

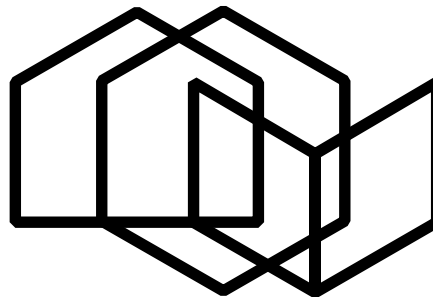
PROF / TRAC:

**PROFessional multi-disciplinary TRAIning and
Continuing development in skills for nZEB
principles**

**The PROF/TRAC qualification schemes and
skills mapping methodologies**

**European Multi-Level Skills Offensive:
The key to ensuring public support for
the energy transition**

Brussels, Belgium, 20-02-2018



PROF / TRAC

Peter Op 't Veld, PROF / TRAC coordinator
Huygen Engineers & Consultants, Maastricht, The Netherlands

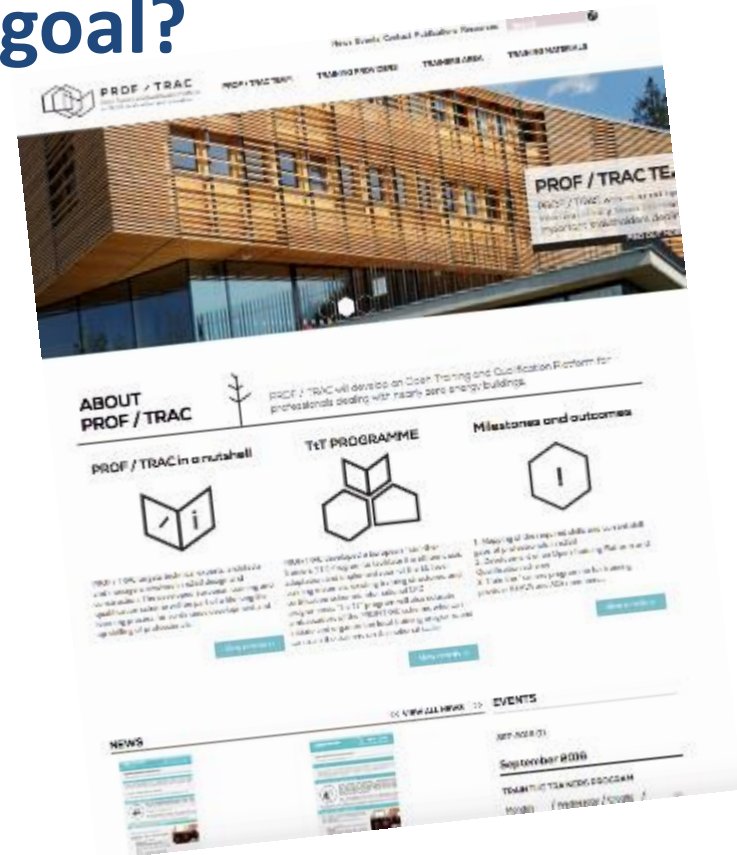


PROF / TRAC



What is the PROF/TRAC overall goal?

- Develop and maintain an **Open Education Platform for Continuing Professional Development** for professionals in the building sector.
- This platform **addresses technical experts, engineers, architects and building managers** > middle and senior professionals
- The developed **European qualification scheme** as part of a life-long learning process for continuing development and up-skilling of professionals.



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Current situation in EU

- Slight shortage of building workers by 2020 in most European countries
- The need for training of the current workforce is much stronger than the estimated need for additional workers
- More than 3 million workers (blue collar and white collar) would require up-skilling on energy efficiency or renewable energy sources by 2020
- Importance of transferable and cross-trade knowledge and skills
- Challenge: Need to improve also the skills of middle and senior level professionals to achieve overall quality in NZEB's
- Scope: upgrading or setting up large-scale qualification & training schemes, foster cross-trade and cross-level collaboration > *understanding and transparency between different trades and levels (e.g installers must be able to understand designs related to their work, engineers need to know how to present their design/engineering to installers)*

No quality and quality control in construction and renovation without the required skills and trainings!



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Outcomes:

Development of a roadmap to train nZEB professionals

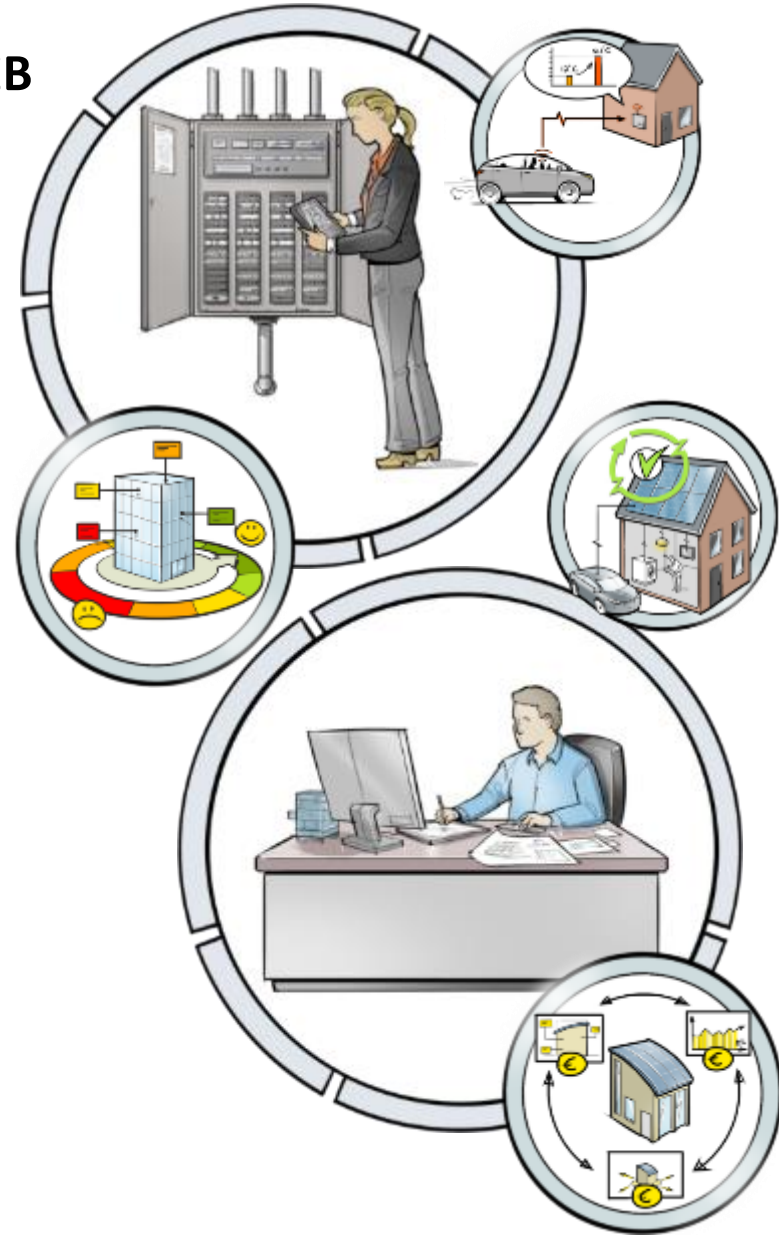
Mapping of the skills and current skill gaps in nZEB

First step:

- ▶ Adapting methodologies of national BUILD UP Skills actions
- ▶ Methodology available for any new comer training provider on www.profrac.eu/publications/reports
- ▶ Done in 7 member states

Second step:

- ▶ Roadmaps have been developed on a national and EU-wide level focussing on successful national implementation of nZEB trainings for professionals.
- ▶ The EU roadmap does the same for the EU, focussing on similarities or corresponding outcomes of the member states



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Methodology skills mapping

1. PROF/TRAC Consortium defined:

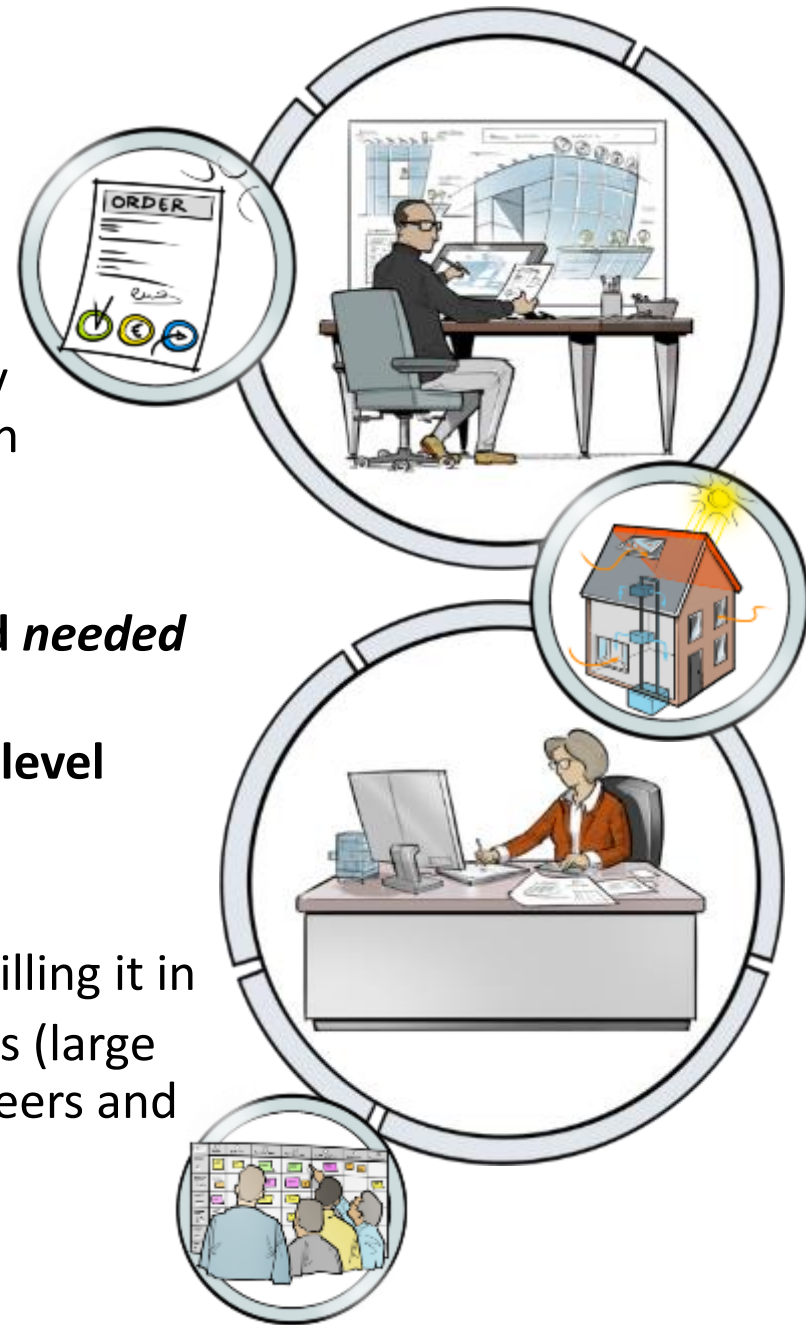
- ▶ Professions
- ▶ Skills levels
- ▶ Relevant nZEB Technologies on Energy Management / Production / Reduction
- ▶ Interdisciplinary skills, such as communications, economics

2. National experts mapped the *current* and *needed* skills on nZEB

3. Outcome is a skills gap, at a certain skills level

>> *Lessons Learned:*

- ▶ Results depend very much on expert filling it in
- ▶ Different skills for different professions (large difference between architects / engineers and building managers)



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Example of results of skills mapping

Professional

CODE	TECHNOLOGY, INTERDISCIPLINARY SKILLS AND PROFESSIONS	Mechanical Engineer					Building aut. Engineer										
		current	nZEB	Gap	1	2	3	4	5	current	nZEB	Gap	1	2	3	4	5
M	ENERGY MANAGEMENT																
EM1	Smart grid systems	2	2	0						4	1						
EM2	Domotic systems	2	2	0						5	1						
EM3	Building management systems	2	3	1						4	5	1					
P	ENERGY PRODUCTION (on-site and nearby)																
EP1	Geothermal energy	3	3	0						2	3	1					
EP2	Biomass	2	2	0						1	2	1					
EP3	Biogas	2	2	0						1	2	1					
EP4	District heating and cooling	3	4	1						2	3	1					
EP5	Heatpumps	3	5	2						3	3	0					
EP6	Solar power systems for electricity generation	3	2	0						3	3	0					
EP7	Solar thermal systems for cooling generation	2	4	2						2	2	0					
EP8	Solar thermal systems for domestic hot water	3	4	1						2	2	0					
EP9	Mini wind power	2	1	0						2	2	0					
EP10	Combined Heat and Power (CHP)	3	3	0						3	2	0					

Skills

Skills gap
from level
2 to 3

CODE	TECHNOLOGY, INTERDISCIPLINARY SKILLS AND PROFESSIONS	Architect					Building Engineer					Construction Engineer				
		current	nZEB	Gap	1	2	current	nZEB	Gap	1	2	current	nZEB	Gap	1	2
M ENERGY MANAGEMENT																
EM1	Smart grid systems	1	1	0			1	1	0			0	0	0		
EM2	Domotic systems	1	1	0			1	1	0			0	0	0		
EM3	Building management systems	1	1	1			1	1	0			0	0	0		
P ENERGY PRODUCTION (on-site and nearby)																
EP1	Geothermal energy	0	1	1			0	0	0			0	0	0		
EP2	Biomass	0	1	1			0	0	0			0	0	0		
EP3	Biogas	0	1	1			0	0	0			0	0	0		
EP4	District heating and cooling	1	2	1			1	2	0			1	2	0		
EP5	Heatpumps	1	2	1			1	2	0			1	2	0		
EP6	Solar power systems for electricity generation	1	2	1			1	2	0			1	1	0		
EP7	Solar thermal systems for cooling generation	1	1	0			1	1	0			1	1	0		
EP8	Solar thermal systems for domestic hot water	1	1	0			1	1	0			1	1	0		
EP9	Mini wind power	0	1	1			0	1	1			0	1	1		
EP10	Combined heat and Power (CHP)	0	1	1			0	1	1			0	1	1		
R ENERGY REDUCTION																
RS1	Insulation	3	4	1			4	5	1			3	2	0		
RS2	For lightness building	3	4	1			4	5	1			2	2	0		
RS3	Micro climate	2	4	2			2	2	0			1	1	0		
RS4	Envelope systems	2	4	2			3	3	0			1	1	0		
RS5	Hot water systems	1	2	1			1	1	0							
RS6	Window and/or glazing systems	3	3	0			4	4	0			2	2	0		
RS7	Heating and cooling emission systems	2	3	1			2	2	0							
RS8	Electric heating systems	2	3	1			2	2	0							
RS9	Artificial lighting systems	2	2	0			2	2	0			1	1	0		
RS10	Ventilation systems	2	2	0			2	2	0			1	1	0		
S INTERDISCIPLINARY SKILLS																
IS1	Communication	4	5	1			3	3	0			3	3	0		
IS2	Information management	4	4	0			4	3	0			3	3	0		
IS3	Collaboration	3	4	1			3	3	0			2	2	0		
IS4	Quality assurance	3	4	1			3	4	1			4	4	0		
IS5	Sustainable architectural design	4	5	1			3	3	0							
IS6	Integrated design	3	4	1			3	3	0			3	3	0		
IS7	Sustainable building materials	3	4	1			3	3	0			2	2	0		
IS8	Sustainable innovation materials	2	2	0			2	2	0							
IS9	Environmental (indoor) quality	3	3	0			2	2	0			1	1	0		
IS10	Economics	3	3	0			2	2	0			2	2	0		
IS11	Procurement	2	3	1			2	1	0							


Skills levels can be estimated from level 0 to 5, and will automatically be coloured.

Explanation of the levels 0 - 5:

0	Not applicable / no knowledge and skills required
1	Has little knowledge and skills with respect to the relevant field / technology
2	Understands basic knowledge and has practical skills within the field, is able to solve problems by
3	Has comprehensive, factual and theoretical knowledge, is capable of solving problems within the field
4	Has advanced knowledge involving a critical understanding of theories and principles and skills, required
5	Has specialised knowledge and problem-solving skills, partly at the forefront of knowledge in the field, in

Development of a European qualification scheme

- a **qualification scheme** is elaborated
- for the **targeted professions** using the **integrated, multidisciplinary approach** of the IEE IDES-EDU and other relevant projects

Technology Nr.								
EP5	Planning and design of heat pump installations				energy production for heating, cooling and potable hot water, making use of an energy source with low temperature and bringing it to a higher temperature.			
Project phase	General description and subtasks	Workfield						
		Architecture	Mechanical Engineering	Electrical Engineering	Structural engineering	Construction management	Financing and procurement	Building management
General	General knowledge of heat pumps, design and application	1	4	2	1	1	1	1
	Understands the basic working and application of heat pumps, is able to explain and discuss.	x	x	x	x	x	x	x
	Is aware of types of available heat sources for use with heat pumps, understands the influence of source temperature on energy efficiency.		x	x				
Pre design	Performance of a feasibility study	2	5	3	1	1	1	-
	Can make an inventory of available heat sources and identify possibilities or restraints		x					
	Can estimate the heat loss of the building, to perform feasibility study of heat pumps		x					
	Inventory of possible heat pumps and available sources (e.g. outdoor air, exhaust air, soil, rivers)		x					

Development of a European qualification scheme

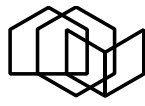
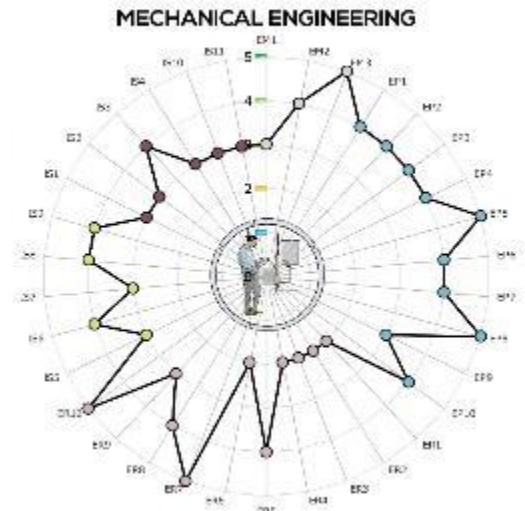
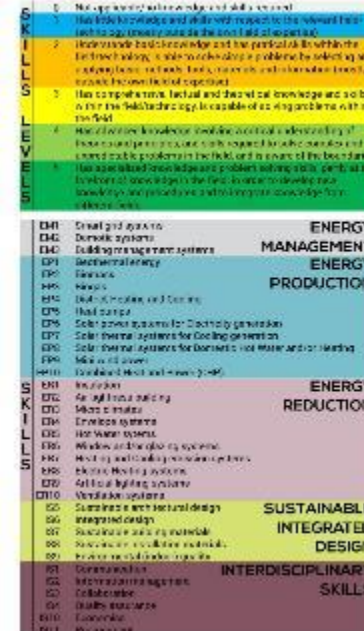
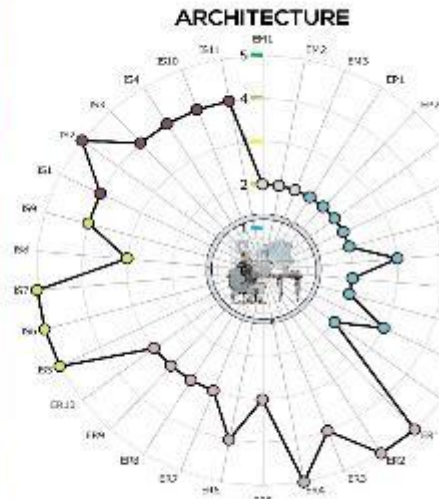
PROF/TRAC recommended nZEB skills levels per skill and per work field

	Work field	Architecture	Civil Engineering	Electrical Engineering	Mechanical Engineering	Building Management	Construction Management	Financing and Procurement
	Reference professions	Architect	Civil Engineer	Electrical Engineer	Mechanical Engineer	Facility Manager	Project Manager	Procurer
			Construction engineer	ICT engineer	Building automation eng.	technical energy engineer	Cost engineer	project developer
			structural engineer		Energy engineer	operator	Quality assurance	
	TECHNOLOGY, INTERDISCIPLINARY SKILLS AND PROFESSIONS							
EM	ENERGY MANAGEMENT							
EM1	Smart grid systems	2	1	5	3	3	2	1
EM2	Domotic systems	2	1	4	4	3	2	1
EM3	Building management systems	2	1	4	5	3	2	1
EP	ENERGY PRODUCTION (on-site and nearby renewable energy production and off-site renewable energy)							
EP1	Geothermal energy	2	2	3	4	2	2	1
EP2	Biomass	2	2	3	4	2	2	1
EP3	Biogas	2	2	3	4	2	2	1
EP4	District heating and cooling	2	2	3	4	2	2	1
EP5	Heatpumps	2	2	3	5	2	2	1
EP6	Solar power systems for electricity generation	3	3	5	4	2	2	1
EP7	Solar thermal systems for cooling generation	2	2	3	4	2	2	1
EP8	Solar thermal systems for domestic hot water and/or heating generation)	2	2	3	5	2	2	1
EP9	Mini wind power	3	3	4	3	2	2	1
EP10	Combined Heat and Power (CHP)	2	2	4	4	2	2	1
ER	ENERGY REDUCTION of construction							
ER1	Insulation	5	4	1	2	1	3	2
ER2	Air tightness building	5	4	1	2	1	3	2
ER3	Micro climates	4	3	1	2	1	3	2
ER4	Envelope systems	5	4	1	2	1	3	2
ER6	Window and/or glazing systems	4	4	1	2	1	3	2
ER	ENERGY REDUCTION of installations							
ER5	Hot water systems	3	2	3	4	2	3	2
ER7	Heating and cooling emission systems	3	2	3	5	2	3	2
ER8	Electric heating systems	3	2	4	4	2	3	2
ER9	Artificial lighting systems	3	2	5	3	2	3	2
ER10	Ventilation systems	3	2	3	5	2	3	2
IS	SUSTAINABLE INTEGRATED DESIGN							
IS5	Sustainable architectural design	5	4	3	3	2	2	2
IS6	Integrated design	5	4	4	3	3	3	3
IS7	Sustainable building materials	5	4	3	3	3	3	2
IS8	Sustainable installation materials	3	3	4	4	3	3	2
IS9	Environmental (indoor) quality	4	3	4	4	3	3	2
IS	INTERDISCIPLINARY SKILLS							
IS1	Communication	4	3	3	3	3	5	4
IS2	Information management	5	3	3	3	3	5	4
IS3	Collaboration	4	4	4	4	4	4	4
IS4	Quality assurance	4	3	3	3	3	4	3
IS10	Economics	4	3	3	3	3	5	4
IS11	Procurement	4	3	3	3	3	4	5



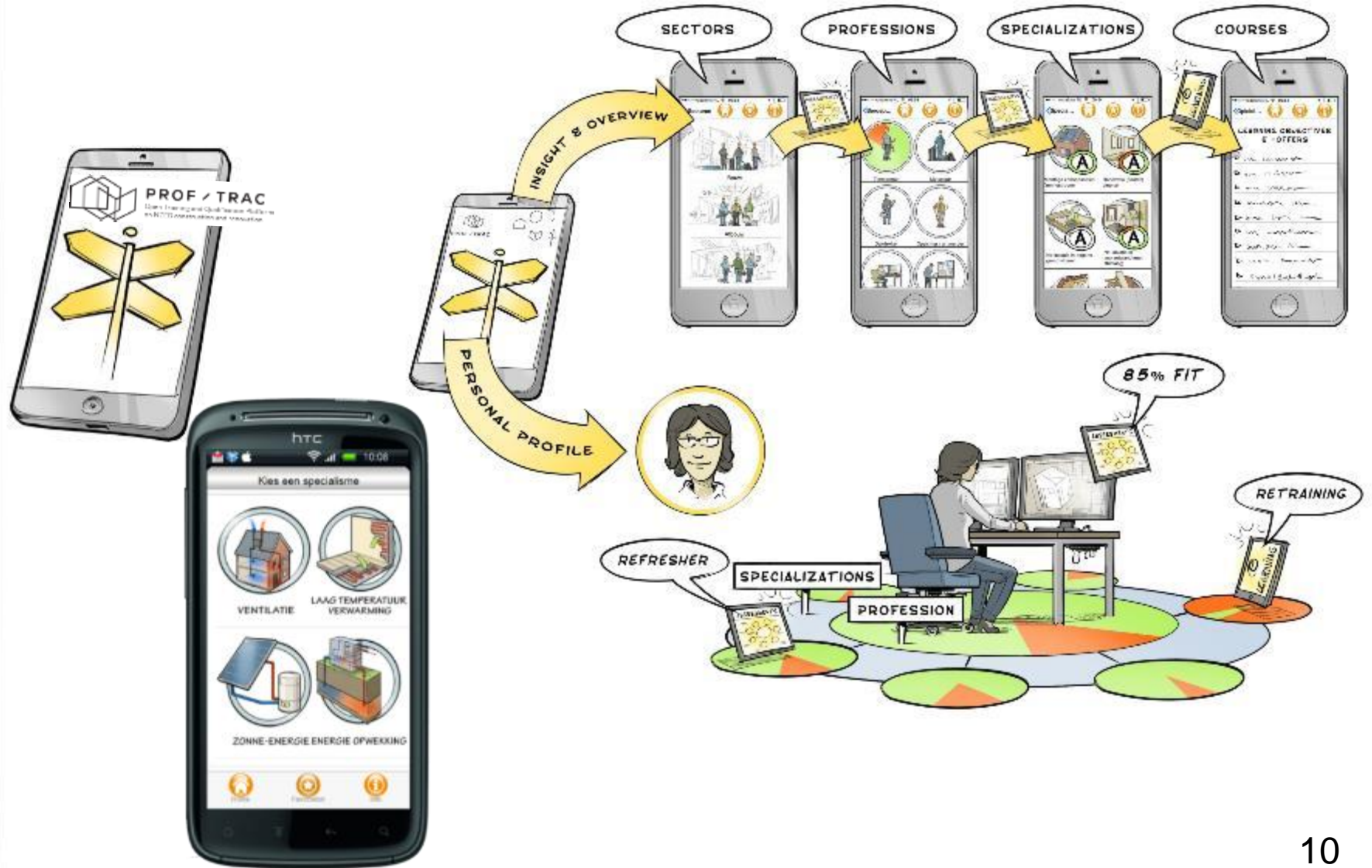
PROF/TRAC European Qualification Scheme – nZEB knowledge and skill level

How to use the qualification level?



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The BUILD UP Skills advisor app



Outcomes:

PROF/TRAC Database – Online

<http://proftrac.eu/training-materials.html>



PROF / TRAC
Open Training and Qualification Platform
on NZEB construction and renovation

PROF / TRAC TEAM

TRAINING PROVIDERS

TRAINERS AREA

TRAINING MATERIALS

TRAINING MATERIAL REPOSITORY WEBPAGE



On this page you can find all relevant training materials on NZEB. Use the filter form on the left to narrow the results.

nZEB knowledge to share?

Upload your training material in the repository and make it available to the PROF/TRAC Community.

UPLOAD >>

Topic

Select topic

Type of project

Select one...

Building use

Select one...

Type of material

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Language



Select one...

Filter result >>

Relevant report

Topic

Project

 The Comfort Houses: Measurements And Analysis
 Of The Indoor Environment And Energy
Consumption In 8 Passive Houses 2008-2011

Energy reduction

ZEB


[More details](#)

 Engeneutralt Byggeri – Definition og fremtidig
rolle i samfundet

Energy management

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 Engeneutralt Byggeri – Designprincipper og
byggede eksempler for enfamiliehuse

Energy management

ZEB

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 Engeneutralt Byggeri – Tekniske løsninger

Energy management

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 Zero Energy Buildings – DESIGN PRINCIPLES AND
BUILT EXAMPLES

Energy management

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 Survey Findings Report

Awareness of energy
efficiency

TRB

[More details](#)

 Final conclusions report

Awareness of energy
efficiency

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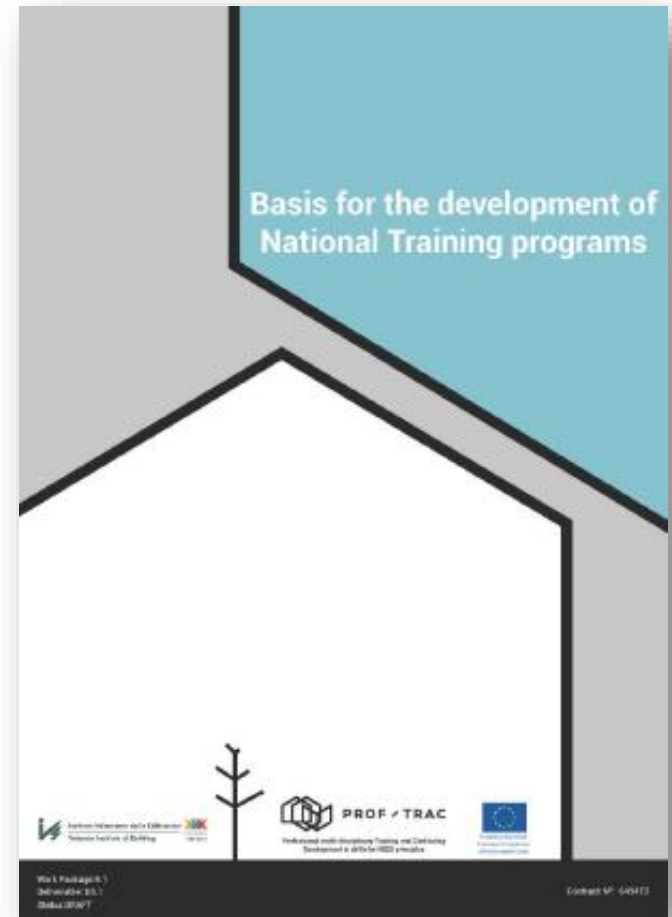


Outcomes:

PROF/TRAC Educational guide

- Basis for the development of national training programs
- Available for training providers to be used as a support to design the pilot courses
- Available:

www.profrac.eu/publications/reports



PROF / TRAC

Training methods:

PROF/TRAC Train the Trainer sessions

- Core of the PROF/TRAC training method is the **organisation of a European, central Train-the-Trainers program**.
- Goal of the Train-the-Trainers (TtT) program is to **create ‘ambassadors’ for the PROF-TRAC project**
- These trained experts will initiate and organise the national training programs and can train the trainers on national scale.
- **Three Train-the-Trainers courses have been organized** as interactive face-to-face trainings on central places.
- Next training rounds will be done by **webinars** to make these trainings very efficient and easily accessible for new teachers. All the stages will be supported by the Open Training Platform.

<https://www.youtube.com/watch?v=0kmP7DnRFj8>

Preliminary conclusions after 3 TtT face-fo-face sessions and 2 as webinars:

- A Train-the-Trainer approach seems to be quite effective to enlarge the impact and to create a snowball effect



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Training methods:

PROF/TRAC Train the Trainer sessions

1. TtT

Number of trained trainers:
1st TtT session: 22
(7 female, 15 male)

2. TtT

2nd TtT session: 26
(13 female, 13 male)

3. TtT

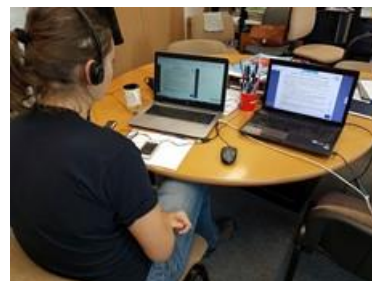
3rd TtT session: 12
(2 female, 10 male)

4. TtT

4th TtT webinar session 138
(48 female, 90 male)

5. TtT

5th TtT webinar session 37
(17 female, 20 male)



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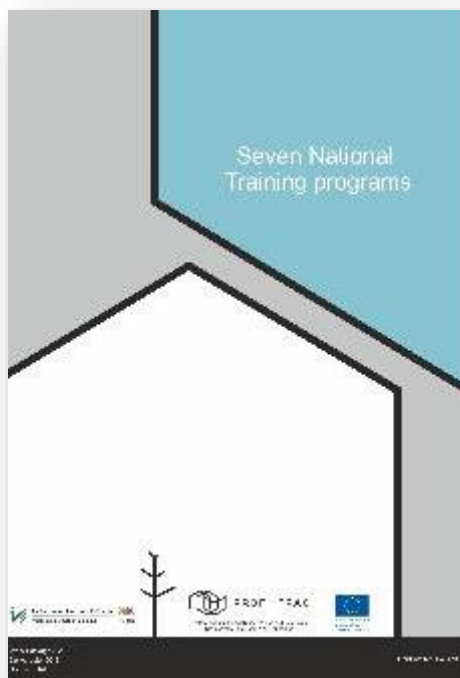
Outcomes:

PROF/TRAC Seven national training programs

Denmark, The Netherlands, Spain, Italy, Czech Republic, Slovenia and Croatia

National courses are tailor-made, as an outcome of the skills mapping and preparation during the TtT sessions

Methods: mix of e-learning (preparations, some cases as threshold level) and interactive group working, assignments



Participants national courses:

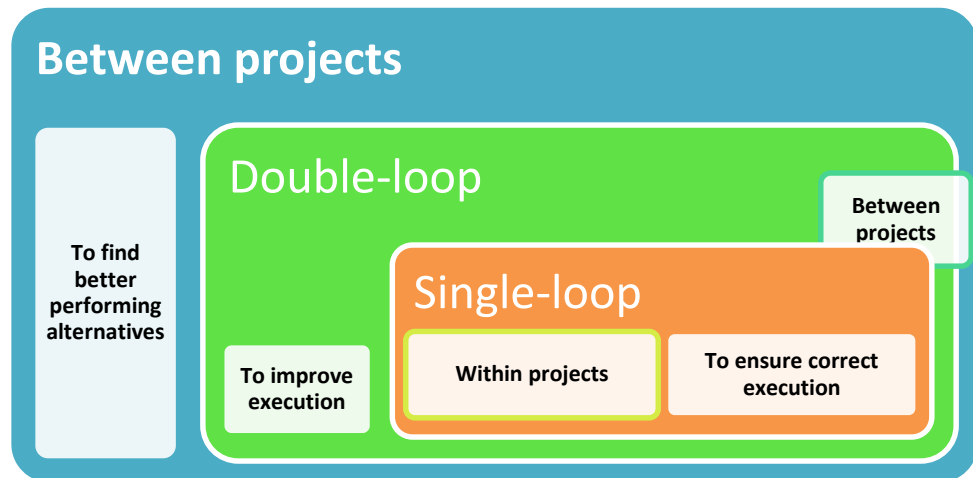
		(female)
•Croatia:	31	(8)
•Czech Republic:	680	(90)
•Italy:	44	(13)
•Netherlands:	20	(2)
•Slovenia:	30	(12)
•Spain:	29	(10)
Total:	834	(135)



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New developments in construction skills: involving BIM and ICT / digital solutions

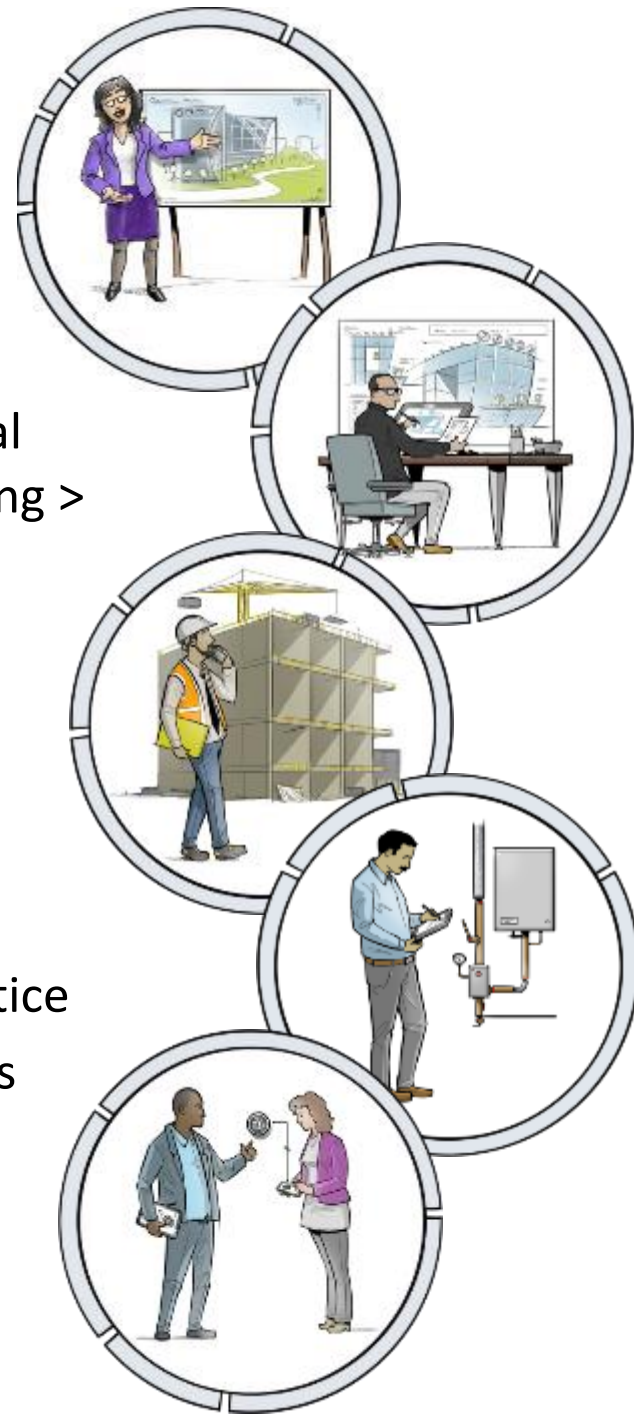
- BIM is addressed in the latest contracted Construction Skills projects
 - Training and upskilling to work with BIM
 - Using BIM as a training tool itself (even more interesting as an innovative approach in training)
- Example: BIMplement (started September 2017)
 - Using BIM as a universal ‘information carrier’ for quality control
 - Identifying quality control levels > identifying necessary skills for involved trades and professional levels > identifying necessary trainings and upskilling > BIM enhanced
 - Enriching BIM-models with process or learning metadata
 - Using hands-on and BIM-enhanced workplace learning tools
 - BIM-enhanced learning loops:



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BIMplement in a nutshell:

- Using BIM as a universal ‘information carrier’ for quality control
- Identifying quality control levels > identifying necessary skills for involved trades and professional levels > identifying necessary trainings and upskilling > BIM enhanced
- Cross-trade and Cross-level
- Enriching BIM-models with process or learning metadata
- Using hands-on and BIM-enhanced workplace learning tools
- Implemented on (at least) 50 building sites in practice
- Mainly SME’s oriented but also for large companies



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BIMplement

Conclusions

- Although the task and challenge is massive (upskilling of more than 3 million workers in the construction sector....) the BUS and Construction Skills actions are not 'a stitch in time' and could give a contribution in upskilling the European work force
- A Train-the-Trainer approach, in combination with local training providers, is effective and can create a snowball effect
- Collaboration with European organisations like REHVA, Architect Council of Europe, Housing Europe is very effective for endorsement and a further European roll out; their national members can act as training providers
- Architectural professions and the (HVAC) engineer branch seem to be covered quite well, managers of housing companies still need attention (for example sustainable procurement, occupant engagement etc.)
- Trainings should also take end-user related issues into account, especially for NZE / deep renovations
- Collaboration between BUS and CS projects (as initiated during the BUS exchange meetings) clearly gives an added value



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