

Building Information Modeling

BIM THEORY

By Aaron Griffiths (2223674) | **BSc/HND Construction Management** | 14/01/25

Company Name: Griffiths & Son's Bespoke Construction

14 Norgan's Terrace, Pembroke

Pembrokeshire, SA71 4EX

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Project Title: Ysgol Clasdir

Dear Merthyr County Council,

I am writing to you to express my opinion on using BIM software for your construction project. My construction company highly detailed orientated, organized and problem solving which allows me to excel within BIM software. As you have commissioned me by Merthyr County Council as lead consultant in the delivery of a Welsh medium infant school, adjoining the community hall. This letter will allow me to outline measures that will be taken to show the competency of the project team in reaching the BIM Maturity requirements. Moreover, monitor the project through COBie compatible CAFM system and use software such as Revizto to allow virtual modelling on site. I'll also discuss and demonstrate how the delivery will include the different levels of information through RIBA stages and how they operate with the methods of LOI (Level of Information) and LOD (Level of Detail) for capital projects.

Why use BIM maturity with this construction project?

Building information modelling is a process which allow for all collaboratives workers between the disciplines which are involved in the design stages of design, construction, maintenance and the use of the building. This way of working within the construction industry means that everyone works the same way with the data provided.

"How much BIM is used can be measured at different 'levels of maturity'.

- Level 0 – unmanaged CAD.
- Level 1 – a mix of 2D and/or 3D technology with a collaboration tool providing a Common Data Environment (CDE)
- Level 2 – collaborative BIM, in which 3D model information is shared within a CDE.

- Level 3 – is still being defined, although it is expected to have more advanced, single point of collaboration requirements and link to further advances such as ‘smart cities.’

CITB (2021). *What is BIM? - CITB*. [online] www.citb.co.uk. Available at: <https://www.citb.co.uk/about-citb/partnerships-and-initiatives/building-information-management-bim-for-site-workers/what-is-bim/>.

CAFM SYSTEM AND REVIZTO PLATFORMS

A recommendation for a software which I would propose to be used within this project is a CAFM System (Computer Aided Facility Management System). This software solution would help my company to organize and manage the physical data and assets within the building extension. As a manager of the work commencing, it allows as a company to improve efficiency and reduce costs where needed. I would like to suggest you implement this software into Merthyr County Council as it's a comprehensive commercial facility or building maintenance tool with many different functions. The functions/solutions in which this software covers include:

Information Technology -

Information is the backbone of CAFM, the main function is to facilitate management, which utilizes CAD, Revit and other design software to visualize the building elements of the project. Furthermore, has a combination of an alphanumeric data processing system of the project. This would allow for my company to be more organised, efficient and have aim projection on the completion the project.

CAFM uses CAD and Refit technology for a variety of capabilities. For example, interactive floor plans which would allow you as the client to see the outcome of the project which hasn't been built yet.

Maintenance Management –

By using this software on this project, it will allow you keep in routine of maintenance which would need to happen on the project once it has been completed. Which like CMMS, CAFM offers a maintenance management ability. CAFM functions as an organizational database to store information on your facilities. This information includes everything from energy consumption, construction data, a list of floorplans, pertinent contact details, equipment located within a specific facility, fire and safety information, and more.

Instead of relying on paper files or Excel spreadsheets, you can store and organize this information neatly within the CAFM where you can use it later. So as Merthyr County Council it will allow you to store data on what need maintenance on the building, in a more efficient and easier manner.

Physical Building Administration –

The advantages which you gain with the software as physical building administration, as Merthyr County Council you will be able to control and monitor the school. Such as remote management, where facility managers can set thermostats or turn window and door locks on and off remotely. Others offer automated meter reading and energy monitoring, so you know right away if something in your resource usage changes. This improves safety, saves money and helps the environment by reducing unnecessary energy usage.

Leasing and Real Estate Management –

This would allow for teachers to book meeting/classrooms with the school, through a remote system. This would give Merthyr County Council the functionalities what meetings are occurring within the building and could act upon appropriately. Also, allow for the community hall to be rented out, which could create another income.

Administration Support –

Another advantage in which the capability of this software is that it can provide administrative support that could help strengthen/streamline the staff within the building.

“You and your employees can use package and material tracking features to keep a close eye on anything going in or out of your facility. Whether that means purchasing and procurement, audit trails, hazardous materials transport, or shipments and deliveries, computer-aided facility management can help you manage it safely and seamlessly.

You can even use CAFM to manage your human resources as well. Many CAFM systems offer a traffic tracking feature to log visitors and create form templates for contractors to ensure everyone who’s inside your facility is supposed to be there! This has the bonus of increasing security for your organization without additional cost.”

Life Cycle Management –

As Merthyr County Council this software will allow you to manage and ensure the building is being used to its full potential with being cost effective throughout its life cycle. For example, planning for upcoming capital projects which might occur within the building’s elements. Which CAFM might sway your options in providing this information.

Asset Tracking –

This tool allows for the materials for the construction of the proposed building. Once construction is completed it will allow you as a council to track your assets on the data system with location on where they are located.

“Too often, they hide these essential features in jargon like “property management services and energy consumption features.” Simply put, CAFM solutions? help with day-to-day planning in real and practical ways”

“When customers figure out that CAFM systems can come with these types of functionalities, they’re often adopted with enthusiasm for their labor-saving and time-saving potential. To get an in-depth comparison of each feature, check out our facility management comparison report to break them down.”

Information Referenced From - Adair, B. (2018). *What is CAFM? Computer-Aided Facility Management In 2020*. [online] Available at: <https://www.selecthub.com/cmms/facility-management-cmms/computer-aided-facilities-management/>.

When constructing this project I am going to be using the software Revizto, this software integrated with BIM and works to create a database and give access to the projects 2D and 3D workflows, so anyone can access this when given permissions on the project requirements. Why as a construction company do I use Revizto? This software will allow me to communicate and show the process which are happening with yourselves as the client/stakeholder.

Furthermore, give you access to tracking and timelines of the process/project and “integrity of all project data is one of its biggest advantages. Other useful features of the solution in this context include issue tracking, visualization across many data types, etc. - Ocean, J. (2020). *How to Benefit from GIS & BIM Integration in 2021*. [online] Revizto. Available at: <https://revizto.com/en/gis-bim-integration-benefits/>.



Figure 1 Revizto.com. (2019). Revizto. [online] Available at: <https://revizto.com/en/>.

Also, uses the GIS (Geographic Information System) to merge with the BIM system so the data which is presented and visualized is accurate for the client to picture the outcome of the building being produced. GIS is a computer based too which spatial relationships, patterns, and trends in geography. This is then displayed onto a map to visualize/picture the buildings location of construction.

For the materials which my company are going to install and supply. The data is going to be collected for you as the client to view and see our guided requirements: In accordance with requirements detailed in the data system of this project. The documentation which will be supplied in accordance with the contract is required as per the contract:

- Manufacturer
- Installation date
- Warranty
- Product name
- Reference number
- Serials numbers

With the aim of decreasing and eliminating the time between handover of the construction of this project, due to the location. The point in which the facilities management system can start operating and maintaining those maintainable assets, is to help the project teams gather and deliver data about the projects maintenance/maintainability assets in a digital format.

As you are the stakeholders of this project, COBie succeeds. This is because it includes engineers, architects, contractors, suppliers, and craftspeople on site. Each plays a part in supplying information about the project's assets throughout the project in which the COBie-standardized digital format. At set project milestones, this data is supplied, with a complete delivery at project handover.

LOI (LEVEL OF INFORMATION)

The purpose of this within BIM is to refine requirements for information submitted at different project stages. By completing this information, it allows to populate the responsibility matrix system which includes the BIM protocols. The responsibility matrix refines the scope of the modules and their purposes within the contract, it is important that the responsibility matrix is regularly updated within reason to the contract. The responsibility matrix also defines the contract, which is being produce, the purpose and the levels of information used at the stages of the project.

The requirements of LOI within the project is that is refers to a non-graphical representation of an object or design at a certain stage of the project. The non graphical representation of the models will facilitate and inform the employer to decide.

The model which my company will be developing to is a requirement of LOI with addition to other forms of information supplied and will be assessed at the key stages of the construction. The LOI for this project is aligned with BS EN ISO 19650 and NBS BIM Toolkit.

RIBA STAGES OF WORK

The BIM overlays to the RIBA outline plan of work which provides straightforward guidance on the activities needed at each RIBA work stage to successfully design and manage construction - BIM Overlay to the RIBA Outline Plan of Work Edited by Dale Sinclair. (2012). Available at: https://mono.eik.bme.hu/~zrostas/assets/files/CPM_RIBAOOutlinePlanofWork_BIMOverlay.pdf [Accessed 13 Jan. 2025].

The RIBA plans of work were introduced in 1963 as a framework for architects to use. Which has evolved to be used in projects that have software BIM. This framework allows there to be a format in which all architects/designers follow to ensure that the plans are drawn and executed correctly.

“The Plan of Work also recognises digital transformation’s role in modern construction. It advocates for:

- Clear information requirements at Stage 1
- Comprehensive digital execution planning to help the exchange of information
- Integration of emerging technologies like digital twins (in construction, this is a digital replica of a building that can mirror its condition and provide data insights)

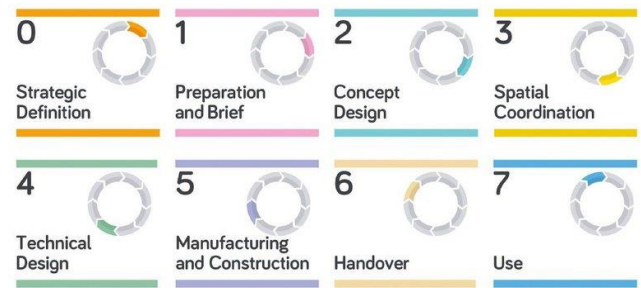


Figure 2 Rectangle Circle. (n.d.). Riba Plan of Work Stages Explained. [online] Available at: <https://rectanglecirclee.blogspot.com/2020/07/riba-plan-of-work-stages-explained.html>.

While not every renovation will need every aspect of each stage or use every strategy, understanding this framework helps you to understand what to expect and when. The clearer you feel about the process, the better you’ll be able to communicate and work with your architect and contractor”. - Evans, J. (2024). *The RIBA Plan of Work Stages Explained | The Page*. [online] The Page. Available at: <https://www.the-page.co.uk/blog/the-riba-plan-of-work-stages/>.

The advantage of using this software and building stage method is that it is understood across the whole construction industry and has been in practice for many years. This is because in each stage of the Riba plan of works it has a clear sign of design making requirements. Moreover, the stages are structured but flexible, they can be adapted to different projects regarding requirements and sizes of the project. In which case that means that before the construction of the project begins it is easy to change the requirements before contrition commences.

LOD (Level of Details)

The purpose of this section is to define the requirements for graphical information submissions exchanges at the project stages.

The requirements of LOD models are to present the graphical information of an object or a design at certain point of the work management stage process. The graphical representation of the model will help the employer decide on the project. Models which have been developed are required a LOD in addition to other forms of information on the project, will be assessed at key stages thorough out the design and construction phases.

The LOD for this project are aligned with BS EN ISO 19650 and NBS BIM Tool LOD definitions.

“LOD refers to a standardized framework that outlines the depth of information and precision within a BIM model throughout different project stages, ensuring clear communication and collaboration by specifying the precise information required for design, coordination, fabrication and facility management.” - Autodesk.com. (2024). *Levels of Development (LOD) in BIM | Autodesk*. [online] Available at: <https://www.autodesk.com/uk/solutions/bim-levels-of-development>.

BIM ACCORDANCE WITH BUILDING REGULATIONS

As a software BIM can integrate and code in the current building regs which are up to date with the construction industry. This is allowing for automated verification of the software against the regulations. This automation can accelerate the compliance process but also enhances accuracy, ensuring that no aspect is overlooked. The standard which Bim software should operate on is “ISO 19650. This standard is an international standard for managing information over the whole life cycle of a built asset using building information modelling (BIM). It contains all the same principles and high-level requirements as UK BIM Framework and is closely aligned with the current UK 1192 standards”. - Bsigroup.com. (2020). *BIM - Building Information Modelling - ISO 19650*. [online] Available at: <https://www.bsigroup.com/en-VN/bim---building-information-modelling---iso-19650/>. By maintaining the software this level of detail, it means that when a company creates the plan for the building. The data created will be in accordance with building regulations as the software identifies the inputs and produces a corresponding drawing within the regs.

To conclude before work commences for this project I would like to suggest as the client you produce an EIR (“The EIR is an important element of a Project BIM Implementation and is used to set out clearly to the Project Team or Supplier what information is required generally and at each project stage” - UCL (2022). *BIM - Employer’s Information Requirements*. [online] Estates. Available at: <https://www.ucl.ac.uk/estates/policies/2022/mar/bim-employers-information-requirements>.) so you can express your opinions on the style and how the project is designed and build prior to work commencing. When receiving this information by yourself you must be kept to the regulation of AIR. “An AIR is the Asset Information Requirements (AIR) are part of the Building Information Modelling (BIM) process, defining the graphical and non-graphical data, information and documentation needed for the lifetime operation and management of a built asset”. -PCSG (2022). *Asset information requirements AIR*. [online] www.designingbuildings.co.uk. Available at: https://www.designingbuildings.co.uk/wiki/Asset_information_requirements_AIR.

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Figure 3 Revizto.com. (2019). *Revizto*. [online] Available at: <https://revizto.com/en/>.

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PCSG (2022). *Asset information requirements AIR*. [online] www.designingbuildings.co.uk. Available at: https://www.designingbuildings.co.uk/wiki/Asset_information_requirements_AIR.