Chapter 7
Methodological Experimentation: Proposal of a Datasheet Template for FM Activities in the BIM Environment

Abstract The aim of this chapter is to investigate a possible implementation of the existing BIM-Objects Information Requirements and data standards in relation to information need of FM processes. In order to address this topic, it is presented the output of a methodological experimentation carried out at Politecnico di Milano with the aim of defining a datasheet template enabling information exchange to support FM activities in a BIM environment. The proposed data schema together with its protocol compilation shall support FM activities by defining a dataset to be included in model elements as necessary to multiple activities which characterizes facility management phase (i.e. maintenance scheduling, space management, spare parts management, etc.). Ongoing research is showing some areas of possible integration of the protocol/data format with FM activities, such as the development of a maintenance manual starting from the design and construction information as provided by the BIM model. The developed datasheet template is also allowing some experimentation concerning the implementation of existing interoperable overlays between BIM software and Facilities Information Systems.

Keywords BIM-Objects information requirements · Data standards · FM-based implementation · Interoperability · Facilities information systems

7.1 Need for an Implementation of Existing Data Standards in Relation to Information Needs of FM Processes

Building Operations and Maintenance (O&M) often represent one of the most expensive building-related activities, since the lack of stakeholders' communication and data interoperability throughout the whole construction process.

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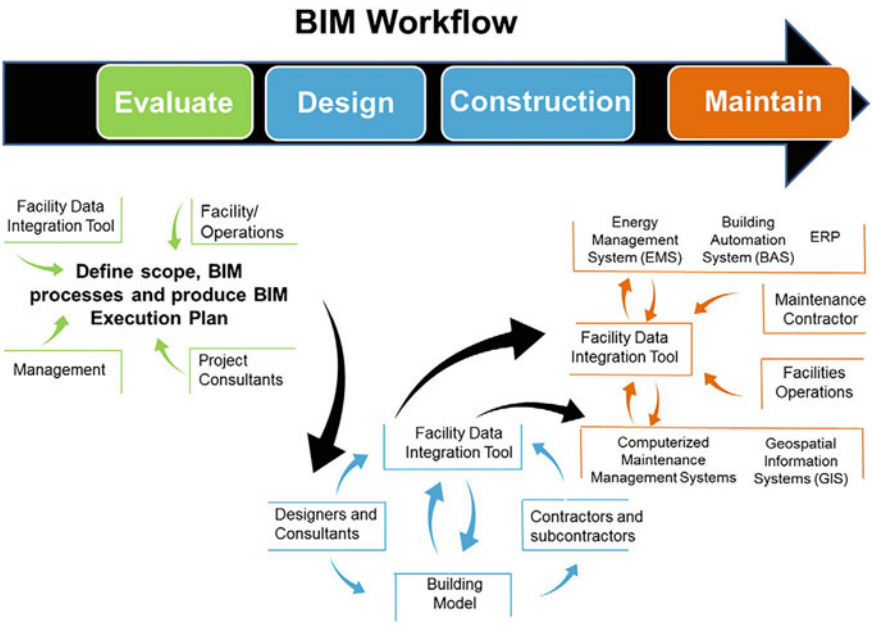


Fig. 7.1 BIM lifecycle workflow [1]

This means that, in order to overcome ineffective and partial information exchanges from the design and construction stages to the use phase, building-related information shall be properly captured, used and stored through the whole asset's life cycle by making them standard and interoperable (Fig. 7.1).

Building Information Modeling represents both the tool and the methodology which can make the AEC/FM stakeholders able to achieve this goal. BIM is able to manage asset-related information along the building lifecycle by providing both the physical and functional characteristics of a facility (Chap. 6).

BIM can both enhance efficient and effective O&M planning, monitoring and control and increase the quality of data, as well as decrease risk and costs. There is significantly growing evidence linking BIM benefits to FM activities, as demonstrated by the current research trend focused on defining BIM standards for the handover of facilities management data (Chap. 6).

Although many research groups, as governments,[1] are working on this strategic topic, facility managers and asset owners are still skeptical about the value of implementing the BIM methodology into their existing processes and activities [1].

Given these considerations, a research group from Politecnico di Milano is focusing on the topic of BIM implementation in the field of FM activities [2].

[1]The United Kingdom (UK) Government is driving to define BIM standards for the handover of facilities management data in the form of Construction Operations Building Information Exchange (COBie) and the Facilities Management (FM) Handover Model View Definition (MVD).

The main goal of the research project[2] is to standardize a datasheet template referring to operations and maintenance phase to enable information exchange in a BIM environment. This data schema should define for each building element a minimum dataset as necessary to multiple activities which characterizes facility management phase (i.e. maintenance scheduling, space management, spare parts management, etc.). In particular, research objectives can be described as it follows:

- definition of a data schema together with its compilation protocol (information taxonomy) for exchanging data related to FM activities in a BIM environment;
- elaboration of a datasheet template for each construction product/building element in order to enhance the information lifecycle management of data concerning FM activities;
- validation of the developed datasheet template in a BIM environment.

In order to address these goals, the research activity has faced the following steps:

- defining the reference scenario by analyzing existing BIM-Objects Information Requirements and data standards (Chap. 6);
- adopting a building registry and a maintenance plan prototype[3] as a primary source of information to define which are the attributes useful to FM activities and processes;
- defining which are the informational attributes to be included in the datasets as useful for FM activities by analyzing the adopted maintenance plan prototype;
- codifying the information previously identified in the maintenance plan prototype in datasets compatibly organized with the analyzed BIM-Objects Information Requirements and data standards;
- selecting and adopting a BIM software;
- defining the information taxonomy by identifying which information included in the developed datasets can be automatically provided by the BIM software as element properties (i.e. geometric information) and by existing BIM-Objects Information Requirements and data standards (i.e. material, manufacturer, model, product page URL, etc.);
- identifying possible sources (i.e. bill of quantities, abacus building components, manufacturer documentation, etc.), referring to different phases of the building process, for each informative attribute of the dataset which is not automatically provided neither by BIM software nor existing data standards;

[2]The research project is an in-depth study inside the PRIN (Progetto di Ricerca di Interesse Nazionale) research "Built Heritage Information Modelling/Management—BHIMM".

[3]The maintenance plan prototype has been developed within the context of a research project commissioned by ATE (the technical office in Politecnico di Milano for buildings management, valorization and development) aiming at developing a model of an information registry, unique for the entire building process and oriented to the needs of knowledge connected with operations and maintenance management.

– transferring and representing the building case study[4] in a BIM environment to test and validate the developed datasheet template.

The definition of this data schema is now allowing experimentations about:

– development of a maintenance manual starting from design and construction information as provided by BIM model;
– definition of possible datasets to integrate existing BIM-Objects Information Requirements and data standards;
– definition of possible datasets to implement interoperable overlay between BIM software and management information system (in particular Archibus) [2].

7.2 Critical Review of the Reference Scenario. Analysis of Existing Data Standards

The first step of the research project has been analyzing the existing data standards and information requirements in relation to the informational needs of building use and maintenance.

Specifically, it has been understood which are the informational attributes included in existing data standards as useful for FM activities. In this sense, a critical review has been done, aiming at defining strengths and weaknesses of the standardized information requirements which are already been developed by many research groups.

The existing BIM-Objects Information Requirements and data standards (Chap. 6) which have been taken as the reference scenario for the research project, and thus critically analyzed, are:

– the *COBie schema* [4] devised by the United States Army Corps of Engineers as a data standard able to store and deliver building information in a usable format for everyone throughout all the PLPs. Now it has been adopted by the UK Government as the official data format enabling information exchange between different lifecycle stages through the progressive filling out of the five data drops (Fig. 6.4);
– the *NBS BIM Object Standard* [7] which has been developed by the National Building Specifications (NBS) as the data standard to be included in all the BIM objects freely available to download from the NBS National BIM Library[5] (Fig. 6.6);

[4]The building case-study used to validate the developed datasheet template has been assigned by ATE (the technical office in Politecnico di Milano for buildings management, valorization and development). It is a students' residence which is currently under construction in Milan.

[5]The NBS National BIM Library is the fastest growing BIM library in the UK. It is an open and free web platform where it is possible to download a comprehensive collection of BIM objects ranging from building fabric systems to mechanical and electrical objects.

- the *SPie project* [8], still under development by the buildingSMART alliance, which aims at creating standardized datasets to be first completed by manufacturers with the specific products information and then used by all the actors of the construction process (Table 6.4);
- the *Product Data Templates* (PDTs) [5] developed by the Chartered Institution of Building Services Engineers (CIBSE) as datasets, following a master template, aiming at identifying all the information required by each party involved in the construction process, and thus providing a qualitative and quantitative description of building elements (Fig. 6.7);
- the *INNOVance project* [6] developed by a consortium of universities, builders and trade associations, as well as IT companies, with the aim of creating an Italian BIM database from which it will be possible to freely download BIM objects of construction products and building elements enriched with a set of standardized parameters.

All these data standards provide some attributes which are useful to support FM activities and processes (Chap. 6). To briefly recap:

- the *COBie schema* has been specifically developed to satisfy the information needs of the building operational phase and thus it includes useful parameters such as Installation Data, Warranty Description, Reference Service Life;
- the *NBS BIM Object Standard*, besides including all the COBie parameters, also provides some useful parameters concerning assets space management which are: minimum operation space, access space, placement and transportation space, installation space and detection zone space;
- the *SPie project* includes all the COBie parameters;
- the *PDTs*, developed by the CISBE, take into consideration the building use-phase by defining a specific category of parameters named "Operations and Maintenance";
- the *INNOVance project* includes a specific category of attributes named "economic and operational parameters" in the technical datasheets provided for all the construction products and building elements freely available to download from the developed BIM database;

In order to understand which parameters have been included in the analyzed data standards and information requirements as useful or not for FM activities, the research project has developed a comparing table (Fig. 7.2).

By comparing the informational structure of these data standards with the content requirement defined by the PAS 1192-3:2014, "Specification for information Management for the operational phase of assets using building information modeling" (Chap. 6), which has been adopted by the research project as the most recent and complete specification for the Information Lifecycle Management concerning the operational phase of assets, it is clear that each of the analyzed data standards shows some strengths and weaknesses.

According to this PAS, in fact, the Asset Information Model, and thus the information requirement adopted as data standard for the BIM-Objects included in

COBie	NBS Standard	SPie	PDT	INNOVance
Category (UNICLASS)	COBie Parameters	COBie Parameters	Model	Maintenance Activity Description
Description	Manufacturer URL		Manufacturer	Frequency
Asset Type	Minimum Operation Space		Manufacturer URL	Cost
Tag Number	Access Space		Access Clearance Top	ID
Model Number	Placement and Transportation Space		Access Clearance Bottom	
Warranty Description	Installation Space		Access Clearance Left	
Warranty Start Date	Detection Zone Space		Access Clearance Right	
Warranty Guarantor Parts			Access Clearance Front	
Warranty Duration Parts			Access Clearance Rear	
Warranty Guarantor Labor			URL to O&M Manual	
Warranty Duration Labor			Daily	
Warranty Duration Unit			Weekly	
Replacement Cost			Monthly	
Expected Life			Quarterly	
Name (JOB)			6 Monthly	
Category			Annually	
Duration			Bespoke Timeframe	
Start			Maintenance required: 0-300hrs	
Frequency			Maintenance required: 301-600hrs	
Name (SPARE)			Maintenance required: 601-1000hrs	
Description			Maintenance required: 1001-2000hrs	
Suppliers			Maintenance required: 2001-4000hrs	
Name (RESOURCE)			Maintenance required: 4001-8000hrs	
Description			Maintenance required: 8001-12000hrs	
			Expected Life	
			Warranty ID	

Fig. 7.2 Comparison table in which existing data standards are analyzed in relation to information useful for FM activities

the model, shall generally contain a set of specific information concerning building assets (Chap. 6). In particular:

- *legal information* (i.e. ownership, and then contractual information, property boundaries in case of an asset is networked and/or interfaced with an another one by making a unique system, work instructions, legal obligations such as health and safety file information, etc.);
- *commercial information* (i.e. asset description and function, vendor data, KPIs, condition and performance targets/standards, criteria of non-conformance, spares description/quantity/location, etc.);

- *financial information* (i.e. original purchase/leasing cost, current replacement cost, etc.);
- *technical information* (i.e. design parameters, asset dependencies and interdependencies, commissioning dates and data, performance characteristics, etc.);
- *managerial information* (i.e. identification number, asset location, spatial data as room size/pavement area, warranties description and duration, work schedules and details of the tasks to be carried out, list of the maintenance activities already performed, any hazardous content/waste, asset end of life, etc.).

Considering this informational structure as the most recent and complete specification for the Information Lifecycle Management, it is clear that the COBie schema is surely the most complete among all the reviewed data standards, since it provides parameters according all the categories mentioned above. Nevertheless, it shows some lacks concerning the "commercial information" category, because it does not provide any information about condition and duty of assets, key performance indicators, condition and performance targets or standards, criteria of non-conformance. Moreover it does not include any details of historical asset failures, causes and consequences, nor asset-related spatial data (i.e. minimum operation space, access space, etc.).

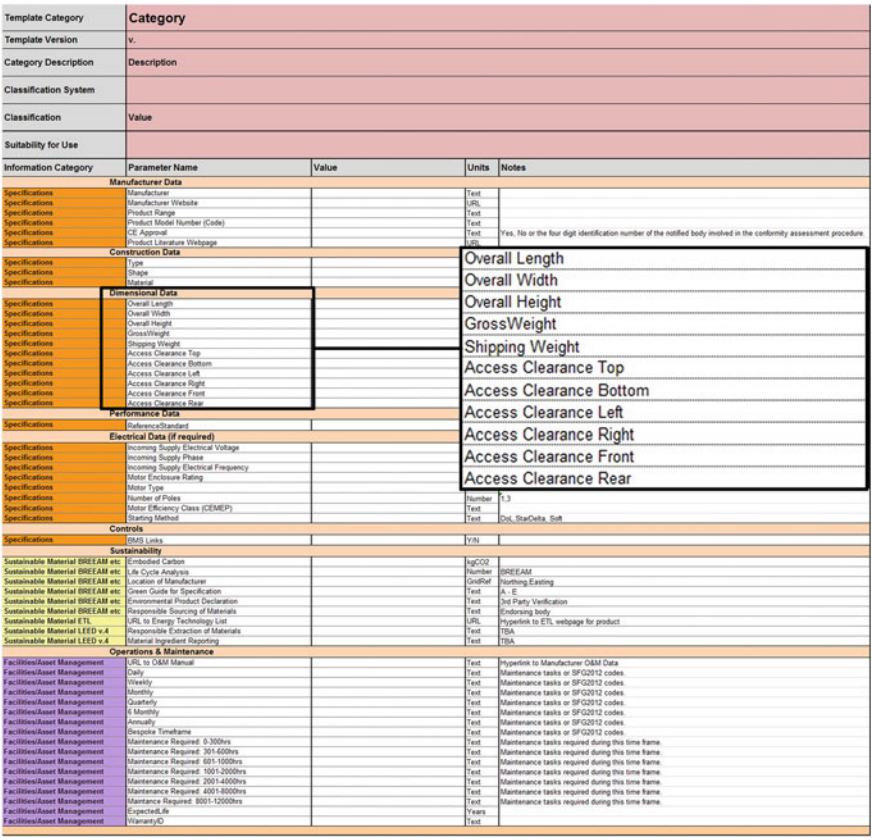
The NBS BIM Object Standard, as well as the SPie project, since they adopt all the COBie parameters in their informational structures, show the same weaknesses of the COBie schema. Nevertheless, the NBS BIM Object Standard, on the contrary to the COBie schema, provides some asset-related spatial data (minimum operation space, access space, placement and transportation space, installation space, detection zone space).

As the NBS BIM Object Standard, also the Product Data Template developed by the CISBE provides asset-related spatial data. Although, this datasheet is more specific concerning the "minimum operation space" attribute, since in the "dimensional data" category it describes the access clearance from different point of views (bottom, top, left, right, front, rear) (Fig. 7.3).

Nevertheless, the PDT, as the technical datasheets developed by the INNOVance project, shows again some weaknesses about the "commercial information" of assets. As for the COBie schema, there is no information about condition and duty of assets, key performance indicators, condition and performance targets or standards, criteria of non-conformance, as well as any data about historical asset failures.

7.3 Adoption of a Maintenance Plan Prototype as an Information Source for Developing a FM-Based Datasheet Template

The research project has adopted a maintenance plan prototype to understand the information which is useful to FM activities and processes, after having critically reviewed the existing BIM-Objects Information Requirements and data standards



Template Category	Category			
Template Version	v.			
Category Description	Description			
Classification System				
Classification	Value			
Suitability for Use				
Information Category	Parameter Name	Value	Units	Notes
Manufacturer Data				
Specifications	Manufacturer		Text	
Specifications	Manufacturer Website		URL	
Specifications	Product Range		Text	
Specifications	Product Model Number (Code)		Text	
Specifications	CE Approval		Text	Yes, No or the four digit identification number of the notified body involved in the conformity assessment procedure.
Specifications	Product Literature Webpage		URL	
Construction Data				
Specifications	Type			
Specifications	Shape			
Specifications	Material			
Dimensional Data				
Specifications	Overall Length			
Specifications	Overall Width			
Specifications	Overall Height			
Specifications	GrossWeight			
Specifications	Shipping Weight			
Specifications	Access Clearance Top			
Specifications	Access Clearance Bottom			
Specifications	Access Clearance Left			
Specifications	Access Clearance Right			
Specifications	Access Clearance Front			
Specifications	Access Clearance Rear			
Performance Data				
Specifications	ReferenceStandard			
Electrical Data (if required)				
Specifications	Incoming Supply Electrical Voltage			
Specifications	Incoming Supply Phase			
Specifications	Incoming Supply Electrical Frequency			
Specifications	Motor Enclosure Rating			
Specifications	Motor Type			
Specifications	Number of Poles		Number	1,3
Specifications	Motor Efficiency Class (CEMEP)		Text	
Specifications	Starting Method		Text	Dol, StarDelta, Soft
Controls				
Specifications	BMS Links		Y/N	
Sustainability				
Sustainable Material BREEAM etc	Embodied Carbon		kgCO2	
Sustainable Material BREEAM etc	Life Cycle Analysis		Number	BREEAM
Sustainable Material BREEAM etc	Location of Manufacturer		GridRef	Northing,Easting
Sustainable Material BREEAM etc	Green Guide for Specification		Text	A - E
Sustainable Material BREEAM etc	Environmental Product Declaration		Text	3rd Party Verification
Sustainable Material BREEAM etc	Responsible Sourcing of Materials		Text	Endorsing body
Sustainable Material ETL	URL to Energy Technology List		URL	Hyperlink to ETL webpage for product
Sustainable Material LEED v.4	Responsible Extraction of Materials		Text	TBA
Sustainable Material LEED v.4	Material Ingredient Reporting		Text	TBA
Operations & Maintenance				
Facilities/Asset Management	URL to O&M Manual		Text	Hyperlink to Manufacturer O&M Data
Facilities/Asset Management	Daily		Text	Maintenance tasks or SFG2012 codes.
Facilities/Asset Management	Weekly		Text	Maintenance tasks or SFG2012 codes.
Facilities/Asset Management	Monthly		Text	Maintenance tasks or SFG2012 codes.
Facilities/Asset Management	Quarterly		Text	Maintenance tasks or SFG2012 codes.
Facilities/Asset Management	6 Monthly		Text	Maintenance tasks or SFG2012 codes.
Facilities/Asset Management	Annually		Text	Maintenance tasks or SFG2012 codes.
Facilities/Asset Management	Bespoke Timeframe		Text	Maintenance tasks or SFG2012 codes.
Facilities/Asset Management	Maintenance Required: 0-300hrs		Text	Maintenance tasks required during this time frame.
Facilities/Asset Management	Maintenance Required: 301-600hrs		Text	Maintenance tasks required during this time frame.
Facilities/Asset Management	Maintenance Required: 601-1000hrs		Text	Maintenance tasks required during this time frame.
Facilities/Asset Management	Maintenance Required: 1001-2000hrs		Text	Maintenance tasks required during this time frame.
Facilities/Asset Management	Maintenance Required: 2001-4000hrs		Text	Maintenance tasks required during this time frame.
Facilities/Asset Management	Maintenance Required: 4001-8000hrs		Text	Maintenance tasks required during this time frame.
Facilities/Asset Management	Maintanc Required: 8001-12000hrs		Text	Maintenance tasks required during this time frame.
Facilities/Asset Management	ExpectedLife		Years	
Facilities/Asset Management	WarrantyID		Text	

Fig. 7.3 *PDT* Product Data Template. Focus on the dimensional parameters (*CIBSE*—Chartered Institution of Building Service Engineers)

by comparing their informational structure with the content requirement defined by the PAS 1192-3:2014.

In this way it has been possible to understand the informational needs of a maintenance manual (Fig. 7.4). In particular, the parameters included in the general schema of a maintenance manual are:

– element code;
– intervention;
– activity;
– cost;
– activity code;
– description;
– frequency;
– operator;
– duration;

Element code	Intervention	Activity	Cost %	Cost (€ / sqm)	Activity code	Description	Frequency	Operator	Duration (h/ man/sqm)	Failures code	Failures
3.1.1.2.E	Inspection	Visual inspection of the wall (indoor and outdoor)	1%	0,91	3.1.1.ISP.1	Evaluation of the degradation	Annual	OPC	0,01	3.1.1.Mg1 3.1.1.Mg2 3.1.1.Mg3 3.1.1.Mg4	Efflorescence Degradation of joints Discoloration Biological layer
		Examination of the cleanness of the wall	1%	0,91	3.1.1.ISP.6	-	Annual	PUL	0,01		
	Cleaning	Cleaning of the wall cladding	3%	2,73	3.1.1.PUL. 1	Cleaning the superficial surface of the wall | indoor	when needed	PUL	0,01		
	Maintenance	Remake of the painting	3%	2,73	3.1.1.MAN.1	Remake of the painting | indoor	Bian-nual	IMB	0,08		
		Recovery of the damaged parts of the wall	35%	31,85	3.1.1.MAN.2	Recovery of the damaged tiles	when needed	MRT	0,5		
	Replacement	Partial replacements of elements	35%	31,85	3.1.1.SOST.1	-	when needed	MRT	1		

Fig. 7.4 Example of a maintenance manual [2]

– failures code;
– failure.

Given this informational schema, it is clear that all the existing data standards show some lacks about at least one of the parameters necessary to develop a maintenance manual. For example, if we suppose to adopt the COBie schema as data standard to manage information in a BIM environment and then to develop the maintenance manual starting from the design and construction information as provided by the BIM model, we will lack data to fill out the "Failures" column of the maintenance manual (Fig. 7.4). Or again, by considering the technical data-sheets developed by the INNOVance project as the BIM data format able to handle the ILM in a common data environment, we will face some difficulties in filling out the "Operator" and "Duration" columns (Fig. 7.4).

Given these considerations, the research project has developed a datasheet template (Fig. 7.5) aiming at satisfying the information needs of the FM activities and processes, focusing in particular on the information needed to develop a maintenance manual.

The proposed datasheet template has been developed by bringing together parameters taken from the different BIM-Objects Information Requirements and data standards which have been taken as the reference scenario for the research project (Chap. 6). Moreover, to develop the datasheet, it has also been considered the informational structure proposed by the PAS 1192-3:2014 (Fig. 6.5).

Through the adoption of this datasheet template, it would be possible:

– an integration of the COBie schema focused on the content requirement of a maintenance plan (Fig. 7.6).
  In this way, it would be possible to develop maintenance manuals starting from the data included in BIM objects. This procedure is not possible yet, since the

Parameter	Description	Unit of measurement
IDENTIFICATION PARAMETERS		
Category		OMNICLASS
Description		text
Asset Type		text
Model Number		code
Tag Number		code
Asset Dependencies		text
COMMERCIAL PARAMETERS		
Manufacturer		URL + @
Key Performance Indicator		text
Spares Identity		code
Spares Quantity		number
FINANCIAL PARAMETERS		
Replacement cost		euro
TECHNICAL PARAMETERS		
Height		mm
Length		mm
Emergency Position		s/n
Core Material		text
Finish Material		text
Opaque surface		%
Opaque surface		sqm
Glazed surface		%
Glazed surface		sqm
MANAGERIAL PARAMETERS		
Reference Service Life		year
Installation Date		gg/m/anno
Starting Date Warranty		gg/m/anno
Description Warranty		text
Duration Warranty		months
Reference Warranty		@
Maintenance Activity		text
Type Maintenance Activity		text
Frequency		daily, monthly, four-monthly, bi-annual, annual
Duration		hrs
Operator		text
Cost Maintenance Activity		euro
Access Clearance Top		sqm
Access Clearance Bottom		sqm
Access Clearance Right		sqm
Access Clearance Left		sqm
Access Clearance Front		sqm
Access Clearance Rear		sqm
Failure		text

Fig. 7.5 Example of the datasheet template developed by the research project for a generic door. It is an integration of parameters taken from the COBie schema and the PDT with new ones identified by the research as useful for FM activities

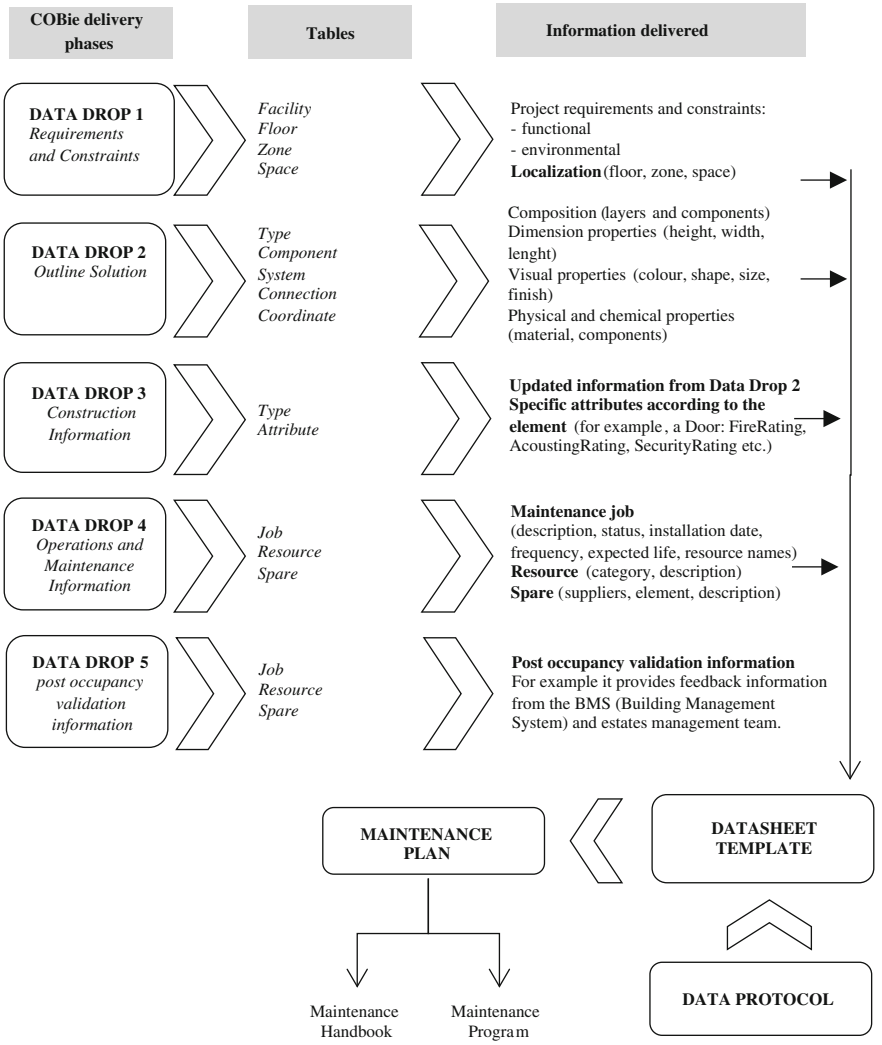


Fig. 7.6 Possible integration of the COBie schema with the developed datasheet template focused on the content requirement of a maintenance plan

COBie data format does not provide any information about assets breakdown modalities/decay, nor it has working resources' coding system to link each maintenance activity to its worker (correspondence among breakdown modalities—maintenance activity—worker);

– an implementation of current BIM-Objects Information Requirements and data standards which are adopted by the existing BIM libraries. For example, the NBS BIM Object Standard [7], which is the data schema adopted by the BIM library "NBS National BIM Library" (Fig. 6.6) may be implemented with the

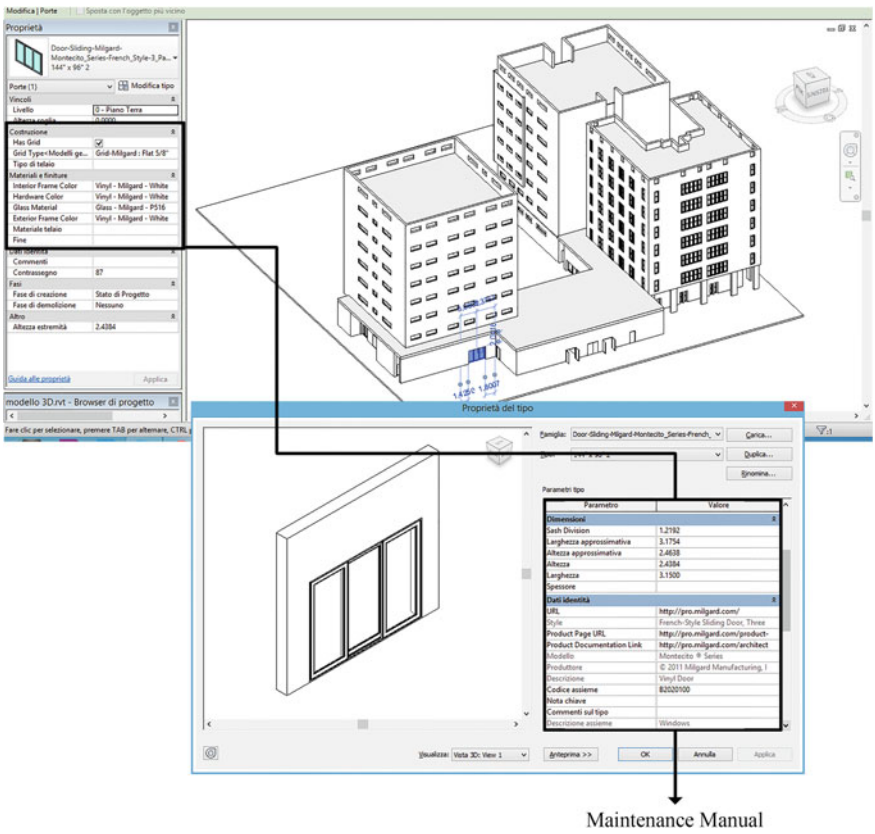


Fig. 7.7 Possible implementation of the NBS BIM-object standard with the developed datasheet template in order to develop maintenance manuals starting from the datasets included in BIM objects

parameters defined as useful for FM activities by the developed datasheet template (Fig. 7.7);

- a simulation of Building Operating conditions at the very early stage of the building design. In this way, the developed data template may be used by all the actors of the construction process as a decision support tool concerning the facility management phase of a building;
- a definition of possible datasets to implement interoperable overlay between existing BIM software and Facilities Information Systems.

7.4 BIM Software and Information Systems. Existing Overlay and Possible Implementation

Nowadays many software companies working in the field of CAFM (Computer Aided Facility Management) applications and Facilities Information systems are focusing on developing overlays with BIM software. It has been understood the potential of a two-way data exchange between BIM applications which capture, manage and store data throughout the building lifecycle and information systems supporting FM activities and processes.

In fact, BIM software, as for example Autodesk Revit, are able to manage just some functions useful for the primary knowledge of a building property, such as spaces and facilities inventories. BIM applications are not yet able to manage all the information which are necessary to perform FM activities.

Moreover, as already underlined, existing BIM-Objects Information Requirements and data standards do not include all the parameters which are useful, for example, to develop a maintenance manual.

Since the potential of the BIM methodology to manage information throughout building lifecycle, the Facilities Information System Archibus has developed an overlay with the BIM software Revit [3] in order to have a two way communication between the two applications. In the grey box proposed below, it is described how it works the existing overlay. In particular they are described the procedures to activate the overlay ("Starting procedures"), number and codify rooms ("Space Planning and Management"), number and codify assets ("Asset Management").

In fact, the research project has identified weaknesses and strengths of the existing overlay after having analyzed its current functioning. In particular:

- it works well to extract spaces and facilities inventories from the BIM model;
- it is not yet able to manage all the other information needed by FM activities and processes due to the lack of the useful parameters in the BIM environment.

Given these considerations, the research project has first understood how it works the existing overlay and then tested it in order to individuate possible areas of implementation.

In fact, as proposed by the BSI PAS 1192-3:2014, an Asset Information Model (Chap. 6) can be managed in two different ways:

- totally within the BIM model (all the information concerning building assets and useful for FM activities are included in the BIM objects) (Fig. 7.7);
- accessed via links and cross-references to existing enterprise information systems.

In the first case, the path to follow is the implementation of existing BIM-Objects Information Requirements in relation to the FM information needs; for example, by bringing together the developed datasheet template with the current data standards. In this way all the necessary information to develop, for example, a maintenance manual may be directly extracted from the BIM model (Fig. 7.7).

In the second scenario, the BIM model is used just to extract information about spaces and facilities inventories and then all the other data are directly managed within the Information System.

The research project is now working for understanding strengths and weaknesses of both the scenarios. Therefore, focusing on the second scenario, the first step has been the analysis and understanding of the existing overlay between Revit and Archibus (see the grey box below).

The Overlay Between Revit and Archibus
How to activate it, manage spaces and assets

- **Starting procedures to activate the overlay**

0# Activating the overlay between Revit and Archibus

0.1 start the Archibus Smart Client
0.2 from the Archibus ribbon, select the command "Preferences"
0.3 select "Autodesk Revit" in the field "CAD application" and select "Yes" in the field "Public Enterprise Graphics on Save"
0.4 start Autodesk Revit
0.5 all of the Archibus commands are now on the Archibus tab of the Revit Ribbon menu

1# Creating the building registry in Archibus

1.1 select the module "Space Planning and Management"
1.2 select "Space Inventory and Performance"
1.3 select "Background Data"
1.4 select "Define Geographical Locations" (Fig. 7.8)
    1.4.1 select the command "Add New" and define:
        – Geographic Region
        – Country
        – Region
        – State
        – City
        – Site

1.5 select "Define Locations"
    1.5.1 select the command "Add New" and define:
        – Site
        – Building
        – Floor

2# Linking the Revit model to the Archibus database

2.1 from the Revit Project Browser select the view to be linked to the Archibus database
2.2 from the Archibus tab select the command "Properties"

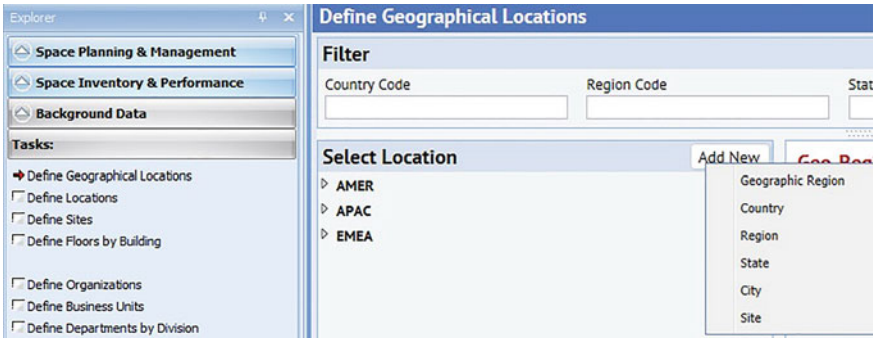


Fig. 7.8 Screenshot describing the procedure to create the building registry in Archibus

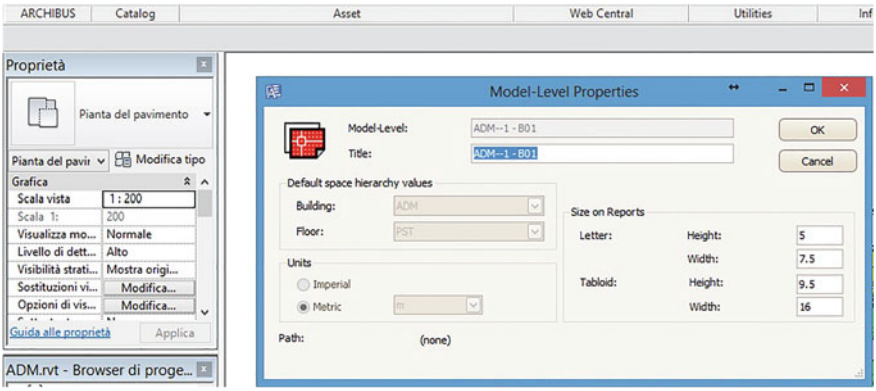


Fig. 7.9 Screenshot describing the procedure to link the Revit model to the Archibus database

2.3 in the window "Model—Level Properties" (Fig. 7.9)
  2.3.1 fill out the fields "Building" and "Floor" by clicking on the command "Browse" which recall to the Archibus tables
2.3.2 select the unit of measurement (m)
2.4 repeat the procedure for all the views to be linked to the Archibus database

- **Space planning and management**

3# Managing the assets—rooms

3.1 from the Revit Project Browser select the view in which there are the rooms to be linked to the Archibus database
3.2 from the Revit "Start" tab select the command "Room" and click on each room to be linked to the Archibus database

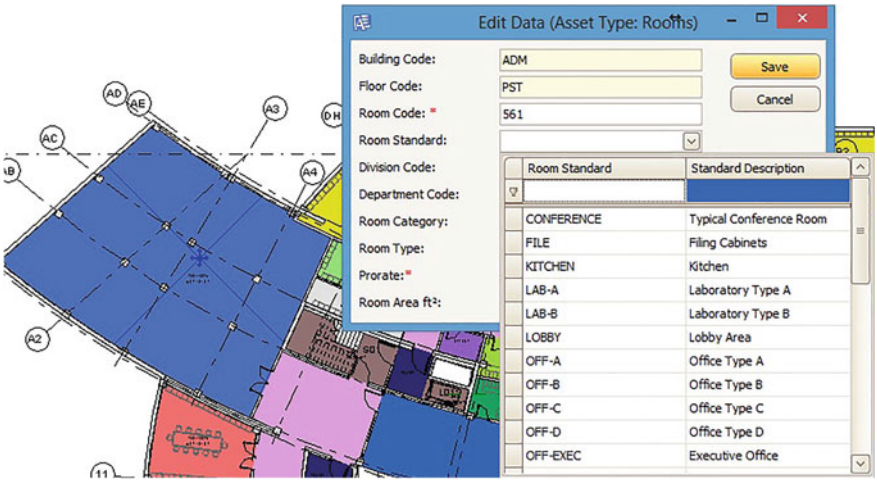


Fig. 7.10 Screenshot representing the procedure to manage "room" assets

3.3 select one of the room and from the "Archibus" tab select the command "Edit Data"
3.4 in the window "Edit Data" there are automatically associated (Fig. 7.10):
- Building Code
- Floor Code
- Room Code
- Room Area

3.5 fill out the remaining fields by clicking on the "Browse" command which recall to the Archibus Tables (Fig. 7.10):
- Room Standard
- Division Code
- Department Code
- Room Category
- Room Type

3.6 from the "Archibus" tab select the command "Catalog" and:
3.6.1 select the field "Rooms" from the menu "Asset Type"
3.6.2 from the menu "Select assets by" choose among the options:
- Select Multiple
- Select Multiple by Rectangle
- Current View
- Entire Model

3.7 after having carried out the numbering and export procedures, the filling out of the fields "Room Standard", "Division Code", "Department Code", "Room Category" and "Room Type" can be done also with Archibus;

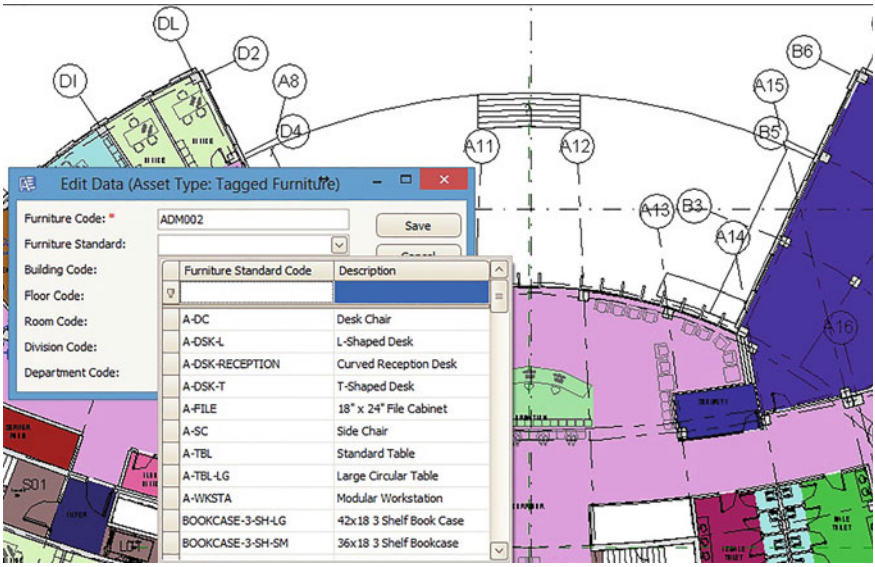


Fig. 7.11 Screenshot describing the procedure to manage "furniture" assets

3.8 then, to export in the Revit model all the data filled out in Archibus, select the command "Synchronization" and then "Read Database Fields"
3.9 in the window "Read Database Field"
  3.9.1 select the field "Rooms" from the menu "Asset Type"
  3.9.2 from the menu "Select Assets by" choose the options:
    – Select Multiple
    – Select Multiple by Rectangle
    – Current View
    – Entire Model

- **Asset management**

4# Managing the assets—furniture

4.1 from the Revit Project Browser select the view in which there are the assets to be linked to the Archibus database
4.2 click on each asset to be linked to the Archibus database
4.3 from the "Archibus" tab select the command "Number"
4.4 in the window "Number" it is possible to define:
  – Furniture Code
  – Furniture Number
  – Room Type
4.5 from the "Archibus" tab select the command "Edit Data" and select the assets to be linked to the Archibus Database (Fig. 7.11):

4.5.1 they are automatically provided:
- Furniture Code
- Building Code
- Floor Code
- Room Code

4.6 fill out the remaining fields by clicking on the "Browse" command which recall to the Archibus Tables (Fig. 7.11):
- Furniture Standard
- Division Code
- Department Code

4.7 from the "Archibus" tab select the command "Catalog" and:
4.7.1 select the field "Tagged Furniture" from the menu "Asset Type"
4.7.2 from the menu "Select assets by" choose among the options:
- Select Multiple
- Select Multiple by Rectangle
- Current View
- Entire Model

4.8 after having carried out the numbering and export procedures, the filling out of the fields "Furniture Standard", "Division Code", "Department Code" can be done also with Archibus;

4.9 to export in the Revit model the data filled out in Archibus select the command "Synchronization" from the panel "Utilities" and select from the menu the field "Read Database Fields"

4.10 in the window "Read Database Field"
4.10.1 select the field "Rooms" from the menu "Asset Type"
4.10.2 from the menu "Select Assets by" choose among the options:
- Select Multiple
- Select Multiple by Rectangle
- Current View
- Entire Model

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