# BIMplement

Towards a learning building sector by setting up a large-scale and flexible qualification methodology integrating technical, cross-craft and BIM related skills and competences.

*www.bimplement-project.eu*

| | |
|---|---|
| **Report:** | **BIMplement maturity scan – users guide** |
| Prepared by: | ASTUS |
| Date: | December 2020 |

***version table for deliverables***

| Version 1 | December 20, 2020 | First  draft |
|-----------|-------------------|--------------|
|           |                   |              |
|           |                   |              |

# Table of contents

# List of Illustrations

# 1. Executive summary

The maturity scan is one of the BIMplement results. It is a tool that has been developed and improved all along the BIMplement project. It gives a quick image of the level of skills of all stakeholders in the projects, in terms of BIM, but also of nZEB, airtightness and ventilation.

This document explains how to implement the tool, and give explanation on how to use it to design appropriate and adapted training course for each stakeholder on a project.

# 2. The maturity scan table

### 2.1. Objective of the "maturity scan" tool

The « maturity scan » is tool that has been created by the BIMplement partners in order to get a quick view (Illustration 1) of the level of skills of all stakeholders in the projects, in terms of BIM, but also of nZEB, airtightness and ventilation.

| DESIGN PHASE | | | | EXECUTION PHASE | | |
|---|---|---|---|---|---|---|
| **Client team** | | **BIM manager** | | supervision team OU TECHNICAL TEAMS Of building companies | | |
| **Project officer** | **building operator** | depends on Client's team | depends on Building company's team | **Structure** | **MEP** | **Other** |
| BIM_Skills_low_1 | BIM_Skills_low_1 | BIM_Skills_nothing_ | BIM_Skills_advanced_5 | BIM_Skills_advanced_ | M_Skills_advanced_ | IM_Skills_advanced_4 |
| BIM_Text_nothing_0 | BIM_Text_nothing_0 | BIM_Text_nothing_ | M_Text_advanced_4 | BIM_Text_advanced_ | BIM_Text_advanced | IM_Text_advanced_4 |
| 0,5 | | 2,5 | | 4,0 | | |
| nZEB_Skills_basic_2 | ZEB_Skills_medium_ | nZEB_Skills_mediun | nZEB_Skills_medium_3 | nZEB_Skills_low_1 | nZEB_Skills_low_1 | nZEB_Skills_low_1 |
| Ventilation_nothing_( | entilation_nothing_( | Ventilation_nothing | entilation_expert_5 | Ventilation_medium_ | Ventilation_advanc | Ventilation_medium_3 |
| Airtight_nothing_0 | Airtight_nothing_0 | Airtight_nothing_0 | Airtight_expert_5 | Airtight_advanced_4 | Airtight_expert_5 | Airtight_advanced_4 |
| 0,8 | | 2,7 | | 3,8 | | |
| | | | | | | |
| **Project manager** | | **Technical design office** | | **On-site workers – Site manager, site foremen** | | |
| **Architect** | **Structural** | **MEP** | **other** | **Building** | **MEP** | **Other** |
| BIM_Skills_expert_5 | BIM_Skills_advanc | BIM_Skills_advanced_ | BIM_Skills_expert_5 | BIM_Skills_medium_ | IM_Skills_medium_ | BIM_Skills_medium_3 |
| BIM_Text_advanced_4 | BIM_Text_advanced | BIM_Text_medium_3 | BIM_Text_advanced_4 | BIM_Text_medium_ | IM_Text_medium_ | BIM_Text_medium_3 |
| 4,5 | | 4,2 | | 3,0 | | |
| nZEB_Skills_expert_5 | nZEB_Skills_basic_ | nZEB_Skills_expert_5 | nZEB_Skills_medium_3 | nZEB_Skills_expert_ | nZEB_Skills_expert | nZEB_Skills_expert_5 |
| Ventilation_expert_5 | entilation_advanced | Ventilation_advanced | Ventilation_expert_5 | Ventilation_expert_ | Ventilation_expert | Ventilation_advanced_4 |
| Airtight_expert_5 | Airtight_advanced_ | Airtight_advanced_4 | Airtight_expert_5 | Airtight_expert_5 | Airtight_expert_5 | Airtight_advanced_4 |
| 5,0 | | 4,0 | | 4,8 | | |
| | | | | | | |
| | | | | **On-site workers – Operator** | | |
| | | | | **Building** | **MEP** | **Other** |
| | | | | BIM_Skills_basic_2 | BIM_Skills_basic_2 | BIM_Skills_basic_2 |
| | | | | BIM_Text_basic_2 | BIM_Text_low_1 | BIM_Text_low_1 |
| | | | | 1,7 | | |
| | | | | nZEB_Skills_advanced_ | EB_Skills_advanced | ZEB_Skills_advanced_4 |
| | | | | Ventilation_medium_ | entilation_medium_ | entilation_medium_3 |
| | | | | Airtight_medium_3 | Airtight_medium_3 | Airtight_medium_3 |
| | | | | 3,3 | | |

*Illustration 1: display of the "maturity scan" sysnthesis results*

It also give indication on the contents of BIM specification about the process that will should be implemented during the design and the implementation phases, depending on the level of BIM use expected for the project.

This tool will be used by the training centres and site trainers :
- to assess the initial level of skills of all stakeholders,
- to identify the group(s) of stakeholders that needs to be upskilled,
- and possibly, to display the final level of skills acquired by the training sessions.

### 2.2. Identified stakeholders

Because our focus was to develop BIM models and viewers tools use on construction sites, we introduced a list of stakeholders that incudes all building companies components.
- Client team
  - project officer
  - building operator (attached to the client or to the asset manager)
- BIM manager, who, depending on the phase (design or execution) may depend on
  - Client's team
  - Project manager's team
  - Building company's team
  - or there may have NO BIM Manager
- Project manager/architect
- Technical design office, that may depend on the project manager or on a general constructor
  - structural eng.
  - HVAC
  - other batches
- building companies : Construction management/design/supervision team
  - structural eng.
  - HVAC
  - other companies
- On-site workers – Site manager, site foremen
  - structural eng.
  - HVAC
  - other companies
- On-site workers – Operator
  - structural eng.
  - HVAC
  - other companies

Of course, depending on the project, not all stakeholders are always participating in a given project, and so, not all cases have to be filled in.

### 2.3. Definition of « level »

From our experience during the H2020 BIMplement project, we introduced 6 skills levels, ranging from no skills (Level 0) to expert (Level 5).

The aim of this tool is to identify, for each stakeholders, what is their initial level of skills, these being identified per level and per stakeholders. To that end, for each stakeholder and for each topic (BIM, nZEB, airtightness and ventilation), a set of 6 definitions of skills is proposed, ranging from 0 to 5. The trainer will specify which is the definition that fits best the stakeholder ; his choice will be done through an enquiry and/or a discussion with this stakeholder, or from his own feeling while analysing a project context.

**The definition of skills for each level have been made coherent between each stakeholders (cross-trade and cross-level) and takes into account the roles and responsibilities of each one.**

From our BIMplement experience, we defined "level 2" as being the minimum level of skill to obtain from all stakeholders (at least for all but operators) to be able to implement a basic but real cross-level and cross-trade BIM process.

Level 3 drives to a BIM process that really integrates all project partners.

In terms of BIM, the following table (Illustration 2) gives the definition of level 2 and 3 for all stakeholders :

| Stakeholders | BIM skills - Level 2 | BIM skills - Level 3 |
|---|---|---|
| **Client team** | in your specifications, you ask for a 3D or BIM model to be able to follow the evolution of the project from sketch to call for bid, but do not impose BIM data. | You understand the importance of BIM data related to the objects in the models. You have started to think about the choice of properties for the main objects, with the writing of simple BIM specification. |
| **BIM manager** | You can draft a simple BIM BEP. You know how to check the export/import of a BIM model to collaborate with several trade models (same software family and/or IFC) and check the consistency of the model. | You are able to manage the interoperability between the BIM process participants. You know how to use specialized software to search for conflicts between different business models |
| **Project manager** | You can export/import a 3D model to collaborate with several business models (same software family and/or IFC). | You create a BIM model that conforms to the data requested in the project owner's specifications. You can manage and use a collaborative platform. You can participate in the writing of a basic BEP for building companies within the framework of the call for bid, and help them collaborate in a BIM process, even if these companies do not need to design a BIM model and you will assume the execution plans of the BIM models. |
| **Technical design office** | You know how to create a 3D object model with your trade software, using models from project manager stakeholders. | You know how to design a BIM model that conforms to the data requested in the project owner's specifications. You can make changes to the BIM model |

| Stakeholders | BIM skills - Level 2 | BIM skills - Level 3 |
|---|---|---|
| | | execution file following companies feedback. |
| supervision team OU TECHNICAL TEAMS of building companies | You know how to use viewers to analyze the project manager's BIM models. You can propose a list of documents to be added to the model (by the project manager) | You are able to use a viewer and/or a collaborative platform to exchange on the project (BCF or eq. format) with the project manager. You know how to link technical documents on a BIM model for a better on site implementation. |
| On-site workers – Site manager, site foremen | You have an active practice of viewers or a collaborative platform, and know how to read and use documents linked to BIM model objects. | You are able to use viewers or a collaborative platform for collaboration via notes or BCF files. You are able to export BIM data for use in a spreadsheet application. |
| On-site workers – Operator | you are able to get a global understanding of a project, using viewers to visualize the existing models. | you are able to use digital tools to visualize a model organized by the company for the needs of the construction site |

*Illustration 2: BIM skills level 2 and 3*

In addition, the trainer can make an analysis of the BIM documents available on site : Client's BIM specification and project manager BEP. In the same way, it is possible to assess the quality of the project specifications and check if they are compatible with the skills of the corresponding stakeholders.

This analysis will give some tips to the trainers to propose some adaptations of the models, as well as indications for the contents and level of details of the BIM documents.

A similar decomposition of 6 levels is given for nEZB, airtightness and ventilation. However the level of details is a bit simpler. But for on-site workers airtightness skills, a more detailed definition of skills is given.

# 3. Users guide

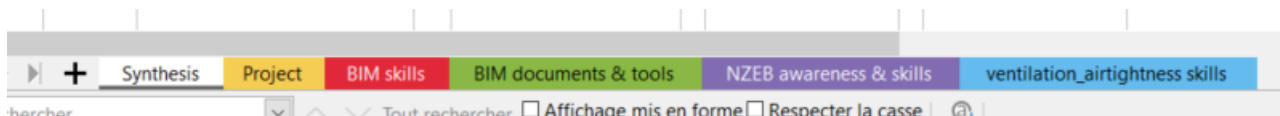The table contents 6 sheets (Illustration 3) :



*Illustration 3: 6 sheets in the table*

The sheets have been protected for an easier use, but no password has been included.

### 3.1. Synthesis sheet

The synthesis sheet displays the final skills analysis, from the data entered in the following sheets. This explains that the sheet is protected.

### 3.2. Project sheet

In the "project" sheet will be entered such data as "name, and place of project". These data will be automatically replicated on the other sheets.
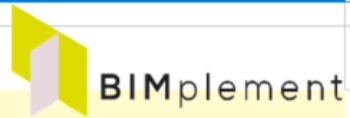


*Illustration 4: project presentation sheet*

In the top part of the sheet (Illustration 4), it is possible to enter data related to the project phase. In the yellow cases, data can be free texts. Oranges cases are linked to an answer list.

In the lower part of the sheets (Illustration 5), the trainer will find some questions he should answer in order to best analyse the project. Orange cases proposes clickable list of answers.

*Illustration 5: exemple of list of data associated to the "BIM models to be created" cell*

### 3.3. The three "skills" sheets

Three different sheets are related to BIM, airtightness and ventilation skills.

In the following illustration (Illustration 7), the trainer considered that the project officer, from the client's team, is able, in his specifications, to ask for a 3D or BIM model so to be able to follow the evolution of the project from 'the initial sketch' to the 'call for bid', but do not impose BIM data.

This skills definition correspond to level 2, for 'client's team'.

Using the arrow on the right of the cell, the trainer can select "level2" in the list of proposals. He will perform the same choice for each of the stakeholders, and for each of the 3 skills sheets.

The ventilation_airtightness skills (presents a detailed of skills only for airtightness skills of building companies.

The trainer will have to fill a double cell for each of the stakeholders (Illustration 6).



*Illustration 6: double cells for ventilation and airtightness skills*

**What is the real SKILL level of the stakeholders ?**

| name of project | ENTER NAME of Project | | |
|---|---|---|---|
| place : | xxx | | enter country |
| | | | cells to be filled up |

BIMplement

**BIM skills**

| | | | Client team | | |
|---|---|---|---|---|---|
| BIM_Skills_nothing_0 | process". | | | | |
| BIM_Skills_low_1 | You have been made aware of BIM (knowledge of future issues and uses). You are considering the possibility of implementing BIM in an experimental project. | | Project officer (service technique) | Building operator (chargé d'opération) | |
| BIM_Skills_basic_2 | in your specifications, you ask for a 3D or BIM model to be able to follow the evolution of the project from sketch to call for bid, but do not impose BIM data. | | | | |
| BIM_Skills_medium_3 | You understand the importance of BIM data related to the objects in the models. You have started to think about the choice of properties for the main objects, with the writing of simple BIM specification. | | BIM_Skills_advanced_4 | BIM_Skills | |
| BIM_Skills_advanced_4 | You have created your table of objects for the different phases (from sketch to as-built phase) that will be the complement to the BIM specification. You have asked for the integration of the companies in the BIM process, execution phase. | | | | |
| BIM_Skills_expert_5 | You are using an asset management software and request that the as-built BIM model be integrated into it. | | | | |

Dropdown list:
- BIM_Text_nothing_0
- BIM_Text_low_1
- BIM_Text_basic_2
- BIM_Text_medium_3
- BIM_Text_advanced_4
- BIM_Text_expert_5

| | | | BIM manager | design phase | execution phase | |
|---|---|---|---|---|---|---|
| BIM_Skills_nothing_0 | This project is your very first BIM project. | | dépends on : | Client's team | Building company's team | ← choose |
| BIM_Skills_low_1 | You have been trained in the BIM process and are competent in 3D design. You have no BIM experience in a position of responsibility | | | | | |
| BIM_Skills_basic_2 | You can draft a simple BIM BEP. You know how to check the export/import of a BIM model to collaborate with several trade models (same software family and/or IFC) and check the consistency of the model. | | | | | |
| BIM_Skills_medium_3 | You are able to manage the interoperability between the BIM process participants. You know how to use specialized software to search for conflicts between different business models | | | BIM_Skills_advanced_4 | BIM_Skills_advanced_5 | |
| BIM_Skills_advanced_4 | You know how to check the conformity of BIM models and their data with the requirements of the project owner's specifications. | | | | | |
| BIM_Skills_expert_5 | You already have several experiences in BIM project management. You are able to propose the implementation of a BIM methodology adapted to the context of the project and of the actors. | | | | | |

| | | | Project manager | |
|---|---|---|---|---|
| BIM_Skills_nothing_0 | You have no understanding of BIM issues and do not work with modeling software. | | | |
| BIM_Skills_low_1 | You can create a 3D object model with your software. | | Architect | |
| | You can export/import a 3D model to collaborate with several | | | |

*Illustration 7: identification of "level 2" BIM skill for the project officer, from the detailed list of skills*

### 3.4. The BIM documents and tools sheet

This sheets includes a detailed presentation of what kind of BIM process description should be included in either the client's BIM specification or the project manager BEP, according to the level of skills of the project stakeholders.

In other words, to implement a BIM process on a project, both stakeholders BIM skills and BIM documents should be coherent and correspond to the sale level.

The following illustration (Illustration 8) shows the type of BIM specification a client may impose to a project manager. This means that the project manager should have the level of skills that corresponds to the level of quality requested by the client.

| | | |
|---|---|---|
| BIM_Text_nothing_ 0 | the client's specifications only require the design of 2D plans | |
| BIM_Text_low_ 1 | the client's BIM specifications only require the design of a 3D architectural model; But some building companies can propose a 3D-trade or BIM model | **Project manager** |
| BIM_Text_basic_ 2 | the client's BIM specifications - request to export 3D model(s) in ifc format for collaboration, and export of 2D plan - require the filling of properties with a table of basic BIM objects | Architect |
| BIM_Text_medium_ 3 | the project owner's BIM specification - requests the export of 3D models in the ifc format, used for exporting 2D drawings, or for BIM-trade models - requires the filling of properties according to a basic table of BIM objects the project manager implements a BIM process described in a basic BIM BEP | BIM_Text_basic_ 2 |
| BIM_Text_advanced_ 4 | Owner's BIM specification - specifies the batches that must have a BIM model - requests export of 3D models in ifc format used for exporting 2D drawings or for commercial BIM models - requires filling in properties with a basic BIM object table The project manager - implements a BIM process described in a specific BIM BEP, including a specific BIM object table - works closely with a BIM manager to check for conflicts | |
| BIM_Text_expert_ 5 | The client's BIM specifications contain specific requirements - for the construction phase (BIM object data, BIM processes, collaboration, quality control, commissioning, etc.). - and for the digital as-built model: BIM object tables, attached documents, … ) | |

*Illustration 8: different possible levels for client's BIM specification*

# COLOFON
BIMplement