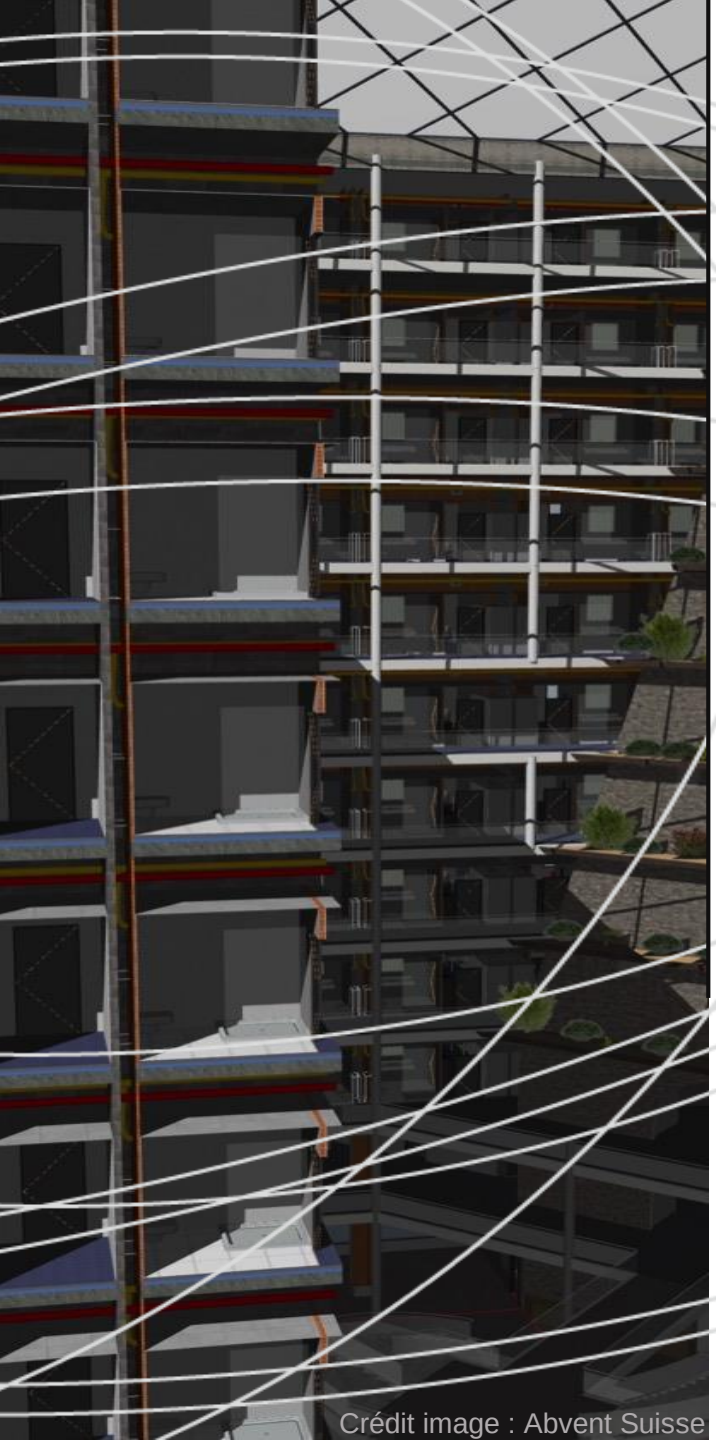

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WP2: BIM FOR ENERGY EFFICIENCY REQUIREMENTS CAPTURE AND BENCHMARK T2.2

Context

- D2.1 BIM for energy efficiency requirements capture
- D2.2 Benchmarking of existing training offers
- D2.3 List the required roles and skills

Objectives

Current State

- What do we mean by BIM and energy efficiency training
- Review of current industry skills and capability
- Identify current training meeting industry requirements

Gap Analysis

- Identify areas where there is a skills gap within the building value chain
- Identify future training requirements for these gaps

Career Progression Pathways

- Identify route of entry and career progression pathways
- Explore scope to make apprenticeships more flexible

Accreditation and Assessment

- Review assessment methods of capability
- Review Accreditation mechanisms

Methodology – Expert panel

Brainstorm with expert panel on two questions:

- What are the skill gaps?
- What training should be delivered?

Brief	Design	Construction	Operation
Transversal Softskills, limitations (what is not possible), knowing the consequences, system thinking,			
Include the significance of early design decisions in Energy BIM workflow	Universities BIM training - combine Energy and BIM training	BIM Vocational Training for construction managers to enhance ability to implement BIM with Energy specs.	Facilities manager to be trained in Energy and BIM facilities management
Final-users should be involved. Good to keep in that health, thermal comfort, productivity and operational costs are more relevant to them than energy and energy-efficiency. These things are connected, so it is ok.	Vocational training for engineers	On-site training blue collar workers for accurate implementation.	Use real case studies, on-site training
Owner, decision maker, should provide requirements and strategy to all.	Architects need to be educated what is zero energy building and how BIM and EE can help to provide	Training for the owners to enhance the ability to participate in decisions.	Provision of tools and training on them to enable managers and users to interact with BIM model.

Methodology – Partner surveys

Completed Excel template of BIM training:

- Training title
- Organisation delivering
- Method of recognition
- Launch year
- Study hours
- Learning outcomes/Objectives
- The audience the training addresses
- EQF Level
- Links to energy efficiency
- Weblink

- chools/colleges
- niversities
- raining organisations

- Certificate of attendance
- Examination
- Certification

- Owners
- Designers
- Contractors
- Building managers
- Blue collar workers etc.

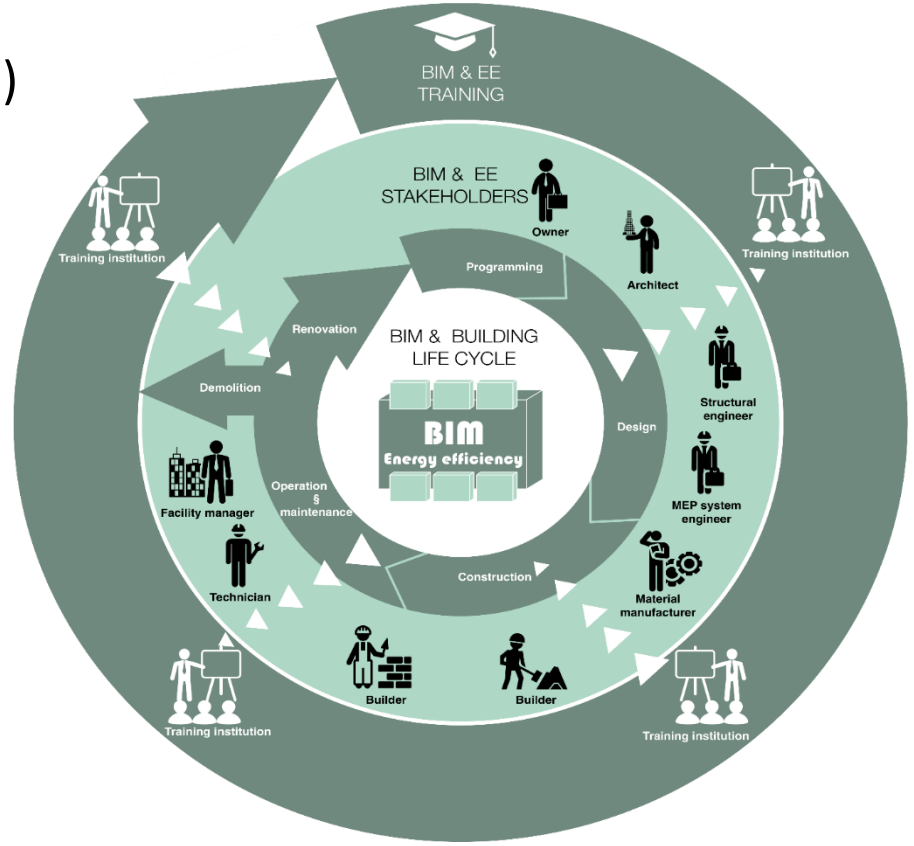
Levels	Knowledge	Skill	Competence
1	Basic general knowledge	Carry out simple tasks	Work under direct supervision in a structured context
2	Basic factual knowledge	Carry out tasks and solve routine problems	Work under supervision with some autonomy
3	Knowledge of facts, principles, processes and general concepts	Solve problems by selecting and applying basic methods and tools	Take responsibility for completion of tasks, adapt own behavior to circumstances in solving problems
4	Factual and theoretical knowledge in broad contexts	Generate solutions to specific problems	Exercise self-management, supervise the routine work of others, taking some responsibility for the evaluation and improvement of activities
5	Comprehensive, specialized, factual and theoretical knowledge and an awareness of the boundaries of that knowledge	Develop creative solutions to abstract problems	Exercise management and supervision, review and develop performance of self and others
6	Advanced knowledge involving a critical understanding of theories and principles	Solve complex and unpredictable problems	Manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work, take responsibility for managing professional development of individuals and groups
7	Highly specialized knowledge, critical awareness of knowledge issues in a field and at the interface between different fields	Develop new knowledge to be integrated from different fields	Manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches, take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams
8	Knowledge at the most advanced frontier of a field	Solve critical problems, extend and redefine existing knowledge	Demonstrate substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work or study contexts including research.

Methodology – Partner surveys

Apprenticeships:

- Becoming an apprentice (who are apprenticeships aimed at?)
- Construction apprenticeships offered (indication of numbers)
- Apprenticeship levels (e.g. higher and degree apprenticeships) and duration
- Employing an apprentice
- Apprenticeship training providers
- Support and advice offered by government
- Funding apprenticeships (levies)

Structure findings using RIBA plan of works and key actors in the supply chain



Skills gaps – BIMEET D2.1

Distillation of findings:

- Poor understanding of policies and standards
- Lack of awareness of BIM and energy efficiency
- Unable to build effective models
- Limitation of models
- Unable to use models
- How models and processes can help collaborative working (communication)

- *Common issue across all stakeholders and mirrors Expert Panel workshop*

Examples of BIM and EE training

Luxembourg

- BIM training due later in 2018 and 2019 to be delivered by CRTIB
- Courses to be 1 or 2 days in duration and are primarily aimed at:
  - BIM co-ordinators and designers with focus on BIM protocols
  - modelling issues
  - BIM management
  - interoperability etc.
- Also a single 1-day course aimed at all actors to introduce BIM and raise awareness
- Completion to be recognised through certificate of attendance

Examples of BIM and EE training

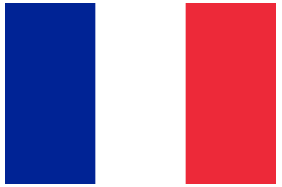
Luxembourg

- Only <u>one</u> course related to energy efficiency to be deliver by HoT covering:
  - energy efficiency of buildings,
  - BIM methodology,
  - understanding how BIM can improve the energy performance of buildings, and,
  - linkage to LENOZ, the sustainability certification scheme for new buildings in Luxembourg

LENOZ

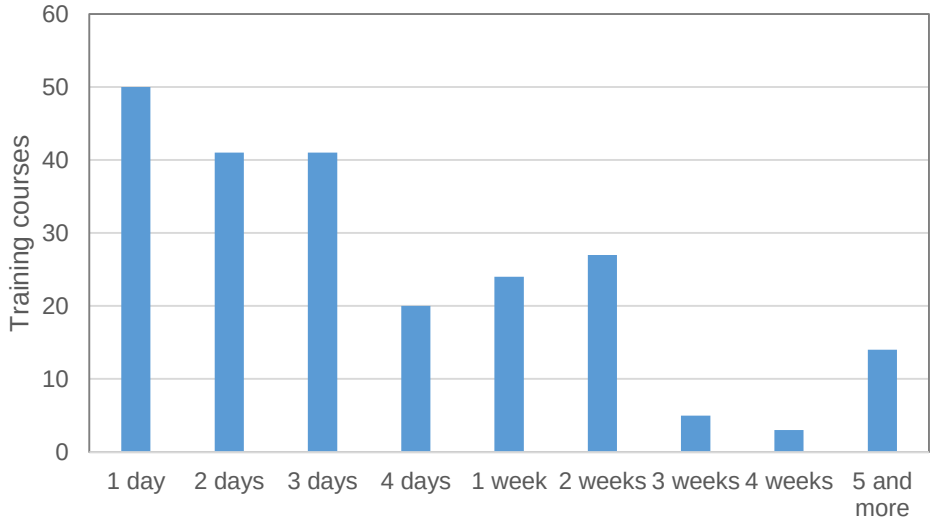
Examples of BIM and EE training

France



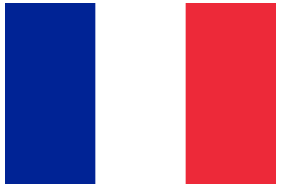
Very extensive BIM portfolio with over 230 courses:

- Address all actors but particularly aimed at architects, engineers and project managers
- Duration typically 30-50 hours but a few are 80-90 hours
- Pitched at EQF Level 5/6
- Key deliver organisations are AFNOR and CESI
- Certificate of attendance
- Also five master's degrees (EQF Level 7)



Examples of BIM and EE training

France



Certificated training at Level 1 and 2 provided by CSTB:

- Level 1 and, subsequently, Level 2 each with ½-day exam
- Learning outcomes:
  - Manage a BIM project
  - Deal with the BIM framework
  - Deal with the BIM environment
  - Co-ordinate all BIM actors
  - Facilitate exchanges around the numerical model
  - Ensure the sustainability and quality of information in the supply chain
  - Establish the specifications and exchange protocols

Examples of BIM and EE training

France

None of the BIM courses address energy efficiency specifically, but:

- INES recently launched 3-day Level 5/6 course *BIM au service de l'efficacité énergétique des bâtiments* addressing:
  - The energy efficiency of buildings
  - The BIM process
  - How BIM can improve the energy performance of buildings
- As a prerequisite, attendees require construction experience and basic knowledge of BIM and energy efficiency
- Training delivered as a series of presentations with case studies and feedback together with practical modelling work

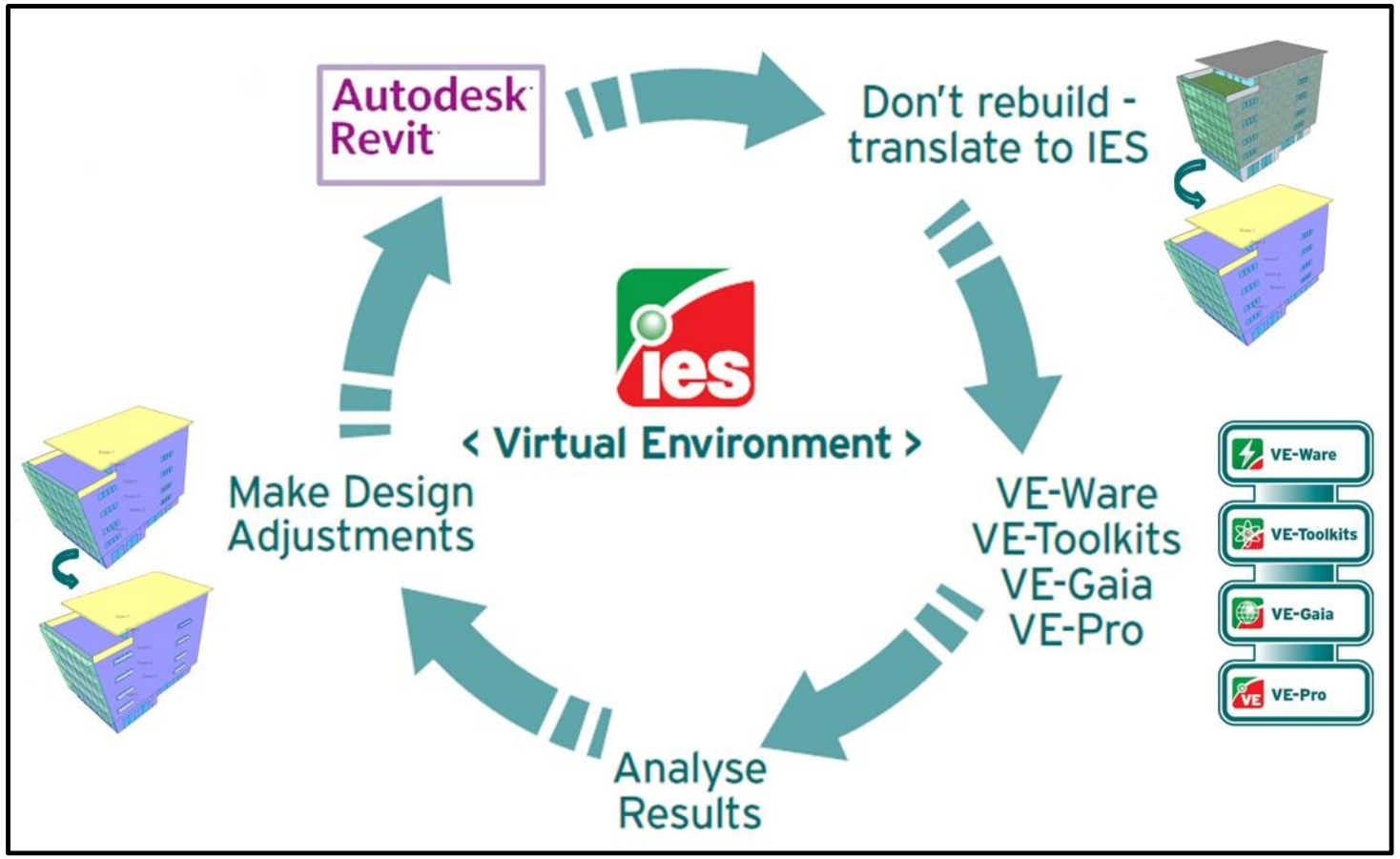
Examples of BIM and EE training

France

Looking to integrate BIM into existing energy efficiency training provided at *Le Lycée Technique* and *Le Lycée Professionnel:*

- 3 years for technological baccalauréats
- Students focus on small buildings where elements of implementation addressed include: integration of building services (e.g. boilers) and simple hydraulic connections (e.g. drainage, air vents)
- Use REVIT with viewers such as eveBIM to extract data in IFC
- Students can take *Brevet de technicien supérieur* (BTS) which is a national diploma of higher education in France
- **BTS Fluids, Energies, Home Automation (BTS FED**) equips technicians capable of designing, commissioning, optimizing and supervising the maintenance of systems and technical installations in housing and professional buildings
- Drive to integrate BIM into BTS FED and schedule for doing this over 2017-2020 has been developed

Software solutions



IES training -

Revit into IES:
https://distance-learning.iesve.com/p/revit-into-ies

SketchUp into IES:
https://distance-learning.iesve.com/p/sketchup-into-ies

Software solutions

Trailoop on-line courses (Level 3-6):

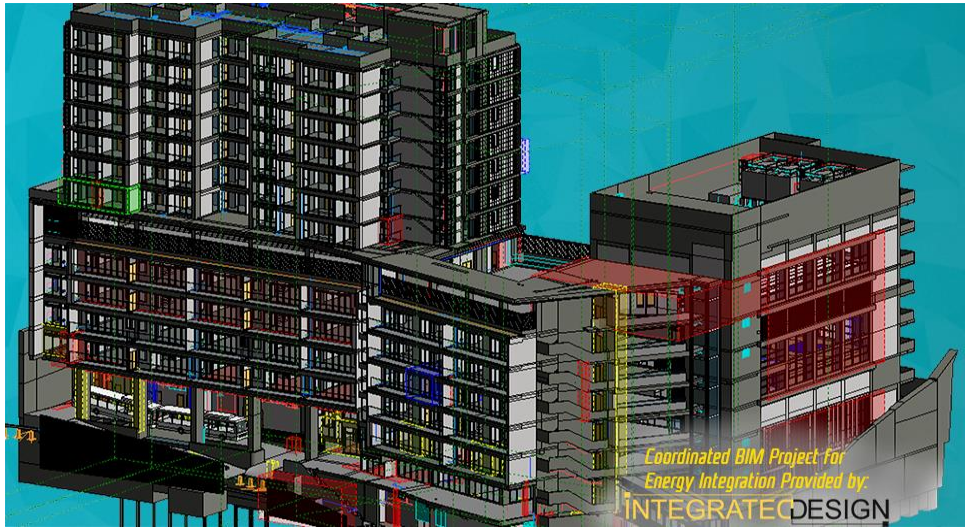
Simple course: 5+ hours tutorials, quiz questions and get 8 hours CPD with GBCI

Course delivery:

- Foundations of Integration Modelling
- Geometry Integration
- Integrated Energy Simulation

Complex course (4 hours/week)

“The integration process works by preparing a clean gbXML import file, avoiding errors before they happen”



BIM for energy introduction:
https://learn.trailloop.com/p/bim-for-energy-modeling-intro
Simple BIM integration:
https://learn.trailloop.com/p/bim-energy-modeling
Detailed BIM integration:
https://learn.trailloop.com/p/bim-management-energy-modeling
Data interoperability:
https://learn.trailloop.com/p/interoperate-data-revit-virtual-environment

Summary of training – BIM courses

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

Not relevant
Reasonable
Limited
Poor

Summary of training – BIM and EE courses

	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						
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	Demolition						