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.

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Report:	**D4.2 - Training content and list of tools for BIMplement coach**
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1. BIMplement Reminders

1.1 GA reference

This deliverable “D4.2 : Training content and list of tools for BIMplement coach” is related to Task 4.4 “Training the BIMplement coaches and providing them with tools”.

The goal is that the BIMplement coaches will receive the appropriate training and tools. In this deliverable, training content and list of tools for the BIMplement coach is provided. The BIMplement coaches will organize the local campaigns, provided with this "know-how" and based on their experiences with awareness campaigns.

1.2 The BIMplement coaches

1.2.1. Reminder of BIMplement coaches functions

The “BIMplement coach” will be in charge of implementing the BIMplement project in its territory by mobilizing stakeholders, finding and documenting potential field labs and experimental sites, and by coordinating the implementation of the project in its territory. In addition to the awareness campaigns, their role will be to coordinate the BIMplement implementation, including the on-site training, and ensure the collaboration between the client, the project manager, the selected building companies and the trainers.

The “BIMplement coaches” will receive an appropriate training (by ASTUS) and tools in order to be able to fulfill the following main tasks:

- Organize awareness campaigns in their local pilot territories, in order to raise awareness of local contractors on one hand, and SME’s and craftsmen on the other hand. Theme: The BIM process and the obligations and opportunities in relation with nZEB buildings,
- Contribute to the identification of potential ‘pilot field labs’ and ‘experimental sites’ (a list of criteria of the selected territories have been provided by AVE),
- Contribute to the identification of potential local “BIM workplace trainers”; for example, from local training providers or internal training academies of involved contractors,
- Coordinate the BIMplement project in their territories, and the training final assessment. Internal monitoring of the training courses for BIMplement coaches and BIM workplace trainers will be done by using questionnaires to assess the quality and usefulness of the training courses.

In France, in addition to BIM aspects, the BIMplement coaches will be provided with basic building knowledge, basic environmental requirement understanding and basic understanding of the BIM process.

1.2.2. the specific needs of BIMplement coaches within the EU project

Within the BIMplement project, BIM coaches have different skills and initial knowledge depending on the partner countries. This distinction is important, and explains the constitution of the tool-box.

The tools here presented have been designed for the French BIMplement coaches, and illustrate best the needs to answer the awareness campaign objectives.

1.2.2.1) French BIM coaches

In France, the BIMplement Coaches depend on the regional “Maison de l’Emploi” (Employment Houses) who have a specific knowledge of the training capacities of their territories, as well as of the building sector.

However, the French BIMplement coaches :

- are not a construction technician, but have basic building knowledge
- have limited knowledge in terms of BIM

1.2.2.2) The other partner countries BIMplement coaches

In Spain, Netherlands, Poland and Lithuania, the BIMplement coaches are, in the same time, BIMplement partners :

- most of them already have basic (and more) building knowledge and skills,
- most of them are already related to the training sector
- most of them have already a theoretical knowledge of BIM

1.3 Implementation of awareness campaigns

The awareness campaigns, to be implemented by the BIMplement coaches, have three objectives :

- Develop awareness of all the building value chain stakeholders (public and private clients and contractors, architects, building companies, facility managers, etc.) on BIM added values, place it within the EU objectives to develop nZEB buildings, and specify that a focus will be given on air-tightness and ventilation
- Present the BIMplement project
- Identify potential « pilot field labs » and « experimental sites »

1.3.1. Target groups for the awareness campaign

The awareness campaigns have three main target groups:

- local public and private contractors
- project developers, including social housing
- architects
- construction companies and their subcontractors

For these target groups, the objective is to:

- raise their awareness about (a) the necessity to include in their call for tenders the requirements and the costs for quality, and (b) the BIM process as a tool to achieve this requirements
- identify potential workplaces to test the BIMplement process (pilot field labs and experimental sites)
- have them help and accompany building and installation companies, with a special attention to craftsmen and SME's, to convince them to build up their skills in terms of BIM.

1.3.2. Organization of awareness campaigns

There are two ways for BIMplement coaches to organize theses awareness campaigns :

- organize a meeting for all stakeholders in one time
- meet each stakeholders separately.

The tools will be adapted to each situation.

2. BIMplement coach training sessions realized during the BIMplement project

During BIMplement project, BIMplement coach training sessions have been organized. At the end of the BIMplement coach training, the BIMplement coaches are able to fulfill their main tasks. They should be able to convince the different stakeholders to participate in the BIMplement project and so, increase their global skills and knowledge within the framework of a real construction.

2.1 Training for the French BIMplement coaches

Two training sessions have been organized for the 10 French BIMplement coaches:

- October 11, 2018 in Lyon
- March 13, 2018 in Paris.

A third session will be organized on October 11, 2018, in Dijon.

2.1.1. Initial skills of the French BIM coaches

The training sessions for the French BIM coaches has been focused on “what is a BIM process ?”.

Because some participants already had awareness sessions on airtightness, nZEB construction, or renewable energies, the objective has been to make the link between the BIM process and these different ways of improving the building quality adapted to these 3 subjects.

Some participants had also already received information about BIM. In fact, in France, there has been a heavy communication program about the interest of BIM :

- national program (PTNB http://www.batiment-numerique.fr)
- specific documents for each building stakeholders
- conferences
- information meetings
- papers in technical journals
- videos and books about BIM

2.1.2. First training session – Lyon, October 11, 2017

2.1.2.1) Objectives of the first training session

The first BIM coach training session aimed at 5 objectives :

- global understanding of the BIM process (culture sharing)
- BIM process contribution to the different stakeholders
- use of freeware viewers to show/demonstrate how to use 3D BIM models
  Point 3 is very important. For many years, the building sector stakeholders encounter great difficulties in understanding and make coherent the total set of a building 2D-plans. To answer this issue, 3D-model appears definitely to be efficient. However, this solution is brand new in the building sector. That is why, for several years, ASTUS expert has developed a training method based on the use of viewers to introduce people to BIM.
- the possibilities of on-site BIM use with tablets
  This point appears essential to allows BIM introduction directly on the work site, which is, at the present time quite unusual in France.
- be able to answers the common and basic questions about BIM with adapted arguments

2.1.2.2) Content of the first training session, Lyon, France

The detailed program of this first training session is given in annex [i] “BIMplement- Programme de formation BIM Coach_20171011”.

The training support in given in annex [ii] “D1 ASTUS-2.Training for the BIM Coach in LYON”

Title	UNDERSTAND THE BIM PROCESS & TO BE IN CAPACITY TO CONVINCE THE BUILDING SECTOR STAKEHOLDERS
Objectives	-Understand the BIM stakes, and the whole BIM process -Be able to explain to all stakeholders their interest in participating in a BIM process -Design a set of arguments to convince a client to implement BIM in his project
Training program	-Understand an overall BIM process -Manipulate digital models and their data, and be able to make a simple use of a viewer and show the interest of working with a 3Dmodel -Design a strategy for a BIM sales talks

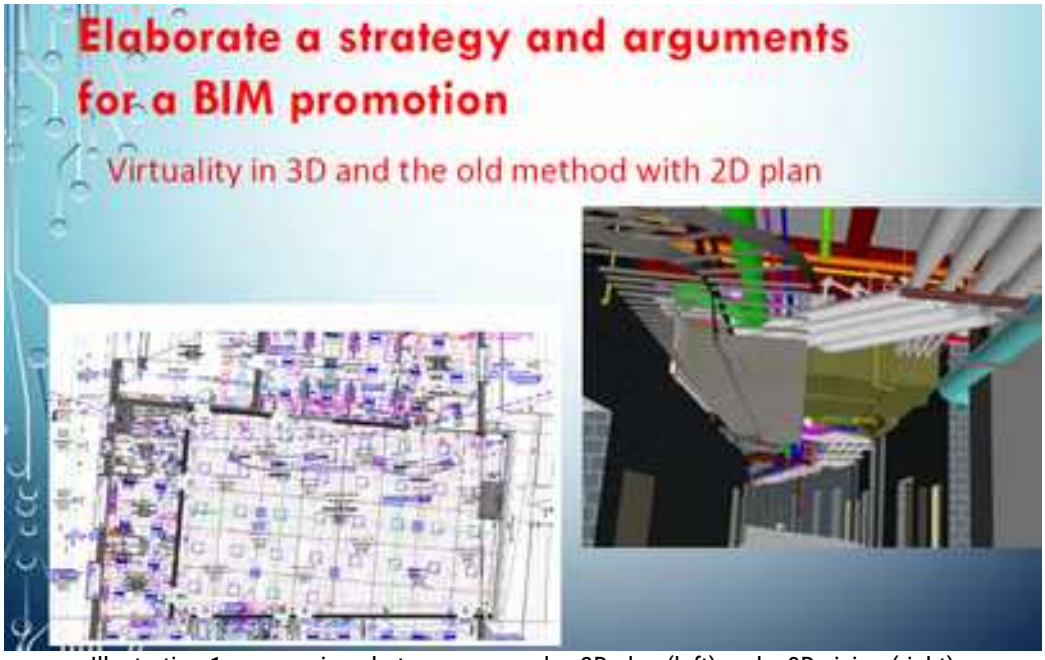

Illustration 1 : comparison between a complex 2D plan (left) and a 3D-vision (right)

2.1.3. Second training session, Paris, France, March 13. 2018

2.1.3.1) Objectives of the second training session

The second training session for BIMplement coaches aims at explaining their role within the pilot and experimental BIMplement projects.

2.1.3.2) Content of the second training session

The detailed program of this second training session is given in annex [iii] "BIMplement- Programme de formation BIM Coach - 13 03 2018".

The training support is given in annex [iv] "D3 Intervention paris 13032018"

State of advancement of each project	• Each BIMplement coaches presents a state of progress of his projects in his territory
Awareness campaigns	• Objectives and roles of the BIMplement coaches • The present available tools (slide presentation, freeware viewers, records ...) • Reporting on : meeting with clients, information meeting about BIM and BIMplement
Pilot and experimental projects	• Presentation of the first two pilot projects (Dijon, Voreppe) see annex [v] "D2 Project pilot in Dijon" • project of agreement between the BIMplement coach, the client and possible other participants • what are the criteria to choose experimental projects
On-site training	• Targets • contents • organization
The BIMplement trainers	• What skills for the trainers • the selection procedure

2.1.3.3) Choice of the pilot and experimental projects

One of the important subject in this session is "how to choose pilot and experimental projects to implement BIMplement training". The following criteria are usable in any contexts, and are simple and low challenging :

- the client is involved in the BIMplement project, and ready to sign an agreement that will specify why and how the BIMplement training sessions will be implemented in his construction project. It will, for instance:
  1) present the partners of the project : the client, the BIM coach, the BIM trainer
  2) specify that the client
     - wishes to enhance BIM use on his project, and legitimate the involvement of the BIM coach and trainers in his project, and so to the project manager and to the building companies
     - agrees for his project to be the support of on-site training
     - give access to the actual BIM model(s) that will be used on site, and for the training courses, as well as to the BIM platform
     - give the BIM coach and trainers access to the building site, and to a place where the training will be implemented and the BIM model will be accessible to the site workers
     - allow the BIMplement partners to participate in the work-site meetings
  3) specifies the roles of the BIMplement coaches and trainers, namely in terms of responsibilities, time, number and duration of training, BIMplement project management on site … and the realization of an assessment of the training sessions

  → Such an agreement will be adapted both to each project and to each country.
- the project manager has done a BIM model and agrees to improve/optimize his participation in a BIM process.
  As a minimum, an architecture BIM model is required. An architecture BIM model is compulsory for the building project to be accepted as a pilot or experimental project. The BIMplement trainer will have a full access to it; however, the client may limit its use
  An additional MEP model is strongly recommended for a better implementation of the BIM process, and for its use to improve ventilation.
  A structural model, linked to joinery, will be the base for the implementation of a better building airtightness.
- A set of building companies eager to build up its employees skills, and most of all, those who work on the building site.
- The project should be
  - representative of the type of buildings realized on his territory (new construction and renovation)
  - relevant in terms of either ventilation or airtightness or both.

A second important point is the on-site training program.
During this training session, the first version of the future BIMplement training pack has been presented (included in annex iv). An extensive explanation of the steps and the contents of the "BIMplement training pack" (see annex [vi]) is presented to the BIMplement coaches. Ever since, this document has been enriched and is now completed under annex vi. It has been explained to the BIMplement why and how this on-site training pack will be adapted to each project.

2.2 Tools for the French BIMplement coaches

2.2.1. Tools already available

Since the beginning of the project, some tools have been created or collected in order to use them during the awareness campaigns:

BIMplement presentation	• PowerPoint "presentation of BIM and BIMplement" (to be adapted to the national data) [vii] • BIMplement Brochure [viii] • presentation of the "BIMplement training pack"
BIMplement methodology	• Methodology guide and tools for awareness campaign [ix] [x] • Example of message for the local public contractors[xi]

	• tools for reporting [xii] [xiii]
BIMplement technical tools	• BIM models to be used/presented with freeware viewer, pedagogical tools for BIM coaches [xiv] [xv] • Videos [xvi] [xvii] • Witnesses videos (http://www.astus-construction.fr/9965-centre-de-ressources.htm)

BIMplement coaches can find these tools in the BIMplement Dropbox (and in a specific Dropbox for the French BIMplement coaches).

In addition, new tools will be created, with different messages adapted to the target groups (local public contractors, craftsmen and SME's, etc.)

2.2.2. New tool in progress

At the present time, a new slide show has been designed and presented in Istres, France, by ASTUS' BIM expert. This presentation is intended for clients and project managers. It has been tested during an awareness meeting, similar to those that will be organized by BIMplement coaches.

2.2.2.1) Objectives of the presentation

This presentation aims at explaining the stakes in respect to using BIM in their professional practices.

- Understand what mean a "coherent BIM process"
- managerial, technical and economical stakes of BIM use within building project
- the economist position, consider his requirements/demands in the process
- master the main BIM ways and means
- launching of a first BIM processed project

2.2.2.2) detail of the presentation : 12 steps [xviii]

The presentation explains the content of the following 12 steps :

Illustration 2: the 12 steps for BIM implementation

step 1 : property management audit

step 2 : internal BIM skills

step 3 : BIM technical specifications

step 4 : present real estate survey and plans

step 5 : launching of a first BIM project

step 6 : contract with the project manager : agreement/protocol

step 7 : project design follow_up

step 8 : how to choose the building companies

step 9 : launching of site work preparation

step 10 : site work monitoring

step 11 : realization of the as-built BIM model, by the end of the project

step 12 : updating the as-built model and its data

This new slide show has been tested in Istres, France. It achieved great success with the audience composed of public authorities.

Illustration 3: test of the new tool in ISTRES, France

2.2.3. BIMplement coaches library

A whole set of documents (including those given in the annexes of this report) are uploaded on the French BIMplement Drop box “BIMplement-Expérimentation_MDE”.

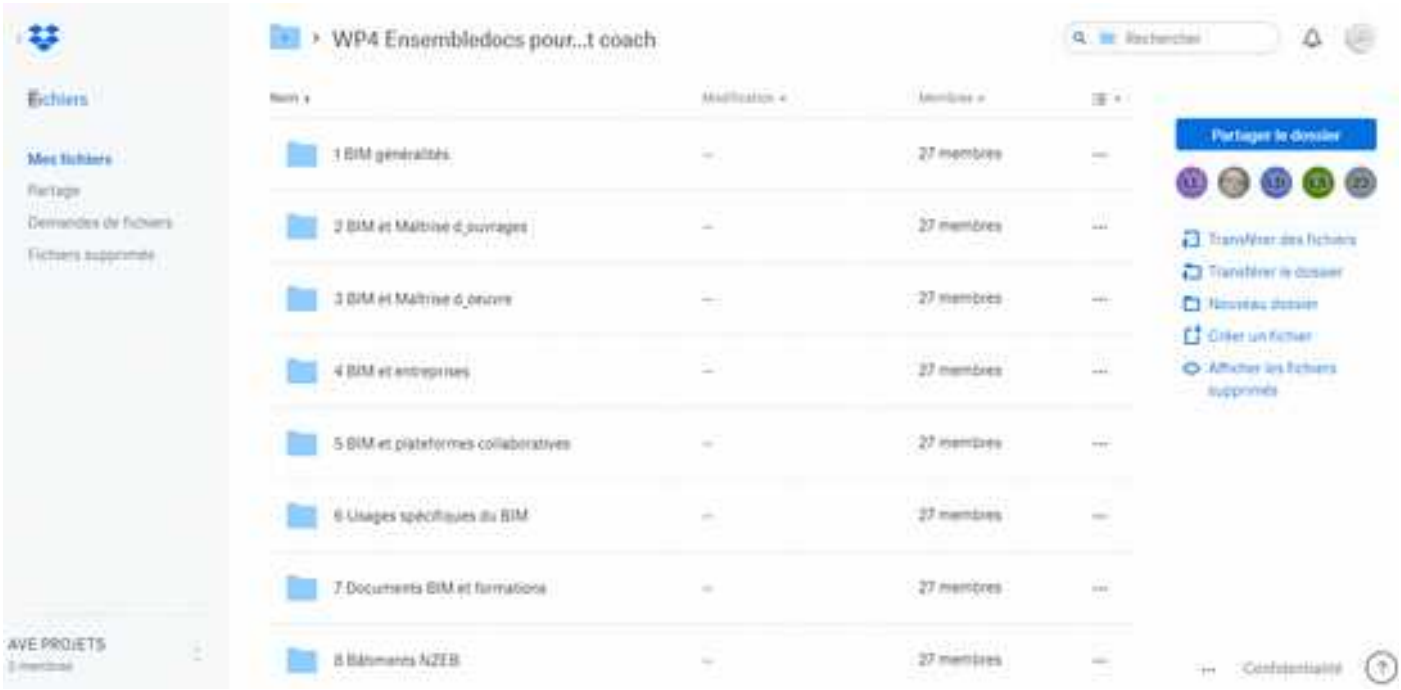

Illustration 4: nZEB & BIM technical documents for French BIMplement coaches

These documents are classified per subject. They consist in a technical monitoring on the BIM process and nZEB building evolution. Each document will have its own abstract for a better understanding and to ease the necessary up-skilling of the BIMplement coaches.

A special file contents different BIM models that can be used to realize demonstrations with the help of viewers.

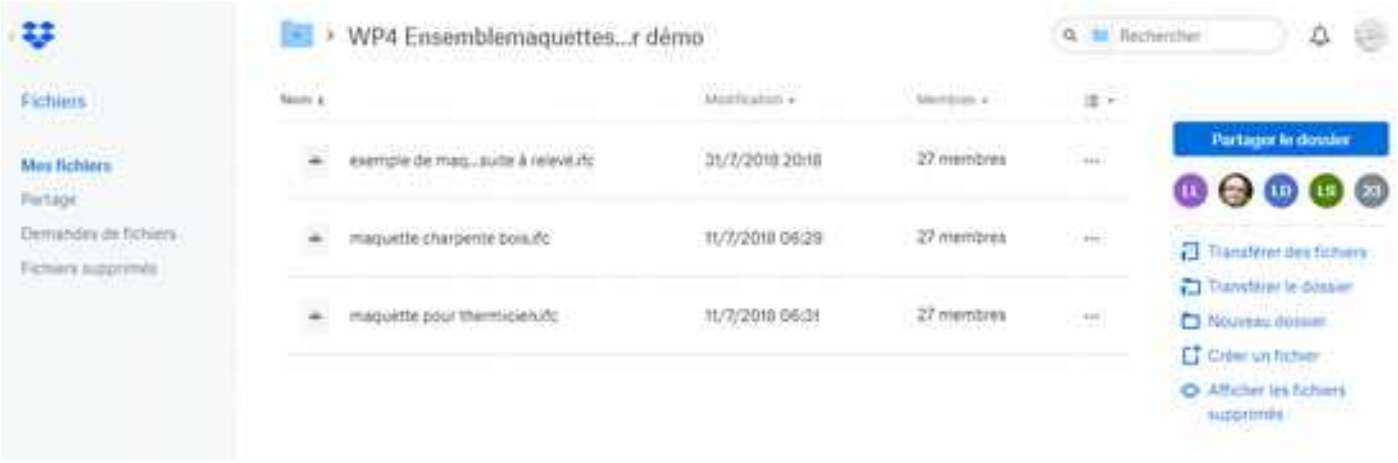

Illustration 5: BIM example models for BIMplement coaches

Finally, a specific folder will be created and filled up for each pilot and experimental site, in the ASTUS google drive. All documents related to these project will so, be accessible for the BIMplement coaches.

2.3 Training for the other partner countries BIMplement coaches

A special training session has been organized in Paris, on January 10 & 11, 2018, for the BIMplement coaches of Spain, Netherlands, Lithuania and Poland.

2.3.1. Preparation of the training session

In order to best design the training content, it was necessary to get information on their level of knowledge. So, before the beginning of the training session, participants received a questionnaire [xix] to specify :

- their BIM skill level
- their real practice in terms of BIM process
- their knowledge in respect to their own country BIM context
- their skills and knowledge in terms of nZEB

2.3.2. training session program

2.3.2.1) BIM training

The BIM subjects have been presented along with the same documents as for the French BIMplement coaches (English version).

In addition, the Orientation & Guidelines document « Handbook for the introduction of building information modeling by the European public sector » [xx] has been presented and analyzed so to understand the strategy developed in Europe for BIM implementation.

2.3.2.2) NZEB training

A technical presentation has been given on nZEB, ventilation and building airtightness [xxi]. The objective was to share and exchange between partners our feelings about these central subjects for BIMplement.

A similar course will be proposed to the French BIMplement coaches during their next training session, in October 2018.

2.3.2.3) Additional specific bibliography

There exist on the international level a certain amount of reference documents, written in English, on which all partners agrees as for the content.

Five of them may be considered as a basis for BIM implementation and development and constitute a common basis (in respect to language and BIM approach) among the BIMplement partners. There are listed in annexes [xxii] [xxiii] [xxiv] [xxv] [xxvi].

However, being written in "technical English, their understanding and use is not that easy for future BIMplement coaches who will not have a strong BIM culture.

This is why, in France, French written documents similar to these 5 English written reference documents have been found by ASTUS and uploaded on the ASTUS google drive (annex xv) to the attention of the French BIMplement coaches.

The same kind of approach could be useful in the other partners countries for whom English is not the native language. For the BIMplement coaches, it will be in fact much more comfortable to read these technical BIM bibliography in their own native language.

2.4 Post training assessment

At the end of the training session, a second questionnaire [xxvii] was sent to check if each partner did have the same understanding of the BIMplement coaches roles :

- Questions about the main tasks of the "BIMplement coaches
- Raise awareness of local contractors on one hand, and SME's and craftsmen on the other hand
- Contribute to the identification of potential "field labs" and "experimental sites"
- Contribute to the identification of potential local "BIM workplace trainers"

Following this phase, each partner counties (Netherlands, Poland, Spain, Lituania) had to adapt the process tested and implemented in France to their own technical and cultural conditions (See ANNEX 0).

3. Diagnosis of site projects to be realized by the UE BIMplement coaches/trainers (beside France) during the BIMplement project

3.1 Context

This chapter is drafted especially for BIMplement coaches from Netherlands, Spain, Lithuania and Poland. However, part of this chapter presentation may also be useful for french BIMplement coaches.

- Contrarily to French BIMplement coaches, the other BIMplement partners are in the same time Partners in the project and BIMplement coaches.
- As for the French BIMplement coaches, they are in charge of finding the pilot and experimental projects.
- They also will have to perform a real follow-up of the project, which means that they need to have some basic technical knowledge in order to be able to check that the objectives in terms of nZEB, airtightness and ventilation quality requirement will possibly be obtained.
- And some of the BIMplement coaches may also be trainers.

It will state the different questions the EU project BIMplement coaches and trainers will have to ask along the project steps. The aim of this chapter is to establish a check-list of the knowledge to acquire, the documents to read and understand, and the activities to be performed by the BIMplement partners in order to implement the BIMplement project in the best conditions.

If such a document appears useful and complementary to those realized for future BIMplement coach tools, this part will be re-written by the end of the project in order to adapt it to the future need of the BIMplement coaches , based on the assessment of the project itself.

3.2 General national requirement

One of the results of the WP3 is to collect general (overall) information on national situations in the partner countries, in particular in terms of nZEB, airtightness and ventilation requirements.

In each country, the BIMplement coach will have to understand the national requirement that have been developed in his country, in order to answer to the EU 2010 nZEB directives.

Depending on the countries, the requirements may take different forms. An explanation has been presented during the BIMplement coach training, Paris, January 11th. 2018 → see presentation on the dropbox : https://www.dropbox.com/s/2zkqi8s1ko1ha1f/ASTUS_BIMcoaches_NZEB_presentation_10jan2018.pdf?dl=0

3.2.1. energy requirement for the building

Each BIMplement coach has to know what are the energy requirements for a building so to answer the nZEB objectives ?

- May depend on the type of building (dwelling, office, public building …)
- may be a quantity : energy consumed by the building
  - in kWh/m²/an (or other unit and criterion) ?
  - is it expressed in primary energy or final energy ?
- What is the origin of energy consumption that is taken into account in the national regulation ?
  - Heating
  - cooling and air conditioning
  - lighting
  - ventilation
  - other systems (pumps, networks …)
- does the nZEB regulation impose some level of consumption for housing/office consumption ?
  - Electricity for cooking, washing, fridge, …
  - electricity for electric devices such as TV, computers, …
  - gaz for cooking …
- See example for France in this document : https://www.dropbox.com/s/2zkqi8s1ko1ha1f/ASTUS_BIMcoaches_NZEB_presentation_10jan2018.pdf?dl=0

These questions have been asked in the inquiry sent after the January. training .

For each pilot- or experimental building, the BIMplement coach has to check that these national requirements are well known by the design office, and will be implemented.

3.2.2. Airtightness

Most of the European countries adopted a specific regulation on airtightness. It appeared along studies realized since 2000 that, because building insulation has been greatly improved, airtightness becomes a most important issue.

Some questions to check :

- In your country, is there a specific regulation about building airtightness ?
- What buildings are concerned with this regulation ?
- What is the required level of airtightness ? Specify the unit : it may be
  1) n50 (no unit)
  2) air renewal volume per m²/hour …
- are there specific documents edited in your country to help design office and companies realize a high quality building airtightness ?

  (see for instance the documents realized in France : Dropbox\BIMplement_745510\WP 3\T3.2\National knowledge sources (learning material, guidelines, inspection procedures, checklists)\France - ASTUS, AVE\Air-tightness

- Is a control of the building airtightness performance required at the end of the construction ? Who does it ? What is the procedure ?

BIMplement coaches may enter in contact with EU program AIVC and/or Tightvent correspondent to obtain this information. Here are names and address for :

- Poland
  - Andrzej Gorka,
  - Poznan University of Technology, Andrzej.Gorka@put.poznan.pl
- Lithuania
  - Valdemaras Geležiūnas,
  - Kauno Technologijos Universitetas, valdemaras.geleziunas@ktu.lt

3.2.3. Ventilation

Usually, ventilation is related to indoor air quality and health. Minimum air renewal maybe imposed by a national regulation.

Questions to check :

- In your country, is there a specific regulation about building ventilation ?
- What buildings are concerned with this regulation ?
- What is the required level of air renewal ? and/or air pressure in ducts ?
- are there specific documents edited in your country to help design office and companies realize a high quality building airtightness ?

  (see for instance the documents realized in France : Dropbox\BIMplement_745510\WP 3\T3.2\National knowledge sources (learning material, guidelines, inspection procedures, checklists)\France - ASTUS, AVE\ventilation
- Is a control of the building ventilation performance required at the end of the construction ? Who does it ? What is the procedure ?

In addition, some countries are implementing a new regulation to improve the ventilation system and duct airtightness.

- Is there such a regulation in your country ?
- If yes, what duct airtightness level is required for nZEB buildings ?
- Is a control of the ventilation system airtightness required at the end of the construction ? Who does it ? What is the control procedure ?

3.3 Criteria for the choice of pilot and experimental sites

One important point in the BIMplement project is “how to choose pilot and experimental projects to implement BIMplement training”. The following criteria are usable in any contexts, and are simple and low challenging :

1) the client is involved in the BIMplement project, and ready to sign an agreement that will specify his role and the roles of the BIMplement coaches and trainers

2) the project manager has realized a BIM model and agrees to improve/optimize his participation in a BIM process.
As a minimum, an architecture BIM model is required.
A MEP model is strongly recommended for a better implementation of the BIM process, and for application to ventilation improvement.

A structural model, linked to/including joinery, will be the base for the implementation of a better building airtightness.

3) A set of building companies eager to build up its employees skills, and most of all, those who work on the building site.

4) The project should be

- representative of the type of buildings realized on his territory (new construction and renovation)
- relevant in terms of either ventilation or airtightness or both.

3.4 Audit of the pilot and experimental projects

Each BIMplement trainer will have to analyze each pilot and experimental project in order to check/confirm the compulsory levels imposed by the client / or the national requirements for the building in terms of

- energy consumption (nZEB requirements may be different from one country to another)
- ventilation quality (all countries do not always have requirements on ventilation)
- airtightness (airtightness requirements may be different from one country to another)

The BIMplement trainer will analyze the project to check, with the help of the project manager team, that these points have been taken in consideration, specify the technical requirements, and propose which subject (ventilation or airtightness, or both) will be accompanied during the BIMplement pilot or experimental project.

This audit applies also to the project BIM model(s), on one hand, to verify its quality and content, and its compatibility with the BIMplement project, and on the other hand to implement the training session (see the document “BIMplement training pack”). The BIMplement trainer, who will audit the projects, will also :

- check with the project manager and design office(s) that the previous requests have been taken into account
- check the BIM model(s) quality (with the possible help of ASTUS)
- decide what criteria will be especially worked out on behalf of BIMplement
- prepare the training sessions (see the document on “BIMplement training pack” : Dropbox\BIMplement_745510\WP 4\BIMplement Training Pack)
- check with the building companies involved with BIMplement if they already use any type of BIM software on site, as well as BIM tools (access to the BIM model(s) with on-site computers or tablets).

Quality of the BIM model can be assessed on 2 levels:

- level 1 – basic: the BIM model must be coherent and all objects have to be correctly identified. A minima, the following questions have to be answered:
  - the different floors are well represented and possibly dissociate
  - the objects names correspond to the IFC specifications
  - “space” objects exist and indicate the correspondence with the project rooms
  - IFC export from the native file keeps up the objects properties
- level 2 – BIMplement compatible: the BIM model should include information that will allow a better implementation of ventilation and airtightness:
  - technical documents attached/linked to the model for implementation and maintenance
  - sketches or references to a set of technical drawings
  - information about the level/type of skills needed to implement the products

3.5 Application of national regulations to the pilot and experimental sites

3.5.1. Energy targets

Because H2020 (and BIMplement) aims at improving energy consumption in buildings, it is necessary for a real effort to be done on this criteria.

3.5.1.1) Design level

In France where there will be many pilot and experimental projects, and maybe also in some of the partner countries, there might be a need for "Master BIMplement trainer" who will have to train and supervise the local BIMplement trainers involved in local projects. In order to adapt the on-site training session to each project, the Master BIMplement trainer, or else, all BIMplement trainers (who might also be BIMplement coaches), will have to :

- check that a thermal calculation has been realized by the design office that drives the project to the requested (regulatory nZEB) level of energy consumption,
- read and analyze any technical notes that explains the hypothesis taken in the calculation and verify that technical solutions have been implemented by the design office in order to answer the weak points ; in particular, those related to airtightness and ventilation,
- check the clarity of the BIM model(s) to translate these objectives,
- check the availability of all documents that will be necessary on site to fulfill the objectives in terms of energy consumption.
- understand the presentation of the skills required for the implementation of the weak points.

3.5.1.2) Construction site level

In addition to the elements given in "BIMplement training pack", the BIMplement trainer has to check :

- the skill level of on-site stakeholders in terms of energetic behavior of a building
- the means the foreman will implement to obtain the required level
- the means the client/project manager/… will implement to control the required level (if any)

Depending on each site and project, it is possible that BIMplement will focus either on airtightness OR on ventilation. In some cases, the focus will be given both on airtightness AND on ventilation. This choice relies on the BIMplement coach. (see § 3.2 & 3.3)

3.5.2. Airtightness

3.5.2.1) Context

- Technical & BIMplement issues

The quality level of airtightness will have many impact on the building quality, and not only on energy consumption. See the presentation given on January 10. 2018 : https://www.dropbox.com/s/2zkqi8s1ko1ha1f/ASTUS_BIMcoaches_NZEB_presentation_10jan2018.pdf?dl=0

The airtightness issue concerns the building as a whole, and more precisely, all interfaces between product or material. Weak points have been identified, and all of them should be addressed in each project, both as an objective within the project specification, and during the design phase. This means that ALL WEAK POINTS have to be examined and documented, and that solutions/technical answers have to be prepared in advance by the design office for later implementation on site.

However, we have to consider that there are different objectives in terms of airtightness between the client's design office and building companies, and the BIMplement project :

- at the end of the construction project, the client's design office and the building companies have to reach the national requirements. This means that, during project design and project realization, all weak points will have to be identified and treated.
- the BIMplement WP4 aims at helping them to improve the on-site implementation thanks to a better design and use of a BIM model, in which technical documents will be attached and easy to find and

open. WP4 aim is to develop BIM use to improve the whole value chain, from the client to the maintenance, including design and realization phases.

- the BIMplement WP2 and WP3 aim at setting, and then experimenting a new methodology to address weak points in a proper way (see WP2, WP3). Based on BIMplement results, then the companies can use BIMplement to address other weak t to address other weak points/fields. These experiments will be done on the pilot and experimental project, usually on one weak point.

In the end, the airtightness quality control will be controlled with the building airtightness test. During this test, it will be possible to control and assess both the global improvement of airtightness level, and the quality difference between weak points realized with the BIMplement methodology and without.

- BIM issues

The main problem in terms of airtightness BIM issues is that there is almost NO existing BIM objects for products used in airtightness. These product are presented in the MindMap Dropbox\BIMplement_745510\WP 3\ASTUS_airtightness-product_v1

As a consequence, there will be no BIM design that will include these products. In order to describe airtightness solution, only linked documents and explanation can be used. The BIMplement methodology should specify the type of document to be proposed and where they should be placed in the BIM model.

3.5.2.2) Analysis of the project design

In order to be able to decide whether this subject will be accompanied by the BIMplement project, the master BIMplement trainer (Or ASTUS for the pilot project) will have to check if it is a real issue :

- are there a lot of weak points (see Dropbox\BIMplement_745510\WP 3\Examples of Weak Points)?
- what is the type of the load bearing structure ? Concrete with inner insulation ? Or outer insulation ? Wood or metal structure ? Other ?
- is there a BIM model for structure and joinery ?
- what is the outside wall filling made of ? Bricks or blocs ? Insulation panel … ?
- are these weak points WELL documented in the model (sketches, documents, technical details …)?
- what is the level of knowledge on airtightness of the construction companies foreman & blue-collars ?
- what are the skills to implement airtight envelop of the construction companies foreman & blue-collars ?
- …

3.5.2.3) On the construction site

With all these previous data, it will be possible to decide if airtightness can be a goal that will be achieved in a much better way with the help of BIMplement.

To accompany the site work on airtightness, BIMplement trainers will check :

- the list of the available technical documents
  1) technical drawings and sketches
  2) technical documents for the implementation of airtightness products
  3) possible samples of these products...
- the effective link of these documents with the BIM model
- the possible participation of industrial producers, and presentation of products and of their implementation,
- the list of the companies foremen and blue collars who will have to implement these solutions and products

- are the present skills, and up-skilling process sufficient to reach the airtightness level requested by the client/the national regulations ?

The BIM training itself is described in the “BIMplement training pack”.

3.5.2.4) Airtightness quality control

A special attention will be given to the way the building airtightness will be controlled at the end of construction work. The following points have to be checked :

- When will the test be performed ? As a minimum, it must be performed at the very end of the construction work, during commissioning. But, it appears to be quite interesting to realize and intermediate test, when the building is wind-and-water tight and locked. In these conditions, finishing are not done yet, and it is much easier to remedy the problems.
- Who performs the test ? And who will pay for it , namely if an intermediate test is proposed ?

3.5.2.5) Maintenance and building transformation

The as-built BIM model, required by the client, managed by the project manager and realized by – or in relation with – building companies, will specify the way airtightness has been actually realized (which may be different than designed).

The facility manager will be explained the airtightness solutions that have been implemented so that, when further works will be realized on the site, airtightness will not be disturbed.

3.5.3. Ventilation

For this point, the § 3.2 presentation for airtightness can also be applied.

However, the ventilation issues are much simpler to handle than airtightness. In fact, a ventilation system is composed of a set of products, perfectly identified at the design stage and calculated by the HVAC design offices. These products also have been described in BIM objects that can be linked together to represent the whole system or coherent part of it.

3.5.3.1) Analysis of the project design

Ventilation has also been presented on January 10. 2018. It is an issue that concerns a whole system design along air flux in a building : from air entrance to air exhaust, including all grids, ducts and engine. Compared to airtightness, all elements of this system can be identified and described, because they all are industrial products. And most of these products have already been modeled as BIM objects.

In order to be able to decide whether this subject will be accompanied by the BIMplement project, BIMplement coaches will have to check if it is a real issue :

- what type of ventilation for the project ?
- is there a MEP BIM model for the project ? The weak/difficult points have been identified ? What technical documentation has been linked to the ventilation BIM objects (design, implementation, maintenance, …) ?
- one of the main problem with MEP BIM model is the possible and rather common interference with the structure model. Has a BIM synthesis been realized ? Have the blockouts been identified ?
- when possible, what is the level of knowledge (on ventilation) of the construction companies foremen & blue-collars ?
- when possible, what are the skills of the construction companies foreman & blue-collars to implement ventilation system ? Do they understand what are the weak points related to ventilation implementation, and did the design office take them into consideration ?
- …

3.5.3.2) On the construction site

If ventilation is to be a goal, in order to accompany the site work on ventilation, BIMplement coaches will check :

- the list of the available technical documents

1) technical drawings and sketches
2) technical documents for the implementation of ventilation products
3) possible samples of these products...

- the effective link of these documents with the BIM model
- the possible participation of industrial producers, and presentation of products and of their implementation,
- the list of the companies foremen and blue collars who will have to implement these solutions and products
- the present skills of these persons
- and the type of up-skilling to organize

The BIM training itself is described in the “BIMplement training pack”.

3.5.3.3) Ventilation quality control

Each country has his own ventilation quality control procedure. If it exists, the control is realized in two complementary ways :

- visual quality control of implementation of the whole system : grid, ducts, entry and exhaust air vents, ventilator, …
- performance measurement of ventilation system : air flux, air pressure at air vents, and possibly, air duct airtightness.

The ventilation quality control of ventilation will be controlled at the end of construction work. The following points have to be checked :

- during construction, the air vents must be airtight closed to prevent dust entering into the duct and filters. Has this been done ?
- Who performs the test ? and who will pay for it ? ….

3.5.3.4) Maintenance and building transformation

The as-built BiM model will specify the way ventilation has been actually realized (which may be different than designed).

The facility manager will be presented the maintenance documents, and the potential maintenance planning, if any.

4. Summary of the BIMplement tools available to day

This report shows that, up to now, 2 types of documents and tools have been created along with the BIMplement project :

- Pedagogical documents for the training and up- skilling of BIMplement coaches
- Tools for the awareness campaigns, the launching and the follow-up of site works

These documents are all quoted in the annexes and in the table here below with a short explanation:

	List of documents/tools links with the n° of doc	For BIMplement coaches training	For on-site implementation
1	BIMplement- Programme de formation BIM Coach_20171011 & training report *program of the French BIMplement coaches first training session : BIM process explanation, use of viewers, arguments.*	x	
2	ASTUS-2.Training for the BIM Coach in LYON *slide show of the first French BIMplement coach training session*	x	

3	BIMplement- Programme de formation BIM Coach -13 032018 & training report *program of the French BIMplement coaches second training session : awareness campaigns, BIMplement training pack and trainers.*	x	
4	Intervention Paris 13032018 *slide show of the second French BIMplement coach training session*	x	
5	Pilot project in Dijon *presentation of the DIJON pilot project as an example*		x
6	BIMplement training pack *presentation of the role of the BIMplement trainers, as well as the different steps in the project analysis and contents of the different training sessions*		x
7	Presentation of BIM and BIMplement – English version *English BIMplement leaflet*		x
8	Presentation of BIM and BIMplement - French version (under progress) *French BIMplement leaflet*		x
9	Visualization of BIMplement methodology as part of a 3D model *video showing how to implement BIM methodology*		
10	BIMplement WP4 - BIM awareness campaign *Objectives ; messages ; target groups ; methodology ; tools*		x
11	Example of message for the local public contractors *standard letter to enter in contact with potential public authorities and have them participate to the BIMplement project*		x
12	BIMplement - collective actions – template *standard file to collect and identify a collective action*		x
13	BIMplement_Awareness campaign reporting *table created by AVE to collect the list of awareness actions realized by the French BIMplement coaches*		x
14 15	Dropbox “BIMplement_Eperimentation_MDE” *Dropbox for French bibliography, BIM models and viewers dedicated to the French BIMplement coaches*		x
16	https://www.aplicit.com/region-auvergne-rhones-alpes-adoption-du-bim/ *video by the Auvergne-Rhône Alpes region, that promotes the use of BIM*		x
17	BIM videos realized by ASTUS-Construction http://www.astus-construction.fr/9965-centre-de-ressources.htm *videos realized by ASTUS-CONSTRUCTION : different stakeholders of the same project talk about their BIM experience*		x
18	12 steps for a BIM process *didactic presentation : understanding of a coherent BIM process and of its stakes*		x
19	ASTUS_1. Questionnaire about the BIMplement coaches skills *Preparatory inquiry for the BIMplement Coaches training* *January, 9 & 10 2018, Paris*	x	
20	« Handbook for the introduction of building information modeling by the European public sector » *slide presentation of this hand book realized by EU_BIM_taskgroup.*		x

21	WP4_formation_BIMcoaches-10janv2018 *presentation of nZEB, ventilation and airtightness stakes*	x	
22	BIM_Handbook_1st *A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers, and Contractors*	x	
23	BIM_Planning_Guide_for_Facility_Owners-Version_2.0 *Structured approach to effectively plan the integration of BIM within an organization.*	x	
24	bim-protocol-2nd-edition-2 Standard Protocol for use in projects using Building Information Models	x	
25	NBS-National-BIM-Report-2018 *annual report on worldwide BM implementation*	x	
26	the_uses_of_bim *Presentation of a system for the classification of the Uses of BIM*	x	
27	BIMplement_ASTUS_enquiry-post-BIMcoach-training_jan25_2018 & final report *Post training inquiry to check the knowledge acquired during the training sessions*	x	

5. Conclusion

This deliverable will be amended by the end of the BIMplement project to take into account the partners on-site experiences, and verify / improve the different tools for BIMplement coaches here presented.

To this end, it appears necessary to realize an assessment of the actions undertaken by these other countries with the actual tools here presented. Then, it will be possible to adjust them to their countries, and later to any country that would like to promote the BIMplement method.,

The final deliverable on “BIMplement coaches tools” will propose the completed methodology presented as a “tool box for BIMplement coaches”.

Following the discussions held during the Paris and Warsaw meetings, as well as in E-mail exchanges, an additional document will Identify of the pilot field labs and the experimental field labs in each countries. A meeting to be held in Paris, in November 2018, with the EU Bimplement trainers in order to apply and adapt the on-site training program to each cases.

In order to realize the training final assessment, internal monitoring of the training courses for BIMplement coaches and BIM workplace trainers will be done by using questionnaires to assess the quality and usefulness of the training courses.

COLOFON

BIMplement

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Annex 0 : implementation strategies in the Netherlands, Spain, Poland and Lituania

Implementation strategy for Netherlands

1) Collaboration between ISSO & HIA

ISSO and HIA are working on establishing a good collaboration with relevant national stakeholders (construction companies where we will identify experimental sites, e.g. Heembouw) as also with governmental/public bodies (municipalities, e.g. Rotterdam municipality) to raise overall awareness on why BIM (requesting it in call for tenders, public procurement).

'BIMplement awareness campaigns' are being organized whenever an opportunity arises. According to ASTUS, it is most important that BIMplement coach has freeware viewers to show how to use simply 3D models and introduce BIM to people during the awareness campaigns in attractive way.

2) Collaboration with the Dutch construction company (e.g. Heembouw):

Collaboration in on the way with a construction company such as Heembouw from the beginning to build trust – as such it will be used as a 'field lab'. They should sign an agreement. The building manager or relevant BIM Manager who will be the 'BIMplement workplace trainer' will be in contact with ISSO BIMplement coach (Arjan).

One of their projects can be used for testing and implementing BIMplement methodology and therefore acts as 'experimental site'. For this one, we first need good BIM model (to be then checked by ASTUS if of good quality). At the experimental site – we need to understand what kind of tools they use – a need for tablets to introduce BIM at the site.

The focus on implementation of BIMplement should be in relation to air-tightness and ventilation.

Before having an actual (ongoing) construction project – we need to have appropriate knowledge, education sources ready. This means that we connect, link the right training module to the needs of the site.

Implementation strategy for Spain

The BIM implementation is in its early stages in Spain.

1) Awareness campaign

After the awareness campaign organized by the IVE in collaboration with the SERVEF, something that we envisaged has become very clear, and it is that the implementation of the BIM methodology in our country is going to be chiefly driven by public administrations, due to the obligation of including it in their call of tenders. We can draw some interesting conclusions from the questionnaire (enclosed) we made to the attendants to the awareness campaign-collective event.

Awareness campaign (collective event and personal meetings) have allowed us to contact with several potential field-labs/experimental sites, with very different profiles. We have to meet them again to assess which projects would match to BIMplement approach. :

- SERVEF (project partner and public administration), they are planning the refurbishment of several offices, so it would be a good opportunity to test BIMplement methodology not also in a public administration but also in a construction company.
- Alicante University Campus: They have all the buildings of the campus in BIM. They are now building some new building. They are interested in the BIM construction process but find it much more useful from the maintenance point of view.
- Regional Ministry of Health: they are pioneers in the demand of BIM model in the call of tenders in our region. They undertake both renovation works and new buildings. They fing BIM model really useful for later maintenance purposes.

- BECSA (Construction company): They are already working with BIM methodology in some projects. They are really interested in BIMplement approach and how its implementation could help them to improve improve their quality and efficiency.
- AECO estudio (Architecture and engineering studio): They are already working under BIM methodology and offer/consider it as a tool for the better understanding and execution of a project. They can link us to the construction companies they have already worked.

2) Tools adapted to Spain

IVE is pending to develop a repository with all the tools to be used in the pilot project. We currently have extensive training material for technicians and also for operators. IVE also have contact with CYPE, with whom we usually collaborate and who usually offer us the use of their tools free of charge for training actions.

Implementation strategy for Poland

1) Awareness campaign outside the company

Mostostal Warszawa is among the 6 initiators of creating the Polish Building_Smart branch. On 20th of September 2018 was organized the meeting at the Warsaw University of Technology during which the main goals of the Polish Building_Smart were presented. Through this association, Mostostal will spread the idea of open BIM in Poland and will participate in the development of new standards.

http://buildingsmart.org.pl/

2) Awareness campaign inside the company

BIM team employees who work in R&D Department carry out on January 2018 an information campaign about BIM in two tender departments explaining how BIM can be useful in the preparation of a precise offer.

On February 2018 was organized BIM awareness campaign at one of construction site. Very interesting discussion with work managers about the construction process and identification of barriers to BIM implementation, finally ended with the decision that the BIM tools will be used at the execution phase. During the second meeting the training on how to use the model and work with it on the tablet was carried out. This can be considered as preparation for further training that will be implemented within BIMplement project and will focus more on ventilation and airtightness.

Implementation strategy for Lithuania

1) Awareness campaign

RIMC, together with LBA, are responsible for awareness campaign strategy and implementation in Lithuania. Both organizations collaborate with public institution “Digital Construction”, which involves a 12 business and professional associations (including LBA) in Lithuania interested in BIM implementation issues. All associations unite a high number of companies and professionals involved in construction sector. Public institution “Digital Construction” serves as a platform for approaching multiple stakeholders in Lithuania. LBA also acts as liaison with governmental institutions responsible for regulation and control of activities in construction sector. Currently, LBA is closely involved in mapping existing in Lithuania BIM competences models, training courses, and certification schemes with newly introduced BIM competence model, certification scheme developed by BuildingSmart international alliance. Accordingly, BIMplement methodology is also under integration process with renewed Lithuania BIM competences model structure.

BIMplement awareness campaign is implemented on collective and individual basis depending on the type and needs of specific stakeholders. It is an ongoing activity that started this year and will continue in the course of the project. On individual basis a couple of meetings took place that among other issues also covered some BIMplement topics, especially, opportunities to use BIM for quality purposes, supposedly using BIMplement methodology, which is currently at the finalization stage. Construction companies like UAB Mitnija, Žilinskis ir Co and others were involved in discussions regerading possibilities to become experimental sites.

2) Tools that will be used in Lithuania

a) Project partners in Lithuania will extensively use results of the project. Lithuanian cloud-based construction classification system, http://ics.infinibim.com/, will serve as a foundation and will be used for implementation of BIMplement competence model in Lithuania aligned with other competence models related with BIM and NZEB. Classification structure will include construction project stages, use cases (management processes), BIM model functional and technical systems, elements, construction technology processes, actors, competences, skills, knowledge, and other structure components.

b) For the presentation of BIM model BIMAXON and other BIM model development, simulation, co-ordination, visualization software will be used for different use cases.

Initial list of different BIM Viewers common in Lithuania is provided below:

1. TeklaBIMSight;
2. Solibri Viewer;
3. Naviswork Freedom;
4. Autodesk Design Review;
5. Bentley Navigator

Cloud based:

1. Autodesk A360
2. BIM+

c) www.statybostaisykles.

It will be the main source for the content related to construction technologies, process descriptions, competence requirements for NZEB in at least 14 technology areas developed during ENERGOTRAIN project. The system is already used by more than 700 companies in Lithuania, and more than 2000 professionals from construction sector. PROF/TRAC platform will be explored and potentially used as an additional valuable EU level source for the use of the NZEB related training content.

List of Annexes cited in the D 4.2

i	BIMplement- Programme de formation BIM Coach_20171011”
ii	ASTUS-2.Training for the BIM Coach in LYON
iii	BIMplement- Programme de formation BIM Coach - 13 03 2018
iv	Intervention Paris 13032018
v	Pilot project in Dijon
vi	BIMplement training pack
vii	Presentation of BIM and BIMplement
viii	French version under progress
ix	Visualization of BIMplement methodology as part of a 3D model
x	BIMplement WP4 - BIM awareness campaign
xi	Example of message for the local public contractors
xii	BIMplement - collective actions – template
xiii	BIMplement_Awareness campaign reporting
xiv	French BIMplement Drop box “BIMplement-Expérimentation_MDE”.
xv	French BIMplement Drop box “BIMplement-Expérimentation_MDE”.
xvi	https://www.aplicit.com/region-auvergne-rhones-alpes-adoption-du-bim/
xvii	BIM videos realized by ASTUS-Construction
xviii	12 steps for a BIM process
xix	ASTUS_1. Questionnaire about the BIMcoaches skills-
xx	« Handbook for the introduction of building information modeling by the European public sector »
xxi	WP4_formation_BIMcoaches-10janv2018
xxii	BIM_Handbook_1st
xxiii	BIM_Planning_Guide_for_Facility_Owners-Version_2.0
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