



P4ELECS Workshop Days 2025

Shaping the Electrification Skills for Europe



Arnhem, the Netherlands



30 September – 1 October 2025



Connectr & HAN University of Applied Sciences



Co-funded by
the European Union

P4ELECS

Platform for electrification
competences and skills



P4ELECS in a NUTSHELL

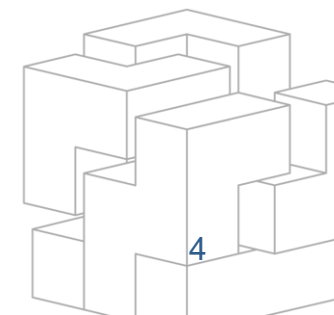
30 September

1. Problem
2. Objectives
3. Concept
4. Deliverables
5. Consortium Partners
6. Workplan



Annick Dexters
KU Leuven - BE

1. Problem



Problem

- **Shortage of practical skills** among **engineers** (design and development) and **technicians** (implementation and operation) related to the energy transition
- **Shortage educational staff**
- **Time from research to implementation is too long**
 - the classical accreditation track for curricula takes several years or more
- **Technology evolves at a very high speed**
- Knowledge is **scattered**

2. Objectives P4ELECS

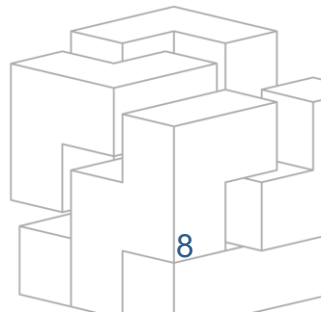
EU requirements...

- **Flexible pathways** for upskilling and reskilling
- **Recognition** of achievements: micro-credentials/stacking
- For **FAST** upskilling and reskilling a **learner centric and tailer made approach** is necessary
- Development of **local skills ecosystems** where **industry, education and research** work together to develop educational material and offer the possibility of **work-based-learning**.

For [ERASMUS-EDU-2023-PEX-COVE](#)

- Establish **international CoVEs** = centers of vocational/practical excellence (addressing EQF levels **7,6,5,4,3**) to establish an **upward convergence** between local skills ecosystems
- Skills ecosystems support **innovation eco systems** to educate engineers/technicians necessary to design/implement the innovations (products, installations, processes)

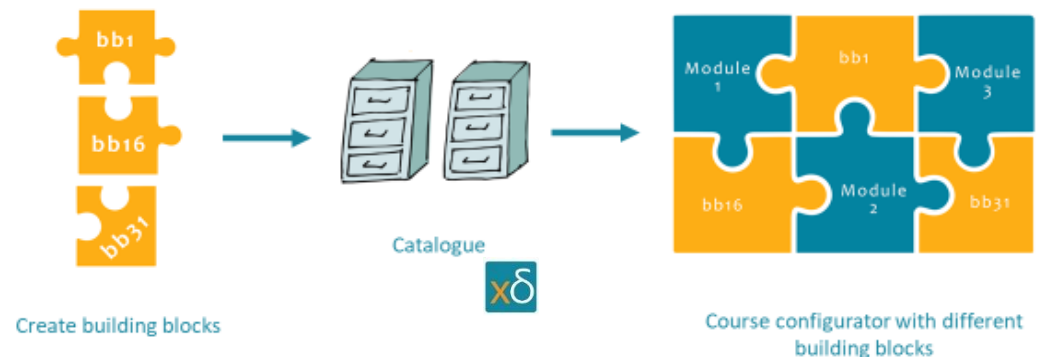
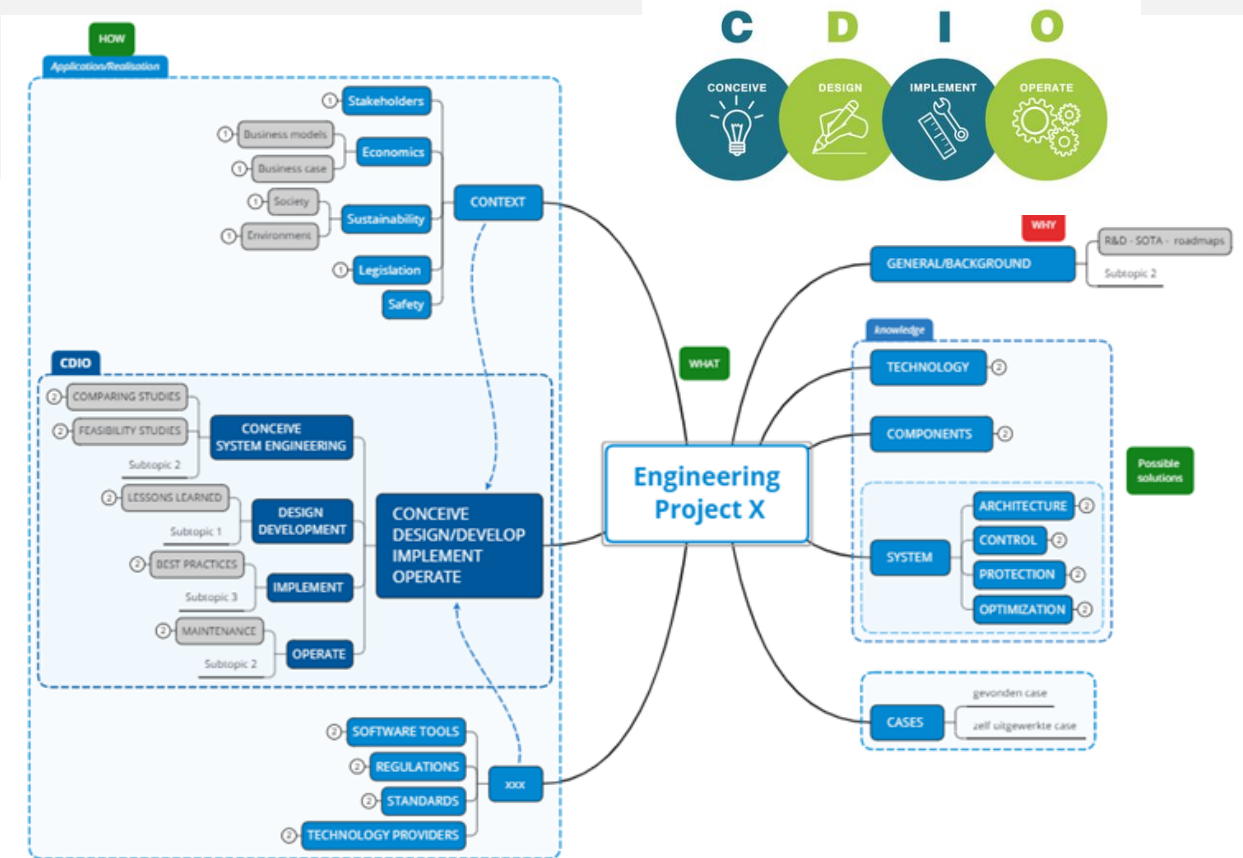
3. Concept of Building Blocks & Spiders



Concept P4ELECS

P4ELECS is based on the **CDIO** initiative (Concept Design Implement Operate) initiated by MIT, which is a taxonomy of the skills and competences an engineer of the 21st century should have (<http://www.cdio.org/>).

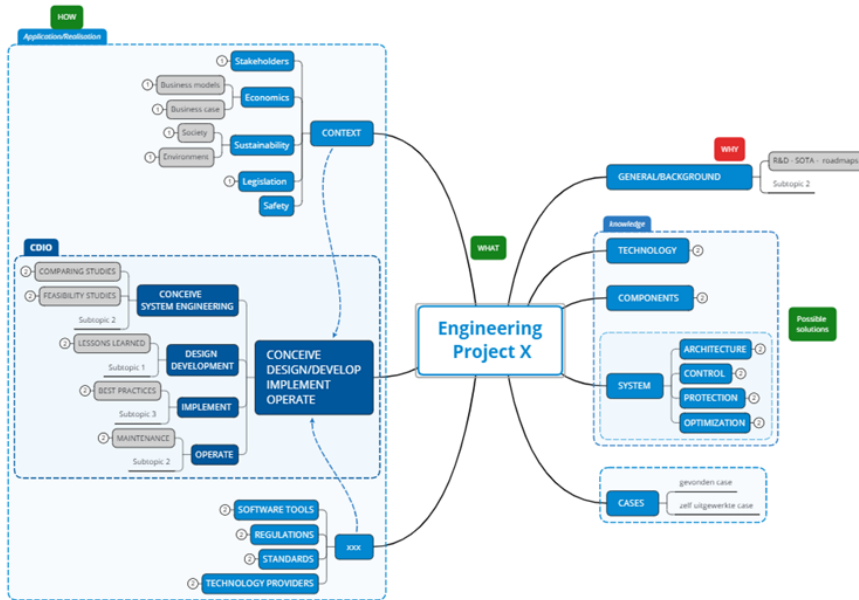
The P4ELECS building blocks (BBs), CDIO maps or spiders and the building block platform (BBP) are built around this methodology.



What is a building block (BB)?

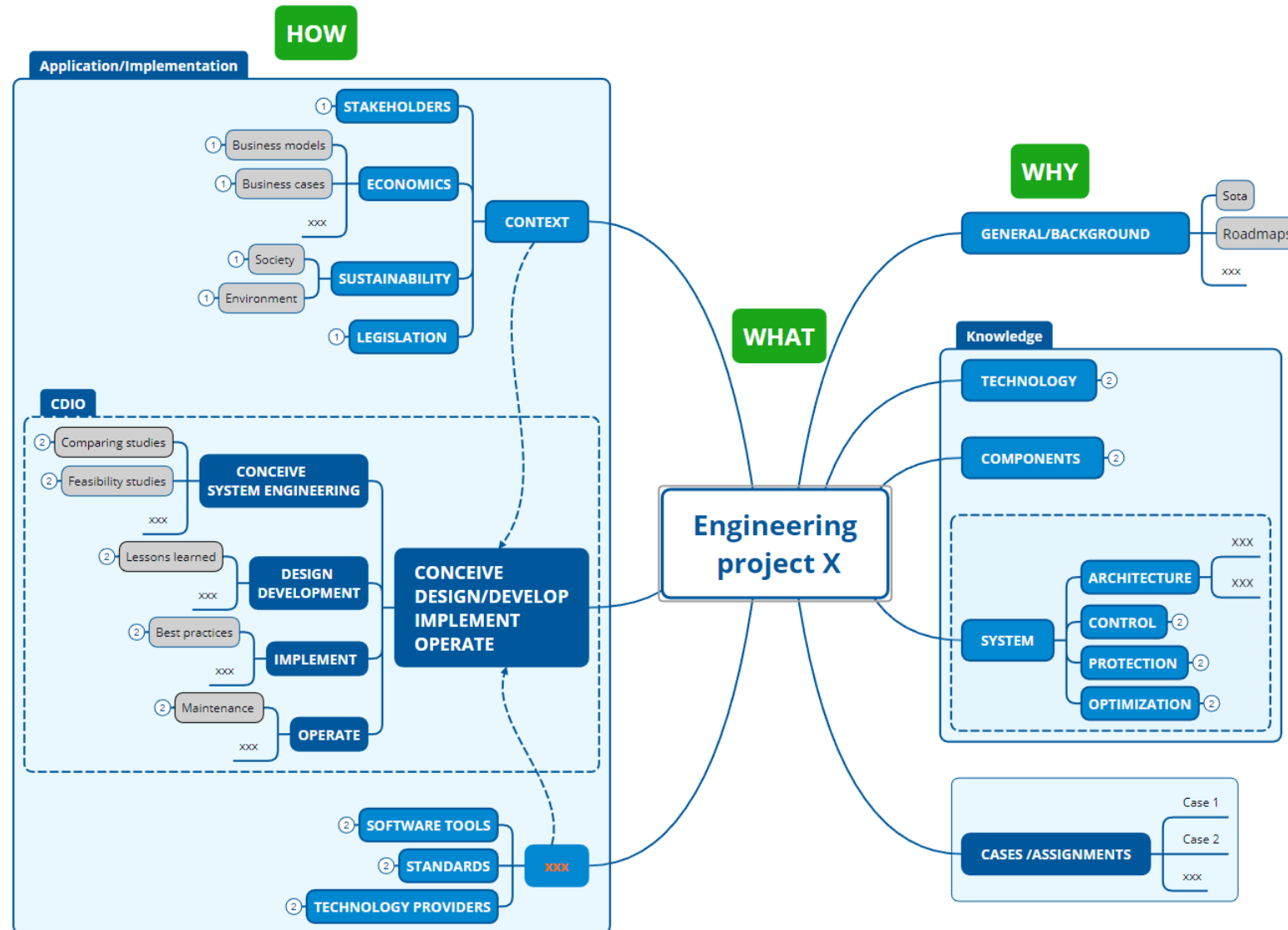
- A BB is a piece of content that covers a well-defined topic and **provides the answer to a specific question**. It can **consist** of a reader, PPT, video, simulation, assignment, data sheets, lab tutorial, URL's, BB information page, Q&A,...
 - A BB consists of **RAW and VALIDATED** information.
 - RAW means that it is sec information, the extraction of knowledge from papers, reports, manuals, standards, experience and lessons learned from realized projects, ...
 - BBs are **VALIDATED by EXPERTS** from research and industry.
 - BBs are **immediately applicable for education or industry**.
 - Teachers can integrate them in their courses and keep their **pedagogical freedom**.
 - Learners (students, employees) can **easily find that specific part of information** they need for their projects, electives or to improve their qualifications (upskilling, reskilling).
- Characteristics of the BBs are **necessary to provide enough flexibility** to develop tailormade courses for individual learners/teachers.

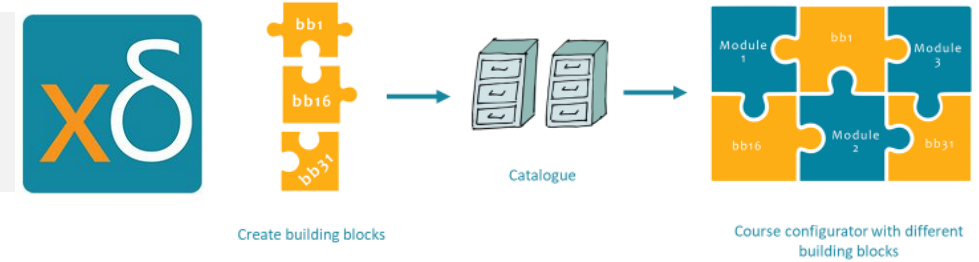
CDIO-maps - Spiders



- BBs are grouped in so-called “CDIO spiders”. **Spiders are linked to the realization of a project** (e.g. a microgrid, a smart building, a charging station, an electric vehicle etc) **and cover all the aspects from design to implementation.** The categories in which BBs can be classified is based on the CDIO taxonomy.
- **CDIO-spiders will follow the timeline of emerging and emerged technologies.** For emerging technologies mostly concept BBs will be available. For emerged technologies mostly design BB and implementation/operation BBs will be developed considering standardization and legislation. Therefore, the **CDIO-spiders and the BBP are very dynamic and provide the state-of-the-art knowledge and support of requested skills.**
- Research oriented institutions, industry and VET-providers need to **collaborate more intensively** and on a much larger scale, to provide the necessary knowledge to develop and sustain these spiders.
- CDIO-spiders offer a NEW structure to support the collaboration between stakeholders of the knowledge triangle in the skills ecosystems to co-create the materials needed for a timely skills adaptation.

CDIO-maps - Spiders





The IT platform or "**Building Block Platform**" hosts the BBs and spiders and will **offer tools and services** to support the users of the platform namely experts for posting BBs, teachers & learners for choosing appropriate BBs.

The **most important** services are:

- **Building Block Configurator** that contains all the necessary information to identify content, required prior knowledge, workload, learning outcomes, the courses or micro-credentials the BB is already associated with etc.
- **Quality control system** (peer review, content & educational quality, recognition (micro-credential, certificate, accreditation))
- **Smart Course Configurator** to compile building blocks into tailormade courses.
Based on ULOs (unit of learning outcomes = knowledge, skills and competences to achieve),
- **Catalogue** with Building Blocks accessible by search, hashtags or CDIO-Spiders.

→ The BBP is an innovative service to teachers and learners and supports LLL, reskilling & upskilling. It is a **trusted source** that allows **everybody worldwide easy access to knowledge/experts at any time (24/7) at any place**.

4. Deliverables

Deliverables

- **Methodology** to identify skill needs
- > 250 BBs cocreated with research & industry
- **Tools** (in BBP) with **educational guidelines** to create BBs and courses
- > 25 international courses (with hands-on part) for engineers, technicians and trainers
- **Tool** (in BBP) with guidelines to create courses based on **ULOs** (units of learning outcomes)
- Recognition (micro-credentials) of P4ELECS courses
- BBP based on platform economy where experts can worldwide post BBs (after quality assessment) and learners/teachers can access/purchase them 24/7
- 5 local skills ecosystems (BE, DE, IT, LV, NL) + upward convergence by working on international level
- **Guidelines and lessons learned** to establish skills ecosystems
- **Handshake** between VETs and HEIs (train the trainer)

THE differentiating elements of P4ELECS ...

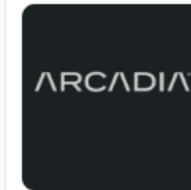
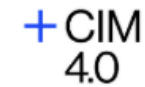
- Cocreation and cooperation between VET, INDUSTRY, RESEARCH based on **CDIO spiders**
- CoVE for **tertiary education levels**: engineers (HEIs - EQF 6,7) **AND** technicians (VET - EQF = 5)
- Focus is on skills and competences “**to design & develop**” **AND** “**to implement & operate**” necessary to cover the whole innovation chain
- **Handshake** between **HEIs** and **VETs**
- BBs, offer validated **bits and pieces** to compose learning modules/courses and offer max flexibility/ pedagogical freedom to teachers/learners.
- BBs, spiders and BBP **will be sustainable** by using a business model based on the **platform economy**
- Integration of **skills ecosystem in the local innovation ecosystems is key** (see WP 8 Skills Ecosystems). This is very challenging, request system thinking and system change. Concept of BBs & Spiders hosted in the BBP offers a structured way to support this system change.



5. Consortium Partners



Partners



SESCOs – SPIDERCOS

The spider COs have the following responsibilities:

- guaranteeing the **relevance and consistency** of the spider.
- guarding that the BBs provide knowledge to increase practical skills like design guidelines, lab tutorials, blue prints for lab infrastructure etc...
- **Coordinate the development of the BBs** in his spider.
- organising and follow up the **quality assurance process of the BBs**. Special attention will be paid to find experts, independent reviewers and automating the quality control process in the BBP.
- follow up the **organisation, adaptation and evaluation of international courses** developed in the P4ELECS project based on the BBs in their relevant spider.
- **Updating BBs** on a regularly basis.

The ecosystem COs or SESCOs are for their respectively regions responsible for

- establishing **Business-Education Partnerships**
- Identifying **WBL places** to facilitate students for apprenticeships, traineeships and to cocreate courses with industry.
- **Cocreating skills-ecosystems** – needs identification – system mapping – system change
- Supporting the **Communication - Dissemination - Implementation** team

 WP2 Co GUIDELINES UCLL2 (BE) An Verburgh	 WP2 ULOs Skill needs WP8 Local implementation plans ISSO (NL) Martijn van Bommel	 WP6 Co BBP Xdemia (NL) Firoz Kariman	 WP7 Co Courses THUAS (NL) Pepijn Van Willigenburg	 WP8 Co Skills Ecosystems Progetto Arcadia (IT) Elena Gentilini	 WP9 Co Communication KU Leuven (BE) Irina Dumitrescu
 Spider Co PV SES Co Germany a.i. THK (DE) Christian Dick	 Spider Co Wind THK (DE) Mozaher Patwary	 Spider Co Smart Home SES Co Italy FORMA (IT) Stefano Ala	 Spider Co SMART GRID HAN (NL) Patricia Boogaard	 Spider Co MVDC RWTH (DE) Fabian Herzog	 Skills Competition Spider Co Charging station E-bikes UCLL1 (BE) Peter Van Hout
 Spider Co Charging Plaza's KUL (BE) Wilmar Martinez	 Skills Competition CIM4.0 Spider Co (P)EV power trains Polito (IT) Silvio Vaschetto	 Spider Co Public Lighting SES Co Latvia RTU (LV) Oscars Krievs	 SES Co Italy CIM 4.0 (IT) Giulia Marcocchia	 SES Co Netherlands HAN (NL) Leon Verhoeven	
 SES Co Belgium T2 (BE) Peter Evens	 SES Co Germany WvSS (DE) Andreas Daube	 SES Co Netherlands VT (LV) xxx	 SES Co Netherlands SGSN (NL) Henry Lootens	 WP1 Co Coordination WP345 Co BBs Spider Co DC-Microgrid SES Co Belgium KU Leuven (BE) Annick Dexters	

6. Workplan

WPs in P4ELECS

Project members often complain that the project is too complex. Let's try the following comparison.

P4ELECS ~ a company that produces BBs

BB = product

WP6: designs (functionalities) and builds the machines (IT-platform) to **support** the production process.

WP2: “designs” the product

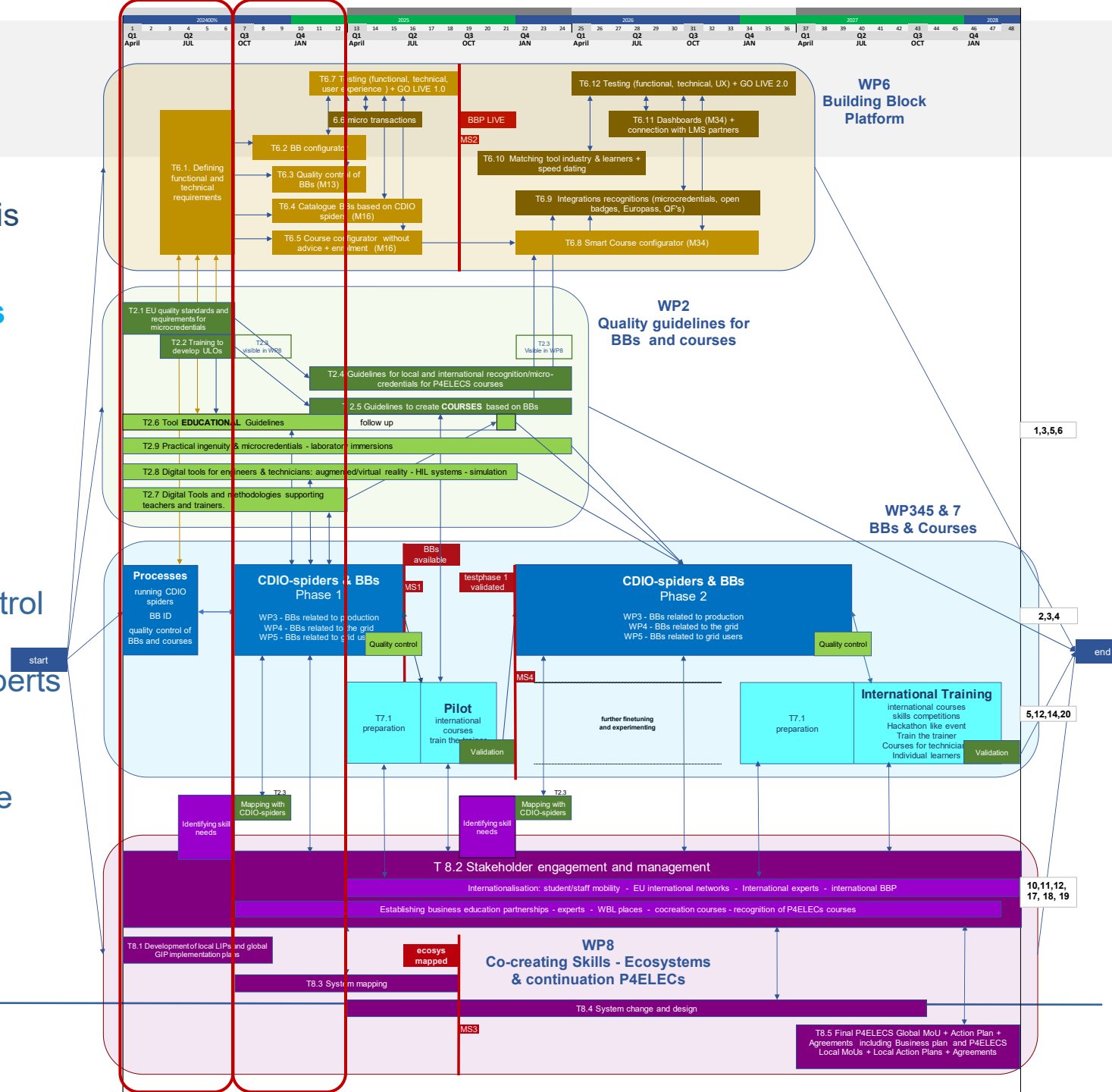
WP3,4,5: “produces” the product

WP7: tests the product and does the quality control

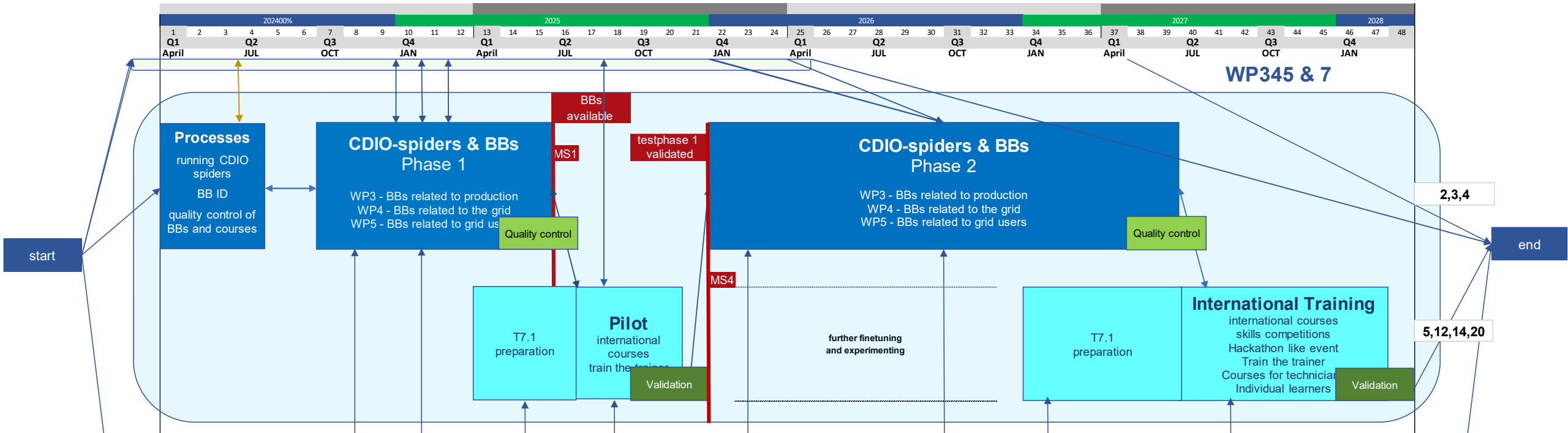
WP8: identifies the needs (ULOs), the clients (learners and teachers) and suppliers (experts from research, industry or...), creates the skills ecosystems (system change) and develops the business model based on the platform economy

WP9: does the “marketing”

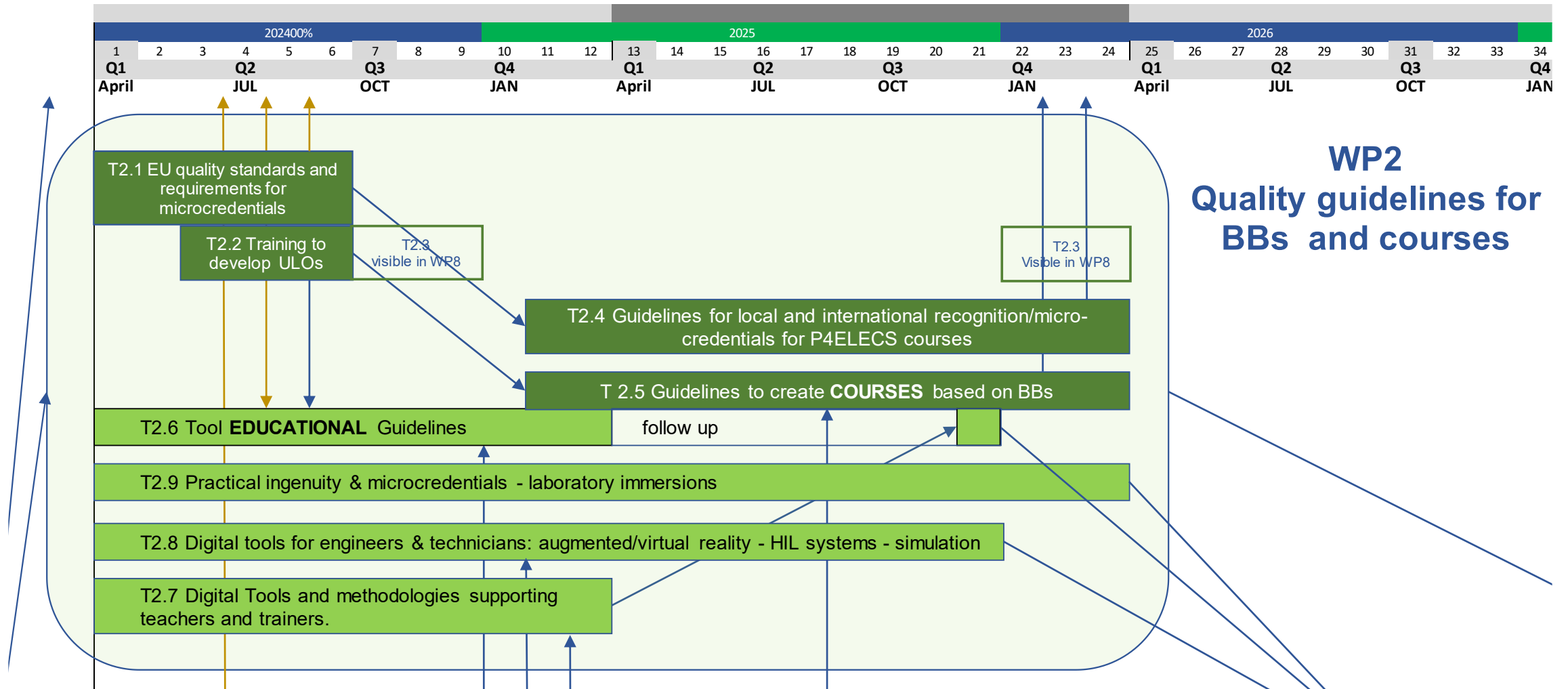
WP1: runs the company



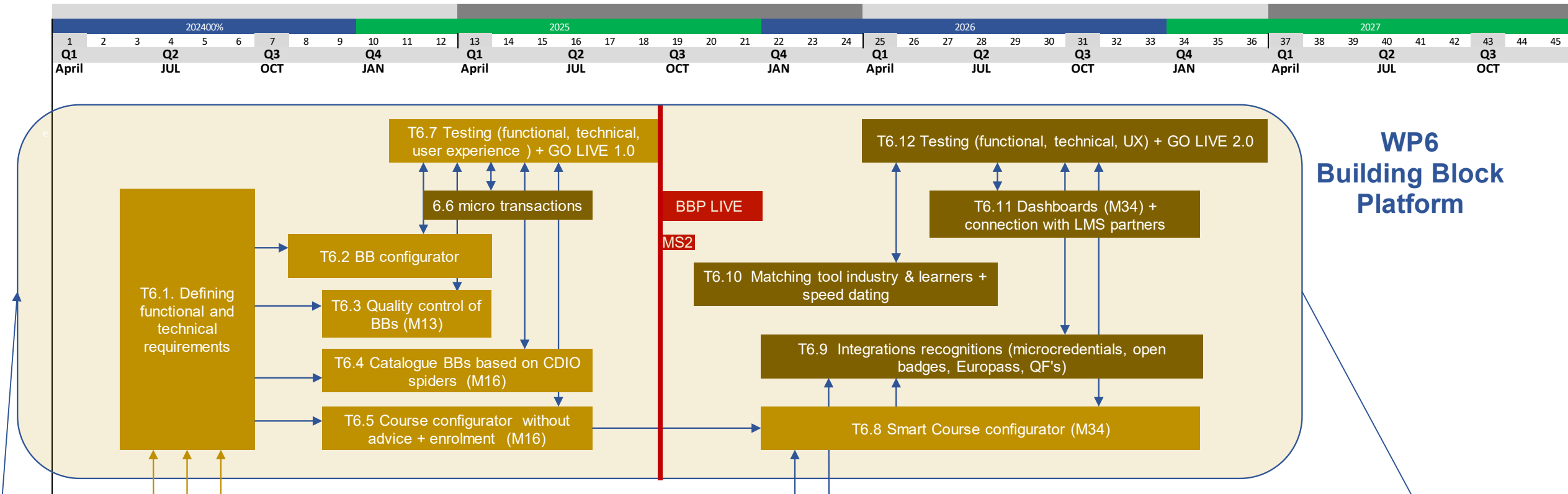
Activities WP3,4,5,7



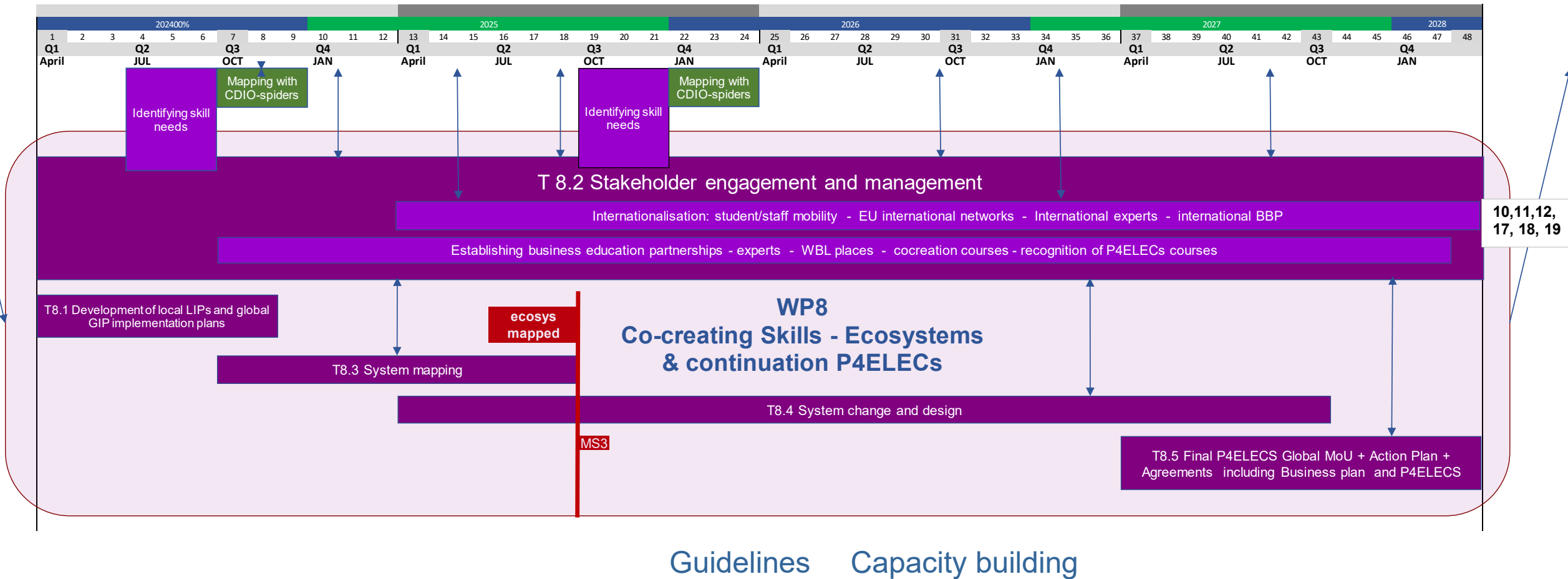
Activities



Activities WP6



Activities WP8



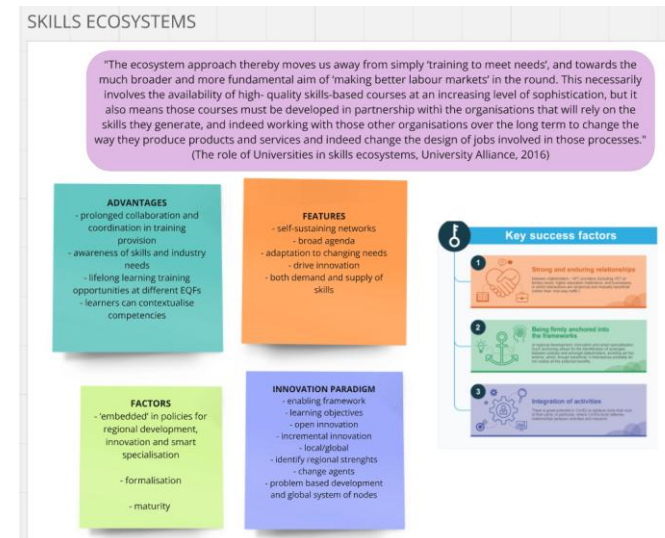
Status after 18 months

- BBP is operational (BB & Course configurator / catalogue / dashboards/ microtransactions / LTI coupling) – finetuning is ongoing (See WS Building Block Platform)
- Educational Guidelines for the BBs and Model for Skills Needs Detection and ULO Development are developed – finetuning is ongoing (See next presentation)
- ±50 BB are uploaded (See WS Spiders 1/10/25)
- 3 courses based on BBs will start this week
- Stakeholder Mapping for the 5 local skills ecosystems was done, System Mapping is ongoing → your input is much appreciated. (see WS 30/9)

The screenshot displays the BBP interface. On the left, a sidebar lists navigation options: Discover more (Institutes, Organisations, Repository, Building Blocks, Courses (beta), Scholarships, Newsroom, Favourites (8)), Spaces (P4ELECS Owner Closed space, P4ELECS - Global Open space, Pilot KU Leuven -), and a search bar. The main content area shows a 'Catalogue (47)' with three featured items:

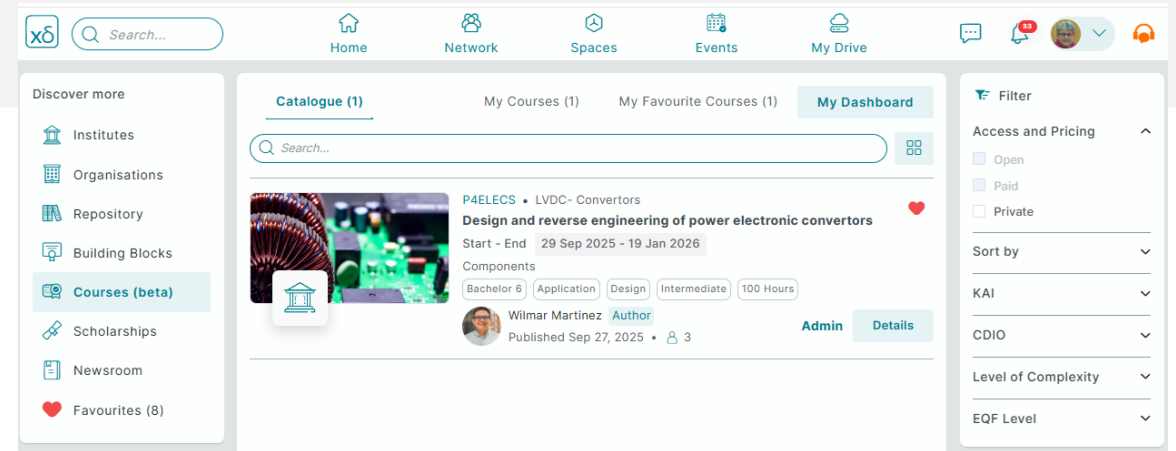
- P4ELECS • SMART HOME • Standard**: Development of the control system of a car charging station. CDIO > Development > Control software parameters. Bachelor 6. Knowledge. Implement. Intermediate. 12 Hours. Author: Thomas Otterbein. Published Sep 28, 2025. 0 followers. Status: Private.
- P4ELECS • PV • Standard**: String and Central Inverters in Solar Park Applications. CDIO > Conceive/ Concept. Bachelor 6. Knowledge. Implement. Intermediate. 3 Hours. Author: Sven De Breucker. Published Sep 28, 2025. 2 followers. Status: Enrolled.
- P4ELECS • SMART GRID • Standard**: Python simulation of city quarter energy systems. System. Master 7. Implementation. Implement. Intermediate. 12 Hours. Author: Ivelina Stoyanova. Published Sep 28, 2025. 2 followers. Status: Enrolled.

On the right, a 'Filter (Beta)' sidebar allows filtering by Access and Pricing (Open, Paid, Private), Sort by, KAI, CDIO, Level of Complexity, and EQF Level.



Next steps

- Upscaling to 200 BBs and 25 courses
- More focus on specialized BBs
- More BBs in the categories of implementing and operating
- Better handshake VET- HEI
- Focusing on AI to support the creation and quality control of the BBs
- Developing additional services of the BBP
- Microcredentials/badges – requirements are clear but practical implementation differs from region to region
- Supporting the improvement of the existing skills ecosystem and improve upward convergence by international mobility and engaging international experts



Thank you



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Program and Objectives

Program P4ELECS Workshop Days

FINAL	GENERAL MEETING 3		September 2025 - HAN (NL)											
	CLEAN TECH PARK ARNHEM, BUILDING KB				HAN UAS, Campus Zuid, P1				CLEANTECH PARK ARNHEM, BUILDING KB					
	Mon 29 September		Tue 30 September		Wed 1 October				Thu 2 October					
8.00	Hetty +31 6 5520 6386 Brenda +31 6 5549 3280 Annick +32 496 69 23 53 <i>Please make PICTURES for the REPORTS!!</i>		8.00	Track - For policy makers EU/NATIONAL/REGIONAL government - organisations involved in skills intelligence - defining funding programs - industry (DSO, TSO) - ROCs - sector organisations (Tecniek Nederland) - ISSO - employment service ect.		8.00	Track - For BB developers = experts from HEIs/VETS/INDUSTRY/CONSORTIUM and BB users = teachers from HEIS/VETS/INDUSTRY/CONSORTIUM ROCs etc.				8.00	only for the consortium / Cleantech Park Arnhem		8.00
8.30			8.30			8.30					8.30	Coffee		8.30
9.00			9.00	Welcome - Coffee - room 1.11		9.00	Welcom - Coffee - room A0.53				9.00			9.00
9.30	 		9.30	Presentation - Annick Dexters - room 1.11 P4ELECS in a nutshell		9.30	Presentation - Annick Dexters - room B1.12 P4ELECS in a nutshell		Discussion - An Verburgh - room A0.53 Lessons learned BB reviews <i>Only for the consortium</i>		9.30	Workshop - Marco Liviantoni EXPLOITATION OF RESULTS <i>only for the consortium room 1.01</i>		9.30
10.00			10.00	Co-creating skills ecosystems for electrification in Europe. Testimonials. Intro Elena Gentilini room 1.11 1. Jan Cromwijk - CRT National central Register "From Skills Intelligence to Unit Learning Outcomes (ULOs) 2. Christian Wildt, Maela Barcon - Hanse Parliament "approaches and experiences in initiating and strengthening cooperation between VET and HEI institutions. The 3-LoE project" ONLINE 3. Cecile Weber, Manuel Gil - Ecorys "Regional Skills Partnerships – A Pact for Skills initiative ONLINE 4. Koen Maassen, Topsector Energie		10.00	Annick Dexters - An Verburgh - room B1.12 PROCESS DEVELOPING and USING BBs				10.00			10.00
10.30			10.30			10.30					10.30			10.30
11.00			11.00	Coffee (15min) - room 1.11		11.00	Coffee (15 min) -room A 0.53				11.00	Coffee		11.00
11.30	Brenda Hengeveld brenda.hengeveld@han.nl	Hetty de Jonge hetty.dejonge@han.nl	11.30	Presentation + guided tour CONNECTR Annick Dexters - Martijn van Bommel - room 1.11 PROCESS DEVELOPING & USING BBs		11.30	Workshop SMART HOME Stefano ALA room C0.09	Workshop DC-AC CONVERTORS Christian Dick room C0.10	Workshop Charging Plazas e-bikes Peter van Hout room C0.12	Workshop SMART GRID Patricia Boogaard room H.0.68	11.30	Workshop - Marco Liviantoni EXPLOITATION OF RESULTS <i>only for the consortium room 1.01</i>		11.30
12.00			12.00	Presentation - Elena Gentilini, Sara Featherstone, Giulia Marcocchia - room 1.11 Co-creating skills ecosystems for electrification in 5 EU regions. Preliminary results from interviews		12.00	Spider - BBs - courses	Spider - BBs - courses	Spider - BBs - courses	Spider - BBs - courses	12.00			12.00
12.30			12.30			12.30	Blue print lab setup	Blue print lab setup	design+built	LN lab	12.30			12.30
13.00			13.00	Lunch (45 min) - ground floor		13.00	Lunch (45 min)				13.00	Lunch (45 min)		13.00
13.30			13.30			13.30					13.30	Presentation - Irina Dumitrescu (45 min) DISSEMINATION/COMMUNICATION		13.30
13.45			13.45	13.45 - 15.45h - room 1.11 Workshop - Elena Gentilini/Sara Featherston "Skills ecosystem for the energy transition in The Netherlands: identify and prioritise leverage points for action 28 stakeholders from NL, 4 from Europe, 8 from NL partners + 6 Sescos as auditors		13.45	Workshop Public Lighting Oskars Krievs room C0.09	Workshop DC-DC CONVERTORS Martinez/ Kleutgens room C0.12	Workshop PV / WIND Mozaher Patwary room C0.10	Workshop SMART GRID Patricia Boogaard room H.0.68	13.45	Presentation - Annick Dexters (20min) WRAP UP and NEXT STEPS room 1.01		14.00
14.00			14.00	Alternative session - Andy Veltjens - room 1.01 HANDS ON WORKSHOP GEN AI <i>Only for the consortium</i>		14.00	Spider - BBs - courses	Spider - BBs - courses	Spider - BBs - courses	Spider - BBs - courses	14.30			14.30
14.30			14.30			14.30	design+built		LN lab		15.00			15.00
15.00			15.00			15.00					15.30	(city walk is canceled, too few registrations)		15.30
15.30			15.30	Coffee (15min) - room 1.11		15.30	Coffee (15min) - room A0.53				16.00			16.00
16.00			16.00	16.00 - 18.00h - room 1.01 Workshop - Elena Gentilini/Sara Featherston "Skills ecosystem for the energy transition in The Netherlands: identify and prioritise leverage points for action 28 stakeholders from NL, 4 from Europe, 8 from NL partners + 6 Sescos as auditors		16.00	Martijn Van Bommel - Annick Dexters - room A0.53 Lessons learned from the workshops - HEI/VET handshake				16.30			16.30
16.30			16.30	Alternative session - room zaal 5 & 6 HANDS ON WORKSHOP GEN AI BBP - LTI-Bridge/Course configurator <i>Only for the consortium</i>		16.30					16.45			17.00
17.00			17.00			17.00	Demo + Hands on - Firoz Kariman - room A0.53 GOING LIVE OF THE BUILDING BLOCK PLATFORM				17.30			17.30
17.30			17.30			17.30					18.00			18.00
18.00			18.00			18.00	Reception - room A0.53				18.00			18.00
18.30			18.30			18.30					19.00			19.00
19.00			19.00	Dinner offered by HAN University (starts at 18.15h) Restaurant Cleantech Park Arnhem		19.00	Dinner (starts at 19.00h) Food & Wine bar Jans' Velperbuitensingel 25 6811 BP Arnhem				19.30			19.30
			20.00			20.00					20.00			20.00

Objectives Wednesday

WHAT

- Testimonials from organizations in NL and EU that play an important role in skills ecosystems
- PPT and visit of CONNECTR a cooperation of the 3 knowledge systems OR deep dive in BBs and BBP.
- Lessons learned from stakeholder management and system mapping till now. (Elena)
- Workshops led by Elena Gentilini and Sara Featherston to finetune the system mapping of the local skills ecosystem in Arnhem

OBJECTIVE

- Finetune the skills mapping of the local skills ecosystem to find missing links and opportunities to enhance the working of the skills ecosystem and embed the CoVE

9.00	Welcome - Coffee - room 1.11	
9.30	Presentation - Annick Dexters - room 1.11 P4ELECS in a nutshell	
10.00	Co-creating skills ecosystems for electrification in Europe. Testimonials. Intro Elena Gentilini room 1.11 1. Jan Cromwijk - CRT National central Register "From Skills Intelligence to Unit Learning Outcomes (ULOs)" 2. Christian Wildt, Maela Barcon - Hanse Parliament "approaches and experiences in initiating and strengthening cooperation between VET and HEI institutions. The 3-LoE project" ONLINE 3. Cecile Weber, Manuel Gil - Ecorys "Regional Skills Partnerships – A Pact for Skills initiative ONLINE" 4. Koen Maassen, Topsector Energie	
10.30	Coffee (15min) - room 1.11	
11.00	Presentation + guided tour CONNECTR	Annick Dexters - Martijn van Bommel - room 1.11 PROCESS DEVELOPING & USING BBs
12.00	Presentation - Elena Gentilini, Sara Featherstone, Giulia Marcocchia - room 1.11 Co-creating skills ecosystems for electrification in 5 EU regions. Preliminary results from interviews	
12.30	Lunch (45 min) - ground floor	
13.00		
13.30		
13.45	13.45 - 15.45h - room 1.11 Workshop - Elena Gentilini/Sara Featherston "Skills ecosystem for the energy transition in The Netherlands: identify and prioritise leverage points for action" 28 stakeholders from NL, 4 from Europe, 8 from NL partners + 6 Sescos as auditors	Alternative session - Andy Veltjens - room 1.01 HANDS ON WORKSHOP GEN AI Only for the consortium
14.00		
14.30		
15.00		
15.30	Coffee (15min) - room 1.11	
16.00	16.00 - 18.00h - room 1.01 Workshop - Elena Gentilini/Sara Featherston "Skills ecosystem for the energy transition in The Netherlands: identify and prioritise leverage points for action" 28 stakeholders from NL, 4 from Europe, 8 from NL partners + 6 Sescos as auditors	Alternative session - room zaal 5 & 6 HANDS ON WORKSHOP GEN AI BBP - LTI-Bridge/Course configurator Only for the consortium
16.30		
17.00		
17.30		

Objectives Tuesday

WHAT

- Deep dive in BBs & the working of the BBP
- For every spider SPIDERCOs and/or BB developers will explain/discuss to the interested parties
 - The content off the different BBs and how this supports the design & development (for engineers) and the installation & implementation (for technicians) of the installation or device.
 - The lab setup that was developed and for what it will be used.
 - The course(s) that are developed based on the BBs and the ULOs
- DEMO and Going Live of the BB

OBJECTIVE

- FB on added value of concept BBs/Spiders/BBP
- FB on realization of HEI/VET handshake

9.00	Welcom - Coffee - room A0.53			
9.30	Presentation - Annick Dexters - room B1.12 P4ELECS in a nutshell		Discussion - An Verburgh - room A0.53 Lessons learned BB reviews Only for the consortium	
10.00	Annick Dexters - An Verburgh - room B1.12 PROCESS DEVELOPING and USING BBs			
10.30				
	Coffee (15 min) -room A 0.53			
11.00	Workshop SMART HOME	Workshop DC-AC CONVERTORS	Workshop Charging Plazas e-bikes	Workshop SMART GRID
11.30	Stefano ALA	Christian Dick	Peter van Hout	Patricia Boogaard
	room C0.09	room C0.10	room C0.12	room H.0.68
12.00	Spider - BBs - courses	Spider - BBs - courses	Spider - BBs - courses	Spider - BBs - courses
12.30	Blue print lab setup	Blue print lab setup	design+built	LN lab
13.00	Lunch (45 min)			
13.30				
13.45	Workshop Public Lighting	Workshop DC-DC CONVERTORS	Workshop PV / WIND	Workshop SMART GRID
14.00	Oskars Krievs	Martinez/ Kleutgens	Mzaher Patwary	Patricia Boogaard
	room C0.09	room C0.12	room C0.10	room H.0.68
14.30	Spider - BBs - courses	Spider - BBs - courses	Spider - BBs - courses	Spider - BBs - courses
15.00		design+built		LN lab
15.30				
	Coffee (15min) - room A0.53			
16.00	Martijn Van Bommel - Annick Dexters - room A0.53 Lessons learned from the workshops - HEI/VET handshake			
16.30				
16.45	Demo + Hands on - Firos Kariman - room A0.53 GOING LIVE OF THE BUILDING BLOCK PLATFORM			
17.00				
17.30				
	Reception - room A0.53			
18.00				