



YSGOL Y TWYN

BIM Appraisal



Table of Contents

1. Introduction	1
2. Project Overview.....	2
3. BIM Strategy Overview.....	3
3.1 Information Management Function.....	3
3.2 Common Data Environment (CDE).....	3
3.3 Defining Information Requirements.....	4
3.4 Federated Model Approach	4
3.5 Integrated whole-life information	4
4. BIM Maturity Requirements	5
5. Information Requirements and Level of Information (LOIN).....	6
5.1 EIR	6
5.2 Project Information Requirements (PIR).....	6
5.3 AIR	7
5.4 LOIN	7
6. Coordination and Collaboration Strategy.....	8
6.1 CDE.....	8
6.2 Model Federation and Clash Detection	8
6.3 Collaboration Processes and Responsibilities	9
7. Whole Life Monitoring, Facilities Management, and CAFM Integration	11
7.1 AIM.....	11
7.2 CAFM Integration.....	11
8. Sustainability, Whole Life Carbon Assessment (WLCA) and Digital Performance Monitoring	13
8.1 WLCA	13
8.2 Post-occupancy Evaluation and Digital Twins.....	13
9. Application to Ysgol Y Twyn.....	15
9.1 Roles and Responsibilities.....	15

9.2	Classification and Modelling Approaches	15
9.3	Whole Life Data Requirements	16
9.4	Risk Management.....	16
10.	<i>Conclusion</i>	17
11.	<i>REFERENCE LIST</i>	18
12.	<i>BIBLIOGRAPHY</i>	21

1.Introduction

This report provides an analytical appraisal of the BIM strategy for *Ysgol Y Twyn*, for *Caerphilly Council*. The development will create a 1 form entry infant school for 90 pupils, with 48 PT nursery provision, and *Twyn Community Hall* and *Caerphilly Story Gallery*. The project is jointly funded by *Caerphilly County Borough Council (CCBC)* and the *Welsh Government (WG)* under the ***Sustainable Communities for Learning Programme***, a capital investment programme that prioritises modern, digitally enabled, and sustainable education infrastructure.

The purpose of this report is to outline how ***Building Information Modelling (BIM)*** will be utilised to satisfy the project requirements, conform to the funding criteria, and execute a coordinated, digital whole life approach. The strategy will be influenced and managed in line with ***ISO 19650 (Parts 1-6 2018-2025)***, ***UK BIM Framework*** guidance (*BSI and Nima n.d*), and *WG guidance (Welsh Government 2025)* to ensure the project is actioned in a collaborative and structured manor.

This appraisal will include themes of BIM maturity and whole life monitoring through ***Computer Aided Facility Management (CAFM)*** and industry examples to demonstrate definitions of ***Levels of Information Needs (LOIN)***. Real word industry examples and established standards are used to support the analysis.

2. Project Overview

The project requires a 1-form infant school for 90 pupils, a 48 place nursery, and two community assets which are *Twyn Community Hall* and the *Caerphilly Story Gallery*. It is envisaged that the amenities can be operated independently.

Mandatory digital design requirements must be followed as part of the ***Sustainable Communities for Learning Programme*** to demonstrate a clear alignment with BIM principles, sustainable targets, and whole life asset optimisation and carbon data (CLAW 2021).

Digital integration will influence and support efficient design, construction, and whole life asset performance, creating a modern learning and community environment for a variety of users (BSI, 2023). CLAW (2021) guidance places significant emphasis on early design integration of data, energy performance data and maintenance planning to mitigate and reduce future operational and lifecycle costs. Therefore, the adoption of BIM is essential to the successful delivery of this project.

3. BIM Strategy Overview

The BIM strategy for *Ysgol Y Twyn* will be developed by the international standard governing information management using BIM (**ISO 19650 series**). This standard emphasises the importance on collaborative information production, structured data workflows, and project level information management responsibilities.

Detailed below are the core elements that will shape the focus for this project. The strategy strives to embed a digital process for the entire existence of the building to ensure a collaborative and compliant project in line with *WG* requirements to mitigate risk and negligence.

3.1 Information Management Function

An information manager will be required to oversee planning, delivery and approval of project information. Their main obligations are to develop the **BIM Execution Plan (BEP)** which outlines responsibilities and provision of information (*BSI, 2023*) and ensuring compliance with the **Exchange of Information Requirements (EIR)**.

3.2 Common Data Environment (CDE)

The CDE must be ISO 19650 compliant, meaning all information will be stored, shared, and managed in a CDE following the structured workflow (Work in progress > Shared > Published > Archived), as recommended by the **UK BIM Framework**.

3.3 Defining Information Requirements

The client will define the (*EIR*), whilst the design and or construction team will develop the *Project Information Model (PIM)*. The (*PIM*) will align with the client's requirements. The **Asset Information Requirements (AIR)** will outline the essential data required for the *CAFM* systems during the operational phase of the project.

3.4 Federated Model Approach

A separate model structured in line with **Uniclass 2015** will be created by each discipline. These separate models include but not limited to architectural, structural, civils, and M&E. Each model will be federated for clash detection, coordination, and validation (*Mordue, Swaddle and Philp, 2015*).

3.5 Integrated whole-life information

To ensure a complete **Asset Information Model (AIM)** at handover, BIM will facilitate the maintenance and asset performance modelling throughout the lifecycle of the building (*Sacks et al., 2025*).

4. BIM Maturity Requirements

BIM maturity places significant emphasis on a structured information exchange, federated modelling, and lifecycle asset management. The *WG* requires all educational sector construction projects to achieve a BIM maturity level aligned with **ISO 19650** (*Welsh Government 2022*).

The current requirements replaces the former **UK BIM Level 2** terminology as defined in *Sacks et al., (2025)*, and whilst the **Bew and Richards Maturity Wedge** is still referenced today current guidance emphasises meeting the specific digital requirements. These requirements are managed information exchange, CDE utilisation, coordination through federated systems, consistent classification, and structured asset information for facilities management.

Achieving an acceptable BIM maturity demonstrates a consistent and respectable approach to digital delivery. This concept is fundamental in demonstrating compliance for funding and producing an asset that meets the whole life performance and maintenance expectations.

5. Information Requirements and Level of Information (LOIN)

5.1 EIR

For the client to effectively communicate the required information at each project stage the BIM strategy will demand a clearly defined EIR (*BSI, 2023*). The EIR must outline deliverables related to the models, documents, and structured data to facilitate decision making as detailed in the ***ISO 19650 Series***.

The *EIR* for *Ysgol Y Twyn* will define the following:

1. Digital model formats and standards
2. Required levels of geometric and alphanumeric detail
3. Coordination tolerances
4. Asset information required for operating the constructed facilities
5. Sustainability and whole life carbon reporting data
6. Information security requirements

The production of *EIRs* ensures clarity and expectations between the client and the respective consultants to reduce ambiguity and facilitate consistent information production.

5.2 Project Information Requirements (PIR)

PIRs align with the client's requirements and mirror the EIR and the scope of services of each respective discipline (*BSI and Nima n.d.*). These requirements will outline the essential information required to action the key project decisions such as but not limited to the concept development, design coordination, cost planning and statutory approval.

5.3 AIR

The *AIR* is necessary to provide a structured specification detailing the information required to operate and maintain the school throughout its existence (*BSI, 2023*). Such information requirements must include asset tags, maintenance intervals, warranty information, and performance data aligned with *CIBSE (2023) Guide M*.

Crucially, given the design is a combined development of multiple environments including communal spaces it is required that separate *AIRs* are produced for every space to ensure independent management plans that address the unique inclusions of every space.

5.4 LOIN

LOIN is the framework for establishing the appropriate depth and detail of project information (*BSI, 2023*). It is structured around three principal elements:

1. Geometric detail
2. Alphanumeric data
3. Documentation and metadata

Superseding the earlier concepts (*LOD/LOI*), *LOIN* provides a more flexible framework tailored to the use of each information deliverable (*Swaddle, 2022*). For example:

Early feasibility models may require low geometric detail but high contextual clarity, whilst technical designs require higher geometric accuracy and detailed asset data.

LOIN ensures information is delivered punctually to fulfil the project requirements.

6. Coordination and Collaboration Strategy

Projects of such complexity and detail require effective multidisciplinary cooperation and coordination to ensure success. *BIM* serves this purpose because it provides a structured methodology that incorporates all disciplines to mitigate risk, improve decision making, and maximise information continuity (*Mordue, Swaddle and Philp, 2015*).

6.1 CDE

ISO 19650 requires all project information to be managed through a compliant *CDE* which facilitates the following workflows:

- Work in progress (*WIP*)
- Shared information
- Published information
- Archived information

A *CDE* creates a golden thread of information, which safeguards the information and governs version control to ensure the project is worked to the latest information (*BSI and Nima n.d*) and ensures collaboration (*BSI, 2023*). Such *CDEs* are but not limited to *Asite*, *Dalux*, and *Autodesk Construction Cloud*.

6.2 Model Federation and Clash Detection

Given that every discipline will produce their own design model it is essential that all produced models are therefore integrated and cooperate digitally (*Mordue, Swaddle and Philp, 2015*). It is required however that all models are produced to *Uniclass (2015)* to ensure consistency and facilitate model federation.

Federated model reviews should take place on a regular occurrence, this could be weekly or fortnightly and especially when there is a change to design. These reviews will identify hard clashes which are physical conflicts between two built elements, and soft clashes which concern clearance, performance, or spatial conflicts.

Early coordination and communications will improve cost certainty and reduce abortive work, this is certainly supported by a wide acknowledgment that *BIM*-led software can dramatically reduce clashes during construction (*NBS, 2020*), even up to 41% (*Dodge Data & Analytics, 2018*).

6.3 Collaboration Processes and Responsibilities

Designated roles will align with **ISO 19650** framework. Responsibility matrices will define the responsible individual for model production, review, and approval. Regular digital coordination meetings at agreed intervals will address any model discrepancies, evaluate risk, and ensure that *LOIN*, *EIR*, and *CDE* compliance is maintained.

The *Information Management Function* (*Boute and Jackson, 2021*) is responsible for organising how information is created, named, stored, verified, and distributed. This can be an individual or small team that ensures that all correct protocol and standards are adopted and followed throughout the project.

The discipline leads *Task Team Managers* manage their own disciplines models, ensuring that their team is working towards the *LOIN* requirements and that all submitted documents meet the correct standards before they are issued. Essentially, they are responsible for the quality of information from their discipline, and all disciplines such as architecture, structural, MEP, and the like will house a dedicated *Task Team Manager*.

The main contractor or lead consultant will be designated the *Lead Appointed Party (LAP)*. The *LAP* is responsible for coordinating all the relevant design and construction

teams to ensure the alignment of information. They may also manage the overall *BEP* and ensure deadlines and responsibilities are clear across the project.

Appointed Parties are appointed by the *LAP* to deliver information according to the *EIR*, *LOIN*, and the project's *BEP*. They too are also subject to adhering to the same standards regarding modelling, naming, and data quality before uploading information to the *CDE*.

7. Whole Life Monitoring, Facilities Management, and CAFM Integration

The reduction of operational expenditure and improvement of long-term asset performance is a primary objective of the ***Sustainable Communities for Learning Programme***.

7.1 AIM

Upon project completion, the federated models and structured datasets must be transformed into an *AIM*, in line with ***ISO 19650***. This must include the following:

- Cobie spreadsheets or equivalent data exchange formats
- Maintenance and replacement schedules
- Product data sheets
- System diagrams
- Digital O&M manuals
- Room data
- Asset tagged equipment metadata

The *AIM* will become the relevant reference for facilities management throughout the building's operation.

7.2 CAFM Integration

A suitable *CAFM* platform such as but not limited to *Planon*, *Concerto*, or *IBM Maximo* must be utilised in order for *BIM* to support *CAFM* by:

- Accurate asset registers

- Planned preventative maintenance
- Automated alerts and lifecycle planning
- Energy and environmental monitoring
- Accurate spatial information to support operational efficiency

This strategy falls in line with *WG* requirements to reduce lifecycle costs and increase building performance.

8. Sustainability, Whole Life Carbon Assessment (WLCA) and Digital Performance Monitoring

Sustainability is a fundamental component of publicly funded education projects in Wales. *BIM* is an effective instrument to achieve sustainability and carbon targets, especially as *WLCA* monitoring will become more abundant in the coming years as organisations and *WG* are exploring a mandatory *WLCA* through updated building regulations (*PART Z UK, 2024*).

8.1 WLCA

A *WLCA* accounts for both embodied carbon and operation carbon. A *BIM* produced model can quantify materials and facilitate carbon counts in line with *RICS (2023)* *WLCA* methodology. Furthermore, *BIM* can compare material options, analyse operational carbon through dynamic simulation and assess demolition and end-of-life impacts. The digital integration ensures a transparent carbon audit trail for third party verification.

8.2 Post-occupancy Evaluation and Digital Twins

To facilitate ***WG Net Zero Carbon Route Map*** (*CLAW 2021*), *BIM* offers real time monitoring of environmental conditions, occupant comfort and energy consumption through digital twins. A digital twin is a live, digital, replica of a real building and both are connected through sensors, data, and *BIM* information allowing a building to instantly identify shortfalls and address current inefficiencies (*Daye, 2022*).

BIM also facilitates lifecycle optimisation through energy modelling, thermal performance analysis, renewable energy integration, and ventilation performance

modelling (*Sacks et al., 2025*). This can be executed prior to construction allowing the design team to test and improve to optimise the design.

9. Application to Ysgol Y Twyn

This section incorporates the *BIM* process to the project specifics outlined in the client's brief. The approach focusses on a structured information management plan, coordinated model delivery and long-term operational efficiency in line with **ISO 19650** and *WG* standards.

9.1 Roles and Responsibilities

The architect will perform the *LAP* duties, such as coordinate design activities and ensuring all design activities comply with the *BEP*. Alongside the architect, dedicated digital consultants will execute the information management role, overseeing the *CDE*, enforcing data standards and ensuring compliance with the *EIR*, *LOIN*, and **ISO 19650** naming standards.

Each discipline will appoint a *Task Team Manager* who will be responsible for ensuring that their discipline takes accountability for the model development, internal auditing, and punctual delivery. *CCBC* as the client alongside the *WG* will provide their own digital leads and representatives to issue strategic guidance and ensure alignment with statutory expectations.

9.2 Classification and Modelling Approaches

All produced models will adopt the **Uniclass 2015** classification framework to ensure that all model elements can be referenced, maintained, and exchanged across the project lifecycle. This includes that all file naming and metadata align with **ISO 19650** conventions allowing ease of navigation within the *CDE*. Coordination amongst the

disciplines will be supported through routine federation of models and clash detection exercises.

9.3 Whole Life Data Requirements

The project handover will ensure that all information is aligned to the asset and whole life data requirements are described in section 7. The *AIM* includes uniquely tagged maintainable components, manufacturer and product data, warranty periods, predicted maintenance cycles and metadata relating to energy and building services systems. These datasets derive directly from *LOIN* and *AIR* principles discussed earlier and provide the foundation for *CAFM* system integration, digital twin development and long-term optimisation of building performance. This ensures that the school can operate efficiently, manage its assets proactively and meet ongoing sustainability and carbon-reduction expectations.

9.4 Risk Management

Digital risk management is embedded throughout the delivery process to safeguard information integrity and compliance with **ISO 19650-5** and *WG* digital standards. Access to project information will be distributed by role and responsibility to prevent unauthorised access (*BSI, 2023*), in addition the *CDE* audit trails provide a golden thread of information in regard to file activity. Frequent model validation checks and approval workflows mitigate the likelihood of inaccurate or incomplete information being distributed. Backup procedures are also incorporated to minimise the risk of data loss.

10. Conclusion

This report has outlined a *BIM* strategy for the development of *Ysgol Y Twyn*, demonstrating alignment with the requirements of *CCBC* and the *WG Sustainable Communities for Learning Programme*. The strategy ensures compliance with the **ISO 19650** framework, establishes clear information management processes, and defines the expectations for collaboration, model coordination and data governance throughout the project lifecycle.

The established information requirements such as *EIR*, *PIR*, *AIR* and *LOIN* ensures that the requirements of the project are met and all information that is required can be provided effectively. The *CDE* and federated model strategy fortifies the design to mitigate conflicts and increase collaborative working to maximise design and reduce risks.

BIM's integration into facilities management and whole life performance, monitoring ensures that the school not only satisfies the immediate construction design but also performs beyond the bricks and mortar to generate long term economic and carbon value and efficiency.

The incorporation of a continuous digital strategy throughout *Ysgol Y Twyn* provides assurance that the school will meet *WG* requirements.

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