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: **D4.5 – Tools, training content and qualification schemes for BIM work place trainers – annex 1 : the Zodiak Project**

Prepared by: ASTUS, P.Perreau, M.Olivier

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Partners involved ASTUS

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Training course content for building companies : example 1, The Zodiak project, Arras, France

1. Executive summary

This annex to D4.5 gives a real pilot project example for BIMplement trainers to design a traing course. The document follows the different steps presented in D4.5.

2. The Zodiak project context

2.1. Description of the Zodiak project

This project is conducted close to Arras, North of France.
This office building project has been selected in Saint Nicolas lez Arras, in the Hauts de France. Modular offices are located in 2 buildings, both having 2 floors, one building is 600 m², divisible in four areas, and one is 400 m², divisible in two. Aerial parking ate included in the lot.
This project was the subject of a competition, won in April 2015 by the agency KIC Promotion of Lille, which has activities in housing and real estate business.
The first building is currently under construction. The training program BIMplement implemented since September 2018 aims to be implemented with the construction of the 2nd building.

2.2. The "Zodiak" project stakeholders

The stakeholders :

- the real estate developer did not ask for a BIM project; however, he wishes to experiment the BIM process so to apply it widely later on
- the architect : he designed the project with REVIT (see Ill.1), for which he only have a 3years experience. This model has been designed only for internal purposes, and has not been transmitted to the other stakeholders.

Illustration 1 : general BIM view of the Zodiak project (two buildings)

- The Structure company designed the metal structure with TEKLA 3D modeling (see Ill.2), but did not take into account the architect's BIM model (note that this model has not been transmitted to the other stakeholders)

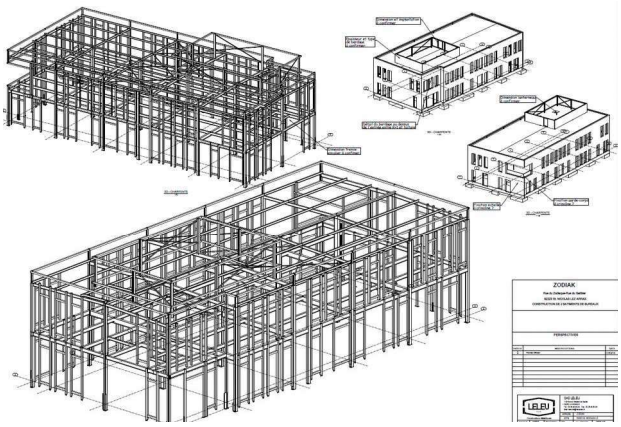

Illustration 2 : Zodiak BIM metal structure

- The other involved companies have different experience about 3D and BIM, but only on the design level, none on site work level. One is using 2D -ALLPLAN (see Ill.3), another one knows GEOMENSURA, the other use AUTOCAD

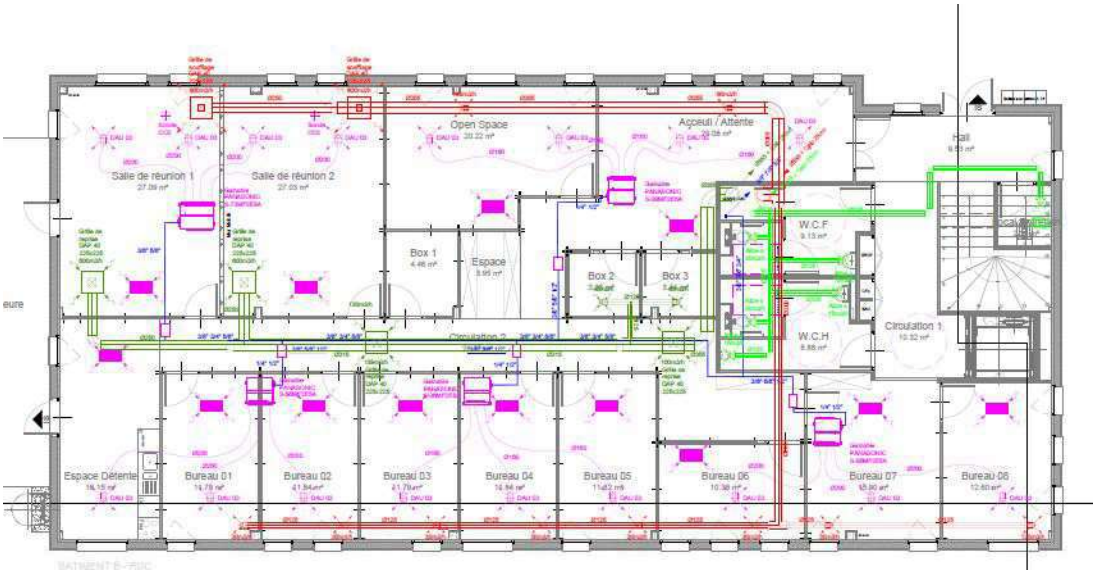

Illustration 3 : All-Plan view of the Zodiak Building

2.3. The conditions for the BIMplement training implementation

The training session occurred while the building was already under construction

So the BIM process has been developed in order to :

- understand the BIM capacities of stakeholders
- identify the “bugs” on the working site, and show up how they could have been anticipated (BIM visualization/ cooperation)
- prepare a BIM process that will be implemented on a second building, built along the same technique and with the same companies.

Illustration 4 : The Zodiak project under construction

The training session occurred while the building was already under construction (see Ill. 4). So the BIM process will be developed in order to :

- understand the BIM capacities of stakeholders
- identify the “bugs” on the working site, and show up how they could have been anticipated (BIM visualization/ cooperation)
- prepare a BIM process that will be implemented on a second building, built along the same technique and with the same companies.

2.4. The ventilation and airtightness context

The general technical specifications related to ventilation and airtightness are given in details in §2.3.

2.4.1. Ventilation

It is specified that the building company in charge of the ventilation batch has to make selfcontrol of his own work, and has to communicate with the company in charge of verification and commissionning.

2.4.2. Airtightness

The building airtightness will be tested upon handover. The expected result is a maximum of 1m^3/Hr/m^2, which is the legal maximum permitted by the RT2012, nZEB regulation in France, for office buildings.

2.5. The training environment

This training example content is related to its context :

- there were no BIM specification required at the beginning of the project
- there were architecture and structure BIM models

- stakeholders were wishing to acquire BIM skills

In this context, the trainers had to prove that BIM tools would help reach the energy efficiency objectives.

In order to help future BIMplement trainers to design their own training course, additional documents will be appended :

- The whole project set of technical document and BIM models
- all files created by the trainer
- several slide shows that explain different training subjects
- a whole set of BIM documents that can be used for other similar training courses
- a complete file related to other projects that will serve as comparison and help improve the process

3. Preparation of the different training sessions design by the BIMplement trainer related to BIM understanding

3.1. collect and assemble the available BIM models

In order to prepare the training session, the trainer had to :

- handle the whole set of the project plans and documents
- identify the airtightness specifications and requirements
- transform a REVIT file into an IFC file (export of only one building)
- ask the steel company to get his TEKLA model and transform it in IFC model (see Ill.5)

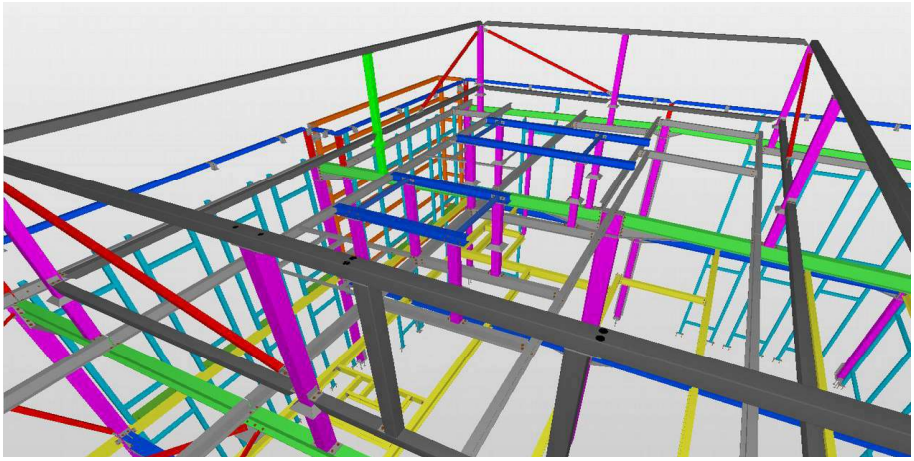

Illustration 5 : IFC BIM model of the metal structure

At this point , two important problems appeared ;

1) different geolocation between the 2 models (see Ill.6)

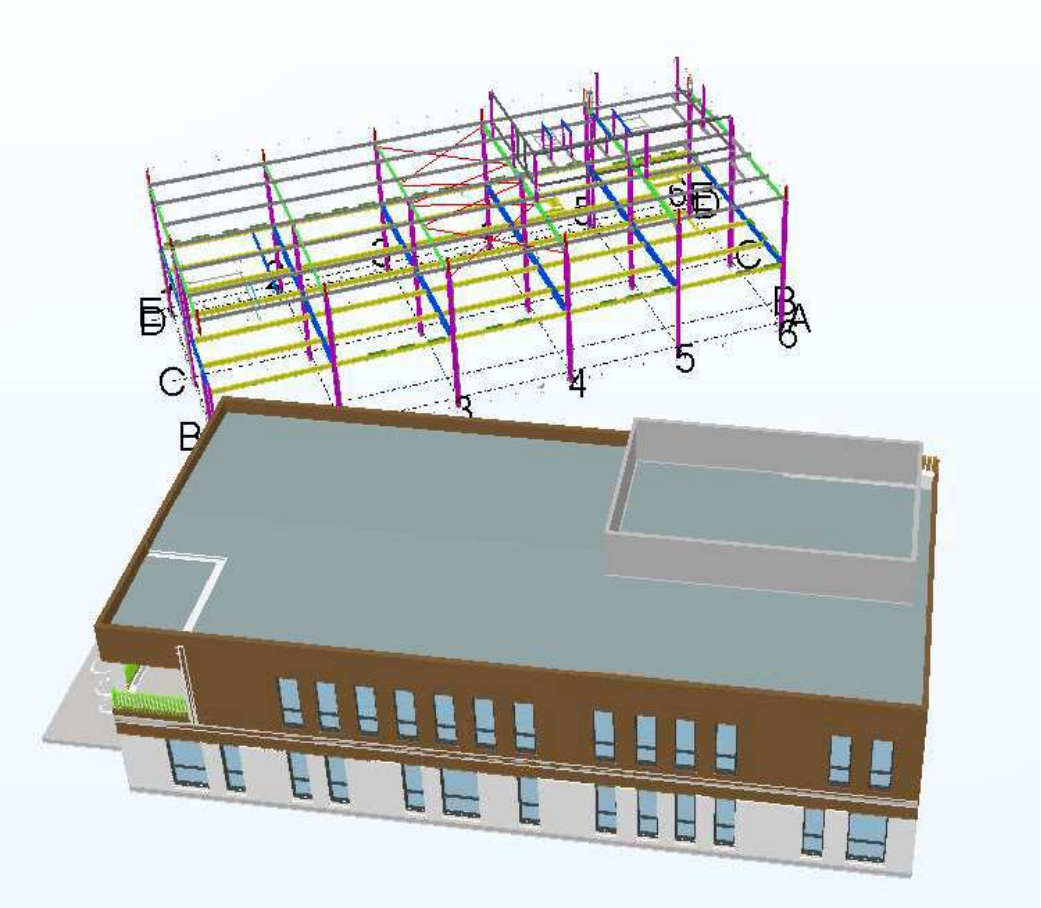

Illustration 6 : Architect and metal BIM model have a different geolocation

To solve this problem, the trainer had to make a synthesis (architecture and structure) with NAVISWORKS_MANAGE (see Ill.7)

Illustration 7 : Navisworks synthesis of Architecture and Metal BIM models

2) Wrong export of the BIM object nomenclature by the Steel company (see Ill.8)

Illustration 8 : IFC export of the metal BIM model

The codification is not correct : all elements of the metal structure have the same name “assembly”, but with a different numbers. It is not possible to distinguish post, portals, … This problem may be due, either to a software error, or to the operator’s lack of skills.

3.2. Create a new BIM model

The trainer, then, created a new BIM model that would associate the architecture and steel structure IFC BIM models

- With the help of SIMPLEBIM software, design a new demonstration BIM model for the construction site (see Ill.9)

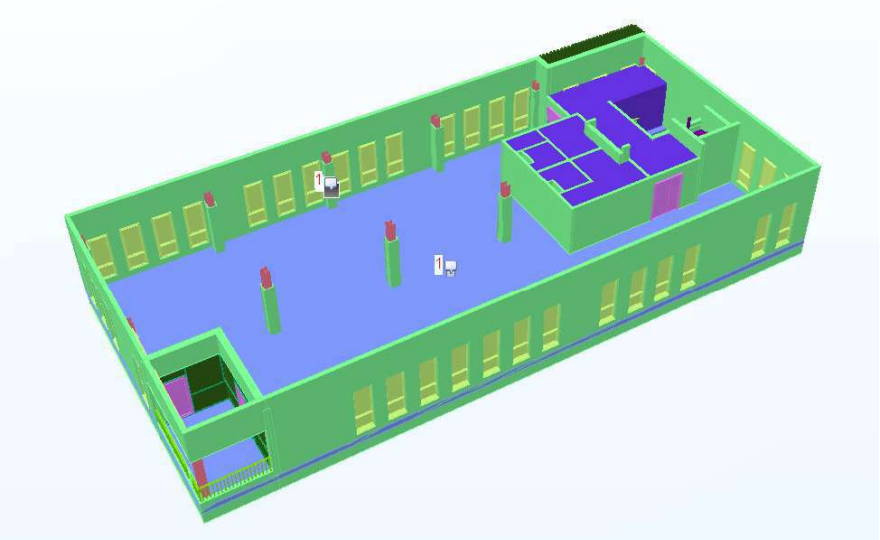

Illustration 9: new BIM model created with SIMPLEBIM

- Then, link to this model some notes and documents with the help of TEKLA_BIM_SIGHT (see Ill.10)

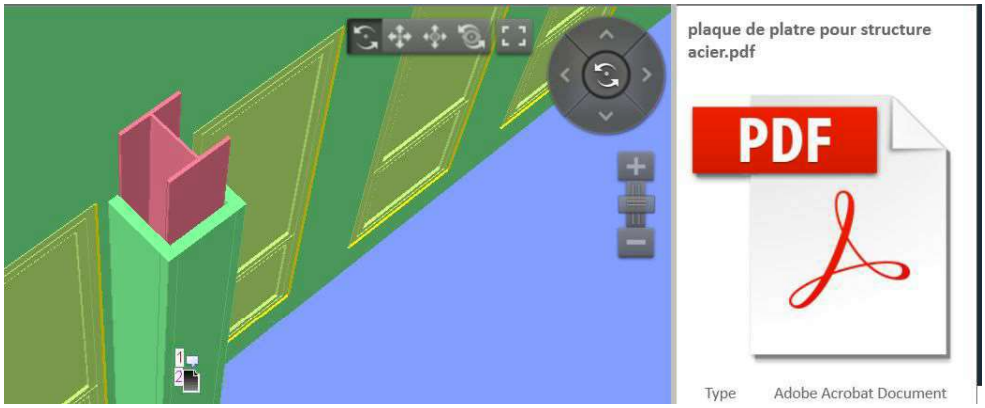

Illustration 10 : pdf technical document attached to one object in the BIM model

- Export the whole set of BIM objects on a (xls) table (see Ill.11)

Door

Name	Description	Object type	Tag	Overall height		Overall width	
12.2_Simple (R):83 x 2		83 x 204 -	1328979	2,075	m	0,900	m
12.2_Simple (R):93 x 2		93 x 204 -	1328980	2,075	m	1,000	m
12.2_Simple (R):93 x 2		93 x 204 -	1328981	2,075	m	1,000	m
12.2_Simple (R):93 x 2		93 x 204 -	1328982	2,075	m	1,000	m
12.2_Simple (R):93 x 2		93 x 204 -	1328983	2,075	m	1,000	m
12.2_Tiercé (R):143 x		143 x 204 -	1328991	2,075	m	1,500	m
12.2_Tiercé (R):143 x		143 x 204 -	1329000	2,075	m	1,500	m
porte sans bati:porte		porte sans	1329014	2,000	m	0,500	m
porte sans bati:porte		porte sans	1329015	2,000	m	0,500	m
porte sans bati:porte		porte sans	1329021	2,000	m	0,500	m
porte sans bati:porte		porte sans	1329022	2,000	m	0,500	m
Simple vitrée-sans do		simple	1491285	2,025	m	0,980	m
Simple vitrée-sans do		simple	1486694	2,025	m	1,025	m

Illustration 11 : creation of an xls_table containing all BIM objects

This table can be used to check quantities, size and object properties, or to place orders on the work site

3.3. Identify all ventilation and airtightness related questions available in the contractual documents and specifications

For example, extracts from the contractual project specifications signed by the companies.

1) Reminder of compulsory auto-controls

– BTP Consultant (the building control officer), within his own service, make sure that the companies who have to realize auto-controls – as reminded in "article 1792-1 du Code Civil" – perform them in a proper way during work execution. BTP Consultant will itself proceed to a survey of these auto-controls – companies are required to communicate to BTP Consultants the name (s) of the persons in charge of auto-controls, in particular on the site works, and to specify the list of inspections the companies will realize, as well as the procedure that will make sure the auto-controls are satisfactory.

2) Compulsory airtightness test

– The project manager draw the Companies attention to the implementation of finishing and drought proofing. The whole works must constitute a perfectly airtight and watertight facade, whose thermal insulation level is in compliance with the present standards. – An airtightness test will be obligatory performed when the building is wind-and-water tight. The result will have to match with the airtightness value included in the thermal calculation, that is 1m3/Hr/m² The company in charge of cladding will have to perform an airtightness test when each building will be airtight. A second test will be performed at the end of the construction. – this test will be covered by the client. However, if the result is not in compliance with the required level, the responsible company will have to realize, at its own charge, all necessary works to reach the required level. A new test will be performed, covered by the company, each time the required airtightness level is not reached.

3) Thermography verification

Auto-control : – the company will perform an infrared thermography on the exterior treated facades, and will draft an illustrated report stating the weak points of the building envelop. – in order to reach a certain precision, the thermographic infrared cameras will have to be 50000pixels. The service provider will justify his material performance.

4. Training course content as given on site

The context analysis made it clear that the building companies had NO BIM skills at all. Same observation for the client's project officer.

But the project manager team (architect and associated design offices were quite competent in terms of BIM.

The decision was taken to,

- as a first step, to train the building companies management level (manager, company design offices, foremen) on the concepts and use of BIM models,
- then in a second step, to apply this new skills to airtightness and ventilation in order to adapt the BM model content to the later step – on-site implementation-,
- and in the third and last step, organize on-site training for blue workers to help them in a better on-site implementation of these 2 issues.

This chapter §4 will present the whole BIM training content, as initially planned, even though, some parts have not yet been given due to lack of time. Because of the important number of building companies on the site work, it has been decided to make two batches for this session.

Several progressive steps are necessary to achieve a good handling of BIM on site :

- Step 1 : convince the stakeholders of the interest of BIM with SOLIBRI MODEL viewer
- Step 2 : additional BIM tools, from another viewer - Tekla BIM Sight
- Step 3 : specific BIM tools that may be requested/compulsory within the BIM process
- Step 4 : model synthesis, properties of BIM objects, export in a table
- Step 5 : a special Viewer - Navisworks Freedom

4.1. Conditions of the training session implementation

This first training session only lasted one morning, as requested by the client (8.00 – 13.00). It was dedicated to company managers, design office and site foremen.
One or two more sessions will be necessary to get through the whole program.

This training session took place inside the first building, still under construction. (see Ill.12)

Illustration 12 : 1st training session on the Zodiak project

It is interesting to note that, when the participants understood the interest of BIM models, they could identify some problems that could have been foreseen right from the design phase. (see Ill.13 & 14)

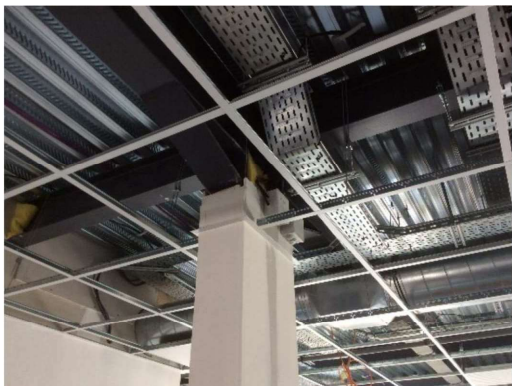

Illustration 13 : a detour of the ventilation duct had to be realized on site

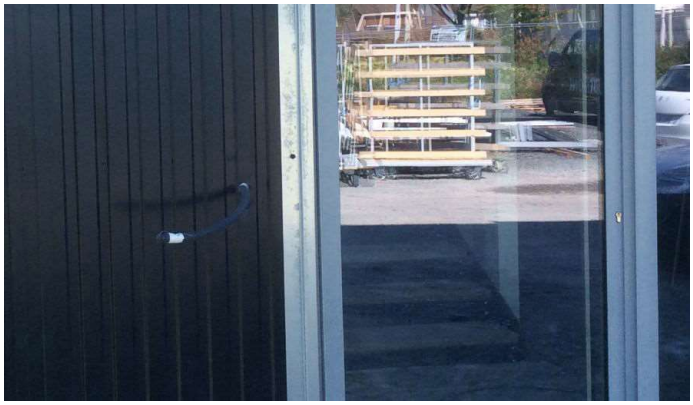

Illustration 14 : electrical outlet with no airtightness consideration

The main training objective was to introduce BIM and BIM tools on site. The ventilation and airtightness issues will be presented later on, in a future training session.

4.2. Step 1 : convince the stakeholders of the interest of BIM (SOLIBRI)

This most important objective will be be reached with the help of a simple BIM model handled with SOLIBRI MODEL viewer

4.2.1. Present and analyze the BIM process

Why BIM can be useful and for whom ?
- all stakeholders are concerned, at any phases
- draw a sketch of the project BIM process on a paper board. It can be based on Illustration 15

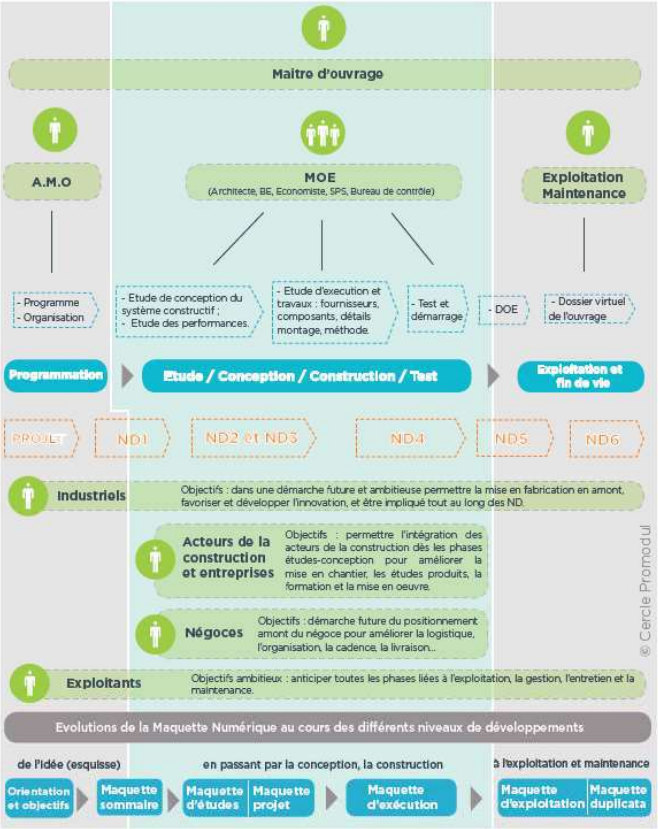

Illustration 15 : sketch of a BIM process

The aim of this session is to explain BIM through examples.
(reminder : airtightness and ventilation are not taken into account in this first training session. These themes will be addresses later on in the training pack with exchanges and practical exercises, and on-site analysis, namely because, in this case, there is no MEP model.)

4.2.2. Introduction about viewers and SOLIBRI model viewer

All trade BIM software have developed freeware viewers (for example, REVIT propose a one-month free try, then only the viewer is free of charge)
However, these trade software are nor easy to use, and do not simply handles data created by other software.
Only IFC viewers (equivalent to PDF for BIM) can handle different BIM model created by different software, as log as these software exported them in IFC format.

For this training session, a simple BIM model is used by the trainer so that participant can easily visualize the model (s).
The guiding thread will be show how to use SOLIBRI model viewer to get a good visualization of the whole project.

4.2.3. SOLIBRI model viewer presentation

4.2.3.1. Basic SOLIBRI tools

- SOLIBRI files organization (see Ill.16)

Illustration 16: SOLIBRI tool bar

- presentation of the different levels (steps of the construction) with the tools : +, -, =
- wander around in the projects
- make some element disappear (right click = hide)

4.2.3.2. present and manipulate BIM objects

- sort per object (possibly per layer)
  - the building objects (doors, poles, …)
  - the “space” objects (see Ill.17)

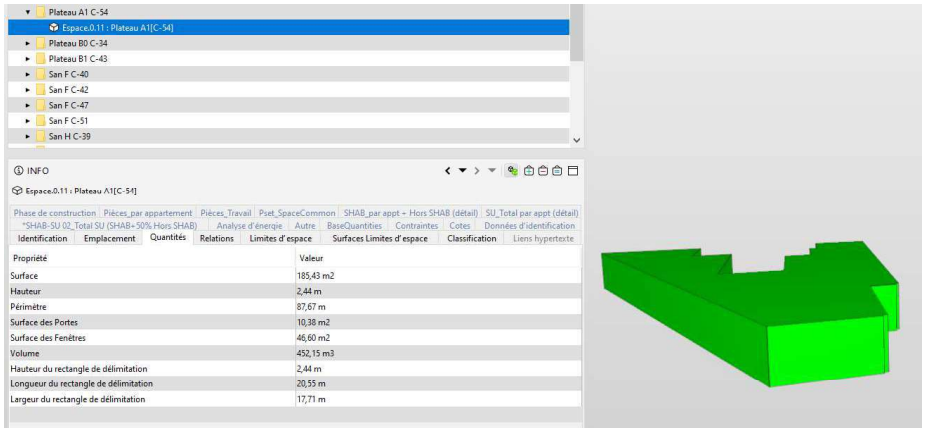

Illustration 17 : example of “space” object

- show off the data window for each object (see Ill.18)

Illustration 18 : data for a partition wall

4.2.4. Importance and handling of BIM data

4.2.4.1. What data in a BIM model

- Compare with a “simple” 3D view, and make it clear that a PDF_3D does not include any data. In the case here below (see Ill.19), it is possible to make close-up in a sketchup model and explicit an issue with 3D.

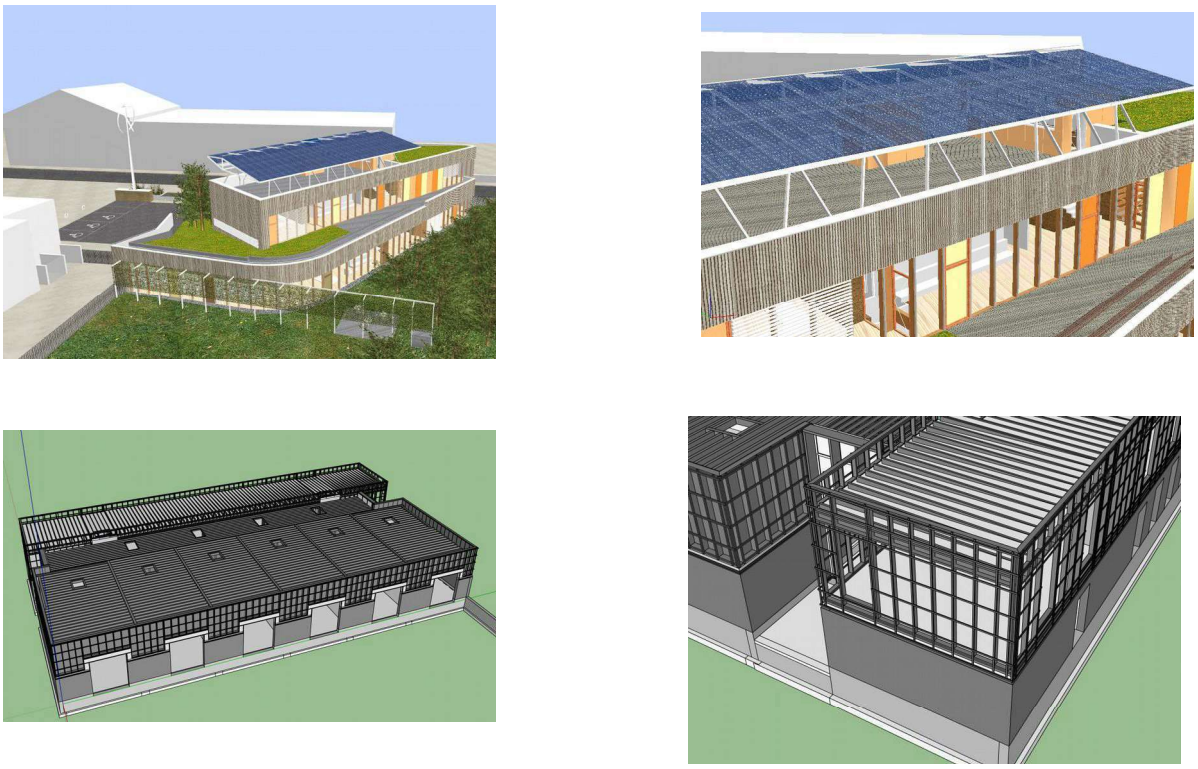

Illustration 19 : sketch-up model with NO data, but possible zoom (on the right)

- Explain that, with BIM models, the main questions are :

What data have to be identified and quantified ? (see Ill.20)
Who enter them ?

INFO

Espace.2.48 : Chambre[Chambre]

Limites d'espace	Surfaces Limites d'espace		Classification
Identification	Emplacement	Quantités	Relations
Liens hypertexte	Attic+ Liste de matériaux		BaseQuantities

Propriété	Valeur
Calibel collé 10+80 a/pare-vapeur	7,19 m2
Acrylique sur plafonds, en 2 couches.	16,47 m2
Doublage par 1 BA 13 collé	5,49 m2
Fibre de verre sur murs + 2c acrylique	48,14 m2
Habillage en plaque BA 13 HD sur ossatu...	11,88 m2
Plafond acoust:BA13/F 530/IBR 50	16,47 m2
Plinthes habillé pvc type Dinac + pvc	20,96 m
Ragréage P3, sur dalle dressée ou chape	16,47 m2
Sol PVC GERFLOR Taraley U3P3E2/3C2	16,47 m2

Illustration 20 : example of data in an economic BIM software (ATTIC+)

- Explain how to enter data in a trade software, for example REVIT, (see Ill.21)

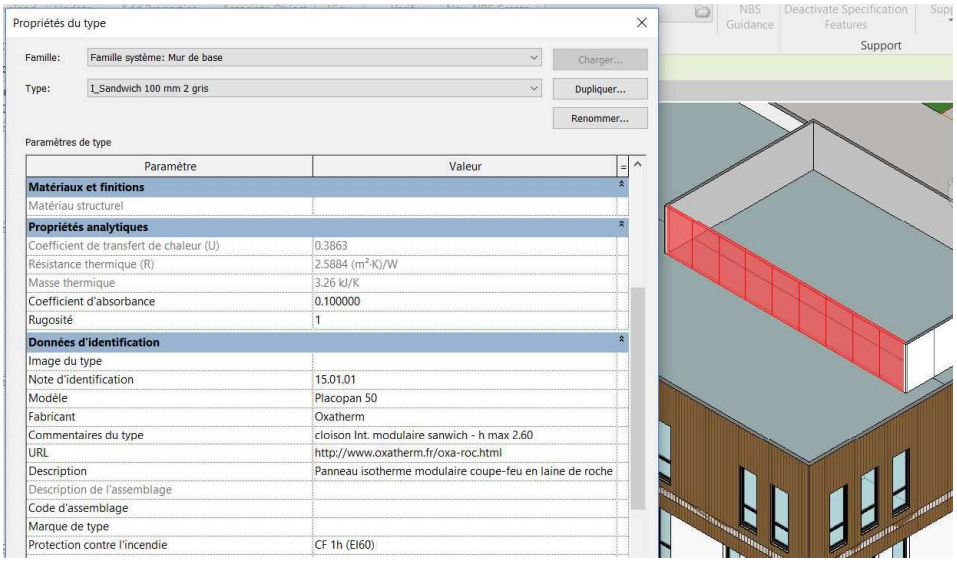

Illustration 21 : REVIT model of the Zodiak project

- show the important number of possible additional data to be included in REVIT show COBIE , regulatory English software for xls export of compulsory basic data (see Ill.22)

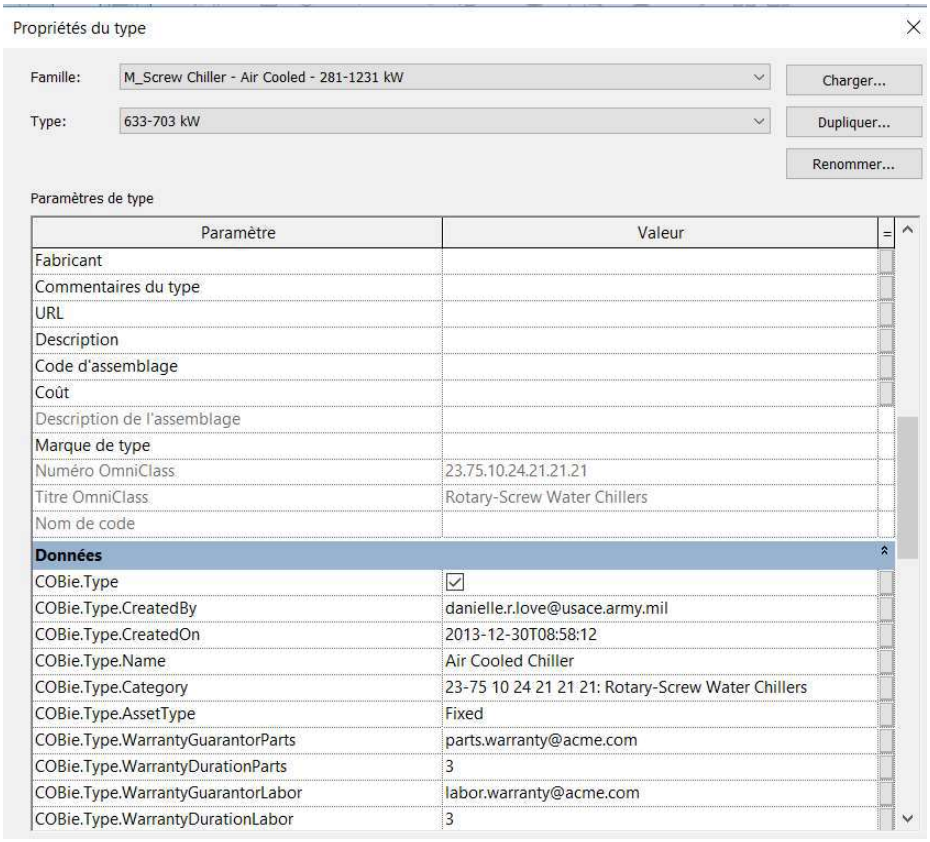

Illustration 22 : COBIE data

4.2.4.2. Data export in a table

- Show how to export IFC data, explain the settings.
  These settings will help improve the IFC export when :

- there is no division per floor
- the objects name are inconsistent
- lack of “space” objects
- lack of essential component

- show how to use IFC with NOTEPAD++

4.2.4.3. what is an IFC data

- show and explain what is an IFC data (see Ill.23)

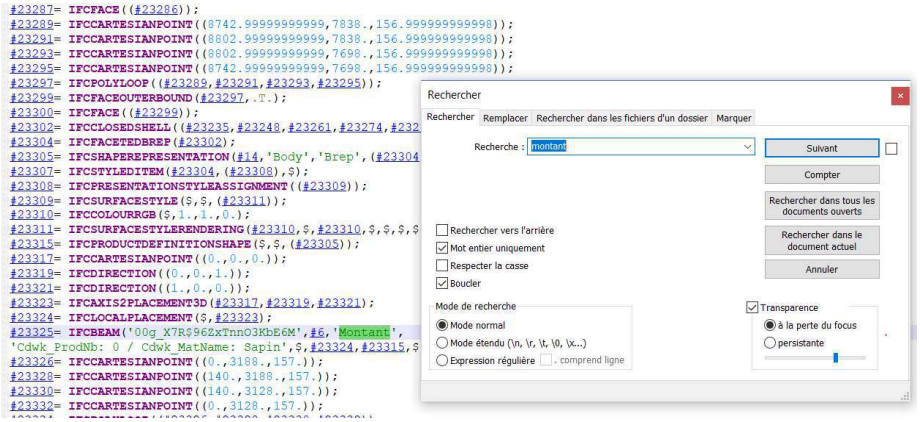

Illustration 23 : configuration of IFC data, with NOTEPAD++

IFC is a text file, used to build the BIM modeling
Warning ! Danger ! within this file, it is even possible to have a direct access and change data !

But, when using a viewer, there is NO risk to change data

- Research within an IFC file
  - use a correct spelling : pole ≠ pile
  - the IFC requirements specification indicates the precise nomenclature of the terms to be used (see Ill.24)

Type d'objet		Type of object	IFC class
ARCHITECTURE	Paroi et mur	Wall	IFCWall
	Escalier	Stair	IFCStair
	Garde corps	Railing	IFCRailing
	Poteau	Poles/Column	IFCColumn
	Poutre	Beam	IFCBeam
	Dalle	Slab	IFCSlab
	Local	Space/Rooms	IFCSpace
	couverture	Roof	IFCRoof
	charpente	Carpentry	IFCBeam/IFCColumn
	Porte + serrure	Doors & Lock	IFCDoor
FACADE	Ouverture + occ	Window & Shutter	IFCWindow
	Mur rideau	Curtain wall	IFCCurtainWall
EQUIPEMENT	CFO	Low-tension distribution panel and cabling	IFCEnergyConversionDevice
	CFA	Telephone and computer system panel and cabling	IFCEnergyConversionDevice
	Luminaire	Luminaire	IFCEnergyConversionDevice
	CVC	HVAC	IFCEnergyConversionDevice:for product IFCFlowSegment: for network
	PLB	Plumbing	IFCEnergyConversionDevice:for product IFCFlowSegment: for network
Other/Autres	Ascenceur	Lift	IFCTransportElement
EXTERNAL WORKS/ VRD	Terrain	Land	IFCGeographicElement
	Réseau	outside networks	IFCFlowSegment: pour les réseaux

Illustration 24 : example of a BIM nomenclature

4.2.5. Additional tools in SOLIBRI model viewers

- Cutting tool : realize a sectional view in a plan
  choose the face : left click + MAJ
  fix the cutting face : keyboard key T (see Ill.25)

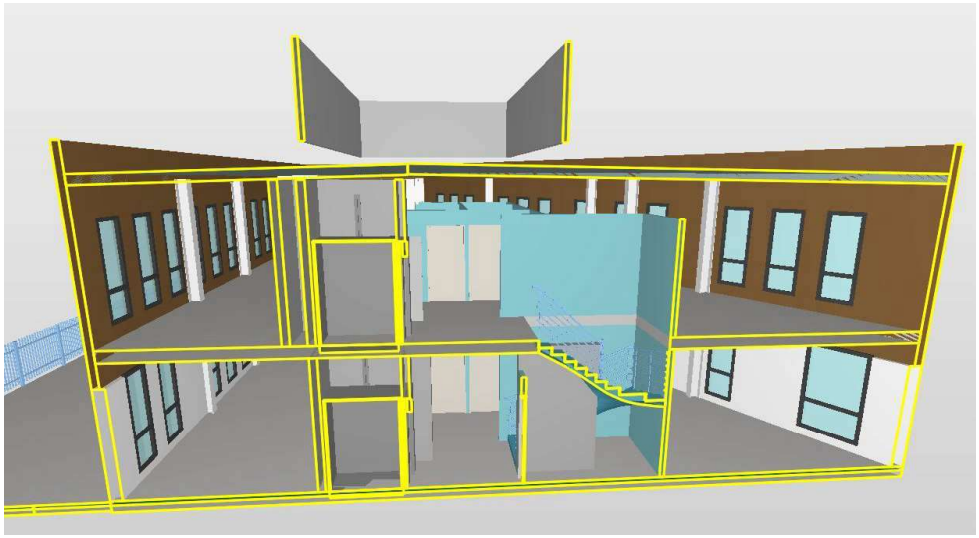

Illustration 25 : example of a sectional view with SOLIBRI cutting tool

- mesuring dimension of an object
  (see Ill.26)

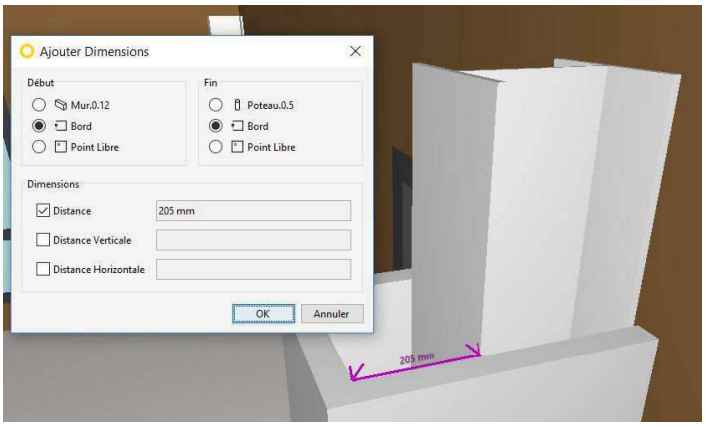

Illustration 26 : example of a dimension measurement

- possibilities to show and demonstrate the other available SOLIBRI tools

4.2.6. First approach of a synthesis of several BIM model

The trainer needs to use Solibri Model Checker (see §3.3.1)

- Retake the different tools to show of interaction between models
- explain that companies using Solibri viewers can see conflicts detected by SOLIBRI MODEL CHECKER only (see Ill.27)

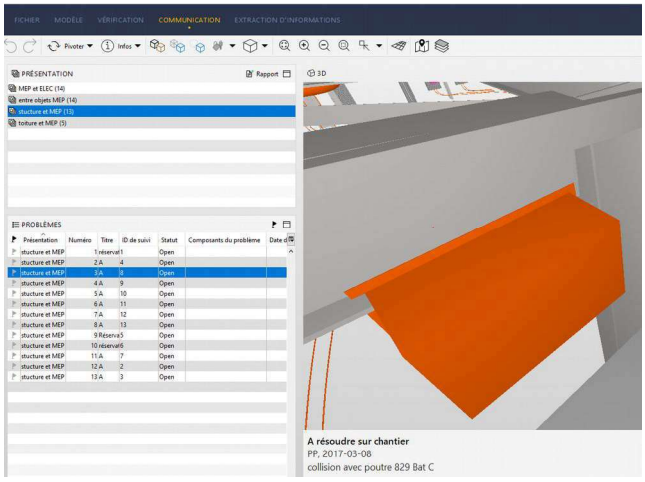

Illustration 27 : example of collision between MEP and structure seen with Solibri viewer

4.3. Step 2 : Additional BIM tools included in another viewer : TEKLA BIM sight

4.3.1. Interest of TEKLA BIM sight

SOLIBRI model viewer is able to present ONLY one model at a time (unless the BIM manager let you use his model synthesis).

TEKLA BIM sight has the possibility to include several models and realize a synthesis of them.

4.3.2. Tool for the conflicts research

Illustration 28 : conflict control with TEKLA BIM sight

However, this tool, being a freeware, is not as precise as SILIBRI MODEL CHECKER. (see Ill.28)

4.3.3. Tool "memo"

4.3.3.1. Add a memo (see Ill.29 & 30)

Illustration 29 : add memos with TEKLA BIM sight

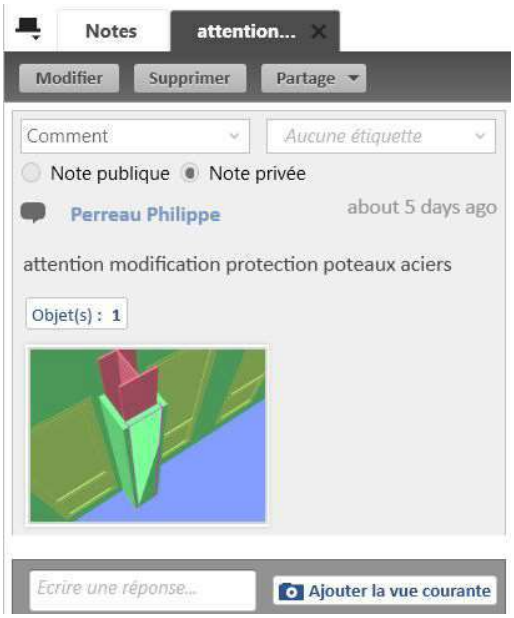

Illustration 30 : example of memos with TEKLA BIM sight

4.3.3.2. What kind of uses for the "memo" function ?

A memo can be (see Ill.31)

- sent to somebody by @
- saved in a file
- imported

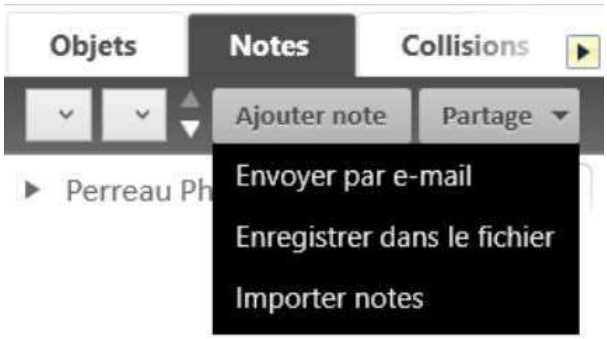

Illustration 31 : different uses of a memo

4.3.3.3. BCF Files

BCF file is the file that contents the memo.

BCF is an OPEN source and open BIM format.
With this format, it is possible to exchange between stakeholders about problems encountered in BIM models.
It is possible to make comments, screenshots, … that will be directly integrated into the BIM model. (see Ill.32 & 33)
All of these data are automatically saved and are kept accessible.

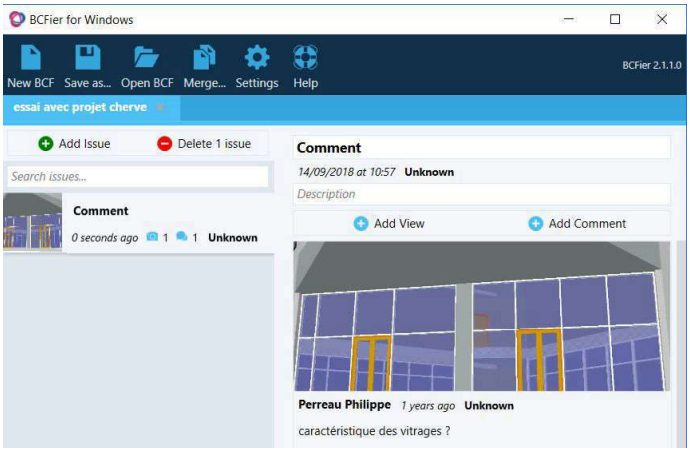

Illustration 32 : comment about windows characteristics

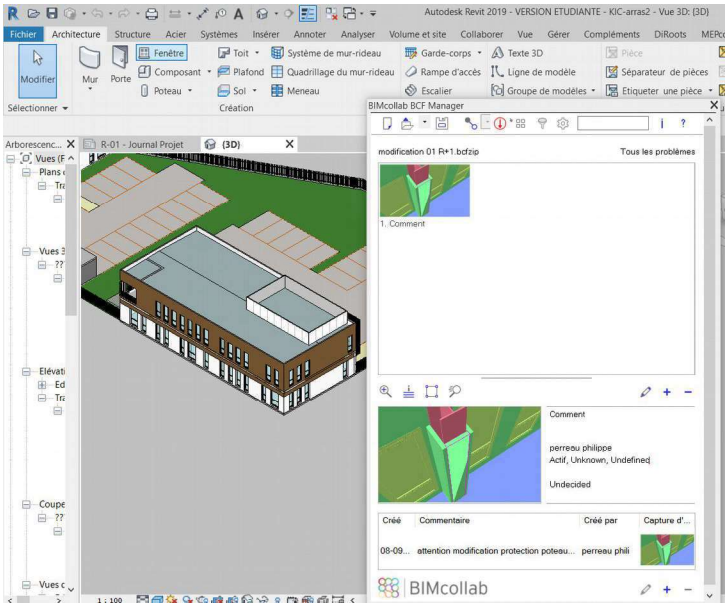

Illustration 33 : BCF file seen/opened with REVIT

For instance, this case concerning a fire protection sheet, upon receiving the BCF file, it is possible to change property of this element (in red, illustration 34)

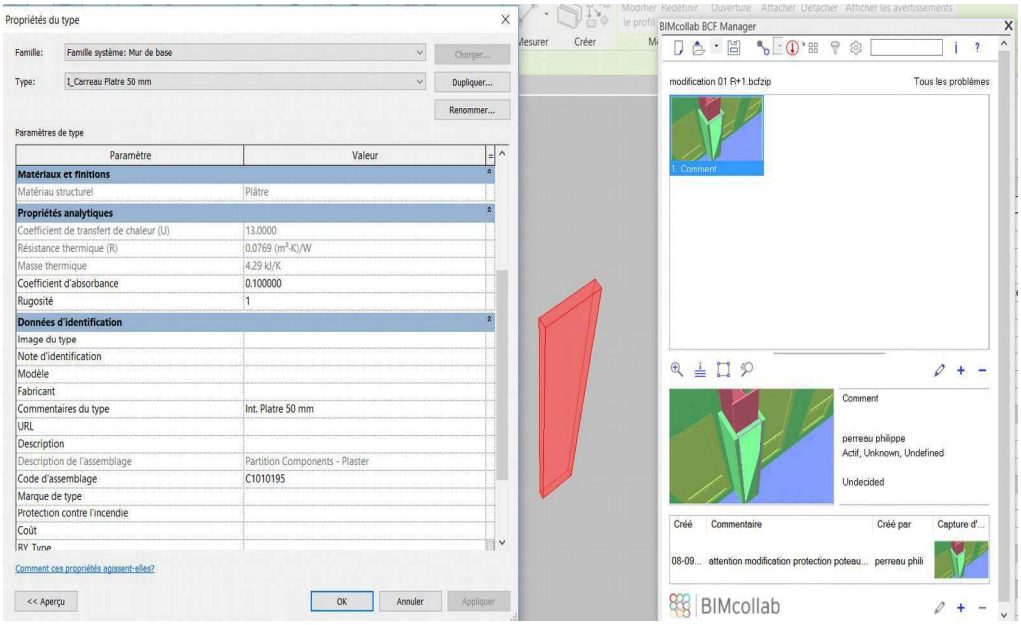

Illustration 34 : answer to a BCF file

4.3.3.4. Tool “add document”

It is possible to attach technical document to a BIM object in a model. (see Ill.35)

Illustration 35 : function “attach document”

4.3.3.5. Tool “photo gallery”

It is possible to keep record of special view in an album (see Ill.36)

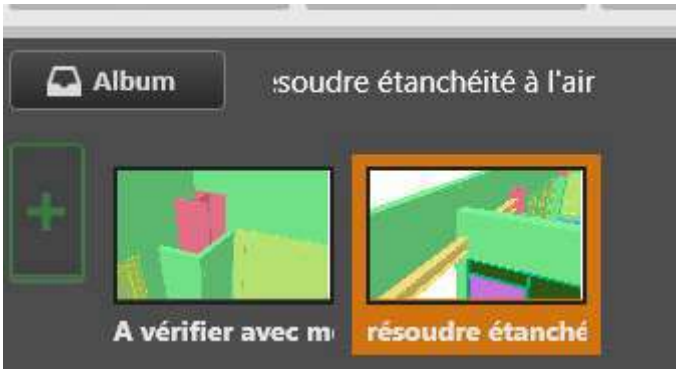

Illustration 36 : photo gallery

4.4. Step 3 : specific BIM tools that may be requested/compulsory within the BIM process

4.4.1. Review the demands of a BIM technical specification

- Contents of a BIM technical specification manual
  - draft by the client’s and control office

- to the attention of project manager, companies ...
- how data are required to be organized ?
  - Example of the client's BIM requirements
    to the attention of the project manager
  - Example of the project manager's BIM requirements,
    to the attention of design offices and architects, companies, control offices, …
- for what and for whom are data required ?
- How will the BIM model quality be declared as compliant with the specifications ?

4.4.2. Possible imposed choice of a BIM viewer

The viewers (§3.2, 3.3 et 3.5) normally make use of IFC data, exported from different trade software.

However, the freeware Naviswork Freedom only uses NWD files, created by the professionnal software Navisworks Manage.
The BIM manager may employ this software, Navisworks Manage, especially if several BIM models are built with REVIT (even though Navisworks Manage can open many other type of files, includinf IFC).
In that case, if the BIM manager provides the building companies with a Navisworks synthesis of the models, then the companies will have to use Navisworks Freedom as a viewer.

It appears very important to read carefully the BIM protocol to be applied on the site work, because it will describe the contractual obligations that may impose a special viewer to the building companies. For instance, in this project (see Ill.37), a special collaborative platform is requested for all stakeholders :

PROTOCOLE BIM – CHANTIER

extract from the BIM protocol

A unique collaborative platform, A360, will enable :
– the management of on-site execution plan (type Drop-Box)
– the visualization of the BIM model, and of all associated plans
This plateform is made available free of charge, for the building companies, and all site worh stakeholders. An on-line registration is required to get access to the files and identifiy who consults the plans.
The BIM manager is in charge of the plateform management and give access rights to users.
The project manager team only may modify its content. All other stakeholders will have access for consultation only, with the ossibility to make comments on the BIM model.

Illustration 37 : extract of specifications

4.4.3. Use of a collaborative platform

A collaborative platform is an on-line numerical space where a project BIM resources can be collected, exchanged and updated real time.
Usually, it includes viewers for the BIM models, and accept BCF comments, memos ....
It may also includes different other tools to achieve better collaboration between stake holders.

4.4.4. Use of the A360 platform

The A360 platform (see Ill.38) allow the use of different files such as IFC, NWD, RVT ….

Illustration 38 : A360 can "read" different file format

This platform includes a viewer (see Ill.39 & 40). It enables the sharing of BIM models and comments between stakeholders

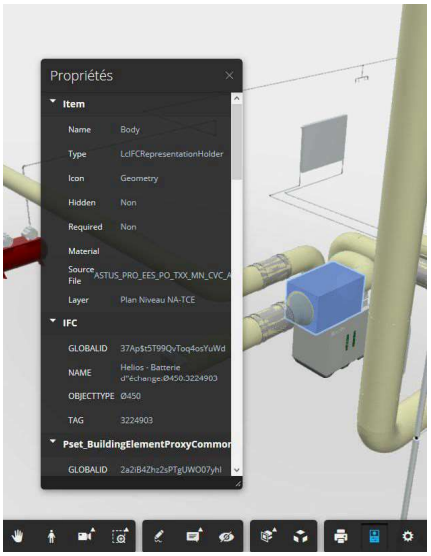

Illustration 39 : "viewer" function of the A360 platform

Illustration 40 : "comment" function of A360

A360 is also accessible with a tablet (Ipad) (see Ill.41)

Illustration 41 : A360 used with a tablet

4.5. Step 4 : Read BIM objects properties, export in a table

This chapter will present different other viewers that enable special action on data.

4.5.1. Viewer "EVEBIM"

This viewer enables the export of quantitative BIM object data. (see Ill.42)

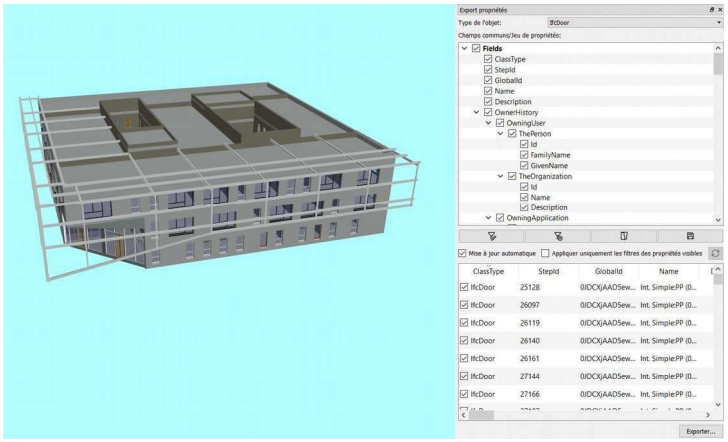

Illustration 42 : EVEBIM data export

4.5.2. SIMPLEBIM software

SIMPLEBIM is a professional software that allows the export of the whole set of a BIM model objects data, including their properties. (see Ill.43)

	A	B	C	N
1	Door			
2				
3	Name	Description	Object type	Fire Rating
4	12.2_Simple (R):83 x 204 - (80):1328979		83 x 204 - (80)	PF1/2H
5	12.2_Simple (R):93 x 204 - (90):1328980		93 x 204 - (90)	PF1/2H
6	12.2_Simple (R):93 x 204 - (90):1328981		93 x 204 - (90)	PF1/2H
7	12.2_Simple (R):93 x 204 - (90):1328982		93 x 204 - (90)	PF1/2H
8	12.2_Simple (R):93 x 204 - (90):1328983		93 x 204 - (90)	PF1/2H
9	12.2_Tiercé (R):143 x 204 - (140):1328991		143 x 204 - (140)	
10	12.2_Tiercé (R):143 x 204 - (140):1329000		143 x 204 - (140)	
11	porte sans bati:porte sans bati 500:1329014		porte sans bati 500	
12	porte sans bati:porte sans bati 500:1329015		porte sans bati 500	
13	porte sans bati:porte sans bati 500:1329021		porte sans bati 500	
14	porte sans bati:porte sans bati 500:1329022		porte sans bati 500	
15	Simple vitrée-sans dormants:simple:1491285		simple	
16	Simple vitrée-sans dormants:simple:1486694		simple	

Illustration 43 : xls table of SIMPLEBIM data export

4.5.3. BIMVISION viewer

This viewer can give a measure or a quantity (see Ill.44), while just clicking on different objects.

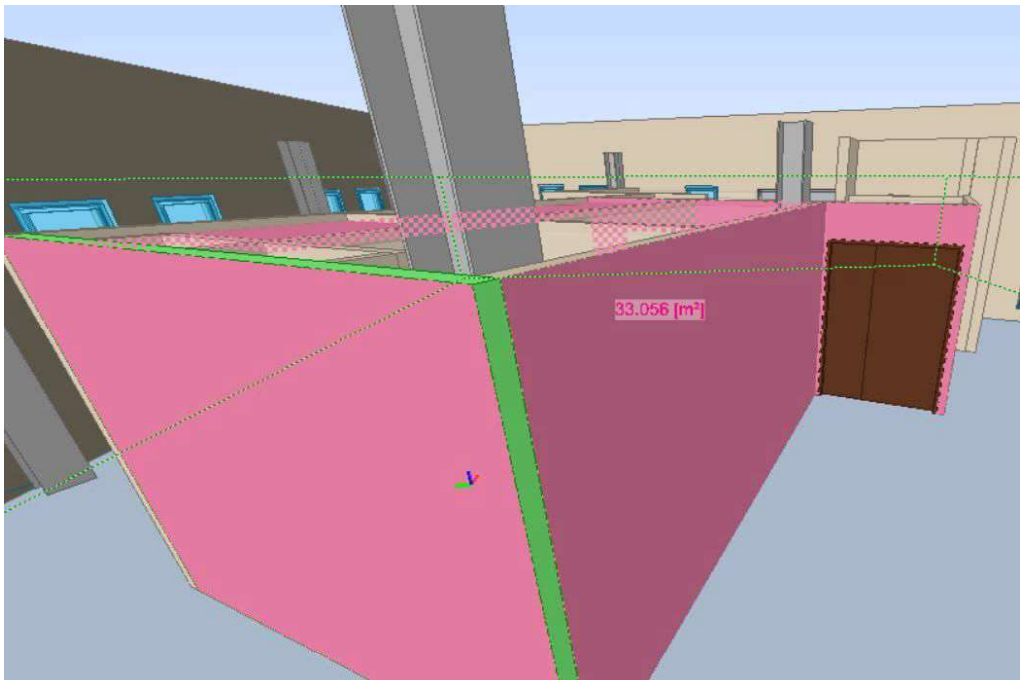

Illustration 44 : wall area in the Zodiak project, calculated with BIMVISION

4.5.4. The specificity of NAVISWORKS Freedom viewer

Navisworks Freedom allows you to :

- view the BIM models
- draft comments (see Ill.45)

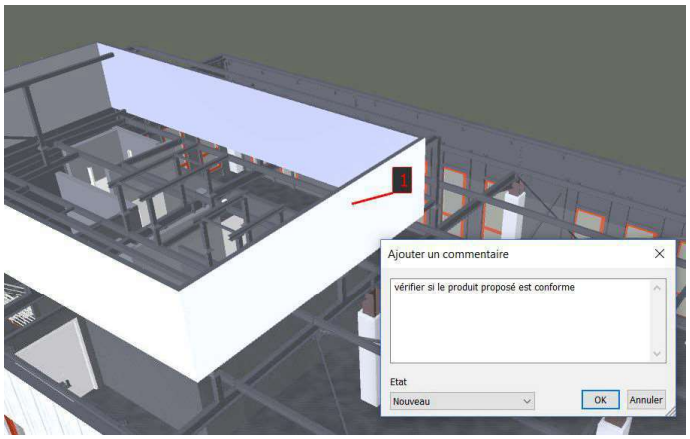

Illustration 45 : draft comments with Navisworks Freedom

- link documents to objects

In addition, Navisworks Freedom allows the BIM manager to

- check conflicts between several models
  for instance to check the good position of blokout (see Ill.46)

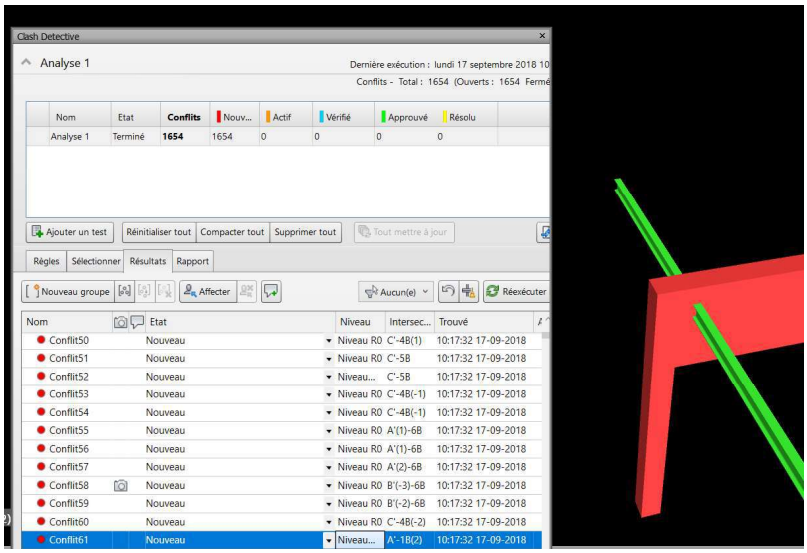

Illustration 46 : conflict position detected

- and finally, build up a 4D planning (see Ill.47)

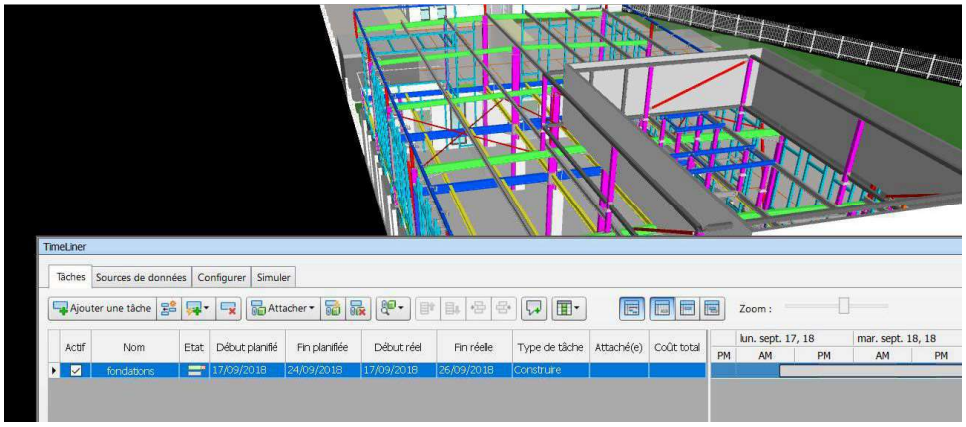

Illustration 47 : building a 4D planning

4.6. Get a bit farther in terms of ventilation and airtightness

The training content presented in §4 was intended for the building company management, that is ; head of the company, technical director, design office and site foremen.
Due to the context, the first training session had to be focused on BIM. And only after, it will be possible to apply this knowledge to ventilation and airtightness. No specific training session have been realized on ventilation and airtightness for the Zodiak project.

These questions have been dealt with during the Carrousel project, second French pilot project.
A pwt presentation have been drafted for this project and is presented in D4.5, annexe 2.2.

Work package 3 created a qualification framework for ventilation and airtightness, and gave an extensive presentation of available training contents and tools.

4.7. Conclusion about this training guideline for building companies manager, design office and general foremen

This first training course presented a whole set of available BIM tools. However, for building companies, it might necessary to propose an additional upstream training session on how to answer a call for tender where BIM is requested, and better understand the issue of BIM process. Such a training session should help them to plan the future and encourage them to think of the necessary investments to become qualified BIM stakeholders.

5. On-site training for blue collars

Chapter 9, of D4.5 presents the subjects that can be presented to on-site workers, as well as the tools that can be used by the BIMplement trainers to design his training contents.
These training sessions will be directed toward on-site stakeholders and workers. In order to adapt his training program to each project, the BIMplement trainers will have to :

- follow and implement the guidelines given in D4.5,
- specify what are the Blue collar workers skills, and to what level they should be up-skilled,
- build his training sessions to reach this level, using the different available tools drafted in WP3 and 4, both in terms of nZEB and BIM,
- possibly propose, for airtightness and ventilation issues, to use a special and adapted model enriched with on worksite retrievable data and documents (see D4.6, French research pilot project),
- explain how to use these tools to show up the implemented work onsite, with pictures, quality files, … and possibly explain how to participate to the as-built model,
- convince site manager to use the main BIM tools (show models instead of working with 2D plans), and more specifically 4D-planning, during all onsite operating meetings.

The training courses will be especially designed for blue workers. It will include parts of this §4 data, and be adapted to the blue collars trainees.
Examples of training contents will be attached to the pilot and experimental BIMplement projects.

COLOFON

BIMplement

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The information in this publication does not necessarily represent the view of the European Commission.