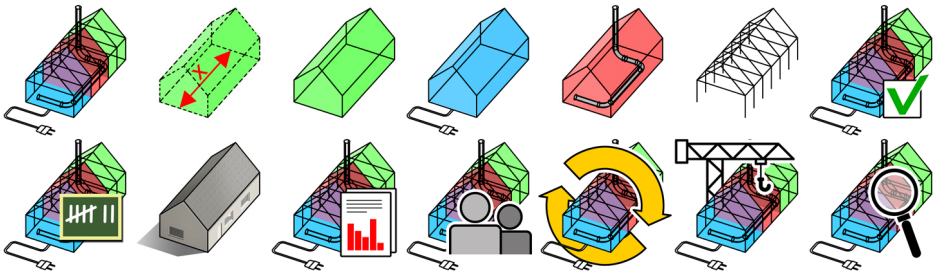
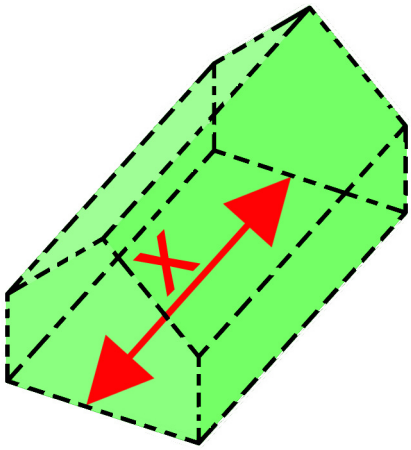


COBIM

Common BIM Requirements 2012

v 1.0



Series 2

Modeling of the starting situation

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 building information modeling 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. **Authors:** 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 in asking for comments from the members of the executive group and from interest groups.

Parties to the © COBIM project.

Table of Contents

1 Main objectives of building information modeling

Property and construction modeling aims to support a design and construction lifecycle 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

This document addresses the modeling of the Starting situation, corresponding surveys inventories and other analyses and documents produced from these and their information content requirements.

The definition of the content and accuracy level of the starting situation modeling is done using this document and measurement and inventory modeling task definition form (Appendix 1).

The task definition form has to be filled in for each project.

Series 3 “Architectural planning” definitions are followed in the modeling principles of the inventory model where these are not defined in this document.

3 General definitions

The modeling of the site and existing building is done based on measurements, inventories and investigations performed on site This information is supplemented based on existing drawings and other documents.

Depending on the required level of accuracy, the clarification of necessary source data may also require the expertise of designers specialised in particular fields and other consultants.

3.1 Modeling of the site and site elements

Requirement
The Site model has to be at least a three dimensional surface model. Otherwise, the site elements are modeled with the agreed accuracy.

Guideline
The plot model can also include boundary marks and location of other judicially or technically significant points, such as drains or cables.

When necessary, ground surveys of the plot can also be done which produces a geotechnical model of the plot.

It is recommended to include nearby buildings and street areas in the model of the plot in the appropriate scale.

3.2 Inventory modeling

Inventory modeling is done based on the measurements, inventories and investigations performed on site. This information is supplemented based on old drawings and other documents.

Requirement

The origin of source data has to be documented in the BIM specification.

3.3 Use of layers in the Inventory Model

Requirement
The layer system used in the Inventory Model has to be documented in the BIM specification if the modeling software has no layers, the information should be organised in another, logical way according to the building elements and documented in the BIM specification

Guideline
The layer requirements of traditional CAD drawing instructions cannot be applied directly to drawings produced using Building information models.

3.4 Modeling of building elements

Requirement
Building elements are modeled into the Inventory model to the defined level of accuracy. Building parts are modeled using the tools intended for modeling this part; the walls are modeled using wall tools, slabs using slab tools, etc. If this principle cannot be followed, e.g. due to geometric diversity, the modeling principle adopted must be recorded in the BIM specification.

The building elements have to be modeled so that when the data is transferred the location of the building element, agreed data content and geometry is also transferred to software of other parties.

Guideline
More detailed definitions according to Series 3: "Architectural design"

3.5 Classification of building elements

Requirement
Building elements are classified according to the accuracy level and accuracy of the Inventory model. The names of the categories must show that this is part of an existing structure. The classification principle used is recorded into the BIM specification.

Guideline
More detailed definitions according to Series 3: Architectural design.

3.6 Coordinate system and units of measurements

Requirement
A project coordinate system is defined for the project so that the datum point is situated near the building.

Guideline
Planning according to the municipality coordinate system is not recommended as locating the information model far from the source coordinate causes problems for most planning software.

It is recommended that the coordinate system is defined in such a way that the whole building area is in a positive coordinate system as negative coordinate system may cause problems in site surveying.

Requirement
The location of the project coordinate system in relation to municipal coordinate system is documented by using at least two corresponding points. X and y coordinates for the corresponding points are stated in the project coordinate systems and in the municipal coordinate system.

Guideline
The change of project coordinate system is made to the municipal coordinate system by using Helmert, i.e. equiform change.

Requirement
The building information models are modeled in actual elevation in the municipal elevation system.

Millimetres are used as the measurement unit for building information models.

3.7 Processing stories

Requirement
The building is modeled by story according to Series 3: “Architectural design”.

Measured floor surface level is defined as the inventory model story zero level.

Guideline
It is recommended that the zero level of the story is defined at the height of the main staircase landing.

3.8 BIM specification

The BIM specification depicts the source data of the inventory model, modeling principles and other issues affecting the use or the reliability of the model.

The BIM specification is an indispensable aid in the continuing utilization of the model.

Guideline

Matters to be documented:

- *measuring methods, accuracy and date/ time*
- *any exceptions from measurement specifications*
- *origin of source data*
- *software used*
- *coordinate system, coordinate corresponding points and information on names, amount and location of stories*
- *naming conventions of files and building elements*
- *layers used in the model*
- *any exceptions from the defined modeling practice*
- *Inventory model inspection form (Appendix 3)*
- *other material obtained in measurement*

4 Requirements pertaining to source data

Requirement

The method of acquiring the source data, its level of accuracy, processing and division of tasks are agreed in detail on a project specific basis between the buyer and if possible, in cooperation with the project team, so that the site model and the inventory model serve the goals of the project as well as possible.

Guideline

The modeling of source data to match future use requirements is essential for the follow-up planning of the project. It is therefore recommended that the designers of the project are also involved in setting the requirements for the inventory model. Thus, it is possible to be forewarned about potential issues such as data transfer problems between design software.

When drafting content requirements for the inventory model, the target operating conditions concerning measurements and surveys must be taken into account.

Guideline

E.g., measuring building elements that are hidden requires opening elements and if the target is in use during the measurement, this may further complicate the measuring process.

4.1 Measurement requirements, content

4.1.1 Level 1 – Laser measurement and existing drawings

The measurements are done using a laser range finder.

Guideline

The measurement material is formed by the distances between the building elements manually recorded by the measurer. The measurements are not in the same coordinate system.

No geometrically reliable Inventory models or measurement drawings can be made based on measurement material obtained using laser ranging method.

The method is suitable for verifying the correctness of individual distances and for example, modeling based on old drawings.

4.1.2 Level 2 –Tacheometric surveying

The measurement is done with a tacheometer using predefined points.

Guideline

The survey material consists of individual points, lines and symbols in the same coordinate system.

The method is very suitable for yard surveys and complementing laser scanning surveys e.g. for floor drains.

The method is suitable for establishing source data for inventory model for geometrically simple targets where the points to be measured are limited in number.

The completion and refinement of the inventory model and measurement drawings requires additional measurements on site.

Confirming the correctness of the inventory model and measurement drawings is difficult visually.

The measurement accuracy of tacheometric measurements

Requirement

The deviation of the defined measurement points must be less than 5 mm.

4.1.3 Level 3 – Laser scanning survey

The measurement is carried out comprehensively using laser scanning from all visible surfaces.

Guideline

The measurement material is graphic and its correctness can be confirmed visually.

If necessary, the Inventory model or drawings can be supplemented and refined without additional measurements.

Accuracy of laser scanning survey

Requirement
Noise i.e. error margin max. ±10mm

Resolution i.e. point density: measurement points within less than 5mm intervals.

Guideline
In special cases such as historic building documentation, measurements can be done at an even greater level of accuracy where measurements points are for example in intervals of 1 mm. However, the work load related to the measurement is in this case considerably higher.

Excerpt of a laser scanning point cloud of a historic building target attached with photographed color data, Turun linnan herrainkellari, picture Tietoa Finland Oy. *(This is one of the rooms in the Museum Centre of Turku)*

Guideline
Laser scanning measurements in places that are awkward to measure, such as roofs, can be complemented by other survey methods such as tacheometric survey or photogrammetry.

An inventory model based on the measurement material can be made reliably at 10 mm tolerance. The materials can also be used to compile detailed drawings, e.g. where material boundaries are visible.

4.2 Requirements for surveys, analyses and inventories

4.2.1 Level 1- Space identifiers and the general classification of building elements

Requirement

Space identifiers and general classification of building elements are included in Inventory model.

Guideline:
The building elements are classified using a general principle of classification (e.g. existing exterior wall type 1 = EEW01, existing load bearing partition wall type 1 = ELBPW01, existing intermediate floor type 1 = EIF01, etc.).

4.2.2 Level 2 – Room space inventory and classification of building elements

Requirement
In addition to level 1 information, room space specification is included in the inventory model.

Guideline:
The building elements are classified according to the definitions of existing plans or designers.

4.2.3 Level 3 – Historical and research information of the building

Requirement
Inventory information on building history survey and information on task investigations such as condition and contaminants are included in the Inventory model.

Guideline
Information content details are defined on a project basis.

Matters to be defined:

- *What is inventoried*
- *What information is attached to the model*
- *What information is reported using other methods such as database format or table format*

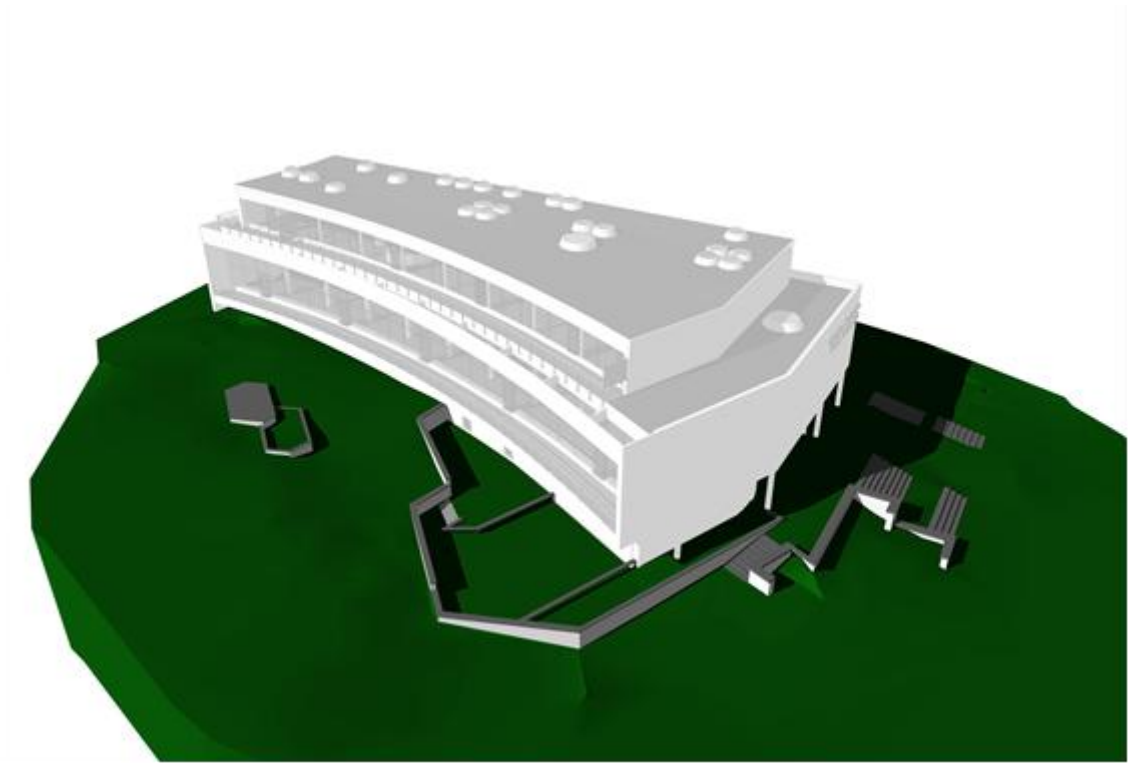
5 Modeling requirements

With regard to modeling the starting situation, the most essential requirements here relate to the modeling of the site and modeling possible existing buildings spaces and structures. The building information model of the site to be built is called “Site model” and that of an existing building “Inventory Model”. Renovation targets require both a Site model and an Inventory model, new builds only require a Site model.

5.1 Site model, Site elements

Requirement
A tool appropriate to the modeling software is used for site modeling. The site elements are modeled, as appropriate, using tools meant for modeling building elements, for example, supporting walls are modeled as walls and stairs as stairs. Otherwise, site elements are modeled so that their geometry location and classification can be transferred in IFC format.

The site and site elements are modeled into their own story so that they can be processed as one entity and if necessary, marked out of the model. The objective is also to model areas external to the site like buildings and street areas nearby so that they can be processed as an entity by themselves.



The site model shows a 3D surface model of terrain forms and area structures, Töölö Library, City of Helsinki, picture: Tietoa Finland Oy

5.2 Accuracy levels of Inventory model

Requirement
The structures of old buildings are almost always somewhat slanted, sloping, curved or otherwise inexact in their geometry. Striving for "absolute" accuracy in the Inventory model is not appropriate.

Accuracy level of Inventory model

The allowed measurement deviations for the Inventory model are:

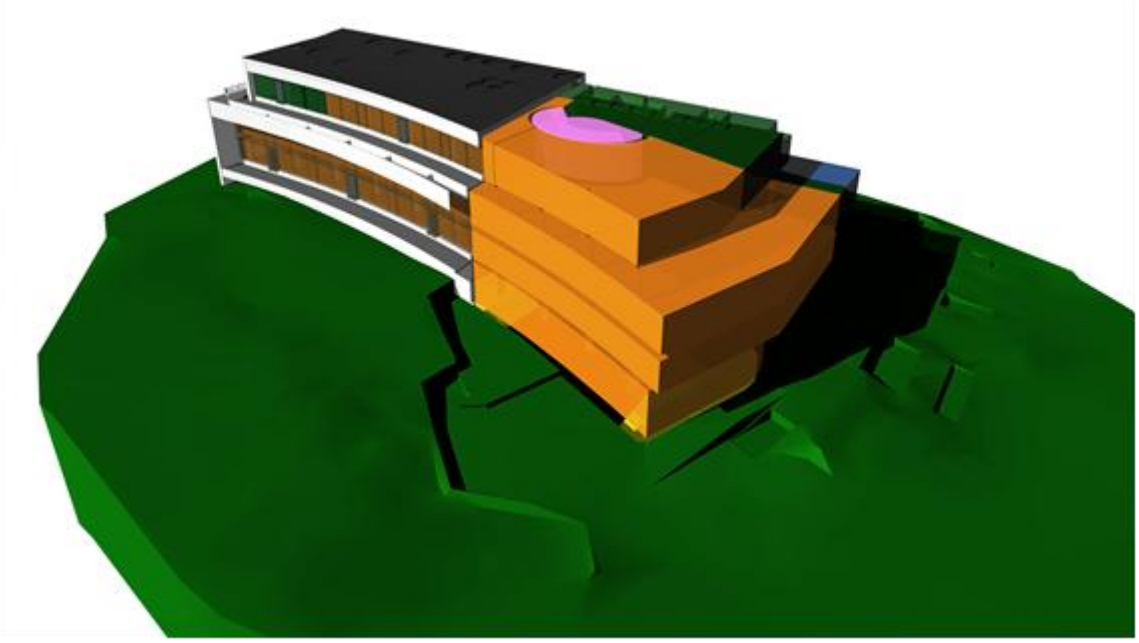
- 10 mm on corner points of building elements
- 25 mm on surfaces, e.g. walls and floors
- 50 mm for old irregular structures such as roof structures.

The modeling accuracy used is agreed on project basis.

Guideline
If required, the permitted deviation from measurements of sites of historical interest is 5mm for details

The required accuracy level may vary between the building elements.

5.2.1 Level 1 – Spatial model



The spatial model models the building's outer shell without details and the spaces as space objects with space information. Töölö Library, City of Helsinki, picture: Tietoa Finland Oy

Requirement

A spatial model level Inventory model and draft level drawings are compiled on the basis of the surveys.

Guideline

The spatial model and drawings are used as source data for surveys and project planning.

Level 1 – Spatial model	
Building element	Requirements
Spaces	
Room area	modeled, space identifiers and defined inventory information are attached to the spaces
11 Site elements – Site model	
3D surface model and vegetation to be retained	defined on a case by case basis
12 Building elements	
122 Ground floors, 123 Structural frame and 125 External decks	defined on a project basis
1241 External walls	modeled without details
1242 Windows	modeled without casing divides
1243 External doors	modeled without details
1263 Roofings	modeled
13 Internal space elements	
1336 Plumbing fixtures	defined on a project basis

5.2.2 Level 2 – Building element model

Requirement
Building element model level Inventory model and main drawing

level drawings.

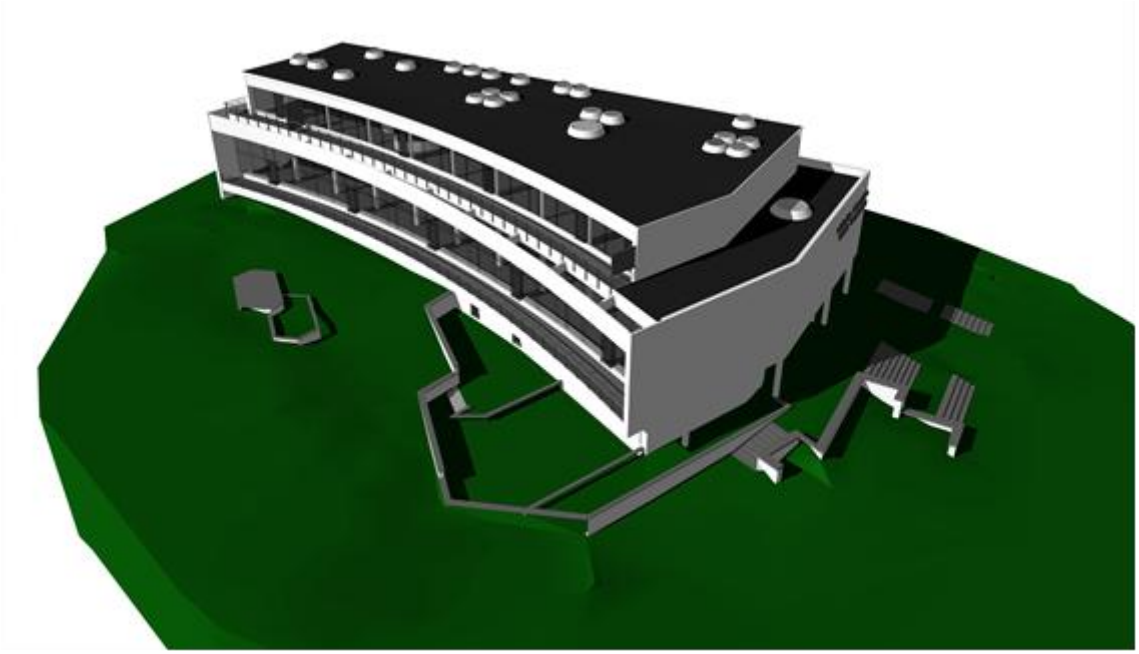
Guideline
Level 2 is the basic level of the Inventory model.

Level 2 Inventory model is needed after the project planning phase and when making Schematic design level project plans where the spatial model is enough as source data.

Level 1 spatial model Inventory model can be supplemented to a Level 2 building element model at the beginning of building design.

Level 2 – Building element model

Building element	Requirements
Spaces	
Net room area	modeled, space identifiers and defined inventory information are attached to the spaces
11 Site elements -Site model	
3D surface model	modeled
vegetation to be retained	modeled
115 Site constructions	modeled
12 Building elements	
1221 Ground floor slabs	modeled by visible parts
1222 Ground floor ducts	defined on a project basis
123 Structural frame	modeled by visible parts without details
1241 External walls	modeled without details
1242 Windows	modeled including casings and frames
1243 Externaldoors	modeled including casings
125 External decks	modeled
1261 Roof substructures	modeled in a simplified manner
1263 Roofings	modeled
1265 Glass roof structures	modeled
1266 Skylights and hatches	modeled
13 Internal space elements (infills)	
131 Internal dividers	modeled without detail
1323 Ceiling surface elements	modeled without detail
1331 Standard fittings	modeled as space reservations
1336 Plumbing fixtures	modeled as space reservations
1342 Fireplaces and flues	modeled from the outside as far as visible



Level 2 Building element model is the base level of inventory modeling where spaces are modeled as space elements with their space identifiers and all building elements. Level 3 building element model is enhanced by ornamental themes, equipment and surface textures.

Töölö Library, City of Helsinki, picture: Tietoa Finland Oy

5.2.3 Level 3 Building element model

Requirement
Building element model level Inventory model and detailed drawings.

Guideline
Compared to the Level 2 Inventory model, the level of detail is enhanced and modeled building elements are added.

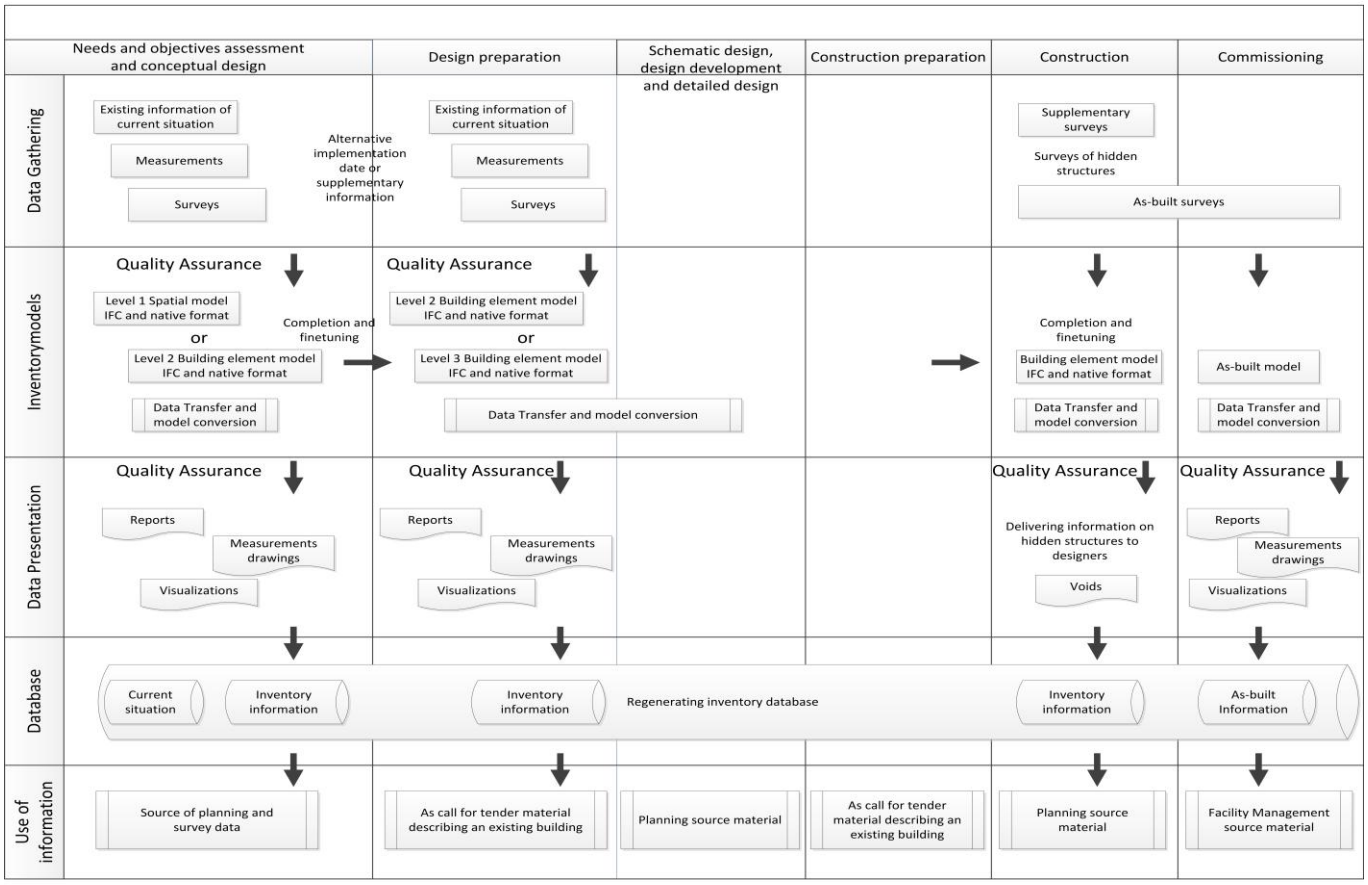
Level 3 Inventory model is required for geometrically complex objects, e.g. where there are building preservation requirements.

Level 3 – Building element model	
Building element	Requirements
Spaces	
Net room area	modeled, space identifiers and defined inventory information are attached to the spaces

11 Site elements – Site model	
3D surface model	modeled
113 Paved and green areas	modeled apart from surface water drainage systems
114 Site equipment	modeled, location and identifier
115 Site constructions	modeled
12 Building elements	
1221 Ground floor slabs	modeled as far as visible
1222 Ground floor ducts	defined on a project basis
123 Structural frame	modeled with details
1241 External walls	modeled with details and ornamentals
1242 Windows	modeled with frames and casings
1243 External doors	modeled with casings
1244 Facade attachments	modeled
125 External decks	modeled
1261 Roof substructures	modeled, tolerance to be agreed per project
1262 Eaves	modeled
1263 Roofings	modeled
1264 Roof safety products	modeled
1265 Glass roof structures	modeled
1266 Skylights and hatches	modeled
	modeled
13 Internal space elements (infills)	tolerance must be agreed per project
131 Internal dividers	modeled with details
132 Space surfaces	modeled with details
133 Internal fixtures	modeled as space reservation
1341 Maintenance platforms and catwalks	modeled
1342 Fireplaces and flues	modeled from the outside as visible
2 Services elements	tolerance has to be agreed on project basis
21 Plumbing elements	defined per project
22 Air conditioning elements	defined per project
23 Electrical elements	defined per project
25 Mechanical elements, usually	defined per project
2511 Elevators	Elevator shaft measurement and modeling

5.3 Modeling requirements in different project phases

This chapter describes the requirements of modeling the starting situation in different project phases.



Example of phasing of inventory modeling in a building project.

Guideline

Sufficient time should be set aside for compiling the measurements and the Inventory models, 2-6 months depending on the target.

Guideline

Before starting the measurements, preferably already in call for tender phase, a measurement plan should be completed which can be used to estimate the conformance of the measurement work. The number and the location of measurements are presented in the measurement plan.

5.3.1 Needs and objectives assessment and conceptual design

The existing building and site is measured and inventoried and agreed surveys are done in the needs analysis and project planning phase. An Inventory model, measurement drawings and reports are compiled based on the information.

The Inventory model is usually at spatial model level in the needs and objectives assessment and project planning phase. If the project planning is done at schematic design level then the Inventory model should also be compiled at building element level.

5.3.2 Design preparation

The Inventory model compiled in the conceptual design phase and the reports based on this are used as source data as call for tender material. If required, the model is further updated and fine tuned in the building element model.

If an Inventory model and measurements are not done in the conceptual design phase they should be started in design preparation phase.

5.3.3 Schematic design, design development and detailed design

The Inventory model is transferred into the software used by the architect and its usability is verified.

5.3.4 Construction preparation

The Inventory model and the reports prepared based thereon are used in call for tenders regarding contracts as descriptive material of the existing building.

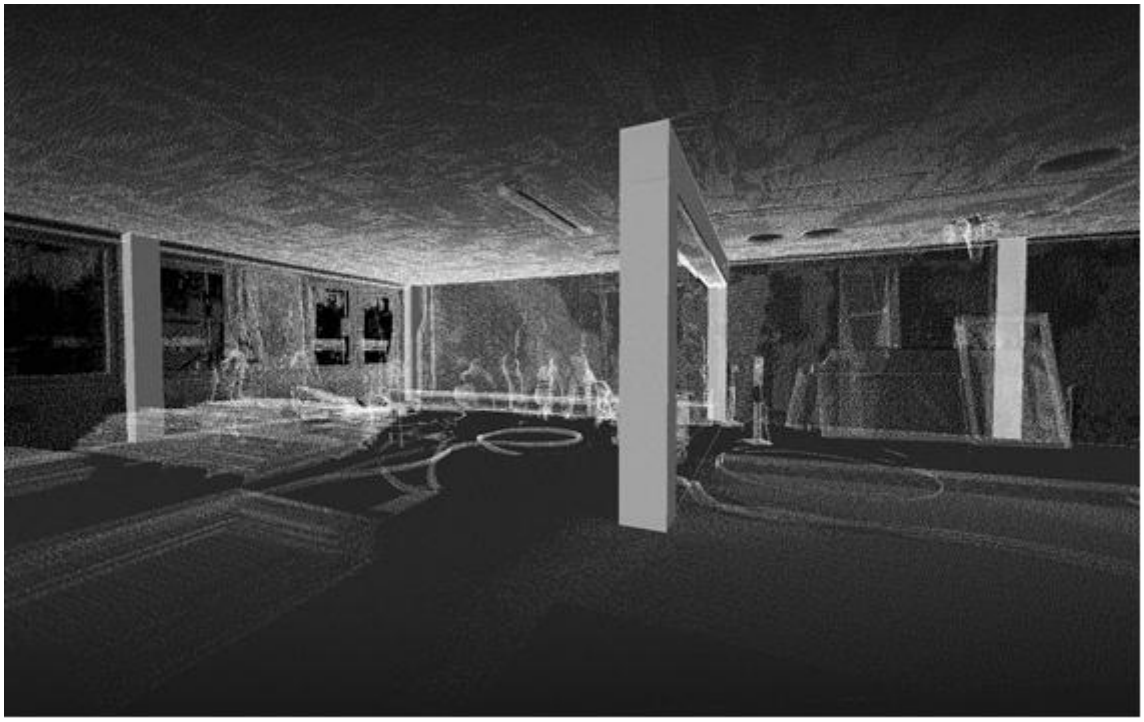
5.3.5 Construction

If necessary, supplementary measurements are done in the construction phase for hidden structures, the Inventory model and other documents are supplemented with for example, void information.

The method of delivering supplementary measurement information to the designers has to be agreed separately.

Guideline

Measurements to document hidden new structures and MEP can also be done in the construction phase. For example, before installing suspended ceilings MEP installations that remain hidden are laser scanned as part of the as-built model.



A point cloud model of additional measurements done in the construction phase, picture: Tietoa Finland Oy

5.3.6 Commissioning

In the commissioning phase, the as-built models together with the Inventory model are merged together to serve the needs of facility management in accordance with Series 12, “Use of models in facility management”.

6 Final documents to be produced

6.1 Data transfer

Transferring and converting the Inventory model from one modeling software to another is often required when the Inventory model is transferred to the architect or, for example, if there is a change in designer after the planning stage.

6.1.1 Transfer of Inventory model to the software used by the designer

Different design software cannot at the present time utilize each other’s BIM models. BIM models are usually transferred using the IFC file format where transfer is successful in the main as regards their data content and geometry. BIM models can thus be utilized well as reference files between different design areas.

The Inventory model transferred to the architect’s design software can be utilized directly as reference information. Parameterization is often lost from the models in IFC data transfer which is required for modifying building elements and for example, managing presentation styles.

It is recommended therefore that the Inventory model is ordered in the design software format used by the architect outright. The Inventory model can be transferred to another design software format if necessary. This does, however, usually require remodeling the Inventory model in parts. It is recommended that the author of the information model is tasked with the conversion as he or she will know the model structure best.

Guideline

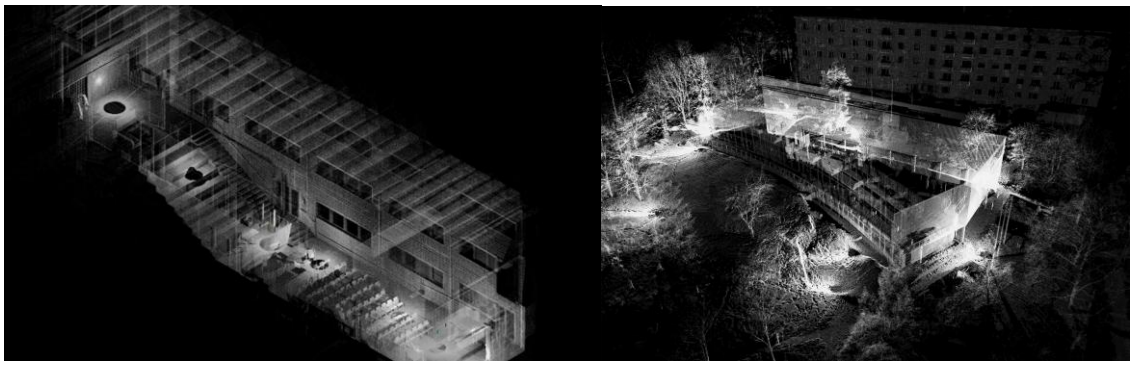
It is important to note that it is not possible to build an Inventory model that would be usable in several different design software at the present time.

6.2 Measurement materials

Requirement

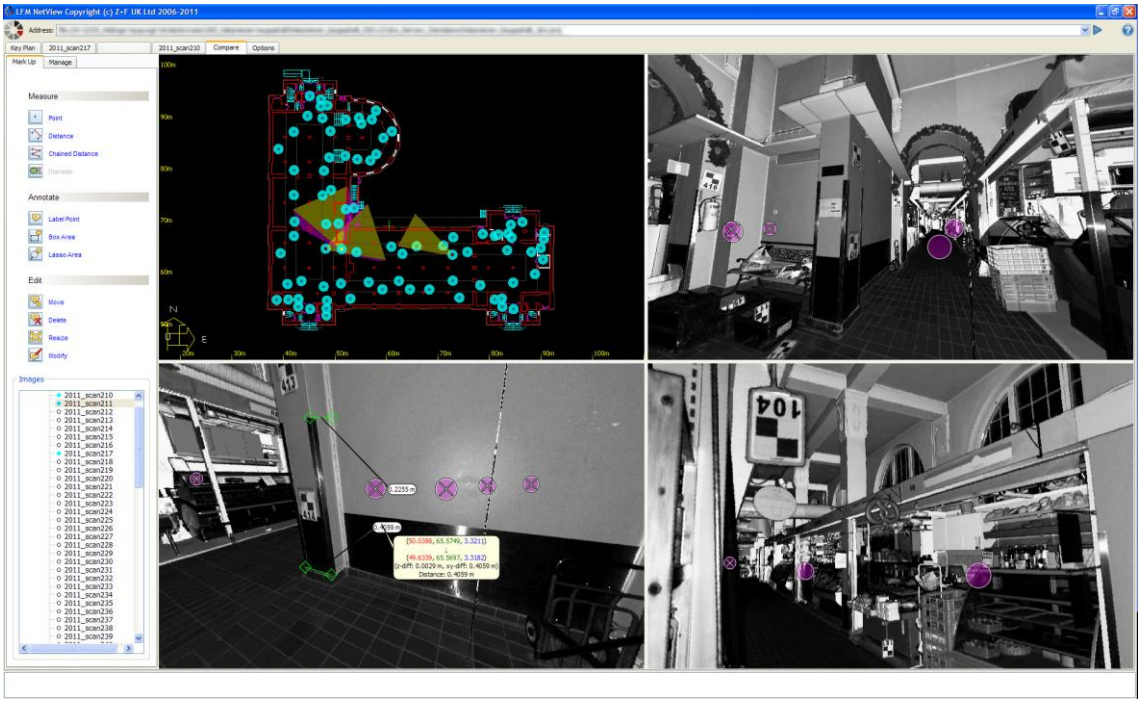
In level 3 measurements

- Produced measurement materials in the same coordinate system with the Inventory model.
- Point cloud model of laser scanning in the agreed formats.
- Rotational pictures of laser scanning and rotational picture index.
- Laser scan point cloud issued as a measurable rotational picture format (bubble view or panoramic view)



On the left, laser scanning point cloud model of indoor measurements and on the right, of outside measurements, picture: Tietoa Finland Oy

Rotational picture of laser scanning, Tamminiemi Cafe, City of Helsinki, picture: Tietoa Finland Oy.



Laser scanning point cloud model issued in a measurable rotational picture format. Measurable rotational pictures allow easy and visually enabled navigation. It is also possible to take measurements or coordinate points from the model. The materials supplement measurement drawings and Inventory models. Hakaniemi Market, City of Helsinki, picture: Tietoa Finland Oy.

6.3 Building information models

6.3.1 Site model – Site elements

Requirement
The Site model in the agreed BIM format as native files and as IFC files.

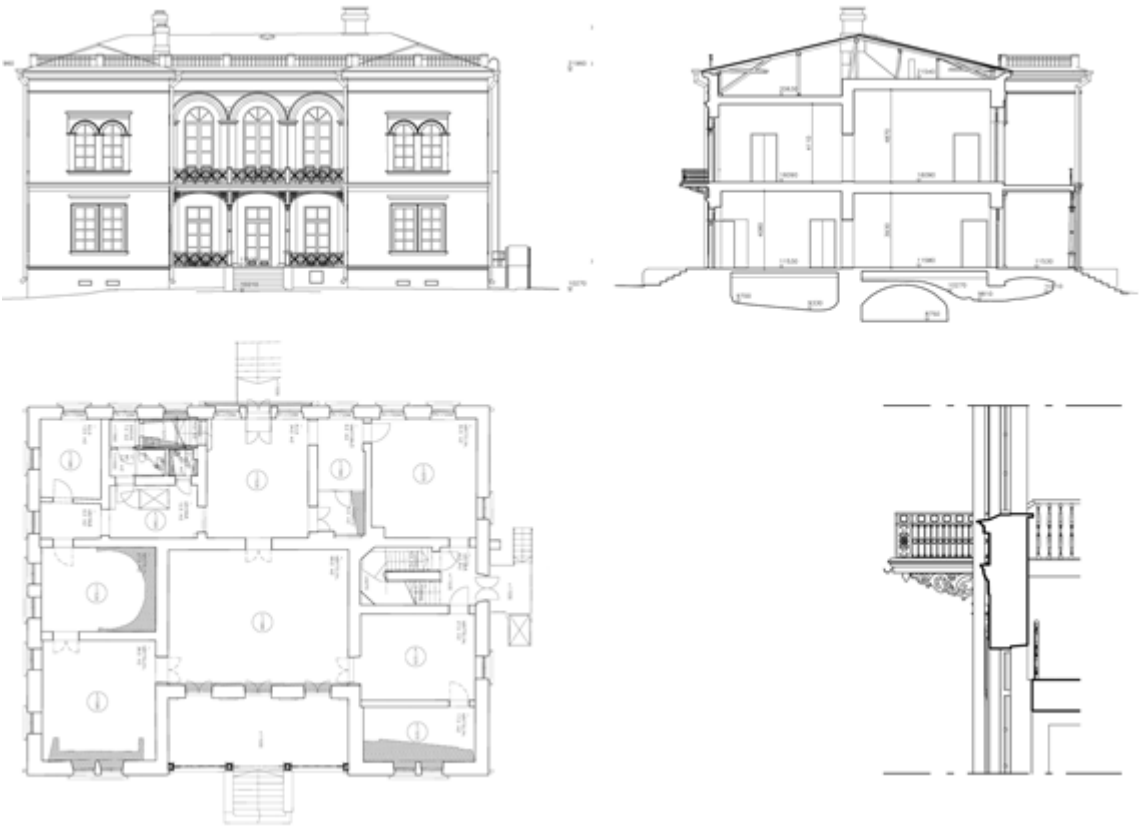
6.3.2 Inventory models

Requirement
Inventory Models in the agreed information model format as native files and as IFC files.

6.4 Drawings

Agreed measurement drawings in the defined format.

- Site survey drawing
- Plan drawings
- Roof drawings
- Section drawings
- Facade drawings
- Detailed drawings, agreed on project basis



Measurement drawings produced from the Inventory model. Hakasalmi Villa, City of Helsinki, picture: Tietoa Finland Oy.

7 Supplementary tasks

Requirement
Potential other supplementary tasks which are included in the inventory modeler's tasks. Supplementary tasks are agreed on a project basis.

- Participation in defining the inventory modeling.
  - Definition of the content and level of accuracy of the Inventory model together with the person who is performing the task through negotiation.
- Panorama photography
  - 360º panorama photography of the object for example to help compiling a building history specification.

360º panorama picture. Tamminiementie Cafe, City of Helsinki, picture: Tietoa Finland Oy.

- Converting the Inventory model to the architect's software
    - If there is a change of designer, for example between the conceptual design and schematic design stages, the software used by the designer may also change. In this case, the Inventory model has to be converted into a new file format. The best person to do this is usually the original author of the Inventory model.
- Surveys, clarifications and inventories
    - Room space inventory, building history specification and other necessary surveys.
- Information content reporting
    - Reports from Inventory model, e.g. a list of spaces or room cards.
- Visualization
    - Visualization material for an existing building, e.g. visualization pictures.

Visualization picture from the inventory model, Lapinlahti Hospital, City of Helsinki, picture: Tietoa Finland Oy

- Other documents
    - Other defined documents such as databases.

8 Quality Assurance

Quality Assurance is an essential part of modeling of the starting situation and has to be undertaken for surveying, modeling and other documents produced.

Source data model inspection form is filled in and signed as an appendix to the BIM specification.

8.1 Measurement

Requirement
Measurement materials have to be reviewed before starting modeling.

Matters to be reviewed:

- The measurement materials are in the agreed coordinate system
- All spaces and building elements according to definition have been surveyed and the measurement results correspond to the building measured.
- There are no internal errors in the measurement materials, e.g. an individual measurement in the coordinate system
- The measurement accuracy is conforms to requirements
- The method of measurement, accuracy and timing is recorded
- Potential exceptions and their reasons are recorded in the information model description. E.g., a locked space which could not be measured.

8.2 Inventory model

Requirement
The Inventory model and the measurement drawings produced thereof and other documents must be checked before the material is delivered to the buyer. The review of the inventory model has to be undertaken by an inspector of sufficient expertise. Suitable software should be utilized for the review.

Matters to be checked:

- Measurement accuracy of the model, the model must correspond to the measurement materials
- Measurement accuracy of drawings, the drawings must correspond to the measurement materials
- The model and the drawings are in the agreed coordinate system and height
- Space and building elements are modeled according to requirements
- Space and building elements contain the information according to requirements
- The model conforms to technical requirements
- The model has no clashes nor overlaps

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Appendix 1: Task allocation form for measurement and inventory modeling

Example of information content

Project information		**Target**	to be measured	
Date	dd.mm.yyyy	Crawl space	yes	x
Project:	Project title	Stories	4	x
Project Manager	Firstname Surname	Attic	yes	x
		Scope:		m2, includes cellar, crawl space and attic

Source data from the buyer		file format
Existing architect plans as image file	x	e.g. plt, tif, jpg or pdf
Existing architect plans as CAD files	x	e.g. dwg, Archicad or Revit
Existing structural plans as image files	x	e.g. plt, tif, jpg or pdf
Existing structural plans as CAD files	x	e.g. dwg
Space numbering and naming instructions	x	
Other		

Method of measurement to be used		Accuracy of measurement
Level 3 - Laser scanning survey	x	noise max ±10mm, point density: measurement points within less than 5mm intervals
Survey of site	x	
Other measurements on site	x	Survey of floor drain
Supplementing the model based on old plans		

Final product of the measurement		file format
Rotational pictures of laser scanning and rotational picture index	x	jpg
Point cloud model of laser scanning	x	e.g. imp or pts
Laser scan point cloud issued as a measurable rotational picture format	x	e.g. LFM Netview or Leica True View

Final products in the project planning phase			file format / note
Site BIM		x	e.g. IFC 2x3 and Autocad Architecture 2012
Inventory BIM	**Level 1- Spatial model**	x	e.g. IFC 2x3 and Autocad Architecture 2012
Measurement drawings		x	pdf (and if necessary, as CAD files e.g. dwg)
	Site survey drawing	x	pdf and dwg
	Plan drawings	6pcs	Story levels' elevation markings, space identifiers
	Section drawings	2pcs	Elevation markings of stories
	Facade drawings	4pcs	Elevation of land surface, eaves and ridge
	Roof drawings	1pcs	Elevation of eaves and ridge
Other			

Final end products at proposal planning phase			file format / note
Site BIM		x	e.g. IFC 2x3 and Archicad 14
Inventory BIM	**Level 2 -Building element model**	x	e.g. IFC 2x3 and Archicad 14
Measurement drawings		x	pdf and dwg
	Site survey drawing	x	e.g. Archicad
	Plan drawings	6pcs	Elevation markings of under and top surfaces of slabs and ceilings, space identifiers
	Section drawings	2pcs	Elevation markings of under and top surfaces of slabs and ceilings, space identifiers
	Facade drawings	4pcs	Elevation of land surface, eaves and ridge
	Roof drawings	1pcs	Elevation of eaves and ridge
Other			

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Appendix 1: Task allocation form for measurement and inventory modeling

Example of information content

Project information		**Target**	to be measured	
Date	dd.mm.yyyy	Crawl space	yes	x
Project:	Project title	Stories	4	x
Project Manager	Firstname Surname	Attic	yes	x

	Requirements analysis and project planning	Proposal and general planning	Implementation planning	Construction preparation	Construction	Implementatioon	Other	x=yes (x)= defined per project
Accuracy level of inventory model in in different stages								
Level 1 - Spatial model	x							
Level 2 - building element model	(x)	x	(*)		(*)			(*) Possible supplementary measurements
Level 3 - building element model		(x)	(*)		(*)			
Options								
Participation in defining the Inventory BIM	(x)	(x)						
Panorama images	(x)	(x)						jpg
Conversion of the model into software format used by architect	(x)	(x)						
Room space inventory	(x)							
Building history description	(x)							
Survey of contaminants	(x)							
Reports	(x)							e.g. Space list from Inventory BIM
Other								
Visualization tasks								
Visualizations								
Aerial pictures	(x)	(x)						
Outside pictures	(x)	(x)						
Indoor pictures	(x)	(x)						
3D animations	(x)	(x)						
Other visualization								e.g. Spatial diagrams
Coordinate system								
Geographical coordinate system	*	*						* Transfer coordinates into municipal coordinate system
Planning coordinate system	x	x	x	x	x	x		Elevation in municipal elevation system

Modeling the starting situation by stages		Level 1 - Spatial model	Level 2 - Building element model	Level 3- Building element model				To be modeled x=yes (x)= defined on project basis
Spaces and location								**note**
Scope information								
Surface areas (space objects)								
Story area [kem2]								
Gross area [brm2]								
Apartment area [htm2]								
Room area [hum2]		x	x	x				
Utility area [hym2]								
Accommodation area [asm2]								
Volumes (space objects)								
Building								
Room		x	x	x				
Rooms to be modeled (space objects)								
Spaces belonging to spatial program		x	x	x				
Spaces outside the spatial program		x	x	x				
Locations								
Building locations								
Building stories		x	x	x				
Apartments and compartments								
Sections								
Thermal zones								
Fire zones								

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Appendix 1: Task allocation form for measurement and inventory modeling

Example of information content

Project information		**Target**	to be measured	
Date	dd.mm.yyyy	Crawl space	yes	x
Project:	Project title	Stories	4	x
Project Manager	Firstname Surname	Attic	yes	x

Modeling the starting situation in stages			Level 1- Spatial model	Level 2 - Building element model	level 3- Building element model			Plot survey	To be modeled x=yes (x)= defined on project basis
Talo 2000	**target**								**note**
11	Site elements								
	3D surface model		x	x	x				
113	Paved and green areas								
	Traffic areas				x			x	
	Parking areas				x			x	
	Leisure areas				x			x	
	Play areas				x			x	
	Surface water drainage system								
	Vegetation to be retained		x	x	x			x	Modeled as a symbol describing location
114	Site equipment								Location, type and geometry
	Building equipment				x			(x)	
	Leisure equipment				x			(x)	
	Play equipment				x			(x)	
115	Site constructions								Location, type and geometry
	Yard sheds			x	x			x	
	Yard shelters			x	x			x	
	Terraces			x	x			x	
	Retaining walls			x	x			x	
	Fences and walls			x	x			x	
	Basins			x	x			x	
	Driving ramps			x	x			x	
	Stairs			x	x			x	
	Other information required for the model								

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Appendix 1: Task allocation form for measurement and inventory modeling

Example of information content

Project information		**Target**	to be measured	
Date	dd.mm.yyyy	Crawl space	yes	x
Project:	Project title	Stories	4	x
Project Manager	Firstname Surname	Attic	yes	x

Modeling the starting situation in stages			Level 1 - Spatial model	Level 2 - building element model	Level 3 - building element model				To be modeled x=yes (x)= defined on project basis m
Talo 2000	**target**								**note**
12	**Building elements**								
121	Foundations								
121	Foundations								modeling of the existing foundations, if necessary, is the task of the construction designer
122	Ground floors								
1221	Ground floor slabs		(x)	x	x				As visible
1222	Ground floor ducts		(x)	(x)	(x)				
123	Structural frame								Modeled as visible
1231	Civil defence shelters		(x)	x	x				
1232	Bearing walls		(x)	x	x				
1233	Columns		(x)	x	x				
1234	Beams		(x)	x	x				
1235	Intermediate floors		(x)	x	x				
1236	Roofing decks		(x)	x	x				
1237	Structural frame stairs		(x)	x	x				
124	Facades								
1241	External walls		x	x	x				
1241	Reliefs and decorations				x				
1242	Windows and installation openings		(x)						
1242	Windows, with frames and casings			x	x				
1243	External doors, installation openings		(x)						
1243	External doors, with casings			x	x				
1244	Facade attachments				x				
125	External decks								
1251	Balconies		(x)	x	x				
1252	Shelters and pergolas		(x)	x	x				
1253	Special exterior decks		(x)	x	x				
126	Roofs								
1261	Roof substructures			x	x				
1262	Eaves				x				
1263	Roofings		x	x	x				
1264	Roof safety products				x				
1265	Glass roof structures			x	x				
1266	Skylights and hatches			x	x				
13	**Internal space elements (infills)**								
131	Internal dividers								
1311	Partitions			x	x				
1312	Glass partitions			x	x				
1313	Special partitios			x	x				
1314	Ballustrades and railings			x	x				
1315	Internal doors			x	x				
1316	Special doors			x	x				
1317	Spatial stairs			x	x				
132	Space surfaces								
1321	Floor surface elements				x				
1323	ceiling surface elements			x	x				
1325	Wall surface elements				x				
133	Internal fixtures								
1331	Standard fittings			x	x				
1332	Special fittings			(x)	x				
1333	Accessories				x				
1334	Standard appliances				x				
1336	Plumbing fixtures		(x)	x	x				
1337	Sanitary equipment				x				
134	Other internal space elements (infills)								
1341	Maintenance platforms and catwalks				x				
1342	Fireplaces and flues			x	x				As visible from the outside

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Appendix 1: Task allocation form for measurement and inventory modeling

Example of information content

Project information		**Target**	to be measured	
Date	dd.mm.yyyy	Crawl space	yes	x
Project:	Project title	Stories	4	x
Project Manager	Firstname Surname	Attic	yes	x

Modeling starting situation in stages		Level 1 - Spatial model	Level 2 - building element model	Level 3 - building element model				To be modeled x=yes (x)= defined on project basis
2 Service elements								Modeling service elements is only required in special cases
21 Plumbing elements								
Piping parts as space reservations				(x)				
Piping parts				(x)				
22 Air conditioning elements								
Ventilation parts as a space reservation				(x)				
Ventilation parts				(x)				
23 Electrical elements								
Lighting fixtures				(x)				
Conductor grooves				(x)				
25 Mechanical elements								
251 Transportation equipment								
2511 Elevators				x				Measurement of elevator shafts and modeling
2512 Conveyors				(x)				
252 Space-specific machines and devices								
2521 Kitchen equipment				(x)				
2522 Laundry machines				(x)				
2523 Civil defence shelter equipment				(x)				
2522 Laundry equipment				(x)				

BIM Specification

Visualization of the target	
Planning target	
Planning stage	
Date of Bim specification	
Date of change revision date	
Company	
BIM contact person	
Email address of the contact person	
Telephone number of the contact person	
Person responsible for the target	
Project manager of the target	
Software to be used	
Additional information, remarks etc.	

Description of measurement

	Method of measurement	
	Accuracy of measurement	
	Time of measurement	mm/dd/2012
	Deviations from measurement definitions	1. 2.
	Delivery method of measurement data	• •
	Additional remarks	

Description of modeling

	Measurement unit of the model	mm	
	Coordinate system	The inventory model is modeled into the project coordinate system. Description of the coordinate system.	
	Height system	The inventory model is at the actual elevation according to xx height system	
	Datum point	Description of datum point position	
	Transfer coordinates	Reference points for transformation of project coordinate system	
	Story height positions	1st floor 2nd floor	+ 10.00 +14.00
	Origin of source data	Description of origin of source data	
	Accuracy of the model	According to ”General information model requirements”, Section 2, Appendix 1.	
	Exceptions to the level of accuracy:	1. …	
	Naming principles of files		
	Naming principles of building elements		
	Used level system		
	Data content of the model	According to ”General BIMrequirements”, Section 2, Appendix 1.	
	Exceptions to modeling practice	1. …	
	Additional remarks		

Location:	
Time:	
Auditor:	
Target Model:	
Version:	
Date of Model Version:	

Checklist for Starting Situation BIM	Passed	Issues	Not Relevant	Comments
BIM Specification				
Models are in Agreed File Formats (IFC and other agreed files)				
Measurements are According to Measured Building				
Model is According to Measurment Documents (Random Test)				
Coordinate System is According to Agreement				
Agreed Layers has Been Used				
Model has Floors				
Building Elements and Spaces Belong to Correct Floor				
Agreed/Required Spaces and Building Elements are Modeled (Part 2, Appendix 1)				
Building Elements are Modeled Using Correct Tools				
Agreed Construction Types are Used				
Model Doesn't Have Extra Building Elements				
Model Doesn't Have Building Elements Inside Each Other or Duplicate Building Elements				
Model Doesn't Have Significant Intersections Between Building Elements				
Spaces, Walls and Columns Fill Gross Area				
Space Heights are According to Agreed Modeling Convention				
Spaces Aligned with Walls and Other Components				
Spaces Don't Intersect With Each Others				
Agreed Space Identifiers Have Been Used				

Signature: