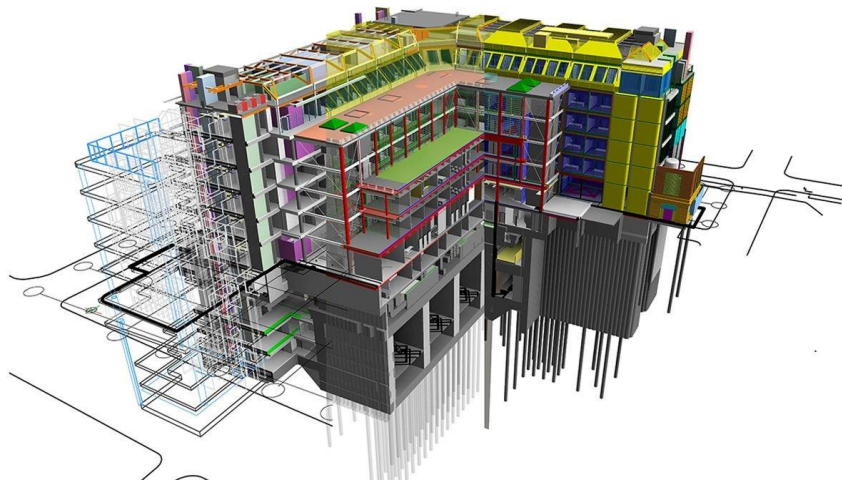




(Building Information Modelling (BIM), n/d)

BIM Information Management Strategy

ANALYTICAL APPRAISAL FOR THE YSGOL Y TWYN PROJECT.
BUILDING INFORMATION MODELLING ACBA 5016



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Glossary of BIM and Project Abbreviations.

Abbreviation	Definition
AIM	Asset Information Model (The information model used for operations and maintenance)
AIR	Asset Information Requirements (Client's statement of information needed for operation/CAFM)
BEP	BIM Execution Plan (Document detailing how information will be delivered by the supply chain)
BIM	Building Information Modelling (The collaborative process of creating and managing information)
BSI	British Standards Institution (The UK's National Standards Body)
CAFM	Computer-Aided Facilities Management (Software system for managing the built asset's lifecycle/operations)
CAPEX	Capital Expenditure (The funds spent on the initial creation or delivery of a physical asset)
CDE	Common Data Environment (The single source of truth for managing project information as per ISO 19650)
COBie	Construction Operations Building Information Exchange (Structured data format for handover to CAFM)
EIR	Exchange Information Requirements (Client's initial statement of information needs)
ISO 19650	International Standards Organization 19650 series (The international standard for information management using BIM)
KCON	King Consultancy (The Project's unique Originator Code)
LOIN	Level of Information Need (The combination of required geometry/detail and non-graphical data at a specific point)
LOD	Level of Detail (The geometrical detail required for an element)
LOI	Level of Information (The non-graphical data required for an element)
NZC	Net Zero Carbon (The mandatory environmental target for Welsh public buildings that drives BIM adoption)
OPEX	Operational Expenditure (The long-term, recurring costs of running and maintaining the asset)
PIM	Project Information Model (The information model built during the delivery phase)
WG	Welsh Government (The key funder/stakeholder)

Summary

King Consultancy is pleased to submit this appraisal outlining the Building Information Modelling (BIM) strategy for the Ysgol Y Twyn project. Our proposed strategy ensures full compliance with the Welsh Government's Sustainable Communities for Learning Programme by strictly following the ISO 19650 series framework (*ISO 19650-1:2018, no date*) for information management. This approach targets BIM Level 2 maturity and beyond (*Patel and Patel (2025)*), utilizing structured data exchange and coordination through a Common Data Environment (CDE) *McPartland (2016)*. By defining clear Levels of Information Need (LOIN) *Swaddle (2022)* and incorporating Whole Life Monitoring capabilities via CAFM data delivery (COBie) (*CONSTRUCTION TO OPERATIONS BUILDING INFORMATION EXCHANGE (COBIE) V3 – National Institute of Building Sciences, n.d.*) for facility management, our plan guarantees reduced OPEX and project risk, improved coordination, and maximum long-term operational efficiency and value for the asset owner.

1. Introduction

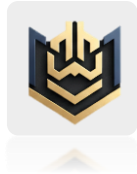
This document serves as the Analytical Appraisal commissioned by Caerphilly Council to establish the foundation of the holistic approach to BIM, for the proposed Ysgol Y Twyn project (UPRN: 5016). The facility combines a new 90-pupil infant school, a 48-place part-time nursery provision, and the essential public facilities. The Twyn Community Hall and a Caerphilly Story Gallery, all designed to operate independently.

The objective of this BIM strategy is to provide assurance to the Welsh Government (WG) that their funding requirements are met and exceeded and is designed to deliver the project with the long-term goals of the Sustainable Communities for Learning Programme (*Sustainable Communities for Learning Programme | GOV.WALES, 2023*). The strategy is focused on utilising BIM as a process for Better Information Management and communication, rather than merely a modelling tool.

2. The Appointed Party & Project Context

2.0 The Appointed Parties

This analytical appraisal is presented by King Consultancy, a specialist digital delivery firm appointed as the lead consultant for the outline business case. Our approach provides the client, Caerphilly Council, and the Welsh Government (WG) with the assurance of a professional, collaborative, and life-cycle focused BIM strategy.

Detail	Content
Company Name	King Consultancy (KCON) 
Business Address	Tecwyn House, Capital Quarter, Cardiff, CF10 4BE
Specialism	Whole Life Asset Information Management compliant with the UK BIM Framework and ISO 19650 standards.

Our approach will look to appoint professionals to specific roles to ensure the process is as efficient as possible. Below is the information relating to the stakeholders likely to be involved.

Category	Role	Stakeholder	BIM Function
Client / Appointing Party	Client Information Manager	C. Davies (Caerphilly Council)	Manages EIR compliance and CDE governance.
	Facilities Manager / End-User	J. Williams (School Site Manager)	Defines AIR and validates data suitability for CAFM.
Lead Consultant / Design Team	Lead Designer	A. Evans (Architectural Lead)	Overall coordination and quality control of the Federated Model.
	Principle Designer	L. King	Overall Management of project progression and productivity.
	Structural Engineer	D. Jones	Develops the Structural Model.
	M&E Coordinator	S. Singh	Develops the Services Model (clash detection focus).
	Quantity Surveyor	S. Patel	Cost planning and scheduling (5D BIM).

Delivery / Contractor	Principal Contractor	TBD (Future Appointee)	Responsible for production and as-built information delivery (AIM).
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2.1 Project Overview

The commission requires the delivery of a 'state of the art' infant school in the heart of Caerphilly town centre. The project is a joint-funded venture, requiring meeting the appropriate standard of BIM maturity.

The final project scope is as follows:

- **Project Title:** Ysgol Y Twyn
- **UPRN:** 5016
- **Description:** A one-form entry infant school for 90 pupils, including a 48 part-time nursery provision.
- **Additional Facilities:** The project scope includes a small community hall and the Caerphilly Story gallery.
- **Operational Requirement:** It is envisaged that the school, nursery, and community functions can be operated independently

3. BIM Maturity, Standards, and LOIN

3.0 BIM Maturity and Compliance

The digital strategy for the Ysgol Y Twyn project requires achieving an appropriate standard of BIM maturity, consistent with public sector requirements as seen in 'Construction 2025: industrial strategy for construction - government and industry in partnership' This mandate is driven by the strategic ambition for a technologically advanced and radically transformed UK industry, the Government Mandate clearly states that "Government will mandate BIM for all centrally procured Government contracts from 2016." (*HM Government, 2013, p. 9*). The maturity progression is shown by the Bew-Richards Maturity Model (Appendix A).

Historically, UK public sector projects moved past Level 0 (Unmanaged CAD) to mandate Level 2 via the Government Construction Strategy as again seen an article by 'APROPLAN' "Building Information Modelling (BIM) Level 2 became mandatory for use on all public sector works in 2016 " (*LetsBuild, 2024*). BIM Level 2 ensures collaborative working by giving each of the stakeholder's access to the 3D CAD model. Collaborative working is the crucial aspect of this level and "BIM Level 2 requirements are, a streamlined information exchange related

to a project and seamless coordination between all the systems and the stakeholders" (*Patel & Patel, 2025*).

All the parties work on their local models, and information is exchanged through a common file format using universal naming conventions. Such a system allows organizations to combine external data with their own model to create a federated BIM Model, this is where collaborative information is compiled to create a unified model as a one truth approach (*McPartland (2017)*). This requires implementing the UK BIM Framework, based on the international standards: BS EN ISO 19650.

3.1 Key Standards: ISO 19650

King Consultancy's strategy is built upon implementing the ISO 19650 series, which supersedes the former PAS 1192 series and provides the structured framework for information management. The key standards guiding this project are detailed below in relation to the Ysgol Y Twyn requirements:

- BS EN ISO 19650-1:2018: Defines the core Concepts and Principles for information management across Europe.
- BS EN ISO 19650-2:2018: "Specifies requirements for information management, in the form of a management process, within the context of the delivery phase of assets and the exchanges of information within it, using building information modelling".
- BS EN ISO 19650-2:2018: " This is applicable to the whole life cycle of any built asset, including strategic planning, initial design, engineering, development, documentation and construction, day-to-day operation, maintenance, refurbishment, repair and end-of-life".
- PAS 1192-3:2014: "Details the requirements to achieve BIM Level 2, focusing on data transfer processes required for the creation of an asset information model (AIM) and to facilitate information exchange with the project information model (PIM)".

(ISO 19650-1:2018, n.d.), Ellis (2020), (PAS 1192-3:2014 Specification for Information Management for the Operational Phase of Assets Using Building Information Modelling (Incorporating Corrigendum No. 1) (Withdrawn), British Standards Institution - Publication Index | NBS, n.d.).

RIBA Stage 1 is preparation and briefing, this will involve the client developing the project brief (*RIBA, 2020*). Once this stage has been completed, King Consultancy will establish the initial EIR (client information needs) and commit to developing the subsequent BIM Execution Plan (BEP), this is a key planning document to define the strategy for the holistic BIM approach for the project (*PROJECT BIM EXECUTION PLANNING (BEP) STANDARD – National Institute of Building Sciences, n.d.*).

3.2 Defining the Level of Information Needed (LOIN)

To meet the efficiency requirements of the Welsh Government and ensure the model is fit-for-purpose, King Consultancy alongside the client will define the Level of Information Needed (LOIN) at every stage of the project. This systematic approach prevents costly over-modelling while still guaranteeing the necessary data for an efficient construction.

LOIN is a detailed, prescriptive framework that combines two components:

1. Level of Detail (LOD): The graphical requirement (geometry/appearance) of model elements, this can have a substantial impact on how quick the initial stage of the BIM model is completed and subsequently have large cost implications.

This is crucial that the correct LOIN is correct initially as this can have substantial impacts on the BIM process through out. To visualize the difference of levels of LOD see *Appendix B* explaining the detail differences.

2. Level of Information (LOI): The non-graphical data required (e.g., performance specifications, BOQ, M&E and O&M data, asset tags).

For the Ysgol Y Twyn project, this definition is crucial given the diverse requirements of the educational, nursery, and public facilities. See *Appendix C* for Ysgol y Twyn LOIN Examples.

4. Collaboration and Data Management

This is the transition from a document-based process, which causes delays and errors, to an integrated digital workflow is managed through formal processes.

4.1 Common Data Environment (CDE) Strategy

The CDE acts as the single source of information for the entire project lifecycle, compliant with ISO 19650. The CDE framework manages information status across four defined states. *Appendix D* illustrates these states as part of an information container workflow.

This process controls the flow of information through key processes (**CHECK/ REVIEW/ APPROVE**) to ensure data is always trustworthy and non-contradictory, eliminating costly mistakes at construction phase. The diagram below (*fig 3*) can be seen showing the four states of information (WIP, Shared, Published, Archive).

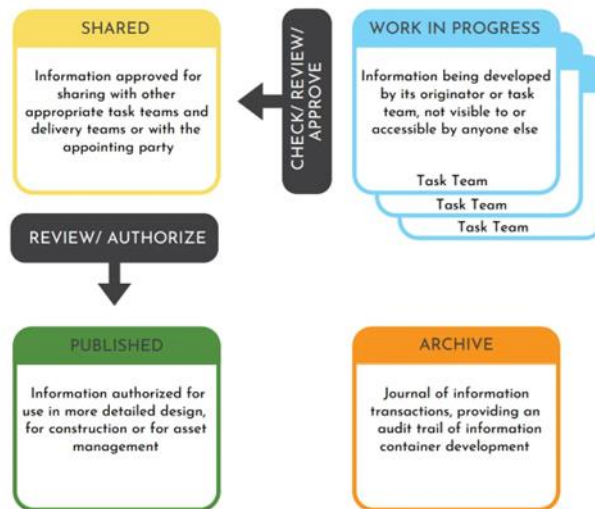


Fig 3 (Kemp et al. (2020).

4.2 Practical Coordination and Clash Detection

The design phase for Ysgol Y Twyn involves integrating Architectural, Structural, Electrical, Mechanical, and Civil Engineering models. This integrated model is referred to as a Federated Model.

Clash Detection is completed through a collaborative software such as Revizto and Navisworks at stages to identify and resolve conflicts (e.g., HVAC ductwork penetrating a structural column) *before* construction commences. This proactive stage can significantly mitigate risk and reduces the high cost of changes later in the project lifecycle.



(Revizto, n.d.) (NavisWorks | 2023 | AutoDesk, n.d.)

Industry Example:

In a case study in 'Construction 2025' published by the HM Government, The Manchester Town Hall Building project is a directly comparable example as a public building, serving as Building project is one of the " Government's pilot Building Information Modelling (BIM) schemes and has proved how valuable digital engineering can be during preconstruction and production delivery stages: saving money on unnecessary temporary works, saving the programme a total of nine months and demonstrating to the client BIM's potential for future facilities management purposes. Virtual 3D tours have educated key stakeholders, whilst

also providing English Heritage with assurances that the building's heritage would be respected and protected." (*Construction 2025*, 2013b, p. 9)

4.3 Information Naming Conventions

King Consultancy will enforce a standardized naming convention to ensure all information meet the requirements of the UK BIM Framework and ISO 19650 protocols. This mandatory structure ensures ease of filing for all involved, the technical schema for the project is detailed in Appendix E.

For Ysgol Y Twyn the naming convention is likely to look like the following:

5016_KCON_SCH_00_D_A_0001_GENR_S1_P1.

5. Whole Life Value and Conclusion

5.1 Whole Life Monitoring and CAFM

King Consultancy's holistic BIM strategy focuses on utilizing the data collected during the CAPEX (delivery/construction phase) to optimize the building's performance and significantly reduce OPEX over the long term, which is a major value driver for the Welsh Government. This link to Lifecycle Management is evident in the BIM Maturity Model (Appendix C) and aligns directly with the cost reduction ambitions of the *Construction 2025* strategy. "Achieving these strategic efficiencies is key to meeting the joint ambition for a 33% reduction in both the initial cost of construction and the whole life cost of assets" (*Construction 2025*, 2013c, p. 21). This approach simultaneously addresses the Whole life monitoring through CAFM (Appendix A). The digital handover package (RIBA Stage 6) (*RIBA*, 2020b, p. 29) enables a smooth transition between build stage and client use:

- **AIM Generation:** The Project Information Model (PIM) developed during design transitions into the Asset Information Model (AIM) used for operation and maintenance.
- **COBie Output:** The primary deliverable format for non-graphical asset data is COBie (Construction Operations Building Information Exchange). COBie provides structured spreadsheet data (location, warranty, maintenance schedule, Asset Tags) *Hamil (2018)* that is immediately ready to populate the client's CAFM (Computer-Aided Facilities Management) system ensuring ease of maintenance.

This proactive approach ensures the client receives all the intelligent data collected, moving facilities management from reactive maintenance to planned preventative maintenance, reducing lifetime operational costs and downtime.

5.2 Sustainability.

The implementation of BIM supports the Welsh Government's focus on the Sustainable Communities for Learning Programme by:

- **Performance Simulation:** Making early design decisions based on performance data (e.g., natural light, energy use, thermal loss) to achieve specified sustainability targets.
- **Resource Efficiency:** Tracking and documenting material use via the models scheduling tools to optimize procurement and reduce embodied carbon in components for the school and community hall.
- **Adaptable Asset Data:** Providing precise, easily updated AIM data that facilitates future refurbishments and maintenance, whilst minimising waste during the lifespan of the facilities.

6. Conclusion and Recommendations

6.1 Conclusion

The BIM strategy proposed by King Consultancy for the Ysgol Y Twyn project provides Caerphilly Council and the Welsh Government with a robust, transparent, and internationally compliant approach to digital project delivery. Our adherence to the ISO 19650 standards, strict CDE process, and detailed LOIN management ensures that we deliver not only a high-quality building but also a highly reliable, structured Asset Information Model that delivers maximum whole-life performance. This strategy reduces project risk, enhances efficiency, and provides the necessary accuracy for public funding requirements.

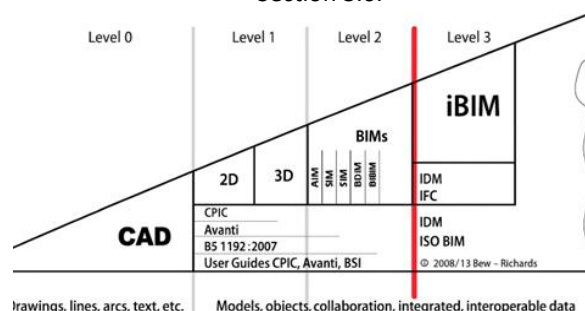
6.2 Recommendations

To formally initiate the digital delivery process and assure full funding compliance for the Outline Business Case, King Consultancy provides the following recommendations:

1. **Formal Adoption of the EIR:** Formally approve the Exchange Information Requirements (EIR) document to clearly set the informational needs and LOIN targets for all project stages, this needs to be completed at the earliest possible stage to minimise later risk.
2. **Appoint Lead Party:** Officially appoint the design team (including King Consultancy) as the Lead Appointed Party, empowering them to formally produce the BIM Execution Plan (BEP).
3. **Establish CDE:** Designate and configure the Project CDE platform in accordance with the ISO 19650 framework to ensure a secure, controlled environment for collaborative information production and access for stakeholders.

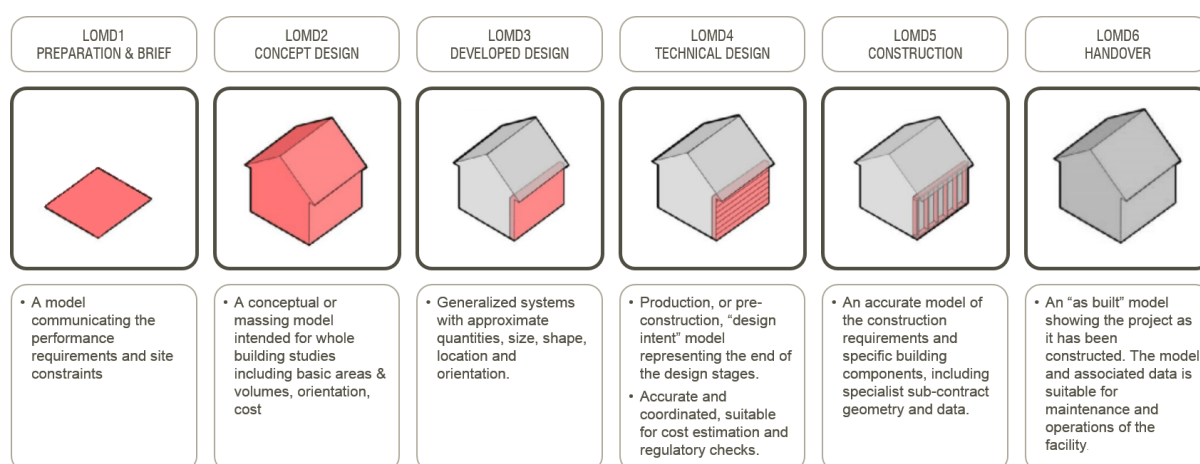
7. Appendices

- Appendix A-The diagram illustrating the transition from CAD (Level 0) to iBIM (Level 3). In reference in to Section 3.0.



(Shatalin and LAB University of Applied Sciences (2020))

- Appendix B- (LOIN Matrix showing detail difference in BIM) Reference to Section 3.2.



(Evolve Consultancy, 2022).

- Appendix C- Ysgol y Twyn LOIN Examples. Reference to Section 3.2.

Asset	RIBA Stage 2 (Concept)	RIBA Stage 4 (Technical Design)	RIBA Stage 6 (Handover to CAFM)
External Wall (School)	LOD: Basic massing geometry. LOI: Generic U-value target only.	LOD: Detailed layers (Brick, Cavity, Insulation, Blockwork). LOI: Manufacturer name, fire rating, confirmed U-value.	LOD: As-built geometry. LOI: Warranty data, scheduled maintenance plan, asset tags to link to COBie data.
Community Hall Doors (Fire)	LOD: Conceptual swing/size. LOI: Required fire rating (e.g., FD30).	LOD: Detailed model including ironmongery spec and frame/head detail. LOI: Certified product data sheet (PDF), link to maintenance schedule, and asset ID.	LOD: As-built location/ID. LOI: 100% complete CAFM data (Asset ID, replacement cost, key maintenance contact).

- Appendix E- Naming convention system for BIM In reference to 4.3

Code Field	Code Length	Description	Notes
Project	4 Characters	A single common project identifier that is recognizably distinct from any individual organisation's internal job number.	Use the 4-digit Company project numeric here. NB. NUMBER ONLY For Student Projects MODULE CODE. In this case 5016.
Originator	4 Characters	The company that produced the data.	NB. A specific unique identifier for each organisation should be defined upon them joining the project (i.e., Use company initials). In this case KCON.
Functional Breakdown	1–2 Characters	Use XX as the default. Only use Zones if project requires. This is then defined by the chosen Model segregation. There should be at least one 'zone' per role (e.g., Arch Model, Mech Model, Struct Model, etc.).	NB. A more complex project may need to be divided into several different zones. If so, the Zone Strategy should be agreed at beginning of project. In this case SCH (School or could be Hall or Gallery) .
Spatial Breakdown	2 Characters	The level the data refers to.	22 – Multi Level, XX – No Level, 00 – Ground Flr, 01 – First Flr, 02 – Second Flr, etc. Mezzanines (M1, M2, etc.) and All levels below ground floor prefix B (B1, B2, etc.). In this case 00 (Ground Floor).
Form	2 Characters	This is simply the type or form of data (e.g., For Files: D – Drawing, G – Diagram, I – Image, L – List, M – Model, T – Textual, V – Video/Audio).	In this case D (Drawing).
Discipline	1 Character Only	The role creating the data.	A – Architect/Architectural, B – Building Surveyor, C – Civil Engineer, D – Demolition/Dismantling, E – Electrical Engineer, F – Facilities Manager, G – Ground Engineering, H – Highways & Transport, I – Interior Designer, K – Client, L – Landscape Architect, M – Mechanical Engineer, O – Other, P – Public Health Engineer, Q – Quantity Surveyor, R – Project Mgmt, S – Structural Engineer, T – Planner, W – Water Engineering, X – Non discipline specific, Y – Topographical, Z – Multi Discipline. In this case A (Architectural).
Number	4 Characters	A 4 digit code denoting drawing grouping and number.	It consists of a 1 digit Drawing Group plus the 3 digit individual drawing no (e.g., 01001 where 1 is the beginning is the drawing group and the 3 latter digits are sequential numbers). Drawing Groups are as follows: 0 – General, 1 – Substructure, 2 – Superstructure, 3 – Openings, 4 – Finishes, 5 – Piped & ducted services, 6 – Electrical, 7 – Fixtures & Fittings (Fixed), 8 – Loose Furniture, 9 – External Works. In this case 0001.
Description	6–8 Characters	Drawing/Model description.	There is no specific standard for description but avoid long, unwieldy descriptions as this will affect your ability to file in Windows. In this case GENR (GENERAL ARCHITECTURAL DRAWING)
Status	2 Characters	The suitability code that indicates and governs the development stages of information and documents throughout the BIM process.	In this case S1 (SHARED 1; refer to 4.1 Fig 3.)
Revision	1 single Character	The revision number of the drawing (e.g., Preliminary revisions and Construction revisions).	In this case P1 (Preliminary Revision 1)

BIM Naming Conventions, (BIMicon, 2021) (Adapted from BIMicon, 2021).

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