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P4ELECS
Platform for Electrification Skills & Competences

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P4ELECS WP8
Co-creating Skills Ecosystems

System Mapping
Methodology

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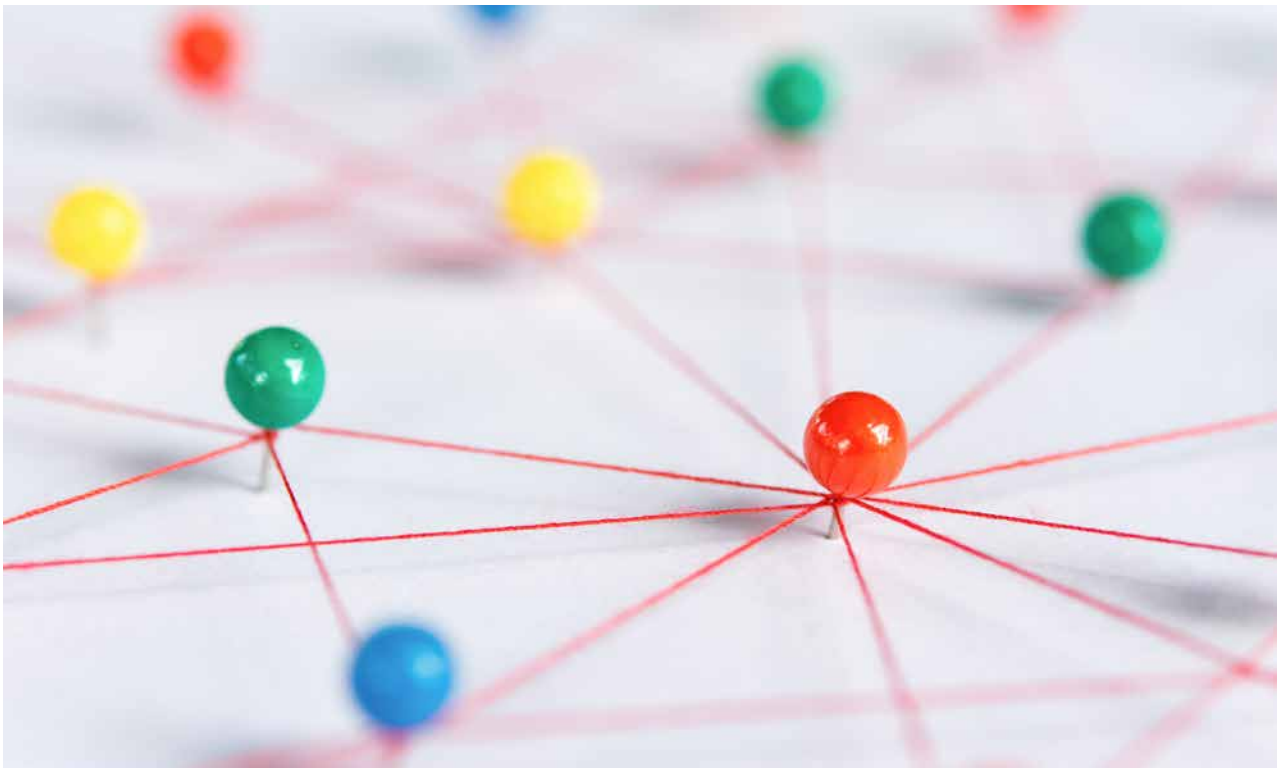
30/06/2026

ARCADIA DEVELOPMENT



1.1 PROJECT INFORMATION

Project Title	PLATFORM FOR ELECTRIFICATION SKILLS and COMPETENCES
Project Acronym	P4ELECS
Project ID	101144017 - ERASMUS-EDU-2023-PEX-COVE
Funding Scheme	Partnership for Excellence – Centres of Vocational Excellence
Web Address	http://p4elecs.com
Coordination Institution	KU Leuven
Project Duration	15/3/2024 – 14/3/2028

1.2 DELIVERABLE DETAILS

Deliverable Type	report
Dissemination Level	public
Work Package no	8
Work Package Title	Co-creating Skills Ecosystems
Task Title	System Mapping Results - Methodology
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version	date	authors
1 draft	8th Jan 2026	Progetto Arcadia – Sara Featherston, Elena Gentilini
2 revisions	13th Jan and 4th Feb 2026	KU Leuven - Annick Dexters, Xdemia – Firos Kaiman, CIM4.0 Giulia Marcocchia
3 final	16th Feb 2026	Progetto Arcadia – Sara Featherston, Elena Gentilini

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ANNEX A Interview semi-structure

ANNEX B Guidelines



GLOSSARY

BB Building Block
Piece of educational material, consisting of elements (reader, PowerPoint presentation, video, exercises, self-assessment with answer keys, …) related to a particular question or topic.

BBP Building Block Platform
BBP is hosted by Xdemia

CDIO Conceive, Design, Implement, Operate.
Based on the CDIO initiative of MIT

ECOSYSTEMS ROLES (Dedehayir et al 2018)

- leader (it sets up governance through designing roles of the actors, coordinate interactions at both internal and external level, orchestrate resources flows, define platform architecture attracts partners stimulates investments, stimulate value appropriation for producers and end users; as dominator it conducts mergers and acquisitions)
- Value-creation (suppliers, assemblers, platform complementor or user)
- Support (expert or champions in needs of technology or knowledge or other competences, it generates knowledge, encourage technology transfer and commercialization, or build connections among actors, provide access to the market, interacts between partners and subgroups)
- entrepreneurial (entrepreneur or sponsor)
- regulator (definition of laws, provides economics reforms, loose regulatory restrictions).

HEI Higher Education Institutes

INNOVATION ECOSYSTEM

A dynamic, interconnected network of diverse actors and resources that collaborate to drive innovation and create value, a system where innovation is not just a solitary act but a collective, collaborative process.

MATURUTY LEVELS (Moore 1996+ Jutting 2024):

1. birth- emergence of the ecosystem: definition of value proposition among partners, identification of stakeholders. Problem definition, collaboration design, resources definition
2. expansion: value proposition capture value for many stakeholders and make possible the concept scale up to a broader or new markets. needs perspectives, solution components identification, additional knowledge
3. authorities: value adding components and processes are stable and leaders set direction for partners to work together. Implementation capacity, dissemination, political regulation
4. renewal: new ideas and new innovations. Ecosystem value proposition refinement, foresight, impact evaluation

SESCO Skills Ecosystem Coordinator
Individual supporting the establishment of a skills ecosystem, a collaboration between education, government, industry and research to support learners and employees in acquiring requested skills (skills intelligence) and competences.

SKILLS ECOSYSTEM

a network of interconnected actors—including research, education providers, industry, policymakers, and civil society—that collaborates to ensure people acquire relevant skills in an evolving labour market

SPIDER CDIO map that contains BBs relevant to the topic of the spider

SPIDERCO Spider coordinator
Individual responsible for the content and quality of a spider

VET Vocational Education and Training

2. General

2.1 P4ELECS in a nutshell

P4ELECS starts from a strong need in the innovation landscape of the energy sector to support the provision of competences and practical skills for projects relevant to the energy transition, reducing the time needed to go from research to implementation as well as creating flows of knowledge and experiences at international level, through an integrated system.

P4ELECS focuses on electrification, the corner stone of the energy transition, involving partners from 5 countries (BE, NL, IT, LT, DE) from Research, Higher Education Institutes (HEI) and Vocational Education and Training (VET) sectors, industry and innovation support organisations, public authorities responsible for education, accreditation and employment at regional and national levels, to work in a twofold direction and contribute to both VET excellence and Innovation support.

Targeting VETs, HEIs, enterprises, industry-related training providers, engineers and technicians, P4ELECS will focus on:

1. Creating a flexible training offer (with more than 250 modules, 25 courses and 500 participants) at the highest Quality via a user-centric platform as well as practical international experiences based on skill needs intelligence. This can be adapted to the specific educational paths of learners both for initial training and up-skilling and re-skilling and includes key competences, from EQF 5 to 7, in order to cover the whole production cycle from idea to implementation responding to innovation needs.
2. Developing long-term local skills ecosystems (involving over 100 stakeholders) through system mapping and system change coordinated by the P4ELECS CoVE
    - based on providing practical skills and competences as a driving force for life-long learning and closely collaborating with the Higher Education and Research institutes
    - deeply linked to the local innovation ecosystems
    - with a strong international dimension, in sharing knowledge, developing content and training experience.

2.2 Co-creating skills ecosystems: the process up to now

Work Package 8 (WP8) is a foundational component of the **P4ELECS project**, which serves as a "Platform for Electrification Competences and Skills" funded by the ERASMUS+ programme. The primary objective of WP8 is to move beyond traditional vocational excellence models by establishing a comprehensive **Skills Ecosystem (SE)** that addresses the complex, "wicked problems" associated with electrification through collaboration patterns able to respond and adapt to changes, through both horizontal (networks) than vertical relationships (multi-level governance).

Unlike previous initiatives, P4ELECS prioritises **System Innovation (SI)**, an approach rooted in systems thinking that seeks to transform entire systems rather than just individual products or services. Why we decided to use system thinking:

- Addresses complexity and fragmentation in education-innovation-employment chains
- Helps identify patterns, gaps, and long-term priorities
- Ensures learning systems evolve with sectoral innovation.

To achieve these goals, WP8 employs a structured **four-step process** involving six workshops, stakeholders mapping and semi-structured interviews. These steps are designed to move from exploration to tangible development:

1. **Explore (Systems Thinking):** Identifying the purpose of the system and formulating challenge questions.
2. **Understand (Systems Mapping):** Mapping the ecosystem identifying the main specific challenges, current relations and activities to address them

3. **Design (Transition Design):** identify and reframe "leverage points" and designing an activation plan for the system.
4. **Develop (Ecosystem Building):** Implementing the refined strategies within the ecosystem.

For the exploration and mapping phases, we combined interviews, stakeholders mapping, systems analysis and participatory workshops to reveal the deeper dynamics shaping Europe's electrification skills landscape. This mixed-methods approach helped us see the system as it really is — its patterns, relationships and leverage points for change.

- **Interviews:** 40 stakeholders from research, education, industry, and policy across 5 ecosystems have been interviewed to gather cluster information and select priority areas
- **Workshops**: Initial workshops in Genk (Sept 2024) and Arnhem (Sept 2025) identified challenges such as refining skills intelligence and redesigning funding structures.
- **Stakeholder mapping and visualisation**: is performed using tools like **Kumu.io** and **Sumapp** to visualize elements and relations within the ecosystems. It integrates ISSO's knowledge flow roles: 1. Determining the need for knowledge in the electrification sector, 2.Formulating a programme or project, 3.Capturing knowledge, 4.Transfer knowledge, 5.Apply knowledge, 6. Exchange knowledge and experience. It also refers to Cedefop's governance framework and the specific framework
- **Integration**: WP8 links closely with the project's exploitation and dissemination strategy, involving social media channels like LinkedIn and the **Xdemia** platform and participation in forums like the Pact for Skills.

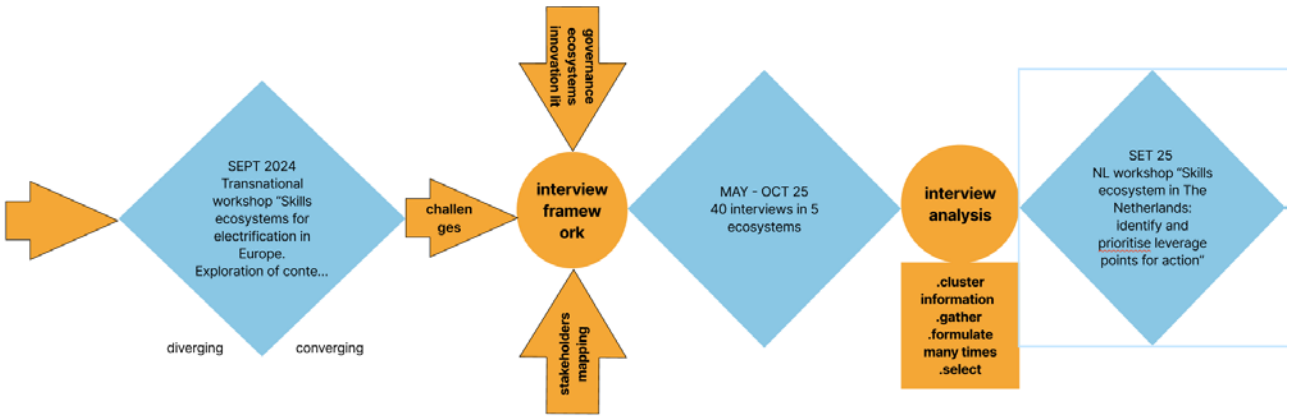

Fig1 WP8 process up to Sept25.

By the end of the project, WP8 aims to deliver:

- A **Memorandum for EU CoVE** and two local agreements among stakeholders on future priorities to be addressed and how, for each regional ecosystem.
- A transnational comparison of ecosystems.
- The launch of **five new services** and the engagement of approximately 150 stakeholders.

The work package focuses on five specific regional ecosystems:

- **Belgium**: Flanders – Limburg – Genk.
- **Netherlands**: East Netherlands – Gelderland – Arnhem.
- **Germany**: North Rhine-Westphalia – Cologne.
- **Italy**: Piedmont – Turin.
- **Latvia**: Riga.

Each local ecosystem in the P4ELECS regions is embedded in a different educational system, characterized by a different relationship between secondary education, tertiary education and life-long learning opportunities. The educational systems have been outlined by P4ELECS project as below. During the initial phase of WP8 "Skills ecosystems

development", while working on the mapping of relevant stakeholders, P4ELECS will also explore the current situation of the skills ecosystems with reference to:
- Level of coordination and cooperation in Training development and delivery
- Effectiveness in developing and delivering a training offer that support life-long learning (at different EQF levels) opportunities for the local workforce
- Degree of business – education – research collaboration
- Degree of internationalization in i) training development, ii) learners' opportunities, iii) work-based experiences
- Links to innovation systems.

2.3 Who we are

Work Package 8 is a Team work led by P4ELECS partner Progetto Arcadia in close collaboration with P4ELECS Coordinator Ku Leuven and partners CIM 4.0 and ISSO and P4ELECS Sescos Skills Ecosystems Coordinators. The real people behind are:

Annick Dexters – Professor Power Systems and P4ELECS Coordinator KU Leuven University

Elena Gentilini – Consultant and Researcher Progetto Arcadia and University of Perugia

Sara Featherston – System Change Consultant Progetto Arcadia

Giulia Marcocchia – Innovation Researcher and Consultant CIM4.0 and Cergy Université University, WP8 facilitator and IT Sesco

Martijn Van Bommel - Consultant ISSO and NL Sesco

Leon Verhoeven – Project Manager SEECE Han University and NL Sesco

Stefano Ala – Trainer Forma-rete and IT Sesco

Oskar Krievs – Professor Riga Technical University and LV Sesco

Ansis Avotins – Leading Researcher Riga Technical university and LV Sesco

Christian Dick – Professor Power Elctronics THKoln and DE Sesco,

Andreas Daube – Headmaster Werner-von-Siemens-Schule and DE Sesco

3. The System mapping and the interview process

3.1 Methodology

A **dedicated framework** (see ANNEXES) has been developed, in a collaborative process between Progetto Arcadia, CIM4.0, KU Leuven and inputs and revisions from ISSO and the Sescos, to analyse and map the relations behind the skills gap in the European electrification sector, specifically focusing on the five P4ELECS regional ecosystems: Flanders (Belgium), East Netherlands, North Rhine-Westphalia (Germany), Piedmont (Italy), and Riga (Latvia). The project utilizes a specific workflow involving stakeholder mapping and system thinking analysis (transnational workshops and interviews) to uncover the underlying local challenges to improve skills provision for electrification.

An initial workshop (2024) among P4ELECS partners as well as Belgium stakeholders based on skills ecosystems literature and Centre of Excellence experiences was held to analyse the current context and main challenges affecting the provision of skills for the energy transition. The workshop returned common systemic challenges:

1. Siloed organisations and poor cross-sector collaboration

2. Education lags behind rapid innovation

3. Fragmented training and lack of lifelong learning culture

+ 10 sub-challenges . among these for example:

- Misaligned stakeholder goals
- Competition vs collaboration
- Underestimation of practice
- Social/cultural barriers; lack of funding/time.

These results were coupled with analysis on stakeholders typologies in each ecosystem and their role and activities, and with questions arising from selected scientific and policy literature on system thinking, governance, skills and innovation ecosystems[1] to identify the main objectives of the mapping process and the interviews framework:

- **General idea about Respondent and Stakeholder organisation.** Gather information on respondent and his/her role, organisation, category of organisation according to the stakeholder mapping used in P4ELECS, data on employees and annual learners if applicable, main organisation activities in education according to the stakeholder mapping. Relations between educational and innovation activities over time was also explored.
- **Identify Stakeholder organisation vision and strategy and potential at ecosystem level.** Describe it especially toward the development of a local innovation and skills ecosystem and find shared points with and stakeholder's perspective on the current local skills ecosystem and with P4ELECS**.**
- **Identify the main current and potential collaboration and governance patterns.** Determine how the stakeholder see the current collaboration and governance, gather information on ecosystems maturity and on the stakeholder current functions/roles.

This led to develop the main areas to be addressed through a careful selection process among the work package team members as well as the main tools (interview structure, guide, C&D and planning tools – see ANNEXES) employed and to the selection and involvement of 8 stakeholders per each ecosystem, with the substantial work of Sescos under the coordination of Progetto Arcadia.

Interviews were 1 hour long and carried out between March 2025 and February 2026, facilitated by Progetto Arcadia.

Analysis of interviews was qualitative.

What we looked for in each ecosystem:

- Main challenges – most recurrent OR developed (meaning that interviewed people talked extensively about it)
- Sub-challenges - more specific challenges linked to the previous ones
- Special roles with functions and specific challenges

Each ecosystem is specifically described in terms of:

- Context
- Values and opportunities
- Roles within the ecosystem
- Ecosystem needs
- Challenges
- Opportunities for P4ELECS

Some local insights on the main challenge from the 5 regions emerged:

- Belgium: the ecosystem next phase and where to go next, to improve coordination and minimise overlapping.
- Netherlands: theory vs practice. System produces too few site-fluent installers and too many theoretical graduates disconnected from real-world practice.
- Germany: rich innovation, but decreasing quality learning.

[1] E.g Dedehayir, Ozgur, Makinen, Saku, & Ortt, Roland (2018) Roles during innovation ecosystem genesis: A literature review. *Technological Forecasting and Social Change*, *136*, pp. 18-29; Guilherme Brittes Benitez, Néstor Fabián Ayala, Alejandro Germán Frank Industry 4.0 innovation ecosystems: an evolutionary perspective on value cocreation, International Journal of Production Economics (Elsevier), Volume 228, October 2020. The main literature from ETF, Cedefop, COVEs Community and European Union strategies (including The Pact for Skills) was analysed.

- Italy: slow training adaptation and lack of systemic integration between education and industry.
- Latvia: dynamic innovation, but lack of a supportive context, due to outdated policy and infrastructure.

The results of the analysis set the ground to describe and understand each context and identify potential challenges, carefully selected, to bring to Local workshops for system change (from Sept 2025 onwards) and to find leverage points for action. This marks the start of the ideation phase.

A Contry-specific report will be produced for each ecosystem and a trans-national report will also be produced to analyse:

- common challenges across ecosystems: to explore in the current workshop phase underlying structures and mindsets and future local action plans
- initial comparison and ideas for transfer/cross/exchange/co-design/collaborate among ecosystems
- ideas for the European level - as well as international cooperation.

And start the ideation for the global COVE.

3.2 Content of interviews. Main areas addressed.

The interview structured has been organised in three sections. It is important to highlight that the structure was anticipated to all respondents in an explicative email and that was only indicative. This means that depending on the conversation and the respondent priorities and topics, the interview would follow the course in some cases skipping some questions. A limited set of questions was deemed the core of conversation and agreed would be asked in any interview to create consistency and comparability. An internal structure was also developed for internal purposes, listing also sub-questions that could help guiding the conversation.

The three sections were:

Section 1 Role and Organisation – 7 questions, 2 sub-questions/specifications.
"*In this section we are going to explore your organisation and your role within it, especially with reference to educational activities and the electrification sector".*

- Background and expertise
- Category and description of the organisation
- Nr employees
- Provision of training – and relative weight compared to innovation activities
- Nr of annual learners
- Subject specialisation + excellence/problems
- Core activities.

Section 2 – Vision and ambition – 6 questions, 9 sub-questions/specifications.
"*In this section we are going to explore your organisation's vision and ambition and your analysis of the current skills ecosystem you work in".*
2.1 Organisation

- Vision 5 years
- Interest in P4ELECS

2.2 Ecosystem

- Vision at ecosystem level
- Strengths in innovation
- Strengths in skills development

Section 3 – Collaboration and governance – 4 questions, 7 sub-questions/specifications.

- Actors of innovation and relationships
- Actors of skills provisions and relationships
- How are decisions taken, values and level of effectiveness
- Methods of allocation of education fundings

For the full set of questions see ANNEX 1 Interview structure and ANNEX 2 Guidelines

3.3 Types of organisations interviewed.

The full list of respondents as of today (we are missing four interviews in Germany and 1 in Latvia) is:

Belgium

Network organisation / Innovation Agency

Industry (large - Technical Services for the Energy Transition)

Research and Higher Education (HEI)

Industry (intermediary)

Policy – Employment Services

Higher Education (Applied)

Industry (intermediary)

Research and Innovation (Funding) and Education (EU level)

The Netherlands

Industry (SME, service - energy)

Industry Association (Technical Services providers)

Research and Innovation Services

Public Innovation Hub

Research and Education Services

Public Enterprise Agency

Industry (large – green energy)

Education (HEI)

Italy

Industry (SME - Smart home)

Regional Development Agency

Industry (large - Automotive)

Research and Innovation Services

Education (VET)

Industry (SME – Smart Home Services)

Policy

Education (HEI)

Industry (large – green energy and environmental services)

Latvia

Industry (SME – Lightning solutions)

BLEEA – Industry (intermediary, certification)

Industry (large - Distribution)

Education (applied/VET)

Research Services

Education (applied)

Local policy

Germany

Education (applied)

Industry driven research network (PV)

Industry and Education (VET)

Education (HEI)