

BIM Client Guide

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1 Introduction to BIM

Building Information Modelling (BIM) is the process of generating and managing digital information about a built asset over its whole life. It brings together all design, component and lifecycle information as a number of 3D digital models amalgamated into a single multi-disciplinary information-rich model, developed in a shared online collaborative environment, representing the life of a building from initial concept through design and construction, operation and demolition.

2 What is Level 2 BIM?

ProCure22 are aiming to achieve Level 2 BIM maturity as a minimum standard. Level 2 BIM maturity can be described as:

“A series of domain (e.g. architectural, structural, services) and collaborative federated models, consisting of both 3D geometrical and non-graphical data, prepared by different parties during the project life-cycle within the context of a common data environment.”

3 Key Client Benefits for ProCure22

- BIM capable PSCPs and supply chains
- Greater Certainty and transparency in CAPEX; delivery and operational costs
- Better whole team engagement through a data rich environment
- Creating enhanced delivery at handover, providing means for the end user to operate and maintain the facility more efficiently.
- More streamlined user engagement
- Visualisation & Lifecycle solution testing at the preconstruction stage
- Input of a populated asset data set into Computer Assisted Facilities Management (CAFM) systems – saving time and avoid duplication

The ProCure22 PSCPs BIM suite of documents will support Trusts to be informed clients, engaging at the outset to specify their requirements and embedding the right organisational culture and IT infrastructure.

4 BIM Road Map

The BIM Road Map Appendix 1 (and detailed road map in Appendix 2) identifies the adoption of best practice BIM engagement over a defined timescale aligned to the RIBA stages and NHS Business Case stages. This has been prepared to assist clients in preparing for BIM engagement in a right first time approach ensuring all stakeholders and suppliers are providing the information at the appropriate time, to define outputs and efficiencies over whole life return.

5 Define BIM Deliverables

To take full advantage and maximise efficiencies in capital and operational outcomes, clients need to define clear and unambiguous BIM deliverable requirements. Identifying the objectives from the outset will enable the best results to be provided during the provision and operation of the client’s facilities.

The Client has a key role in defining the requirements for a successful BIM project. This is underpinned by a robust brief, procurement strategy, and ensuring the contractual appointments are aligned with your BIM outcomes.

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6 Develop Client Internal BIM Capabilities / maturity

Clients should be adopting BIM from a position of knowledge and understanding, ideally the client will nominate staff who will have a dedicated interest in the subject matter who will support the aspirations of the organisation and will be instrumental in delivering the change management required client side. These individuals should engage with internal stakeholders to address matters such as;

- Data Security requirements
- Legal and Intellectual Property
- Technical Training
- Knowledge capture and share
- Promotion of best practice

For most Clients increased digital management of their estate will be part of a long term strategy that will include building staff and IT capability as well as digitising existing asset information. All of these will influence the use of BIM on any capital project.

Clients are directed to the Scottish Futures Trust Grading and ROI tool to assist in establishing their BIM requirements for capital projects.

<https://bimportal.scottishfuturestrust.org.uk/level2/nhs-scotland/stage/1/task/1/bim-grading-roi-review-undertake>

Remember that BIM is a process that involves team collaboration, the expertise and responsibility cannot reside with a single 'BIM expert', roles will need to be defined that will reside within the existing responsibilities of existing staff, this may vary from a simple understanding to an in-depth knowledge of CAD systems.

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7 Team / Client BIM Capabilities

The BIM capabilities of the P22 PSCPs have been validated as part of the P22 Framework Award. The PSCPs in turn validate the BIM capability of their supply chains.

It is important that Clients assess the BIM capabilities of any designers where they plan to undertake design work prior to appointment of the P22 PSCP.

It is essential the NHS Client tests the capability and capacity of its own project teams and designers prior to concluding their appointment.

A number of tools are available to assist in this:

The ProCure22 framework has secured the credentials of the PSCPs during the award criteria.
The PSCPs in turn review and validate the PSCM and SCM appointments

Pre-Qualification

PAS 91: 2013 Construction pre-qualification questionnaires (PQQ) includes questions to examine competence in BIM and collaborative information exchange and is an ideal tool to be used at this early stage. Particular focus should be given to capability to deliver in accordance with the requirements of PAS1192:2:2013.

CPic (Construction Project Information Committee) have also produced a series of assessment templates which can and should be utilised prior to contract:

- BIM Assessment Form <http://www.cpic.org.uk/cpix/cpix-bim-assessment-file/>
- Supplier IT assessment Form <http://www.cpic.org.uk/cpix/cpix-supplier-it-assessment-form/>
- Resource Assessment Form <http://www.cpic.org.uk/cpix/cpix-resource-assessment-form/>

Additional clauses should to be added to appointments dealing with BIM roles and responsibilities, the appointment and identity of the Collaborative BIM/Information Manager (usually the Lead Consultant for design development and the Contractor for design execution) and BIM Managers (one from within each contributing organisation), developing a project BIM programme and adherence to the requirements set out in the EIR and BEP.

Considerations from The Clients own internal perspective will include:

Mobilisation

In order to gain the most value out of the process to ultimately procure an asset that is delivered safely and functions in the way it was intended, the following should be considered;

- Have client staff been trained and have access to a platform to open and navigate around the model?
- Have client staff been trained as to how to schedule information and comment on modelled data?
- Is there awareness on how the model can be used to inform stakeholders and customers on the implications of a construction project? Specifically addressing safety and logistical issues?
- Have client staff been trained on and have access to data verification and validation tools?
- Has an ongoing strategy been developed to train, develop and nurture BIM / digital awareness?

Handover

- Is there a drive to capture case studies and share best practice / lessons learned?
- Is there a plan to maintain the model? i.e. 'keeping it live'?
- Is there a capability to check data integrity?
- Is the post-handover data compliant with the EIR?

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8 Appointments incorporating BIM Deliverables

Once deliverables have been determined and deployment planned, the Client must ensure that the PSCP supply chain will provide what is required of them. There are three key documents that need to be drawn up by the client influenced by the OIR/AIR to ensure that their supply chain has clarity around process and project outcomes.

- Use of the relevant P22 NEC 3 Contract BIM appendices.
- A high level Employers Information Requirement (EIR) protocol.
- A pro-forma for project based BIM Execution Plans (BEP).

9 Processes, tools and guides for Implementing Level 2 BIM

The P22 BIM document suite have largely been developed to be consistent with wider BIM documents and standard as summarized below:

PAS 1192-2:2013 Specification for information management for the capital/delivery phase - Provides information on the management of data produced within a BIM project environment, and supplements the processes and procedures contained in BS 1192.

PAS 1192-3, Specification for information management for the operational phase of assets - Processes and data for the commissioning, handover, operation and occupation stages. Takes the processes and develops them for use in the operational life of assets. An important document for the FM/Estates team as it sets out the need for comprehensive and accurate asset information, which can be used as the basis for all asset-related decision making.

BS 1192-4:2014 Collaborative production of information. Fulfilling employer's information exchange requirements using COBie. Defines expectations for the exchange of information throughout the life cycle of an asset, and includes requirements for reviewing and checking for compliance, continuity and completeness. This document standardises the Construction Operation Building Information Exchange (COBie) templates for the employer's information requirements (EIR).

PAS 1192-5:2015 Specification for security-minded BIM, digital built environments and smart asset management: Outlines security threats to the use of information during asset conception, procurement, design, construction, operation, and disposal. It addresses the steps required to create and cultivate an appropriate security mindset and the security culture necessary to enable business to unlock new and more efficient processes and collaborative ways of working

Government Soft Landings (GSL) - is an approach that truly addresses outcomes required and how they will be delivered and assessed. It proposes operational input and challenge to construction and design to ensure that operational costs are maintained and impacts of change assessed.

Classification - A classification system is an essential tool for organising information. Without an agreed, comprehensive system for organising construction information it will be impossible to ensure interoperability between different information systems, design tools, and facilities management tools with data entered once and re-used several times through the process. For Example, Uniclass 2015 is a unified classification for the UK industry covering all construction sectors and is a good example – Please refer to the P22 BIM AIR document.

All the BIM Level 2 process documents and guides can be downloaded via the UK BIM Task Group website: and <http://bim-level2.org/en/>

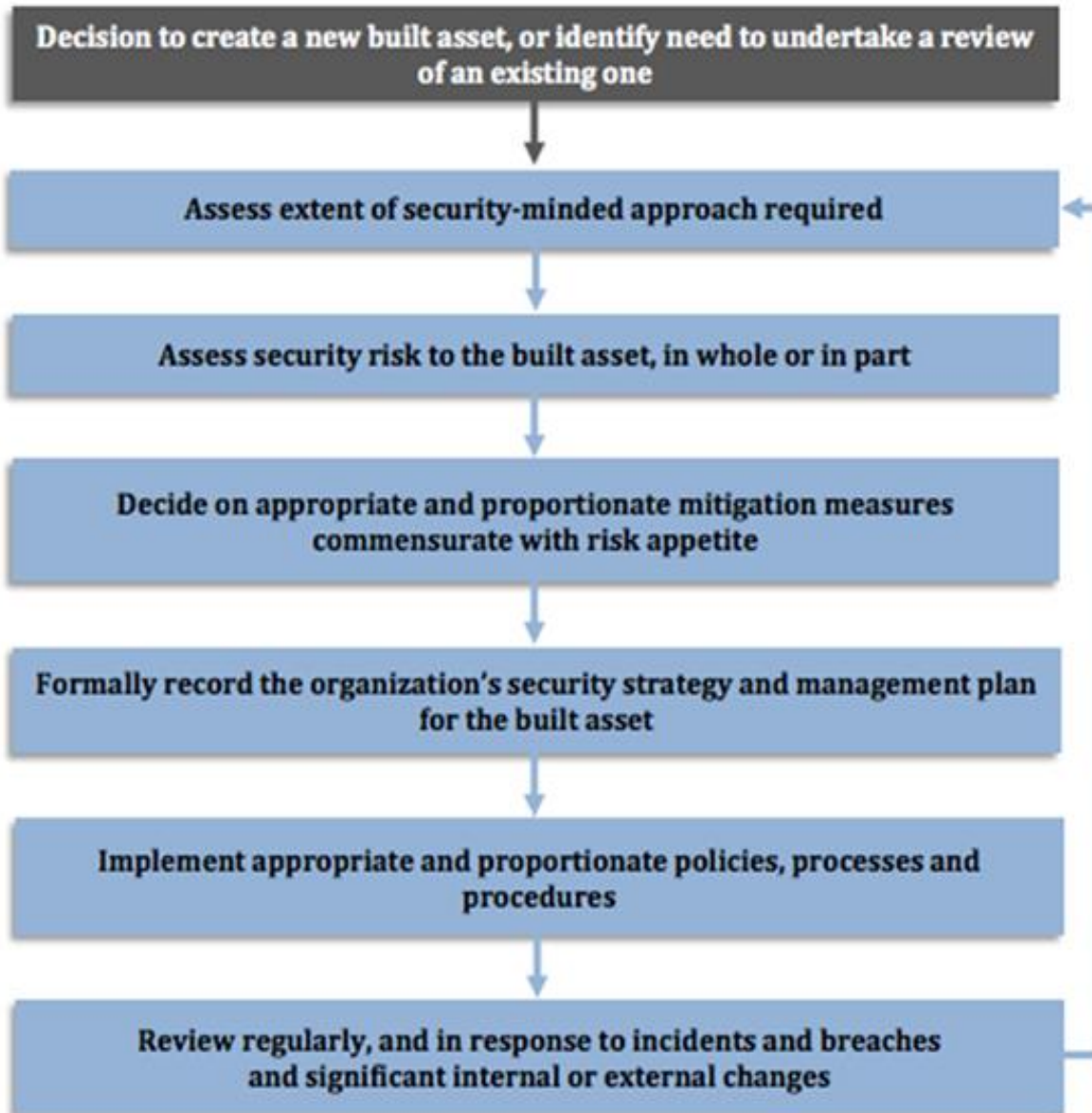
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10 Specification for Security of Information

PAS 1992-5 outlines security threats to the use of information during asset conception, procurement, design, construction, operation, and disposal. It addresses the steps required to create and cultivate an appropriate security mind-set and the security culture necessary to enable business to unlock new and more efficient processes and collaborative ways of working.

The process is summarised in the diagram below:



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NHS England BIM-enabled projects should consider the following as part of their data security strategy:

- Do you and your supply chain have cyber security policies and procedures?
- Do you and your supply chain undertake cyber security awareness and education training?
- Do you and your supply chain have processes to assess and protect a project's technical infrastructure?
- Does the Information Manager consider whether an overall cyber security policy is required for a project?
- Do you and your supply chain clearly establish cyber security responsibilities for the CDE?
- Do you and your supply chain have controls to govern access to the CDE and the protection of BIM data?
- Does your supply chain have awareness and education activities to support cyber security at an overall project level?
- Do you consider protocols for the ongoing custody and maintenance of the 'as built' data information?
- When updating the asset information models do you have in place processes to appropriately manage data with controls over who can update the models, and measures in place to protect their integrity and availability?

1. Does PAS 1192-5 apply to my built asset?

To establish whether PAS 1192-5 applies to a built asset, the Employer or the Asset's Owner should apply the Security Triage process set out in the PAS (Clause 5). This will help determine the level of security-minded approach required for the asset, the associated asset information and any other asset information held pertaining to neighbouring built assets.

2. As an organization with an existing built asset, how can we determine if there are any security issues concerning our asset information?

CPNI (Centre for the Protection of National Infrastructure) has prepared a guidance document setting out questions which an organisation can ask of itself and its supply chain in order to understand what information it, or others, holds in relation to its built assets. The questions will also help in assessing the availability and accessibility of that information, and any associated potential impact on the security of the asset, its users or services.

3. Doesn't the protection of digital asset information just require good cyber security?

Assuring the security of a built asset and related asset information requires a holistic approach – encompassing the aspects of people and process, as well as physical and technological security (see clause 4.3 of PAS 1192-5).

4. How does PAS 1192-5 fit with other government guidance and codes of practice on security?

PAS 1192-5 deals specifically with the security-minded approach to building information modelling, digital built environments and smart asset management. However, the policies, processes and procedures it specifies should, where appropriate, be cross-referenced to the other security management policies and plans which the employer or asset owner has in place, as well as relevant government guidance and codes of practice on wider security issues.

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5. Why can't we just apply ISO 27001?

ISO 27001 sets out the information security requirements for an individual organisation. BIM and smart asset management, as well as future digital built environments, are inherently collaborative processes involving the sharing of large amounts of digital models, data and information between the broad range of organisations in a supply chain, from multinational companies to sole traders. In addition, requiring the application of ISO 27001 may be too onerous for many within this diverse range of enterprises, in particular SMEs and sole traders. It is recommended that the Cyber Essentials Scheme be adopted as a minimum cyber security standard (see clause 5.6 of PAS 1192-5).

6. Why can't the Built Asset Security Manager role be fulfilled by the Information Manager on the project?

The Information Manager exists only during the course of a project and is a role fulfilled by the supply chain. However, the Built Asset Security Manager is directly accountable to the Employer or Asset Owner for the design, implementation and operation of an appropriate security regime throughout the asset's lifecycle.

7. Does the Built Asset Security Manager have a role outside a project?

The Built Asset Security Manager has a key role in security-minded delivery of projects. There is also a need for this function to continue throughout the lifecycle of a sensitive built asset in order to ensure appropriate and proportionate measures are maintained to protect asset information. On smaller projects, the role is likely to be a part-time function and fulfilled by an individual who may undertake or be responsible for security and other duties.

8. Does PAS 1192-5 place any new responsibilities on the Information Manager?

The Information Manager will have to work closely with the Employer's Built Asset Security Manager in the delivery of the Built Asset Security Information Requirements (BASIR). (See Clauses 6 & 10).

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11 Developing Information Requirements

The BIM Road Map in Appendix 1 provides an overview of how an NHS Client can approach the development of its information requirements and how the information relates to the Asset Information Model (AIM) PAS1192:3 and the Project Information Model (PIM) PAS1192:2. The P22 BIM suite of documents are briefly summarised:

Organizational Information Requirement (OIR)

The OIR details the data and information necessary for an organization to satisfy its requirements and meet its objectives. In an Asset Management context, Organisational Information Requirements (OIR) are translated into Asset Information Requirements

Asset Information Requirement (AIR)

The data or information requirements related to an Asset. Asset Information Requirements (AIR) are typically fed into the Asset Information Model and form part of the Employer's Information Requirements

Employer Information requirements (EIR)

The EIR is a high-level protocol document that sets out the BIM standards and deliverables required by the client from the supply chain on all their projects. There is now an emerging set of industry-wide UK standards relating to BIM, and as far as possible it makes sense for a client to adopt these

For FM & O&M information it would also be worth considering defining your own COBie requirements, since much effort has been put into these by the UK government client, by BIM authoring tools for output of COBie information and by FM tools for the input of COBie information.

The EIR may be developed based around a series of simple 'plain language questions' (PLQ's), that the client will wish to answer at specific stages to assess whether the project is developing as required, and whether it should proceed to the next stage. Specific information will be required at specified times, in certain formats and to a certain level of detail to allow the client to answer those questions effectively and efficiently.

BIM Execution Plan (BEP)

This is a project-based protocol document drawn up by the design team as a response to the Client's EIR and will include such matters as:

- Model Assembly Diagram
- BIM Management Structure
- File Structure (BS1192)
- Data Back-Up
- Software Matrix
- Key Common Data for Co-ordination and Orientation
- Model File Sharing arrangements
- Information Exchange
- Level of Detail
- Change Control

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12 Further Information and Guidance

For further information and guidance please refer to the ProCure22 BIM Document Suite.

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12.1 Appendix 1

- ProCure22 BIM Road Map

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12.2 Appendix 2

- ProCure22 BIM Road Map (detailed)

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Appendix 3

13 Glossary of Abbreviations and Terms

BEP	BIM Execution Plan
BIM	Building Information Modelling
BSRIA	Building Services Research and Information Association
BWM	BIM workgroup meeting
CIC	Construction Industry Council
CDE	Common Data Environment
EIR	Employer Information Requirement
IFC	Industry Foundation Class
LOD	Level of Detail
LOI	Level of Information
MPDT	Model Production Delivery Table
NBS	National Building Specification
WIP	Work In Progress
4D	3D representation of an asset with the element of time included to enable simulations.
5D	3D representation of an asset with the element of time and cost included to enable simulations, commercial management and earned value tracking to take place.
BEP	Plan prepared by the suppliers, facilitated by the Employer or the Employer's BIM representative to explain how the information modelling aspects of a project will be carried out
BIM	Process of designing, constructing or operating a building or infrastructure asset using electronic object-oriented information
CIC Scope of Services	Multi-disciplinary scope of services published by the Construction Industry Council (CIC) for use by members of the project team on major projects
COBie	Construction Operation Building information exchange. Structured facility information for the commissioning, operation and maintenance of a project often in a neutral spread sheet format that will be used to supply data to the employer or operator to populate decision-making tools, facilities management and asset management systems
CDE	Common data environment - Single source of information for any given project, used to collect, manage and disseminate all relevant approved project documents for multi-disciplinary teams in a managed process. This is commonly a cloud based SaaS solution synchronised with party servers to host the information model
Data	Information stored but not yet interpreted or analysed
Design intent model	Initial version of the project information model (PIM) developed by the design suppliers
Document	Information for use in the briefing, design, construction, operation, maintenance or decommissioning of a construction project, including but not limited to correspondence, drawings, schedules, specifications, calculations, spread sheets
Drawing	Static, printed, graphical representation of part or all have a project or asset
Employer	Individual or organization named in an appointment or building contract as the employer
EIR	Employer's information requirements - Pre-tender document setting out the information to be delivered, and the standards and processes to be adopted by the supplier as part of the project delivery process

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Federated model	A federated model is an assembly of distinct models or design disciplines, to create a single complete model of the building. Eg Architectural, Structural and Mechanical models may be viewed in a single 'federated' model.
Graphical data	Data conveyed using shape and arrangement in space
Level of Definition	Collective term used for and including "level of model detail" and the "level of model information"
MIDP	Master information delivery plan - Primary plan for when project information is to be prepared, by whom and using what protocols and procedures, incorporating all relevant task information delivery plans
Pre-contract BEP	The pre-contract BEP is to demonstrate the supplier's proposed approach, capability, capacity and competence to meet the EIR. It is utilised prior to the appointment of any stakeholder.
Post-contract BEP	The post-contract BEP is the document defining standard methods and procedures adopted during the contract in order to meet the objectives and requirements set forth in the EIR. It is utilised following the appointment of project stakeholders and in particular the main contractor.
PIP	Project implementation plan - Statement relating to the suppliers' IT and human resources capability to deliver the EIR
SMP	Standard method and procedure - Set of standard methods and procedures covering the way information is named, expressed and referenced.
Volume	Manageable spatial subdivision of a project, defined by the project team as a subdivision of the overall project that allows more than one person to work on the project models simultaneously and consistent with the analysis and design process