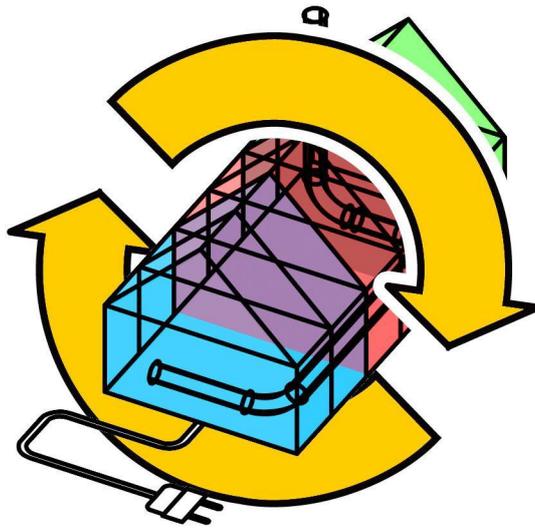


COBIM

Common BIM Requirements
2012

v1.0



Series 12

Use of models in facility management

Foreword

The publication series “Common BIM Requirements 2012” is the result of a broad-based development project entitled *COBIM*. The need for these requirements arises from the rapidly growing use of BIM in the construction industry. During all phases of a construction project, the parties to the project have a need to define more precisely than before what is being modeled and how the modeling is done. “Common BIM Requirements 2012” is based on the previous instructions of the owner organizations and the user experiences derived from them, along with the thorough experience the writers of the instructions possess on model-based operations.

The parties to the project are: **Funding providers:** Aitta Oy, Larkas & Laine Architects Ltd, buildingSMART Finland, City of Espoo Technical and Environment Services, Future CAD Oy, City of Helsinki Housing Production Office, City of Helsinki Premises Centre, University of Helsinki, Helsingin Yliopistokiinteistöt Oy, HUS Kiinteistöt Oy, HUS Premises Centre, ISS Palvelut Oy, City of Kuopio Premises Centre, Lemminkäinen Talo Oy, Micro Aided Design Ltd. (M.A.D.), NCC companies, Sebicon Oy, Senate Properties, Skanska Oy, SRV Group Plc, Sweco PM Oy, City of Tampere, City of Vantaa Premises Centre, Ministry of the Environment. **Written by:** Finnmap Consulting Oy, Gravicon Oy, Olof Granlund Oy, Lemminkäinen Talo Oy, NCC companies, Pöyry CM Oy, Skanska Oyj/VTT Technical Research Centre of Finland, Solibri, Inc., SRV Rakennus Oy, Tietoa Finland Oy. **Management:** The Building Information Foundation RTS.

The requirements were approved by an executive group consisting of parties to the project. The executive group acted as committee TK 320 of the Building Information Foundation RTS, and as such, participated actively in developing the content of the requirements and asking for comments from the members of the executive group and from interest groups.

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1 Main objectives of building information modeling

Property and construction modeling aims to support a design and construction life-cycle process that is of high quality, efficient, safe and in compliance with sustainable development. Building information models are utilized throughout the building's life cycle, starting from initial design and continuing even during use and facility management (FM) after the construction project has concluded.

Building information models enable the following, for example:

- Provision of support to the investment decisions by comparing the functionality, scope and costs of the solutions.
- Energy, environment and lifecycle analyses for the purpose of comparing solutions, design and objectives of facility management follow-up.
- Design visualization and analysis of construction feasibility.
- Enhancement of quality-assurance and data exchange and making the design process more effective.
- Utilization of building project data during use and facility management activities.

To make modeling successful, project-specific priorities and objectives must be set for models and model utilization. Project-specific requirements will be defined and documented on the basis of the objectives and general requirements set in this publication series.

General objectives of building information modeling include, for example, the following:

- To provide support for the project's decision-making processes.
- To have the parties' commit to the project objectives by means of using the building information model.
- To visualize design solutions.
- To assist in design and the coordination of designs
- To increase and secure the quality of the building process and the final product.
- To make the processes during construction more effective.
- To improve safety during construction and throughout the building's lifecycle.
- To support the cost and life-cycle analyses of the project.
- To support the transfer of project data into data management during operation.

“Common BIM Requirements 2012” covers targets for new construction and renovation, as well as the use and facility management of buildings. The minimum requirements for modeling and the information content of models are included in the modeling requirements. The minimum requirements are intended to be observed in all construction projects where the use of these requirements is advantageous. Besides the minimum requirements, additional requirements can be presented on a case-specific basis. Modeling requirements and content must be presented in all design contracts in a binding and consistent manner.

The publication series “Common BIM Requirements 2012” consists of the following documents:

1. General part
2. Modeling of the starting situation
3. Architectural design
4. MEP design
5. Structural design
6. Quality assurance
7. Quantity take-off
8. Use of models for visualization
9. Use of models in MEP analyses
10. Energy analysis
11. Management of a BIM project
12. Use of models in facility management
13. Use of models in construction
14. Use of models in building supervision

In addition to the requirements in his or her field, each party to a building information modeling project must be acquainted at a minimum with the general part (Series 1) and the principles of quality assurance (Series 6). The person in charge of the project or the project's data management must have comprehensive command of the principles of building information modeling requirements.

2 Introduction

Building Information Models (BIM) have been used in design and construction for many years; however, they are still a relatively new concept in facility management applications. Practices and even terms of model based information management are still under development. That being the case, this series, “*Use of models in facility management*”, introduces more opportunities and alternatives than requirements.

Use of building information models in facility management has also attracted interest internationally. IFC is becoming established as the standard for open information transfer in construction project modeling, and is gradually gaining ground also in facility management.

Another open information transfer standard, COBie, has been developed alongside IFC and to supplement it. The main goal of COBie is to facilitate and standardize construction project information transfer from design, construction and commissioning to the needs of facility management. To date, while this new format is not yet in use in Finland, this series contains a short introduction of its application in the BIM management process.

3 BIMs during operation and maintenance

3.1 Support to property management processes

Figure 1 visualizes operation areas of property management with potential for utilizing models. The terminology follows principally *KiinteistöRYL 2009*, the Finnish property services general quality requirements (see Appendix 2).

Potential exists in most areas, from operative property management to maintenance, repairs and replacement of technical systems, end-user services, cleaning etc.

Model based applications are already available for space management, maintenance manual, monitoring of energy consumption and environmental impacts, maintenance budgeting, long-term planning, etc.

Maintenance manual applications, utilizing models either on a restricted basis or more widely, are available for management of technical data, service requests, contracts, documents, various maintenance tasks and maintenance history.

Building information models are also used to simulation of energy consumption target and to real-time monitoring of building performance.

3.2 Benefits across business lines

Property management processes can be supported through model based applications at different levels and for a variety of information needs: operative property management, provision of services, management of maintenance, etc. Figure 2 lists some examples of potential use. The table can also be applied as a basis in outlining building information modeling objectives, planning software procurement, etc.

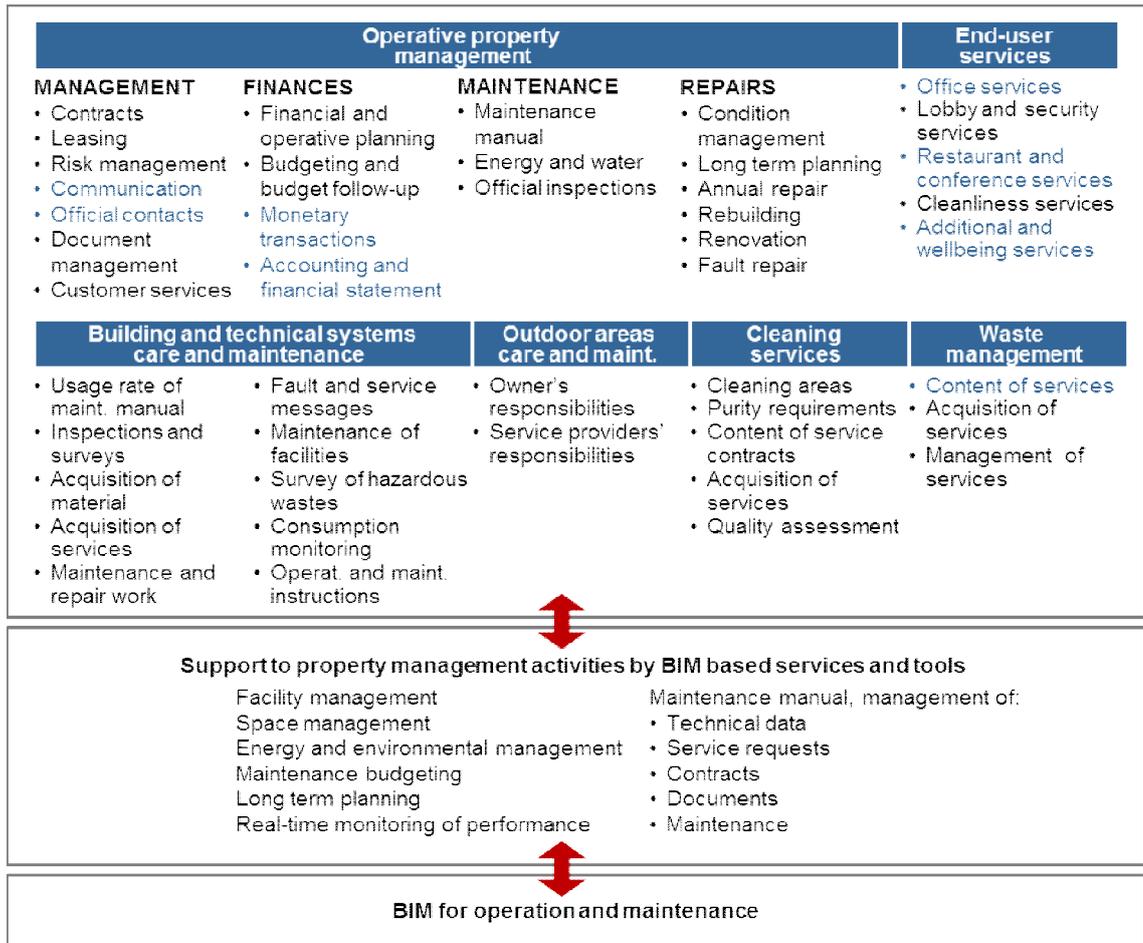


Figure 1. Property management operating areas and examples of processes, which potentially can be supported through model based software (text in black). The terminology follows principally KiinteistöRYL 2009, the Finnish property services general quality requirements (see Appendix 2).

Construction project						Operation and facilities management		
Construction project data	Docs.	Native BIMs		Open data transfer BIMs		Facilities management data to FM BIMs	Technical visualization by FM BIMs	Support to property management processes
	PDF file	Design tools	FM tools	Req.	Design			
Spaces and space groups (zones)								
Base data of spaces (Arch.)		Min.		Min.	Min.	Work place data	Theme charts: - spaces - space groups - attribute data	Rent management Tendering and service contracts Planning of repair construction projects Maintenance planning and budgeting Security management Management of access rights and keys
Condition targets (MEP)	Min.			Option		Rent and service contract areas		
Technical services of spaces (MEP)	Min.			Option		Condition measurement data		
Classification of special spaces (MEP)	Min.			Option		Cleaning areas and requirements		
Zones of technical systems (MEP)	Min.			Option		Repair needs		
Zones of consumption measur. (MEP)	Min.			Option		Access permissions and routes		
Consumption targets	Option			Option		Keys		
Environmental classification	Option			Option		Official inspections		
Building parts, systems, equipment								
Building part model (Arch.)		Min.			Min.	Preventive maintenance plan	2D/3D graphics: - building parts - systems - equipment	Tendering and service contracts Planning of repair construction projects Maintenance planning and budgeting Management of repairs Management of service requests Monitoring of conditions Monitoring of energy consumption Monitoring of environmental impacts
Structural model (Struct.)		Min.			Min.	Maintenance and repair history		
System model (MEP)		Min.			Min.	Service requests		
Supplementary design data (All)	Min.		Option			Consumption data		
Contractors' product data	Min.		Option					
Measurement and inspection data	Min.		Option					
Operation and maintenance instructions	Min.							
Construction project documents								
Design documents	Min.					Document archiving data		Guarantee inspections and repairs
Contract documents	Min.							Planning of repair construction projects
Construction and commissioning documents	Min.							

Remark:
 1) to be agreed in each project:
 - space model or building part model

Min. = required in all BIM projects
Option = to be agreed in each project

Figure 2. Examples of potential use of construction project data to support property management processes.

Property management costs and life-cycle impacts, an area of importance to the **property owner**, are served by executive reporting, tools for tendering services using real data of quantities, simulated targets for energy, conditions and environmental impacts, etc. For operative property management, applications for leasing, among others, are available.

Service providers can gain competitive advantage by effective management of their business data. Benefits that are visible also to the end-users of facilities, involve quick response to problems and customer requests, improved quality of services. The final outcome is improved customer satisfaction.

Supporting **open data transfer** is in the property owner's interest in many respects. Up-to-date and comprehensive information supports property management processes and planning of repair construction. Compared to proprietary systems, the variety of available applications and suppliers is wider, and more potential areas for BIM utilization exist.

3.3 Objectives for information management in property management

Information technology investments are assessed naturally taking into consideration the costs and benefits. In property management, consideration begins from strategic goals, such as ownership, management, service procurement, long-term quality targets etc. In addition, investments to information systems are evaluated on the basis of start-up costs, ease of use, availability of support services, data updating costs etc.

The strategy and objectives for information management during facility usage and management should be known at the beginning of the building project, so that the client's needs can be taken into consideration in an appropriate manner in defining requirements for modeling and responsibilities for all parties.

Requirements

- At the beginning of the construction project: documenting the objectives for information management, also during facility management, for use of all parties.

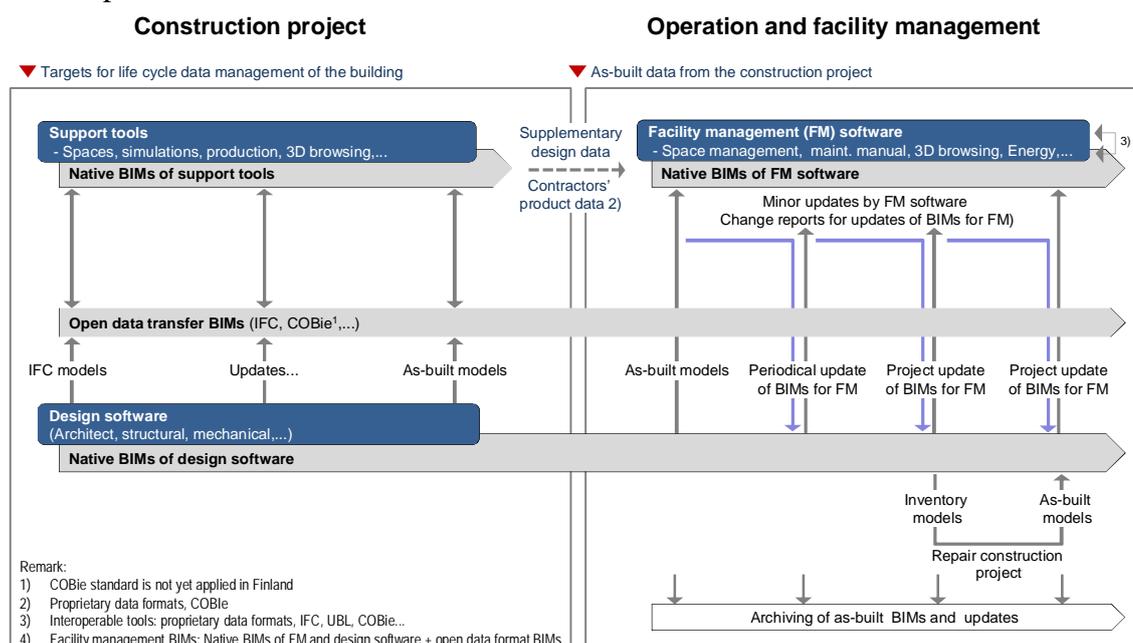


Figure 3. BIM management process during the building life-cycle.

4 BIM management process

Figure 3 presents BIM management as a process that covers the building's life-cycle, starting from setting the targets for life-cycle data management of the building, progressing from design to construction and commissioning, handover of the as-built models to the property, and further, managing and updating the models during operation and facility management.

Efficient use of the building information at all stages of the property's life-cycle is one of the main objectives of the BIM management process. The greatest benefit and cost savings from modeling are obtained when the construction project data can be transferred to facility management's use with up-to-date and adequate content.

To gain a better picture of the whole, modeling is described below as a life-cycle process, but from the point of view of operation and facility management. Detailed descriptions of and requirements for modeling during the project are included in the design and construction phase series.

5 Design software

Modeling of the building (and outdoor areas) is performed mainly by using **design software**. The basic requirement is that the **native BIMs of design software** can be saved also as **open data transfer BIMs** in the IFC format.

Examples of commercial IFC-compatible design software are the following tools:

- Architectural design: AutoCAD, Revit, ArchiCAD
- Structural design: Tekla, Allplan
- Mechanical design: MagiCAD, CADS

When the project is completed, the native BIMs of design software shall be updated to comply with the changes made during construction and commissioning. The native models with as-built data are handed over to the property owner, as described below.

The native BIMs of design software are utilized in facility management tasks by viewing programs, and in renovation/refurbishment by design software. The native BIMs shall be maintained up-to-date during the life-cycle process.

To secure the information content, the updates of the native BIMs of design software shall be performed using the same design tools that was applied to creating the original models. In extensive changes (repair construction projects, etc.), updates shall be performed by the designer, while small changes (replacing equipment, etc.) can also be carried out by others, for example the maintenance staff. The prerequisite is adequate competence in using the design software and following the modeling instructions.

In updating native BIMs, compatibility of the design software must be ensured and the same modeling rules used that were applied to design in order to retain the integrity of the models and the information content.

Design software is intended to be used by designers. In facility management, the design tools are too complex for everyday needs of data browsing and visualization. The native BIMs of design software can be browsed by lighter and easier to use viewing tools, as described later.

6 Open data transfer BIMs

6.1 General

IFC is the basic requirement of open data transfer in the construction projects. COBie is another open standard, supporting and supplementing IFC (see Appendix 2). COBie is not yet in use in Finland.

Open data transfer BIMs are utilized in design, construction and facility management software and in standalone model viewing tools. Energy consumption, for example, can be simulated using the architect's IFC model.

IFC models contain only an **interoperable part** of the data and "intelligence" of native BIMs of design software. Therefore, they do not replace the native BIMs.

Open data transfer BIMs are kept up-to-date by each design discipline within the construction project. They are handed over to the property owner with as-built data, in the scope agreed upon in the contracts.

The requirements of IFC models are described in detail in other series. They apply also to the facility management models

6.2 Requirements models

On a project-specific basis, the architect saves the space requirements as an **architect's requirements model** in datasheet or database format. The minimum requirement is a space list in datasheet format (Excel).

MEP (Mechanical, Electrical, Plumbing) requirements for spaces (conditions, thermal loads, energy consumption, environmental classification, security classification, etc.) as well as zones of technical systems can be modeled into the architect's requirement model using appropriate tools. The model is known as a **MEP requirements model**.

The minimum task in MEP design is saving the system zones (colored maps) and the MEP requirements for spaces in document format. If level 2 is chosen (see Series 4, *MEP design*), the zones shall be modeled into the MEP requirements model.

Requirements models are utilized in design and simulations. They are transferred further into facility management software, in which the information can be browsed and visualized by means of colored maps, etc.

The data containing the MEP requirements model has many potential uses, for example, in condition and consumption monitoring, designing changes for the space's purpose of use, and in rental management (customer promises etc.).

Requirements

- Architect's space list
- Space-specific MEP requirements in datasheet format:
 - Level 1: colored maps of the systems zones in document format
 - Level 2: system zones modeled into the MEP requirements model
- To be agreed on a project-specific basis: modeling the MEP requirements into the MEP requirements model.

6.3 Technical visualization of IFC models

The IFC models can be visualized by means of standalone **3D viewing tools** or integrated facility management software that contain model viewing features. The 3D viewing tools are intended for technical visualization of models of the architect, structural designer and MEP designer as well as **combined models**.

There are 3D viewing tools both for design software native models and for IFC models. Free-of-charge tools are also available. Some advanced tools have also features for analysis and quality assurance of the models.

Combined models are saved in the native file format of the specific 3D viewing tool. To facilitate utilization of visualizations in everyday use, it is possible to save a set of **views** of the combined models for the most common use cases.

In the **construction project**, browsing of integrated models is useful in technical visualizations and for quality assurance in checking the models' compatibility and clashes.

In the **facility management**, 2D/3D viewing can be applied to localize spaces, equipment and other maintenance objects, to show views of hidden maintenance and repair construction objects etc.

Integrated visualization and data browsing is a feature available in the most sophisticated software. A visual user interface in the models' search functions allows the models to be utilized in a more effective and versatile manner.

Examples of viewing programs that are applicable for different use in facility management are Autodesk Navisworks, TeklaBIMsight and Solibri Model Checker.

Requirements

- Saving the IFC models used in facility management as combined models in native file format of the specific 3D viewing tool
- Saving a set of views of the combined models for the most common use cases.

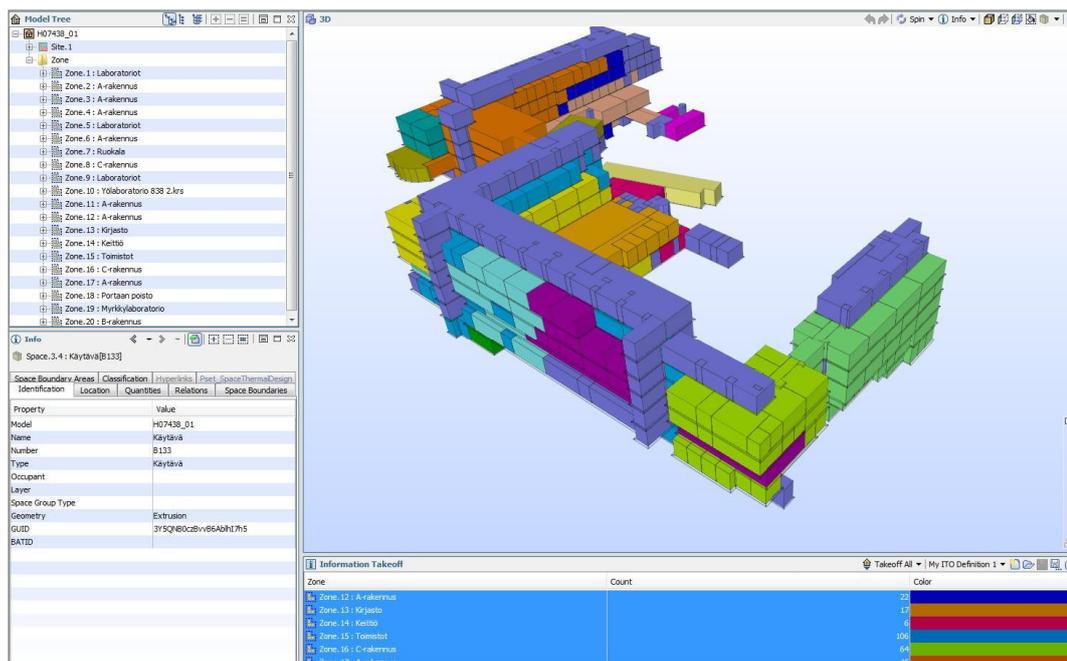


Figure 4. An example of visualization of system zones by a 3D viewing tool.

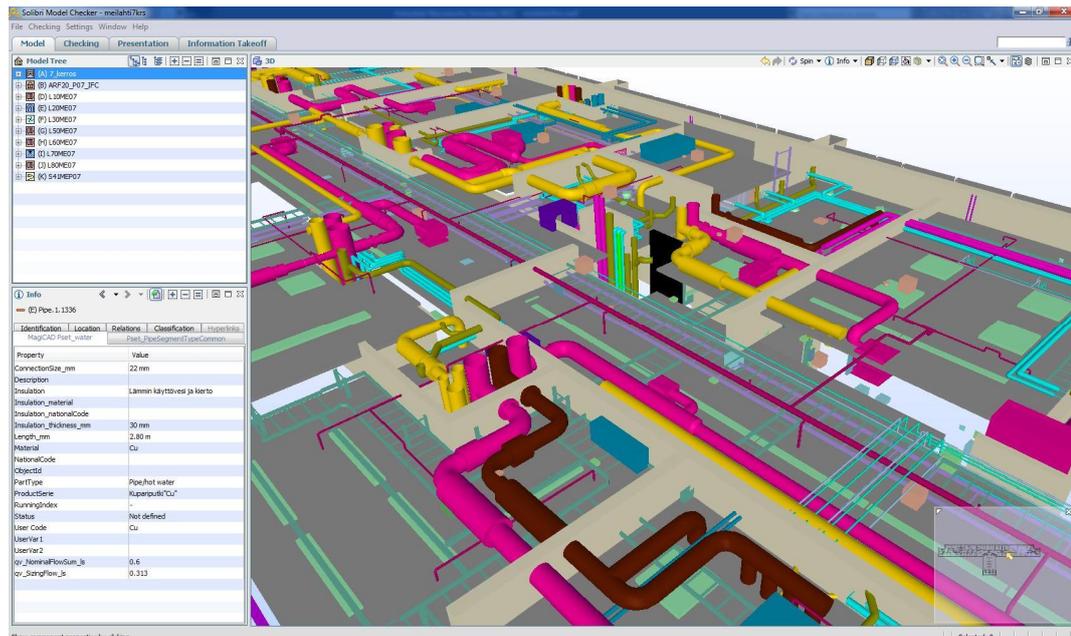


Figure 5. An example of visualization of spaces, structures and technical systems by 2D/3D views of the combined models.

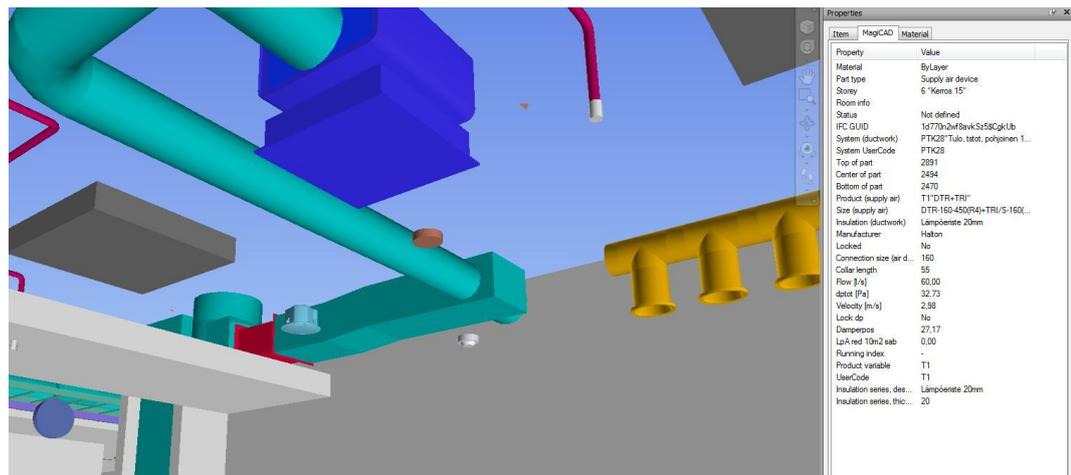


Figure 6. An example of browsing object data (equipment etc.) by 3D views of the combined models.

7 Support tools

7.1 General

In design firms, alongside the design software, various complementary tools are used for managing spaces and space requirements, saving object data, perform technical calculations, simulations and visualizations, etc. Similarly, construction companies have applications for quantity calculations, tendering, production planning and management, etc. In this series of the publication series, such tools are called **support tools**.

Beside commercial tool, also in-house applications are in use. The native models of support tools are usually specific to the software. The most advanced tools can also utilize open data transfer.

In design, support tools complete the design software in saving technical information. For example, the most commonly used MEP design applications in Finland do not currently enable saving all technical data that is important in terms of design and facility management. That is the case for example with main equipment, as air conditioning units. For this reason designers document the **supplementary design data** in datasheet or database format using mainly their own tools.

The supplementary design data is transferred into facility management software manually from design documentation or by means of proprietary data transfer links between interoperable software. To date, an open data transfer format for transferring support tool data is not in use in Finland (see Appendix 1 and 2, COBie).

Requirements

- Facility management data from design in document format
- To be agreed on a project-specific basis: corresponding data in a format compatible with the specified facility management software.

7.2 Contractor's product information

In the construction project handover, contractors are obliged to supply the information needed for facilities management of the products they have delivered. In this series of the publishing series, such information is called **contractor's product information**. It includes, for example:

- Product data concerning the building parts, equipment and materials
- Commissioning documentation, for example inspections and measurements data
- Instructions for operation and maintenance.

The contractor's product information shall be supplied, at a minimum as document files (PDF, Excel). It can be agreed on a project-specific basis that specified data, like manufacturer, type, technical values, etc. are delivered in a format that is compatible with the property's facility management software. To date, an open data transfer format for transferring contractor's product data is not in use in Finland (see Appendix 1 and 2, COBie).

Requirements

- Definition of the obligations concerning the delivery of the contractors' product information (to be agreed with the maintenance manual coordinator and BIM coordinator)
- Documentation of the contractor's obligations in the building modeling plan, special requirements in the design documents
- Supply of the contractor's product information, at a minimum as document files (PDF, Excel)
- To be agreed on a project-specific basis: contractor's product information in a specified format that is compatible with the specified facility management software.

8 Facility management software

8.1 General

In this series of the publication series, **facility management software** refers to applications for facility and space management, maintenance budgeting, long-term planning, maintenance manual, monitoring of energy consumption and

environmental impacts, etc. **Native BIMs of facility management software** are usually in a software-specific format.

Facility management BIMs refer to all models applied to facility management:

- Native BIMs of design software
- Open data transfer BIMs (IFC, COBie, UBL, etc.)
- Combined BIMs (IFC)
- Native BIMs of facility management software.

8.2 Construction project as-built BIMs

When the construction project is completed, the models are updated and completed to comply with the changes made during construction and commissioning. These updated models are called **as-built BIMs**. They include, at a minimum:

- Native BIMs of design software
- Open data transfer BIMs

The as-built BIMs shall be supplied to the property to be archived and utilized for the needs of operation and facility management. Quality assurance of the as-built BIMs is described in Series 6, *Quality assurance*.

Requirements

- As-built BIMs within the scope described above
- Quality assurance of as-built BIMs.

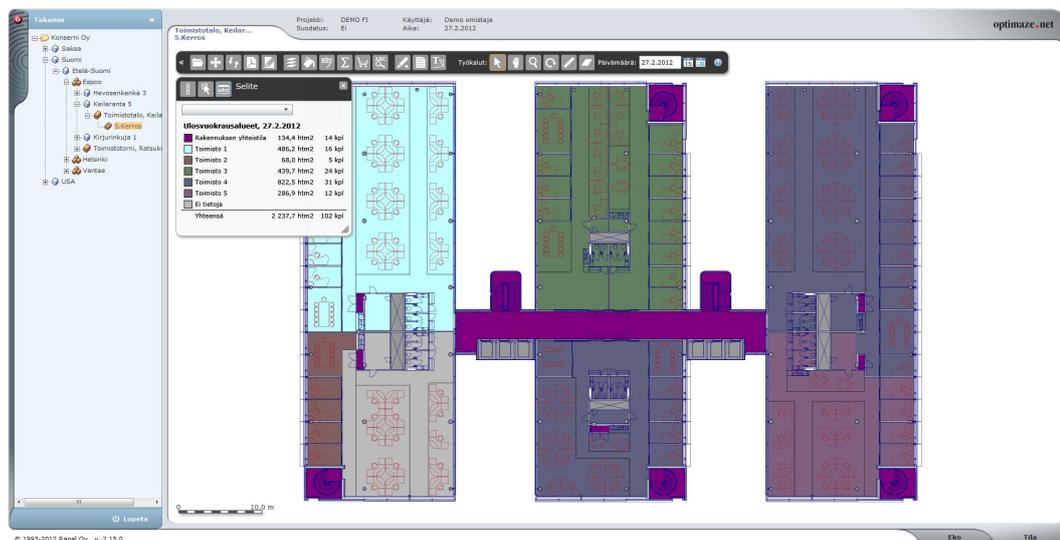


Figure 7. An example of 2D visualization and management of tenant areas, spaces and workplaces by operative property management software.

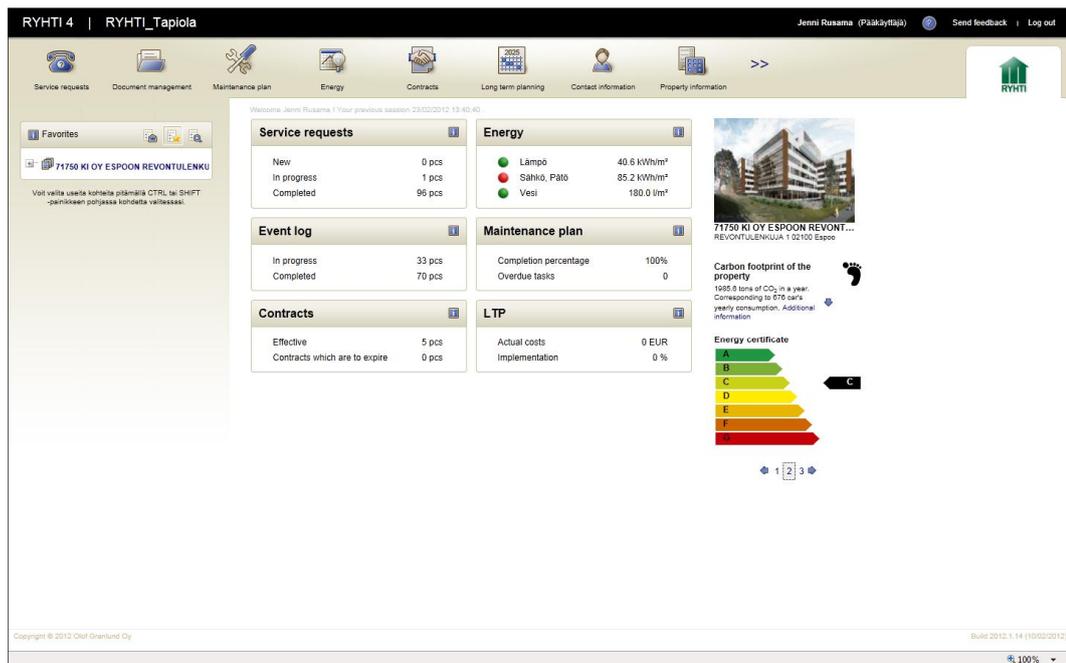


Figure 8. An example of a maintenance software, which utilizes models for visualization of spaces, zones and equipment, for management of object data, service requests, repair needs etc. The energy target can also be simulated by the architect's BIM.

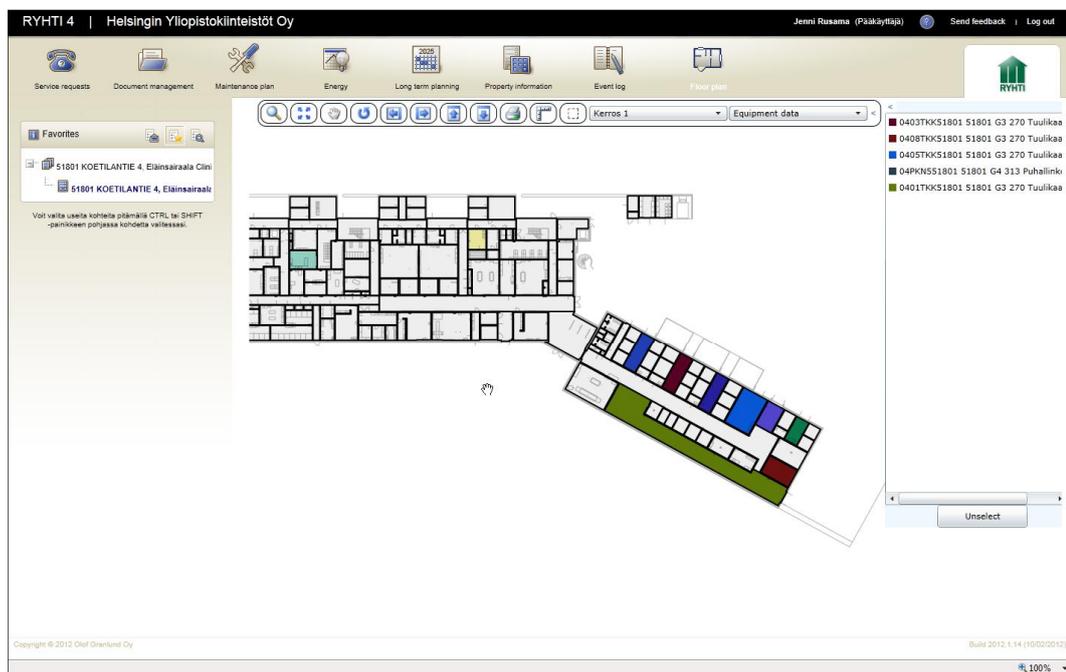


Figure 9. An example of 2D visualization for localization of equipment. For 3D visualization, an integrated 3D viewing tool can be opened from the user interface.

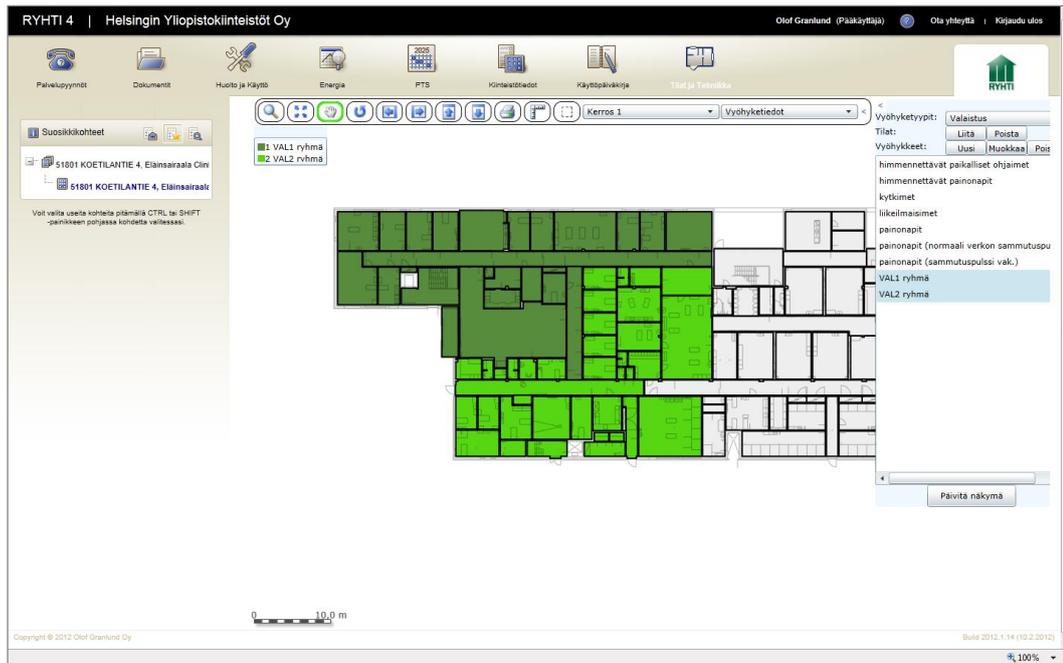


Figure 10. An example of 2D visualization of system zones (lighting, air conditioning, access control etc.).

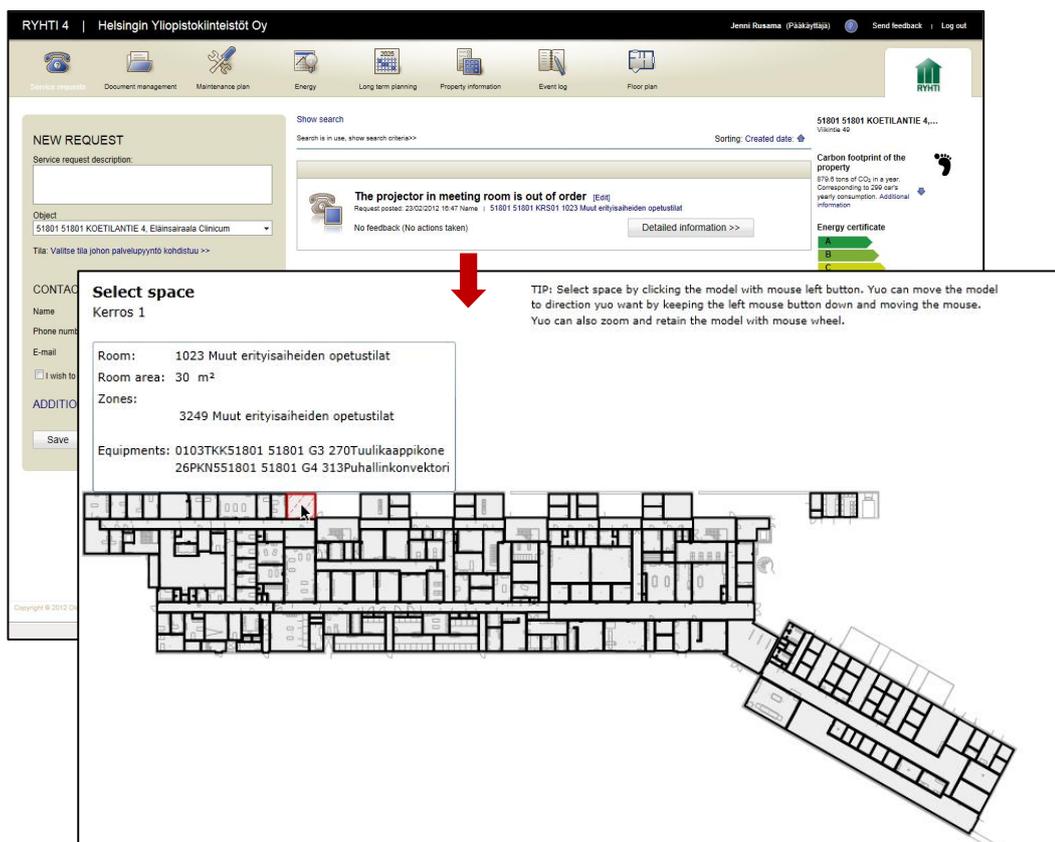


Figure 11. An example of addressing service requests using 2D visualization of spaces.

8.3 Interoperable use of facility management software

Data transfer links between facility management tools facilitate utilization of common data in several applications and centralized updating. Software vendors have developed proprietary data links, but also open data transfer is available.

Open data transfer based on the UBL (Universal Business Language) standard is an example of transmitting service requests and maintenance task messages.

In Finland, RAKLI – The Finnish Association of Building Owners and Construction Clients aims to promote the commissioning of open data transfer. In 2009, RAKLI published guidelines concerning UBL data transfer (see Appendix 2). A group of organizations and software suppliers in the real property business participated in compiling the guidelines.

8.4 Modeling existing buildings

A model of an existing building, based on drawings, on-site surveys and possibly measurement of the spaces and building parts, is known as an **Inventory BIM**. They are described in detail in Series 2, *Initial situation modeling*.

Inventory models are utilized as initial data for design of repair construction projects. They can also serve as a spatial BIM for facility management software in case of upgrading to model-based information management at the property.

Modeling of an existing building is often easiest to conduct at the time the renovation construction project is underway. Modeling in connection with facility management service procurement is also worth considering.

Modeling accuracy and the level of details in the BIM of an existing building must be considered carefully to balance benefits and cost. If the modeling is performed primarily for the needs of facility management software, it can be often restricted to the basic data of spaces and objects.

8.5 Archiving and securing facility management BIM data

The construction project **as-built BIMs** and their **updates** are archived in a manner that is consistent with the property's documents.

The BIM data **must be secured**, for example, by means of automatic back-up copies so that the different versions of the models can be restored if necessary.

Requirements

- Archiving as-built BIMs and their updates
- Securing the BIM data.

9 Facility management BIMs updating procedure

9.1 General

It is important to document a clear procedure for updating and quality assurance of the property's facility management BIMs and software to ensure that all data and software versions are **up-to-date** and **compatible** with one another.

Guidelines for facility management BIM updating should be drawn up for the property, describing the procedure, responsibilities and tasks.

The requirement of models being up-to-date and compatible with one another applies to **all facility management BIMs** (native BIMs of design software, open data transfer BIMs, combined BIMs, and native BIMs of facility management software).

If necessary and agreed, an **energy certificate update** and **facility management audit** can be performed in connection with updating.

The updating process of facility management BIMs is visualized in Figure 3. It is easiest if the updates are performed alongside repair construction projects. From time to time there may be a need for periodic updates. Both alternatives are described below.

Requirements

- Compiling Guidelines for facility management BIM updating.

9.2 Project update of facility management BIMs

A **project update** refers to updating of all facility management BIMs in connection with a significant repair construction project. The update is conducted in two phases:

- Before the project, based on the inventory BIMs, see Series 2, *Initial situation modeling*
- After the project, based on the as-built BIMs of the repair construction project.

Requirements

- Updating of all facility management BIMs in connection with a significant repair construction project.

9.3 Periodic update of facility management BIMs

Small changes, such as moving of partition walls, may be done by facility management tools or design software without updating all facility management BIMs. If such changes have only minor importance from other programs viewpoint, updating of all facility management BIMs is too heavy operation. In such instances, complete updating may be performed periodically.

The need for **periodic updates** depends on the nature of the property use, the scope of the software, and the requirements for accuracy of information. Tendering of property services is an example of a logical time for BIM updates. In that case tender inquiries are based on real and up-to-date quantities of spaces, equipment etc.

The need for a periodic update should be **assessed at least every three years**, even if significant BIM-related changes have not occurred at the property. Updating may be necessary also to ensure the compatibility of BIMs and software programs.

9.4 Change report

The minimum requirement for small changes is a software-specific **change report**, documentation of changes for a periodic or project update of the facility management BIMs. A Change report may be a manual datasheet or a printout from a software tool, see figure 12. The report itemizes the changes and the dates (time stamping).

Requirements

- Change Report of small changes for updating of all facility management BIMs
- At least every three years: assessment of the need for a periodic update of the facility management BIMs

		Inventory Report									
		22.2.2012									
HELSINGIN YLIOPISTO RYHTI Ylläpidon hallintajärjestelmä		Changed or Added 1.1.2009 — 22.12.2011 Objects Maintenance Plan Maintenance History			Main system LVI-tiedot Sähkö-tiedot Muut tiedot						
		Object created	Objects			Maintenance Plan			Maintenance History		
			LVI-tiedot	Sähkö-tie	Muut tie	LVI-tiedot	Sähkö-tie	Muut tie	LVI-tiedo	Sähkö-tie	Muut tie
Kampus, Viikki											
51801 KOETILANTIE 4, Eläinsairaala Clinicum											
LVI LVI-järjestelmät											
G1 Lämmitysjärjestelmät		18.2.2004	18.9.2009			2.5.2011			26.5.2011		
G2 Vesi- ja viemärijärjestelmät		1.7.2004	12.11.2009			28.6.2011			28.6.2011		
G3 Ilmanvaihtojärjestelmät		25.2.2004	18.9.2009			14.10.2011			14.10.2011		
G4 Kylmätekniset järjestelmät		9.8.2005	18.9.2009			27.9.2011			1.11.2011		
G51 Paineilmaverkostot		16.2.2004	18.9.2009			31.10.2011			31.10.2011		
G81 Varavoiman apulaitteet		29.4.2004	18.9.2009								
J6 Rakennusautomaatiojärjestelmät		13.4.2005	18.9.2009								
G82 Kohdepoistokojeet		27.6.2006				4.7.2011			4.7.2011		
AK Autoklaavit		4.7.2011	30.9.2011			28.10.2011			28.10.2011		
Sähkö											
W22 Varvoimajakelu		31.5.2004		23.9.2009							
W21 Normaali-jakelu		14.12.2005		23.9.2009		2.5.2011			2.5.2011		
W23 UPS-jakelu		24.5.2004		23.9.2009							
W1 Sähkönjakelu yli 1 kV		21.4.2005		23.9.2009							

Figure 12. An example of a change report as a printout of facility management software. All changes and the dates are documented for updating of the facility management BIMs.

9.5 Quality assurance

Project updates and periodic updates of the facility management BIMs shall include **quality assurance**, at least as follows.

Requirements

- Ensuring the integrity and consistency of the updated BIMs, see Series 6, Quality assurance
- Checking the compatibility of the facility management BIMs and the software versions used at the property
- Ensuring that updates are performed consistently in all facility management BIMs
- Preliminary agreement of the date for the next periodic update

9.6 Updating the energy certificate

Update of the facility management BIMs should include a check whether the BIMs have changed in a manner that updating the **consumption targets** and **energy certificate** is needed. In that case, energy simulation based on the updated BIMs should be considered.

Requirements

- Consideration of the need to update the consumption targets and energy certificate in connection with updating the facility management BIMs.

9.7 Facility management software audit

The requirements set the minimum level of quality assurance in connection with the BIM updates. From time to time it should be considered if a more extensive **audit** of the facility management software or even the facility management information system as a whole. For example, auditing could include the following:

- Use rate of facility management software
- Updating and adequacy of the facility management data
- Documentation of the small changes
- Periodic updates and project updates
- Support and training of the software users
- Needs to develop information management processes

Appendix 1: Definitions

Native BIM

The native BIM is a building information model (BIM) for design, construction or facility management software in the format in which the software used to create the BIM processes it.

Open data transfer BIM

The open data transfer BIM is based on the IFC standard or other open data transfer standards (COBie, UBL, etc.).

COBie

COBie (Construction Operations Building Information Exchange) is an open data transfer standard for the purpose of saving in a construction project the information needed for facility management. COBie aims for simplicity. It supports and supplements the utilization of BIMs in the IFC format and is compatible with it.

COBie is still in its early stages, but several important design and facility-management software suppliers on the U.S. market have already developed COBie compatibility into their tools. It is becoming the minimum requirement in construction projects of some property owner organizations, for example the U.S. General Services Administration (GSA), see Appendix 2.

Inventory BIM

The Inventory BIM is a model of an existing building, based on drawings, on-site surveys and possible measurements of the spaces and building parts. The inventory BIM is used as initial data for repair construction project modeling and as the spatial BIM for facility management software.

Building modeling plan

The building modeling plan is a construction project document, obliging all stakeholders, and describing the objectives, procedures and responsibilities of the modeling. Objectives comprise the utilization of models in the project and in facility management.

As-built BIM

The as-built BIM is a model that has been updated to include the changes made in construction and commissioning. The as-built BIMs are updated in repair construction projects or periodically.

UBL

UBL (Universal Business Language) is an XML-based presentation for electronic transfer of a business transaction. It was developed by the international OASIS organization. RAKLI – the Finnish Association of Building Owners and Construction Clients published guidelines in 2009 for applying UBL in the real estate sector (see Appendix 2).

Contractor's product information

Contractor's product information refers to the documentation, which the contractor shall deliver for use in facility management. It contains product information of building parts, equipment and materials, operation and maintenance instructions, as

well as measurement and inspection data. The contractor's product information supplements design data.

Support tools

In design firms, alongside design software programs, various complementary tools are used for managing spaces and space requirements, saving object data, performing technical calculations, simulations and visualizations etc. Similarly, construction companies have applications for quantity calculations, tendering, production planning and management etc. Such tools are called support tools.

Project update of facility management BIMs

The project update refers to updating all facility management BIMs in connection with a significant repair construction project implemented at the property.

Periodic update of facility management BIMs

The periodic update refers to updating of small changes in native models into all facility management BIMs.

Facility management software

The facility management software refers to applications for facility and space management, maintenance budgeting, long-term planning, maintenance manual, monitoring of energy consumption and environmental impacts, etc.

Facility management BIMs

The facility management BIMs is used as a common expression for all BIMs applied to facility management: native BIMs of design software, open data transfer BIMs, combined BIMs, and native BIMs of facilities management software.

Appendix 2: References

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