SUSTAINABLE PLACES 2024

Renewable Energy Implementation: Does Farm Anaerobic Digestion Have Good Press? A lexicometric analysis of the daily press in France

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Université de Strasbourg

1. What are we talking about? Agricultural anaerobic digestion and the controversies surrounding it

- I aim to shed light on agricultural anaerobic digestion, examining **the dialectic between the challenges of energy transition and those of ecological transition** considering local actors and localised processes.
- **Anaerobic digestion** refers to a natural process by which organic matter is broken down in the absence of oxygen, a process which can be technically controlled through the use of anaerobic digester systems.
- **Upstream**, anaerobic digesters can be fed a variety of **inputs**: household and community waste, sewage sludge and, above all, **agricultural residues** (crop residues, animal manure or slurries) as well as **some crops** as maize, beet or sorghum that can be grown specifically for anaerobic digestion…
- **Downstream**, anaerobic digestion produces **biogas** – a carbon-free renewable energy which is valued for its contribution to the energy transition – and **digestate** – which can be spread on farmland as a fertilizer, but whose use **is controversial due to its impacts:** for example, there is a risk of pathogen contamination of groundwater, where drinking water is pumped for a territory at a large scale.

1. What are we talking about? Agricultural anaerobic digestion and the controversies surrounding it

- The research project **METHATIP** dealing with "the socio-environmental impact of agricultural anaerobic digestion: energy transition, professional identities and the 'new ruralities'" was selected for support by the CNRS *Mission pour les initiatives transverses et interdisciplinaires* (which seeks to promote cross-disciplinary initiatives) in 2022.

- Its aim = **to reconsider together three main types of issues and controversies:**

1) Issues linked to <u>the processes involved</u>, which require:

- A specific organisation of the **technical and economic actors and industries** concerned (« big » or « small » players);
- Specific **technologies**, from feeding the digesters to biogas distribution and digestate spreading;
- The coexistence of food farming and **renewable energy farming**;
- Taking into account **environmental quality**, the risks of pollution and possible ecological impacts.

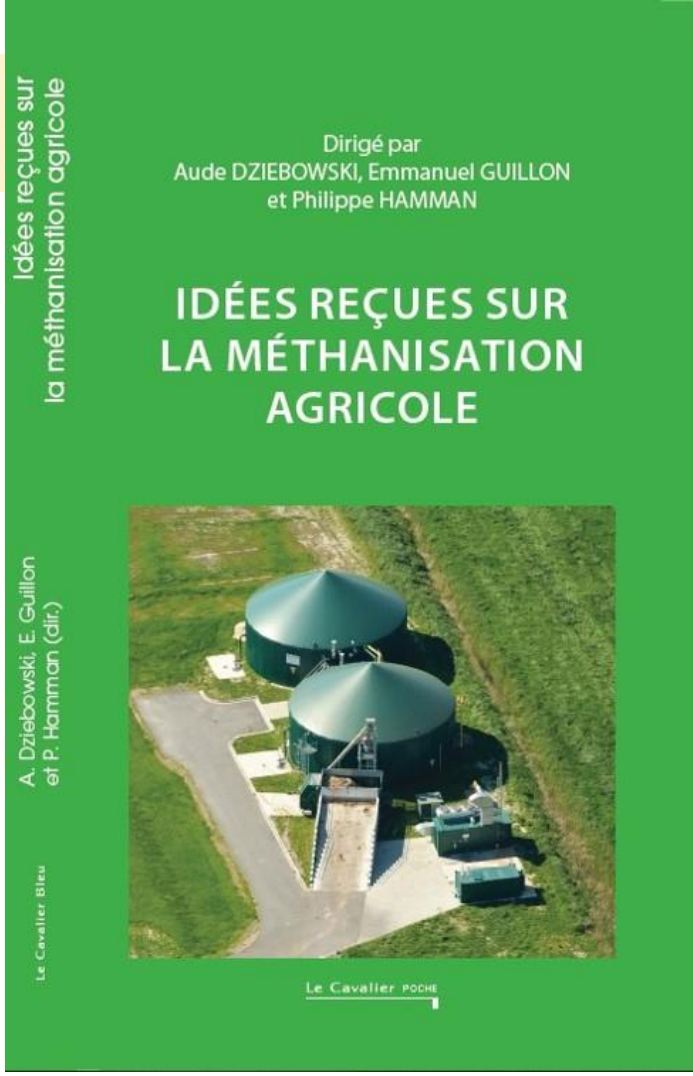
1. What are we talking about? Anaerobic digestion and the controversies surrounding it

2) Issues linked to the multiplicity of <u>interacting scales</u>:

- **On site**: different types of biogas plants (cogeneration plants, which produce both heat and electricity, or plants injecting the biogas into existing distribution networks),
- **Local protest** against anaerobic digester installations,
- The national **legal framework** and European energy targets.

3) <u>Current debates</u>:

- With **agroecology**, about the right way to ensure food security (through agroindustrial production?) *and at the same time* take into account ecological principles,
- Perceptions of (renewed) **professional agricultural identities**,
- The share of anaerobic digestion in the energy mix and its role in **future scenarios**. Biogas production in France increased 12-fold between 2007 and 2024.



Aude Dziebowski, Emmanuel Guillon, Philippe Hamman, *Idées reçues sur la méthanisation agricole*, Paris, Le Cavalier bleu, Idées reçues, oct. 2023.

2. Issues of territorialization and acceptability: going beyond standard sociological interpretations

- The **materiality** of anaerobic digestion installations is a fundamentally "turbulent" one (Cresswell, Martin, 2012). Anaerobic digesters raise issue of "**covisibility**".
- One strategy has been to **make the infrastructure less conspicuous**, for instance to paint biogas plants in green so they can blend into the landscape.
- Hence many discussions have centered on the issue of **acceptability**, assuming protest and controversy as a preformated frame.

In Alsace: © Mylène Fassina, intern on the METHATIP project, 29/03/23

In the Argonne region: ©Aude Dziebowski, 26/04/23

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3. A lexicometric study: Does farm anaerobic digestion have good press?

- Our aim is to **let the material speak for itself**, using a broad sample of daily newspapers, both national (France) and regional (Grand Est region) and a lexicometric approach.
- In February-March 2023, we built **two press corpora**, France (F) and Grand-Est (GE), using the online database Europresse and Factiva, and the archives of the regional daily *Dernières Nouvelles d'Alsace (DNA)* past issues. I wish to thank Sophie Henck and Manon Laborde for their help!
- We are inspired by Max Reinert's **« lexical worlds »** (Max Reinert, 1983) approach, which considers the relations between texts, their conditions of production and social perceptions.
- The software **IRaMuTeQ** counts occurrences of terms and measures co-occurence = both frequency + chi2 tests of association.
- This requires **lemmatisation** of the corpora (= grouping together inflected forms of words, as singular & plural…) I want to thank Céline Monicolle for her help in using IRaMuTeQ!
- For a five-year period (Jan. 2018-Jan. 2023), after keyword filtering and reading, I have selected 68 articles for corpus F and 178 for corpus GE.

3.1. Statistical analyses

- **Comparison between corpora F and GE = The same structure of utterance** in the national and regional press (shaded words) = the results appear to all the more convincing.
- **Based on the first 30 active forms in the 2 corpora (in frequency)**, farm anaerobic digestion appears to be mainly considered (i) **as a 'project'** (F : 242 occurrences, GE : 495), with words related to implementation (F : 'méthaniseur' : 130, 'exploitation' : 75, 'installation' : 66 ; GE : 'méthaniseur' : 194, 'exploitation' : 148, 'installation' : 125) ; and (ii) in terms of **its aim, biogas production** (F : 'produire' : 162, 'production' : 106, 'énergie' : 158, 'gaz' : 255, 'biogaz' : 173, 'biométhane' : 119 ; GE : 'produire' : 225, 'production' : 160, 'énergie' : 204, 'gaz' : 309, 'biogaz' : 143). Conversely, there are **almost no terms related to environmental concerns.**

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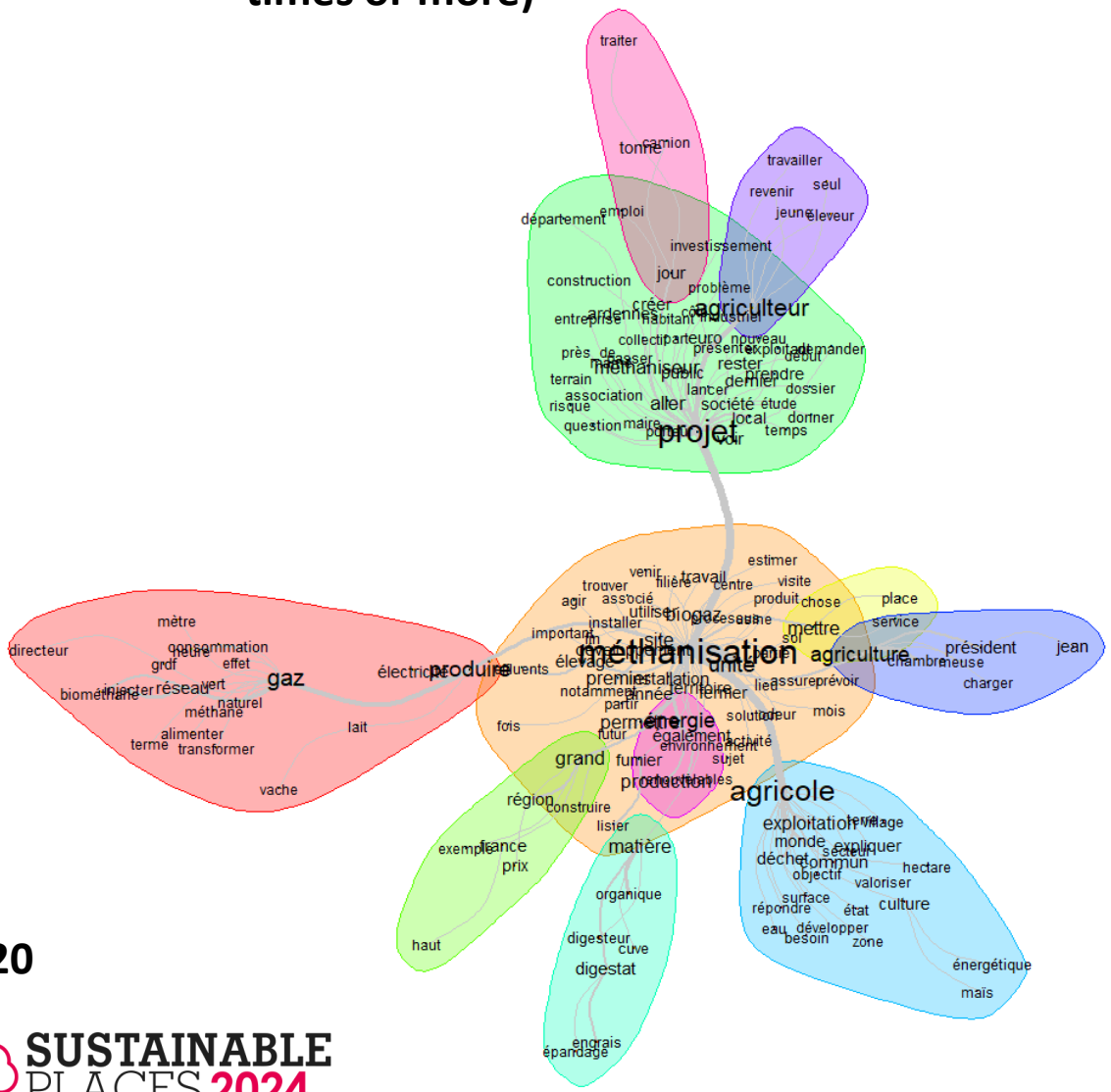
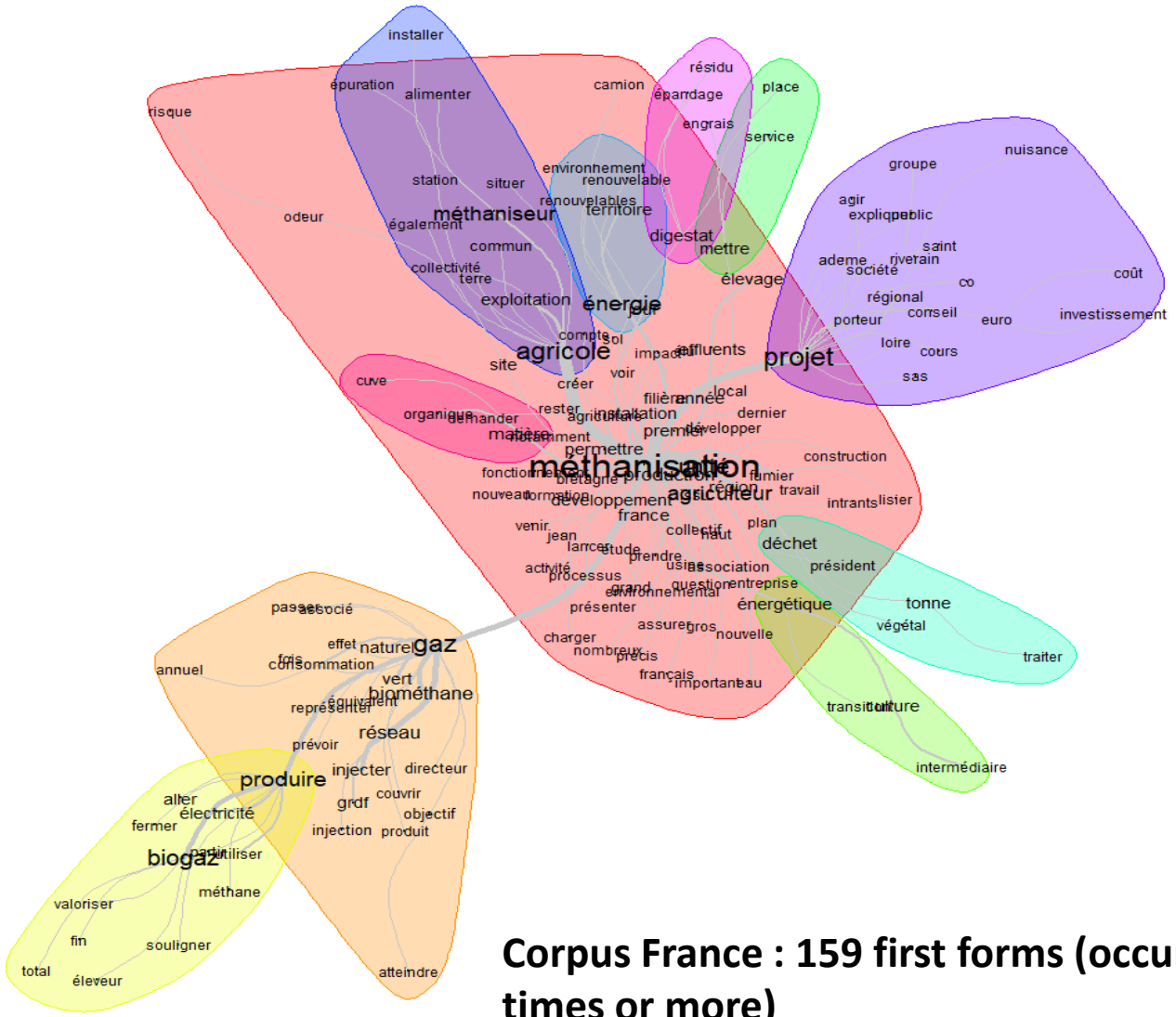
	France			Grand Est	
1	méthanisation	426	**1**	méthanisation	577
2	gaz	255	**2**	projet	495
3	agricole	251	**3**	agricole	414
4	projet	242	**4**	gaz	309
5	unité	191	**5**	agriculteur	297
6	biogaz	173	**6**	unité	240
7	produire	162	**7**	agriculture	230
8	énergie	158	**8**	produire	225
9	agriculteur	133	**9**	énergie	204
10	méthaniseur	130	**10**	grand	194
11	biométhane	119	**11**	méthaniseur	194
12	réseau	114	**12**	aller	181
13	production	106	**13**	site	162
14	déchet	92	**14**	production	160
15	matière	91	**15**	premier	156
16	france	84	**16**	permettre	152
17	permettre	81	**17**	matière	152
18	premier	77	**18**	exploitation	148
19	culture	76	**19**	euro	145
20	énergétique	75	**20**	biogaz	143
21	exploitation	75	**21**	mettre	134
22	injecter	73	**22**	déchet	130
23	digestat	72	**23**	installation	125
24	tonne	67	**24**	président	124
25	installation	66	**25**	réseau	120
26	élevage	63	**26**	digestat	119
27	site	61	**27**	voir	119
28	vert	60	**28**	jour	115
29	développement	58	**29**	rester	113
30	aller	55	**30**	commun	113

Réalisation : UMR SAGE

3.2. Similarity analysis (= defining different universes of meaning)

Corpus Grand-Est : 169 first forms (occur 40 times or more)





Corpus France : 159 first forms (occur 20 times or more)

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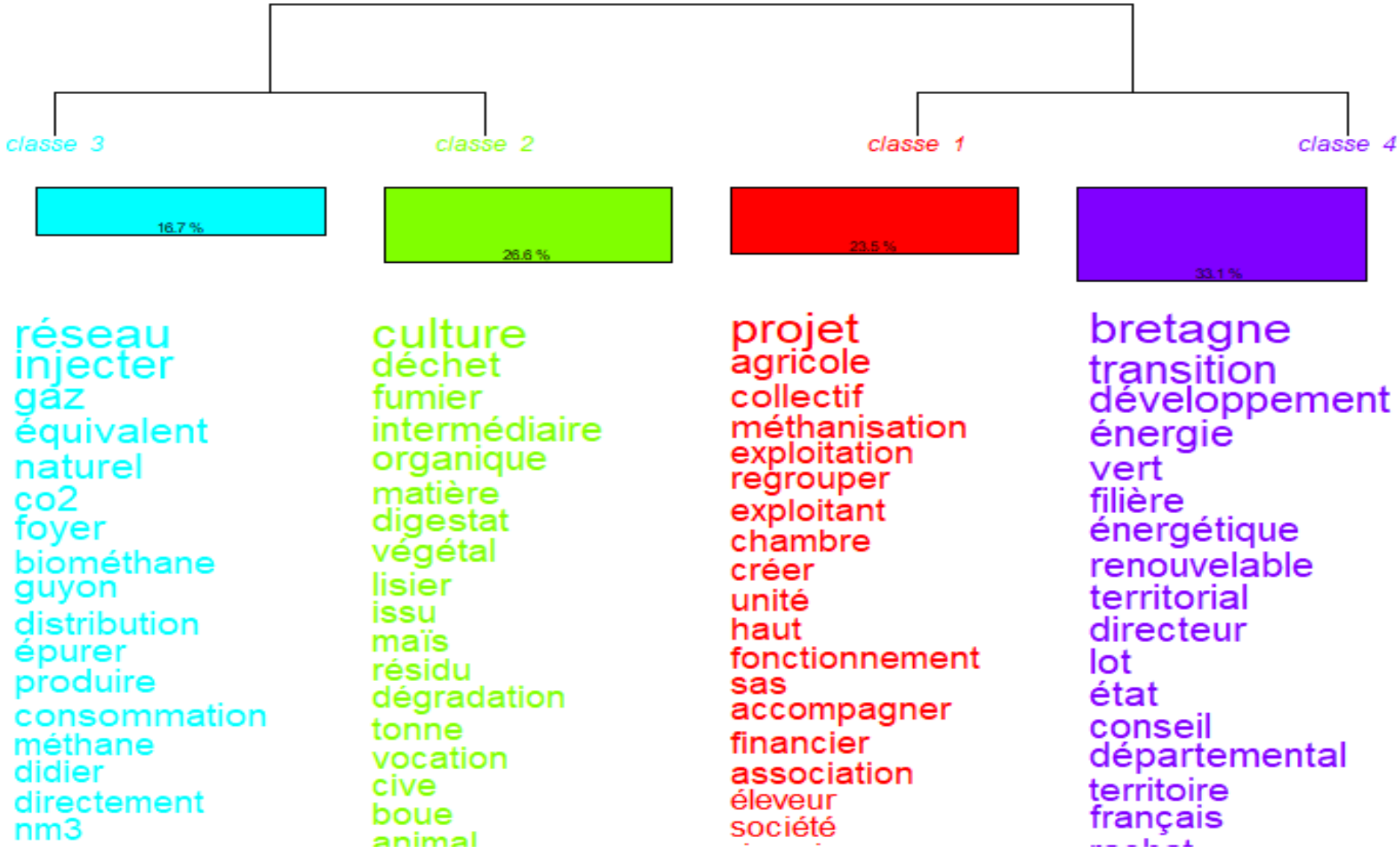
- **3 main universes: a project to be implemented, the farm and biogas production**
  - Farm anaerobic digestion is described as a 'project' (in corpus F, cf. top right cluster, in corpus GE cluster at the top, which includes considerations about economic viability and the multiple players involved around the farm) and as an activity aiming at 'producing' 'gas'/ 'biogas' (corpus F: 2 clusters at the bottom left: 'biogas' 'used' by 'the farmer' him/herself, and 'injection' into the 'network' operated by 'grdf'; corpus GE: cluster left, to 'produce' 'gas' both to 'inject' it into the 'network' and to 'consume'),
  - The other clusters are much less significant, for example concerning energy crops or digestate, which are both the subject of debates.
- **In both corpora, there is little sign of the resistance** which would give credence to the studies on social acceptability. Ex.: GE: no specific cluster, and when 'risk' is mentioned, it is as part of the challenge of implementing a project.
- Finally, **there is no overall mention of environmental concerns.**
  - In corpus F, only a small, little visible cluster at the top links together 'energy', 'territory', 'renewable' and the 'environment'. In corpus GE, only a secondary cluster establishes relations between 'energy', 'renewables', 'the environment'.

3.3. Lexical analysis using a top-down hierarchical classification



The dendrograms make visible universes of meaning that are both consistent (within the same class) and interconnected (the classification tree connecting classes together).

Dendrogram Corpus France top-down hierarchical classification into 4 classes (classification of 80,52 % terms).

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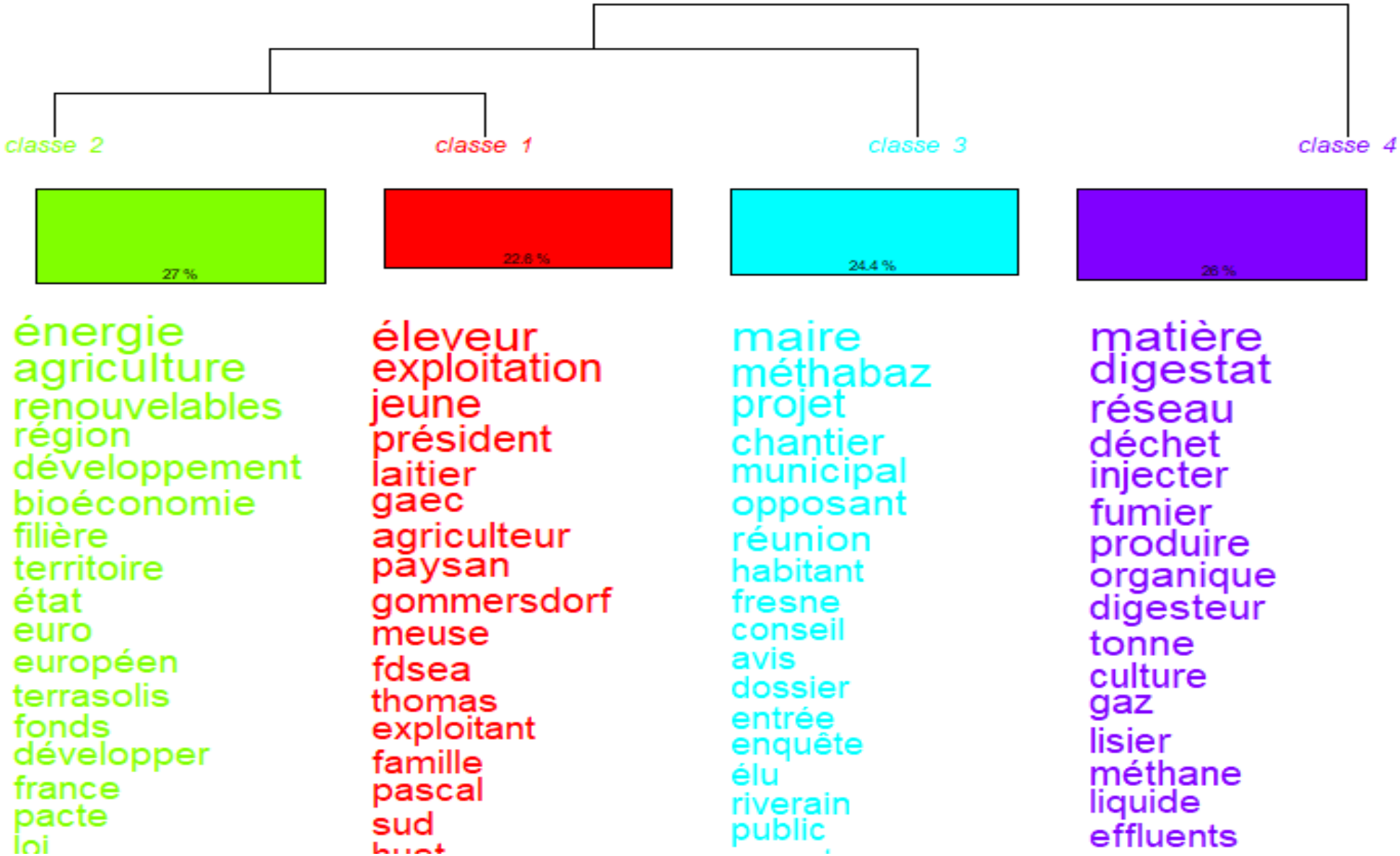
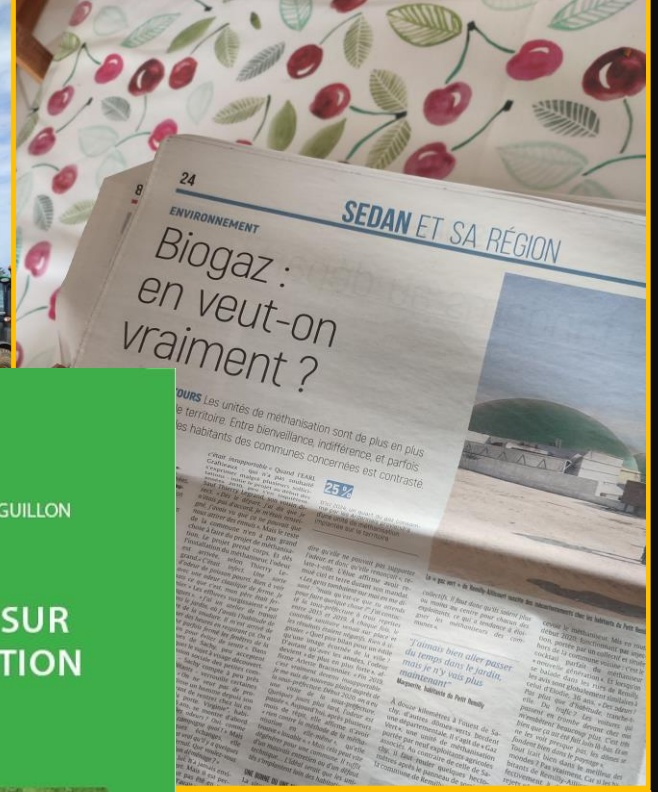


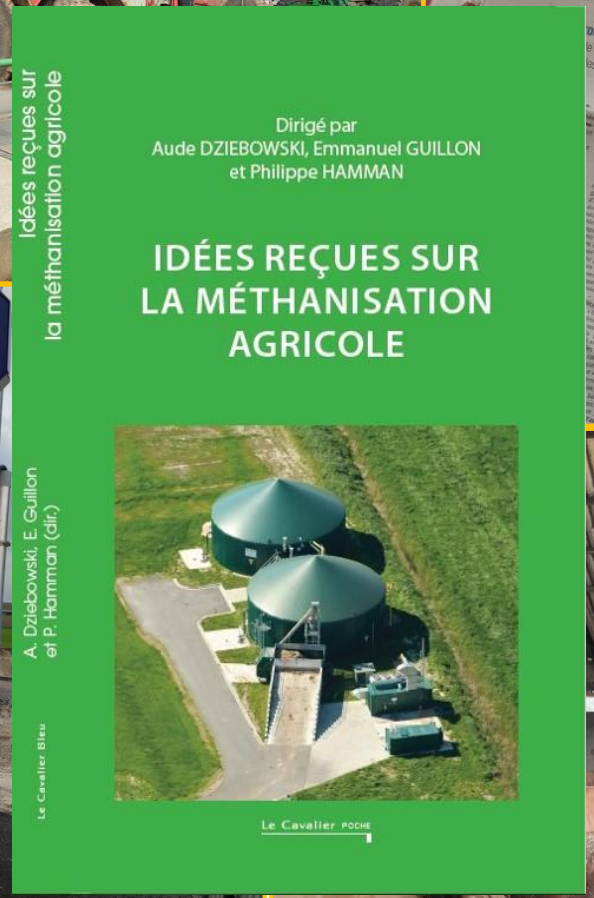
Dendrogram Corpus Grand-Est Top-down hierarchical classification into 4 classes (classification of 99,81 % terms).

- Dendogram F establishes a division into 4 classes, gathering 80,52 % of the information, and dendogram GE also has 4 classes, classifying 99,81 % of the terms = **good homogeneity**.
- The **general structure** is **similar in both cases**, which reveals stable, and all the more meaningful, lexical worlds. **Two main blocks** can be seen:
  - The first one has to do with the various **scales** at which anaerobic digestion is being **considered and implemented**, i.e. the branch linking classes 1F and 4F / 1GE, 2GE and 3GE.
  - The second one is concerned with **the anaerobic digestion process itself**, from its inputs to its outputs, i.e. classes 2F-3F and class 4GE.
- **Two main aspects seem to be essential:** first, anaerobic digestion seen as a **process**, which invites consideration of the techniques used and the input/output chain; second, anaerobic digestion seen as a **project**, in a context when energy transition is a necessity and is to be achieved thanks to localised projects, mostly implemented by farmers. Rather than controversies, the press language points to an **informative register**.
- Lastly, **environmental concerns**, again, seem to be relatively ignored.

4. Conclusion

- A strong conclusion to be drawn is that there is **a significant gap between the use of language related to the energy transition and to the ecological transition** in discourse legitimising anaerobic digestion projects in France.
- The issue, as reported in the daily press, is **mainly framed in sociocentric terms**, i.e. as concerning the relations between agriculture and energy (involving questions of economic viability and local development). There is **far less interest in the ecological dimension**, i.e. environmental quality and environmental footprint.
- This **diverges from the call for a shift to 'new ruralities':** Farmers could lay the foundations of a renewed frame of reference, which might then extend beyond agricultural food production. So far it has remained more or less exclusively centered around the objective of **energy production** – in line with the current agricultural production model – instead of fully taking into account ecosystemic interdependencies.





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Thanks for listening!

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The transformative power of Energy Communities

- Insights from within

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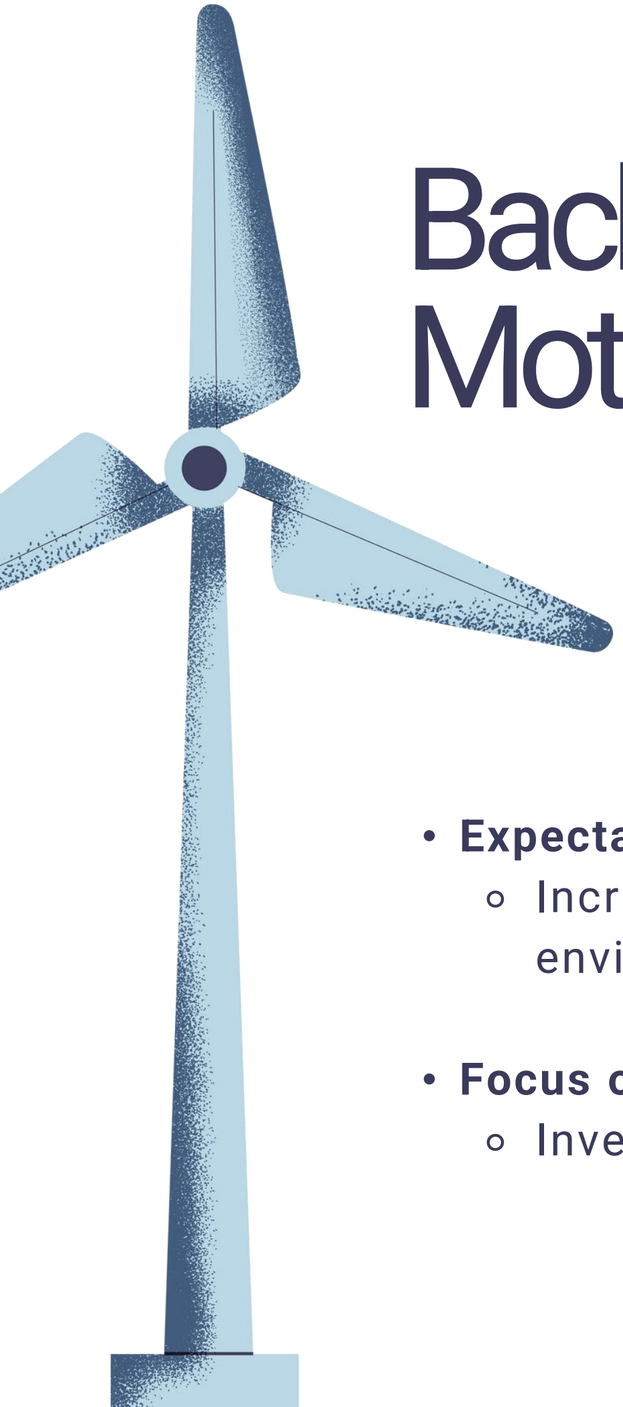


Background & Motivation

[1] Hanke, F., Guyet, R., & Feenstra, M. (2021). Do renewable energy communities deliver energy justice? Exploring insights from 71 European cases. Energy Research & Social Science, 80, 102244. https://doi.org/10.1016/j.erss.2021.102244

[2] Dudka, A., Moratal, N., & Bauwens, T. (2023). A typology of community-based energy citizenship: An analysis of the ownership structure and institutional logics of 164 energy communities in France. Energy Policy, 178, 113588. https://doi.org/10.1016/j.enpol.2023.113588

[3] Bielig, M., Kacperski, C., Kutzner, F., & Klingert, S. (2022). Evidence behind the narrative: Critically reviewing the social impact of energy communities in Europe. Energy Research & Social Science, 94, 102859. https://doi.org/10.1016/j.erss.2022.102859

- **Expectations from ECs:**
  - Increase acceptance, democratize renewable energy, and prioritize finacial, social, environmental, and/or community benefits (RED Directive, 2018).

- **Focus of UCERS Project:**
  - Investigating the role of communal and social aspects for Austrian EC members.

Research Questions

Part 1

- How do members of Energy Communities in Austria perceive their membership, and what benefits do they expect?

Part 2

- How do communal and societal aspects shape participation, perception, and the overall societal impact of Energy Communities in Austria?

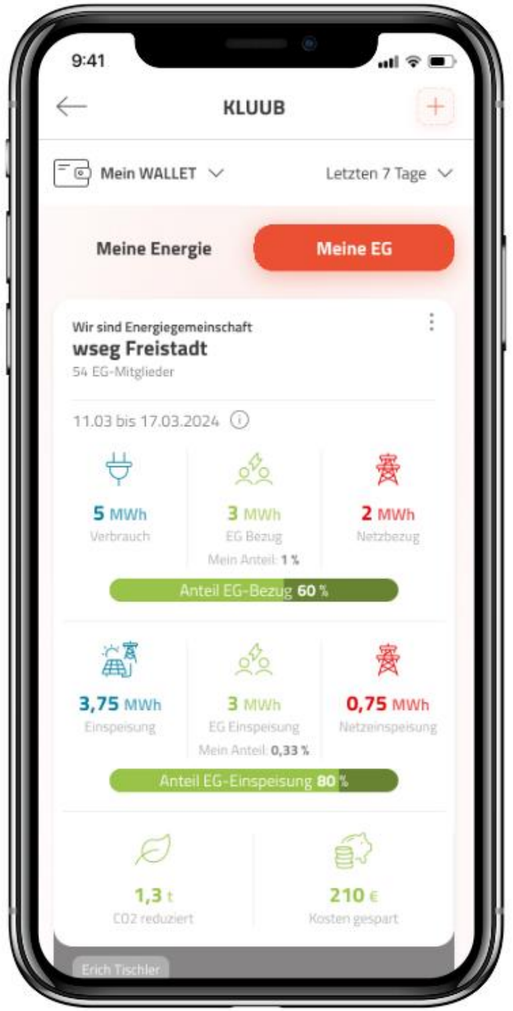
Methodology: Mixed-Methods Approach

Tools: MaxQDA and SPSS

- Quantitative Survey:
  - Structure: Anonymous questionnaire about motivations/expectations and/or experiences with ECs/neoom KLUUB
  - KLUUB preferences and expectations
  - Timeframe: November 2023 – February 2024
  - Target Group: sent to over 1000 individuals via neoom GmbH (Full-Service Provider)
  - Respondents: 127 EC members, 60 interested individuals

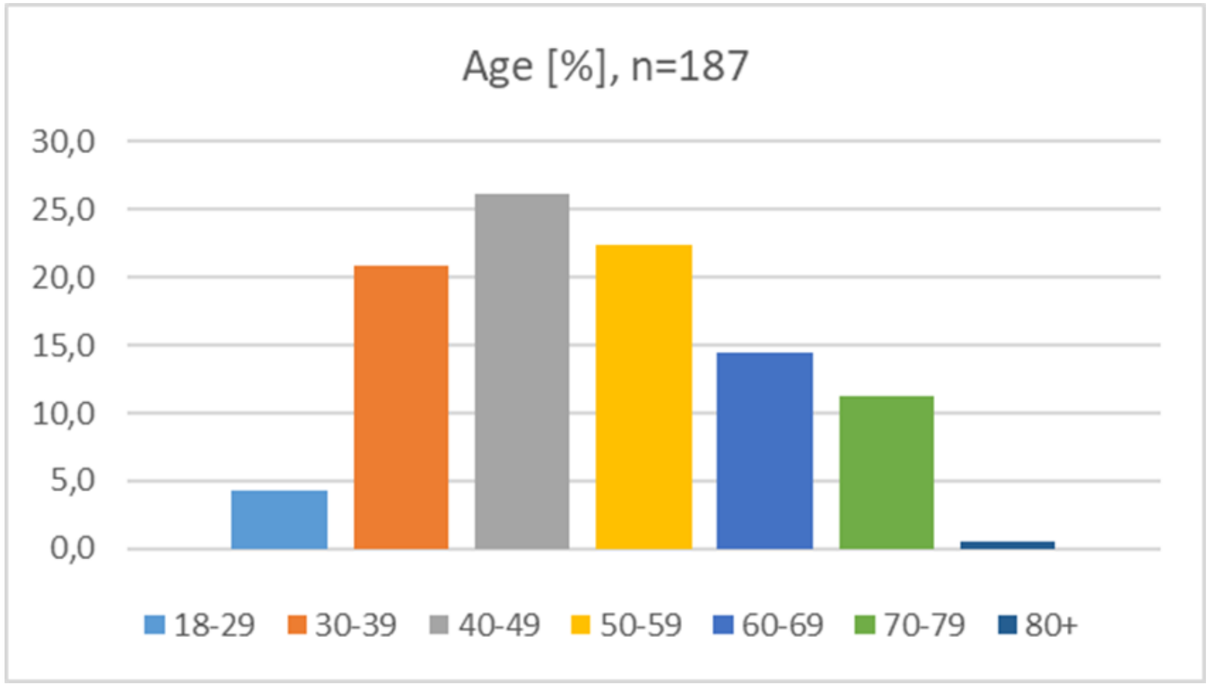
- Qualitative Interviews:
  - 5 online interviews (till now)

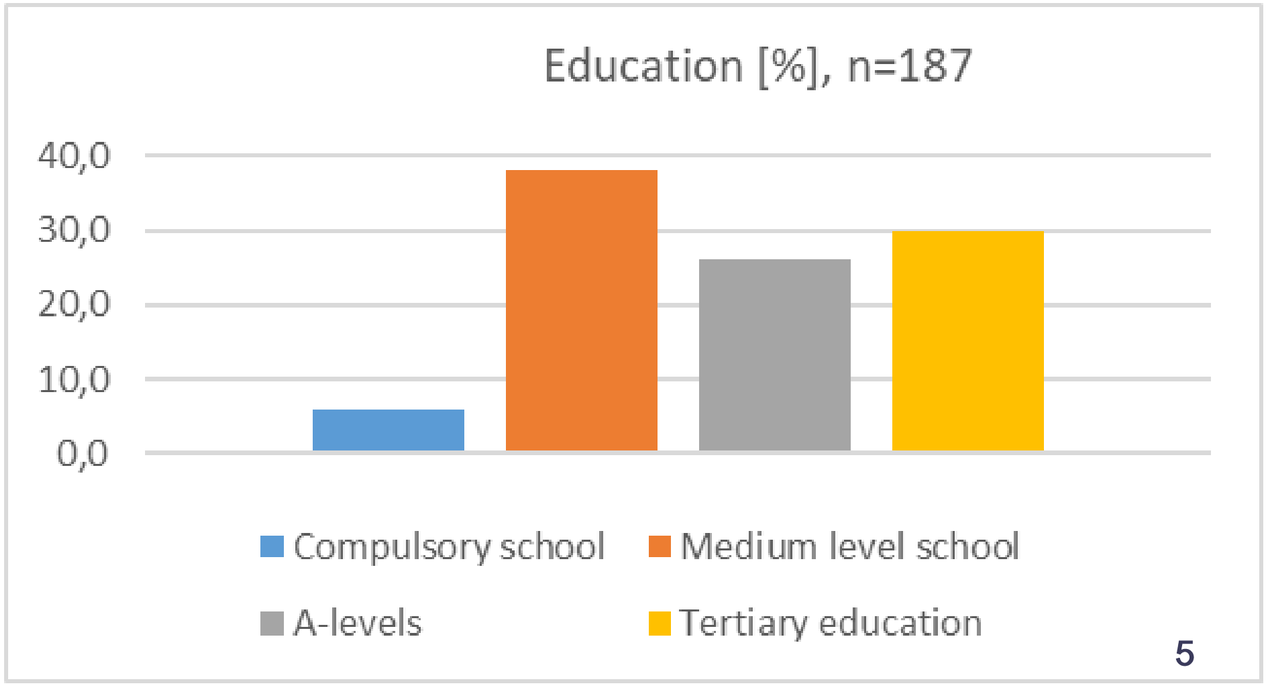
Neoom KLUUB ECs



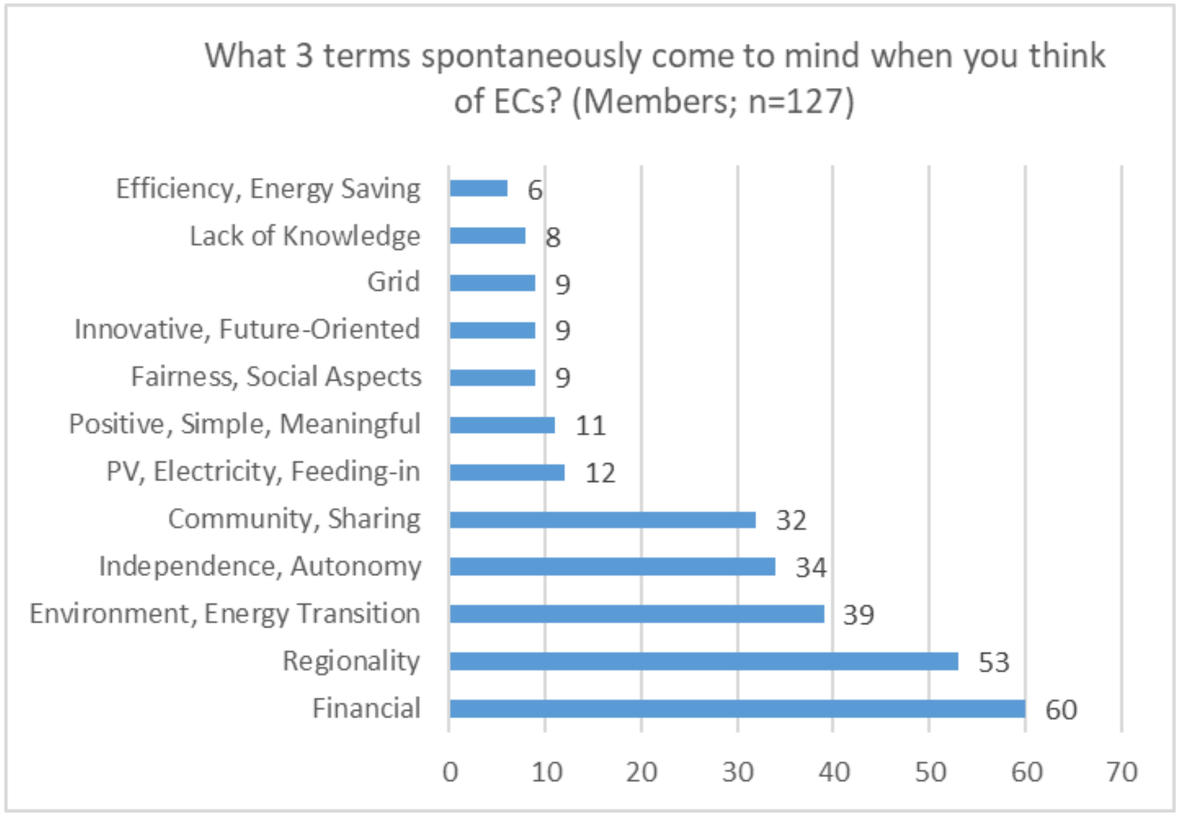
Who are the EC Members / Interested Individuals?

- 94% male
- 92% live in owner-occupied houses
- 85% perceive their living environment as rural or somewhat rural
- Households with above median income are overrepresented
- 25% prosumers, 75% consumers





Motivation for Participation



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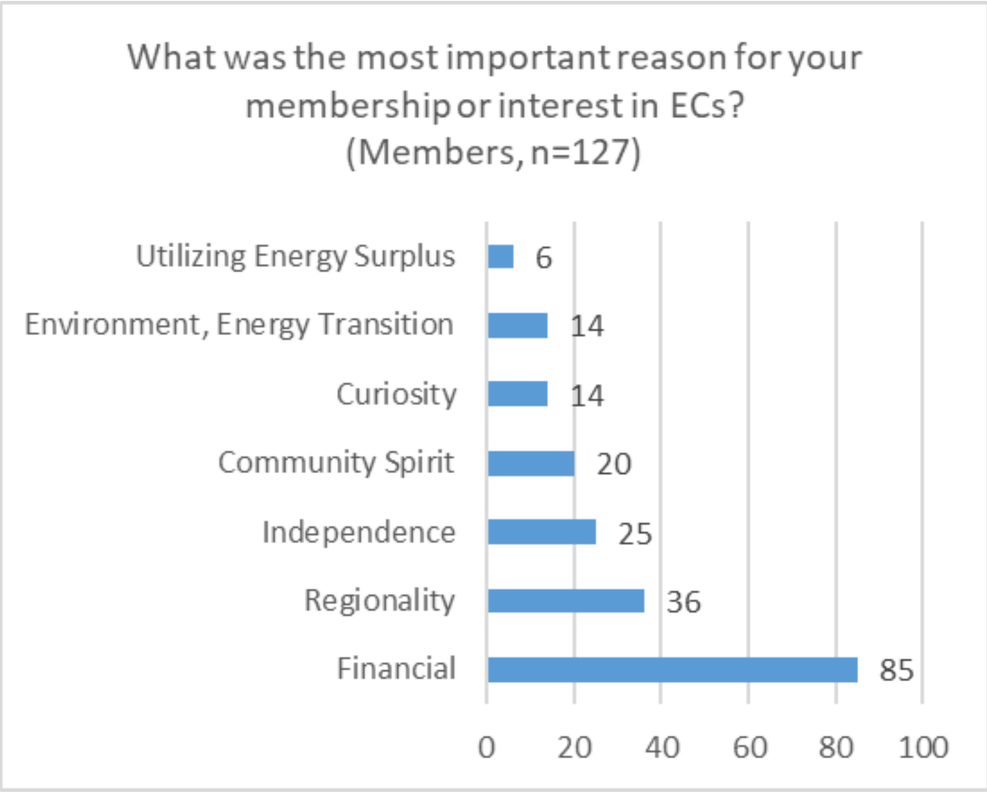
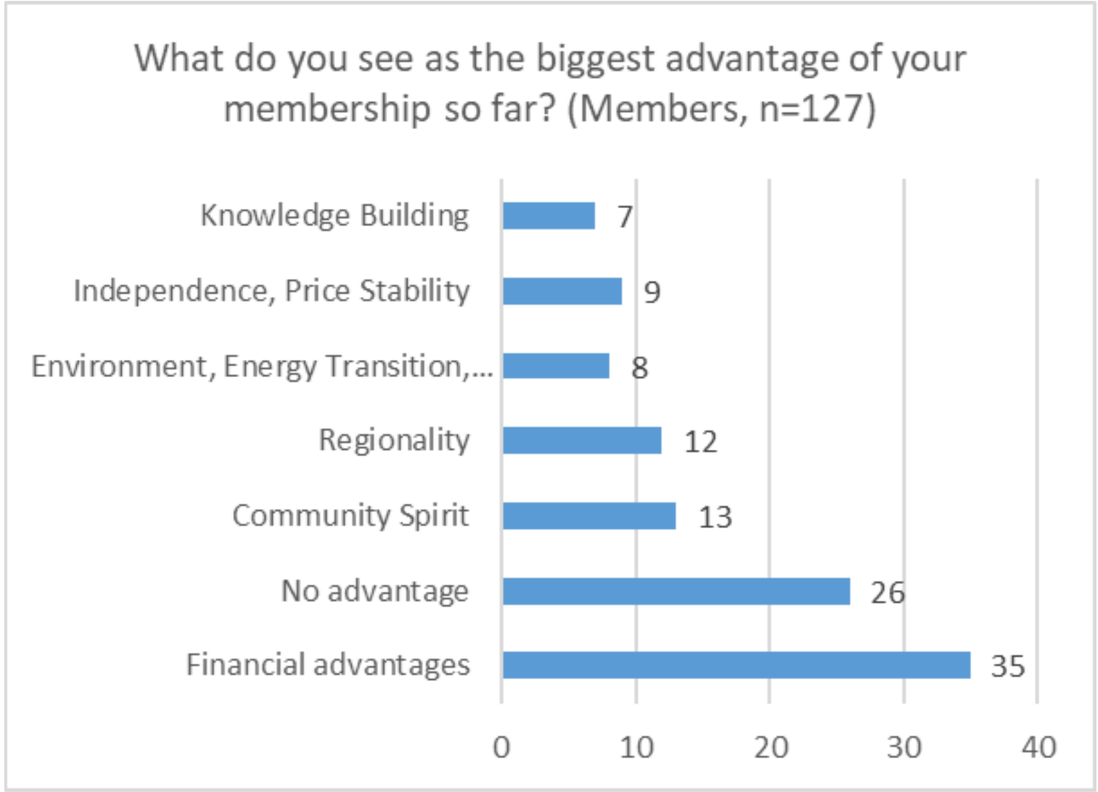
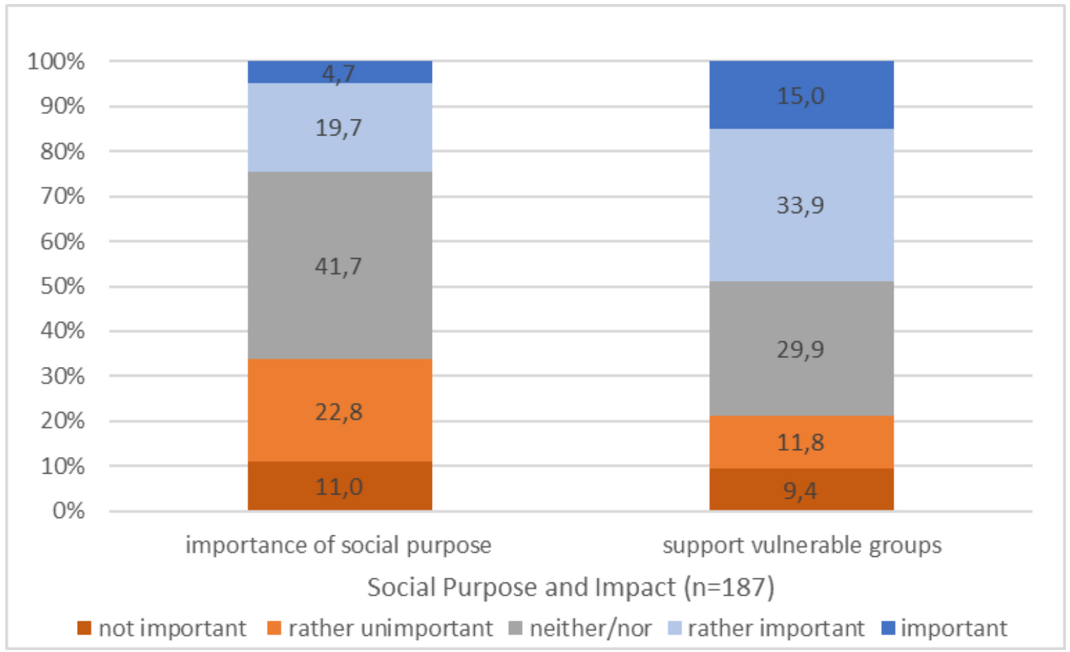
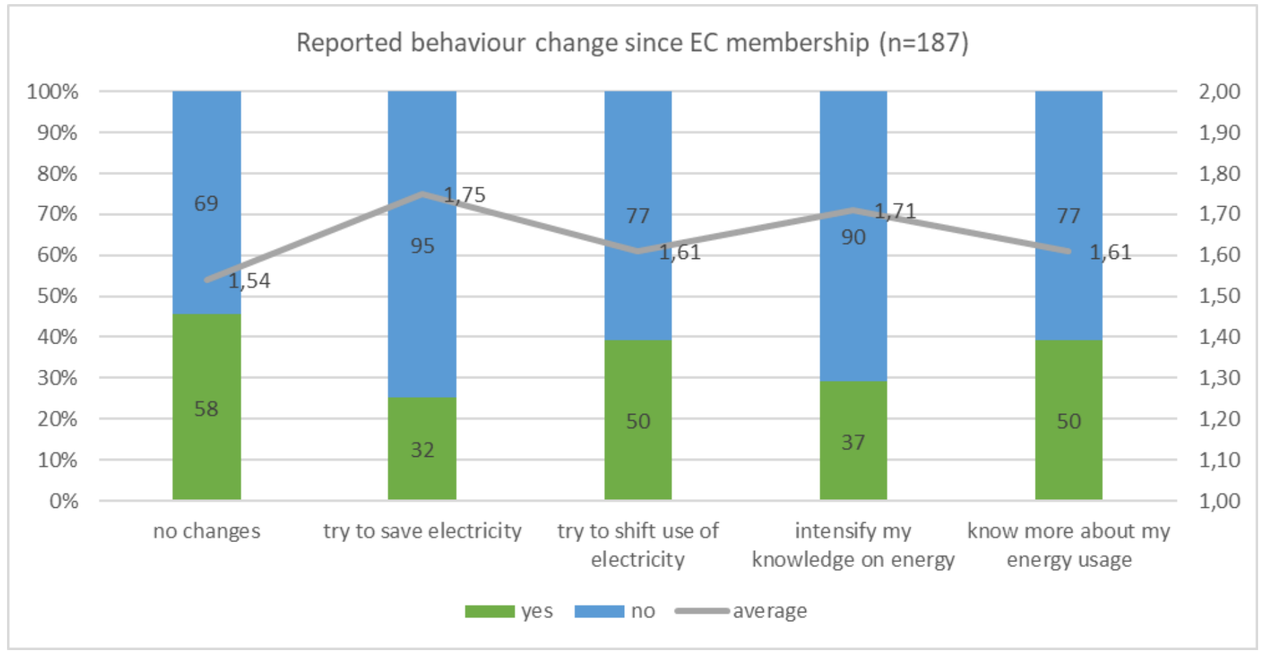




ECs - Social Goals?

- Critical EC goals: renewable energy, regional value creation, and "green" electricity supply
- Reframing social/community purposes through regionality
- Communal interactions/contributions and broader societal impact are gaining importance





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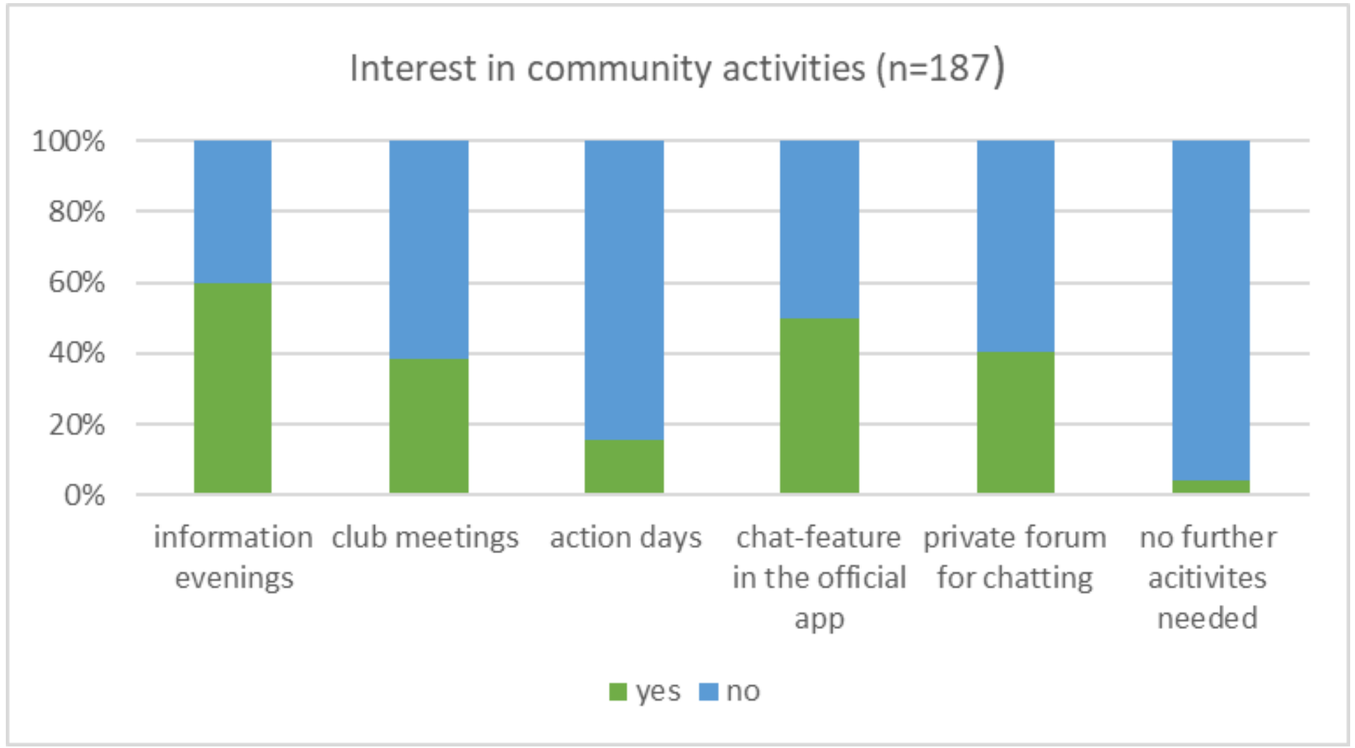
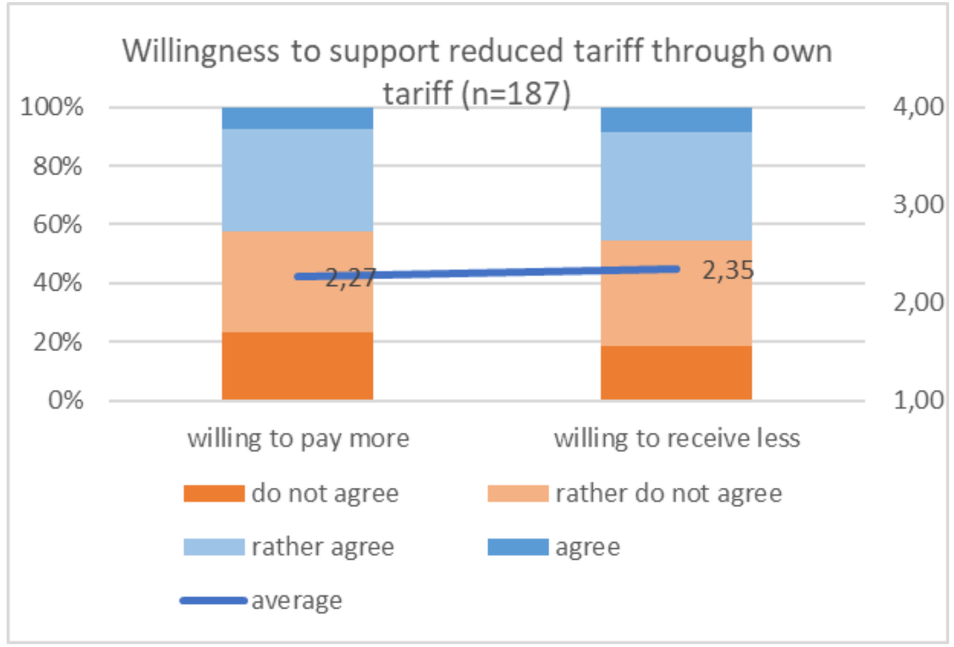
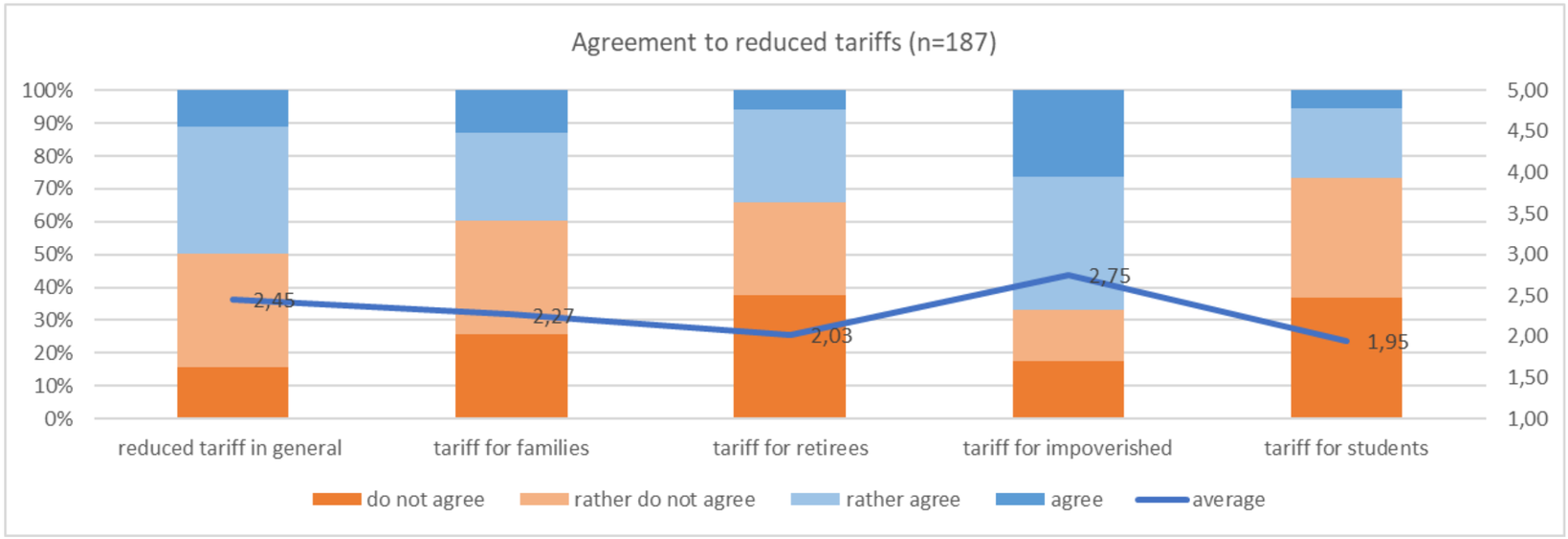


Reduced Tariffs: Mixed Reactions

- Support for general tariff reductions, skepticism exists for targeting certain groups
- Greater support for providing cheaper energy to the impoverished, highlighting the potential for social framing in tariff adjustments





Insights from inside ECs

- **Survey Findings:** no link between knowing EC members and agreement on reduced tariffs.
- **Interview Objective:** understand social dynamics and balance community benefits with broader contributions.
- **Untapped Potential:** enhancing interactions and addressing fairness misconceptions can unlock ECs' social value for a more inclusive energy transition.

EC Member Profiles

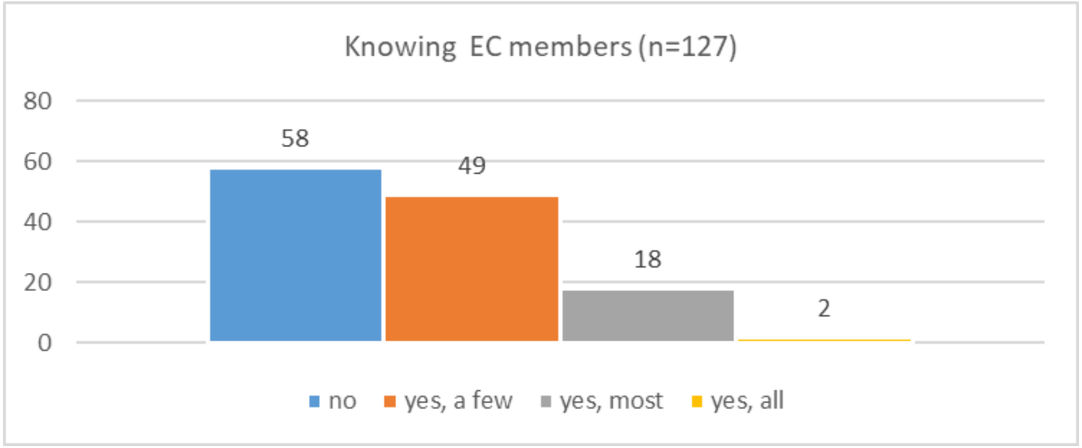
neoom client #1	summer 2024	Producer
neoom client #2	2024 (left recently)	Prosumer
neoom client #3	February 2024	Consumer
neoom client #4	Summer 2024	Prosumer
neoom client #5	October 2023	Prosumer

Lack of information transparency

- *"Currently, it's really anonymous, I don't know a single person who is part of it. ... I want to know how many are consumers and how many are producers."* and *"Right now, it feels too distant, and that makes it hard to feel like we're really a community."* — neoom client #1"

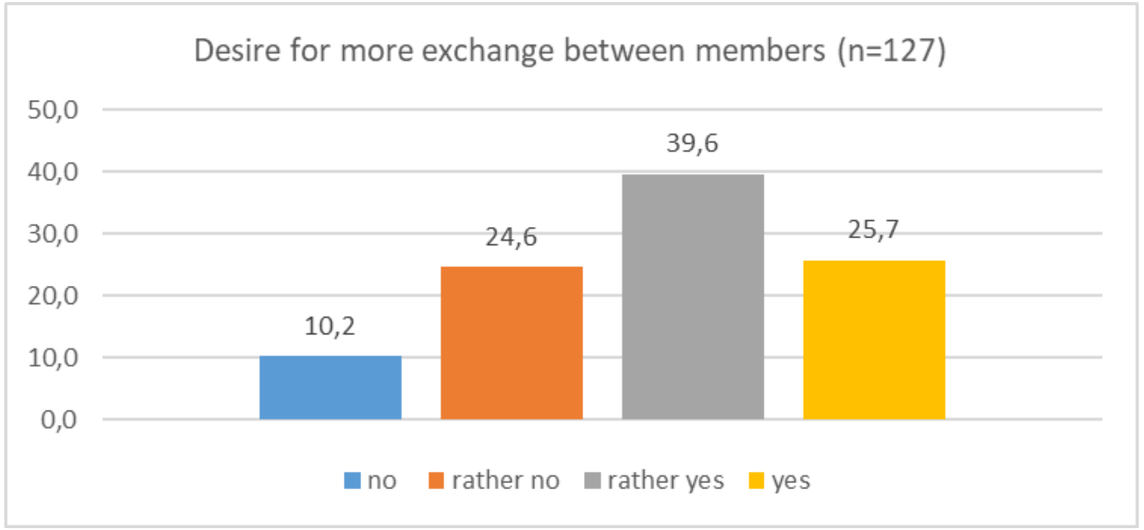
- *I don't even know the names of the three other members. I don't know who is just a consumer or who is a producer. I only know that they are part of the EC, and even there, I just rely on neoom sharing that information."* — neoom client #3

- *"At the moment, there's no real exchange between members. I know we have 40 members, but I have no idea who they are. It would be great if we could have a meeting to get to know each other and maybe learn something from one another."* — neoom client #5



Community building

- *"I'd love to know more about the other people in the EC. Who's producing? Who's consuming?"* and *"I don't see any community building happening at the moment. We just get an email when there's something important."* — neoom client #3
- *"I think a chat feature in the app would be great. It could help bring people together, even if we don't know each other personally. You could share tips, discuss things like the electricity price or ideas to improve the community."* — neoom client #4
- *"I would really appreciate it if we had more interaction, maybe a meeting once a year where we could discuss and share our experiences. Maybe you can also learn something from the others. It would help build a sense of belonging."* — neoom client #5



Social tariffs as a challenge

- *"There are many people who just can't manage their money, they spend more than they have, and then say they don't have anything and can't pay their electricity bill. But the big problem I see is, how can we determine this in such a community? Especially when I don't know the person myself."* — neoom client #1

- *"I'd be happy to support lower tariffs for people who need it, like families or lower-income households. It feels like a fair way to share the benefits of the community. If everyone knows where the money is going, I think most people would be on board."* — neoom client #2

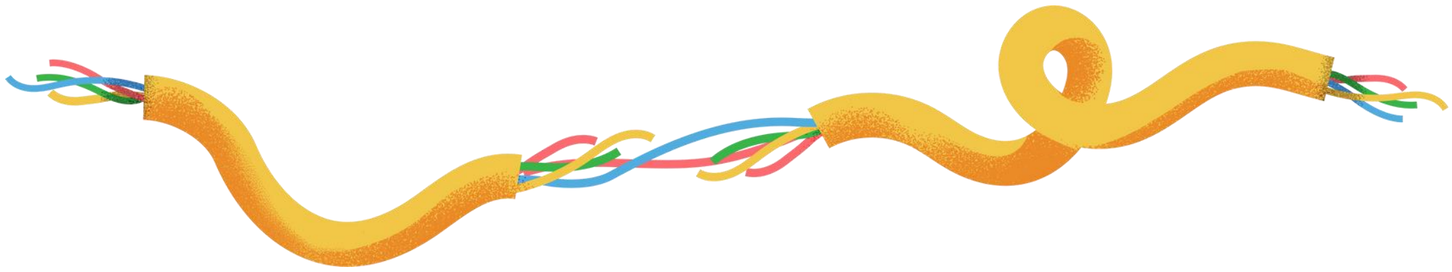
- *"I'd be fine with it if it's clear who is getting the reduced rate. Maybe for people on social welfare or similar groups. It just needs to be fair and transparent."* — neoom client #3

- *"Yes, it would be great, but it's always difficult, of course, to determine who qualifies for paying less. But it always depends on how this is determined. Who qualifies as 'vulnerable'?"* — neoom client #4

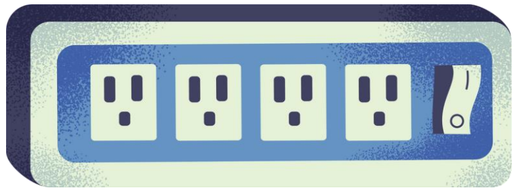
- *"Yes, you could definitely reduce the rates a bit for people with lower incomes, other disadvantaged people or institutions like schools, or maybe even give them a certain amount of electricity for free."* — neoom client #5

Greater communal and societal impact

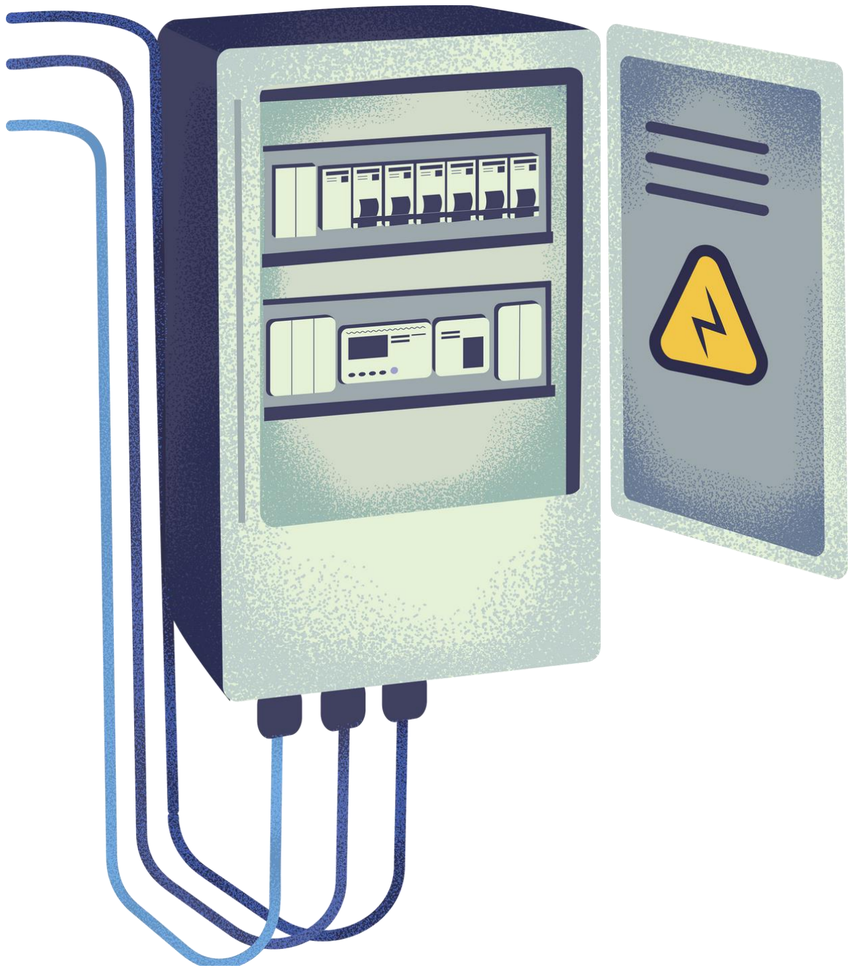
- *"Some communities reinvest their profits into local projects, like building infrastructure that benefits everyone. I think something like that could work well for our EC too."* — neoom client #2
- *"It would be interesting if the surplus from the energy community could be reinvested into projects for the community. Maybe even something like a shared energy storage system for everyone."* — neoom client #4
- *"The biggest benefit I see is that we're helping to reduce reliance on large energy providers. We're getting energy from people like us, not from big corporations."* — neoom client #5
- *"We're using energy from local sources, which is a huge benefit for society."* — neoom client #1



Future outlook



- *"I think that energy communities will play a bigger role in the future, especially when it comes to building data systems and networks that will make the power grid smarter."* — neoom client #1
- *"There is definitely potential for ECs to develop further. But it depends on how well the community works together and how much long-term interest people have."* — neoom client #2
- *"Medium term, ECs will certainly have a positive effect on the grid. I believe that the systems will continue to evolve, and we as a society will benefit from that."* — neoom client #3
- *"I think the challenge is that many people don't know they can join an energy community even if they don't have their own PV system. There's a lot of untapped potential here, but we need better outreach and communication."* — neoom client #4



Conclusions

- The primary reason for joining ECs is cost savings and sustainability.
- Members desire more transparency and engagement with other EC members. The current anonymity limits the sense of community.
- Support exists for reduced tariffs for vulnerable groups, but fairness and clear eligibility criteria are key concerns.

- **Need for: transparency, community-building activities, social initiatives, and information/sensibilisation.**

Thank you very much for your time!

Funded by the Climate and Energy Fund within the project UCERS (Grant No. 892267)

To each their own

Exploring the possibilities of design and transmedia storytelling in the energy transition

Cyril Tjahja

24 September 2024
Sustainable Places 2024 | European Convention Centre | Luxembourg

This project has received funding from the Horizon 2020 programme under grant agreement n°824418. The content of this presentation reflects only the author's view. The European Commission and INEA are not responsible for any use that may be made of the information it contains.

Cyril Tjahja

- Currently:
  Assistant Professor Design Cultures
  (Vrije Universiteit Amsterdam)
- Formerly:
  Postdoctoral researcher / Project leader
  MAKING-CITY (Hanze University of
  Applied Sciences / HUAS)

Making City

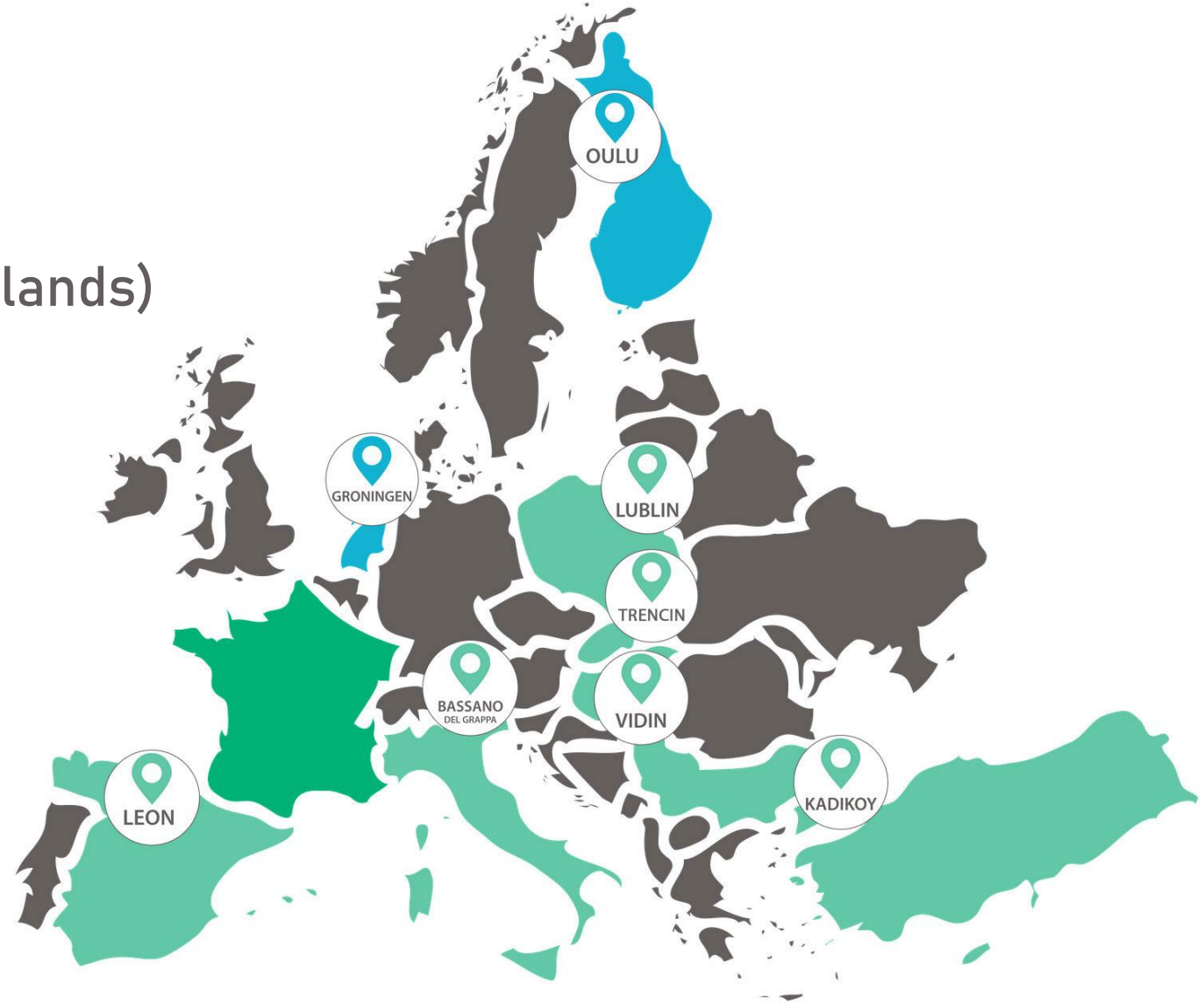
Background

- MAKING-CITY (2018-2024)
- Horizon 2020 project
- Positive Energy Districts (PEDs)

Making City

8 cities

- 2 lighthouse cities:
  Groningen (The Netherlands)
  & Oulu (Finland)
- 6 follower cities



Making City

34 partners

- In total: 9 municipalities, 5 universities, 4 research institutes, 4 housing corporations, 4 SME's, 3 energy companies, and 1 building contractor
- In Groningen: HUAS, University of Groningen, Municipality of Groningen, Grunneger Power, TNO, New Energy Coalition, Warmtestad, Waarborg Vastgoed, Nijestee, CGI, and Sustainable Buildings

Making City

PED districts in Groningen

Paddepoel
(PED North)

Europapark
(PED South)

Making City

Multidisciplinary research (1)

- Researchers & students (HUAS) collaborating with local energy initiatives in Groningen
- Students from various disciplines: Energy for Society, Real Estate, Psychology, Design, Facility Management, Business, Law, Communication
- Students have individual projects, but also contributed to larger research studies

Making City

Multidisciplinary research (2)

- Three citizen social research studies (Sep 2019-Jan 2021) in three different neighbourhoods in Groningen
- Surveys (105 respondents / 66 respondents) and interviews (30+ respondents)

Making City

Findings (selection)

Communication barriers

- Insufficient communication / awareness about energy transition
- Communication with municipality
- Language barrier

Making City

Findings (selection)

Demographic & contextual barriers

- Difficulty engaging tenants and landlords
- Tenants' lack of incentive
- (International) students rarely involved
- Dislike of top-down approach
- Local energy initiatives' activities aimed at specific type of residents (home owners, financially well off, older), not appealing to other groups of residents

Making City

Transmedia storytelling

- Disseminating parts of a narrative, with ideally each part contributing to the overall story in its own unique way (Jenkins, 2008)
- Not the same as *crossmedia* (same narrative/message, adapted to different media)
- Different narratives for different types of residents to appeal to their specific interests/needs

Making City

Examples

Star Wars

Harry Potter

Dawson’s Creek

Lost

Making City

Transmedia & MAKING-CITY (1)

- Different narratives for different types of residents to appeal to their specific interests/needs
- Students Communication & Media Design (CMD) at the HUAS following the Transmedia Storytelling course
- Two batches of four groups of students
- In collaboration with local initiative (Wijkbureau Paddepoel)

Making City

Transmedia & MAKING-CITY (2)

Project brief

- Design a transmedial campaign, consisting of different media (artefacts)
- The campaign is aimed at activating these ‘difficult to reach’ audiences to participate in converting their neighbourhood into a Positive Energy District
- The campaign should target at least two groups of the following residents in the Paddepoel neighbourhood:
  - Social housing tenants
  - Private tenants
  - Students (local and international)

Making City

Samen Duurzaam in Paddepoel

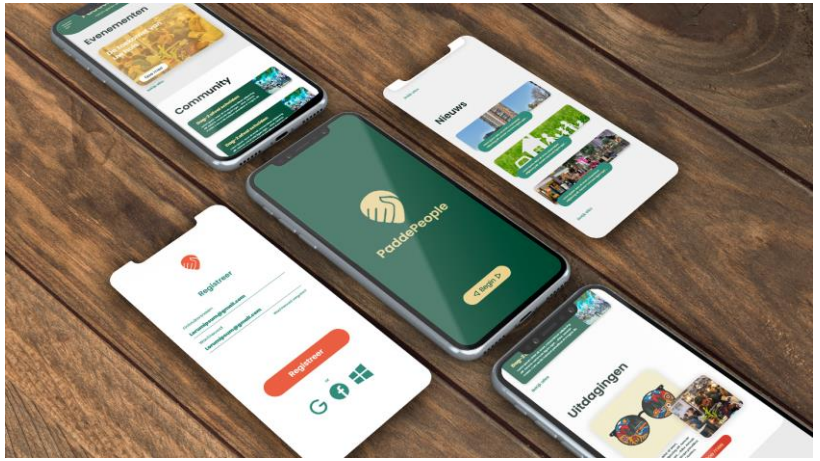
- '[Being] Sustainable Together in Paddepoel'
- Aimed at students and social housing tenants in Paddepoel
- Literature & field research
- Goals: increase social cohesion and sustainable measures in neighbourhood
- Media/artefacts: printed materials, app and escape room

Making City

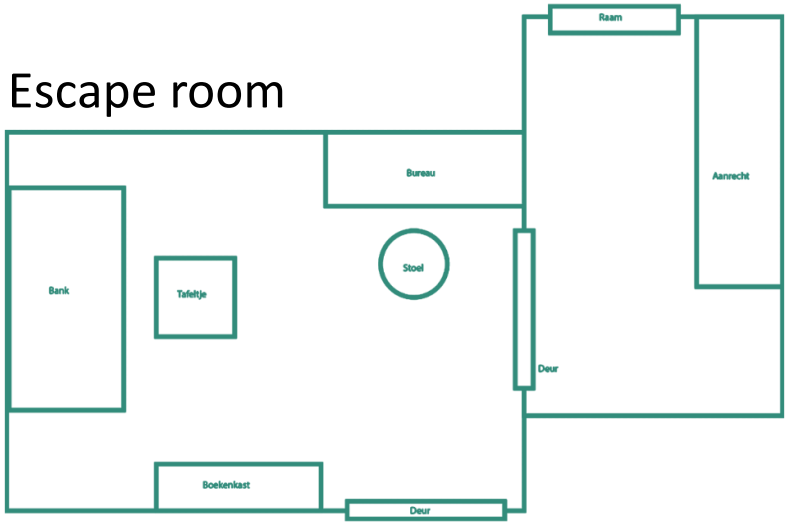
Samen Duurzaam in Paddepoel

Poster

Mobile app



Escape room



Making City

‘t Groenhuuske

- ‘The little greenhouse’ (in Groningen dialect)
- Aimed at social and private tenants in Paddepoel
- Literature & field reseach, focus groups
- Goals: increase social cohesion, create physical meeting/event space for different groups of residents
- Media/artefacts: posters, magazine, Instagram, physical event location (greenhouse)

Making City

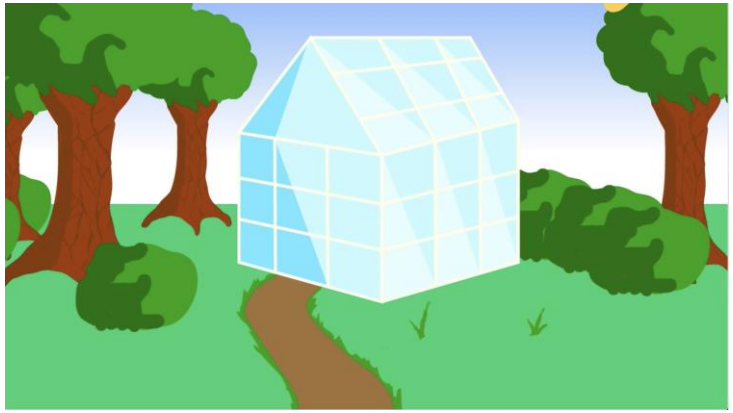
‘t Groenhuuske

Instagram

Website

Poster

E-Zine



Animation

Making City

‘t Groenhuuske

Moodboard for physical structure

Making City

Evaluation

- Presentation attended by Muncipality of Groningen and Wijkbureau Paddepoel
- Concepts positively received by stakeholders
- Supervision by CMD teachers: indirect feedback
- Funding is an issue: who is going to pay for it?

Making City

Thank you

For more information about the project:
www.makingcity.eu

Get in touch:
Cyril Tjahja / c.tjahja@vu.nl

FORTESIE

AN OVERVIEW OF CBDCs AND THEIR POTENTIAL ROLE IN THE GREEN ECONOMY

Christos Kontzinos, Maria Flouri, Panagiotis Kokkinakos, Konstantinos Alexakis, Fotis Siouzios, Vangelis Marinakis
Decision Support Systems Lab, National technical University of Athens

SUSTAINABLE PLACES 2024

Content

- CBDC Background
- Technological Framework
- Bibliographic Review
- State of CBDCs in the EU
- The Role of CBDCs in the Green Economy
- Conclusions

Scope of Publication

- Physical forms of currency are taking a backseat due to the radical increase in use of digital currencies and digital forms of payment
- Even credit and debit cards are being slowly but steadily replaced by digital wallets, e-banking, and m-banking applications
- The emergence of blockchain and cryptocurrencies has given rise to even more forms of digital currencies
- CBDCs are another emerging concept in the global economy
- Why are many central banks considering the introduction of CBDCs?
- What is the role of CBDCs in global finance and the green economy?

CBDC Background: Definition

FORTESIE

How can we define a CBDC?

- *A digital form of money, which is issued by the Central Bank, and is different from deposits in reserve or settlement accounts. In other words, it is an obligation of the Central Bank, expressed in an existing accounting unit, which serves both as a medium of exchange and as a means of storing value*

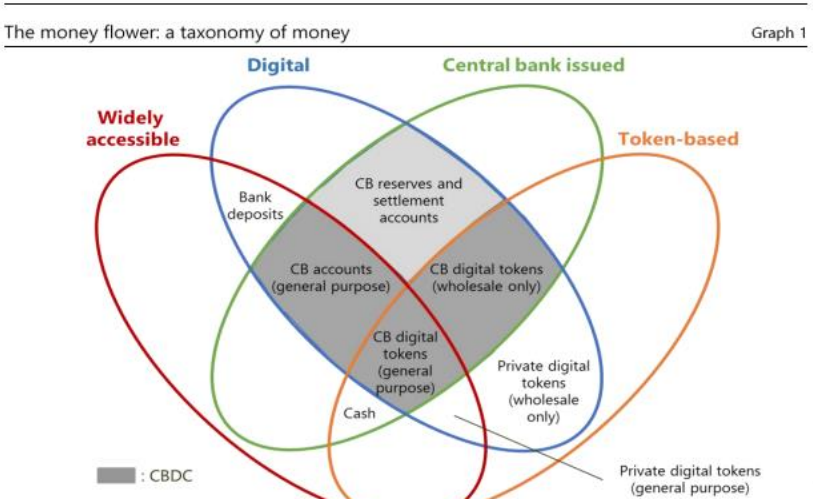
  CPMI (Committee on Payments and Market Infrastructures)

- *A new form of money, digitally issued by the Central Bank and intended to serve as a legal tender*

  IMF (International Monetary Fund)

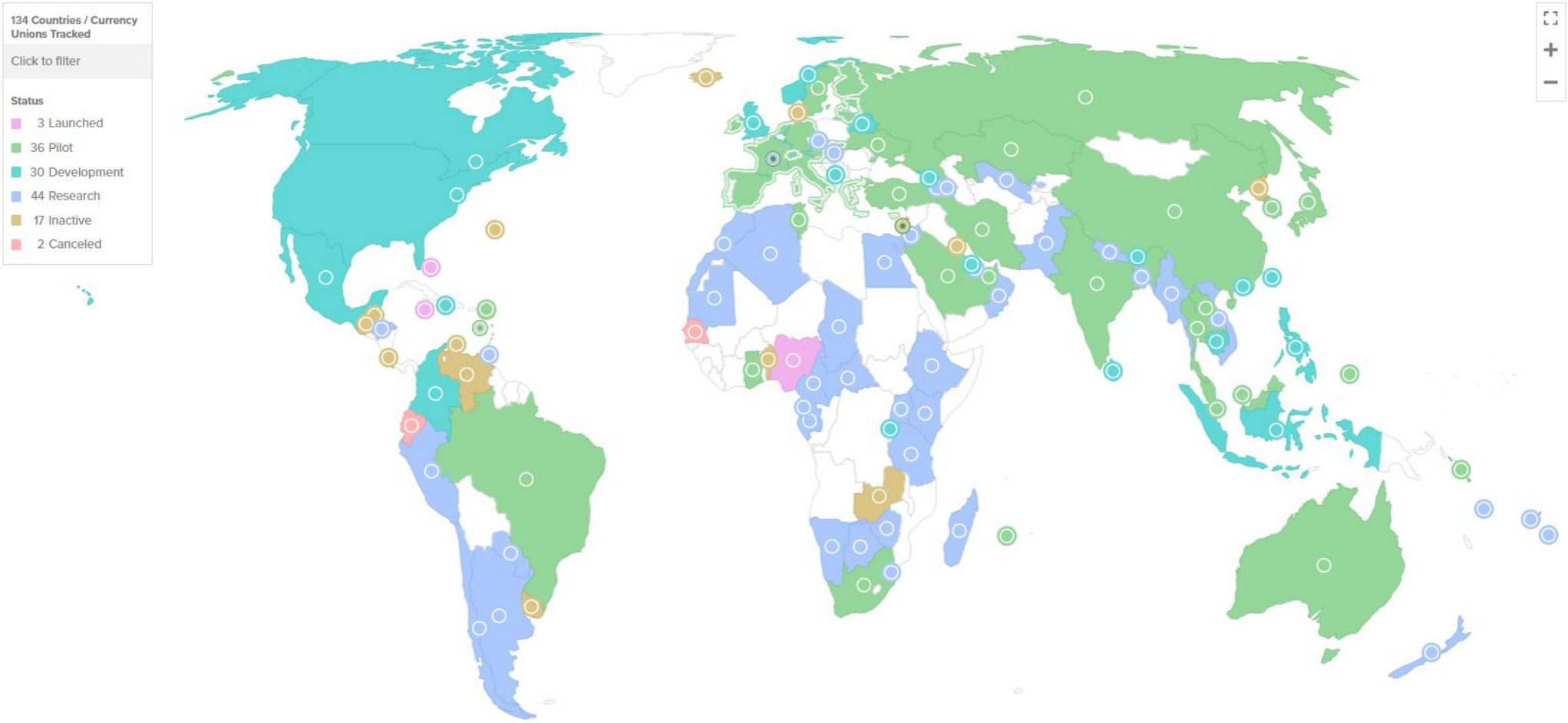
CBDC Background: Taxonomy

- There are two distinct types of CBDC that can be issued by a central bank:
  - General purpose or retail CBDCs are further divided into two categories that depend on whether the issued currency is based on tokens or bank accounts
  - Wholesale CBDCs are always based on tokens
- Tokens are a representation of either physical or digital currency and their value is set by the central bank that issues them
  - They are accessed and validated through the use of private and/or public keys, similar to cryptocurrencies
- Account-based CBDCs on the other hand are based on central bank accounts and require a user's digital identification to be accessed



Source: CPMI, 2018

CBDC Background: Global Interest



Source: https://www.atlanticcouncil.org/cbdctracker/

Bibliographic Review

Paper Thematic	Keywords	Number of Articles
Classification, Functional Architecture	Central Bank Digital Currency (CBDC), function, architecture, taxonomy, classification	251
CBDC Advantages and disadvantages	Central Bank Digital Currency (CBDC), advantages/ benefits, drawbacks/ disadvantages	158
CBDCs Technology Background	Central Bank Digital Currency (CBDC), technological background, DLT, blockchain	146
Applications in the Financial Sector & Easy Payments	Central Bank Digital Currency (CBDC), application, financial sector, easy payments	173
Perspectives of CBDCs in the European Economy	CBDCs, perspectives, potential, European economy, digital euro, Eurozone	176
Digital Euro & Legal Issues	Digital Euro and legal considerations, legal framework	71
CBDC Implications on the Banking System	CBDC, banks, bank intermediation impact, banking sector	189
CBDC Applications in a Green Economy	CBDC, applications, green economy, circular economy, green finance, sustainable development	14

CBDCs in the EU: General

- In the (EU) there are many current initiatives for the development of a digital euro
  - Discussions about issuing this digital euro as a CBDC, as it could provide an infrastructure, similar to the Single Euro Payment Area (SEPA)
  - a European digital currency would facilitate the transition from physical to secure digital payments, given that transaction security would be guaranteed by the central bank
- A properly designed digital euro could support the economic objectives of the EU by providing citizens with a strong alternative to a secure form of currency as well as an alternative for fast and efficient payments.
- An improperly designed digital euro could have negative implications for financial stability and the transmission of monetary policy in the EU, by lowering the demand for bank deposits of private banks
- There is a wide uncertainty regarding a CBDC's projected demand, its technical characteristics, and the conditions in the EU
- No real-life applications of CBDC in the EU

CBDCs in the EU: Legal Requirements

FORTESIE

- Concerning user privacy and protection of personal data, there are two different options that are being investigated.
- One solution envisages that data privacy and transaction security could be ensured through the categorisation of transactions and payments based on risk and value
  - Customers, after their initial identification in the system, would enjoy a greater level of privacy for low-value payments, if they so choose
  - For transactions of larger value and/or risk the technological properties of the CBDC would allow for greater visibility and accountability from all involved parties
- An "offline mode" option is also being examined as it would allow greater personal data protection for low-value payments, such as cash payments that require the user's physical presence
  - Customers, after their initial identification and onboarding to the system (similar to the previous example), would be the only ones to know their account information
  - A CBDC offline mode would be beneficial to the people who live in remote areas without access to smart devices and fast internet connections

CBDCs in the Green Economy (1/3)

FORTESIE

- There is little relevant data on the potential of CBDCs in the Green Economy
- CBDCs could target specific private "green" investments, reducing financing costs and providing valuable support to green business activities
- CBDCs could be used to facilitate investments and donations to “green” projects without the need to involve intermediaries, the presence of which, increases transaction cost
  - By eliminating investment fees and transaction costs (which are much higher for large-value transactions), the amount of funds that are invested in the green economy would rise significantly giving a much-needed boost to the domain
- For low-income countries, employers would be able to pay the wages of informal workers in CBDCs, even if they do not have a personal bank account:
  - a secure repository for their money (physical money/cash are the most liable to loss, theft, burglary, and so on) and
  - gaining access to the national banking system, which means that they would be able to use banking services, such as getting a loan

CBDCs in the Green Economy (2/3)

- CBDCs can be used as a means of offering financial assistance to businesses operating or investing in the Green Economy, and which face financial problems
- CBDCs can give businesses the opportunity to request financial assistance from the Central Bank as well as more favourable conditions when, for example, they want to get a bank loan with lower interest rate
- Although this may not be a convincing enough argument for the importance of a CBDC for green economy businesses, it should be emphasised that:
  - green and circular businesses try to maximise their positive environmental impact instead of their profits
  - such businesses might face an inability to pay high-interest loans or even be considered eligible to get them, which would negatively affect their viability
  - a Central Bank that has adopted a CBDC would provide a solution to this challenge
- The connection between a CBDC and the green economy depends mainly on its design, the objectives that each Central Bank has set to fulfil by adopting it, as well as on its effect on the financial transactions carried out in the context of the green economy

CBDCs in the Green Economy (3/3)

- Incentives could also be given by businesses to individuals, in order to lead them to actions that promote the Green Economy, in connection with the use of CBDCs
  - reduced consumption targets could be set when drawing up electricity supply contracts. by creating a ratio between the energy saved and the "green" digital euros corresponding to it
  - CBDCs could, as an option, be used by citizens to redeem on the next electricity consumption bill in the form of a discount
  - such options could be set out in an electricity contract and exercised automatically through properly designed smart contracts that would also alleviate any potential overhead required by the electricity companies.
- Another option, as an incentive, could be their cashing out for energy upgrading works on their residence, which is also the main objective of the European Union, through the initiative "A Renovation Wave for Europe”
  - this measure could be extended to any other form of green investment (e.g., photovoltaic installation) with parallel additional discounts from the companies (trade, installation, etc.) to which they will be addressed
  - it will be necessary to create an entire ecosystem involving governments, banks, investment houses, and companies, under the supervision of the European Union, that will promote the use of green CBDCs through such initiatives

Conclusions

- CBDCs hold significant promise in shaping a more sustainable future economy, particularly in the realm of green and renewable energy initiatives
- CBDC systems can ensure greater accountability in directing funds towards green initiatives and renewable energy projects
- Through targeted monetary policies and digital payment mechanisms, CBDC can encourage individuals and businesses to allocate funds towards renewable energy projects and eco-friendly initiatives
- CBDC can democratise access to green investments, particularly for underserved communities and individuals in developing regions
- CBDCs can facilitate microtransactions and peer-to-peer lending for green initiatives, fostering greater participation in the green economy
- CBDC has the potential to mitigate environmental externalities and incentivise sustainable behaviour.

SUSTAINABLE PLACES 2024

VTT

We talk BIM for LCM and sustainability

– The importance of qualification frameworks for professionals

Sustainable Places 2025
Tarja Mäkeläinen, VTT

SUSTAINABLE PLACES 2024

VTT

bimeet

INSTRUCT

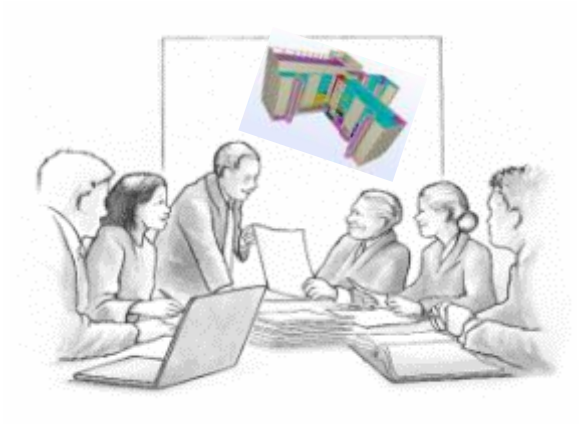
ACCORD

We talk BIM….?

Introduction

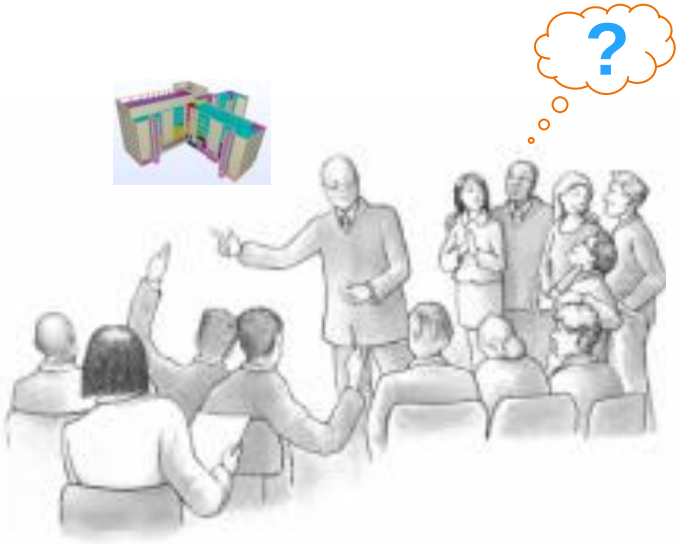
Innovate UK

Today many BIM use-cases are already implemented in the building project phases and collaborative processes….



….The skill-sets needed may still be week.

Skill-sets vary by disciplines and stakeholders involved. Week skill-set lead to misunderstandings, failures in BIM usages and ineffective BIM process.



SUSTAINABLE PLACES 2024

VTT

Why it is important to talk about BIM Competence Frameworks

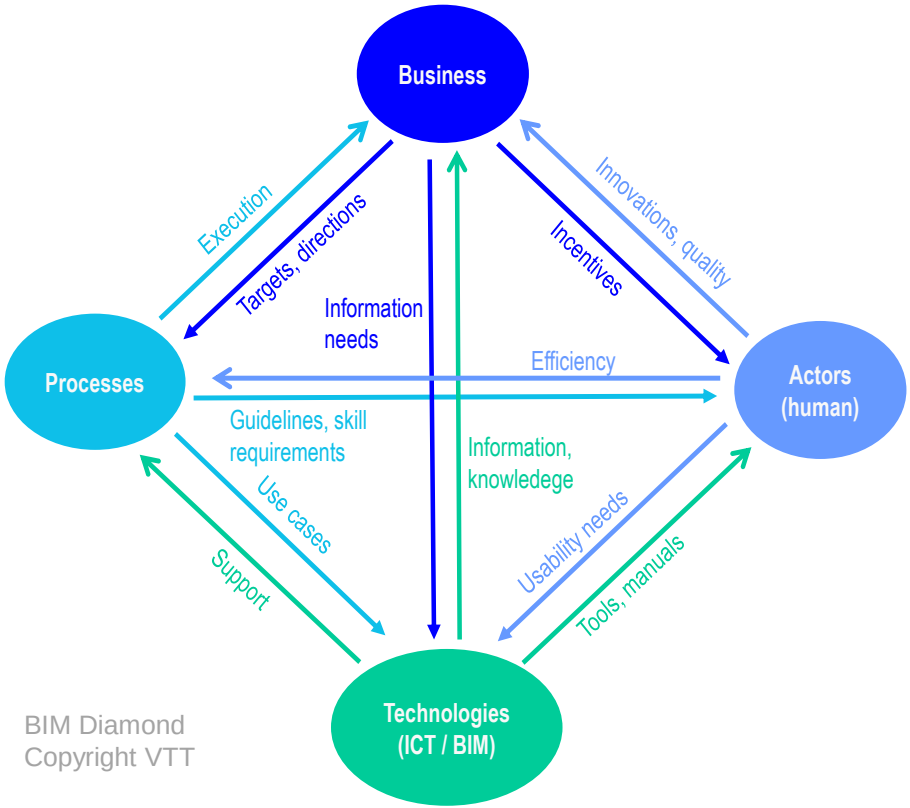
21/10/2024

BIM as instrument

- Business – information requirements
- Processes – information flow and integration
- Actors – know-how
- Technologies - interoperability

For a successful implementation and adaption of BIM, a **good maturity level** is needed for each 4 elements of BIM Diamond and for the 11 connections.

BIM Diamond

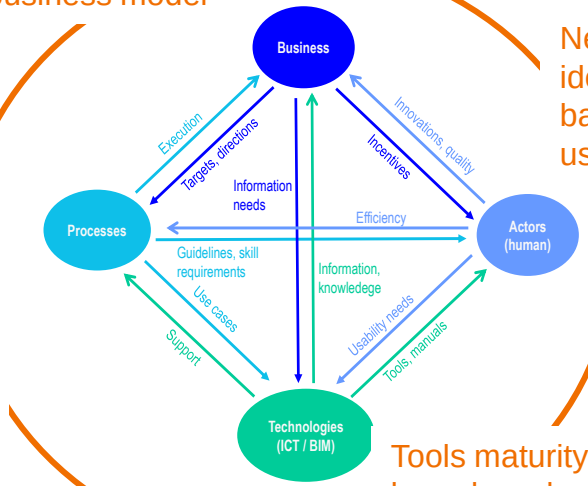


BIM Diamond
Copyright VTT

BIM Diamond elements and development

Useful set of BIM usages identified to support business model

Needed competence identified for BIM based working and usages



Useful set of BIM use–cases defined in value chain of the integrated information modelling and management

Tools maturity for BIM based work and for open information and data transfer

BIM Diamond with development Layer
Copyright VTT

BIM Diamond elements and their standard-based development

BIM use-case definitions and guidelines for diciplines (AIM, PIM)

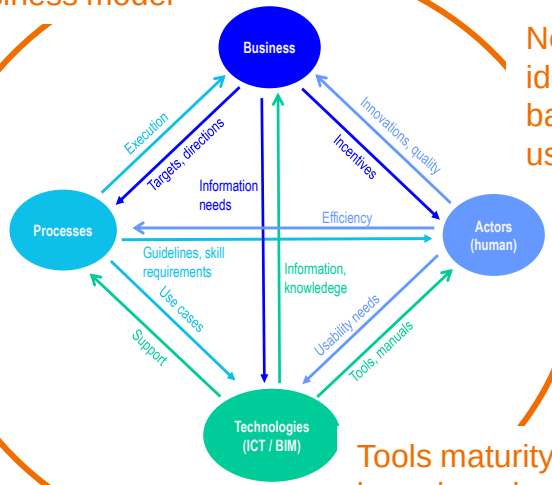
Useful set of BIM usages identified to support business model

Needed competence identified for BIM based working and usages

Standards for defining skills, knowledge and competence requirements (LO-framework)

Standards for defining Data flow process, Roles, User requiremenst, Data content (IDM IDS)

Useful set of BIM use–cases defined in value chain of the integrated information modelling and management



Tools maturity for BIM based work and for open information and data transfer

Standards for defining open data transfer (IFC, BSF, MVD, ….) and standard implementation

BIM Diamond with development and standardisation Layers

Enablers for BIM implementation

27 enablers for BIM implementation

13 related on Capabilities / Competencies:

- Strategic plan
- User training and education
- Supportive supervisor
- Management readiness for change
- Existence of change agents
- **Learning orientations (6)**
- **Knowledge Capability (2)**

Constructs	*Enablers*
Strategic initiatives	Support from top management
	User's input
	Strategic vision
	Strategic plan
	Stakeholder's analysis
	Cost-benefit-risk analysis
Change management	Rewards and recognition
	User training and education
	Supportive supervisor
	Management readiness for change
Cultural readiness	Existence of change agents
	Risk aversion
	Early user involvement
	Open communication and information sharing
Learning orientation	Colleague's help
	System expertise
	Individual competency assessment
	Learning-by-doing
	Community of practice
	Learning from past experiences
Knowledge capability	Developing knowledge management system
	Use of communication technologies
Network relationships	Inter-organizational linkage
	Cross-functional cooperation
Process Management	Setting benchmarking metrics
	Tracking benchmarks
	BIM maturity assessment tools

Abbasnejad et al. Key Enablers for Effective Management of BIM Implementation in Construction Firms
https://www.irbnet.de/daten/iconda/CIB_DC29325.pdf

Policies and strategies

ECTP, The European Construction Technology Platform
- Digital Built Environment

BUILD UP Skills

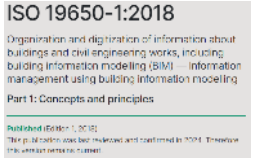
EC3, European Council on Computing
- “Bridge between academia and market”

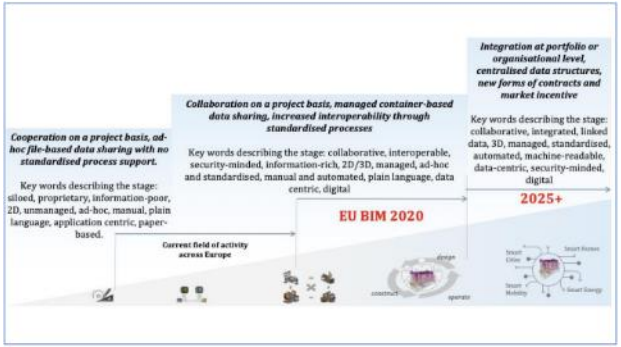
buildingSMART
- International and regional/ national levels

Standardization
- ISO 19650

CEN/TC 442 Building Information Modelling
- WG8: Competencies

National Laws, Degrees, Ordinance and Requirements
- Building owner’s strategies
- National Bim requirements





Administration Set

Summary: the day-to-day organizational activities required to meet and maintain strategic objectives. Administration competencies include tendering and procurement, contract management, and human resource management.

CODE	COMPETENCY TOPIC	DESCRIPTION
A01	Administration, Policies and Procedures	Developing managerial initiatives into policies and procedures to facilitate the adoption of BIM tools and workflows
A02	Finance, Accounting and Budgeting	Planning, allocating and monitoring the costs associated with BIM Adoption
A03	Performance Management	Assessing organizational BIM capability/maturity, Individual Competency and project performance using standardized metrics
A04	Human Resource Management	Planning, developing and managing human resources as to align staff competencies to organizational BIM goals
A05	Marketing	Promoting an organization's BIM Capability to its clients and business partners
A06	Tendering and Procurement	Developing the necessary specifications and documents to pre-qualify, recommend or procure BIM products and services
A07	Contract Management	Administering the contractual documentation underlying Collaborative BIM Projects and workflows
A08	Risk Management	Managing the risks associated with using BIM tools and collaborative workflows
A09	Quality Management	Establishing, managing and controlling the quality of models, documentation and other Project Deliverables

Implementation Set

Summary: the activities required to introduce BIM concepts, tools and workflows into an organization. Implementation competencies include component development, standardization and technical training.

CODE	COMPETENCY TOPIC	DESCRIPTION
I01	Implementation Fundamentals	Identifying and managing issues associated with BIM implementation
I02	Component Development	Implementing a structured approach for developing or customizing Model Components using documented Modelling Standards
I03	Library Management	Developing or managing component libraries as required for the standardized delivery of BIM Projects
I04	Standardization and Templates	Generating standardized templates, item lists and workflows for initiating, checking or delivering BIM Projects
I05	Technical Training	Developing a BIM Training Plan or maintaining a Skill Register to track staff training and their acquired skills
I06	System and Process Testing	Assessing the capability/compatibility of systems and the suitability of workflows and procedures
I07	Guides and Manuals	Developing guides, manuals or educational material covering Model-based Workflows

Managerial Set

Summary: the decision-making abilities which drive the selection/adoption of long-term strategies and initiatives. Managerial competencies include leadership, strategic planning, and organizational management.

CODE	COMPETENCY TOPIC	DESCRIPTION
M01	General Management	Defining and communicating overall managerial goals from adopting new systems and workflows
M02	Leadership	Leading and guiding others throughout the process of implementing new systems and workflows
M03	Strategic Planning	Identifying strategic objectives and developing implementation strategies
M04	Organizational Management	Identifying the organizational changes necessary for instigating, monitoring and improving BIM Adoption
M05	Business Development and Client Management	Maximizing the value achieved by the organization and its clients from BIM tools and workflows
M06	Partnership and Alliancing	Initiating partnerships and alliances with other organizations based on BIM Deliverables and workflows

Technical Set

Summary: the abilities required to generate Project Deliverables across disciplines and specialties. Technical competencies include modelling, drafting and model management.

CODE	COMPETENCY TOPIC	DESCRIPTION
T01	General IT	Installing, managing and maintaining general IT infrastructure
T02	Software Systems	Selecting, deploying and maintaining software systems in a multi-user environment
T03	Hardware and Equipment	Specifying, recommending or procuring computer hardware and equipment
T04	Modelling	Generating BIModels based on pre-defined Modelling Standards and protocols
T05	Documentation	Generating drawings and construction documents using standardized details and workflows
T06	Presentation and Animation	Generating professional-quality renderings or 3D animations using Specialized Software Tools
T07	Model Management	Managing and maintaining BIModels generated using standardized processes, protocols and specifications
T08	Document Management	Using Document Management Systems or similar to store, manage and share files and BIModels

Operation Set

Summary: the daily, hands-on individual efforts required to deliver a project or part/aspect of a project. Operational competencies include designing, simulating and quantifying.

CODE	COMPETENCY TOPIC	DESCRIPTION
o01	General Modelling	Using software tools to model project requirements and generate Model-based Deliverables across industries, information systems and knowledge domains
o02	Capturing and Representing	Using software tools and specialized equipment to capture and represent physical spaces and environments
o03	Planning and Designing	Using software tools for conceptualization, planning and design
o04	Simulating and Quantifying	Using software tools to conduct various types of model-based simulations and estimations
o05	Constructing and Fabricating	Using BIModels for the specific purposes of construction and fabrication
o06	Operating and Maintaining	Using models to operate, manage and maintain a Facility
o07	Monitoring and Controlling	Using models to monitor Building Performance or control its spaces, systems and equipment
o08	Linking and Extending	Linking BIModels and their components to other databases
o09	Custom Modelling	Using software tools to deliver a custom combination of Model-based Deliverables reflecting a variety of Model Uses

Many existing programmes:

Certification systems like BIMe -Initiative programme and building SMART Professional Certification programme

or

Qualification systems

[201in BIM Competency Table | BIMe Initiative (bimexcellence.org)](bimexcellence.org)
[BIM Excellence]

Competence frameworks - identify the content

- Developed for harmonising or up-dating skill-sets
  - skills, knowledge and competencies
- Competencies are listed for example on levels
  - foundational
  - intermediate
  - advanced
  - expert

Qualification frameworks - enable assessment

- Needed on national/ regional level when competence threshold levels are defined.
- Qualification frameworks are aligned with
  - National legistlative framework
  - National and regional reguirements
  - National BIM guidelines (required BIM levels)

Content of this presentation

Introduction
SoP
BIM Diamond
Policies and strategies
Competence frameworks

BIM competence LO-frameworks

Content
Topology
Taxonomy

Some examples

Usage Scenarios of the BIM competence framework

Scenario 1: **Use of Competence-Matrix in planning of BIM course content and production of learning modules**
Examples:
- Continues education course
- eLearning content development.

Scenario 2: **Use of Competence-Matrix in skills verification process during project procurement;**
Examples:
- EE-BIM
- LCM-BIM

How you define LOs for teaching professionals

Example: BIM use case for ACCC

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INSTRUCT

BIM Competence
LO- Frameworks

Content -LOs
Topology –how you structure competency sets
Taxonomy – how you can classify the competency levels
- Some examples

Terminology

- Learning outcomes are attributed to individual educational components and to programmes at a whole.
  - Learning outcomes are specified in three categories – as knowledge, skills and competence.

- Qualifications – in different combinations – capture a broad scope of learning outcomes, including **theoretical knowledge, practical and technical skills, and social competences where the ability to work with others will be crucial.**

ECTS users' guide 2015
Latest edition.
https://op.europa.eu/en/publication-detail/-/publication/da7467e6-8450-11e5-b8b7-01aa75ed71a1

LEARNING OUTCOMES 1/3
(content with chosen taxonomy)

	Client & Client advisors Client & Project manager (C), Energy manager (EM/ HVAC supervisor), Energy coordinator (EC), Briefing consultant (Bc)	C	EM	EC	Bc
	FUNDAMENTALS of ENERGY INTERVENTIONS AND LIFE CYCLE (Knowledge)				
LO1	**Learner is able to explain the fundamentals of energy interventions and the underlying principles of uses with respect to building life-cycle.**				
1.1	Explain and give examples of aspects and terminologies of energy interventions on levels of building project and building life-cycle.				
1.2	Explain added value of energy efficient and sustainable projects for society, neighbourhoods, clients and users				
1.3	Summarize and give examples about the potentials of renewable energy sources and smart energy solutions applicable to buildings including district-scale solutions.				
	Point out legislation and regulations related to energy performance, thermal comfort and air quality.				

	ENERGY PERFORMANCE OF BUILDINGS	C	EM	EC	Bc
LO2	**Learner is able to explain the fundamentals of sustainability and energy-efficient buildings and building performance.**				
2.1	Explain and give examples of aspects and terminologies of energy performance and building performance.				
2.2	Describe the financial and environmental aspects and related indicators, benchmarks and certification systems of energy and building performance.				
2.3	Explain the issues that affect energy performance of buildings and can demonstrate competence in domain specific solutions.				
	List and explain the core technologies and building solutions for required energy performance of buildings.				
	Explain relations between life-cycle costs, environmental impacts, energy performance and building performance.				
	List and explain the core concepts of sustainable building rating and certification systems.				

LEARNING OUTCOMES 2/3

	ENERGY ASSESSMENT	C	EM	EC	Bc
LO4	**Learner is able to explain about the procedures and importance of setting energy targets for sustainability and building performance.**				
4.1	Explain and give examples of different types of objectives, quality objectives, sustainability aspirations, targeted outcomes, budgeting and other constraints for building projects.				
4.2	Include and explain the importance of energy analysis in the decision making starting from the earliest stages of the project and even on the basis of very simple and preliminary plans (and BIM models).				
4.3	Assess potentials, feasibility and risks of different alternatives based on studies performed by consultants.				
.	Use risk analysis and conduct feasibility (financial and technical) studies to make sure set objectives of the project are achievable.				
	Control and review design plans (and BIM models) and evaluate the functionality of spaces with regard to user needs, designed energy performance and set energy performance targets. Set targets for the energy consumption of the realized building and demand clarifications and solutions in case of a mismatch between design and actual.				
	Explain how to define requirements for performance documentation, eG. how and where the targeted, designed and achieved performance is				

	COLLABORATION FOR ENERGY MANAGEMENT and PROSESSES	C	EM	EC	BC
LO5	**Learner is able to explain and use collaboration methods for energy management and processes.**				
	Describe the essential parts of the procedure for collaboration				
	Explain the course of procurement process and give examples of collaborative procurement models to support interdisciplinary working practices resulting in best solutions for energy-efficient buildings.				
	Describe different collaborative interdisciplinary and open BIM working methods, tools and processes -for energy performance design, construction and operation				
	Explain and give examples how to apply project management and leadership methods for collaborative design, execution and supervising				
	Moderate and coordinate collaboration amongst the stakeholders including design team, client, manufacturers, construction site and building authorities				
	Moderate collaboration with the help of communication platforms and processes like CAVE (computer aided virtual environment) and Big Room working and BIM coordination.				

LEARNING OUTCOMES 3/3

	INTEGRATED INFORMATION MANAGEMENT	C	EM	EC	Bc
LO7	**Learner is able to use different relevant energy software and interfaces between relevant software.**				
7.1	Use information and communication technologies for buildings taking into account data security and protection requirements.				
7.2	Explain the use of spatial sketching and performance assessment tools and results for decision making.				
7.3	Use different tools for collaborative working.				
	Use visualization tools, viewers and dashboards.				
	Use tools for information extraction from the models to make informed decisions about the cost, quality, sustainability and building performance.				
	Use project data and file management systems.				
	Use digital archive systems for documents and models.				

	USE of TOOLS				
LO8	**Learner is able to use different energy tools for solving complex problems at the interface between domains (i.e. energy-water nexus)**				
8.1	Use target setting tools and performance assessment tools				
8.2	Use energy performance estimation tools				
8.3	Use energy and LCA calculation tools				
	Knowledge on comparing the relevant tools for client				
	Demand tools and relevant skills for BIM based process including EE and LCA model uses				
	Demand use of rating tools				

LO topology: structuring LO-topics and LOs

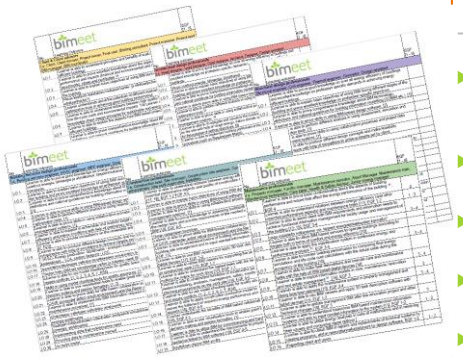
Report D3.2 – Definition of learning outcomes in the European level

bimeet

Group 1 (LO1) Fundamentals of BIM and principles of its uses with respect to building life-cycle

- Group 2 (LO2) Fundamentals of sustainable and energy-efficient buildings and building performance
- Group 3 (LO3) Preparation of information management documentation and setting strategic targets for the project
- Group 4 (LO4) Early stage target setting for energy, sustainability and building performance
- Group 5 (LO5) BIM-based collaboration methods in project management and processes
- Group 6 (LO6) Quality management procedures for achieving set targets
- Group 7 (LO7) Skills for relevant software and interfaces between software.

Topology cover widely sustainable and digital construction.
Competence level for each role specific LO by using EQF



Roles in BIMEET

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

Report D2.3 Delivering Skills and Definition of Qualifications tcomes Matrix in the EU

INSTRUCT

- Group 1 (LO1) Basic general knowledge of sustainable energy interventions and principles and their application across lifecycle and supply-chains
- Group 2 (LO2) Basic factual knowledge of sustainable and energy-efficient buildings and building performance.
- Group 3 (LO3) Knowledge of facts, principles, processes and general concepts on building energy efficiency
- Group 4 (LO4) Factual and theoretical knowledge on energy efficiency, sustainability and building performance
- Group 5 (LO5) Comprehensive, specialised, factual and theoretical knowledge on energy efficiency, sustainability and building performance
- Group 6 (LO6) Advanced knowledge in energy efficiency, involving a critical understanding of theories and principles
- Group 7 (LO7) Highly specialised knowledge in energy efficiency.
- Group 8 (LO8) Knowledge at the most advanced frontier of energy efficiency and at the interface between related disciplines

Topology have focus on EE-BIM
Competence level for energy expert profile (role or discipline)

LO topology example

The competences during the existing condition stage

Tasks	Mod. 1 Understand which information for existing conditions is necessary to specify, produce, exchange, maintain and/or refurbish
Select/develop the use case for energy analysis	1.1 To be aware of the advantages of using BIM for defining the existing conditions for developing new and/or refurbished buildings
Select the relevant information related to the technologies to be used for improving energy performance	1.2 Identify and list the technologies to be used for existing conditions when developing BIM models for new and/or refurbished building
Gather the information r… different technologies an… among which to chose th… technical solution	
To acquire the EIR related… improvement of the ener… performance and legal re…	
To acquire any informati… constrain to meet legal re…	

The competences during the preliminary design stage

TASKS	Mod. 2 Understand which information is necessary to specify, produce, exchange, and maintain during the preliminary design stage
Select and manage information related to the different use cases at preliminary design stage using open standard formats	2.1 Identify the purpose and advantages of using BIM for improving energy performance of a building during it's lifecycle, compared to traditional methods
Contribute and develop the BIM Execution Plan for the specific …	2.2 Identify the benefits of incuding energy issues when developing a BIM
Select relevant use c… energy performance … desing stage	
Select the relevant in… technology to be con… simulation to optimi…	
Identify the key acto… needed to perform t…	

The competences during the technical design stage

	Mod. 3 Understand which information is necessary to specify, produce, exchange, and maintain during the technical design stage
Select and manage information related to the different use cases of technical design using the relevant standards	3.1 Identify use cases for energy efficient technical design of buildings
Be capable of selecti… introduce in a code c…	
To define the Level of… necessary to describe… energy performance … standards	
Select the right tools … requirements for tha…	
To ensure reliable inf… efficiency evaluation	

The competences during the construction stage

	Mod 4 Understand which information is necessary to specify, produce, exchange and maintain during the construction stage
Select and manage information related to the different use cases during the construction stage using relevant standards	4.1 Identify the objectives to ensure high energy performance during the construction process
To ensure the correct information fo… case	
To be able to identify roles and respo… for managing the information during… construction phase	
To ensure that the information for a… technology is sufficient to evaluate … sustainability during the construction…	
To ensure the completeness and corr… the information released during han…	
To be able to collect and manage the… information of the asset for the hand…	

The competences during the operation & maintenance stage

	Mod. 5 Energy management at the operational stage-principles, tools and methods for smart energy management, underpinned by BIM
Select and manage information related to operations and maintenance using the correct standards	5.1 Identify use cases for energy efficient management of Nearly Zero Energy Buildings at the operational stage;
To be able to verify the existence of the information required for the asset management	5.2 Identify the information requirements and standards for openBIM information exchange for the facility management
To be able to identify the information necessary to maintain the best performance of the installed technologies	5.3 Identify the technologies for the maintenance stage to ensure the foreseen energy performance
To be able to select the critical information to ensure the correct management of the installed technologies	5.4 Identify and assess the risks of using incorrect information that are essential for facility management and maintenance
To manage the correct procedures for the final disposal of equipment, materials and components at the end of the lifecycle	5.5 Be aware of the use of correct information for the disposal of any component to transfer to landfill or for reuse

Substances with focus on EE and BIM/BEM. Topology links also directly to BIM tasks.

iBIMi | buildingSMART Italy

Anna Moreno, President of the Italian buildingSMART Chapter (4.11.2021/ bSF Seminar)

LO framework Scope and how to measure competency

BIMEET Learning Outcomes are defined taken into account needed knowledge on:

1. **Sustainable construction**
   - Energy Performance
   - Greenhouse gasses
2. **Performance based process**
   - Continuous Commissioning
   - Target setting (KPIs), Follow up, Assessment
3. **Collaborative BIM process**
   - Team work, Team leadership
   - Project process management
4. **Integrated information modeling and management (BIM) processes**
   - Social BIM, Decision support
   - Data flow during life cycle of buildings
   - BIM use-case/ BIM dimensions
   - Information in BIM use-cases, IDM
   - Data transfer formats, IFC
   - Product data formats, IDF

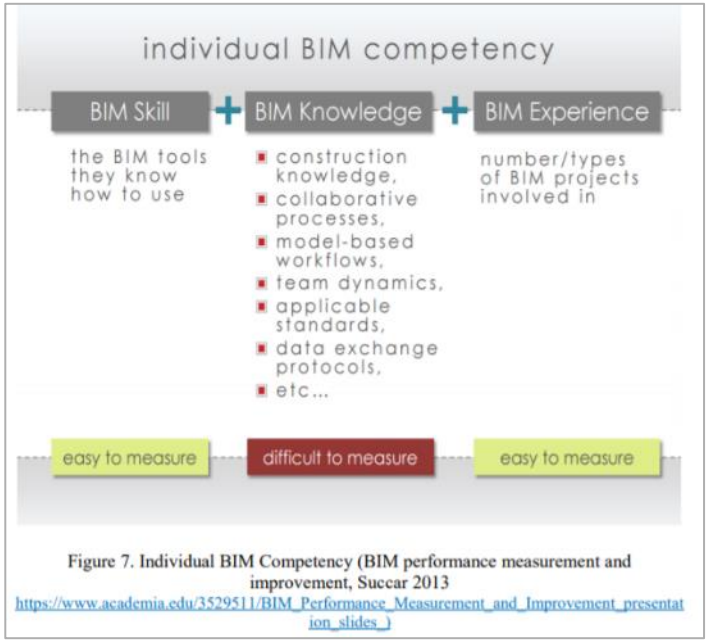
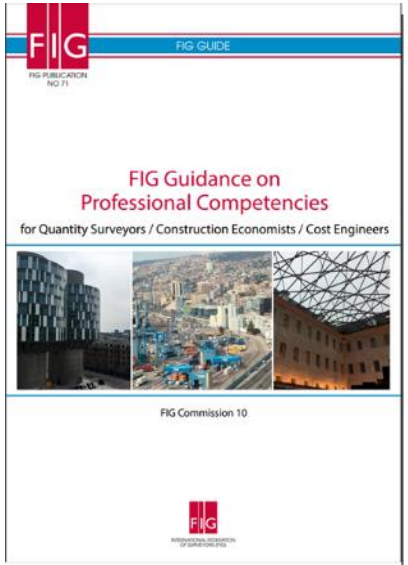


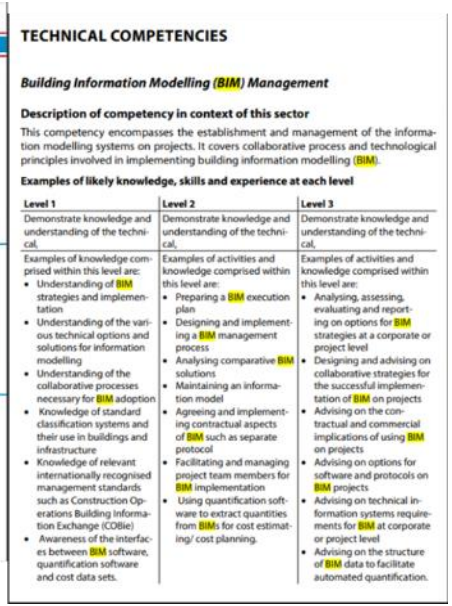
Figure 7. Individual BIM Competency (BIM performance measurement and improvement, Succar 2013
https://www.academia.edu/3529511/BIM_Performance_Measurement_and_Improvement_presentation_slides_)

Succar (2013), BIM Performance measurement and improvements

LO topology: ways of setting up competence level

- Competence level as stages for each profile/ role
  - Example: FIG professional competencies
- Competence level of each LO by using EQF
  - Example: BIMEET and INSTRUCT LO's for LCM/EE-BIM
- Competence level follow each task of role/ discipline
  - Example: BIMEET Skills-Knowledge-Competence
- Competence level follow each digital task of a role/ discipline
  - Example: EE-BIM, iBIMi, buildingSMART Italy





TECHNICAL COMPETENCIES

Building Information Modelling (BIM) Management

Description of competency in context of this sector

This competency encompasses the establishment and management of the information modelling systems on projects. It covers collaborative process and technological principles involved in implementing building information modelling (BIM).

Examples of likely knowledge, skills and experience at each level

Level 1	Level 2	Level 3
Demonstrate knowledge and understanding of the technical,	Demonstrate knowledge and understanding of the technical,	Demonstrate knowledge and understanding of the technical,
Examples of knowledge comprised within this level are: • Understanding of BIM strategies and implementation • Understanding of the various technical options and solutions for information modelling • Understanding of the collaborative processes necessary for BIM adoption • Knowledge of standard classification systems and their use in buildings and infrastructure • Knowledge of relevant internationally recognised management standards such as Construction Operations Building Information Exchange (COBie) • Awareness of the interfaces between BIM software, quantification software and cost data sets.	Examples of activities and knowledge comprised within this level are: • Preparing a BIM execution plan • Designing and implementing a BIM management process • Analysing comparative BIM solutions • Maintaining an information model • Agreeing and implementing contractual aspects of BIM such as separate protocol • Facilitating and managing project team members for BIM implementation • Using quantification software to extract quantities from BIM; for cost estimating/ cost planning.	Examples of activities and knowledge comprised within this level are: • Analysing, assessing, evaluating and reporting on options for BIM strategies at a corporate or project level • Designing and advising on collaborative strategies for the successful implementation of BIM on projects • Advising on the contractual and commercial implications of using BIM on projects • Advising on options for software and protocols on BIM projects • Advising on technical information systems requirements for BIM at corporate or project level • Advising on the structure of BIM data to facilitate automated quantification.

https://www.fig.net/resources/publications/figpub/pub71/figpub71.asp

Defining the LOs with Bloom's taxonomy and using European Qualification Framework (EQF)

Competence level is aligned with action verb to be used in formulation of the LO or competence requirement clauses.

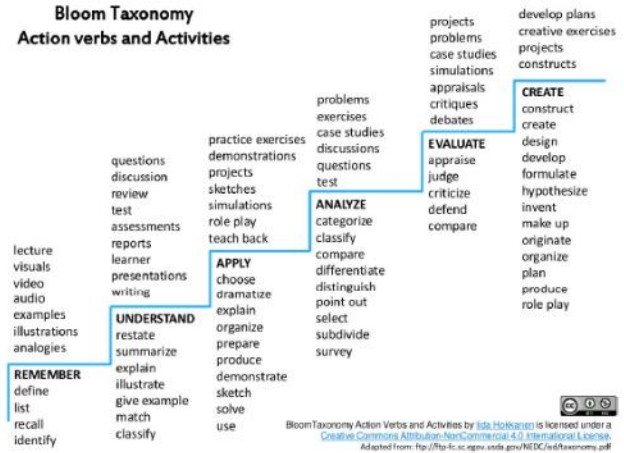


Figure 4 Bloom taxonomy action verbs and activities (Iida Hokkanen 2015) .[20]

EQF as 1-6 (8) levels of knowledge, skills and competence can be adapted to different levels of assessment: LO- clauses, role profiles, roles/ disciplines, courses, programmes, diplomas, qualification schemes.

	Knowledge	Skills	Competence
Level 1	Basic general knowledge	basic skills required to carry out simple tasks	work or study under direct supervision in a structured context
Level 2	Basic factual knowledge of a field of work or study	basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools	work or study under supervision with some autonomy
Level 3	Knowledge of facts, principles, processes and general concepts, in a field of work or study	a range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information	take responsibility for completion of tasks in work or study; adapt own behaviour to circumstances in solving problems

	Knowledge	Skills	Competence
Level 4	Factual and theoretical knowledge in broad contexts within a field of work or study	a range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change; supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities
Level 5	Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge	a comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems	exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others
Level 6	Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles	advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study	manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts; take responsibility for managing professional development of individuals and groups
Level 7	•Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research •Critical awareness of knowledge issues in a field and at the interface between different fields	specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge 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
Level 8	Knowledge at the most advanced frontier of a field of work or study and at the interface between fields	the most advanced and specialised skills and techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice	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

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INSTRUCT

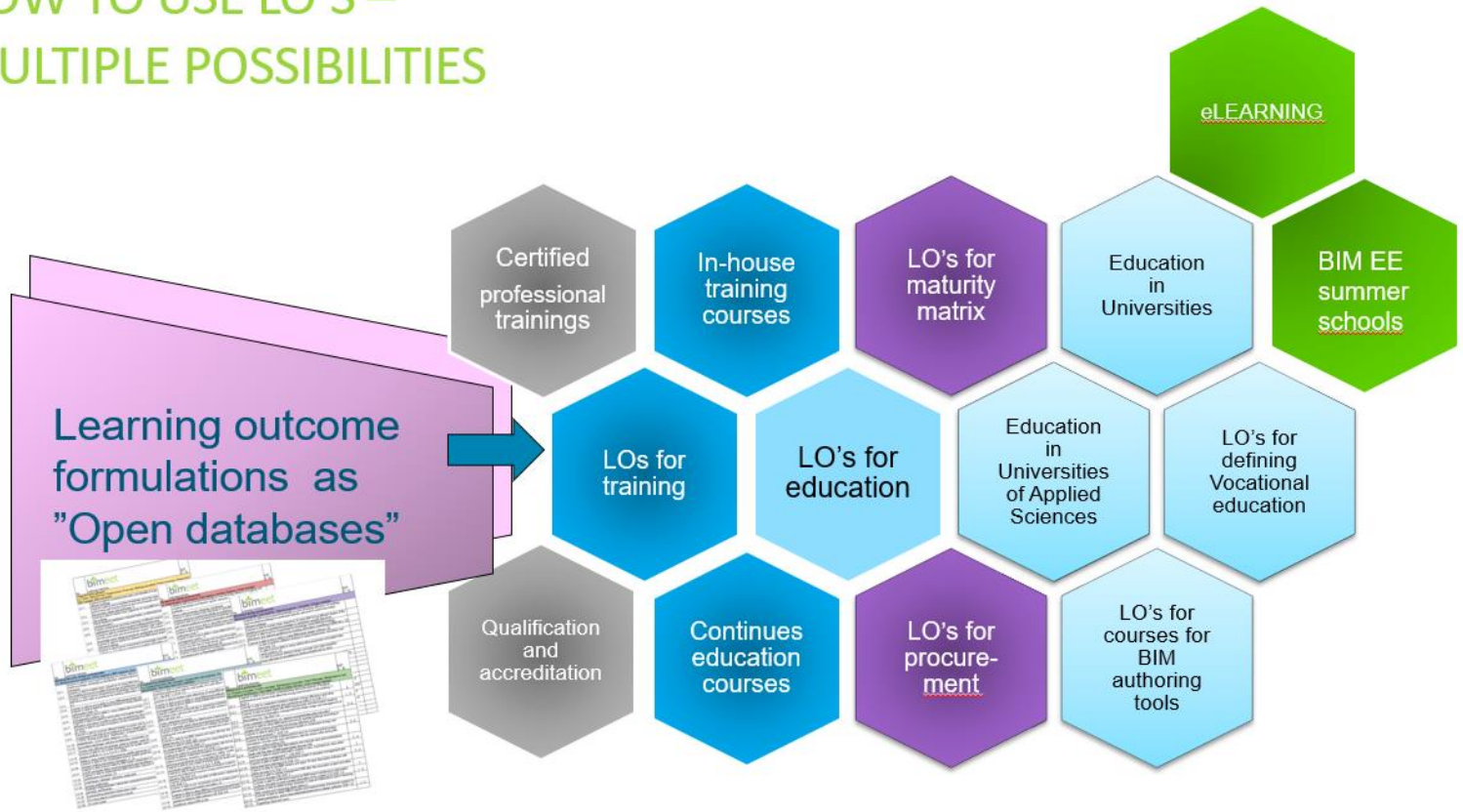
Usage Scenarios of the BIM Competence Framework

Examples of the usage of LOs or competence requirements

- developing eLearning and continues competence decelopment courses

Potential Usages

HOW TO USE LO'S – MULTIPLE POSSIBILITIES



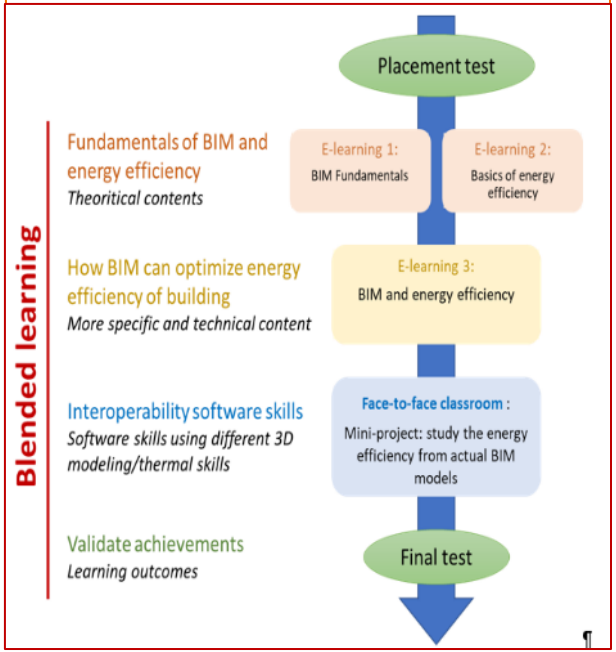
LO based eLearning - content

eLEARNING

BIM for Energy Efficiency

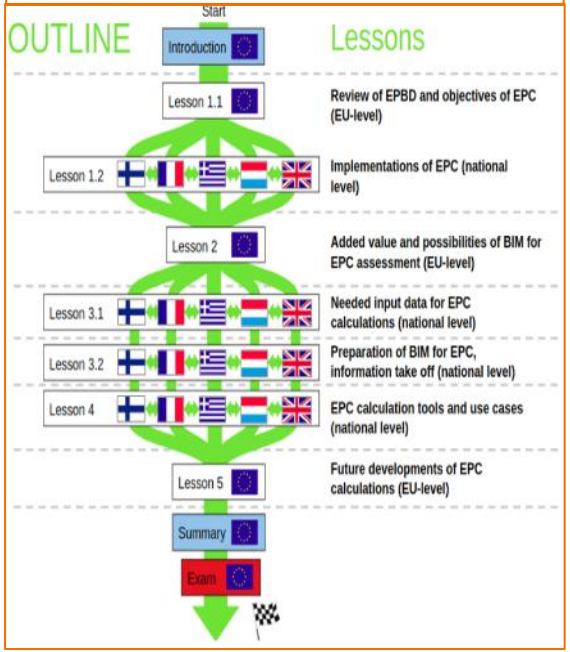
- **blended learning course**

1 hour on-line and 2 days in-class

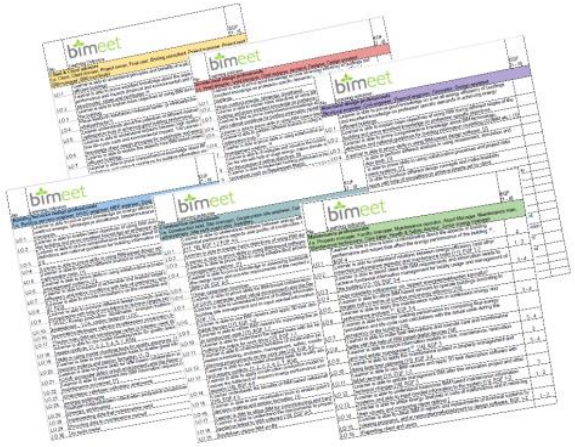


Introduction of BIM enabled EPC assessment

- **on-line course**



LO based eLearning – Learning objectives 1/2



eLEARNING

BIM For Energy Efficiency

- **blended learning course**

1 hour on-line and 2 days in-class

Learner is able to explain

- the fundamentals of BIM and the underlying principles of uses with respect to building life-cycle
- use BIM based collaboration methods for project management and processes
- basic objectives of using BIM during different stages of the building
- the fundamentals of sustainable and energy-efficient buildings and building performance
- about the procedures and importance of setting targets for energy, sustainability and building performance
- the aspects how BIM based projects benefit energy efficient buildings.

Learner is able to prove

- comprehensive knowledge about BIM terminology, definitions and national guidelines for building information modelling –
- good knowledge on over all energy efficiency of buildings and excellent knowledge on profession specific demands in achieving energy efficient buildings

Learner is able to implement

- energy performance, building performance and sustainability targets into design process is able to create and develop sustainable energy efficient buildings using BIM tools

LO based eLearning – Learning objectives 2/2

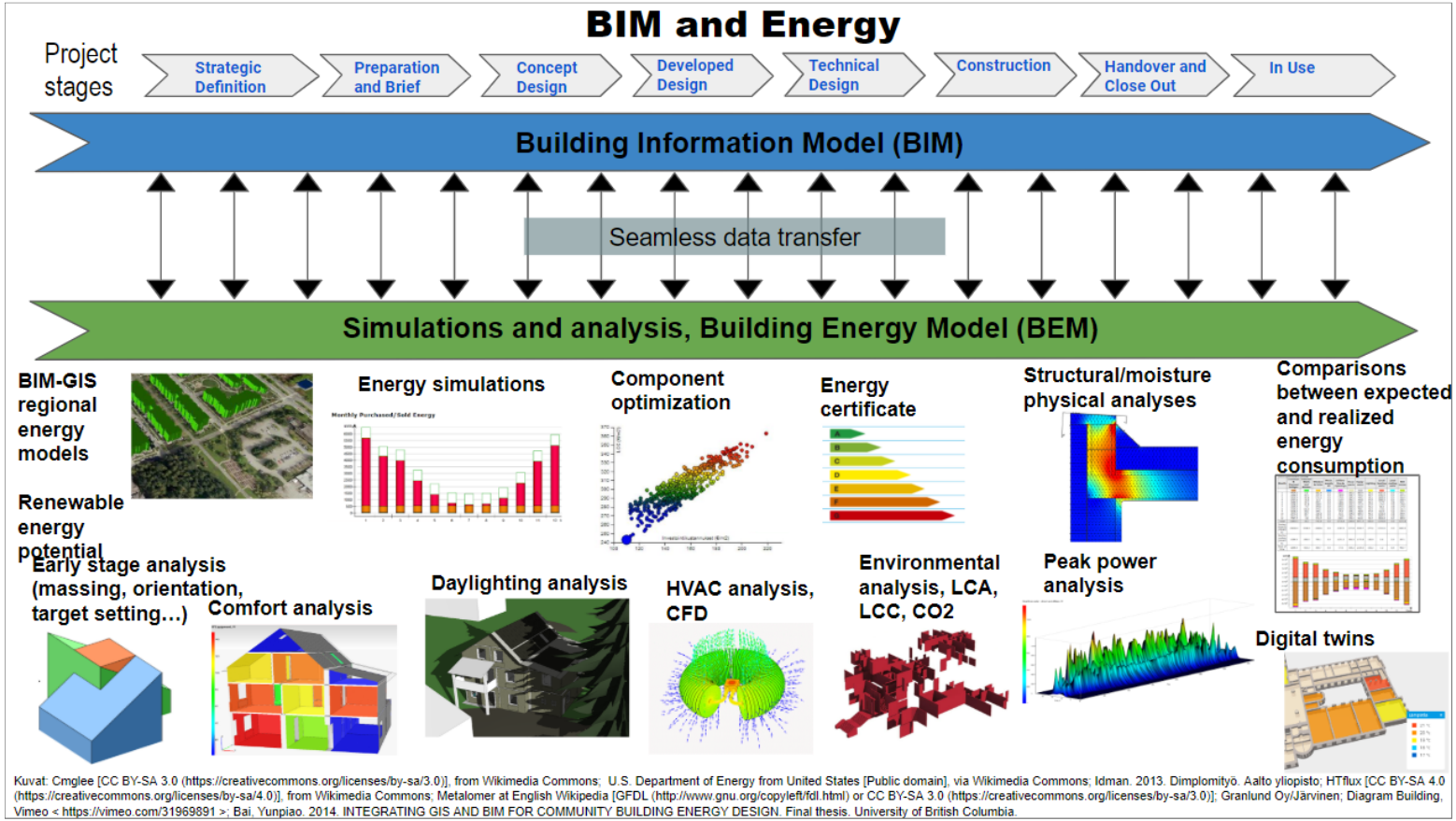
eLEARNING

eLearning modules
in Energy-BIM platform

https://www.energy-bim.com/view/document?id=180&parentId=113&category=euinfo&doctitle=BIM%20for%20Energy%20Efficiency&q=&token=0

Learner is able to prove skills in using BIM-based design software
- **to use** different relevant software and interfaces between relevant software
- **to understand and correct** interoperability errors
- **to prove skills** in using BIM-based design software
- **to produce** BIM models with accurate and required information content for different uses and phases of a building project
- to produce different design concepts and make feasibility comparisons with help of simulations to achieve targets set by client
- to perform different analysis in using assessment, simulation and optimisation tools - Learner is able to explain how to define resources needed for design and defining competence requirements for designers and engineer

BEM realted simulations and analyses

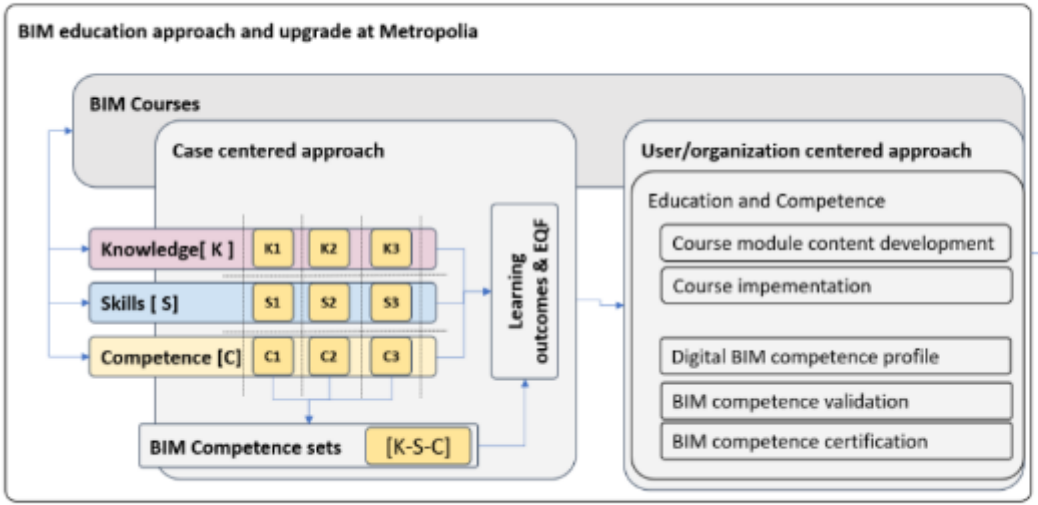


Kuvat: Cmglee [CC BY-SA 3.0 (https://creativecommons.org/licenses/by-sa/3.0)], from Wikimedia Commons; U.S. Department of Energy from United States [Public domain], via Wikimedia Commons; Idman. 2013. Dimplomityö. Aalto yliopisto; HTflux [CC BY-SA 4.0 (https://creativecommons.org/licenses/by-sa/4.0)], from Wikimedia Commons; Metalomer at English Wikipedia [GFDL (http://www.gnu.org/copyleft/fdl.html) or CC BY-SA 3.0 (https://creativecommons.org/licenses/by-sa/3.0)]; Granlund Oy/Järvinen; Diagram Building, Vimeo < https://vimeo.com/31969891 >; Bai, Yunpiao. 2014. INTEGRATING GIS AND BIM FOR COMMUNITY BUILDING ENERGY DESIGN. Final thesis. University of British Columbia.

BIM education

Metropolia

Metropolia BIM education

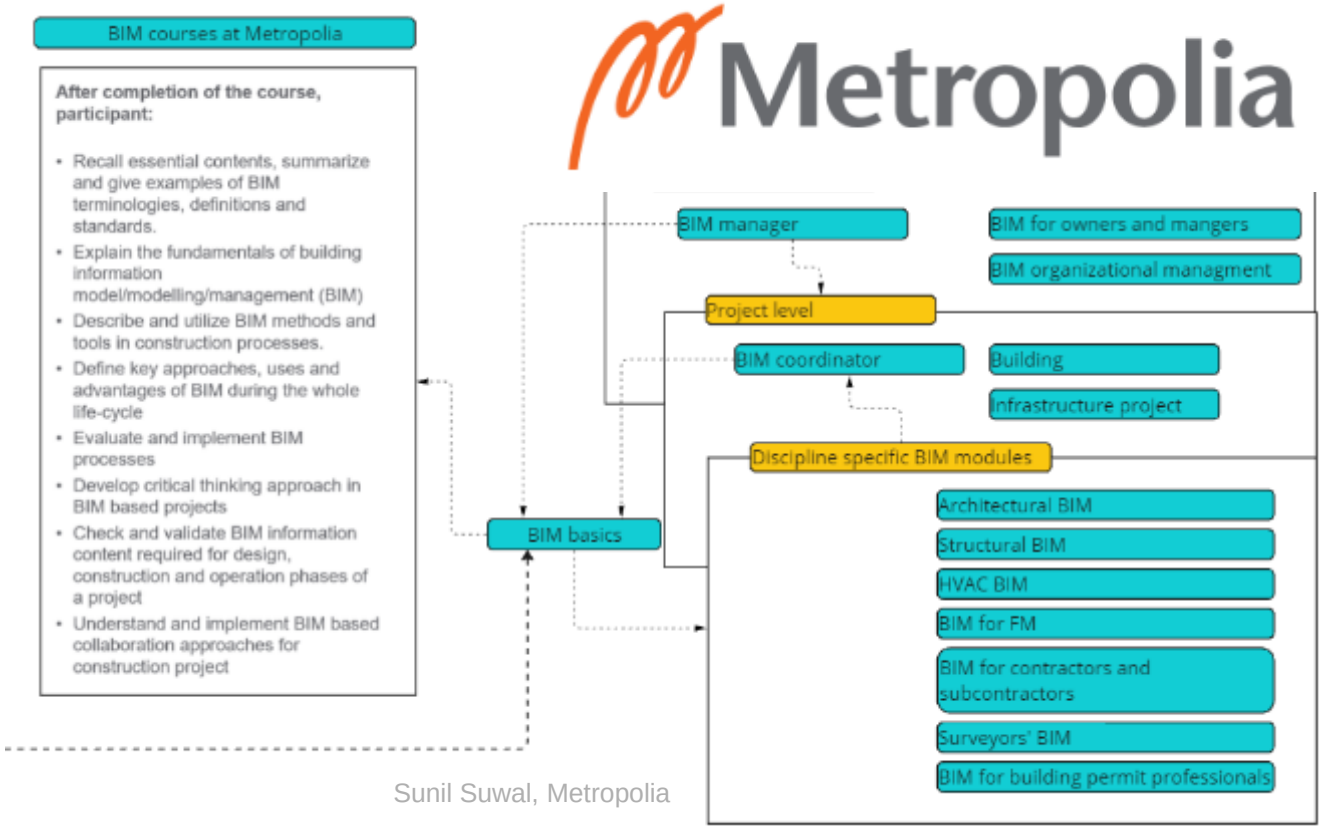


Course offerings:

- BIM for Directors
- BIM Basics [5 ECTS]
- BIM for Owners [5 ECTS]
- BIM for Architects [5 ECTS]
- BIM for Structural Engineers [5 ECTS]
- BIM for HVAC/MEP Engineers [5 ECTS]
- BIM for Construction [5 ECTS]
- BIM for Facility Management [5 ECTS]
- BIM for Surveyors [5 ECTS]
- BIM for Blue Collar Workers [2 ECTS]

Continues education courses

Use of Competence-Matrix in planning of BIM course content



Sunil Suwal, Metropolia

Continues education courses

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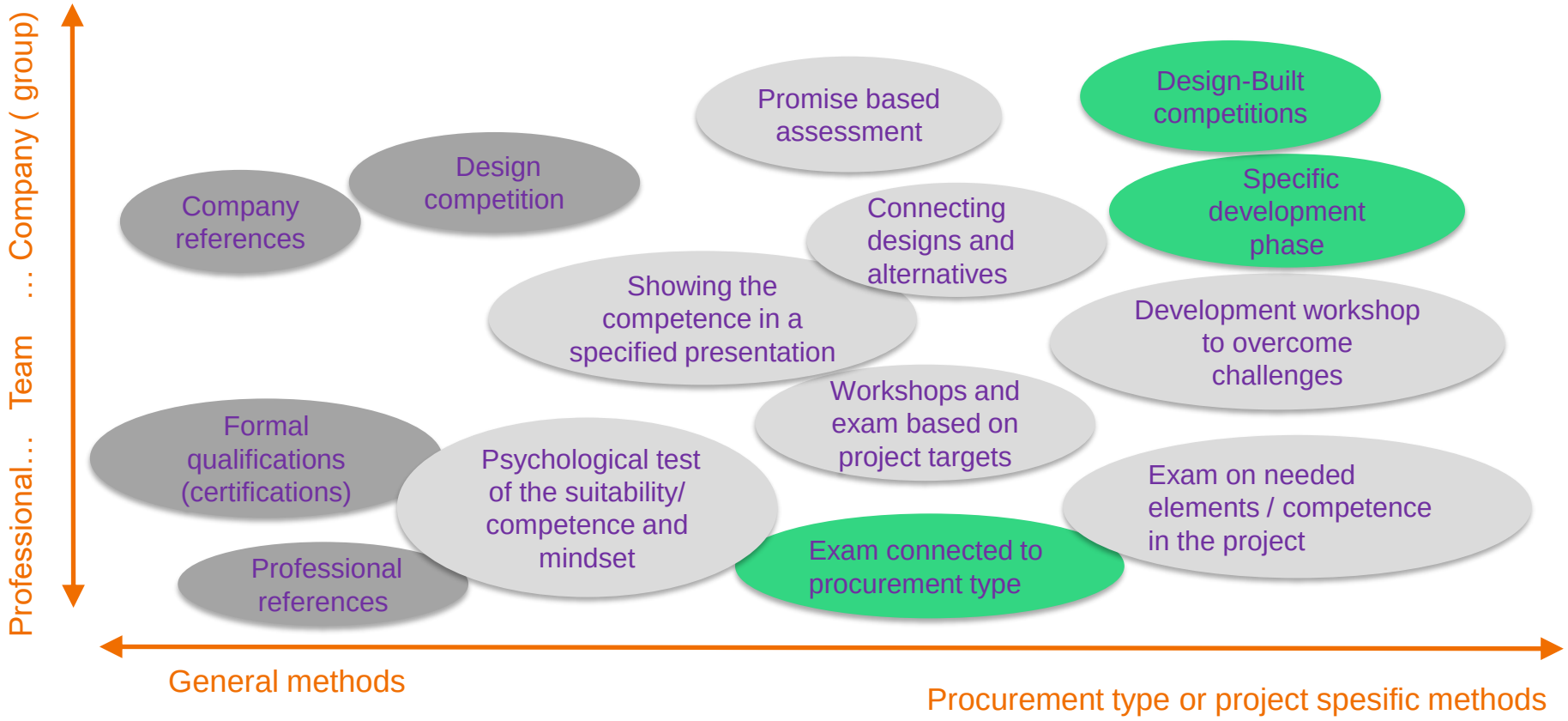
INSTRUCT

Usage Scenarios of the BIM Competence Framework

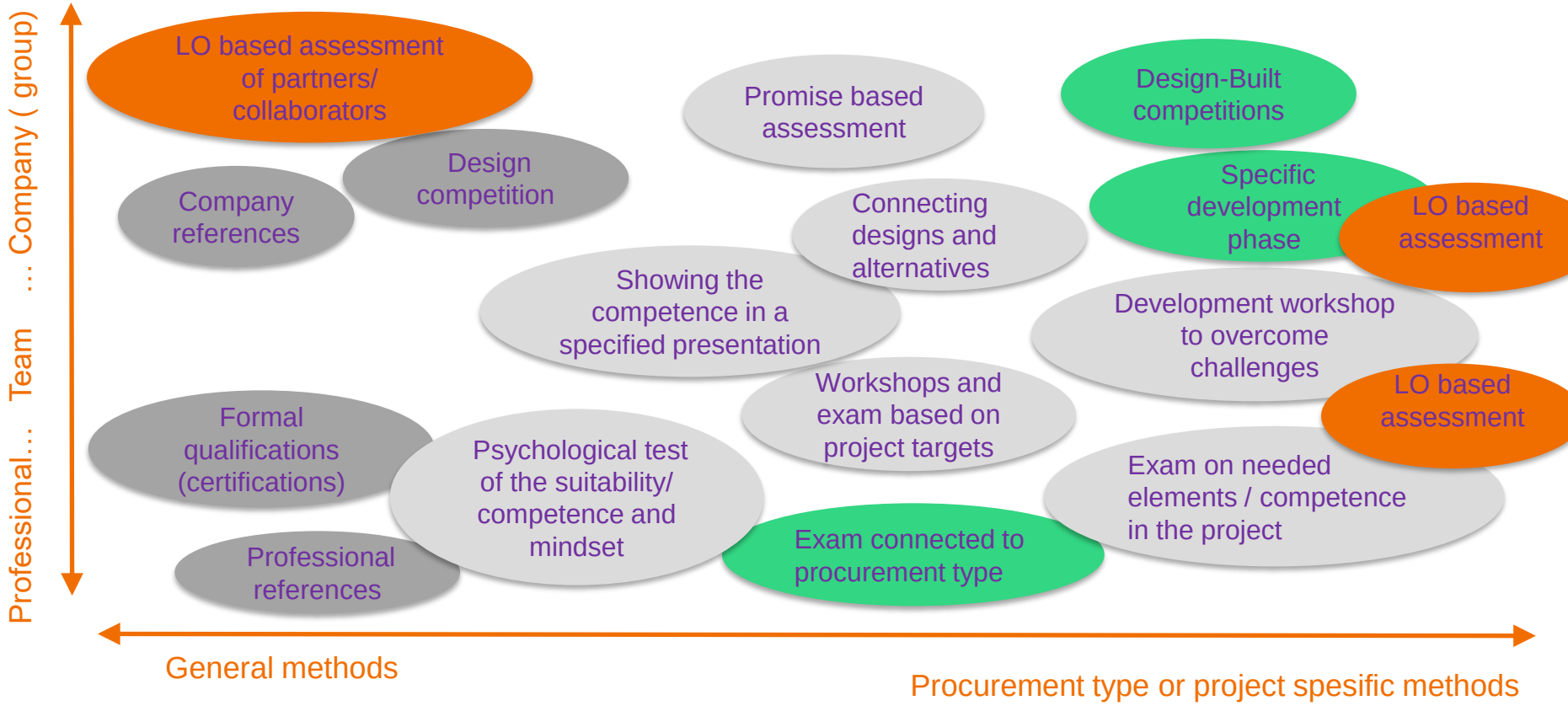
Example of the usage of LOs or competence requirements

- **skills verification method during procurement process**

Methods fro skills and competence verification



LO based assessment



Skills verification method – setting up minimum competence targets and self-estimation

Using competence requirement tables (LOs)

Method in 3 steps:

1. Client identifies demands for skills, and knowledge for the team or each role, using Aspects of competence)
   - Minimum levels are defined in the tables of competence requirements (= learning outcomes)
2. Service provider identify their competence levels
   - Self estimations with the tables of competence requirements.
3. Client assess the offers level of skills to the required/ demanded levels

ASPECTS OF COMPETENCE	required level	offered
FUNDAMENTALS of ENERGY INTERVENTIONS AND LIFE CYCLE (Knowledge)		
ENERGY PERFORMANCE OF BUILDINGS		
TARGET SETTING for BUILDING (EE and sustainability)		
ENERGY ASSESSMENT		
COLLABORATION FOR ENERGY MANAGEMENT and PROSESSES		
INTEGRATED INFORMATION MANAGEMENT		
USE of TOOLS (skills)		

Levels for demanded skills: Framework (EQF-levels), 1-6

	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

LO's for procure-ment

High level qualification scheme (LO-topology) for energy efficiency and LCM

Areas of the competence requirements - Design disciplines	Required Level (EQF) 1-6 for use-case or role	Offered Level (EQF) 1-6
Basic knowledge on BIM and integrated digital ways of working during building project phases, and during use and maintenance.	**Minimum levels for this project and for the expert/ discipline role to procure** - EQF - Additional requirements	
Professional knowledge on Energy efficiency of buildings and life cycle management.		
Performance based design skills, knowledge on design solutions and their performances.		
Target setting achieving energy efficiency, low carbon targets, GHG and other sustainability criteria and setting up target level.		
Energy related and sustainability criteria (KPIs) follow up and assessments as part of continues commissioning process.		
Collaboration in steering of energy efficiency and sustainability problem solving during the process and in building operations and management.		
Management skills in integrated information modelling and data governance.		
Skills in using the calculation, analyses simulation and visualisation tools, e.G BIM based energy simulations, LCA (embedded), checkers, KPI assessment tools, …		

LO's for procure-ment

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Competence Framework for teaching professionals

- Example: BIM and ACCC
(Automated Code Compliance Checking)

ACCORD

Innovate UK

Building up BIM skills

"Individual BIM competencies are the personal traits, professional knowledge and technical abilities required by an individual to perform a BIM activity or deliver a BIM-related outcome. These abilities, activities or outcomes must be measurable against performance standards and can be acquired or improved through education, training, and/or development." (Succar et al. 2013)

- Technology will be implemented – new skills to master the BIM tools are needed
- Technology will change the process - new know-how on integrated information management is needed.
- Technologies and process change enable new kind of business – new innovations are possible.

We need teachers
to build-up needed skill-sets

Competence Hierarchy

Able to develop national qualification schemes/ certifications

Able to develop diploma level qualification framework

Able to develop learning program (using LOs)

Able to define learning target for a course

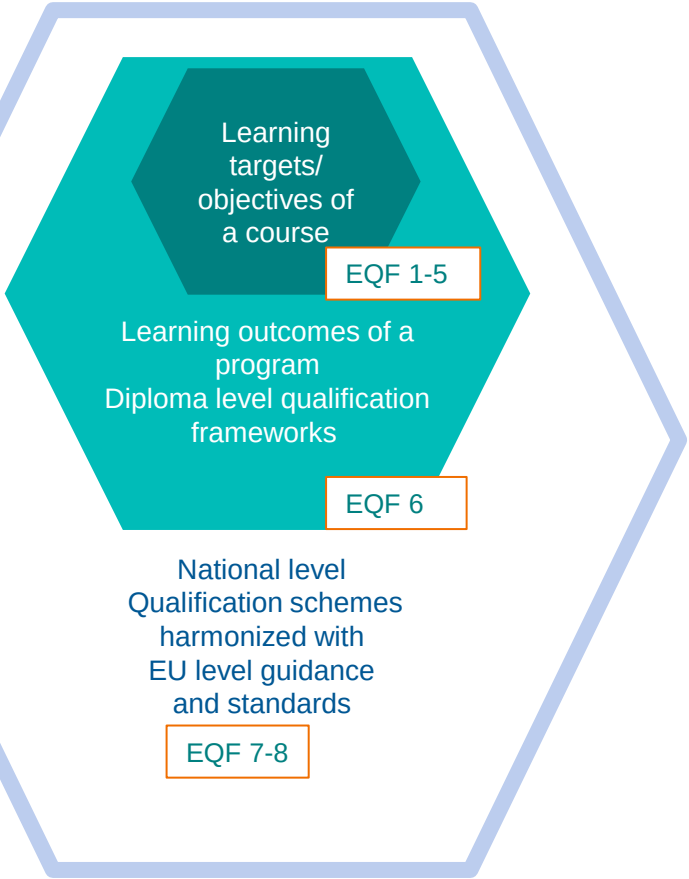
- Able to teach basics
- Able to teach skills
- Able to teach knowledge
- Able to teach ability/ capabilities

Able to up-date learning targets

Able to up–date learning program (using LOs)

Able to up-date diploma level qualification framework

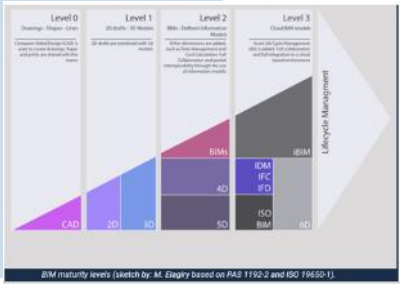
Able to up-date national qualification schemes/ certifications



Competence areas for Teaching Professionals 1/2

Entry knowledge: BIM basics

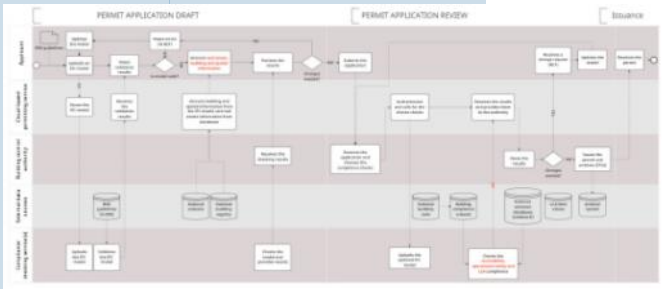
- BIM Standards
  - Guidelines, classifications, data transfer
- BIM use-cases and BIM Usages
- Adaptation, implementation
  - Interorganisational working environment
- Development history of Information Management and Digital transition



BIM maturity levels (sketch by: M. Elagiry based on PAS 1192-2 and ISO 19650-1).

Knowledge on: SoA Digi-building permitting and ACCC

- SoP–pilots
- Roadmaps, common vision
- Process change, re-engineering
- Conversion of requirements/ building code
- ACCC as BIM use–case
  - Tools
  - Platforms
  - Checkers
  - Machine-readable requirements



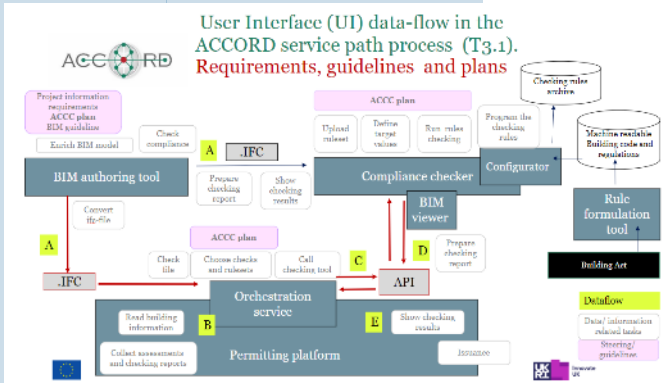
Source: EU -ACCORD

Competence areas for Teaching Professionals 2/2

Digital building permitting with ACCC

Skills and know-how about

- Use of technologies and tools connected to BIM-ACCC
  - Tools
  - Platforms
  - Checkers
  - Machine-readable requirements
- Adaptation, implementation:
  - Technological readiness
- Development and innovation:
  - Data-standardization behind BIM –ACCC –use-cases



Source: EU -ACCORD

Qualification schemes for Digital building permitting with ACCC

Competence on

- Building up skills, and use of learning methods
- Setting up programmes/ courses with Los for learning modules
- Setting up competence requirements for profiles
- Know-how on qualification frameworks
- Learning material planning and production
- Exam planning

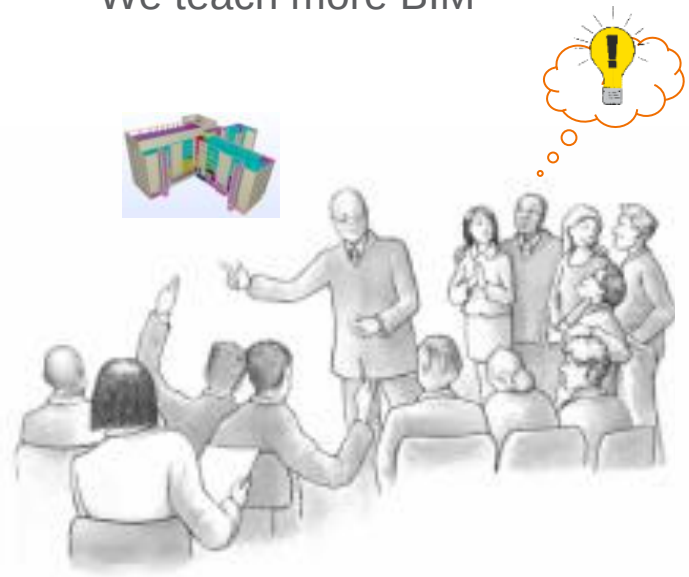
Tomorrow We talk BIM

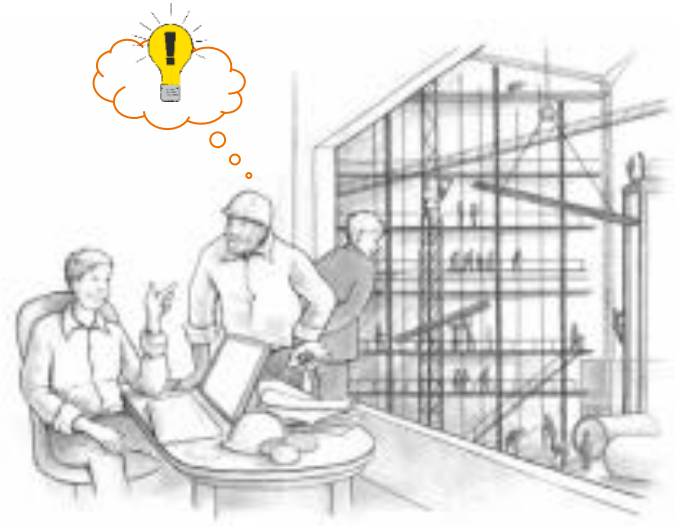
We procure BIM

We design BIM

We do BIM

We teach more BIM





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Thank You !

tarja.makelainen@vtt.fi

Replication and Upscaling Methodology for Reducing Energy Poverty

WELLBASED

@wellbasedEU

wellbased.eu

Funded by the Horizon 2020 Framework Programme of the European Union

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Melda KARADEMİR

Demir Enerji Consulting

Energy Poverty

- Energy poverty refers to unhealthy living conditions and has a direct and negative impact on welfare. The fact that energy poverty depends on many factors necessitates the need for a comprehensive analysis of this issue. In this context, the H2020 project is developing a methodology to reduce energy poverty. Within this methodology, the design of the Solution Catalogue, which will be useful for studies on reducing energy poverty, is detailed.

About Solution Catalog

Solution Catalogue aims to provide a detailed understanding of the challenges pilots might encounter before implementing the implementation and the barriers they face during the execution of actions. The goal is for the proposed solutions to offer guidance to other pilots involved in or considering similar projects when implementing their actions. The actions are categorized within the 4 Layers specified in the Social-Ecological Model of Social Determinants of Health (Dahlgren and Whitehead, 1991). The layers are outlined below:

- Layer 1: Individual Lifestyle Factors
- Layer 2: Social and Community networks
- Layer 3: Living and working conditions
- Layer 4: General socio-economic, cultural and environmental conditions

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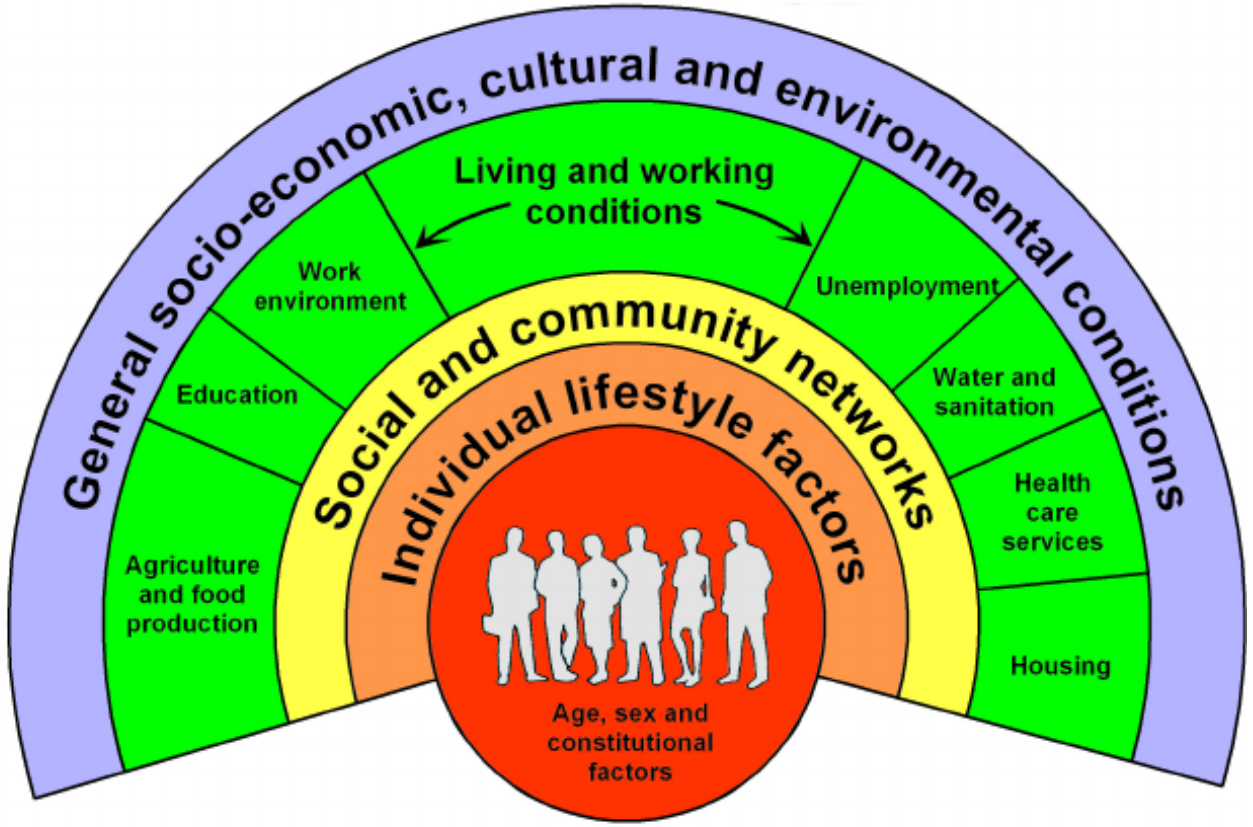
Socio-Ecological Model



Source: Dahlgren and Whitehead, 1991

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Design of Solution Catalog

Based on the socio-ecological model and realistic assessment approach, the study designs a Solution Catalogue so that other studies can benefit from the actions identified to reduce energy poverty and its impacts on citizens' health and well-being.

The steps followed to develop the Solution Catalogue are as follows:

- ✓ Identify the study area
- ✓ Identify actions to reduce energy poverty in the study area
- ✓ Identify the political, economic, social, technical, environmental, environmental, legal barriers and facilitating factors that may be encountered prior to implementation of the identified actions
- ✓ Identify the political, economic, social, technical, environmental, environmental, legal barriers and enablers to the implementation of the identified actions
- ✓ Elaboration of the solutions developed for barriers in the study area
- ✓ Design Solution Catalogue for actions for the benefit of other studies

Actions of Solution Catalog

Catalog No	Layer 1: Individual Lifestyle Factors	Catalog No	Layer 2: Social and Community networks	Catalog No	Layer 3: Living and working conditions	Catalog No	Layer 4: General socio-economic, cultural and environmental conditions
1.1	Socio-energy audits	2.1	Training on energy efficiency and air quality improvement in participants' homes	3.1	Building improvements	4.1	Policy recommendations to the governance on energy poverty
1.2	Energy efficiency trainings	2.1	Training professionals on energy poverty	3.2	Delivery energy box / Digital Parkstad energy app	4.1	Policy advocacy plan (Parkstad level)
1.3	(Energy) dept support	2.2	Open talks/ community meetings (for the intervention group)	3.3	Collaboration with housing corporations	4.2	Communication campaign
				3.4	Home audits	4.2	Local stakeholders network collaboration
1.2	Training to energy vulnerable people	2.1	Training on energy efficiency and air quality improvement in participants' homes			4.1	Recommendations for policymakers
1.2	Educational excursion to the Energy Efficiency Center						
1.1	Socio-energy audits	2.1	Educational materials				
1.4	Energy efficiency toolkit	2.1	Collectives advice support to local NGO's representing vulnerable groups				
1.1	Socio-energy audits			3.1	Building improvements		
1.1	Energy audits	2.3	Attitude forming programs	3.2	Installing smart metres	4.2	Engagement of stakeholders
1.3	Areas management	.2.3	Community building programs	3.4	Energy modernization of households		

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Content of Solution Catalog

Return to Solution Catalogue

WSC1.1	SOLUTION CATALOGUE	
	PROJECT NAME:	
Pilot City		
Country		
Action		
Plan		
Subactions	SA1.	
	SA2.	
	SA3.	
	SA3.	
Stakeholders Involved		
Period		
Budget & Investments		
Project website		
Key Performance Indicators (KPI)	KPI 1.	
	KPI 2.	
	KPI 3.	

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Content of Solution Catalog

Risks & Mitigation Measures	Risk 1.	
	Mitigation Measures 1.	
	Risk 2.	
	Mitigation Measures 2.	
	Risk 3.	
	Mitigation Measures 3.	
	Risk 4.	
	Mitigation Measures 4.	
	Risk 5.	
	Mitigation Measures 5.	

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Content of Solution Catalog

Barriers	Political	
	Economic	
	Social	
	Cultural	
	Technical	
	Environmental	
	Legal	
Facilitators	Political	
	Economic	
	Social	
	Cultural	
	Technical	
	Environmental	
	Legal	
Solution 1.		
Suggestion		
Expected Impacts		
Stakeholders		
Potential for Replication		
Relevant Publications		

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Results of Solution Catalog

Layer 1 : Audits

Barriers

- **Social**: Some people do not agree for individual household audit, prefer to receive consulting in distance which may influence the amount of practical information they receive
- **Cultura**l: Dificult to meet people
- **Legal:** Ownership of land building

Facilitators

- **Political:** Local municipality is supportive regarding energy efficiency improvements both for public and private sector
- **Cultural:** Provide leaflets and information about consumers' rights during the energy audit.
- **Environmental:** Participants - and people in general - are suffering from heat waves, droughts and other extreme weather events.

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Results of Solution Catalog

Layer 1 WUP: Empowerment and training interventions/actions

Barriers

- **Social:** Due to tense economical situation people are not willing to be involved in additional activities

Facilitators

- **Political:** local municipality is supportive regarding energy efficiency improvements both for public and private sector
- **Legal:** several energy efficiency supporting programmes are available for individuals regading use of renewable resources, home renovation etc.

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Results of Solution Catalog

Layer 2 WUP: Community / group activities

Barriers

- **Economic:** Due to the inflation, some WB budget will need to be relocated and this might affect attitude forming and community building events
- **Social:** Participants will not be interested enough to take part in attitude forming programs
- **Cultural:** Gathering together and explain one's personal situation is not yet very common.

Facilitators

- **Political:** Ensure data protection and confidentiality
- **Social:** The role of the workshop facilitator to create a safe space of sharing
- **Cultural:** User friendly language and explanations. Use of examples, practical cases and experiences
- **Environmental:** Participants sign an assistance sheet at the beginning of the session which contains some features such as self image protection and communications.

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Results of Solution Catalog

Layer 3 WUP: home renovations and interventions

Barriers

- **Economic:** The interventions have made the overall price of the apartments to go up and tenants who had plans to buy their apartments have had to put the plans on hold due to how much more the price of the apartments cost. Current tenants are being priced out of their houses.
- **Social:** The scaffolding and ongoing noise from the renovations have made it difficult for the tenants to socialise.
- **Cultural:** Language of technician and household must be similar

Facilitators

- **Environmental:** Leeds City Council has a stated aim of being Carbn Neutral by 2030 and in its Houasing Strategy for 2022-2030 one of the targets is the 'decarbonisation of the existing housing stock and improement of energy efficiency'.

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Conclusion

While following these steps, workshops with pilot cities, focus meetings with other project coordinators who are members of the Urban Health Cluster, and meetings with relevant stakeholders were held to enrich the content.

Thanks to the Solution Catalogue, it is expected that pilots involved in other projects related to energy poverty and public health will be able to implement their actions more efficiently, addressing the challenges they face during implementation.

The research presented in this study was funded by the European Union's Horizon 2020 program under grant agreement ID: 945097. The contents of this publication are the sole responsibility of the WELLBASED project owners and do not necessarily reflect the opinion of the European Union.

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We talk BIM for LCM and sustainability

– The importance of qualification frameworks for professionals

Sustainable Places 2025
Tarja Mäkeläinen, VTT

SUSTAINABLE PLACES 2024

VTT

We talk BIM….?

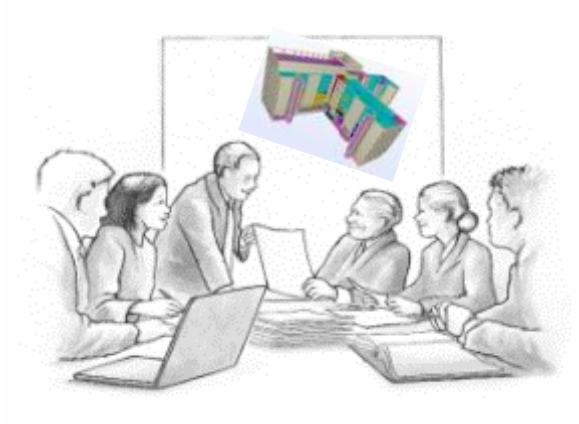
Introduction

BIM-based EU-wide Standardized Qualification Framework for achieving Energy Efficiency Training

Evidence-based market and policy instruments implementation across EU to increase the demand for energy skills across construction sector value chain

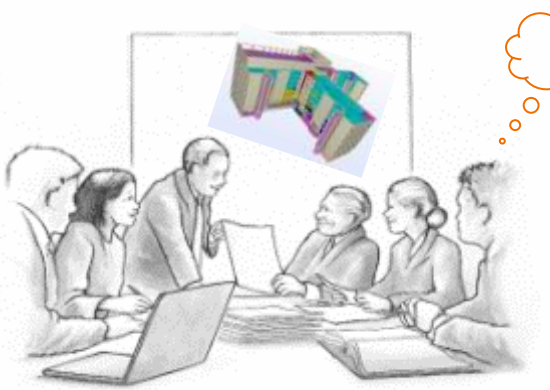
Automating the Building Permitting and Compliance

Today many BIM use-cases are already implemented in the building project phases and collaborative processes….



….The skill-sets needed may still be week.

Skill-sets vary by disciplines and stakeholders involved. Week skill-set lead to misunderstandings, failures in BIM usages and ineffective BIM process.



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Why it is important to talk about BIM Competence Frameworks

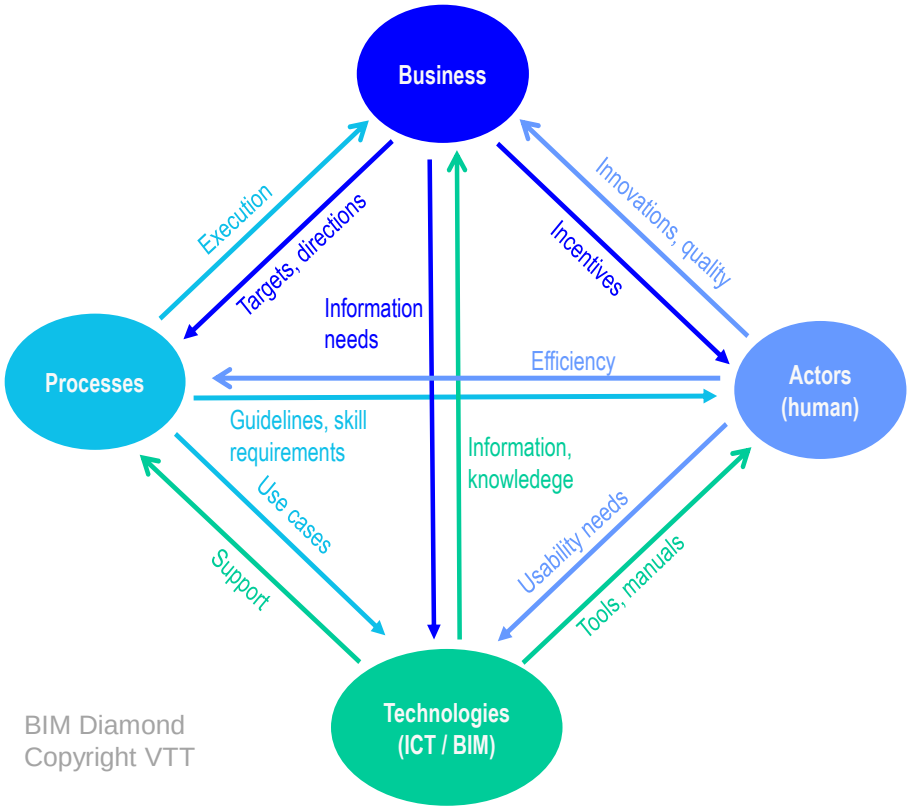
21/10/2024

BIM as instrument

- Business – information requirements
- Processes – information flow and integration
- Actors – know-how
- Technologies - interoperability

For a successful implementation and adaption of BIM, a **good maturity level** is needed for each 4 elements of BIM Diamond and for the 11 connections.

BIM Diamond

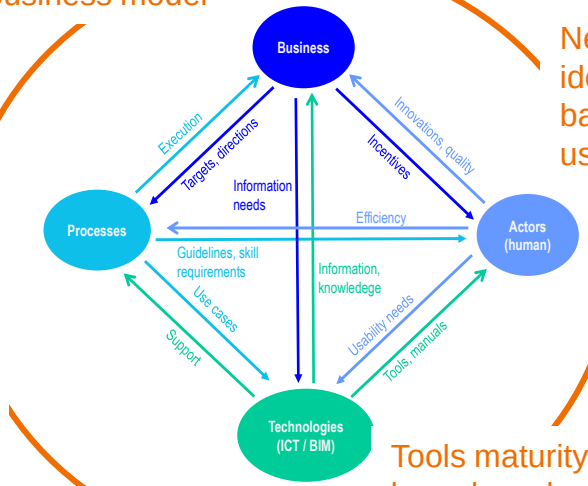


BIM Diamond
Copyright VTT

BIM Diamond elements and development

Useful set of BIM usages identified to support business model

Needed competence identified for BIM based working and usages



Useful set of BIM use–cases defined in value chain of the integrated information modelling and management

Tools maturity for BIM based work and for open information and data transfer

BIM Diamond with development Layer
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BIM Diamond elements and their standard-based development

BIM use-case definitions and guidelines for diciplines (AIM, PIM)

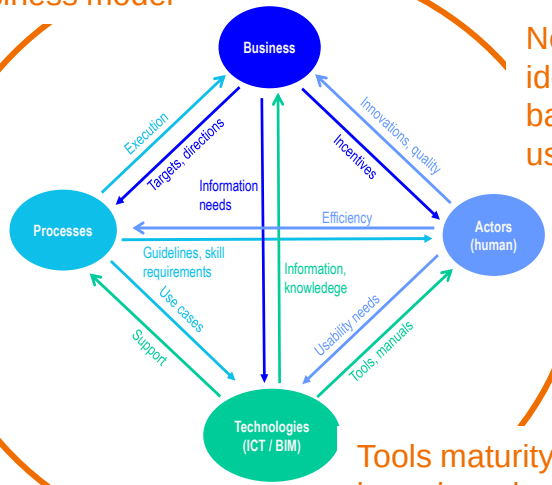
Useful set of BIM usages identified to support business model

Needed competence identified for BIM based working and usages

Standards for defining skills, knowledge and competence requirements (LO-framework)

Standards for defining Data flow process, Roles, User requiremenst, Data content (IDM IDS)

Useful set of BIM use–cases defined in value chain of the integrated information modelling and management



Tools maturity for BIM based work and for open information and data transfer

Standards for defining open data transfer (IFC, BSF, MVD, ….) and standard implementation

BIM Diamond with development and standardisation Layers

Enablers for BIM implementation

27 enablers for BIM implementation

13 related on Capabilities / Competencies:

- Strategic plan
- User training and education
- Supportive supervisor
- Management readiness for change
- Existence of change agents
- **Learning orientations (6)**
- **Knowledge Capability (2)**

Constructs	*Enablers*
Strategic initiatives	Support from top management
	User's input
	Strategic vision
	Strategic plan
	Stakeholder's analysis
	Cost-benefit-risk analysis
Change management	Rewards and recognition
	User training and education
	Supportive supervisor
	Management readiness for change
Cultural readiness	Existence of change agents
	Risk aversion
	Early user involvement
	Open communication and information sharing
Learning orientation	Colleague's help
	System expertise
	Individual competency assessment
	Learning-by-doing
	Community of practice
	Learning from past experiences
Knowledge capability	Developing knowledge management system
	Use of communication technologies
Network relationships	Inter-organizational linkage
	Cross-functional cooperation
Process Management	Setting benchmarking metrics
	Tracking benchmarks
	BIM maturity assessment tools

Abbasnejad et al. Key Enablers for Effective Management of BIM Implementation in Construction Firms
https://www.irbnet.de/daten/iconda/CIB_DC29325.pdf

Policies and strategies

ECTP, The European Construction Technology Platform
- Digital Built Environment

BUILD UP Skills

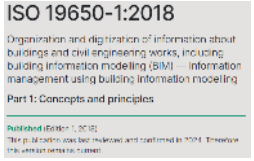
EC3, European Council on Computing
- “Bridge between academia and market”

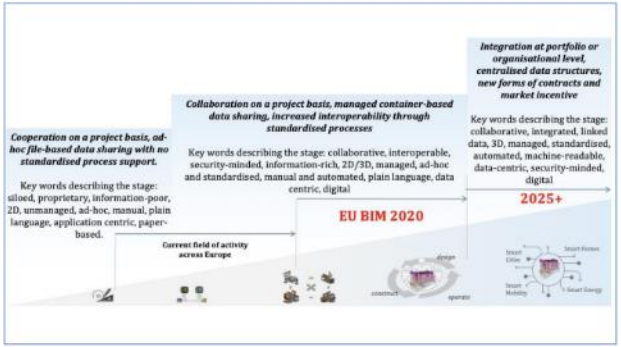
buildingSMART
- International and regional/ national levels

Standardization
- ISO 19650

CEN/TC 442 Building Information Modelling
- WG8: Competencies

National Laws, Degrees, Ordinance and Requirements
- Building owner’s strategies
- National Bim requirements





Administration Set

Summary: the day-to-day organizational activities required to meet and maintain strategic objectives. Administration competencies include tendering and procurement, contract management, and human resource management.

CODE	COMPETENCY TOPIC	DESCRIPTION
A01	Administration, Policies and Procedures	Developing managerial initiatives into policies and procedures to facilitate the adoption of BIM tools and workflows
A02	Finance, Accounting and Budgeting	Planning, allocating and monitoring the costs associated with BIM Adoption
A03	Performance Management	Assessing organizational BIM capability/maturity, Individual Competency and project performance using standardized metrics
A04	Human Resource Management	Planning, developing and managing human resources as to align staff competencies to organizational BIM goals
A05	Marketing	Promoting an organization's BIM Capability to its clients and business partners
A06	Tendering and Procurement	Developing the necessary specifications and documents to pre-qualify, recommend or procure BIM products and services
A07	Contract Management	Administering the contractual documentation underlying Collaborative BIM Projects and workflows
A08	Risk Management	Managing the risks associated with using BIM tools and collaborative workflows
A09	Quality Management	Establishing, managing and controlling the quality of models, documentation and other Project Deliverables

Implementation Set

Summary: the activities required to introduce BIM concepts, tools and workflows into an organization. Implementation competencies include component development, standardization and technical training.

CODE	COMPETENCY TOPIC	DESCRIPTION
I01	Implementation Fundamentals	Identifying and managing issues associated with BIM implementation
I02	Component Development	Implementing a structured approach for developing or customizing Model Components using documented Modelling Standards
I03	Library Management	Developing or managing component libraries as required for the standardized delivery of BIM Projects
I04	Standardization and Templates	Generating standardized templates, item lists and workflows for initiating, checking or delivering BIM Projects
I05	Technical Training	Developing a BIM Training Plan or maintaining a Skill Register to track staff training and their acquired skills
I06	System and Process Testing	Assessing the capability/compatibility of systems and the suitability of workflows and procedures
I07	Guides and Manuals	Developing guides, manuals or educational material covering Model-based Workflows

Managerial Set

Summary: the decision-making abilities which drive the selection/adoption of long-term strategies and initiatives. Managerial competencies include leadership, strategic planning, and organizational management.

CODE	COMPETENCY TOPIC	DESCRIPTION
M01	General Management	Defining and communicating overall managerial goals from adopting new systems and workflows
M02	Leadership	Leading and guiding others throughout the process of implementing new systems and workflows
M03	Strategic Planning	Identifying strategic objectives and developing implementation strategies
M04	Organizational Management	Identifying the organizational changes necessary for instigating, monitoring and improving BIM Adoption
M05	Business Development and Client Management	Maximizing the value achieved by the organization and its clients from BIM tools and workflows
M06	Partnership and Alliancing	Initiating partnerships and alliances with other organizations based on BIM Deliverables and workflows

Technical Set

Summary: the abilities required to generate Project Deliverables across disciplines and specialties. Technical competencies include modelling, drafting and model management.

CODE	COMPETENCY TOPIC	DESCRIPTION
T01	General IT	Installing, managing and maintaining general IT infrastructure
T02	Software Systems	Selecting, deploying and maintaining software systems in a multi-user environment
T03	Hardware and Equipment	Specifying, recommending or procuring computer hardware and equipment
T04	Modelling	Generating BIModels based on pre-defined Modelling Standards and protocols
T05	Documentation	Generating drawings and construction documents using standardized details and workflows
T06	Presentation and Animation	Generating professional-quality renderings or 3D animations using Specialized Software Tools
T07	Model Management	Managing and maintaining BIModels generated using standardized processes, protocols and specifications
T08	Document Management	Using Document Management Systems or similar to store, manage and share files and BIModels

Operation Set

Summary: the daily, hands-on individual efforts required to deliver a project or part/aspect of a project. Operational competencies include designing, simulating and quantifying.

CODE	COMPETENCY TOPIC	DESCRIPTION
o01	General Modelling	Using software tools to model project requirements and generate Model-based Deliverables across industries, information systems and knowledge domains
o02	Capturing and Representing	Using software tools and specialized equipment to capture and represent physical spaces and environments
o03	Planning and Designing	Using software tools for conceptualization, planning and design
o04	Simulating and Quantifying	Using software tools to conduct various types of model-based simulations and estimations
o05	Constructing and Fabricating	Using BIModels for the specific purposes of construction and fabrication
o06	Operating and Maintaining	Using models to operate, manage and maintain a Facility
o07	Monitoring and Controlling	Using models to monitor Building Performance or control its spaces, systems and equipment
o08	Linking and Extending	Linking BIModels and their components to other databases
o09	Custom Modelling	Using software tools to deliver a custom combination of Model-based Deliverables reflecting a variety of Model Uses

Many existing programmes:

Certification systems like BIMe -Initiative programme and building SMART Professional Certification programme

or

Qualification systems

[201in BIM Competency Table | BIMe Initiative (bimexcellence.org)](bimexcellence.org)
[BIM Excellence]

Competence frameworks - identify the content

- Developed for harmonising or up-dating skill-sets
  - skills, knowledge and competencies
- Competencies are listed for example on levels
  - foundational
  - intermediate
  - advanced
  - expert

Qualification frameworks - enable assessment

- Needed on national/ regional level when competence threshold levels are defined.
- Qualification frameworks are aligned with
  - National legistlative framework
  - National and regional reguirements
  - National BIM guidelines (required BIM levels)

Content of this presentation

Introduction
SoP
BIM Diamond
Policies and strategies
Competence frameworks

BIM competence LO-frameworks

Content
Topology
Taxonomy

Some examples

Usage Scenarios of the BIM competence framework

Scenario 1: **Use of Competence-Matrix in planning of BIM course content and production of learning modules**
Examples:
- Continues education course
- eLearning content development.

Scenario 2: **Use of Competence-Matrix in skills verification process during project procurement;**
Examples:
- EE-BIM
- LCM-BIM

How you define LOs for teaching professionals

Example: BIM use case for ACCC

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bimeet

INSTRUCT

BIM Competence
LO- Frameworks

Content -LOs
Topology –how you structure competency sets
Taxonomy – how you can classify the competency levels
- Some examples

Terminology

Competence

- Ability to apply knowledge and skills to achieve intended results
- Results = fulfillment of required tasks
- Competence

- Learning outcomes are attributed to individual educational components and to programmes at a whole.
  - Learning outcomes are specified in three categories – as knowledge, skills and competence.

- Qualifications – in different combinations – capture a broad scope of learning outcomes, including **theoretical knowledge, practical and technical skills, and social competences where the ability to work with others will be crucial.**

ISO/IEC 17024: 2012
Conformity assessment — General requirements for bodies operating certification of persons
ISO/IEC 17024:2012 - Conformity assessment — General requirements for bodies operating certification of persons

ECTS users' guide 2015
Latest edition.
https://op.europa.eu/en/publication-detail/-/publication/da7467e6-8450-11e5-b8b7-01aa75ed71a1

LEARNING OUTCOMES 1/3
(content with chosen taxonomy)

	Client & Client advisors Client & Project manager (C), Energy manager (EM/ HVAC supervisor), Energy coordinator (EC), Briefing consultant (Bc)	C	EM	EC	Bc
	FUNDAMENTALS of ENERGY INTERVENTIONS AND LIFE CYCLE (Knowledge)				
LO1	**Learner is able to explain the fundamentals of energy interventions and the underlying principles of uses with respect to building life-cycle.**				
1.1	Explain and give examples of aspects and terminologies of energy interventions on levels of building project and building life-cycle.				
1.2	Explain added value of energy efficient and sustainable projects for society, neighbourhoods, clients and users				
1.3	Summarize and give examples about the potentials of renewable energy sources and smart energy solutions applicable to buildings including district-scale solutions.				
	Point out legislation and regulations related to energy performance, thermal comfort and air quality.				

	ENERGY PERFORMANCE OF BUILDINGS	C	EM	EC	Bc
LO2	**Learner is able to explain the fundamentals of sustainability and energy-efficient buildings and building performance.**				
2.1	Explain and give examples of aspects and terminologies of energy performance and building performance.				
2.2	Describe the financial and environmental aspects and related indicators, benchmarks and certification systems of energy and building performance.				
2.3	Explain the issues that affect energy performance of buildings and can demonstrate competence in domain specific solutions.				
	List and explain the core technologies and building solutions for required energy performance of buildings.				
	Explain relations between life-cycle costs, environmental impacts, energy performance and building performance.				
	List and explain the core concepts of sustainable building rating and certification systems.				

LEARNING OUTCOMES 2/3

	ENERGY ASSESSMENT	C	EM	EC	Bc
LO4	**Learner is able to explain about the procedures and importance of setting energy targets for sustainability and building performance.**				
4.1	Explain and give examples of different types of objectives, quality objectives, sustainability aspirations, targeted outcomes, budgeting and other constraints for building projects.				
4.2	Include and explain the importance of energy analysis in the decision making starting from the earliest stages of the project and even on the basis of very simple and preliminary plans (and BIM models).				
4.3	Assess potentials, feasibility and risks of different alternatives based on studies performed by consultants.				
.	Use risk analysis and conduct feasibility (financial and technical) studies to make sure set objectives of the project are achievable.				
	Control and review design plans (and BIM models) and evaluate the functionality of spaces with regard to user needs, designed energy performance and set energy performance targets. Set targets for the energy consumption of the realized building and demand clarifications and solutions in case of a mismatch between design and actual.				
	Explain how to define requirements for performance documentation, eG. how and where the targeted, designed and achieved performance is				

	COLLABORATION FOR ENERGY MANAGEMENT and PROSESSES	C	EM	EC	BC
LO5	**Learner is able to explain and use collaboration methods for energy management and processes.**				
	Describe the essential parts of the procedure for collaboration				
	Explain the course of procurement process and give examples of collaborative procurement models to support interdisciplinary working practices resulting in best solutions for energy-efficient buildings.				
	Describe different collaborative interdisciplinary and open BIM working methods, tools and processes -for energy performance design, construction and operation				
	Explain and give examples how to apply project management and leadership methods for collaborative design, execution and supervising				
	Moderate and coordinate collaboration amongst the stakeholders including design team, client, manufacturers, construction site and building authorities				
	Moderate collaboration with the help of communication platforms and processes like CAVE (computer aided virtual environment) and Big Room working and BIM coordination.				

LEARNING OUTCOMES 3/3

	INTEGRATED INFORMATION MANAGEMENT	C	EM	EC	Bc
LO7	**Learner is able to use different relevant energy software and interfaces between relevant software.**				
7.1	Use information and communication technologies for buildings taking into account data security and protection requirements.				
7.2	Explain the use of spatial sketching and performance assessment tools and results for decision making.				
7.3	Use different tools for collaborative working.				
	Use visualization tools, viewers and dashboards.				
	Use tools for information extraction from the models to make informed decisions about the cost, quality, sustainability and building performance.				
	Use project data and file management systems.				
	Use digital archive systems for documents and models.				

	USE of TOOLS				
LO8	**Learner is able to use different energy tools for solving complex problems at the interface between domains (i.e. energy-water nexus)**				
8.1	Use target setting tools and performance assessment tools				
8.2	Use energy performance estimation tools				
8.3	Use energy and LCA calculation tools				
	Knowledge on comparing the relevant tools for client				
	Demand tools and relevant skills for BIM based process including EE and LCA model uses				
	Demand use of rating tools				

LO topology: structuring LO-topics and LOs

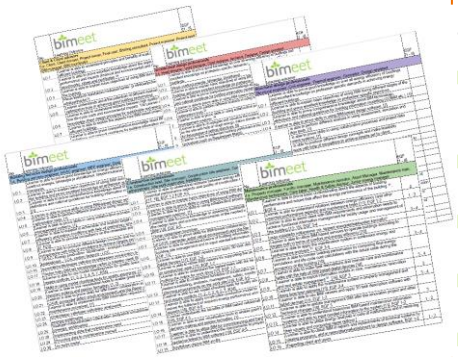
Report D3.2 – Definition of learning outcomes in the European level

bimeet

Group 1 (LO1) Fundamentals of BIM and principles of its uses with respect to building life-cycle

- Group 2 (LO2) Fundamentals of sustainable and energy-efficient buildings and building performance
- Group 3 (LO3) Preparation of information management documentation and setting strategic targets for the project
- Group 4 (LO4) Early stage target setting for energy, sustainability and building performance
- Group 5 (LO5) BIM-based collaboration methods in project management and processes
- Group 6 (LO6) Quality management procedures for achieving set targets
- Group 7 (LO7) Skills for relevant software and interfaces between software.

Topology cover widely sustainable and digital construction.
Competence level for each role specific LO by using EQF



Roles in BIMEET

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

Report D2.3 Delivering Skills and Definition of Qualifications tcomes Matrix in the EU

INSTRUCT

- Group 1 (LO1) Basic general knowledge of sustainable energy interventions and principles and their application across lifecycle and supply-chains
- Group 2 (LO2) Basic factual knowledge of sustainable and energy-efficient buildings and building performance.
- Group 3 (LO3) Knowledge of facts, principles, processes and general concepts on building energy efficiency
- Group 4 (LO4) Factual and theoretical knowledge on energy efficiency, sustainability and building performance
- Group 5 (LO5) Comprehensive, specialised, factual and theoretical knowledge on energy efficiency, sustainability and building performance
- Group 6 (LO6) Advanced knowledge in energy efficiency, involving a critical understanding of theories and principles
- Group 7 (LO7) Highly specialised knowledge in energy efficiency.
- Group 8 (LO8) Knowledge at the most advanced frontier of energy efficiency and at the interface between related disciplines

Topology have focus on EE-BIM
Competence demand levels inbedded in LO-sentences.
- energy expert profile (role or discipline)

LO topology example

The competences during the existing condition stage

Tasks	Mod. 1 Understand which information for existing conditions is necessary to specify, produce, exchange, maintain and/or refurbish
Select/develop the use case for energy analysis	1.1 To be aware of the advantages of using BIM for defining the existing conditions for developing new and/or refurbished buildings
Select the relevant information related to the technologies to be used for improving energy performance	1.2 Identify and list the technologies to be used for existing conditions when developing BIM models for new and/or refurbished building
Gather the information r… different technologies an… among which to chose th… technical solution	
To acquire the EIR related… improvement of the ener… performance and legal re…	
To acquire any informati… constrain to meet legal re…	

The competences during the preliminary design stage

TASKS	Mod. 2 Understand which information is necessary to specify, produce, exchange, and maintain during the preliminary design stage
Select and manage information related to the different use cases at preliminary design stage using open standard formats	2.1 Identify the purpose and advantages of using BIM for improving energy performance of a building during it's lifecycle, compared to traditional methods
Contribute and develop the BIM Execution Plan for the specific …	2.2 Identify the benefits of incuding energy issues when developing a BIM
Select relevant use c… energy performance desing stage	
Select the relevant in… technology to be con… simulation to optimi…	
Identify the key acto… needed to perform t…	

The competences during the technical design stage

	Mod. 3 Understand which information is necessary to specify, produce, exchange, and maintain during the technical design stage
Select and manage information related to the different use cases of technical design using the relevant standards	3.1 Identify use cases for energy efficient technical design of buildings
Be capable of selecti… introduce in a code c…	
To define the Level of… necessary to describe… energy performance standards	
Select the right tools… requirements for tha…	
To ensure reliable inf… efficiency evaluation	

The competences during the construction stage

	Mod 4 Understand which information is necessary to specify, produce, exchange and maintain during the construction stage
Select and manage information related to the different use cases during the construction stage using relevant standards	4.1 Identify the objectives to ensure high energy performance during the construction process
To ensure the correct information fo… case	
To be able to identify roles and respo… for managing the information during… construction phase	
To ensure that the information for a… technology is sufficient to evaluate… sustainability during the construction…	
To ensure the completeness and corr… the information released during han…	
To be able to collect and manage the… information of the asset for the hand…	

The competences during the operation & maintenance stage

	Mod. 5 Energy management at the operational stage-principles, tools and methods for smart energy management, underpinned by BIM
Select and manage information related to operations and maintenance using the correct standards	5.1 Identify use cases for energy efficient management of Nearly Zero Energy Buildings at the operational stage;
To be able to verify the existence of the information required for the asset management	5.2 Identify the information requirements and standards for openBIM information exchange for the facility management
To be able to identify the information necessary to maintain the best performance of the installed technologies	5.3 Identify the technologies for the maintenance stage to ensure the foreseen energy performance
To be able to select the critical information to ensure the correct management of the installed technologies	5.4 Identify and assess the risks of using incorrect information that are essential for facility management and maintenance
To manage the correct procedures for the final disposal of equipment, materials and components at the end of the lifecycle	5.5 Be aware of the use of correct information for the disposal of any component to transfer to landfill or for reuse

Substances with focus on EE and BIM/BEM work flow. Topology links also directly to BIM tasks.

iBIMi | buildingSMART Italy

Anna Moreno, President of the Italian buildingSMART Chapter (4.11.2021/ bSF Seminar)

LO framework: Scope and how to measure competency

BIMEET Learning Outcomes are defined taken into account needed knowledge on:

1. **Sustainable construction**
   - Energy Performance
   - Greenhouse gasses
2. **Performance based process**
   - Continuous Commissioning
   - Target setting (KPIs), Follow up, Assessment
3. **Collaborative BIM process**
   - Team work, Team leadership
   - Project process management
4. **Integrated information modeling and management (BIM) processes**
   - Social BIM, Decision support
   - Data flow during life cycle of buildings
   - BIM use-case/ BIM dimensions
   - Information in BIM use-cases, IDM
   - Data transfer formats, IFC
   - Product data formats, IDF

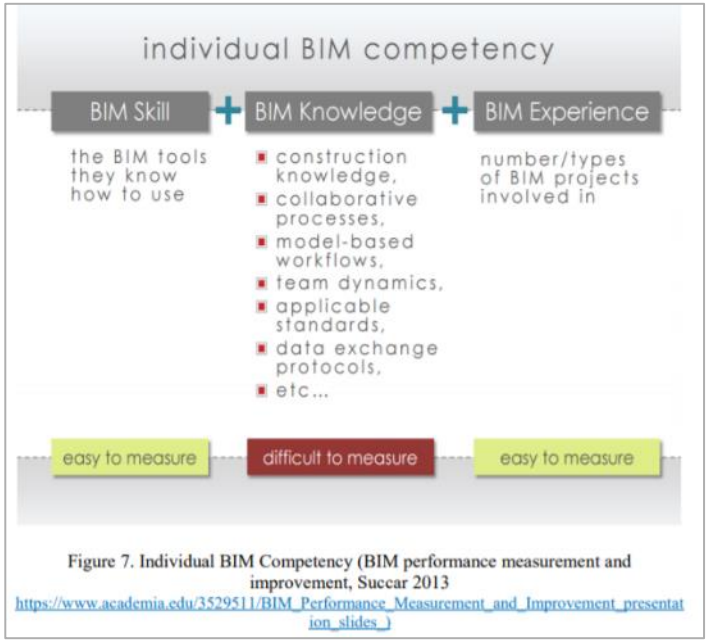
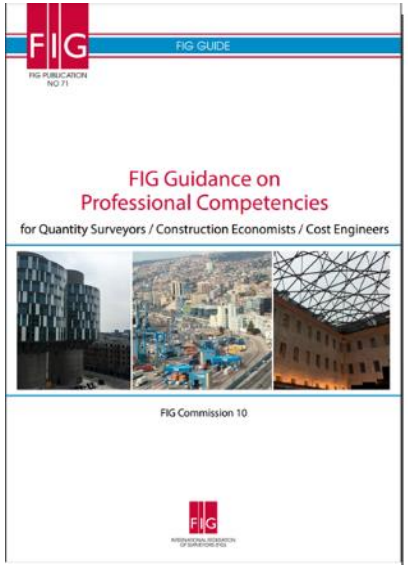


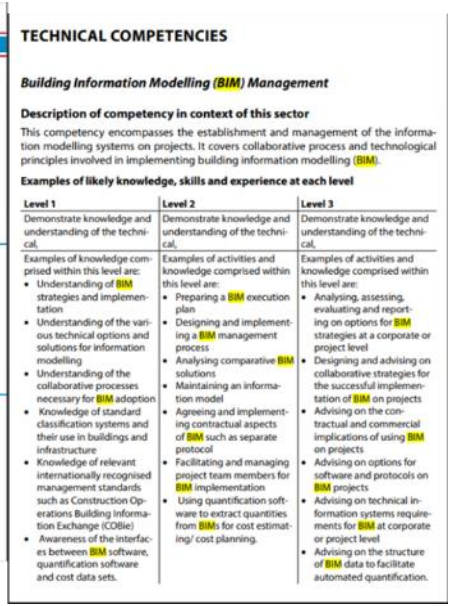
Figure 7. Individual BIM Competency (BIM performance measurement and improvement, Succar 2013
https://www.academia.edu/3529511/BIM_Performance_Measurement_and_Improvement_presentation_slides_)

Succar (2013), BIM Performance measurement and improvements

LO topology: ways of setting up competence level

- Competence level as stages for each profile/ role
  - Example: FIG professional competencies
- Competence level of each LO by using EQF
  - Example: BIMEET and INSTRUCT LO's for LCM/EE-BIM
- Competence level follow each task of role/ discipline
  - Example: BIMEET Skills-Knowledge-Competence
- Competence level follow each digital task of a role/ discipline
  - Example: EE-BIM, iBIMi, buildingSMART Italy





TECHNICAL COMPETENCIES

Building Information Modelling (BIM) Management

Description of competency in context of this sector

This competency encompasses the establishment and management of the information modelling systems on projects. It covers collaborative process and technological principles involved in implementing building information modelling (BIM).

Examples of likely knowledge, skills and experience at each level

Level 1	Level 2	Level 3
Demonstrate knowledge and understanding of the technical,	Demonstrate knowledge and understanding of the technical,	Demonstrate knowledge and understanding of the technical,
Examples of knowledge comprised within this level are: • Understanding of BIM strategies and implementation • Understanding of the various technical options and solutions for information modelling • Understanding of the collaborative processes necessary for BIM adoption • Knowledge of standard classification systems and their use in buildings and infrastructure • Knowledge of relevant internationally recognised management standards such as Construction Operations Building Information Exchange (COBie) • Awareness of the interfaces between BIM software, quantification software and cost data sets.	Examples of activities and knowledge comprised within this level are: • Preparing a BIM execution plan • Designing and implementing a BIM management process • Analysing comparative BIM solutions • Maintaining an information model • Agreeing and implementing contractual aspects of BIM such as separate protocol • Facilitating and managing project team members for BIM implementation • Using quantification software to extract quantities from BIM; for cost estimating/ cost planning.	Examples of activities and knowledge comprised within this level are: • Analysing, assessing, evaluating and reporting on options for BIM strategies at a corporate or project level • Designing and advising on collaborative strategies for the successful implementation of BIM on projects • Advising on the contractual and commercial implications of using BIM on projects • Advising on options for software and protocols on BIM projects • Advising on technical information systems requirements for BIM at corporate or project level • Advising on the structure of BIM data to facilitate automated quantification.

https://www.fig.net/resources/publications/figpub/pub71/figpub71.asp

Defining the LOs with Bloom's taxonomy and using European Qualification Framework (EQF)

Competence level is aligned with action verb to be used in formulation of the LO or competence requirement clauses.

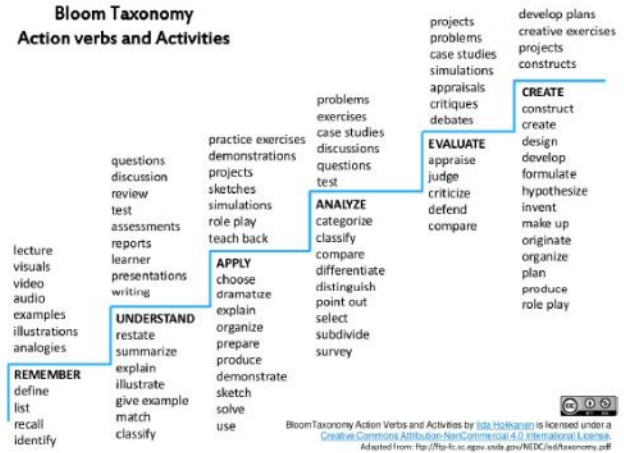


Figure 4 Bloom taxonomy action verbs and activities (Iida Hokkanen 2015) .[20]

EQF as 1-6 (8) levels of knowledge, skills and competence can be adapted to different levels of assessment: LO- clauses, role profiles, roles/ disciplines, courses, programmes, diplomas, qualification schemes.

	Knowledge	Skills	Competence
Level 1	Basic general knowledge	basic skills required to carry out simple tasks	work or study under direct supervision in a structured context
Level 2	Basic factual knowledge of a field of work or study	basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools	work or study under supervision with some autonomy
Level 3	Knowledge of facts, principles, processes and general concepts, in a field of work or study	a range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information	take responsibility for completion of tasks in work or study; adapt own behaviour to circumstances in solving problems

	Knowledge	Skills	Competence
Level 4	Factual and theoretical knowledge in broad contexts within a field of work or study	a range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change; supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities
Level 5	Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge	a comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems	exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others
Level 6	Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles	advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study	manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts; take responsibility for managing professional development of individuals and groups
Level 7	•Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research •Critical awareness of knowledge issues in a field and at the interface between different fields	specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge 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
Level 8	Knowledge at the most advanced frontier of a field of work or study and at the interface between fields	the most advanced and specialised skills and techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice	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

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INSTRUCT

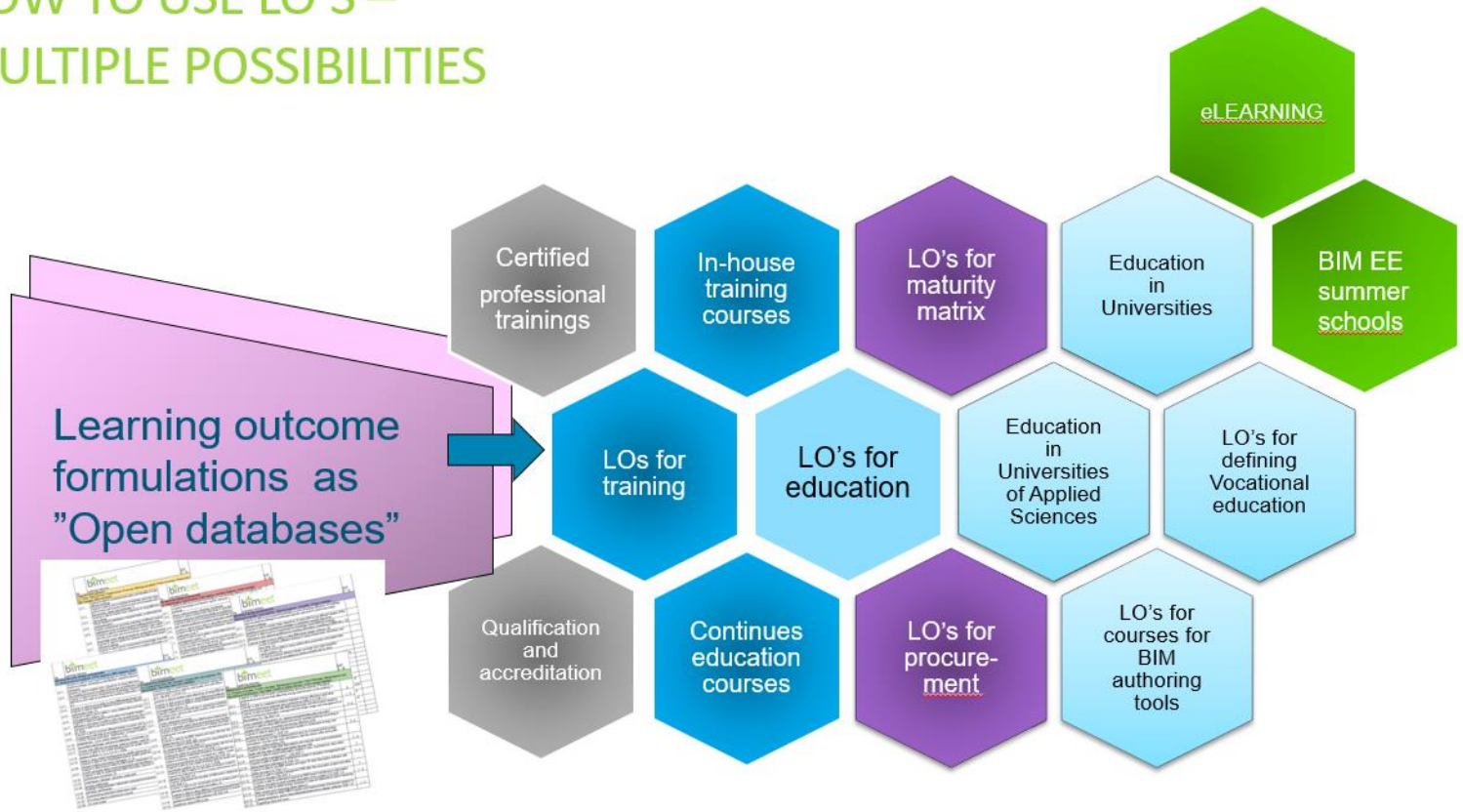
Usage Scenarios of the BIM Competence Framework

Examples of the usage of LOs or competence requirements

- developing eLearning and continues competence decelopment courses

Potential Usages

HOW TO USE LO'S – MULTIPLE POSSIBILITIES



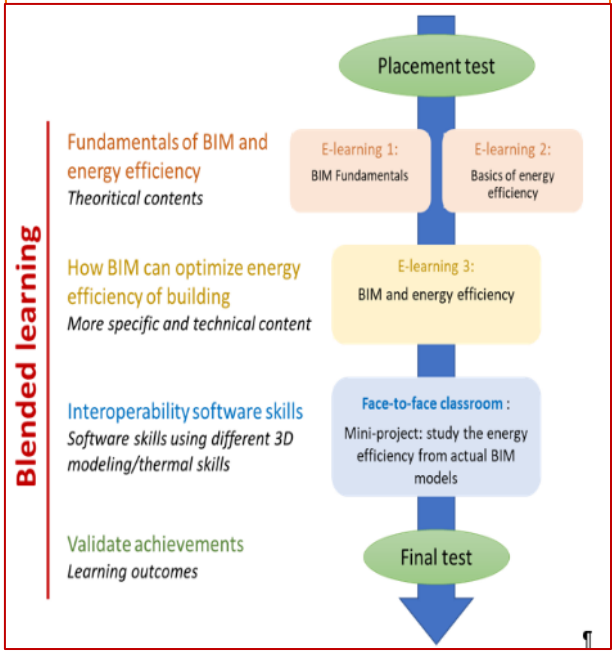
LO based eLearning - content

eLEARNING

BIM for Energy Efficiency

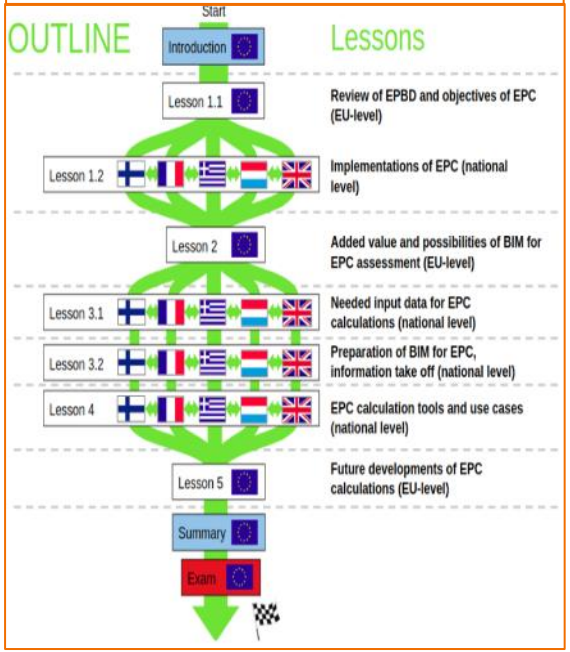
- **blended learning course**

1 hour on-line and 2 days in-class

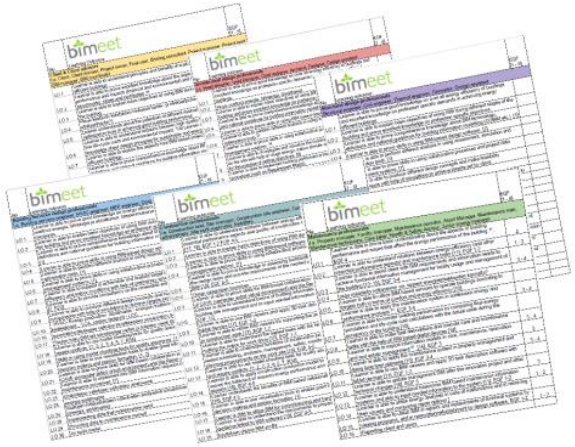


Introduction of BIM enabled EPC assessment

- **on-line course**



LO based eLearning – Learning objectives 1/2



eLEARNING

BIM For Energy Efficiency

- **blended learning course**

1 hour on-line and 2 days in-class

Learner is able to explain

- the fundamentals of BIM and the underlying principles of uses with respect to building life-cycle
- use BIM based collaboration methods for project management and processes
- basic objectives of using BIM during different stages of the building
- the fundamentals of sustainable and energy-efficient buildings and building performance
- about the procedures and importance of setting targets for energy, sustainability and building performance
- the aspects how BIM based projects benefit energy efficient buildings.

Learner is able to prove

- comprehensive knowledge about BIM terminology, definitions and national guidelines for building information modelling –
- good knowledge on over all energy efficiency of buildings and excellent knowledge on profession specific demands in achieving energy efficient buildings

Learner is able to implement

- energy performance, building performance and sustainability targets into design process is able to create and develop sustainable energy efficient buildings using BIM tools

LO based eLearning – Learning objectives 2/2

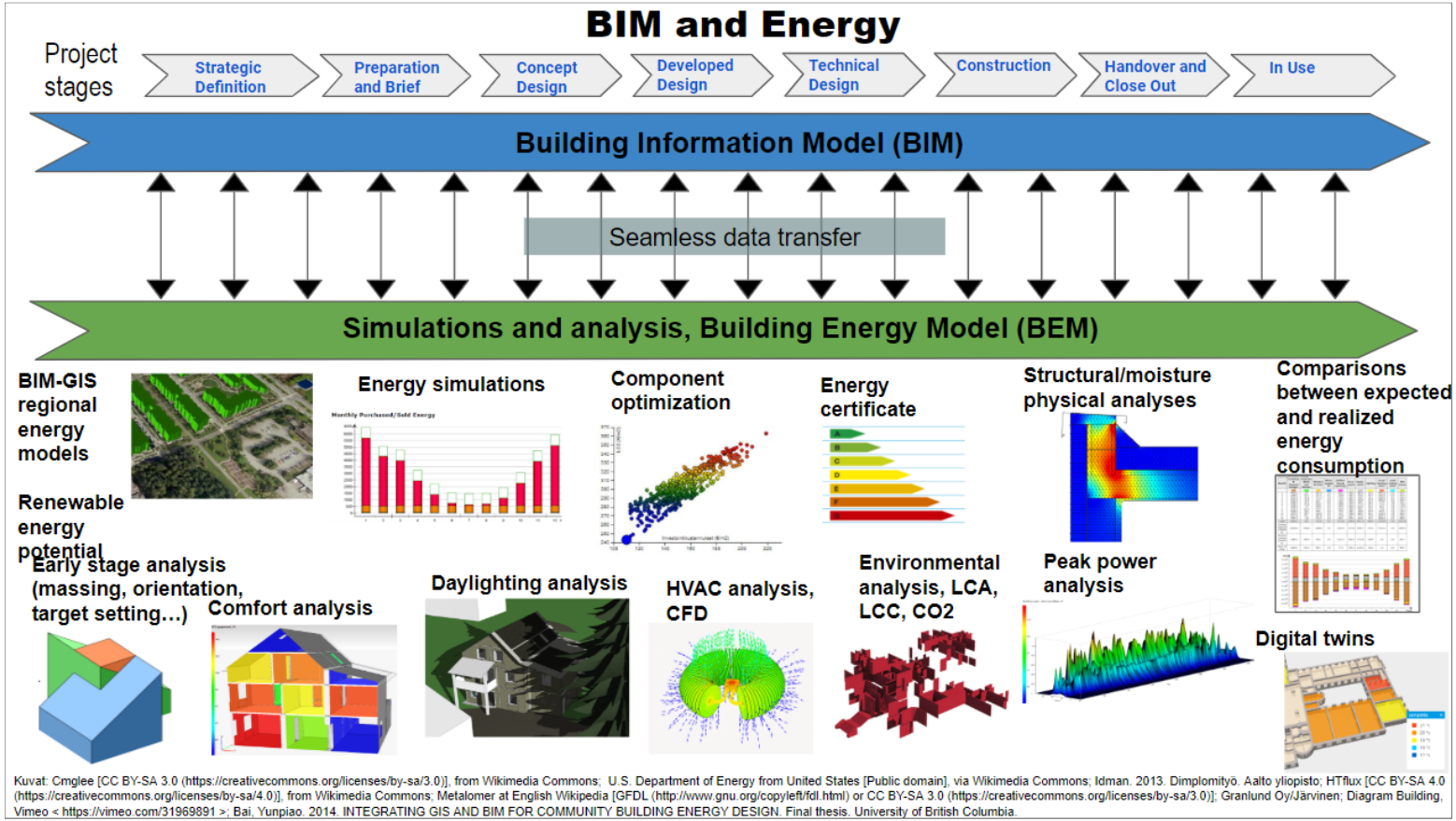
eLEARNING

eLearning modules
in Energy-BIM platform

https://www.energy-bim.com/view/document?id=180&parentId=113&category=euinfo&doctitle=BIM%20for%20Energy%20Efficiency&q=&token=0

Learner is able to prove skills in using BIM-based design software
- **to use** different relevant software and interfaces between relevant software
- **to understand and correct** interoperability errors
- **to prove skills** in using BIM-based design software
- **to produce** BIM models with accurate and required information content for different uses and phases of a building project
- to produce different design concepts and make feasibility comparisons with help of simulations to achieve targets set by client
- to perform different analysis in using assessment, simulation and optimisation tools - Learner is able to explain how to define resources needed for design and defining competence requirements for designers and engineer

BEM realted simulations and analyses

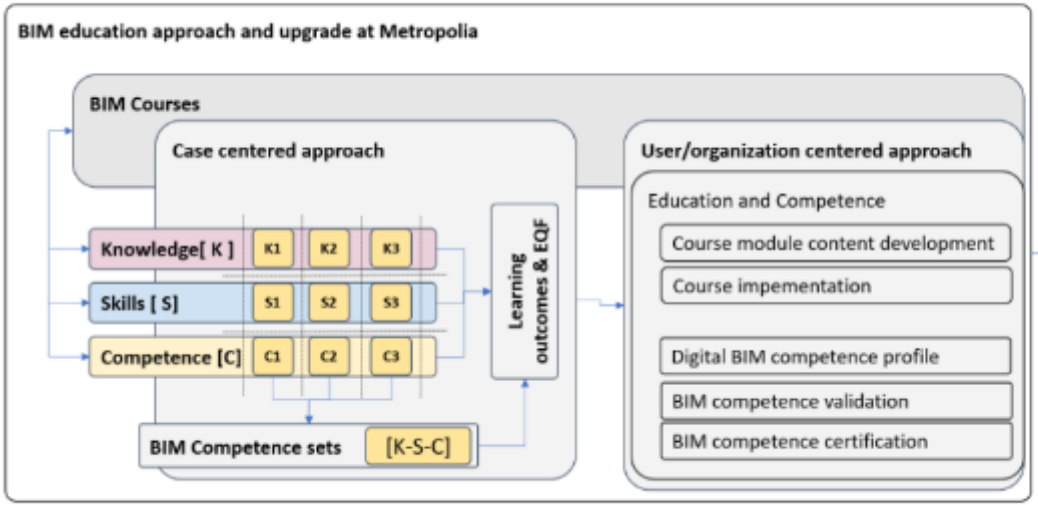


Kuvat: Cmglee [CC BY-SA 3.0 (https://creativecommons.org/licenses/by-sa/3.0)], from Wikimedia Commons; U.S. Department of Energy from United States [Public domain], via Wikimedia Commons; Idman. 2013. Dimplomityö. Aalto yliopisto; HTflux [CC BY-SA 4.0 (https://creativecommons.org/licenses/by-sa/4.0)], from Wikimedia Commons; Metalomer at English Wikipedia [GFDL (http://www.gnu.org/copyleft/fdl.html) or CC BY-SA 3.0 (https://creativecommons.org/licenses/by-sa/3.0)]; Granlund Oy/Järvinen; Diagram Building, Vimeo < https://vimeo.com/31969891 >; Bai, Yunpiao. 2014. INTEGRATING GIS AND BIM FOR COMMUNITY BUILDING ENERGY DESIGN. Final thesis. University of British Columbia.

BIM education

Metropolia

Metropolia BIM education

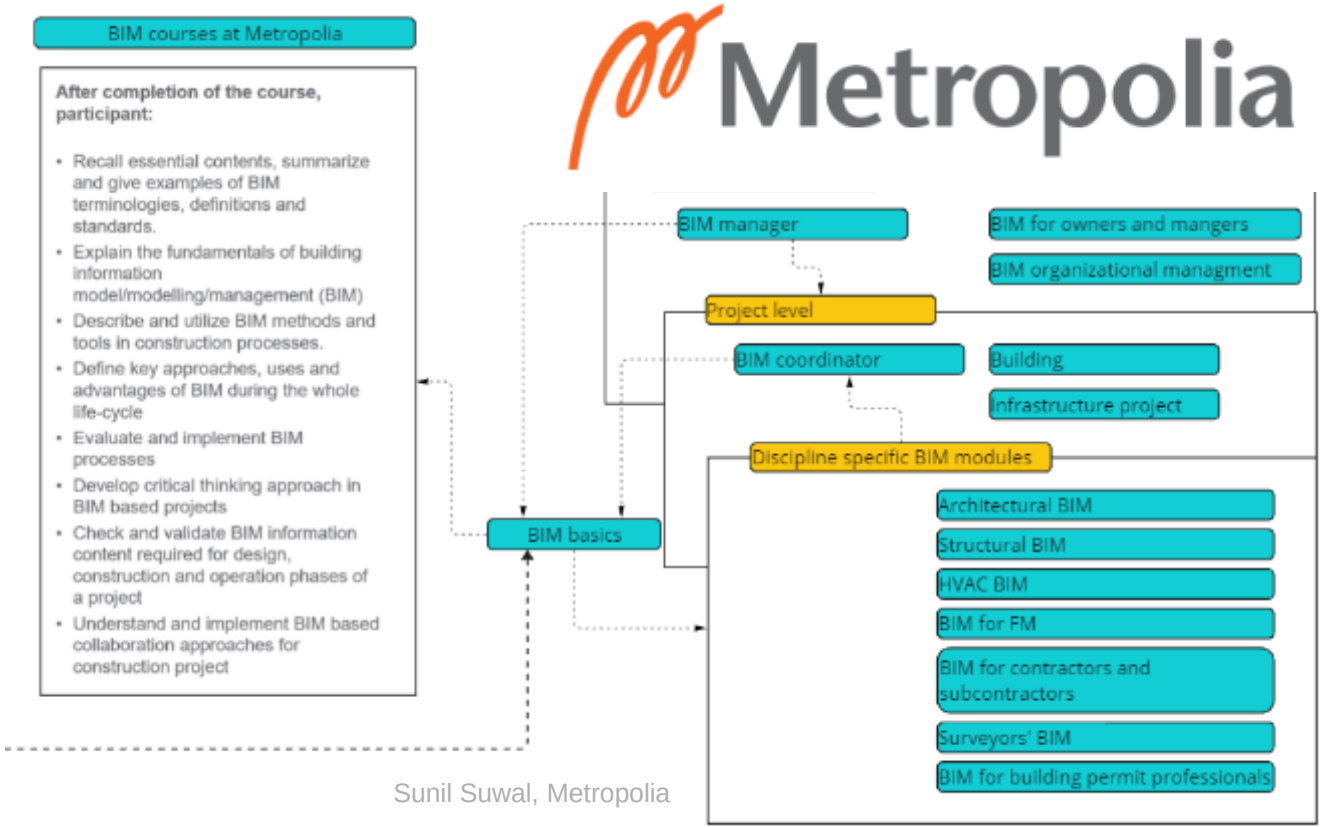


Course offerings:

- BIM for Directors
- BIM Basics [5 ECTS]
- BIM for Owners [5 ECTS]
- BIM for Architects [5 ECTS]
- BIM for Structural Engineers [5 ECTS]
- BIM for HVAC/MEP Engineers [5 ECTS]
- BIM for Construction [5 ECTS]
- BIM for Facility Management [5 ECTS]
- BIM for Surveyors [5 ECTS]
- BIM for Blue Collar Workers [2 ECTS]

Continues education courses

Use of Competence-Matrix in planning of BIM course content



Sunil Suwal, Metropolia

Continues education courses

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Usage Scenarios of the BIM Competence Framework

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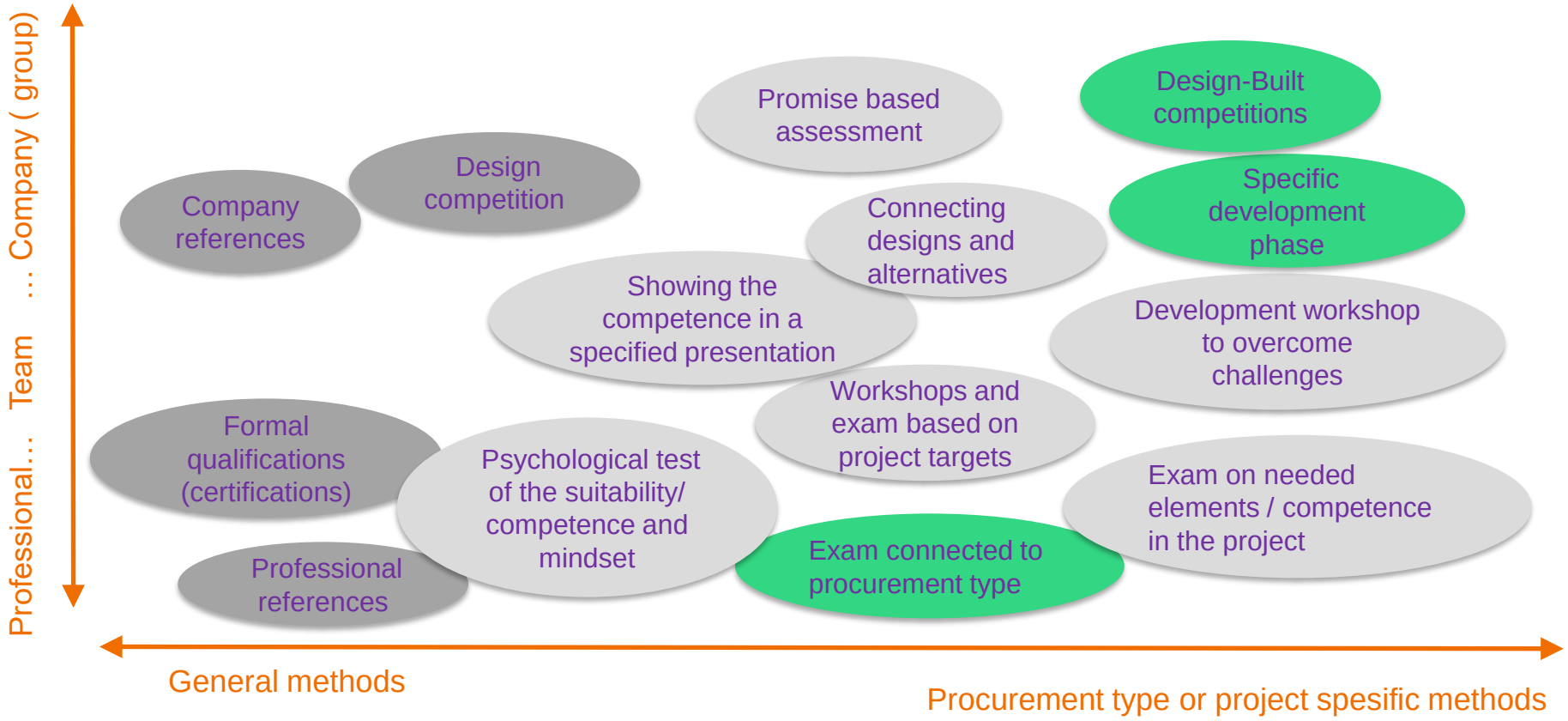
INSTRUCT

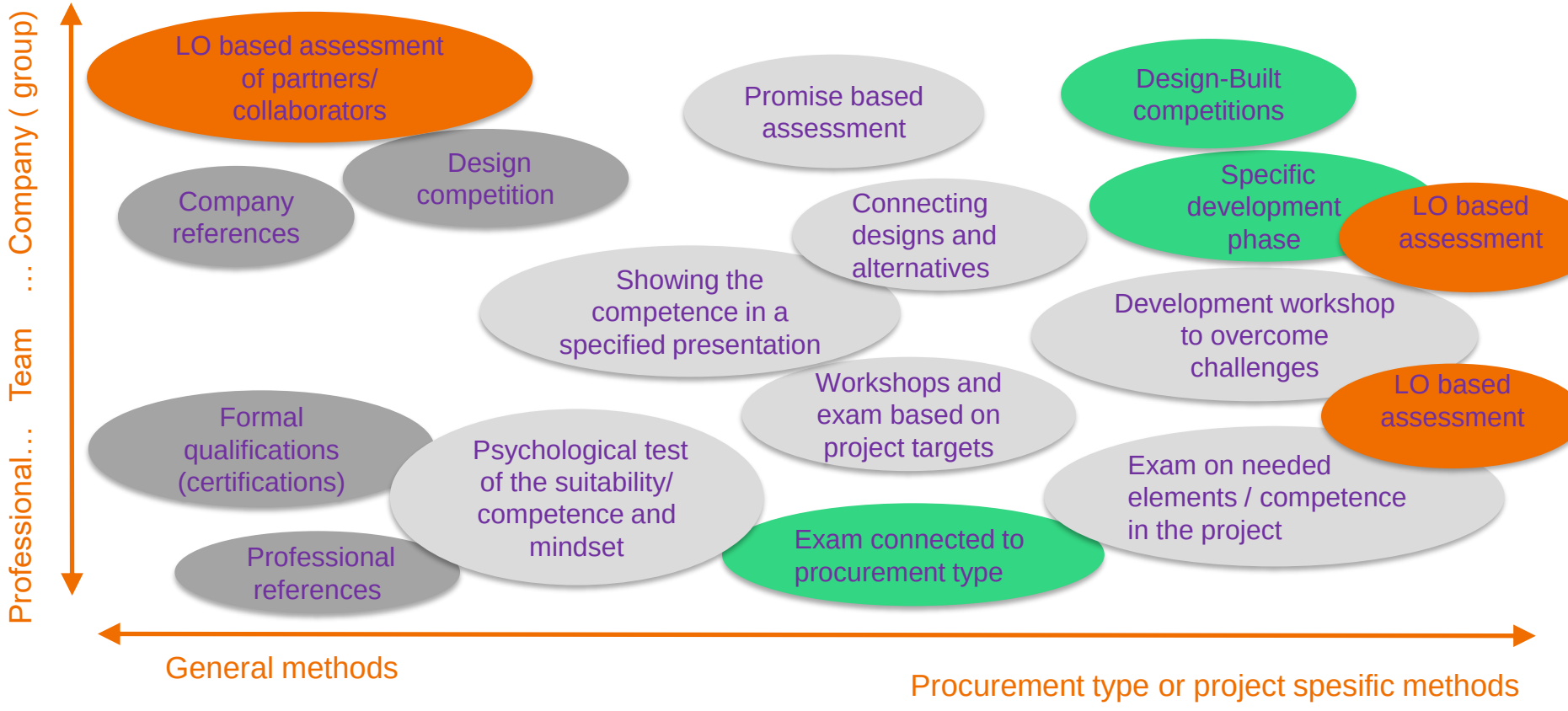
Example of the usage of LOs or competence requirements

- **skills verification method during procurement process**

Methods fro skills and competence verification



LO based assessment



Skills verification method – setting up minimum competence targets and self-estimation

Using competence requirement tables (LOs)

Method in 3 steps:

1. Client identifies demands for skills, and knowledge for the team or each role, using Aspects of competence)
   - Minimum levels are defined in the tables of competence requirements (= learning outcomes)
2. Service provider identify their competence levels
   - Self estimations with the tables of competence requirements.
3. Client assess the offers level of skills to the required/ demanded levels

ASPECTS OF COMPETENCE	required level	offered
FUNDAMENTALS of ENERGY INTERVENTIONS AND LIFE CYCLE (Knowledge)		
ENERGY PERFORMANCE OF BUILDINGS		
TARGET SETTING for BUILDING (EE and sustainability)		
ENERGY ASSESSMENT		
COLLABORATION FOR ENERGY MANAGEMENT and PROSESSES		
INTEGRATED INFORMATION MANAGEMENT		
USE of TOOLS (skills)		

Levels for demanded skills: Framework (EQF-levels), 1-6

	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

LO's for procure-ment

High level qualification scheme (LO-topology) for energy efficiency and LCM

Areas of the competence requirements - Design disciplines	Required Level (EQF) 1-6 for use-case or role	Offered Level (EQF) 1-6
Basic knowledge on BIM and integrated digital ways of working during building project phases, and during use and maintenance.	**Minimum levels for this project and for the expert/ discipline role to procure** - EQF - Additional requirements	
Professional knowledge on Energy efficiency of buildings and life cycle management.		
Performance based design skills, knowledge on design solutions and their performances.		
Target setting achieving energy efficiency, low carbon targets, GHG and other sustainability criteria and setting up target level.		
Energy related and sustainability criteria (KPIs) follow up and assessments as part of continues commissioning process.		
Collaboration in steering of energy efficiency and sustainability problem solving during the process and in building operations and management.		
Management skills in integrated information modelling and data governance.		
Skills in using the calculation, analyses simulation and visualisation tools, e.G BIM based energy simulations, LCA (embedded), checkers, KPI assessment tools, …		

LO's for procure-ment

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Competence Framework for teaching professionals

- Example: BIM and ACCC
(Automated Code Compliance Checking)

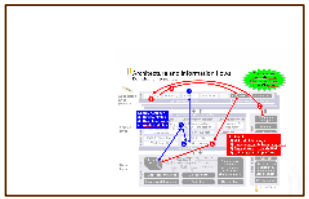
ACCORD

Innovate UK

Building up BIM skills

"Individual BIM competencies are the personal traits, professional knowledge and technical abilities required by an individual to perform a BIM activity or deliver a BIM-related outcome. These abilities, activities or outcomes must be measurable against performance standards and can be acquired or improved through education, training, and/or development." (Succar et al. 2013)

- Technology will be implemented – new skills to master the BIM tools are needed
- Technology will change the process - new know-how on integrated information management is needed.
- Technologies and process change enable new kind of business – new innovations are possible.



We need teachers
to build-up needed skill-sets

Competence Hierarchy

Able to develop national qualification schemes/ certifications

Able to develop diploma level qualification framework

Able to develop learning program (using LOs)

Able to define learning target for a course

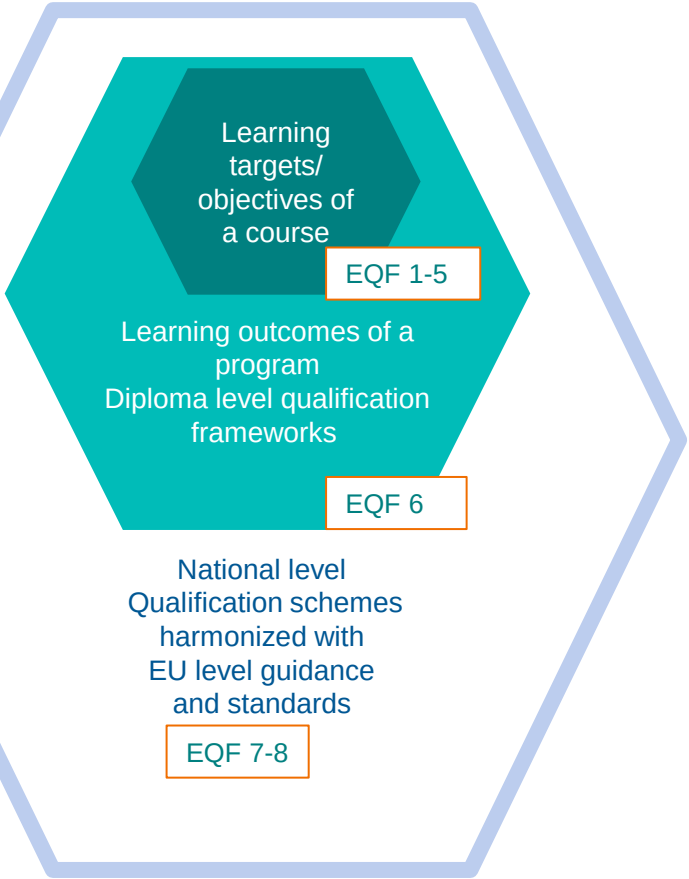
- Able to teach basics
- Able to teach skills
- Able to teach knowledge
- Able to teach ability/ capabilities

Able to up-date learning targets

Able to up–date learning program (using LOs)

Able to up-date diploma level qualification framework

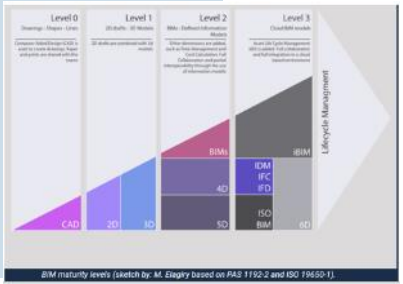
Able to up-date national qualification schemes/ certifications



Competence areas for Teaching Professionals 1/2

Entry knowledge: BIM basics

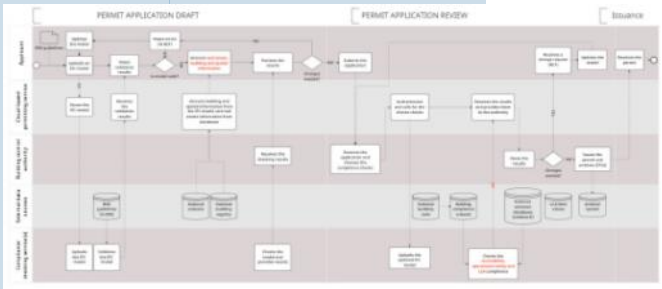
- BIM Standards
  - Guidelines, classifications, data transfer
- BIM use-cases and BIM Usages
- Adaptation, implementation
  - Interorganisational working environment
- Development history of Information Management and Digital transition



BIM maturity levels (sketch by: M. Elagiry based on PAS 1192-2 and ISO 19650-1).

Knowledge on: SoA Digi-building permitting and ACCC

- SoP–pilots
- Roadmaps, common vision
- Process change, re-engineering
- Conversion of requirements/ building code
- ACCC as BIM use–case
  - Tools
  - Platforms
  - Checkers
  - Machine-readable requirements



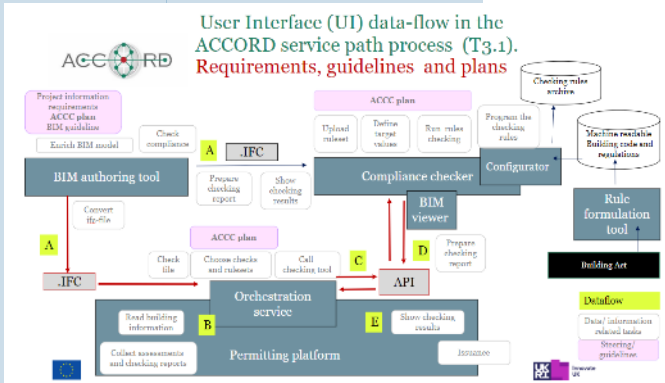
Source: EU -ACCORD

Competence areas for Teaching Professionals 2/2

Digital building permitting with ACCC

Skills and know-how about

- Use of technologies and tools connected to BIM-ACCC
  - Tools
  - Platforms
  - Checkers
  - Machine-readable requirements
- Adaptation, implementation:
  - Technological readiness
- Development and innovation:
  - Data-standardization behind BIM –ACCC –use-cases



Source: EU -ACCORD

Qualification schemes for Digital building permitting with ACCC

Competence on

- Building up skills, and use of learning methods
- Setting up programmes/ courses with Los for learning modules
- Setting up competence requirements for profiles
- Know-how on qualification frameworks
- Learning material planning and production
- Exam planning

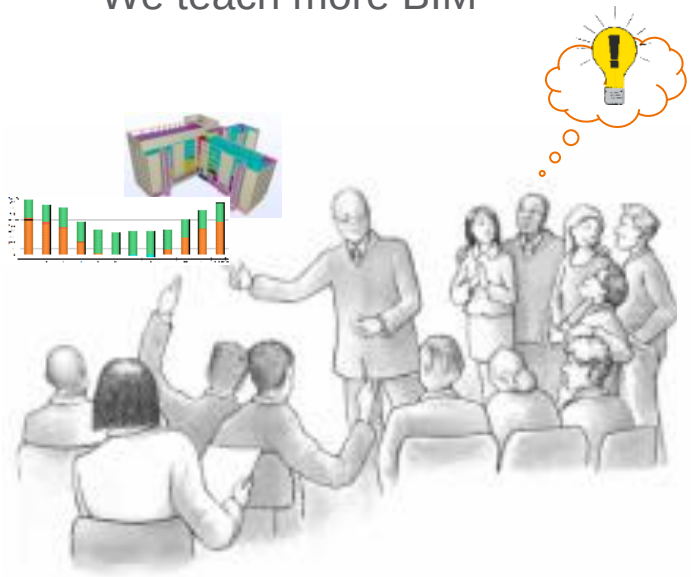
Tomorrow We talk BIM

We procure BIM

We design BIM

We do BIM

We teach more BIM



SUSTAINABLE PLACES 2024

VTT

Thank You!

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