Towards a shared use case repository – the SWIMing initiative started in the framework of the EU H2020 R&DI programme

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Abstract
Data exchange and data sharing are one of the big challenges in the Architecture, Engineering, and Construction (AEC) industry and energy efficient building (EeB) domain. BIM open standards and lately the use of Semantic Web technologies provide a sound basis to implement exchange requirements derived from typical EeB use cases. However, the challenge remains to identify what models are available and how to align these with a particular use cases data requirements. This paper focuses on the application of an established methodology (Information Delivery Manual) adapted for the EeB domain and the application of the BIM*Q tool, which applies this methodology. The paper proposes building a shared use case repository that collects detailed data Exchange Requirements as well as alignments to existing models to support projects, when developing new, novel use cases, in the difficult task of aligning data requirements with models and standards.

Keywords: Energy Efficient Buildings, Building Information Modelling, Ontologies, Linked Data

1 Introduction

Access to reliable structured data plays a key role in all aspects of energy management across the Building Life-cycle (BLC), which covers the design, construction, operation and maintenance, refurbishment/renovation and on to eventual demolition/recycling (Smith & Tardif 2012) (Wong & Zhou 2015). ICT solutions ranging from energy and performance modelling tools to operational decision support tools rely on this for their correct operation. Building Information Modelling (BIM) has been identified as a key enabler to supporting new and existing energy management processes by making data more interoperable (Wong & Zhou 2015) allowing different computer aided tools employed at different stages of the BLC to exchange data (Eastman et al. 2011).

The leading standard developed around the concept of BIM is Industry Foundation Classes (IFC), which is also the only BIM ISO standard (ISO 2013). IFC is a large data schema with many relations between different entities. Identifying whether it will meet the exchange requirements of a particular use case remains a considerable challenge, especially for those unfamiliar with the data schema. To make the process of using IFC simpler, the Information Delivery Manual (IDM) and Model View Definitions (MVD) have been developed by the non-profit organization buildingSmart (buildingSmart 2014). IDM can help identify and capture the exact information exchange requirements to meet a business use case. As the IDM methodology is agnostic about the particular data schema used to meet data exchange requirements, it is also possible to map data requirements to data structures other than IFC if they are not yet covered, or fall outside its scope. Here the challenge is to identify which standard or ontology is best suited to meet the specific requirements of a use case. Moreover, where multiple standards are needed, linking these models together adds to the complexity as the constraints on concepts and entities can make alignment difficult.

To address the latter, this paper proposes the use of Linked Data (LD), a structured form of data storage, distributed across the web, and which is supported by tools to easily query that data. By integrating BIM into the wider web of data, building data can be accessed alongside all other open

Linked Data (LD) sources. These include, for example, data on materials and systems (e.g. sensor and state of building devices data) which make up the building, profiles of occupants, and information about weather patterns and regional and global energy prices. Bringing this information together can make for more meaningful analysis of energy consumption and its relation to the localized costs of materials, systems, and personnel in existing and future buildings.

To address the former, this paper presents work conducted by the SWIMing intiative within the framework of the EU H2020 R&DI programme, which includes; the IDM methodology adapted for the EeB domain and which supports the collection of use cases, the BIM*Q tool which supports this methodology by providing a web-based interface and shared repository for capturing use cases and detailed Exchange Requirements as well as their implementation in data structures, and an exploratory use cases taken from the repository which has undertaken this process. Potential extensions to the BIM-Q tool that can help to better analyze and compare requirements will also be discussed. To illustrate the use of the shared repository, the paper will focus on the development of a use case in the area of energy simulation, and look at the properties of two models (IFC and gbXML) and whether these independently, or combined can meet each use cases requirements.

2 Background and State of the Art

This section gives a brief description of BIM standards, the IDM methodology and the use of LD to manage the linking between different data models.

Building Information Modelling is a concept which has arisen to enable data related to the BLC be exchanged to support decision-making (Eastman et al. 2011). BIM has been identified as an enabler for energy efficient buildings (Wong & Zhou 2015) and therefore, plays an important role towards achieving the EUs Energy Performance of Buildings Directive (EPBD) which aims to reduce energy consumption across the BLC, as part of its overall goal of cutting EU energy consumption by 20% by 2020 (European Parliament 2010). Within the Architecture, Engineering and Construction (AEC) community the leading standard around the concept of BIM is Industry Foundation Classes (IFC), developed by buildingSmart (buildingSmart 2014). Other candidates for BIM include Green Building XML (gbXML), prevalent in the energy simulation domains. Nonetheless, as IFC is the only BIM currently an ISO PAS standard (ISO 2013), it remains a primary candidate. IFC is a non-proprietary data model which is open and freely available for exchanging and sharing BIM data in terms of the semantics of constituent building elements. It addresses several core data domains for building AEC processes, enabling information to be passed between different stakeholders across the BLC. IFC has seen major government clients in the UK, Norway, and Finland, as well as a growing commitment in China (Howard & Björk 2008) and the US (McGraw Hill Construction 2012). In practice though, IFC has yet to make the impact expected of it in the AEC communities (Eastman et al. 2010). One major barrier to the use of IFC is its complexity. Developing use cases which make use of the standard requires a considerable investment of time and effort in order to be able to understand which areas of the schema can best be leveraged for meeting the use case data requirements. To support this role the current practice within the industry is to use the IDM/MVD methodology.

IDM is a methodology for developing use cases and managing the definition of data requirements and mapping of those data requirements to a specific data model, e.g. IFC (Jeffrey & Karlshoej 2010). IDM focuses on knowledge defined by domain experts. It defines processes and exchange requirements which answer; what kind of tasks must be carried out? Who is responsible? When they have to be carried out (order, dependencies)? And what data needs to be exchanged (called exchange requirements)? MVD is used to translate Exchange Requirements to data structures, which are used for implementation. For IFC, this means a subset schema must be agreed upon along with any additional constraints that need to be implemented by tool vendors. This process not only reduces the efforts for software implementation but also ensures a certain level of quality for IFC-based data exchange. In the context of BLC Energy Management (BLCEM) use cases, an MVD can be assigned to one or more (linked) ontologies that are able to cover expected data requirements, for example, geographical data (GIS) or by covering a higher level of detail like for instance dealing with special material properties for novel heat loss. How to manage and maintain these links remains an open question.

Linked Data (LD) is an approach to expose, share, and connect related data, which was not previously linked, on the Web (Heath & Bizer 2011) and therefore can be used to achieve this goal. It uses the Resource Description Framework (RDF) as a data model for representing structured content and Uniform Resource Identifiers (URIs) as a unique identifier of information resources. RDF describes information as a directed graph, where a set of nodes are connected with directed edges (Klyne & Caroll 2014). RDF defines a triple consisting of a subject, predicate, and object that can be queried using SPARQL (Prud'hommeaux, E. & Seaborne 2008). LD is implemented using standard Web protocols and dereferencing mechanisms. Due to this fact, the LD cloud is inherently associated with human-readable descriptions (mainly in HTML) of the resources described in RDF. This implies that RDF and textual (HTML) content do not just live next to each other on the Web of Data, but are also indirectly connected to each other. In modern AEC, data related to different domains such as: building geometry and topology data, sensor data, behavior data, geo data, are generated and consumed across BLC stages. The combination of BIM and LD has the potential to meet the requirements for storing and sharing those data. However, data must be represented or at least tagged using RDF. Several researches have been developing linked data representations for those different domains, for example FIEMSER and SAREF for devices and energy domains (FIEMSER 2016), (Daniele et al. 2015), Semantic Sensor Network (SSN) for devices domain (Compton et al. 2012), Adapt4EE Occupancy Ontology for behavior domain (Adapt4EE 2016), Geonames for geolocation domain (Geonames 2016), and also KnoHolEM and Serum-iB which cover multiple domains (Wicaksono et al 2015) (Wicaksono et al 2012). General methodologies for LD generation can be used for transforming existing resources into the Linked Data and for linking new and existing RDF resources to others, for instance, IFC and gbXML. ifcOWL, now an official standard (buildingSmart 2015) transforms the well-established IFC standard defined in EXPRESS schema into OWL to enable reasoning and querying using SPARQL and to improve the extensibility of the data model. An approach has also been developed to transform gbXML into OWL (Kofler & Kastner 2013).

3 Methodology for Use Case Capture

As discussed previously, the management of data across BLCEM processes presents a considerable challenge in terms of maintaining interoperability between those processes. In this section, the adapted IDM methodology to meet the specific needs of the BLCEM domain is presented. The methodology is based upon the IDM/MVD methodology and also guidelines set down in a project which addressed linked data for managing data in smart cities, call the Ready4SmartCities project (Radulovic et al. 2015). Figure 1 gives a high level overview of the Business Process Model Notation (BPMN) (Object Management Group 2012) for this methodology. Here we describe each step.

3.1 Task 1-3 'Define BLC Stage', Define Actors and Roles' and 'Define Data Domains'

The purpose of Task 1 is to enable the quick identification of where in the BLC data is both generated and processed. The BLC stages can be broadly categorized as: Design, Construction, Commissioning, Operation, Retrofitting/ Refurbishment/ Reconfiguration, Demolition/Recycling. More fine grained definitions of processes may also be defined during this task and aligned with a specific data exchange (see Task 4). It is possible to apply different modelling techniques to capture processes, for example processes may be defined more formally using BPMN (as is done in the IDM methodology), but this is not a mandatory requirement. In Task 2 the different actors involved in the different processes required to complete the use case are identified. The purpose of this process is to enable the quick identification of responsible stakeholders for generating and processing data exchanges. For each process identified in the use case one actor must be defined who is responsible for generating that data. An actor may include non-human agents which process data and generate new data outputs. In Task 3 the data domains that the use case requires are identified at a high level. The purpose of this process is to provide a quick reference to data structures best suited for a particular domain. These data domains are presented here (McGlinn et al. 2016) and include the following models: Product, Device, Control, Behaviour, Communications (and Measures), Energy, Weather and Geolocation. Once these three tasks are complete, the next step is to explore the data requirements in greater detail, assigning each data exchange requirement to its previously identified processes and actors.

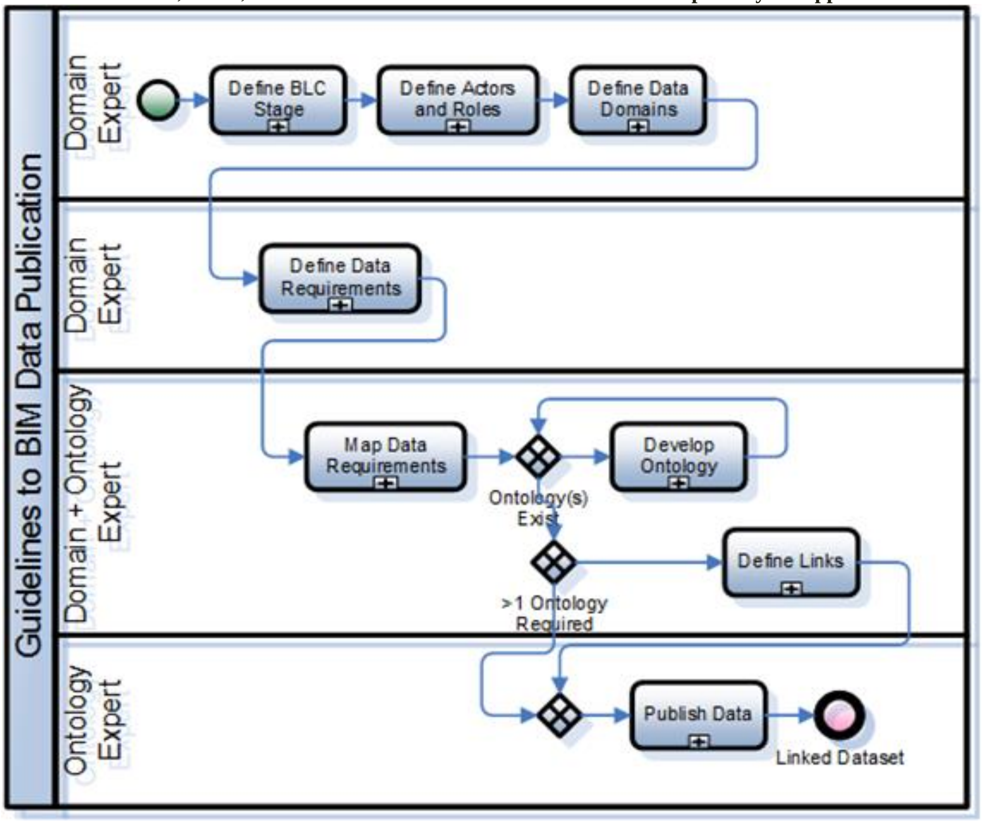

Figure 1 Methodology for generating and publishing BIM Data

3.2 Task 4 - 5 'Define Data Requirements' and 'Align Data Requirements'

In Task 4 the specific data requirements for each process in the use case are defined in greater detail. The purpose of this task is to understand the exact structure of the data required to meet the use case. Each data value that is required must be captured and described. This involves structuring the data as concepts and properties. These classes are then aligned with the processes and actors. In Task 5 the conceptual model is aligned with existing ontologies and standards. The purpose of this task is to provide a quick reference point for the identification of alignments within existing domain models, thus supporting those who wish to enable similar use cases. The alignment process is based upon expert knowledge of the existing domain models and therefore may need to undergo several review steps to ensure that the data alignments are correct (see Task 8).

3.3 Task 6 - 8 'Develop Ontology', 'Define Links', 'Publish Data'

Task 6 is concerned with the development of models for meeting the data requirements of use cases which are not currently supported by any existing ontology or standard. The development of these ontologies should be conducted using existing methodologies and tools, for example, the Protégé tool (Knublauch 2004) or the BIM*Q tool (AEC3 2016) (see next section) to provide lightweight ontologies. Where these new data structures are extensions of existing schema, they may also be used as a precursor to extending the schema for certification purposes. Task 7 is concerned with the definition of links between ontologies and data models, where multiple are required to meet the use case. At this stage, the mappings and alignments identified in task 5 must be formalized with equivalence statements (e.g. owl:equivalentClass/Property) as well as other types of linked properties. Finally, in Task 8 the publication of data so as to make it accessible both within the scope of a particular use case, but also to make it available to external use cases, is addressed. It is envisaged that prior to the completion of this task all concerns related to licensing, security and privacy have been addressed. This paper will not address these last three tasks, instead focusing on the use of the BIM*Q tool for steps 1-5.

4 Tool Support for Use Case Modelling

In order to apply the outlined methodology, a web-based tool has been developed and used, called the BIM*Q tool (previously known as ReqCap), developed by AEC3 (AEC3 2016) and the result of many years of experiences in collecting and structuring end user requirements. It replaces a former spreadsheet-based solution used within the IDM methodology, an approach which was chosen due to a low learning curve for new projects. However, experiences have shown that collected requirements quickly become complex and are then difficult to maintain and evaluate in spreadsheets. They are also difficult to re-use as there is no central repository of IDM documents to search for existing descriptions and data exchanges. Also, changes to one data exchange do not propagate to those derived from it without additional effort. Besides these data management issues, there is also need to use collected requirements for sophisticated reporting and, based on the mvdXML format developed by buildingSmart, to export a specification which is usable for basic model checking. Accordingly, there are a couple of reasons to use the BIM*Q solution for collecting requirements. In the context of EeB projects, the application of the methodology described here along with tools like BIM*Q not only support the collection of requirements for a single EeB project, but also to share and reuse definitions with other projects, thus improving the impact of those projects by promoting their outcomes and enabling new projects to examine so as to reduce the time to align their data requirements with existing standards, like IFC.

Accordingly, the motivation of using a tool like BIM*Q is not only to share requirements and all related definitions between project partners, but also to share it with other projects. The BIM*Q consists of a front end web-based interface which supports the modelling of data requirements and specifications that are relevant to implement a data exchange scenario. The initial setup consists of identifying the involved stakeholders (who is responsible to deliver that information), relevant stages and processes (when and why is something needed) (Task 1 – 3 Figure 1). Next, it enables the capture of relevant data exchanges in a structured way (Task 4).

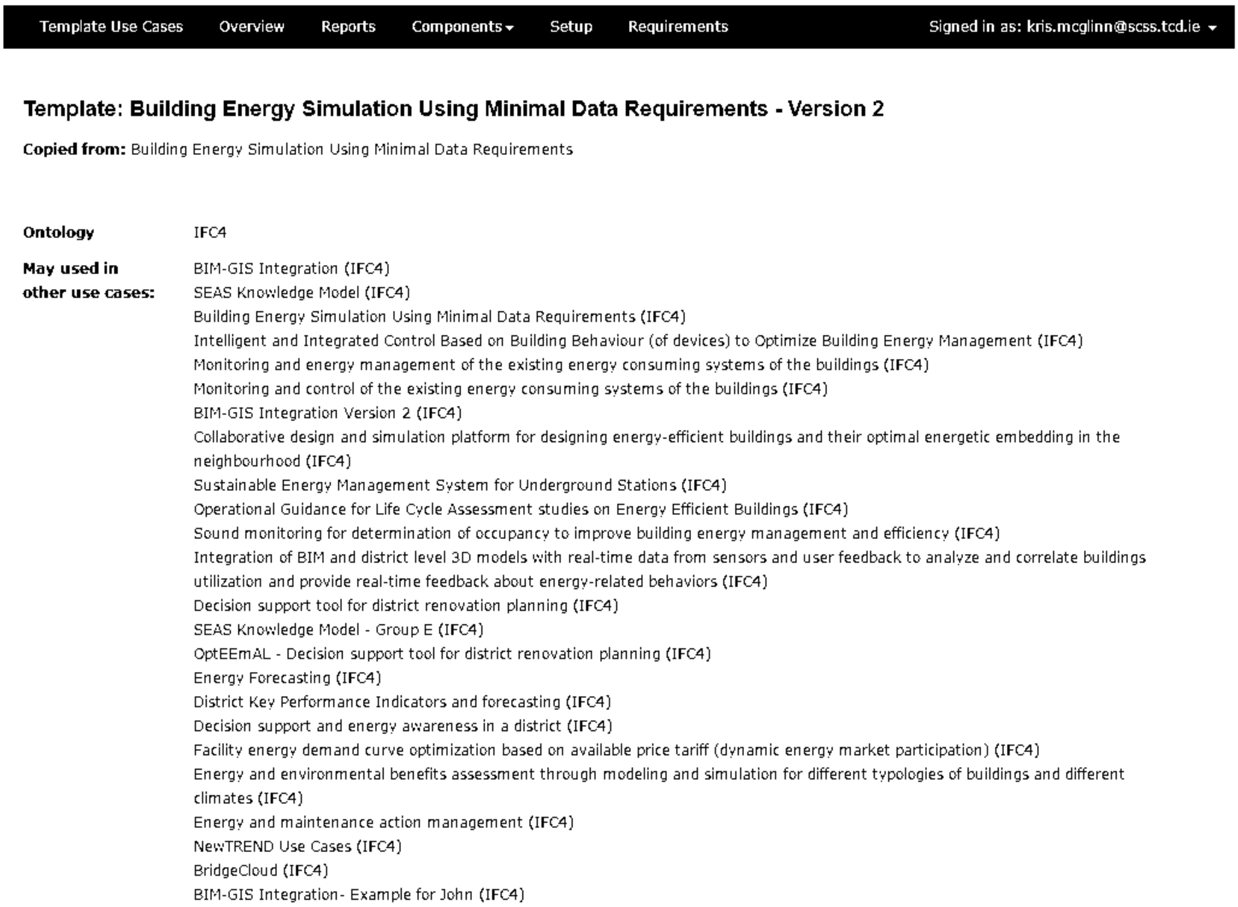

Figure 2 Use cases within BIM*Q which have indicated potential or actual alignments with IFC4 for data exchange

The tool has features to name and describe a use case, label and describe processes, label and describe stakeholders and capture at a conceptual level the different data requirements which can then also be associated with the processes and stakeholders. The conceptual data model may also be further annotated with suggestions for alignments with existing standards, for example, IFC or gbXML (Task 5). In Figure 2 a use case has been selected for the purposes of discovering other use cases which share the same alignments to an existing data schema. Using the tool, the user selects a data schema, in this case it is the IFC4 data schema, and then gets a list of use cases which are also using that data schema. Further details about which parts of IFC4 are being used can be explored by clicking on the appropriate use case. In the following section, the process for developing this sample use case and alignments is presented.

5 Application of Methodology using BIM*Q Tool

In this section, an exploratory use case is presented which has undergone the first five steps of the methodology, taken from the EeB domain, and specifically looking at capturing data required for conducting energy simulations. The case is structured as followed: first, the use case title and a code for the use case are given. After the title, a short description of the use case. Next, the processes in the use case are identified, followed by the stakeholders. Finally, a list of class and class properties are provided along with initial mappings to standards and ontologies. All of this data is available in the BIM-Q tool. The information found in each use case description should not be considered to be complete; rather, the descriptions are part of an iterative process of defining and refining data requirements. Also, we document the process here of identifying alignments to two existing standards, in this case, IFC and gbXML. IFC was chosen due to its identification previously as a core model for supporting interoperability across data domains (McGlinn et al. 2016). GbXML was chosen due to its prevalence within the energy simulation domains.

5.1 UC1 ‘Building Energy Simulation Using Minimal Data Requirements’

This use case is concerned with enabling building energy simulation using a minimal set of data, for example, data on the floor area of the building, the ratio of window area, occupancy for zones, etc. Using this data it is possible to make predictions about kWh energy requirements for different zones in the building, which is then used to inform the responsible party about what building systems (e.g. HVAC) are required for installation and how they should be configured. Table 1 defines the processes (Task 1 of the methodology). The identified stakeholders (Task 2) responsible for generating or processing the data: Architect, Building/Facility Owner. Energy Manager/Auditor and Operations Manager.

Data domains (Task 3) are identified to begin at a very high level to have a quick reference to other use cases which are interested in similar data domains. More information on the different top-level data domains and how they have been identified (i.e. product, behaviour) can be found here (McGlinn et al. 2016). Along with high-level data domains, it is also recommended to begin to identify the high-level classes required within each domain and cross-domain classes, those which can be applied to multiple domains. We can see the identified high-level domains in Figure 3 which gives a screen shot of the data requirements as seen in the BIM*Q tool. On the left we see two domains of interest are identified; ‘Product’ and ‘Behaviour’, with domain specific concepts building, façade and occupancy. Also are three cross-domain concepts, ‘Identification’, ‘Position’ and ‘Space’.

Table 1 The different processes within this use case.

Code	Name	Description	BLC Stage
P00	Check Net Floor Area	Determine the net floor size.	Design
P01	Building Material Specification	Determine the building materials.	Design
P02	Window to wall ratio calculation	Calculate window to wall ratio.	Design
P03	Energy Demand Calculation	Calculate energy demand.	Design

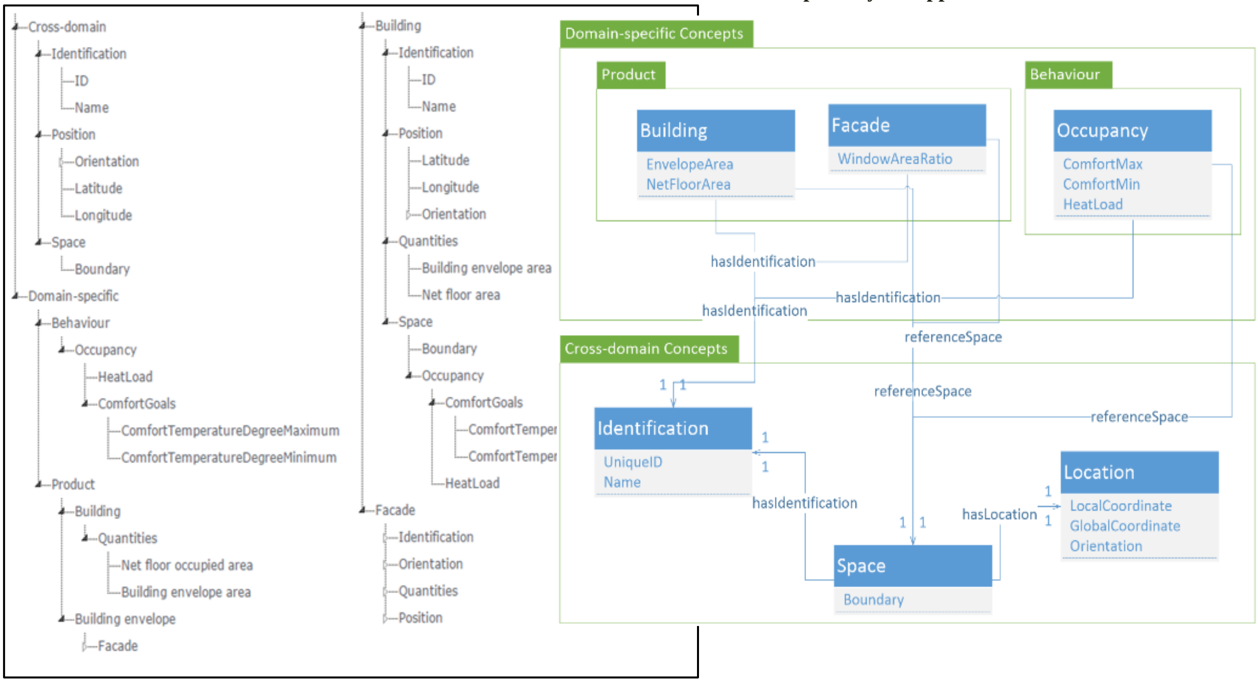

Figure 3 Left Image: Modelling Data Exchanges in the BIM*Q Tool (Left Classes by domains, Right Exchange Requirements). Right Image: UML Class Diagram to Highlight Relations between Concepts

Next, task 4 begins by dividing the data requirements into concepts and their properties. Figure 3 gives a screen shot of the data requirements as seen in the BIM*Q tool. On the left the different concepts are organised as per the domains identified in Task 3. These are: (Product, Behaviour) and generic-concepts which are related to multiple domains (Identification, Position and Space). On the right side we see the specific data exchanges. These include each property which must be met to enable the use case. The tree has been unfolded for Building. Building requires some unique identification, its position (related to geolocation), some quantities to enable the predictive energy simulation, and a relation to Occupancy through Space, i.e. the building has a related space which gives the heat load and comfort range of the building.

Figure 3 (right) gives an overview of the different concepts as described in a UML Class diagram (Martin 1997). Concepts from BIM*Q are described here as classes (e.g. Building, Façade, Space) and properties (e.g. UniqueID.) and associations/relations (e.g. hasIdentification) are given. While more subclasses are indicated in the BIM-Q tool, here we include only the important classes, properties and relations to highlight the relationships between these for illustrative purposes. To adhere to RDF principles, relations are directed. The UML diagram helps to reveal how relations can be used to link concepts to each other, which indicates what concepts may be best suited for alignment purposes, and which then form the basis for LD linking between generated data sets.

Once the collection of concepts and their properties are defined, the next step is to make a choice about which model (or models) can best support the use case (Task 5). In this example, both IFC and gbXML have been identified as potential candidates for meeting the different exchange requirements. Figure 4 gives an overview of these alignments as seen in the BIM*Q tool. Finally, Table 2 gives a list of all the identified classes and properties for the use case and potential alignments between both IFC4 and gbXML, as well as a brief description. The arrow symbol '->' indicates properties which belong to concepts, e.g. the concept Identification has the concept of a UniqueID, which can be seen as a property of the class Identification, written in Table 2 as 'Identification -> GUID'. In the case of the recommended alignment for the concept 'Position -> Latitude, Longitude' in IFC4, the property RefLatitude which belongs to the entity IfcSite can be used. In gbXML, the property Latitude, which belongs to the concept Location. Where there is no potential alignment, this is indicated by 'No suggestion'. In this way, The BIM*Q tool can support the alignment of both generic and specific concepts with existing models like IFC4 and gbXML. In the next section, we discuss how this can be applied to support EeB projects.

Template: Building Energy Simulation Using Minimal Data Requirements- (Derived)

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Concept Definition	IFC4	P00	P01	P02	P03
Building	IfcBuilding	-	-	-	-
Identification	-	-	-	-	-
ID	IfcRoot.GlobalId	OPT	MAN	MAN	MAN
Name	IfcRoot.Name	OPT	MAN	MAN	MAN
Position	check spatial containment -> IfcSite instance	-	-	-	-
Latitude	IfcSite.RefLatitude	OPT	MAN	MAN	MAN
Longitude	IfcSite.RefLongitude	OPT	MAN	MAN	MAN
Orientation	via IfcProject.RepresentationContext -> IfcGeometricRepreser	-	-	-	-
East	requires geometric calculation (geometry -> global coordinate	-	-	-	-
Floor	requires geometric calculation - typical towards negative z-Axi	-	-	-	-
North	requires geometric calculation (see East)	-	-	-	-
Roof	requires geometric calculation - typical towards positive z-Axis	-	-	-	-
South	requires geometric calculation (see East)	-	-	-	-
West	requires geometric calculation (see East)	-	-	-	-
Quantities	-	-	-	-	-
Building envelope area	-	-	MAN	MAN	MAN
Net floor area	Qto_BuildingBaseQuantities.NetFloorArea	-	MAN	MAN	MAN
Space	-	-	-	-	-
Occupancy	-	-	-	-	-
ComfortGoals	-	-	-	-	-
ComfortTemperatureDegreeMaximum	-	-	-	-	-
ComfortTemperatureDegreeMinimum	-	-	-	-	-
HeatLoad	-	-	-	-	-
Facade	IfcGroup with external walls	-	-	-	-

Figure 4 Data alignments with IFC4 for exchanging data related to the building concept and whether it is mandatory or optional for a particular process.

5.2 Discussion and Further Work

The adapted IDM methodology and its application through the use of the BIM*Q tool have been demonstrated in this paper. The BIM*Q tool is designed to support developers of new EeB solutions to identify similar use cases to their proposed use case, in order to identify existing models, like IFC4 and gbXML, which can be applied to support data exchange between the different processes and actors involved. By addressing the issue of interoperability early in the design cycle of an EeB project, the potential to avoid wasted effort when integrating the different aspects of the developed solution can potentially lead to a more efficient and cost effective execution of the project, and also make the resulting solution better integrated into the entire BLC of the building.

The BIM*Q tool has several advantages over the traditional IDM approach, based on documents and spreadsheets for capturing data exchanges. 1) All identified data exchanges are available in one central repository accessible through a web browser, 2) multiple domain experts can collaboratively work on the tool in real time over the internet 3) the data stored in BIM*Q can be further semantically enriched with additional meta-data to help with classification and identification of use cases. In the case of 3) the BIM*Q tool is being extended to support new functionalities, for example, word matching of concept terms to the IFC standard. The next steps are to further analyze the use cases currently being stored and developed in BIM*Q, and begin to classify data requirements by domains. In this way, developers of new use cases will be able to quickly identify data domains and concepts of interest, as well as concepts which can be used to support the alignment of different models.

6 Conclusion

In this paper, a methodology adapted from the Information Delivery Manual (IDM) for the Energy Efficient Building (EeB) domain has been presented and its application explored through an illustrative use case. A tool called BIM*Q is also presented, which using the methodology, supports modelling of use cases, identification of data requirements and their alignment with existing models like IFC4 and gbXML. Through this process of modelling and identification of alignments, the BIM*Q tools is intended to become a go to place for use cases in the EeB domain. Through the interface, use cases with similar names and descriptions can quickly be identified, the different data requirements analysed and alignments to existing models explored. In this way, projects can use current developments in other projects as a basis for their own. By taking this approach, the potential for improving the interoperability of the developed models with existing approaches becomes less time-consuming and difficult, and gives users access to the shared knowledge of the community.

Table 2 All currently identified concepts for the use case along with alignments to IFC4 and gbXML

Concept and Properties	Short Description	IFC4	gbXML
Identification -> UniqueID	A unique identifier	IfcRoot.GlobalId	GUID
Identification -> Name	A name (may not be unique)	IfcRoot.Name	No suggestion
Space	A space has geometric properties and a location. For this use case, the building is related to a space which has data related to comfort of occupants and façade properties.	IfcSpace	Space
Space -> Boundary	A description of the boundaries of a space.	IfcRelSpaceBoundary	SpaceBoundary
Position	Position is used to determine effects of external environment (weather, sun)..	IfcPlacement	Location
Position -> Latitude, Longitude	The global coordinate	IfcSite -> RefLatitude, IfcSite -> RefLongitude	Location -> Latitude, Location -> Longitude
Position -> Orientation(2D/3D) -> Vector	The orientation of an object/space captures as a vector to its origin	IfcGeometricRepresentation.Orientation	Location -> CADModelAzimuth/ RectangularGeometry -> Azimuth
Building	A description of the building which includes information for identification, positioning and quantities (building envelope, net floor area)	IfcBuilding	Building
Building -> Quantities: Envelop Area, Net Floor Area	The surface area of the building envelope and the net floor area.	Qto_BuildingBaseQuantities.NetFloorArea, (Envelop + Roof)	Building ->Area/ surfaceTypeEnum -> InteriorFloor, ExteriorWall
Façade	A description of the building facades, e.g. windows	IfcGroup with external walls	SpaceBoundary
Façade -> Quantities: Window area ratio	A value indicating the total window area ratio.	Window area / (Envelop + Roof)	derived from WindowType
Occupancy	A description of the comfort requirements for the building space.	Pset_SpaceThermalLoad.People	PeopleNumber
Occupancy -> HeatLoad	Heat load of the expected level of occupants.	Pset_SpaceThermalLoad.OccupancyHeatLoad	May be calculated from PeopleNumber
Occupancy -> ComfortMax	Maximum temperature for comfort to be maintained	Pset_SpaceThermalRequirements.SpaceTemperatureMax	MaxTemp
Occupancy -> ComfortMin	Minimum temperature for comfort to be maintained	SpaceTemperatureMin	MinTemp

Acknowledgements

This work is conducted under the SWIMing project, which is funded by the Horizon 2020 European Union (EU) Research and Innovation programme under grant 637162. Additional thanks to Nick Kaklanis from CERTH and Willie Layton from Tyndall for their contributions to the paper and also Odilo Schoch, for his input on the use case.

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