordination	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N
Modelling / authoring	N	N	N	N	N	N	N	N	N	Y	Y	Y

Fig. 1 Skills Matrix

3.1.1 Strategic

This is a firm-wide role, not a project role, which impacts on each project, primary responsibilities being:

- Corporate BIM objectives
- Best practice / research
- Creating processes and workflows
- Creating standards and protocols
- Implementation
- Training strategy

3.1.1.1 BIM Management (Strategic)

It is important to understand how vital the BIM management role is. It is not simply a rebranded CAD Manager, nor does it replace the CAD Manager's role. It is about understanding what BIM can achieve: vision, engaging external stakeholders, collaborating partners and the internal teams. Somebody credible

has to be responsible for the BIM strategy, the process change and the cultural impact. In-house or outsourced, successful models cannot be built without a strategic manager.

Business and project size will dictate the structure of the project team delivering and/or implementing BIM.

3.1.2 Management

This is a project focussed role, primary responsibilities being:

- In-house ownership of the Project BIM Execution Plan
- Performing regular audits of the project information and project-specific model philosophies
- Represent the team at interdisciplinary model co-ordination meetings
- Management and quality control of the content creation and dissemination process

3.1.2.1 Coordination (Management)

The management function is project- and BIM-specific. Each project needs an individual (or multiple individuals) to help set up the project, audit the model and co-ordinate with all collaborators. Multi-disciplinary co-ordination with BIM is essential. The individual(s) may manage several small projects.

3.1.3 Production

This is a project focussed role, primary responsibility being the production of information.

3.1.3.1 Modeller / Author (Production)

Production is project specific. BIM experience is not essential to produce the model but technology skills are. Hence, all staff at this level must have appropriate technology skills.

3.2 Project BIM Execution Plan (BEP)

The project BIM Execution Plan (BEP) defines how the modelling and information exchange aspects of the project are to be carried out and how the model and data are formatted. It should specifically address the project BIM requirements or, for full PAS1192-2 compliance, the “Employer’s Information Requirements”. The contents of the BEP are defined in PAS1192-2, section 7.2.

Specifically in terms of BIM authoring tools, the following items need to be considered:

- **Goals and Uses**: Define the project’s BIM goals, uses and aspirations along with the workflows required to deliver them for the specific technology employed.

Refer to PAS1192-2 section 5.3 a), sections 5.3 b) 2) & 3), section 7.2.1 a) 3).

- **Software**: Define and clarify the BIM technology to be utilised and the interoperability strategy. Catalogue information exchange and interoperability issues and determine how inconsistencies will be addressed.

  Refer to PAS1192-2 section 5.3 b) 3), section 7.2.1 d) 1).

  Meetings: Defines the BIM meeting frequency and attendees. Refer to section 0 Base project BEP templates can be downloaded from CPIc but should be reviewed and amended based on project-specific requirements:

  CPIc pre-contract BIM Execution Plan template

  CPIc post-contract BIM Execution Plan template

- Project BIM Meetings.

  Refer to PAS1192-2 section 7.2.1 b) 2).

- **Coordinates**: Defines the common coordinate system for all BIM data and describes the software-specific methods for producing coincident models within accurate modelling limits. Details modifications required to any file types that do not support the approved project methodology.

  Refer to PAS1192-2 section 7.2.1 c) 2).

- **Data Segregation**: Addressing model organisational structures where relevant to enable multi-discipline, multi-user access and project phasing as well as ownership of project information.

  Refer to PAS1192-2 section 7.2.1 c) 1).

- **Checking/Validation**: Defines the checking/validation process of information.

  Refer to PAS1192-2 section 7.2.1 a) 6), section 7.2.1 a) 7)

- **Information Exchange**: Defines the communication protocols along with the frequency and form of information exchange between formal decision points.

  Refer to PAS1192-2 section 7.2.1 a) 3).

  Base project BEP templates can be downloaded from CPIc but should be reviewed and amended based on project-specific requirements:

  CPIc pre-contract BIM Execution Plan template

  CPIc post-contract BIM Execution Plan template

3.3 Project BIM Meetings

3.3.1 BIM Kick-Off

At the outset of the project a BIM Kick-Off meeting shall be initiated.

The purpose of the meeting is to determine the how the project information requirements are to be met and to define the project-wide BIM Execution Plan.

The BIM kick-off meeting should engage with all key stakeholders and should consider early on the information requirements for the full lifecycle of the project.

The agenda for the kick-off meeting can be based around the headings covered in the Project BIM Execution Plan as a basic measure.

3.3.2 BIM review meetings

Efficient and regular communication is essential to the running of a BIM-based project. To facilitate this, regular BIM project meetings, to continually monitor the project to fulfil project BIM requirements and BEP is being followed, are to be encouraged. The frequency of these meetings may vary as the project progresses.

3.3.3 Design review meetings

Where required an individual should be present at the design review meetings with appropriate skills in the relevant technology to navigate the model.

4 Collaborative BIM Working

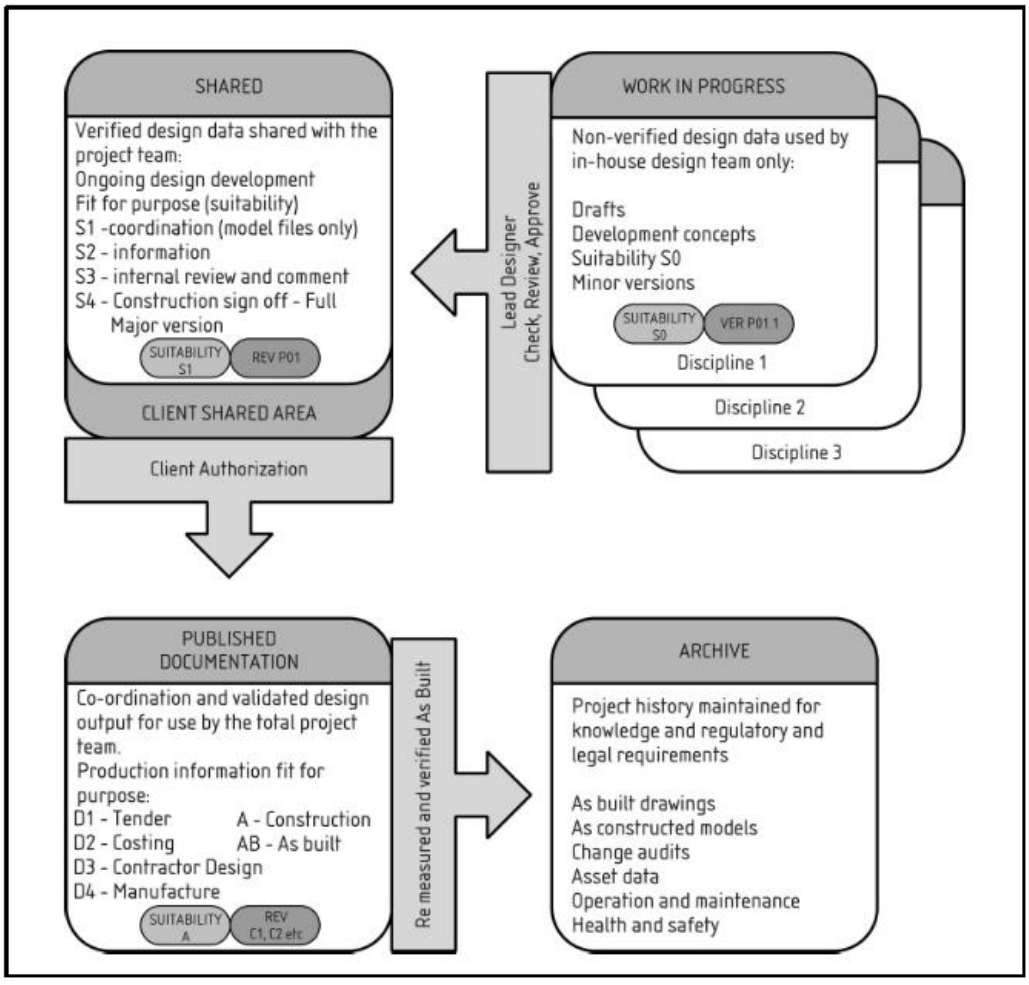
A major constituent of collaborative environments is the ability to communicate, re-use and share data efficiently without loss or misinterpretation. This section summarises the principles outlined in BS1192:2007, which defines the working processes for project collaboration and efficient data sharing.

Refer also to PAS1192-2 section 9.2 for the extended Common Data Environment across the project team at Capex and Opex stages.

4.1 Common Data Environment (CDE) core principles

A **Common Data Environment (CDE)** process approach allows information to be shared between all members of the project team.

There are four areas relevant to a **CDE** as illustrated below:



4.1.1 Work In Progress (WIP)

Model data described as Work in Progress is that which is currently in production and has not yet been checked and verified for use outside of the authoring team.

4.1.2 Shared

To facilitate co-ordinated, efficient working, each party shall controlled release of information available for project-wide formal access through a shared repository or exchange protocol. These files shall be accessible by all from a central location, or replicated in the **Shared Area** of the project folder structure of each party.

Prior to sharing, the data shall be checked, approved and validated in line with the BS1192 workflow.

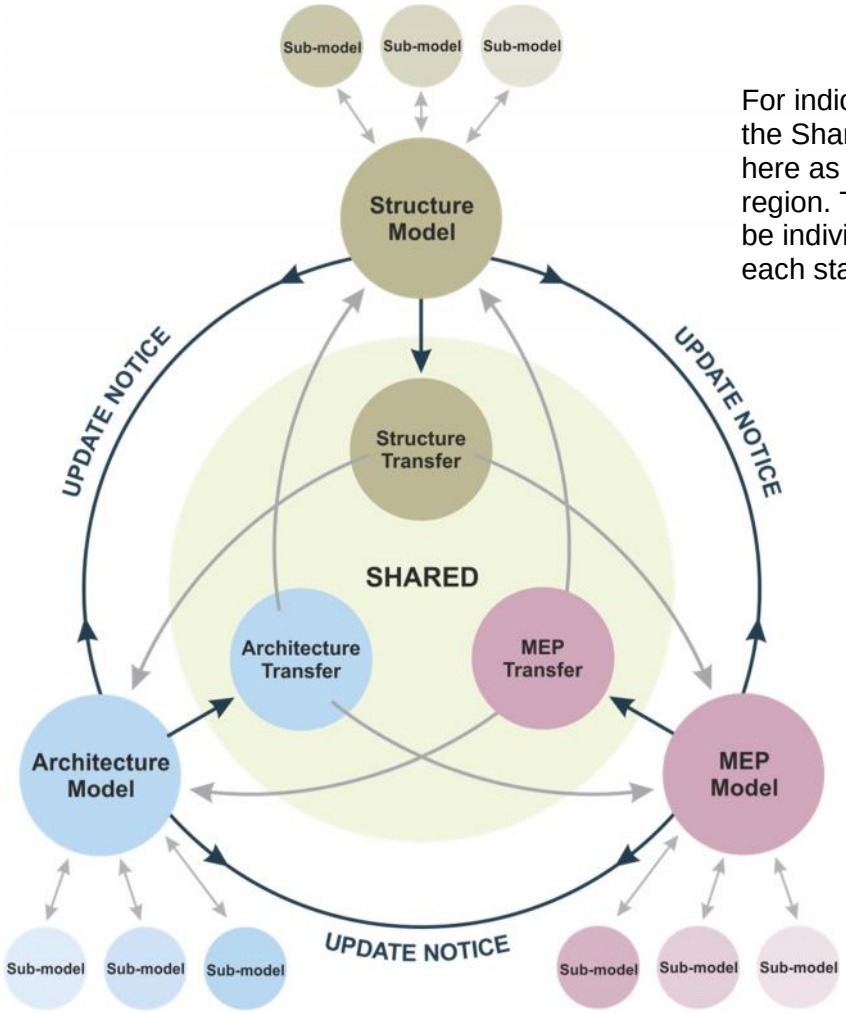
- Only BIM data or files that have been checked, approved and given the appropriate suitability/status code and revision shall be transferred to the Shared Area (see section 4.2 for checking process).

  Refer to BS1192 section 15.3.2 figure 5 and PAS1192-2 section 9.2.3 table 3.

- Sharing of models (iterative model exchanges) shall be scheduled and carried out on a regular basis in order that other disciplines are working to latest validated information as defined in the Project BIM Execution Plan.

- It is recommended that individual discipline model files should be issued exactly as produced with no additional merging, or editing. All necessary references and linked files should also be issued.

- A process for communicating changes needs to be defined. Changes to the shared models shall be effectively communicated to the team through traditional drawing issues sheets or transmittal forms, change register or other suitable notice, such as e-mail, as defined in the project BIM Execution Plan.



For indicative purposes, the Shared area is shown here as a single shaded region. This may, in truth be individual locations for each stakeholder.

4.1.3 Published

Published documentation is created at agreed project milestones from the Shared information. This is a repository of “client approved” information and is not covered in this workflow.

Refer to BS1192 section 4.2.4 and PAS1192-2 section 9.2.

4.1.4 Archive

- All approved information shall be stored in the designated Archive location, including shared, published, superseded and record information.
- Archived data shall reside in logical folder repositories that clearly identify the archive status *e.g. 2014-12-11 Stage 3 Detailed Design.*

Refer to BS1192 section 4.2.5 and PAS1192-2 section 9.2.

4.2 Validation

Prior to the transmittal of any models validation and approvals checks need to be carried out to ensure that the data is technically correct, suitable for its intended purpose and optimised for use.

4.2.1 Model validation

To aid the validation process a check list should be utilised to confirm what has been checked and validated. The “AEC(UK)BIMTechnologyProtocol-ModelValidationChecklist” document provides a check list as a guide for preparing the model file for issue, the intention being that the recipients of the model know that the file is fit for use and will not require additional work to fit within the project framework.

A model publication checklist should contain as a minimum:

- It is advised that all extraneous and unrequired information be removed from the BIM where applicable.
- If contractually pressured to deliver a model containing sheets then the sheet borders should be swapped for a transmittal border.
- Model file has been audited, purged and compressed;
- File format and naming conventions conform to project Data Exchange protocols,
- Data segregation conforms to the agreed project BIM methodology,
- Model files are up-to-date, containing all users’ local modifications,
- Model files are all independent,
- Any linked reference files have been removed and any other associated data required to load the model file is made available,
- Model is correctly assembled through visual inspection,
- Any changes since the last issue are communicated to the project team.

4.2.2 Drawing validation

The drawing validation procedures only cover drawings produced from the BIM. Any other associated drawings should undergo the standard quality assurance and technical checks.

Sheets from the BIM shall be published PDF (preferred), where they can be checked, approved, issued and archived as traditional documents.

Key Points

- Is there a need for a model matrix to explain the file structure?
- If Phasing and Design Options are utilised these will require an explanation.

4.3 Legal

Not included in this release. Refer to CIC BIM Protocol & CIC Best practice guide for PII when using BIM for guidance.

4.4 Data Security & Saving

- All project BIM data developed within a CDE should be subject to the necessary security requirements as specified in the EIR.

  Refer to PAS1192-2 section 5.3 a) 7).

  Further development of the AEC (UK) BIM Technology Protocol will follow the final publication of PAS1192-5: Specification for security-minded building information management, digital built environments and smart asset management.

4.5 BIM access by non-authors

People not directly involved in delivering production information should use appropriate software to access a non-editable version of the model.

The technology to be used and review procedures shall be defined in the project BIM Execution Plan.

5 Interoperability

5.1 Introduction

Interoperability between software products is of paramount importance for successful BIM working. Whether it is output to 2D CAD for subsequent drawing production or output for 3D visualisation or analysis, the preparation and methods adopted to compose the BIM will ultimately determine its successful application within other software packages and technologies.

5.2 Incoming CAD/BIM Data Management

- All incoming CAD/BIM data shall be logged in accordance with the project's data management procedures.
- A copy of incoming CAD/BIM data shall be stored in its original format within the project Incoming sub-folder.
- The suitability of incoming data shall be confirmed prior to making it available project-wide through the project Shared area.
- Modifications of incoming CAD/BIM data shall be kept to the absolute minimum and only be carried out where the received data format prevents design progress. Modifications shall only be carried out with the approval of the person responsible for co-ordination.
- CAD data should be produced to the same coordinate location as each discipline's BIM but may need be relocated to 0,0,0 prior to import. In this instance, the model will not be fully compliant with BS1192 & PAS1192 requirements (See section 7.4.)

5.3 Intended Use of Model

Modelling shall be carried out to the Level of Detail (LOD) required to produce each discipline's plans and elevations accurately at the defined scale, or to deliver the Employer's Information Requirements if they exist. BIM data will only be provided for the specific purpose specified

The BIM issue shall be prepared, checked and exchanged taking into account the requirements of any recipient software applications, to ensure that error free, reliable data is exchanged (e.g. link to analysis packages or interface with GIS).

Example:

When modelling structural frames, some analysis software may dictate that columns need to be stopped at each floor level regardless of whether, in reality they continue as a single length.

5.4 BIM Exchange between Software Platforms

Prior to BIM exchange between different software platforms, the following tasks shall be carried out:

- Understand process of exchange (BIM kick-off meeting) within authoring software.
- Requirements and limitations of the target software/hardware system shall be understood, actioned and resolved in order that BIM data can be prepared appropriately for exchange. This should be recorded in the project BEP.
- 2D output from the BIM shall be constructed in a manner that is usable to the team, reasonably complies with project CAD Standards, and allows easy manipulation of the data held within the file, e.g. layering.
- Data exchange protocol between different software/hardware systems shall be verified through sample testing to ensure data integrity is maintained.

6 Model structure(s)

6.1 General Principles

A number of methods exist which enable collaborative working in a BIM environment, including working practices and team management as well as the technological solutions covered by the remit of this document.

This section deals with the principles of subdividing a model in compliance with the project volume strategy (refer to PAS1192-2 section 7.6) for the purposes of:

- multi-user access,
- operational efficiency,
- collaboration.

In general, the following practices should be followed:

- The model structure shall take into account, and be agreed by all internal and external disciplines to be involved in the modelling and documented in the BEP.
- No more than one building shall be modelled in a single file.
- A model file shall contain data from one discipline / project stakeholder only (although exceptions may apply for Building Services where multiple disciplines converge).
- Further segregation of the geometry may be required to ensure that model files remain workable on available hardware.
- In order to avoid duplication or co-ordination errors, clear definition of the data ownership throughout the life of the project shall be defined and documented. Element ownership may transfer during the project time-line – this shall be explicitly identified in the Project BIM Execution Plan model responsibility matrix.
- Where multiple models make up a single project, a container model should be considered, whose function is to link the various assemblies together for coordination/clash detection purposes.

Example of model structure:

Discipline	Breaks in design
Architecture	Floor by floor or groups of floors
Structure	Major geometry splits, such as east-wing or west-wing, or movement joints between sections.
Mechanical	Construction joints such as podium and tower.

Electrical	Work packages and phases of work.
Civil	Document sets
	Work allocation such as core, shell and interiors.

6.2 Division

Division of a model allows multiple users to simultaneously work on a model. Properly utilised, division of a model can significantly improve efficiency and effectiveness on projects of any size, but in particular multi-user projects.

- Appropriate model divisions shall be established and elements assigned, either individually or by category, location, task allocation, etc.
- To improve hardware performance only the required models should be opened. It is better to utilise only required models as opposed to opening/referencing them and turning their display off.
- Where required, access permissions and model ownership shall be managed to avoid accidental or intentional misuse of the data.
- All models and sub-divisions shall be named following the guidance defined in section 8.4 File Naming.

6.2.1 Saving on Multi-user Projects

- All team members shall save their models regularly to ensure all users have access to up-to-date information and that risk of data loss is reduced.
- Users shall not save without consideration for and resolution of any issues which arise to avoid delays to other team members.

6.3 Referencing

Referencing enables additional geometry and data to be used within a project. This may be either other parts of a project which are too big to manage in a single file, or data from another discipline or external company.

Some projects require that models of single buildings are split into multiple files and linked back together in order to maintain manageable model file size.

In some large projects it is possible that all the linked models may never be brought together as one. Various container files will exist to bring model files together for different purposes.

- Task allocation shall be considered when dividing the model so as to minimise the need for users to switch between models.
- When referencing, the models must be positioned relative to the agreed project origin:

- The real-world co-ordinates of a point on the project shall be defined and coordinated in all models,

- The relationship between True North and Project North is correctly established.

6.3.1 Inter-Disciplinary Referencing

Each separate discipline involved in a project, whether internal or external, shall have its own model and is responsible for the contents of that model in compliance with the Volume Strategy. A discipline can reference another discipline's Shared model for coordination.

- Agreed project coordinates and direction of North shall be agreed and documented at the outset. No deviation from these shall occur without the permission defined in the Project BIM Execution Plan.

- Details of any discipline-specific requirements, such as the difference between Finished Floor Level (FFL) and Structural Slab Level (SSL), shall be fully documented in the Project BIM Execution Plan.

- Ownership of elements shall be properly communicated and tracked through the project Model Responsibility Matrix (e.g. floors may be created by the Architectural team, but are then adopted by the Structural team to form part of the load-bearing structure).

  The matrix should be included in the project BEP. It should define the responsible party (the "originator") for each model and the targeted Level of Model Development at each stage.

- Should a team develop a 'starter model' for a partner discipline, such as defining the structural model in conjunction with the architecture, consideration should be given to creating this in a separate model which can then be referenced as required to allow development of the continued design.

- With models produced for Building Services, several disciplines may be collated in a single model, as a single piece of equipment may require connection to various services. In this scenario, the model may be split in various ways. This project-specific volume strategy must be defined in the Project BIM Execution Plan.

7 Modelling Methodology

This section defines the methodologies for BIM working that enables efficient use and re-use of information.

7.1 Model Development Methodology

A “Model Development Methodology” shall be used to develop projects in early stages as it enables rapid model development and allows for very large models to be created with low hardware requirements.

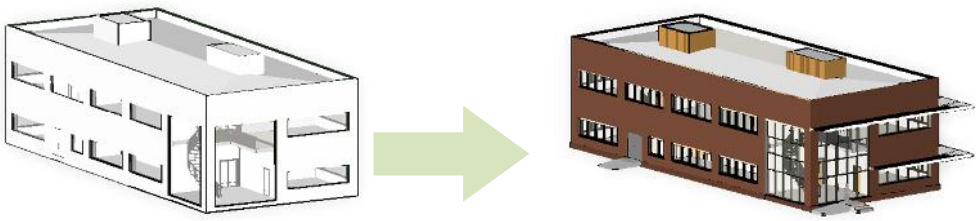
This approach also enables the PAS1192-2 concept of design for bespoke manufacture (refer to PAS1192-2 section 9.6), where placeholders of limited graphical detail may be used prior to construction-specific products being specified.

Additionally, when used in conjunction with the overall Level Of Definition, a separate Level of Detail (LOD) can help to define the expected contents of a BIM at a component level throughout the project lifecycle. For example, an HVAC model may be being developed at an overall LOD3, but because of the design programme, certain aspects of the ductwork sizing may not yet be possible to calculate, and might therefore be specified as a lower level of graphical detail until exact sizing can be designed.

- Concept (Grade 1 - *see section* 7.2) elements shall be used to form categorised place-holders in the model.

- As the design develops, and precise materials and components are chosen, data will be added to the objects. These concept objects can be swapped, individually or en masse, for more specific Grade 2 or Grade 3 variants should a higher level of modelling detail be required.

- For structural components, indicative members which are representative of steel or concrete elements shall be used. The frame shall be constructed from these placeholders. If the section size is known from an early stage it can be chosen from the libraries, but no assumptions shall be made by opting for a default section.



Model initially created using concept grade components.

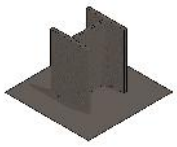
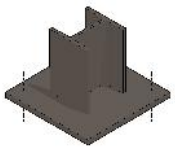
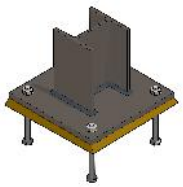
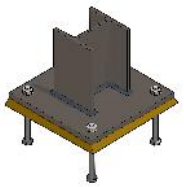
Concept components substituted for Grade 2 or 3 components as design progresses.

7.2 Graded Component Creation

In line with the PAS1192-2 requirements for Level of Detail and Information, all components created, or otherwise obtained shall be graded, named and stored accordingly in the project or central folder structure.

Refer to PAS1192-2 section 9.9.

The graphical appearance is completely independent to the metadata included in the object. For example, it is possible to have a Grade LOD1 (Symbolic) object with full manufacturer's data, cost and specification attached.

LOD1	LOD2	LOD3	LOD4	LOD5	LOD6
Symbolic	Conceptual	Generic	Specific	Construction	As Built
					

Elements shall be graded as follows:

Component Grade LOD1 – Symbolic

- Symbolic place-holder representing an object which may not be to scale or have any dimensional values.
  This is particularly relevant to electrical symbols which may never exist as a 3D object.

Component Grade LOD2 - Conceptual

- Simple place-holder with absolute minimum level detail to be identifiable, e.g. as any type of chair.
- Superficial dimensional representation.
- Created from consistent material: either 'Concept–White' or 'Concept–Glazing'.

Component Grade LOD3 - Generic

- A generic model, sufficiently modelled to identify type and component materials.
- Typically contains level of 2D detail suitable for the "preferred" scale.
- Dimensions may be approximate.

Component Grade LOD4 - Specific

- A specific object, sufficiently modelled to identify type and component materials.
- Accurate dimensions.

- A production, or pre-construction, “design intent” object representing the end of the design stages.
- Suitable for procurement and cost analysis.

Component Grade LOD5 – For Construction / Rendering

- A detailed, accurate and specific object of the construction requirements and building components, including specialist sub-contract geometry and data.
- Should include all necessary sub-components adequately represented to enable construction.
- Used only when a 3D view at a sufficient scale deems the detail necessary due to the object’s proximity to the camera.

Component Grade LOD6 – As Built

- A precisely modelled representation of the constructed object.
- Any construction irregularities or eccentricities should be modelled

Important!

When in doubt, users should opt for less 3D geometry, rather than more, as the efficiency of the BIM is largely defined by the performance of the components contained within.

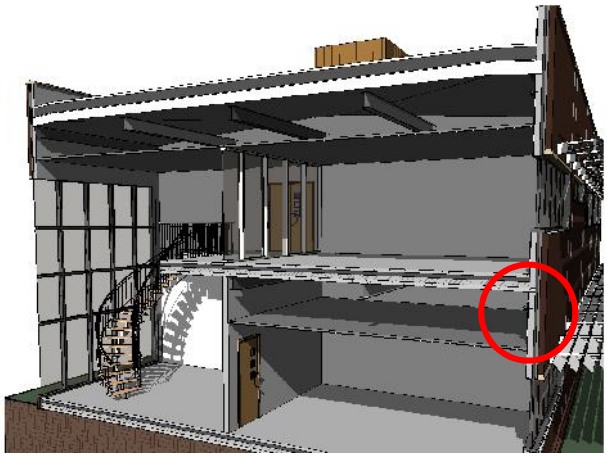
Adherence to the above grading and Model Development Methodology may result in multiple versions of the same element existing at different grades. This is accommodated in the object naming strategy defined in Section 8.6.

- Further purposes of the BIM will lead to additional specifications of the content, which should be built to suit the purposes of the deliverables.
- Objects generated in the development of a project will be stored in the WIP area of the project folder structure.
- The person responsible for co-ordination will assess and verify minimum quality compliance before submitting new objects to the corporate library stored in the central resource folder.
- The intended purpose of the components shall be considered and the results checked and verified prior to large scale use. For instance, structural analysis applications may require elements with certain naming conventions or other criteria, without which they will not be recognised. Different applications may have different requirements.

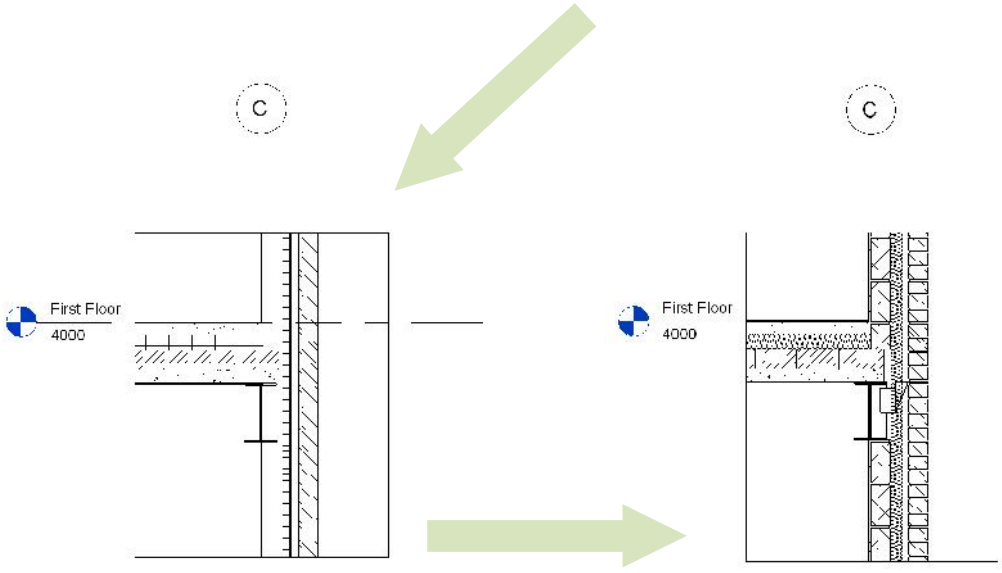
7.2.1 Model / Draughting Detail

At the outset of the project, consideration shall be given to the maximum level of detail to be included in the BIM. Too little and the information will not be suitable for its intended use; too much and the model may become unmanageable and inefficient.

- It shall be dictated in the Project BIM Execution Plan the point at which 3D geometry ceases and 2D detailing is utilised to prepare the published output.
- Intelligent 2D linework shall be developed to accompany the geometry and enhance the required views without undue strain on the hardware. 2D linework is not exclusive to detailed/fabrication information.
- Detailing and enhancement techniques shall be used whenever possible to reduce model complexity, but without compromising the integrity of the model.



.



2D information contained within model

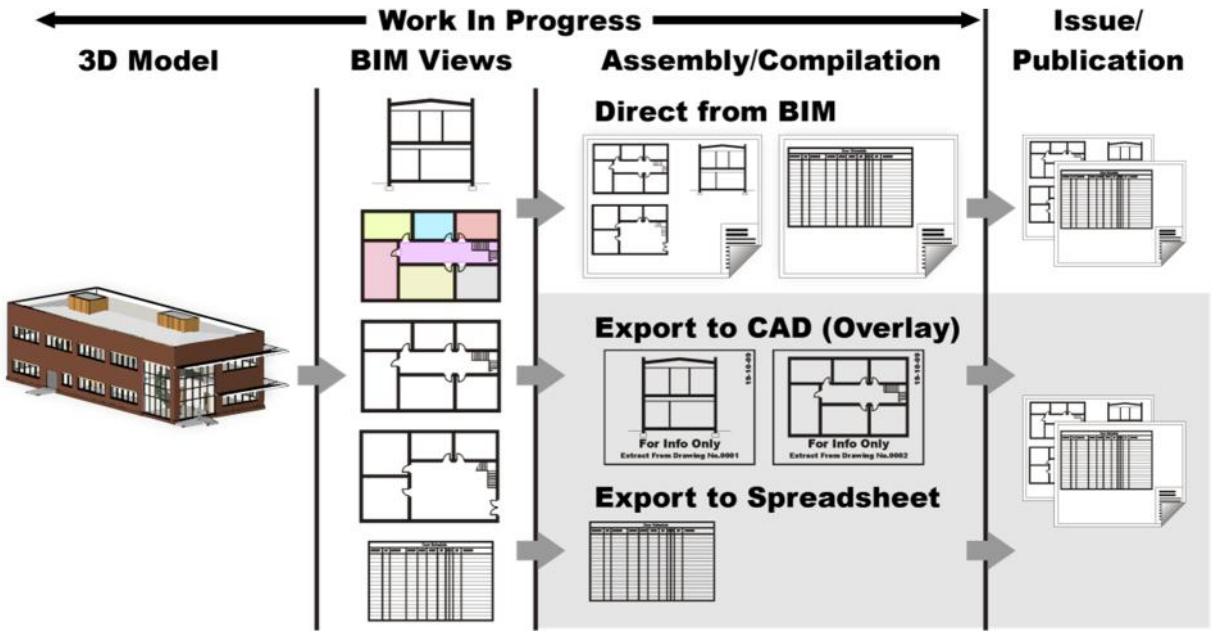
Detail Components, Repeating Details, Filled / Masking Regions, Tags, Keynotes, Text and Detail Lines are used to enhance the finished image

7.3 Drawing Compilation

Drawing compilation and preparation for publication can be carried out in two ways:

1. Fully assembled compilation of views and sheets within the BIM environment (preferred).

2. Export views in the form of output files for assembly and graphical enhancement using 2D detailing tools within a CAD environment.



- Exporting data in order to 'finish off' in CAD negates the advantages of the BIM data for coordination purposes and should be avoided where possible.

- Whichever methodology is chosen, the 3D model shall be developed to the same maximum extent before 2D techniques are applied.

- When CAD or BIM data is referenced into a project, the design teams shall ensure that the latest validated / checked design information is accessed directly from the project Shared area when composing drawing sheets.

7.3.1 Sheet composition direct from within the BIM

Drawing sheet composition from within a BIM environment shall be established through the linking of views, callouts, elevations and drawing sheets fully within the BIM authoring software.

Care shall be taken to ensure that any referenced data is available and visible prior to the publication of documentation from the BIM.

7.3.2 Sheet composition from Views/Output files

Views exported from the BIM for sheet compilation in CAD, or for use as a background to other drawings in CAD, shall be placed on a plain border which clearly indicates the following:

- The status and intended use of the data
- Details of the origin of the data
- The date of production or issue

Where output files are exported from the BIM for further 2D detailing in CAD, originators shall ensure that changes occurring within the BIM are correctly reflected and updated within the CAD files used to produce the final drawing.

If it is a requirement to export data from the BIM authoring software in 'Real-World' co-ordinates, then the export operation must be performed from a model view (such as a floor-plan) and not from a compiled sheet view which will be scaled and/or rotated.

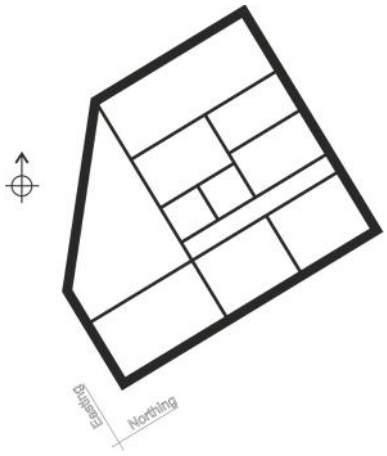
Warning:

The integrity of exported views/output files from within a BIM environment must be checked for accuracy and content prior to drawing compilation.

7.4 Spatial Location & Co-ordination

As defined in BS1192:2007, shared BIM project data shall:

- Use real world co-ordinate systems and relative to North.
- Be produced to true height above project datum.
- Adopt the established project coordinate system across all BIM files to allow them to be referenced without modification.



Refer to BS1192 annex A.

In order to comply with these rules, models should always be constructed close to the "centre point" (0,0,0) of the file, as information becomes less accurate and may cause significant errors the further it is from this location. Real world coordinate values shall then be assigned to a known point of the model using the relevant BIM authoring software tools.

Files that do not use this methodology and are drawn in "true space" need to be shifted closer to 0,0,0 prior to import into the BIM. This shift shall be agreed, consistent and documented in the Project BIM Execution Plan.

Data exported from the BIM can then be either real world or local and whilst the majority of data will need to be delivered in OS co-ordinates for the purposes of collaboration and cross-referencing, some software (e.g. certain structural analysis software) requires data to be located at 0,0. For export to such software, local coordinate systems can be utilised.

7.5 Units and Measurement

- Models shall use consistent units and measurement across the project.

  For building projects: millimetres with two decimal places in order to employ a sufficient level of accuracy.

  For infrastructure projects: metres with three decimal places.

  Refer to BS1192 annex A A1.

- Other uses of the BIM may require a higher level of accuracy, for example fabrication. In these instances consideration should be given to the expected accuracy, but not to the detriment of efficient design modelling.

- Dimension styles shall be created to override project settings, so whilst a measurement might read 3000.00, the permanent dimension will read 3000.

- 2D input/output files shall conform to the unit and measurement protocols designated for specific drawing types e.g.

  - 1 unit = 1.000 metre — Site layout drawings relating to the project coordinate system to an accuracy of 3 decimal places.

  - 1 unit = 1 millimetre — Elements, details, sections, elevations and building structure outlines to an accuracy of 0 decimal places.

- Switching between Imperial / Metric units shall be avoided where possible in order to maintain proper or conventional measurements, such as 50mm rather than 50.8mm.

- CAD data shall be scaled to the appropriate units prior to linking into the BIM environment.

8 Folder Structure and Naming Conventions

8.1 Introduction

This section defines storage of BIM data within the project filing system along with the naming conventions associated with aspects of BIM working.

8.2 Project Folder Structure

The defined structure shall allow the implementation of the BS1192 Common Data Environment. An example is provided in Appendix 11.2.

Where a project comprises of a number of separate elements such as multiple buildings, zones or areas, the BIM structure shall be maintained within a set of designated sub-folders representing the various project elements.

All project data shall be held within the standard project folder structure located on central network servers or appropriate Document Management technology. This includes all WIP components or assemblies.

8.2.1 Central Resource Folder Structure

Standard templates, drawing borders, object definitions and other non-project-specific data shall be held within the server based Central Resource Library, with restricted write access.

Resources for each product and version, the Central BIM Resource Library, shall be maintained within each folder. For further details, refer to section 10.3.2.

8.2.2 Local Project Folder Structure

Where it is a requirement of the BIM authoring software to store files on each local workstation, a strict folder convention shall be defined and employed throughout.

8.3 General Naming Conventions

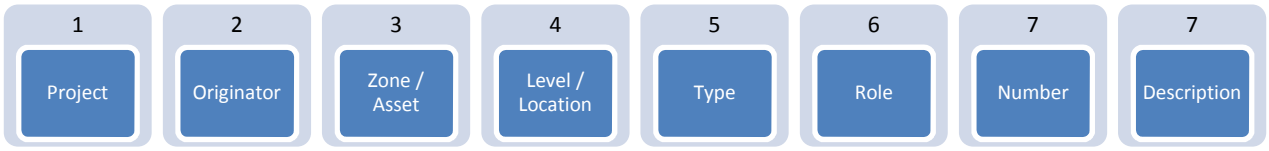
- Use only letters A-Z, hyphen, underscore and numbers 0-9 for all fields.
- All fields shall be separated by a hyphen character “-” Do NOT use spaces.
- Within a field, either CamelCase or an underscore “_” shall be used instead of a space to separate words.
- A single period character "." shall be used to separate the file name from the extension. This character should not be used anywhere else in the file name.
- The file extension shall not be amended or deleted.

- For standard and additional project codes for discipline, zone and level refer to Appendix 11.1
- Elements where a naming convention is not explicitly defined by this Standard shall adopt the naming convention of existing elements and prefix with a 3-character abbreviation to identify corporate author.

8.4 File Naming

Naming of files shall be based on BS1192:2007 container naming. For full compliance, recommended character restrictions should be adopted.

For a more accessible and simpler naming convention, all fields are optional. The BS1192 optional “Description” field is added to enable easier to understand model file naming. To maintain compliance, any variations should be clearly stated in the Project BIM Execution Plan.



Field 1: **Project**

An abbreviated code or number identifying the project.

Field 2: **Originator Code** *(Recommended 3 characters)*

An abbreviated code identifying the originating stakeholder.

Field 3: **Zone and assets** *(2 characters)*

Identifier of which building, area, phase or zone of the project the model file relates to if the project is sub-divided by zones).

Field 4: **Level and locations** *(2 characters)*

Identifier of which level, or group of levels, the model file relates to if the project is sub-divided by levels.

Field 5: **Type** *(2 characters)*

Document type, which will be **M3** for 3D model files.

Field 6: **Role** *(1 or 2 characters)*

1 or 2 character discipline identifier code. Refer to Appendix 11.1.

Field 6: **Number** *(Recommended 5 characters)*

5 character identifier. It should be noted that as the Name is made up by concatenating all fields. The Number part is only unique where other fields are the same. See examples.

Field 7: **Description**

Descriptive field to define the type of data portrayed in the file. Avoid repeating information codified in other fields. Can be used to describe any part of the previous fields, or to further clarify any other aspect of the contained data.

BS1192 model examples:

Model File Name	Description
XYZ-AEC-XX-XX-M3-A-00001-Arch_Building_Model	AEC Architectural building model – no zones or segregation of floors
XYZ-AEC-Z1-XX-M3-ME-00001-Building_Services_Model	AEC Zone 1 Building Services model
XYZ-AEC-Z6-01-M3-S-00001-Structures_Model_Local	AEC Zone 6 Structures model of Level 01. Local version

Other BS1192 examples:

Drawing File Name	Explanation
XYZ-AEC-XX-GF-DR-A-00001-Ground_Floor_GA_Plan; **XYZ-AEC-XX-01-DR-A-00001-First_Floor_GA_Plan;** **XYZ-AEC-XX-02-DR-A-00001-Second_Floor_GA_Plan**	The Number component is the same as the Floor codes change for each Name.
XYZ-AEC-XX-XX-DR-A-00001-GA_Elevation_Sheet_1; **XYZ-AEC-XX-XX-DR-A-00002-GA_Elevation_Sheet_2;** **XYZ-AEC-XX-XX-DR-A-00003-GA_Elevation_Sheet_3**	The Number component changes with each example drawing as all other fields are identical.
XYZ-AEC-XX-XX-SH-A-00001-Internal_Door_Schedule; **XYZ-AEC-XX-XX-SH-A-00002-External_Window_Schedule**	The Number component changes with each example schedule as all other fields are identical.

8.5 Division Naming

For software that requires non-file-based divisions the divisions should be named in a consistent and logical manner to aid navigation through the project.

8.6 Library Object Naming

Library object naming provides a unified approach to the identification of objects across the dataset and associated tools.

Library object naming is covered in BS 8541-1:2012.

- Names should be composed using characters A to Z, a to z, 0 to 9, and the _ underscore character
- The following characters should not be used in names:

  • ,. ! “ £ $ % ^ & * ( ) { }[ ] + = < > ? | \ / @ ’ ~ #¬ ‘ ‘
- The name should use the _ underscore character as the delimiter and use CamelCase (no spaces, and capitalized words) to simplify phrases. No spaces or other punctuation should be used.

Note: It is not recommended to rename out-of-the-box objects where updates are carried out by software vendors.

Object naming can follow one of 2 options and should follow either *4.3.2 Objects with associated classification attribute(s)* or *4.3.3 Objects without associated classification attribute(s).*

8.6.1 Option 1 (see BS 8541-1:2012 4.3.2)

The naming should be as follows:

Field 1: **Source** *(Optional)*

Library author or manufacturer. May be omitted for generic objects.

Field 2: **Type**

The type of object. E.g. Column, Door, Light Fixture etc.

Field 3: **Subtype/Product** *(Optional)*

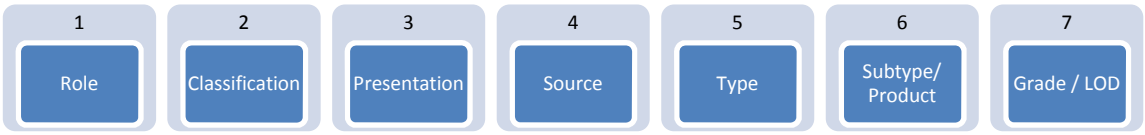
Used to convey additional specialisation information not captured in attribute data. Can be the predefined subtype.

BS8541 example:

Object name	Description
AEC_LightFixture_CeilingPendant	Object authored by AEC which is a Light Fixture Type and the Subtype/Product is a Ceiling Pendant.

8.6.2 OPTION 2 (see BS 8541-1:2012 4.3.3)

The naming should be as follows:



Field 1: **Role** *(Optional)*

Identifies the owner of the object. Normally this would be omitted as objects are generic; ownership is inferred by file/layer containing the object.

Field 2: **Classification**

Uniclass code to classify the object. This is positioned at the start of the name to allow easier listing of all specific object types. e.g. all furniture regardless of manufacturer.

Field 3: **Presentation** *(Optional)*

Indicates the “level of detail” or intended presentation of the object. Presentation codes:

M3 3D model

ME 2D elevation

MP 2D plan

MR 2D reflected ceiling

MS 2D section

Field 4: **Source** *(Optional)*

Library author or manufacturer. May be omitted for generic objects.

Field 5: **Type**

The type of object. E.g. Column, Door, Light Fixture etc.

Field 6: **Subtype/Product** *(Optional)*

Used to convey additional specialisation information not captured in attribute data. Can be the predefined subtype.

Field 7: **Grade / Level of detail** *(Only required in technologies that have no graded representation capabilities)*

Specifies the intended graphical scale of usage and how much detail is contained in the object.

Component Grade LOD1 – Symbolic

Component Grade LOD2 - Conceptual

Component Grade LOD3 - Generic

Component Grade LOD4 - Production

Component Grade LOD5 – Construction / Rendering

Component Grade LOD6 – As Built

BS8541 example:

Object File Name	Description
G25-M3-Wall-Brick-102.5-LOD4	Brick wall, 102.5mm wide, 3-dimensional, grade suitable for up production but not construction (e.g. no brick bond defined or wall ties)
Ss_25_30-M3-Door-InternalDoor-LOD3	Generic internal door, not specifically sized, 3-dimensional, grade for schematic modelling purposes of ~1:200. Classification included as a property of the object.
Ss_25_30-MP-Door-InternalDoor-826	Internal door system of 826mm wide, intended for plan use
Ss_25_30-M3-Door-InternalDoor-1010x2100	Internal door system of 1010 x 2100 structural opening for modelling
M3-Premdor-63990-838x1981x35-LOD5	Internal door made by Premdor, model reference 63990 (838 x 1981 x 35mm), 3-dimensional, fully detailed with ironmongery. Classification included as a property of the object.
S-G2613-M3-Westok-B01-1160x267x134CUB-LOD5	Structural owned steel beam, described as a “B01” (structural engineering naming for a beam type 1), made by Westok, with a section size of 1160 x 267 x 134 CUB, 3-dimensional, grade suitable up to construction.
E-G6432-MP-PowerOutlet-LOD1	Electrical symbol representing a plug socket, intended for plan use.

8.7 Object Property Naming

Parameters, or object properties, should be named in a consistent and logical manner to aid clarity and usability. Unique names should always be used.

8.8 View Naming

Conventions in the naming and use of views are necessary to coordinate team activity and prevent inadvertent changes in the output documents.

View naming should comply with BS1192:2007 container naming conventions. For full compliance, recommended character restrictions should be adopted.

Refer to Section 8.4 aboveFile Naming.

- View naming shall be consistent across all references to that view. Renaming of views shall be carried out with care as any changes will be automatically reflected across all documentation.

Examples:

Name	Description
123-ABC-XX-01-P-A	Architectural first floor plan of project 123 by company ABC.
123-ABC-XX-01-R-A-Ceiling	Reflected ceiling plan of the same floor and project
Level3-DetailPlanElevator1	Third floor detail plan at elevator 1
10001-ACME-Z2-AA-S-M-Grid4	Acme mechanical services' section A-A along gridline 4 for zone Z2.
9876-ACE-B1-NS-S-S-BuildingSection	Ace Structures' full North-South section of building B1.

8.9 View List Scheduling

Refer to software-specific supplements.

8.10 Data Organisation

Well-organised project data both within project folders and internally within your BIM authoring software will help to identify, locate and efficiently use the information you need. Maintaining separate folders for WIP, Shared and Published data is part of a best approach even if they are not named exactly in this manner. Structure and label your files, models and data according to requirements outlined in the software-specific supplements.

8.11 Sheet Naming

Sheet naming shall be based on the document and drawing numbering protocols established for the project. These names automatically match the text as it appears in the title block and any schedules.

9 Presentation Styles

9.1 Introduction

This section defines the criteria which ensure the plotted appearance of drawing output from the BIM is consistent and of the highest quality. It is not the remit of this standard to dictate aspects covered by existing national and corporate draughting standards. Most of the aspects covered in this section are software-specific and should be obtained from those supplements.

9.2 AEC (UK) Compliant Materials

Templates and other source files are available to help construct AEC (UK) compliant projects. They can be obtained from the www.aec-uk.org web site and are maintained by the AEC (UK) BIM committee.

Where client requirements deviate from those expressed in this standard, project-specific templates shall be created. These shall be stored within the Project BIM Resources Library (refer to suggested folder structure, Appendix 11.2).

9.3 Annotation

Where no pre-defined text standards exist, the Text Style shall be **ARIAL NARROW** using font file **ARIALN.TTF**

- The appearance of text shall be consistent across a set of drawings.
- Annotation shall be legible, clear and concise.
- An opaque background should be considered as an aid to clarity.
- Text shall remain legible when drawings are plotted at reduced size. Wherever practical lettering shall not be placed directly on top of lines or symbols.
- Dot style arrowheads shall be used instead of closed filled arrowheads when calling up hatched/shaded areas.

9.4 Text Assignment

All text shall be restricted to the following sizes:

Text height (mm) Plotted full size	Usage
1.8	General text, dimensions, notes – used on A3 & A4 size drawings
2.5	General text, Dimensions notes

3.5	Sub-headings,
3.5	General text, dimensions, notes – A0 drawings
5.0	Normal titles, drawing numbers
7.0	Major titles

Alternative text sizes shall not be used without clarification in the Project BIM Execution Plan.

9.5 Line Weights

Line weights control the graphical display of on-screen data as well as all published output.

- The plotted appearance of modelled components shall be consistent across the project.
- The plotted appearance of modelled components shall be represented in a manner that provides ‘depth’ to the drawing and allows for adequate differentiation of elements cut in section, profile view and priority elements.

9.6 Line Patterns

Refer to software-specific supplements

9.7 Line Styles

Refer to software-specific supplements

9.8 Hatching and Filled Regions

Refer to software-specific supplements

9.9 View Templates

Refer to software-specific supplements

9.10 Dimensioning

Default dimension styles should be provided for the consistent appearance of dimensions across all project documentation. New styles shall be added only if authorised.

- Where practical, all dimensioning shall be created using relevant software dimensioning tools. The dimension text shall not be exploded or overridden, but can be appended, e.g. “1200 (Typ.)”.

- Where practical avoid duplicate dimensioning either within a drawing or within a set of drawings.
- Where practical, dimension lines shall not be broken and shall not cross other dimension lines.
- In general, dimensions shall be placed on a drawing so they may be read from the bottom or right-hand side of the drawing.
- In general, dimension text shall be placed above the dimension line and shall be clear of other lines so that they are legible.
- In general, dimension styles shall adopt standard engineering style dimensioning using:
  - Closed filled 3:1 / 20º arrow head for unconfirmed dimensions
  - 45º diagonal tick/slash for confirmed dimensions
- Default dimension styles shall not be overridden.

9.10.1 Dimension Style Naming Convention:

Field 1: **Text Size**

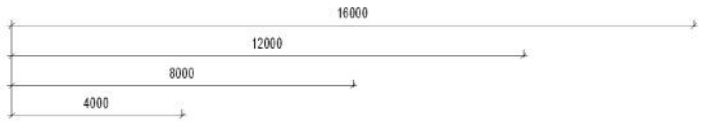
Size of text used on the dimension in the appropriate units. By default this shall be 2.5mm Arial Narrow.

Field 2: **String Type** *(Optional)*

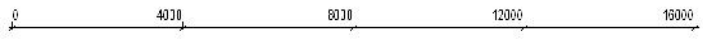
Dimension String Type

CON Continuous

BAS Baseline



ORD Ordinate



Field 3: **Tick Mark**

Description of the tick mark used on the dimension style such as Dot, Arrow or Diagonal tick marks.

Field 4: **(Units)**

The reporting units of the dimension style.

Field 5: **Description** (Optional)

Provision for distinguishing specific dimension styles

Examples:

1.8-Con-Arrow-(mm)

2.5-Con-Diagonal-(mm)-Centreline

2.5-Arrow-(deg)

9.11 Drawing borders and title blocks

Project-specific title blocks shall be created and stored in the Project BIM Resources folder (refer to suggested folder structure, Appendix 11.2).

9.12 Symbols

Standard symbols such as North point, section marks and call-ups shall be made available from within the project or central Resource folder.

All symbols should be defined to comply with BS8541-2:2012.

9.12.1 Section and Detail Marks

For definition of cross-referencing symbols, refer to BS8541-2 table 1.6.

- All **Sections** shall be alphabetically labelled.
- All **Details** shall be numerically labelled.
- Where practical, sections shall be listed consecutively, from left to right and from top to bottom on the drawing on which they are drawn.
- All sections and details shall be correctly cross-referenced in both directions i.e. cross-reference to where the section/detail is actually drawn.
- Drawing cross-referencing shall not include the revision code.

9.13 Copyright

All drawings, sketches or figures containing copyright information shall display the relevant permission to use that data.

For example with Ordnance Survey mapping:

> Maps reproduced by permission of Ordnance Survey on behalf of Her Majesty's Stationary Office © Crown copyright and database right 2009. All rights reserved. Ordnance Survey Licence Number 0123456789

10 Resources

10.1 Introduction

To increase efficiency of BIM working, and to ensure a consistent and high quality output, resources and content shall be shared across the practice.

Certain projects may require deviations from this standard: these shall be defined in the Project BIM Execution Plan document.

10.2 Software

- A consistent software platform will aid the collaboration potential of BIM projects and is recommended. Interoperability between applications should be checked and verified at the outset of the project.
- Where 3rd party applications are used, originators shall ensure the standards defined within this document are complied with, unless situations make this impractical.
- Any potential implementation of software upgrade during the course of a live project shall be reviewed for its appropriateness. Formal approval must be obtained prior to any upgrade.
- Implementation of any upgrade shall be in line with corporate CAD / BIM software strategy.

10.3 BIM Content / Resource Libraries

Content libraries hold objects and other items for use within the BIM.

- Creation of project-specific content is encouraged but shall be coordinated to ensure it is developed in accordance with this standard and the associated best practice guidelines.
- No content shall be stored on users' own hard-drives, but shall be shared in a controlled manner through the Project BIM Resource Library to provide access across the project team (refer to suggested folder structure, Appendix 11.2).
- Project content shall be reviewed periodically for inclusion in the Central BIM Resource Library which is read-only.

10.3.1 Project BIM Resource Library

This shall be the repository for the storage of project-specific standards where deviation from this standard is required due to project or client requirements.

- Standards, templates, title blocks, and other data produced in the process of completing the project shall be held within the Project BIM Resource Library.

- Additions or modification to content held within this resource shall be carried out in a controlled manner and be approved prior to use.

- A suggested folder structure is included in Appendix 11.2.

10.3.2 Central BIM Resource Library

- Standard templates, title blocks, families and other non-project-specific data shall be held within the server based Resource Library, as defined in Section 8.2.1.

- Additions or modification to content held within this resource shall be carried out in a controlled manner and be approved prior to use.

- Content shall be segregated by software product and version.

- When content is updated for use in newer product version:

  - The original data shall be maintained,

  - The updated version of the content shall be created in the appropriate location for that product & version. This avoids ‘forwards incompatibility’ when using content with the version of the software for which it was originally created.

10.4 Keynotes

Refer to software-specific supplements

10.5 Custom metadata

Refer to software-specific supplements

10.6 Keyboard Shortcuts

Only approved keyboard shortcuts shall be used.

11 Appendices

11.1 Model File Naming Codes

Discipline Codes BS1192:2007 standard codes shown in **bold**	
A	**Architects**
B	**Building surveyors**
C	**Civil engineers**
CB	Bridge engineers
CR	Road / highway engineers
CW	Water / dam engineers
D	**Drainage**
E	**Electrical engineers**
EC	Cable Containment
EF	Fire Alarms
EL	Lighting
EP	Protection
ES	Security
F	**Facilities Manager**
G	**GIS, land surveyors**
GA	Aerial surveyors
H	**Heating and Ventilation**
I	**Interior designers**
K	**Client**
L	**Landscape architects**
M	**Mechanical engineers**
ME	Combined Services
MW	Chilled Water
MH	Heating
MV	Ventilation
P	**Public health**
PD	Drainage
PF	Fire Services
PH	Public Health Services
PS	Sanitation and Rainwater
PW	Water Services
Q	**Quantity surveyors**
R	Rail
RS	Railways signaling
RT	Railways track
S	Structural engineers
SF	Façade engineers
SR	Reinforcement detailers
T	**Town & country planners**

Cont…	
W	**Contractors**
X	**Sub-contractors**
Y	**Specialist designers**
YA	Acoustic engineers
YE	Environmental engineers
YF	Fire engineers
YL	Lighting engineers (non-Building Services)
Z	**General (non-specific)**

Note
Additional codes shown feint comply with BS1192 section 10.3.

Project Zone Code Examples	
Z1	Zone 1
ZA	Zone A
B1	Building 1
CP	Car Park
A2	Area Designation 2

Project Level Code Examples	
RF	Roof level
01	First floor
00	Ground floor
B1	Basement level 1
B2	Basement level 2
M1	Mezzanine 1
FN	Foundations
PL	Piling

11.2 Project Folder Structure

The following folder structure is provided as an example arrangement, designed to encourage compliancy with the strategies contained within this standard.

This is provided as an example only and should not be used in preference to or replace any internal company quality assured standard folder structures. Always consider your company processes and procedures, especially if ISO accreditation is involved before adopting change.

- 🗀 ***[Project Folder]***	
- 🗀 BIM	[BIM data repository]
- 🗀 **01-WIP**	**[WIP data repository]**
- 🗀 CAD	[CAD files (incl. 'Modified')]
- 🗀 BIM	[Design models (incl. 'Modified')]
- 🗀 SheetFiles	[Sheet/dwg files]
- 🗀 Export	[Export data e.g. IFC or images]
- 🗀 Families	[Components created during this project]
- 🗀 WIP_TSA	[WIP Temporary Shared Area (TSA)]
- 🗀 **02-Shared**	**[Verified Shared data]**
- 🗀 CAD	[CAD data/output files]
- 🗀 BIM	[Design models]
- 🗀 CoordModels	[Compilation models]
- 🗀 **03-Published**	***[Published Data]***
+ 🗀 YYYYMMDD-Description	[Sample submission folder]
+ 🗀 YYYYMMDD-Description	[Sample submission folder]
- 🗀 **04-Archived**	**[Archived Data repository]**
+ 🗀 YYMMDD-Description	[Archive folder]
+ 🗀 YYMMDD-Description	[Archive folder]
- 🗀 **05-Incoming**	**[Incoming Data repository]**
- 🗀 Source	[Data originator]
+ 🗀 YYYYMMDD-Description	[Incoming folder]
+ 🗀 Source	[Data originator]
- 🗀 **06-Resource**	**[Project BIM Resources Library]**
+ 🗀 Titleblocks	[Drawing borders/titleblocks]
+ 🗀 Logos	[Project logos]
+ 🗀 Standards	[Project standards]

No spaces are to be used in the folder naming as this can potentially interfere with certain file management tools and collaboration across the internet.