BIMEET project

CONSTRUCTION SKILLS   ENERGY EFFICENCY

BIMCERT

REGULATING SUPPLY CHAINS   TACKLING CLIMATE CHANGE

bimeet

BIMcert Conference

22nd January 2020

Reducing the energy footprint in the built environment

Speaker Title:

Richard Hartless

Session Title:

BIMEET project

Contents:

BIMEET project

BIM-based EU-wide Standardized Qualification Framework For achieving Energy Efficiency Training
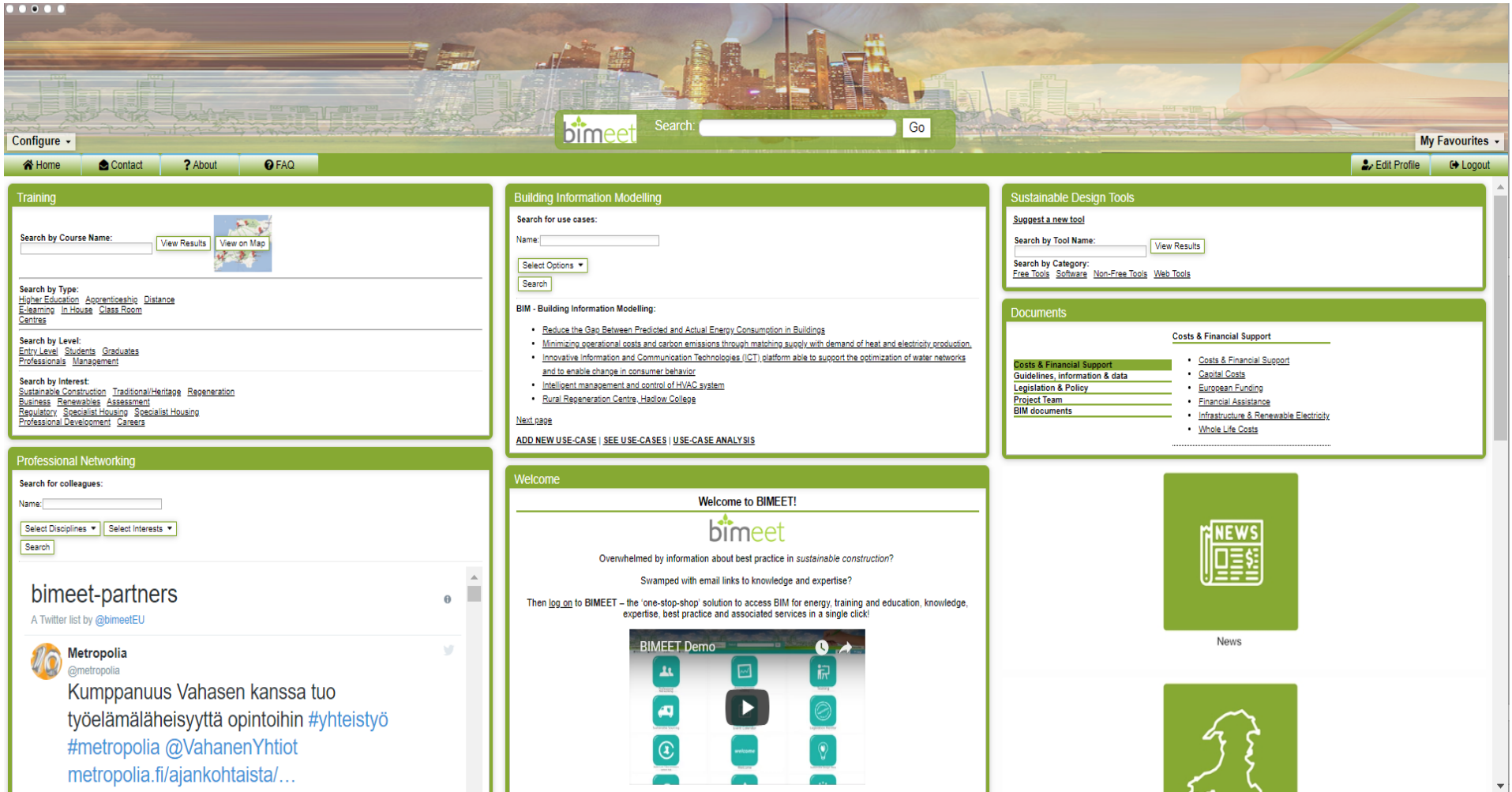
BIMEET concept

- BIMEET considers
  - Each stage of building's life-cycle
  - All actors involved
- To highlight specific skills required
  - For a global BIM approach
  - Enabling achieving EE in buildings

- BIM as a tool for improved multi-disciplinary approach across trades
- BIM-based material for enhanced energy efficiency learning
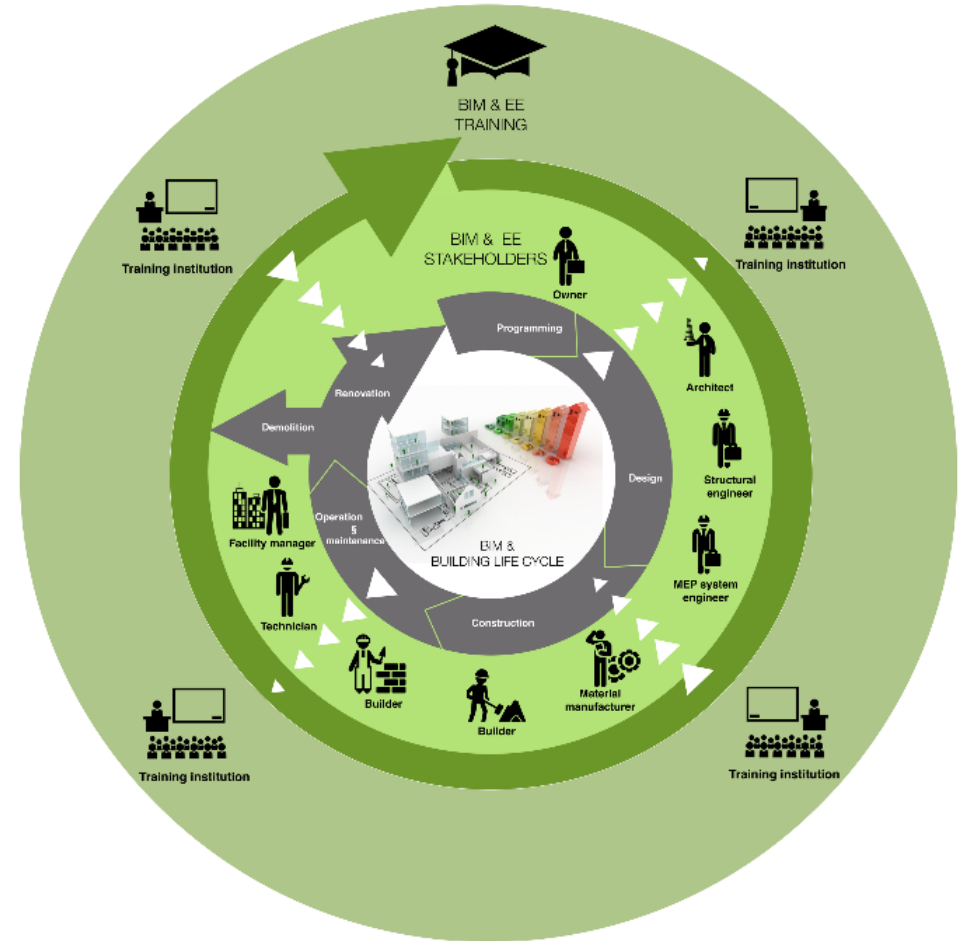
BIMEET objectives

- BIMEET specifically focuses on *BIM qualifications*, in the perspective of NZEB and energy efficiency.

- Objectives
  - **O1:** Demonstrate the role of BIM in achieving energy efficiency in buildings across the whole value chain.
  - **O2:** Benchmark existing Europe-wide BIM (+EE) trainings
  - **O3:** Harmonize energy related BIM qualification and skills frameworks available across Europe with a view of reaching a global consensus
  - **O4:** Map identified skills, qualifications, accreditation into a BIM for energy efficiency national overlay
  - **O5:** Provide a robust online and open-access environment for BIMEET
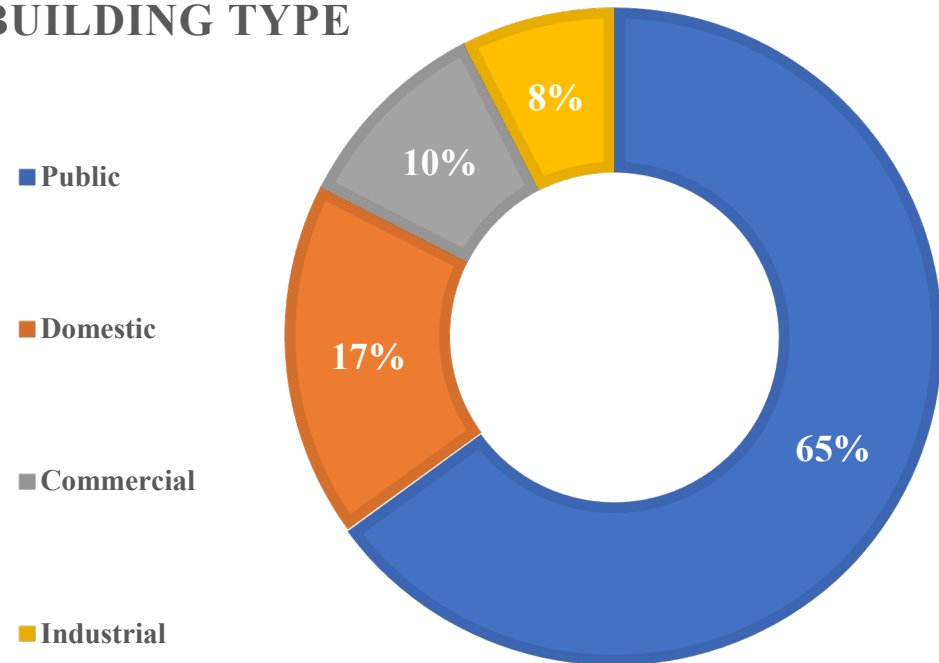 - **O6:** Ensure the long-term sustainability of the proposed BIMEET

BIMEET platform

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BIMEET case studies

NO.	Building Type	Many of use cases
1	Public	26
2	Domestic	7
3	Commercial	4
4	Industrial	3

BUILDING TYPE

- Public
- Domestic
- Commercial
- Industrial

8%
10%
17%
65%

BIMEET case studies

No.	Use cases/ Target discipline	Architecture design	Facility management	Structural engineer	Mechanical engineer	Other	Impacts
1	Reduce the Gap Between Predicted and Actual Energy Consumption in Buildings		✔				Reduction of 25% energy compared to baseline figures.
2	Minimizing operational costs and carbon emissions through matching supply with demand of heat and electricity production.		✔				Leading to a 32% increase in profit and 36% reduction in CO2 emissions.
3	Intelligent management and control of HVAC system		✔				Up to 30% of Energy Saving Up to 30% Emission reduction
4	Friendly and Affordable Sustainable Urban Districts Retrofitting (FASUDIR) - Heinrich-Lubke housing area, Frankfurt, Germany		✔				GWP reduction of 60%. Operational energy consumption reduction of 35%
5	Friendly and Affordable Sustainable Urban Districts Retrofitting (FASUDIR) - Budapest Residential District		✔				Operational energy reduced by 35% and energy running costs reduced by 35%
6	An innovative integrated concept for monitoring and evaluating building energy performance (the gap between predicted and actual building energy performance is addressed by the project).		✔				Achieve building energy performance
7	Parametric design of a shelter roof in urban context	✔	✔	✔	✔	✔	Early BIM for parametric optimization through simulations
8	Building As A Service	✔	✔	✔	✔		Optimize energy performance in the application domain of non-residential buildings
9	Delivering highly energy efficient hospital centre		✔				41% reduction in fabric loss heat, 29% reduction in carbon emissions,15% reduction in overall energy usage
10	Shopping Center using around half the energy of a typical development	✔	✔	✔	✔		50 % energy savings , 50 % savings in water consumption
11	Design of energy-efficient library with high architectural goals	✔	✔	✔	✔		Energy optimization results impacted for the building and HVAC design
12	Use of Optimization tool to compare hundreds of concepts energy efficiency before actual design	✔					Use of Optimization tool has the potential to save money and time while directing to more optimal energy efficiency solutions.

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Summary of BIM training

BIM training	Clients	Facility and asset management	Design consultants (including technicians)	Contractors (including site managers)	Sub-contractors (including blue collar workers)	Students
Awareness	Reasonable	Reasonable	Reasonable	Reasonable	Reasonable	Reasonable
0. Definition	Limited	Limited	Not relevant	Not relevant	Not relevant	Limited
1. Brief	Limited	Poor	Poor	Not relevant	Not relevant	Limited
2. Concept	Poor	Poor	Reasonable	Not relevant	Not relevant	Limited
3. Design	Poor	Poor	Reasonable	Not relevant	Not relevant	Limited
4. Technical	Poor	Poor	Reasonable	Reasonable	Poor	Poor
5. Construction	Poor	Poor	Reasonable	Reasonable	Limited	Poor
6. Handover	Limited	Limited	Reasonable	Reasonable	Limited	Poor
7. In use	Poor	Limited	Not relevant	Not relevant	Not relevant	Poor
Demolition	Poor	Poor	Poor	Poor	Poor	Poor

RIBA stage

Legend:
- Not relevant (black)
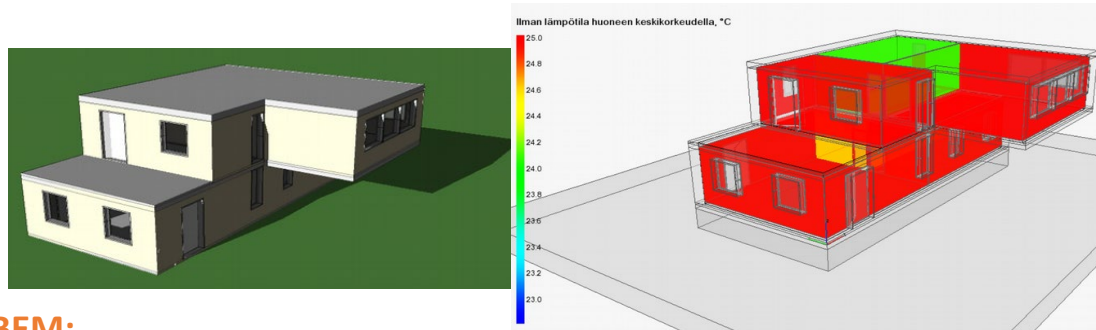- Reasonable (green)
- Limited (orange)
- Poor (red)

Summary of BIM and EE training

Integrated BIM and energy efficiency training	Clients	Facility and asset management	Design consultants (including technicians)	Contractors (including site managers)	Sub-contractors (including blue collar workers)	Students
Awareness	🟧	🟧	🟧	🟧	🟧	🟧
0. Definition	🟥	🟥	⬛	⬛	⬛	🟧
1. Brief	🟥	🟥	🟥	⬛	⬛	🟧
2. Concept	🟥	🟥	🟧	⬛	⬛	🟧
3. Design	🟥	🟥	🟧	⬛	⬛	🟧
4. Technical	🟥	🟥	🟧	🟧	🟥	🟥
5. Construction	🟥	🟥	🟧	🟧	🟥	🟥
6. Handover	🟥	🟥	🟧	🟧	🟥	🟥
7. In use	🟥	🟥	⬛	⬛	⬛	🟥
Demolition	🟥	🟥	🟥	🟥	🟥	🟥

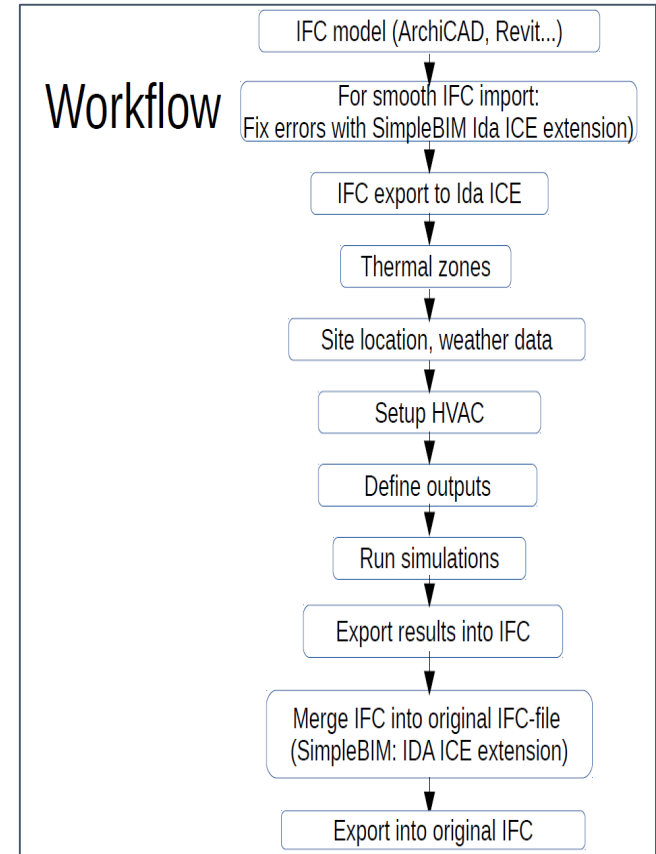RIBA stage (rows 0. Definition through 7. In use)

BIM for energy knowledge management

Development process included:

- BIM + EE case studies
- Enquiries to experts
- Tests of different tools (BIM->BEM->BIM)
- Existing BIM and EE courses
- Harvesting Twitter with algorithms
- **Development of S-K-C and Learning outcomes**

**BIM to BEM:
TESTING IDA-ICE**

Workflow

IFC model (ArchiCAD, Revit...)

For smooth IFC import:
Fix errors with SimpleBIM Ida ICE extension)

IFC export to Ida ICE

Thermal zones

Site location, weather data

Setup HVAC

Define outputs

Run simulations

Export results into IFC

Merge IFC into original IFC-file
(SimpleBIM: IDA ICE extension)

Export into original IFC

BIMEET Learning Outcomes

- LOs are attributed to individual educational components and to programmes as a whole

- LOs are specified in three categories – as knowledge, skills and competence. This signals that qualifications – in different combinations – capture a broad scope of LOs, including theoretical knowledge, practical and technical skills, and social competences where the ability to work with others will be crucial
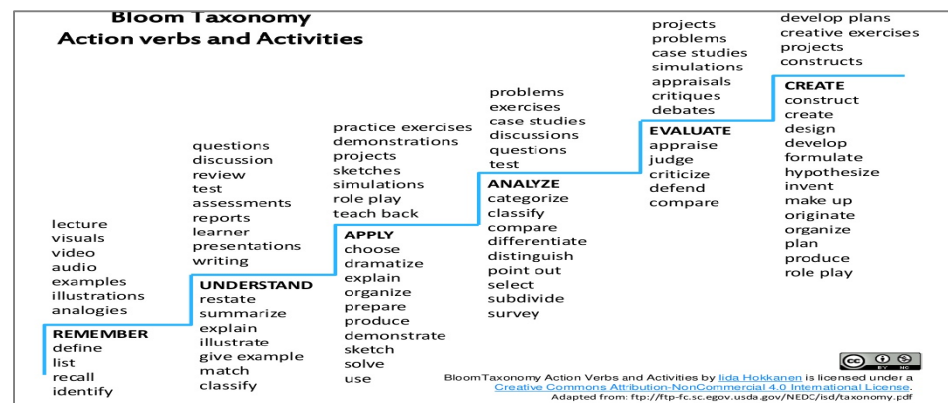
- Approach: Bloom's taxonomy is the most frequently used tool when developing LOs
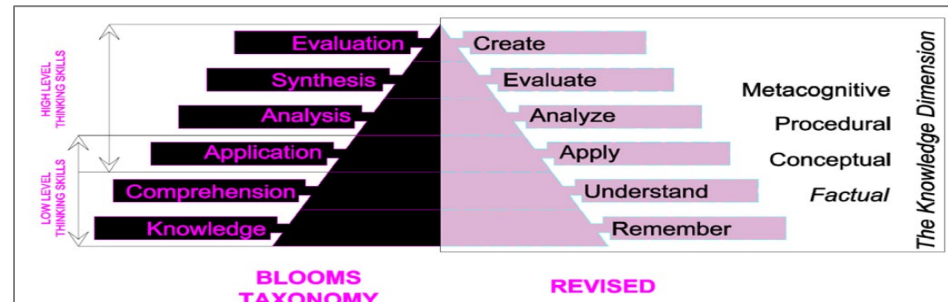
Users' Guide, E. C. T. S. "Luxembourg: Publications Office of the European Union." DOI 10 (2015): 87192.
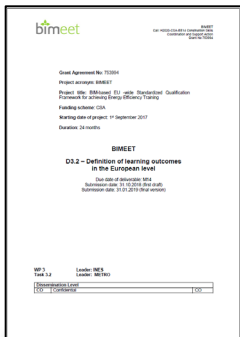https://europass.cedefop.europa.eu/sites/default/files/ects-users-guide_en.pdf.
Krathwohl, D. R. (2002). A revision of Bloom's taxonomy: An overview. *Theory into practice*, *41*(4), 212-218. Iida Hokkanen 2015: https://www.slideshare.net/IidaHokkanen/bloom-taxonomy-action-verbs-and-activities
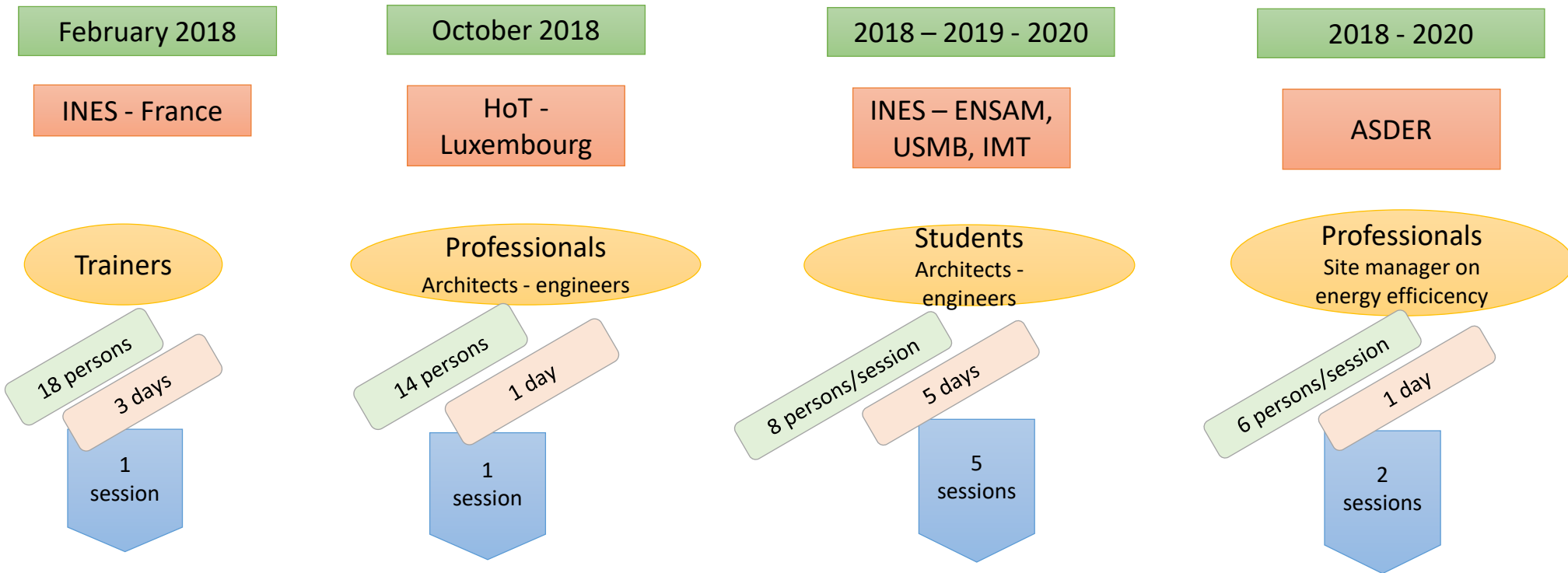
BIMEET Learning Outcomes for main roles

- Client & Clients' advisors
- Architectural design roles
- Structural design roles
- Building services design roles
- Construction work roles
- Maintenance work roles

Report D3.2 – Definition of learning outcomes at the European level

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BIM for energy efficiency training – In-class

February 2018	October 2018	2018 – 2019 - 2020	2018 - 2020
INES - France	HoT - Luxembourg	INES – ENSAM, USMB, IMT	ASDER
Trainers	Professionals Architects - engineers	Students Architects - engineers	Professionals Site manager on energy efficiency
18 persons	14 persons	8 persons/session	6 persons/session
3 days	1 day	5 days	1 day
1 session	1 session	5 sessions	2 sessions

BIM to EPC online course

Introduction	
Lesson 1	• **Review of (2018) Regulations EPBD + EPC** (EU) • **National EPC implementations** (FIN, FRA, GR, LUX, UK)
Lesson 2	• **Added value of BIM in EPC assessment** (EU)
Lesson 3	• **Parameters needed for EPC calculations (geometry, equipment…)** (FIN, FRA, GR, LUX, UK) • **How to prepare/build BIM: What data should they have and in what form?** (FIN, FRA, GR, LUX, UK) • **How to transfer the data from BIM to EPC tool** (FIN, FRA, GR, LUX, UK)
Lesson 4	• **Review of EPC tools** (FIN, FRA, GR, LUX, UK) • **Use cases/Animated demos**
Lesson 5	• **Next generation EPC** (EU)
Summary	
Final exam	• **Quiz**

WP4 – TANGIBLE APPLICATION

Putting BIM on the map
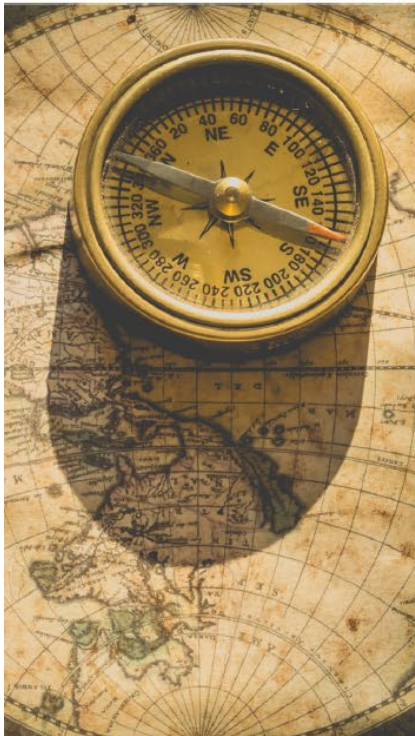
- **Objectives**
  - Building a tool, supporting training institutions in:
    - 1. Finding the most appropriate venue location with respect to desired target audience.
    - 2. Determine market needs in terms of learning outcomes based on already available trainings.
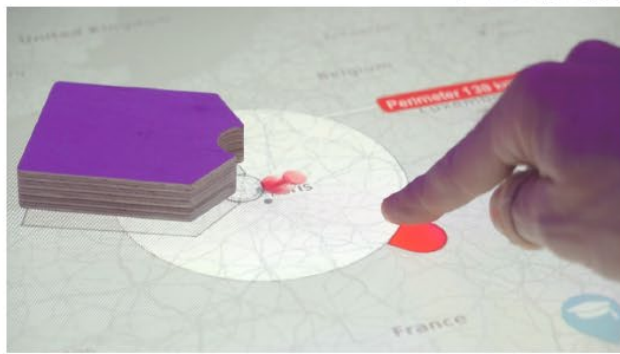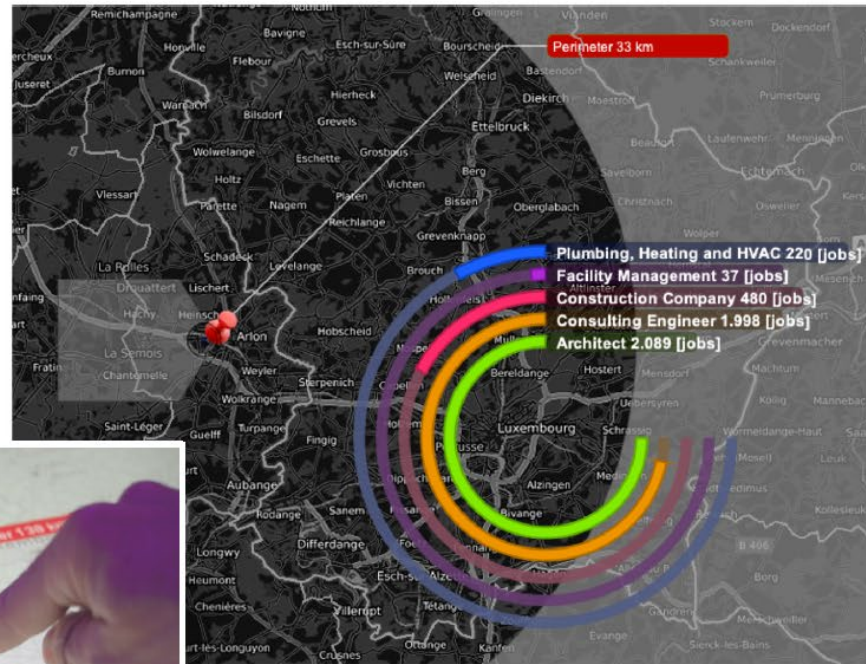
WP4 – TANGIBLE APPLICATION

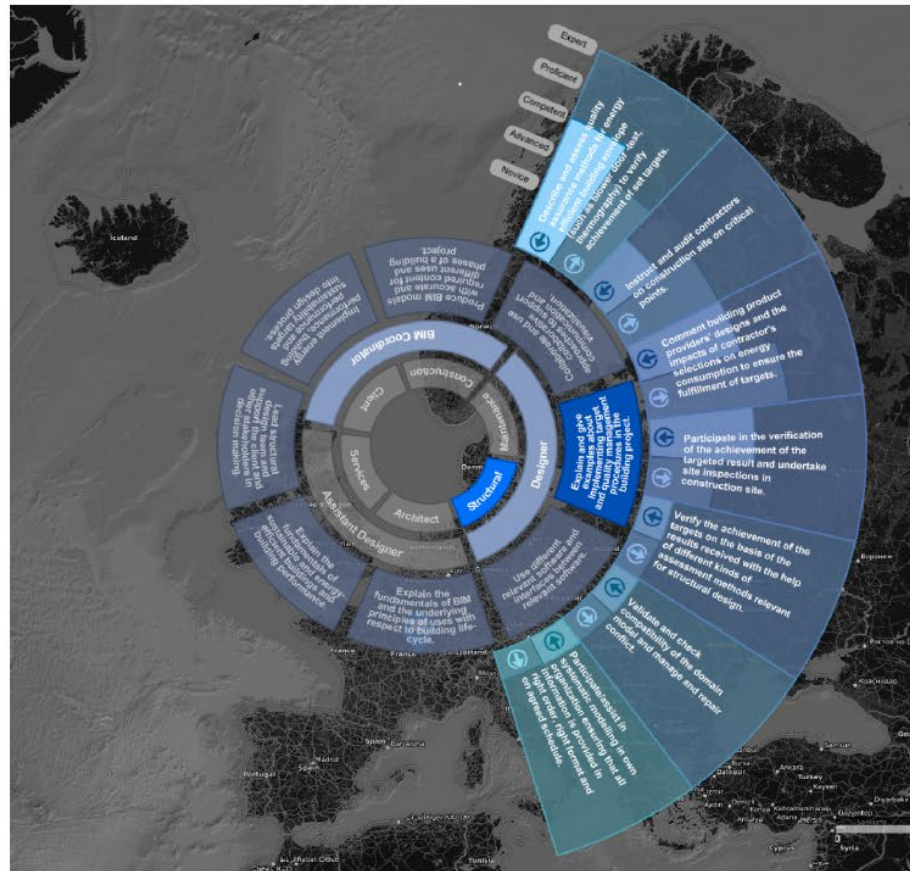## Tangible Tables – Natural and collaborative User Interface

GEOREFERENCED MODEL

Spatial Querying – Finding your potential audience

GEOREFERENCED MODEL

Learning Outcomes

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BIMEET label

- Developing a BIMEET label to badge training organisations as well BIM/EE courses that meet the Learning Outcomes

- Working with EU to identify Key Exploitable Results from the project and to maximise BIMEET's impact