Towards a conceptual framework to manage BIM/COBie asset data using a standard project management methodology.

Abstract:

Purpose:
The purpose of this paper is to investigate the asset data flow between building stakeholders throughout building lifecycle using the Construction Operation Building Information Exchange Standard (COBie) standard.

Methodology/Approach:
The papers initially reviews the relevant BIM for FM studies including the identification of gaps and challenges of producing COBie data. A standard Project Management Institute (PMI) methodology is introduced as a theoretical framework to map the different areas of managing COBie data as a project in coordination with Royal Institute of British Architects (RIBA) Plan of work (PoW). This theoretical background is coupled with an inductive approach through a partnership with Bouygues, UK in relation to the University College London Hospital (UCLH) – Phase 4 construction project in order to produce the conceptual framework that is aligned to industry needs.

Findings:
The lack of well-structured approach for managing COBie data throughout building lifecycle causes many problems and confusion regarding the roles and responsibilities of different stakeholders in creating and managing asset data. This confusion, in turn, results in incomplete and low-quality COBie data at the handover phase which hinders the ability of facility managers to use this data effectively in the operational phase. The proposed conceptual framework provides a standard project management process to systemise the data flow among all stakeholders.

Practical implications:
The proposed framework is developed in conjunction with Bouygues UK (a large construction company), so it is well aligned with an actual industry approach to managing COBie data. Furthermore, it provides a systematic step by step approach to managing COBie as a project and this could be easily used in actual construction projects.

Originality:
The paper introduces a new approach to managing COBie data using a standard project management methodology based on an actual live construction project perspective coupled with project management theory.

Keywords:
BIM for Facility Management, COBie data Management, Asset Lifecycle Data flow, Asset Management, Construction Project Data Management

1.0 Introduction:

Managing asset information is one of the most critical tasks for facility managers. It involves collecting data about assets from earlier phases of building lifecycle, analysing this data, and using it for decision support throughout the operations and maintenance phase (Araszkiewicz, 2017). This operational phase accounts for 80-85% of the overall cost spent throughout the building lifecycle (Thabet and Locas, 2017). Hence, achieving asset operation efficiency through asset data availability is fundamental to attaining an improved total cost of ownership especially for large and public buildings where the range and complexity of the assets are more significant than residential buildings (Volk et al., 2014).

Traditionally, the involvement of facility managers in the process of asset data management process commenced at the building handover phase (Patacas et al., 2015). During this phase, building owners and facility managers used to receive an enormous amount of data about the building systems and its assets. This data used to come in many different formats including Computer Aided Design (CAD) drawings, PDF files, text documents, spreadsheets, graphical/spatial data, and in many cases printed operations and maintenance documentation as well. Each format of these data sources was often prepared using different software platforms. These platforms do not necessarily have a universal data standard to make the data more accessible and usable using a single interface (Patacas et al., 2015). This inconsistency of data sources made it difficult for facility managers to search for information about a specific asset across these many software platforms. The data search process was time-consuming and inefficient (Aziz et al., 2016). In the recent decade, the emergence of Building Information Modelling (BIM) proved to have the potential to solve this information management problem (East & Brodt, 2007) (Eastman et al., 2011) for facilities management industry. However, to date, limited research has been done to investigate the optimum process of asset data exchange between different building stakeholders.

BIM is a process to prepare, store, exchange, and share information about buildings among design, construction and operations teams (Vanlande et al., 2008). This collaborative philosophy of BIM brought many benefits to all phases of the building lifecycle. For example, in design and construction phases. BIM made it easier to manage the project schedule, optimise material transportation and logistics and minimise storage requirements by knowing exactly when each building component or asset will be fabricated and installed. Furthermore, it improved cost management (Zheng & Cao, 2013) because each BIM object has a cost associated with it. This cost label enables better budgeting and cost prediction (Gallaher et al., 2004). It also reduced cost and time associated with the rework by detecting and resolving design clashes before the construction phase. Also, BIM played a vital role in improving sustainability (Alwan & Gledson, 2015) by providing accurate information about energy use and Carbon Dioxide (Co2) emission of assets which is used to optimise the building sustainability performance. The emergence of the Construction Operations Building Information Exchange (COBie) provided a structured way to collect and manage asset data throughout building life-cycle.

Many aspects need to be considered to prepare a complete and high-quality COBie data. The three main elements are:

- People: Qualified and trained personnel in all areas of the lifecycle supply chain including the client facility management team (Xu et al., 2014), the Architecture team, the Main Contractor team, and all the Subcontractors. All personnel involved in creating and management COBie data should be well trained and equipped with the necessary skills to manage a successful BIM project.

- Technology: the use of adequate technology and software tools is significant to create COBie data and also to monitor its quality throughout the building lifecycle.
- Clear and collaborative process: This process should make it explicit for each stakeholder what their roles and responsibilities in creating and managing COBie data, what data deliverables should they provide when data is delivered, and to what quality standard.

This paper will provide a conceptual framework that coordinates the three elements of COBie data management using a standard project management methodology. The COBie data management will be considered as a project in its own, and the production of this data will be aligned with the project management methodology of the Project Management Institute (PMI).

2.0 Facilities Management, data and BIM:

Facilities management require the collection, analysis, and management of data about different building components. Hence, the success of FM relies heavily on the accuracy, availability, and accessibility of this data (D'Urso, 2011) that is created in design and construction phases of the building lifecycle, then handed over to the FM team. When this asset data is not complete or not accurate, it becomes a mandate for facility managers to recreate all asset data in the operations phase (Chen et al., 2013). This re-creation process takes a long time causing cost overruns, less efficiency, and productivity in building operations, and negatively affect the responsiveness to client requests (East & Nisbet, 2010). The National Institute of Standards and Technology (NIST) in the US estimated the cost of waste in the process of validation and/or re-creation of facility data due to lack of interoperability in the US at US$15.8 billion in 2002 (Gallaher et al., 2004). This loss included about US$10.27 billion loss that occured in the operations and maintenance phase.

The emergence of BIM open data standards such as Industry foundation classes (IFC) provided a standard definition of the geometry and attributes of building objects (Becerik-Gerber, Jazizadeh et al., 2012). These definitions allow the exchange and reproduction of BIM objects such as walls, doors and so on between different BIM authoring software. Building on IFC, the Construction Operations Building information exchange (COBie) standard provided an efficient way for capturing and delivering facilities management information in a structured manner from an early stage of the construction project (Patacas et al., 2015). It is fundamentally a data exchange tool between the BIM model and the Computer Aided Facilities Management (CAFM) system by exporting the asset data from the model into a spreadsheet, and importing this sheet into any BIM compatible (CAFM) system in the commencement of the operations phase (Khosrowshahi & Arayici, 2012).

Using BIM for facilities management has the potential to provide several advantages compared to traditional approaches to managing building information (HM Government, 2012). It enables a structured way of managing data flow from design and construction phases to building operation phase; it also provides access to accurate location, attributes, and the relationship between building assets and systems (Pauwels et al., 2013). The open standards associated with BIM like Industry Foundation Classes (IFC) and COBie (if implemented and managed correctly) put an end to the mentioned FM interoperability problem and provides a platform neutral way of managing building information (Guillen et al., 2016).

There are many case studies in the literature about the use of BIM for facility management. Ballesty et al. (2007) investigated the reuse of BIM data for facility management for the Sydney Opera House project. This case study focused on BIM as an information framework for facilities management, and how the data it generates can be flexible and extensible enough to accommodate organisation-specific data for the mentioned building. It demonstrated the many advantages of BIM for FM as a consistent and structured source of building asset data that can be used with any facility management software platform. Nisbet (2008) explored the integration of the COBie standard with computerised Maintenance Management software (CMMS). He used the COBie standard integrated with IBM's Maximo to incorporate any IFC or COBie based file into Maximo software.

East & Nisbet (2010) developed an approach to compare the cost savings between using COBie2 in information exchange vs the traditional ad-hoc approach of information sharing in facilities management. This method is produced using a top-down strategy in which the information required for facilities management are analysed, and the attributes of assets are identified, and then this information is fed back into the BIM process to ensure all required information in the operation phase is incorporated and ready to use in the BIM model. This cost comparison concluded that using COBie can save up to 75% of the total costs spent on FM ad-hoc information systems for the same building. Most of the case studies developed for the use of BIM for FM are individual studies from academics with use by industry is still in its infancy (Lavy & Jawadekar, 2015).

BIM came with a fundamental change of the role as well as the expected level of engagement of facilities management teams in the design and construction phases of building lifecycle (Eadie et al.2013). With the use of BIM, it became a mandate for facilities management teams to provide their asset data requirements as a scope of the COBie data that needs to be prepared in all pre-operation stages of building lifecycle (East, 2016). These requirements are a part of the “Asset Information Requirements” document. This document is ideally provided by the facility management team and must contain a list of all the manageable assets in the building, as well as the required attributes for each asset that the construction supply chain will provide throughout building lifecycle (Edirisinghe et al., 2017). This change mandates a complete re-engineering of the traditional process of data preparation and exchange between construction and facilities management teams using COBie standard.

The structure of COBie contains almost all information required for effective asset management in the operations phase (Jaspers, 2016). It has information about the spatial arrangement of the building, i.e. the relationship between different floors, zones and spaces. Furthermore, it contains information about the building systems and their components and the relationship between these systems and the area containing it (Cavka et al., 2017). In the asset level, COBie includes a lot of valuable data about assets that makes it very important for operations and maintenance phase. For example, it includes physical information about the asset such as length, width, height and also operational data such as power consumption, voltage, warranty information, and supplier information (Becerik-Gerber et al., 2012). This structured way of preparing and managing data flow throughout building life cycle makes it vital for all stakeholders to collaborate effectively in producing high quality COBie dataset that's is usable by facility managers in the operation phase of building lifecycle.

There are many challenges identified in the literature about BIM for FM. For instance, lack of FM engagement in the data management process from an early stage of lifecycle, lack of realisation of BIM benefits by FM industry (Kassem et al., 2015), lack of skills and experience of BIM adoption in FM, immature software interoperability (Ashworth, 2015), and finally, one of the most critical challenges is process inefficiencies (Fukuda et al., 2014). This process challenge results in a lot of confusion about creation, exchange and management of asset data from construction to operation phase. Most of these papers identify issues that could have been avoided if there is a structured way to manage the data exchange between building stakeholders. This paper will propose a conceptual framework based on a standard project management methodology to manage COBie data as a "Project", hence the main question that will be investigated in this paper is: If COBie is "a data management project", how could it be mapped into standard PMI project stages, and how could this methodology be used in managing it?

3.0 Methodology

The data collection methodology used in this research is based on an inductive bottom-up approach. This approach is a research methodology where the collected data is used to form a new framework based on observational results and then generalise this theory to cover a broader context (Jebb, Parrigon, & Woo, 2016). This methodology is ideally used when there is no existing theoretical framework covers a particular phenomenon or research problem which is the case in studying COBie management process as demonstrated in the literature review section of this paper.

The data collection started with a review of the existing literature on BIM for facility management and the COBie process. It also included a review of industry reports, case studies, current software and hardware tools used to create, manage and quality control of COBie such as Revit COBie extension, Navisworks COBie extension, XBIM and "COBieQCReporter". Following that, data was gathered about the COBie management process from the University College London Hospital (UCLH) Phase 4 project through interaction and observation of current processes and procedures in this project. This observation process took place for a period of one year from December 2016 to December 2017. During this period the authors had access to the project documentation and collaborated with project teams under a partnership contract between UCL and Bouygues, UK. This contract allowed the authors to participate in BIM management meetings with the project team, reading and analysing project documentation, and contrasting the currently used processes with industry standards and literature. This observational data was then coupled by the standard project management methodology by Project management Institute (PMI) to produce a conceptual framework for COBie data as a project to improve and streamline the process of COBie management (Project Management Institute, 2018) as will be discussed in details in the following section.

4.0 The COBie Management Plan structure:

This study used the inductive methodology described earlier to propose a mapping process between the project management methodology that is used by the Project Management Institute (PMI), the Royal Institute of British Architects (RIBA) Plan of work (PoW) (RIBA Plan of Work 2013, n.d.) and COBie drops. This mapping is critically important in clarifying the roles and responsibilities of the different building project stakeholders in preparing and exchanging COBie information in each phase of building lifecycle. The five phases of project lifecycle as per PMI are: Initiation, planning, execution, monitoring and controlling and handover/closeout phases. Fig. 1 below illustrates this mapping between the three processes. Following is a detailed discussion of the different elements of the mapping mechanism and the project management plan that are proposed to be used in creating and managing COBie throughout building lifecycle.

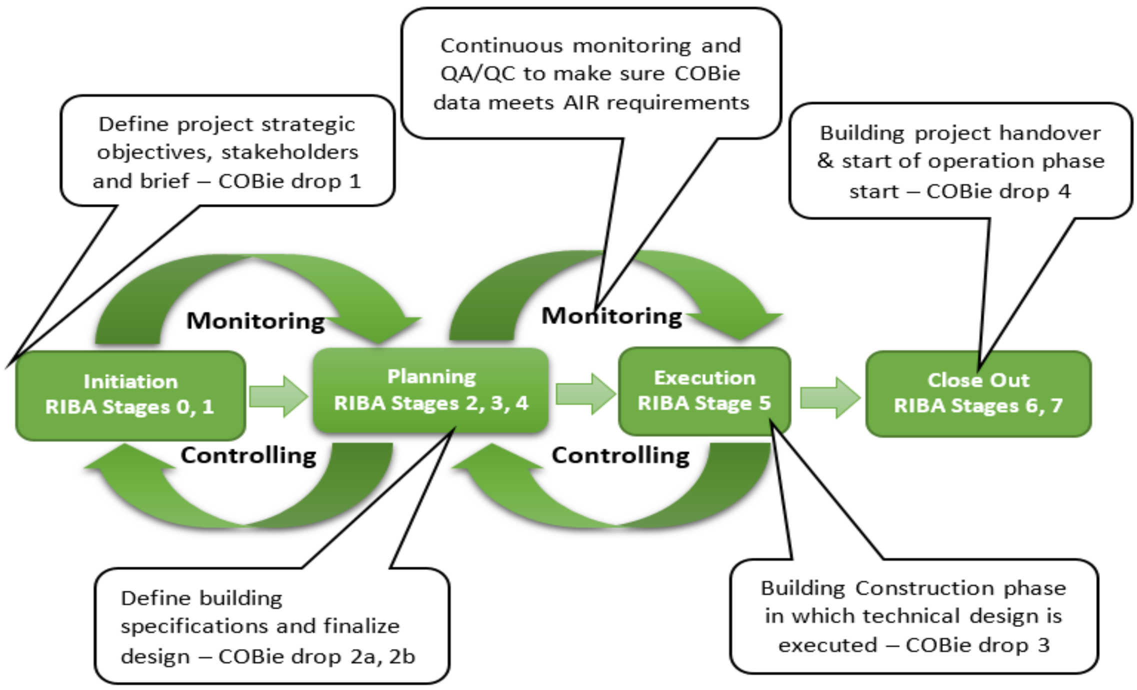

Fig. 1: Mapping PMI Project Management Methodology with RIBA PoW

4.1 Phases of the COBie Management Plan (CMP)

This section will briefly discuss the different phases of the COBie management project and its mapping with the PMI project management methodology and RIBA plan of work:

Initiation Phase of CMP: this will ideally take place at RIBA stage 0 (Strategic Definition) and stage 1 (Preparation and Brief). The purpose of this phase is to make sure that the scope of the COBie management project is set properly, includes all information that needs to be delivered and information that will not be a part of COBie deliverable (Goedert, & Meadati, 2008).

The planning phase of CMP: This phase takes place at RIBA stages 2 (Concept Design), 3 (Developed Design) and 4 (Technical Design). After the scope of the CMP is agreed, the architect prepares the COBie management plan document (As detailed in section 4.2 of this paper) which includes all the information required by the construction supply chain to deliver this scope. The plan should include roles and responsibilities for all stakeholders (Lavy & Jawadekar, 2015) and COBie schedule. Therefore, it becomes clear to the client FM team who will manage the COBie deliverables, who will deliver COBie data, when it is delivered, and the quality criteria of checking COBie data throughout the project until it is handed over for operations phase (Masania, Dossick & Lin, 2015).

The execution phase of CMP: The execution of the CMP is a continual process throughout all RIBA stages. However, most of the asset data that needs to be populated in the COBie format should be available by the end of RIBA stage 5 (Construction). During this stage, the main contractor takes the lead in delivering the final COBie drop 3 in collaboration with the construction supply chain.

Closeout phase of CMP: This phase takes place in RIBA stage 6 (Handover and closeout) and 7 (In use). During this phase, the main contractor in collaboration with the architect, and the client FM team perform the final quality check for COBie data to make sure it meets the requirements for the building operation, and make any required changes/additions in the COBie final deliverable before uploading the data into the Computer Aided Facility Management (CAFM) system.

4.2 The structure of the COBie Management plan:

This section will present the different elements of the COBie management plan with a discussion of each element.

4.2.1 COBie Scope:

Scope of the COBie data requirements should be clearly and comprehensively stipulated in the asset information requirements (AIR) document (Nical & Wodyński, 2016). This document should be a section of the Employer Information requirements (EIR) or it could be a separate document. This document must include at least the following information:

- A list of manageable assets in the building. This list consists of a detailed list of building systems, i.e. electrical and mechanical systems and their components, Information technology assets, audio-visual equipment, and also a list of furniture items that require special cleaning/maintenance procedures or assembly requirements.
- A list of specified attributes for each asset. This includes physical attributes, operations attributes and warranty information that will be used for effective facility management.
- The Zoning strategy: This part describes the criteria for the grouping of spaces to perform a specific function. For example, facility managers may include lighting zones, ventilation zones, security zones, fire alarm zones, and occupancy/space purpose zones. This zoning make it easier to make some operational decisions according to zones. For example, a security zone could have a special access procedure, or a fire alarm in a zone operates the fire suppression system only in the affected zone, and so on.
- The classification standard that will be followed by all construction supply chain.
- The naming convention for the assets in the Facility, floors, spaces, components, and systems. The consistency of this naming convention is of a critical value because it will then be used by the Architecture, Engineering and construction supply chain to maintain a single unified naming for each asset in their respective models. This guarantees that when the BIM models are federated, every asset will be unique and there will be no duplication of assets in the models.
- What data is not required as a part of COBie so that the scope boundaries are well identified and documented. The client FM may request some asset data to be extracted and delivered in a different format rather than COBie. This could be for various reasons including security, safety or operational reasons. This data needs to be segregated from the COBie scope and a separate plan needs to be prepared on how to deliver this information between client, architect and the construction supply chain.

- What software tools will be used, and how the information extracted from these software tools will be coordinated and populated in a consolidated and uniform COBie drop.
- The scope of COBie Management project extracts all the above information from the AIR and rearranges it in the form of the scope of this information delivery project. This scope will then be reviewed and signed off by the client, and any further change in this scope at any stage of the project will follow the change management process detailed in the change management section of the project management plan as discussed in more details in section 4.8 of this study.

4.2.2 Project Team

The COBie management plan must identify the appointed COBie Lead from each stakeholder participating in the building lifecycle including:

- The client COBie Lead (facility management team or the FM consultant selected by the client to prepare the AIR and manage the implementation of COBie).
- The architect COBie lead role.
- The main contractor COBie Lead role.
- A COBie lead from each of the subcontractors in the construction supply chain.

The identification of these members of the COBie delivery project provides a sense of accountability and responsibility in managing COBie data (Shafiq et al., 2013). The COBie lead in this context is not a job, but it should be only a role. For example, the BIM manager or the Information Manager in the Architect organisation can act as the COBie lead for the architect, and for the client, the "Facilities Director" or the government Soft-landing champion may act as the COBie lead. The main aim is to streamline communication and have specific reporting lines between COBie leads in different stakeholders (Volk et al., 2014).

In this section of the plan, the roles and responsibilities for each team members must also be identified in each stage of building lifecycle, for example, which provides quality check at each stage, who presents COBie progress, and who accepts it from the client side.

4.2.3 Communication

The communication plan will list all the COBie progress related communication between all stakeholders of the project throughout the different stages of building lifecycle (Lavy, & Jawadekar, 2015). The following aspects would be expected to be a part of the communication plan:

- Reporting period, format, and medium for COBie reporting between all stakeholders.
- A plan for periodic meetings between the architect, the client FM, the main contractor and subcontractors to report on COBie progress.
- The reporting should be aligned with RIBA stages, so in RIBA stages 0 to 4, the architect will take the lead in COBie progress reporting, and the architect COBie Management lead (CML) will provide progress reports to the Client FM.
- Towards the end of the technical design phase, there will be a handover meeting between the Architect, the client FM and the main contractor. In this meeting, the CML from the main contractor will be briefed by the architect. The architect will also present the COBie drop 2b, and the COBie management plan to the main contractor.
- In RIBA stage 5 (Construction) the main contractor's CML will be leading the COBie management, and they will present all COBie data requirements to the construction subcontractors including the scope of data delivery required from each subcontractor

and the reporting period. In this stage, the main contractor will also take the lead in setting and managing meetings with the architect and the client FM team to report in progress until the handover phase.

4.2.4 Schedule

COBie drops must be attached to a timeline to ensure timely progress and delivery of its data. The architect should put a COBie data delivery schedule in place detailing the COBie drops and when they are due to be delivered. Arguably, the schedule of data delivery might change like any other deliverable of the project, so keeping the COBie delivery schedule updated is important (Eastman et al., 2011). This continuous update is necessary because it gives a sense of time-bound responsibility to all project stakeholders, and it also informs the client when to expect a COBie drop and what data is anticipated to be included in each drop. The schedule should list the COBie drops as milestones, and detail any intermediate delivery points. After the schedule is prepared in the concept stage, i.e. RIBA Stage 1 by the Architect, it will be a part of the COBie delivery plan and will be gradually updated and disseminated to other stakeholders once they join the project. Subsequently, it will be introduced to the main contractor towards the end of the construction phase, and then gradually to other subcontractors when they are appointed by the Main Contractor, so that the client is well informed about the timing of data delivery throughout the building lifecycle.

4.2.5 Budget:

In many cases, the budget for COBie delivery is not accounted for either in the Client side or the other stakeholders involved in data management throughout the building lifecycle. COBie management plan must respond to that by providing a clear budget for delivering COBie data. The following are some items that need to be included in the budget for all stakeholders:
Consultation budget for the client if the COBie knowledge is not a part of the team skills. The consultation related to that should include, preparing the AIR in alignment with the overall facility management strategy for the client organisation, receiving and quality assurance of COBie drops throughout building lifecycle, and the hardware and software packages that will be used to quality assurance. The same applies to the architecture. For the main contractor, the consultation fees need to be included in the pricing strategy for the overall BIM delivery for the project including all the required consultation that will be used to manage COBie delivery from the construction supply chain. This ensures that the cost incurred in COBie delivery thought building lifecycle is accounted for and guarantees smooth operation of COBie delivery project with n cost-related issues.

4.2.6 Risk

Like any project, risk management must be an integral part of the COBie management plan. This ensures that risks are recorded and managed systematically to avoid any interruption in the delivery of asset data using COBie. The following must be a part of the COBie delivery project plan:

- A list of the high-level risks related to Cobie delivery (Skills, technology, process, contract).
- An Assessment for each risk and its likelihood and impact on the COBie delivery project.
- A mitigation plan for each risk including how this risk is managed to start by risks with highest likelihood/impact on the project.

4.2.7 Quality

Many problems associated with COBie delivery are due to lack of proper quality management of COBie data since an early stage of the building lifecycle. That's why it's critical to embed quality management from the earliest stage of the project (Cavka et al., 2017). Quality checks should be clearly identified internally within each stakeholder's organisation (Zadeh et al., 2017) and across stakeholders when a coordinated COBie drop is due to be delivered for client check. COBie drops should be checked for:

Completeness: Making sure all the data required at a certain stage of the building lifecycle is included in the COBie drop associated with this stage.

- Structure: This part of the quality check ensures that the structure of the COBie data adheres to the COBie standard. For example, every space should be a part of at least one zone, every component should be at least a part of one system, and every component should be a part of at least one space. This check is of utmost importance for the CAFM system when importing the COBie data because it allows the CAFM system to create a correct structure and relationships between building systems and spaces correctly.
- Consistency: Making sure the data in a certain COBie drop is consistent across all stakeholders. For example, the asset naming is being followed as required in the AIR, the classification standard is the same among all subcontractors and so on.
- Data correctness: this ensures the data in COBie is correct and adheres to the design and the AIR requirements. For example, the dimensions are using the correct units, the spatial information of the spaces and the performance information of the assets are correct. For example, if we have a floor with height that reads 190000 mm in the COBie file, this means that something is wrong with the data because this means that the floor height is 190 meters which doesn't make sense. These kind of semantic errors need to be checked and rectified as a part of the COBie quality check.
- Identify who will provide quality checks for the COBie deliverables from each contractor.
- Identify the tools and procedures that will be used for quality check.
- Identify the timing of the quality checks and the person responsible for performing the final review for coordinated COBie drops. Who will sign it off, and who will present it to Client.
- Identify the responsible person from client side who will provide comments of the received COBie deliverables and set deadlines for compliance.
- Identify the person responsible for signing off the final COBie drops from the client side.

4.2.8 Change Management:

COBie scope change can occur at any stage of the project (Moayeri et al., 2017). For example, a new zoning strategy may be introduced, a new asset tagging strategy could be required towards the handover phase, or more information could be required by the client (Liu, 2013) about a specific system or components. The COBie management team should put a clear and well-structured change management process to manage these changes.

The proposed change management process is as follows:

- Receive the change request from the client; this could be through email, a meeting or any form of communication.

- The COBie management lead will prepare a change request form, which captures all the updated requirements, and gets it signed by the client to make sure the required changes are all documented. The COBie management lead is usually the architect in RIBA stages 0-4, and then it becomes the main contractor in RIBA stage 5 and 6.
- After the client signs the change request form, the COBie management Lead will then assess the required change compared to the COBie scope, including the time, cost and quality implications, and send a report to the client.
- The client will then evaluate the report and make an informed decision about the benefits of the change and if it will outweigh its cost, and time implications.
- If the client approves the change report, then it will be implemented based on the additional requirements and resources detailed in the change report. In this case, it's the responsibility of the COBie management lead to inform all stakeholders about the change and what is required from each stakeholder to implement it.
- This process makes sure that changes and their implications on the project are well understood (Juszczyk, et al., 2016), and well communicated among the COBie management supply chain.

5.0 Conclusion and future work:

The lack of well-structured approach for managing COBie data throughout building lifecycle causes many problems and confusion about the roles and responsibilities of different stakeholders in creating and managing asset data. This confusion, in turn, results in incomplete and low-quality COBie data at the handover phase which hinders the ability of facility managers to use this data effectively in the operations phase. The proposed conceptual framework provided a standard project management process to systemize the data flow among all stakeholders. This framework is aligned with the standard project management methodology by PMI and also mapped with RIBA stages. As the framework is based on an actual construction project, the concepts provided will potentially systemise the process of COBie data Management throughout the building lifecycle. This systematic approach will improve the overall quality of the COBie data handed over to the facility management team.

Based on this conceptual framework, more research could be done in developing a step by step process to manage the data exchange between building stakeholders through the planning, design, construction, and handover phases of the building lifecycle. This step by step process will make it easier for all stakeholders to know the content of each COBie drop, when they are delivered, by who and to what quality standard.

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