Interreg CENTRAL EUROPE

Co-funded by the European Union

GREENE 4.0

D2.1.1 – Open Innovation Maps

Date of Report: 30/10/2024

Document Control Sheet

Work package Number	2
Work package Title	Transnational GREEN 4.0 Open Knowledge HUB for Digital transformation
Activity Number	2.1
Activity Title	Digital and Green Open Innovation Mapping
Deliverable Number	2.1.1
Deliverable Title	Open Innovation Maps
Dissemination level	Confidential, only for members of the consortium
Main author	Elena Mossali, Annalisa Giavarini, Andrea Jester (IMECH/PP7)
Contributors	All partners
Quality Assurance	All partners

Versioning and Contribution History

Version	Date	Author/Editor /Reviewer	Contributors	Description/Comments
_D01	06/09/2024	IMECH/PP7	-	Table of Content & first draft
_D02	20/09/2024	IMECH/PP7	All partners	Final version for review
_D03	03/10/2024	LP/PP1	-	Review of the document
_D1.0	08/11/2024	IMECH/PP7	-	Final version
Due date of deliverable		30/10/2024		

Contents

Executive summary

The purpose of this document is to map the regional innovation stakeholders that could support SMEs green and digital transition. Particularly, this Deliverable provides an overview on the GREENE 4.0 actions and developed tools during Period 2-3 for the *Activity 2.1 "Digital and Green Open Innovation Mapping"*.

The first chapter is dedicated to the developed methodology and tools, based on a 6-step process allowing the collection of significant data from each country. Partners aligned on the scope of the activity as well as on the target stakeholders to ensure an effective and efficient mapping. Several tools have been identified and made available to GREENE 4.0 partners, to maximise the stakeholders' engagement and the comparability of collected information.

At the end, all data have converged into 7 Open Innovation Maps, one for each country, where the most relevant technology providers, innovation assets, green and digital experts, facilitators and other relevant initiatives are collected and shown. Preliminary comparative analysis are also included in this report to highlight strengths, weaknesses and differences among the involved countries. This could act as basis for future inter-regional collaborations and promote the exploitation of transnational synergies towards a more competitive and resilient European industrial ecosystem.

The work reported in this deliverable is strongly connected to WP1, leveraging on the mapping performed in Activity 1.1 and on the stakeholders already contacted and involved in the preliminary phases of GREENE 4.0 project. Furthermore, it will be the baseline for activities in WP3: Activity 3.2 dedicated to Innovation Contest, Activity 3.3 related to Innovation programs, Activity 3.4 focused on piloting and testing of new value chains and Activity 3.5 concerning the development of GREENE 4.0 innovation platform.

1. Introduction

1.1 Project Overview

The GREENE 4.0 project aims at facilitating and supporting small and medium-sized enterprises (SMEs) in the manufacturing sector in the adoption and use of green production methods and digital technologies. GREENE 4.0 innovative approach is based on the capitalization of existing knowledge, solutions and outputs focused on smart and green manufacturing. The main objectives of the project are:

1. The design, testing and **deployment of a user acceptance model** for improving SME's capacities and willingness to adopt digital technologies and green business models.
2. The **aggregation and integration of existing regional infrastructure** of labs, testbeds, living labs, prototyping, and testing facilities in Transnational Digital Transformation Sites. They will be involved in the co-creation approach and will apply project open knowledge box toolkit capable of generating new integrated value chains in 7 pre-defined manufacturing sectorial clusters.
3. The creation of the **GREENE 4.0 innovation platform** by aggregating open knowledge box toolkit with new value chains models and with innovation programs methodologies as well as upgrading the tools and functionality of the existing digital platform PRO.Net.
4. **The engagement** of large and SMEs manufacturing companies (solution seekers) with IT and green tech SME's (solutions developers), and with private equity investors in joint co-creation processes to promote industrial twin transition.
5. The set up of a **Policy Learning Centre** to develop Regional Actions Plans for putting into practice the transnational strategy vision and framework for learning, transferring and replicating GREEN 4.0 innovation platform with its entire capabilities, services and tools.

.

1.2 Scope of the Document

This document reports the work of A2.1 "Digital and Green Open Innovation Mapping", where IMECH/PP7, in joint cooperation with other project partners, prepared the working methodology and tools for realizing the **mapping process of digital and green knowledge**, as well as innovation assets in project regions (living labs, testbeds, smart labs, patents etc.). Once defined the methodology and tools, PP7 organized a joint online seminar to train other partners in the activities to be performed.

The final outcomes of A2.1 are reported in the present document and are: i) the organization of 2 Open Innovation Workshops in each project region using a quadruple helix approach, engaging the participation of local authorities, national authorities, companies, consumers associations and research organizations, industry, sectorial clusters and agencies, ii) the collection of data from surveys, interviews, questionnaires, and iii) the development of 7 Open Innovation Maps, one for each project region.

According to this, D2.1 "Open Innovation Maps" is divided into different sections:

- *Chapter 1 – Introduction*, explaining the project and the scope of the deliverable
- *Chapter 2 – Methodology and Tools*, describing the applied methodology and the survey, questionnaires, event guidelines to be used to collect data

- *Chapter 3 – Data Collection and Visualization*, where the work done by each partner for the collection of data is reported and preliminary suggestions of Open Innovation map digitalisation are described
- *Chapter 4 – Open Innovation Maps*, one for each region mapping innovative digital and green knowledge infrastructures, capabilities and competencies
- *Chapter 5 – Comparative Analysis*, highlighting the main differences among the 7 regions
- *Conclusion*
- *Annex*, where the filled questionnaires are collected.

1.3 Audience

This document is meant to report GREENE4.0 project Output 2.2 “Open Innovation Maps”, collecting 7 Maps, one for each of the regions involved in the project. For this reason, the document represents a formal report to be submitted to JEMS for the validation of project activities. The document is intended to be confidential, only reserved to consortium members.

2. Methodology and Tools

The first step to proceed with the mapping process of digital and green knowledge in each of the partners' regions is the development of a working methodology and of available tools to ensure an efficient, high-quality and homogenous collection of relevant data. The methodology and tools have been explained to all partners during the periodic projects meeting, as well as individual 1-to-1 meetings, with the support of internal reports and presentations. In particular, IMECH/PP7 organized a joint online seminar on the 18/10/2023 to define and validate the developed methodology and tools with all partners. In particular, during the seminar PPs agreed on "what to Map", as well as "How to Map", therefore the steps to be undertaken to perform the regional Open Innovation Map. During the meeting the discussion has been stimulated by the use of Mural, an interactive tool able to favour the brainstorming and collect ideas from the different partners (
Figure **1**).

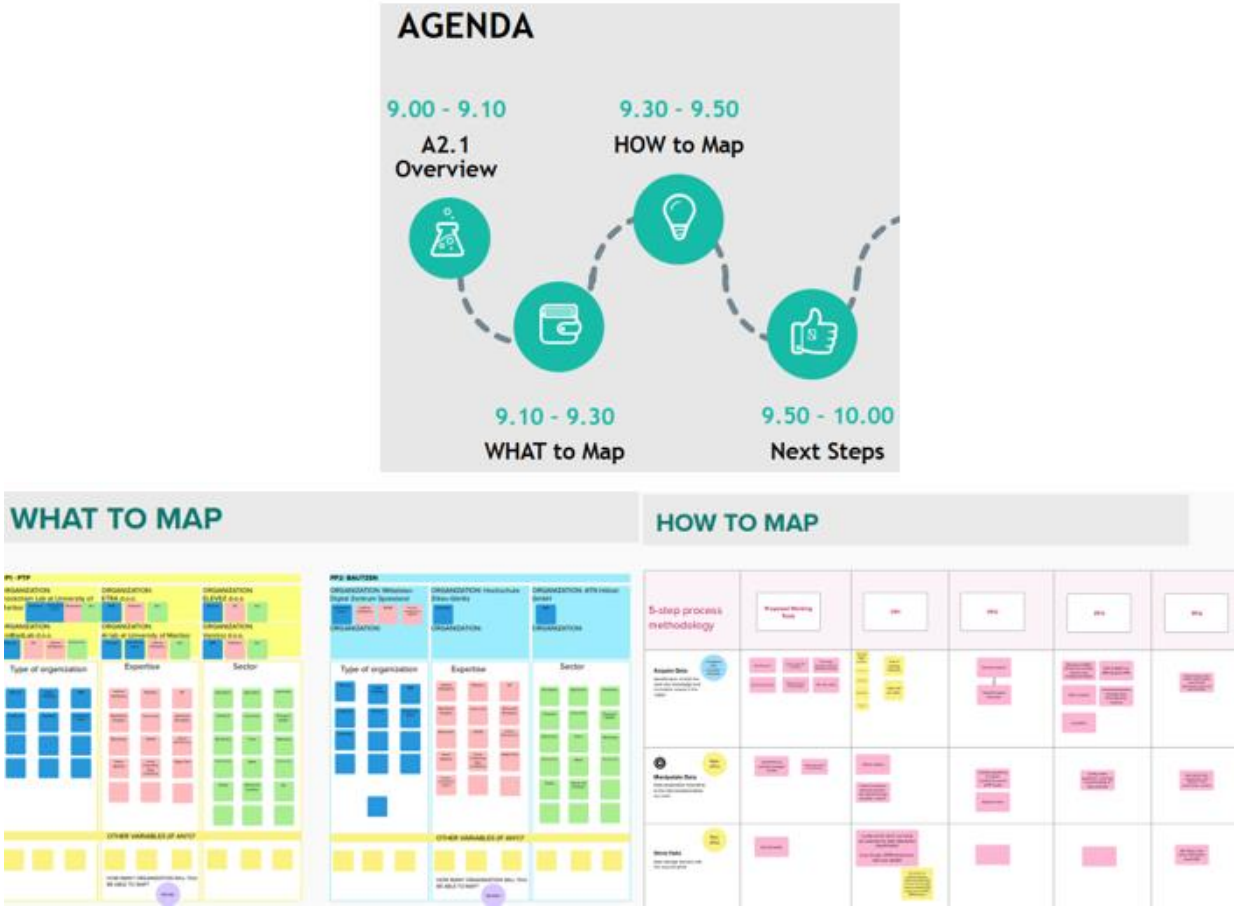


Figure 1: agenda and mural session of the online seminar with all PPs.

As already mentioned, the mapping is focused on the regional **sources of knowledge** that can be defined as technology provider companies and organizations having concrete solutions (products, services, PSS) to foster the twin transition, namely digital and green transformation. They supply the tools, systems, and expertise necessary for technology seekers to effectively exploit green and digital technologies in their operations. Technology providers may offer a wide range of services, including hardware and software sales, consulting, maintenance, support, and training, among others. Their

primary role is to facilitate the adoption and use of technology to enhance productivity, efficiency, and innovation within their client's or customer's operations.

For the purpose of the GREENE 4.0 project, it is recommended to focus on technology providers having:

- Concrete, complete and verified solutions and systems with TRL 8 or 9,
- Validated use-cases.

Furthermore, partners should map **Innovation Assets**. They refer to any valuable infrastructure within an organization ecosystem that contributes to the generation, development, or implementation of innovative ideas, products, or processes. While numerous definitions and categories of innovation assets are found in the literature, for the purposes of this project, the definition of Innovation Assets has been specifically narrowed to encompass the following:

1. Infrastructure and Equipment Providers: Entities that offer access to advanced technologies, enabling the development and deployment of innovative solutions. Examples of such Innovation Assets include Competence Centres, Living/Smart Labs, and Test-Beds/Testing and Experimenting Facilities.
2. Technological Solutions: Innovations developed by industry or academia that support the green and digital transition of SMEs. Examples include:
    1. Energy-efficient manufacturing systems: Advanced production technologies that reduce energy consumption in industrial processes.
    2. Digital twins for process optimization: Virtual models that simulate and optimize manufacturing processes, improving efficiency and reducing resource use.
    3. Smart sensors and IoT for energy monitoring: Internet of Things (IoT) devices that provide real-time data to monitor and reduce energy usage in production environments.
    4. AI-driven predictive maintenance tools: Artificial intelligence solutions that predict equipment failures, helping companies avoid downtime and reduce maintenance costs.
    5. Sustainable materials: New materials or technologies that minimize environmental impact, such as biodegradable packaging or low-carbon building materials.
3. Green and Digital Knowledge Creators: Technical experts who provide training, advisory support, or solution development services to manufacturing and production companies, facilitating sustainable and digital transformation.
4. Innovation Creation Opportunities: Projects, grants, and events that serve as platforms for SMEs to explore and engage in innovation activities. These initiatives can provide essential resources, networking opportunities, and funding to drive the green and digital transition of SMEs.
5. Facilitators: Soft skill experts with a business-oriented background who assist companies in scaling up their business. These professionals support SMEs as key account managers, guiding them through their twin transition (green and digital) journeys by offering tailored advisory services and fostering growth opportunities.

There is not a predefined target number to be mapped, but the idea is to find around 15 technology providers (sources of knowledge and innovation assets) per country, depending on the regional peculiarities. The mapping wants to highlight the strengths of the involved regions, collecting the information about the most innovative digital and green technology providers available to be furtherly

involved in the next phases of GREENE 4.0 project. Project partners should be able to easily reach them through email or direct contact and explained the opportunity to be integrated in the GREENE 4.0 platform (branded under B2GreenHub), gaining a visibility at European level to support the twin transition of SMEs.

The deliverable is a comprehensive document that describes the first mapped stakeholders, but the activity should not be considered closed. Until the end of the project, and even beyond, the partners will commit to engage more stakeholders from their own regional ecosystem, diffusing GREENE 4.0 objectives and opportunities in events, social media, website, etc. When the project platform will be available online (Activity 3.5 concerning the development of GREENE 4.0 innovation platform), a massive communication and dissemination will promote it and encourage always more technology providers and innovation actors to join this initial basis.

In the next paragraphs, the developed methodology will be explained in its different phases, as well as all the available tools to effectively proceed with the mapping.

2.1 Methodology

Project Partners followed a 6-step process working methodology to successfully implement the Open Innovation Mapping:

1. **Acquire data**: alignment of all partner on the type of data to be collected, providing a unique definition of Sources of Knowledge and Innovation Assets. Collection of mapping information through the organization of the Open Innovation workshops, the focus groups and brainstorming sessions, the online forms and the questionnaires. The results of this phase are presented in *Chapter 3.1 Data Collection*.
2. **Manipulate data**: data preparation according to the defined variables (position, expertise, sector, etc.). Partners prepared data, evaluating the received interest and the compiled questionnaires in order to ensure the consistency of the results. The results of this phase are presented in *Chapter 3.1.1 Preliminary Analysis of Collected Data*.
3. **Store data**: data storage process into the internal project repository to continuously monitor the work of the partners and support them in case of need. Stored data will be used for the digitalization phase of the Open Innovation Map (Activity 2.4), as well as to maintain contacts for the further phases of the project.
4. **Process data**: elaboration of data to extract useful, usable, understandable information for technology seekers that will surf the online digital Open Innovation Platform. This phase will be addressed mainly by collecting facts and figures, proofs of evidence, use cases, videos or other effective material (possibly public material) to facilitate technology seekers in understanding the opportunities and solutions provided by technology providers and innovation assets. The results of this phase are presented in *Chapter 4 Open Innovation Maps* and *Chapter 5 Comparative Analysis*.
5. **Visualize data**: effective data visualization in the Open Innovation Map. This phase refers to the definition of a set of criteria and a preliminary idea for the Open Innovation Map visualization in the GREENE 4.0 platform. The effective digitalization will be done in Activity 2.4 “Setting up Transnational Open Knowledge Box”, starting in Period 4. The results of this phase are presented in *Chapter 3.2 Conceptual Design of the Open Innovation Maps.*
6. **Enrich data**: further detailing of the initial set of data. The described process is iterative and, once analysed the first collected data, partners could be required to map additional key regional technology providers or to provide more detailed information about the stakeholders already mapped. In this specific phase, the most important tools are the questionnaires. In

the present report, the enriched data have been integrated into the initial acquired data and can be found in *Chapter 3.1 Data Collection*.

Furthermore, data collected through the developed methodology should satisfy three main conditions:

1. Mapped technologies, solutions and expertise should be directly related to **operational processes** within a manufacturing company (Figure 2). The company, research stakeholder and expert should propose digital or green innovation ready for implementation into manufacturing industries, from TRL6 to TRL9.

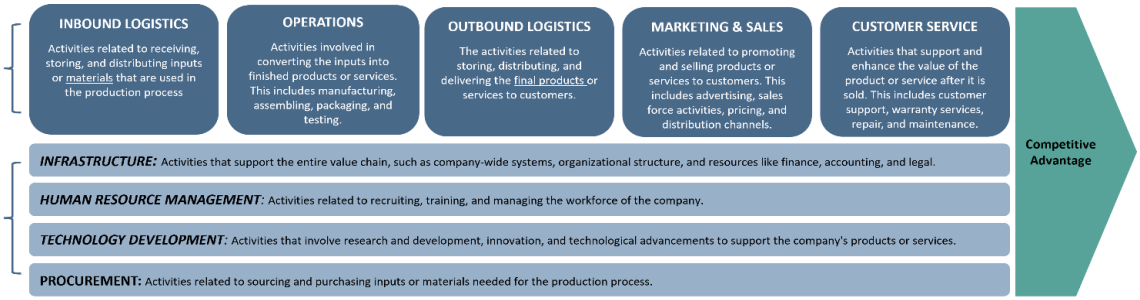


Figure 2: operational processes in manufacturing companies.

2. GREENE 4.0 focuses on specific digital and green technologies related to specifical identified **focus areas** reported in Figure 3, as defined during WP1.

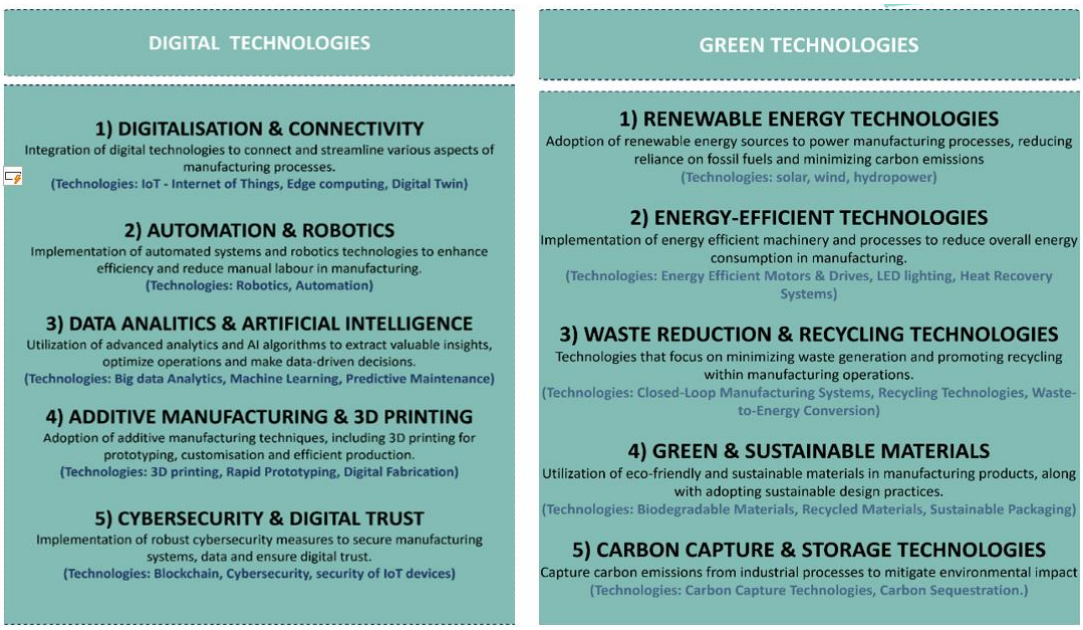


Figure 3: digital and green technologies focus areas.

3. The mapped solutions and stakeholders should mainly address one or more of the following **market sectors**, as identified in WP1 (Figure 4).

Figure 4: addressed market sectors.

To successfully implement the methodology using the suggested tools developed for the open innovation mapping process, partners have organized 2 regional Open Innovation Workshops focused on phase 1 “Acquire data” and phase 6 “Enrich Data”, then analysed and detailed the preliminary received feedback and information with some desk research, dedicated interviews, etc. The received data has been stored in the repository and was presented to other partners during internal meetings. Furthermore, the second regional Open Innovation Workshop also addressed the phase 5 “Visualize data” in order to collect and discuss already existing mapping initiatives to extract suggestions on a suitable platform interface to be developed for GREENE 4.0 project.

The methodology used for the organization of these regional Open Innovation Workshops is shown in the following paragraphs, while the obtained results are reported in the next chapters.

2.1.1 Regional Open Innovation Workshops

The **first regional Open Innovation Workshop** represented the kick-off of the open innovation mapping process. The workshop aimed at getting the key regional innovation stakeholders committed to the GREENE 4.0 project and at identifying the main sources of knowledge and innovation assets to be included into the Open Innovation Map. For this reason, the regional workshops were organized between November 2023 and February 2024, mainly in a physical form and in an informal location to facilitate the brainstorming phase. When was not possible to physically gather all participants, they were planned online or using a mixed/hybrid approach.

To ensure the involvement of all key target stakeholders and innovation actors, partners invited representatives of the quadruple-helix:

- Industrial association representatives or companies’ representatives to ensure the commitment of industrial stakeholders, the main target of GREENE 4.0 project
- Academic institutions that can in particular support the identification of innovation assets
- Government representatives, clusters or policy makers having deep knowledge of technology providers.

- Public civil representatives serving as the society that might contribute to the open innovation mapping process.

The workshops were not necessarily restricted to regional boundaries and involved from 5 to 10 people: smaller groups might not be representative for the region, while too many people might not be able to achieve the workshop goal.

The suggested programme included:

- A brief introduction presenting GREENE 4.0 project and the Open Innovation Map activity (15')
- A roundtable to know each other (15'-30', depending on the number of participants)
- A brainstorming to identify the main source of knowledge and innovation assets (30')
  Mural or similar tools could be used during the online seminar to stimulate the remote participation.
- The conclusion with the presentation next steps, such as the Open Call for Offer "Technology Providers & Innovation Assets" and/or the questionnaires (10')

After the workshops, participants received the presented materials and could eventually come back to the organizers with additional inputs. If case of Mural, for example, they had the opportunity to return on the document and add information also in the coming days.

The **second regional Open Innovation Workshop**, instead, aimed at validating the drafted regional Open Innovation Map and at collecting suggestions on the suitable platform interface. For this reason, the regional workshops were organized between January 2024 and March 2024, 1-2 months after the 1st regional workshop. Also in this case, the workshops were held mainly in a physical form and in an informal location to facilitate the brainstorming phase. When was not possible to physically gather all participants, they were planned online or using a mixed/hybrid approach.

The workshops addressed the same target audience, representatives of the quadruple-helix, better if the attendees were the same of the 1st workshop. The audience does not have to necessarily be restricted to regional boundaries. It depends on your actual relationships. The workshops were not necessarily restricted to regional boundaries and involved from 5 to 10 people.

The suggested programme included:

- A brief introduction to resume the objective of the Open Innovation workshops (like "Where were we?) (15')
- A roundtable to know each other if there were new attendees (15'-30', depending on the number of participants)
- A presentation of the inputs received during the 1st workshop and to the further back office activities that PP performed (20')
  Partner could use effective and short PPT and/or graphs that summarize the main features of the Open Innovation Map showing the already listed sources of Knowledge and Innovation Assets according to their own expertise focus and sectoral focus.
- Q&A sections (10')
- Brainstorming to discuss the main features they expect on the digital Open Innovation Map (20')
- The conclusion with the presentation next steps (10')

Both workshops mainly targeted attendees personally invited by partners, avoiding public promotion, in order to ensure a more effective involvement of participant stakeholders to GREENE 4.0 projects ant the following activities. PPs could also leverage on dedicated interviews with relevant stakeholders that are not able to join the workshop or with whom you might want to deepen the discussion.

During workshops and in general to collect info and data for the Open Innovation Maps, focus groups and brainstorming sessions could be used. As part of the methodology, some tips and guidance have been provided to all partners.

A **Focus Group** is a qualitative research method to encourage open and candid discussion among participants, providing valuable information and feedback. Conducting effective focus group sessions requires the right tools to facilitate discussion, gather insights, and manage the process. Here are some suggestions used by GREENE 4.0 partners to conduct a successful focus group:

- Organize small groups, typically of 6-12 participants, to promote a meaningful interaction and ensures that everyone has the opportunity to express its own view.
- Structure the discussion through the presence of a trained moderator or facilitator (PPs) able to guide the discussion using a predefined set of questions or topics. The discussion is typically semi-structured, allowing for flexibility and exploration of relevant issues.
- Select different types of participants, better quadruple-helix representatives, to collect a range of backgrounds, perspectives, or demographics, depending on the research objectives. This diversity helps uncover a variety of viewpoints.
- Create an interactive and informal environment that encourages participants to engage in open and spontaneous dialogue. This often leads to the sharing of personal experiences and opinions enriching the collection of data.

Brainstorming, instead, is a creative process used to generate ideas and solutions to problems. There are various available tools and techniques to be used to facilitate brainstorming sessions, such as:

- Mind Mapping, that consists in the creation of a visual representation of ideas using a mind map, or virtual collaborative boards like Mural.
- SWOT Analysis, able to identify strengths, weaknesses, opportunities, and threats of the selected innovation ecosystem.
- Silent Brainstorming, where participants write down their ideas individually, then share and discuss them as a group. This reduces the fear of judgment and can lead to more diversified ideas.

Through focus groups and brainstorming sessions, PPs preliminarily identified potentially interesting organizations to be directly contacted and invited at the regional Open Innovation Workshops, as well as to fill the “Open Call for Offer” and/or the questionnaires to gather the initial key information.

Partners collected all the materials of the regional Open Innovation Workshops, such as the list of participants, available “facts and figures” of the workshop, meeting recording, presentations and agenda in the GREENE 4.0 internal repository.

2.2 Tools

The developed methodology, as already mentioned, is supported by a series of tools for locating the sources of knowledge and innovation assets, their characteristics, their classification and their possible usage in industrial environments. The tools also served as a preliminary inventory system of the main green and digital technology providers available in project regions and countries.

The specific developed tools supported the methodology phases “Acquire Data” and “Enrich Data” to collect significant information on regional stakeholders, “Manipulate Data” according to the variables needed for the mapping and “Store Data” when made available and saved by partners in the GREENE 4.0 internal repository. In particular, tools were the project presentations to explain the main objectives of GREENE 4.0 and specifically of the Open Innovation Maps activity, the online form for the initial “Call for Offers” and the questionnaires used to map all significant assets that will be part of a comprehensive matchmaking platform for digital and green solutions /competencies, along with robust testing facilities. Partners were not obliged to use all the available tools, but only the ones that each PP believed the most suitable and effective in their regional ecosystem, considering their relationship with significant stakeholders and the specific industrial and innovation context.

2.2.1 Online form

An online form has been prepared and used to collect “Call for Offers”, namely an application from technology providers and innovation assets willing to be included in the Open Innovation Map and, therefore, to be involved in GREENE 4.0 activities. They will be invited to join the GREENE 4.0 platform, showing their available infrastructures, capabilities and expertise to support technology seeker organizations. This tool was intended to preliminary collect interest and contacts to be then deepen through the questionnaires or dedicated materials and interviews.

The base English form was made available to each partner and could also be translated into local language to favour the compilation. It has 3 main sessions:

- **Preliminary information**
  A brief explanation of GREENE 4.0 project and the objective of the “Call for Offer” was provided to the participants. Then, the contact email and the consents are required to proceed with the compilation.

Figure 5: Call of Offer introduction.

- **Organization's basic data**
  The organization is briefly described is detailed in terms of typology (company, living lab, competence centre, etc.), areas of expertise (additive manufacturing, AI, photonics, robotics, etc.), sectors (automotive, life science, machinery and equipment, etc.) and business areas (assembly, logistics, manufacturing, quality, etc.). The classification followed the one developed during WP1 and was furtherly detailed based on BOWI Project (H2020 – 873155). The participants had the possibility to have multiple choice, highlighting more than one areas of expertise.

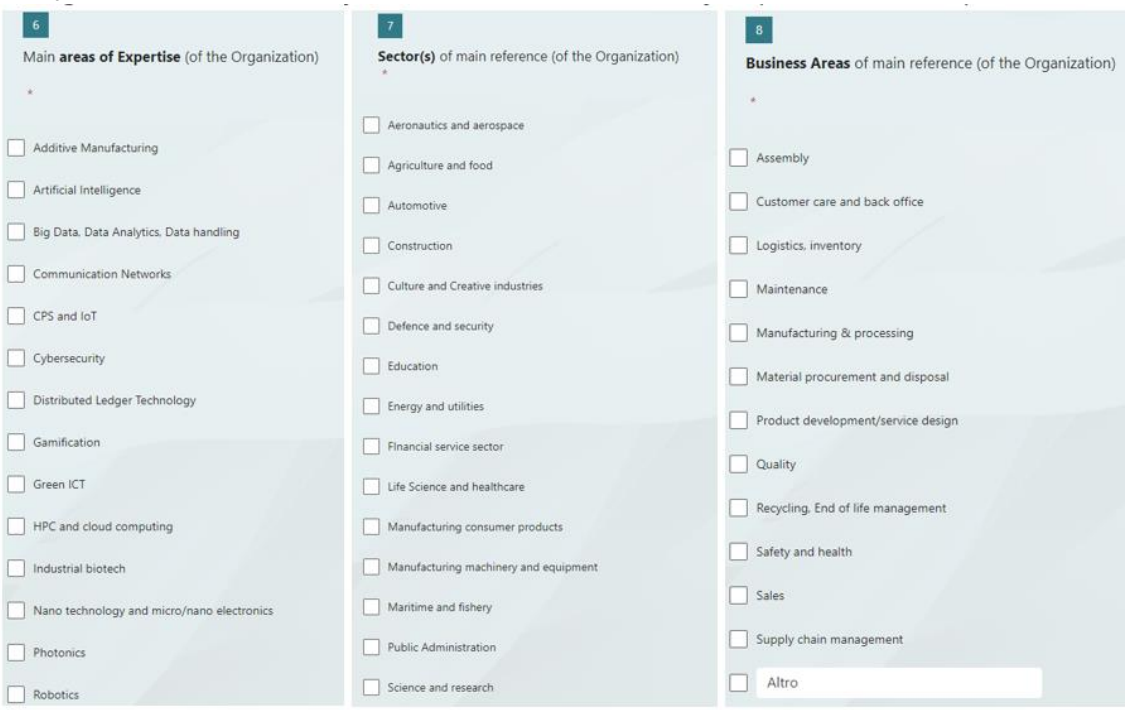


Figure 6: multiple choice questions to describe the organization.

- **Additional information**
  A contact email, the organization website and information about the willingness to collaborate with other entities outside their region are required. In particular, the interregional aspect is fundamental for GREENE 4.0 project that aims at favour interregional collaboration to support the digital and green transition of manufacturing companies.

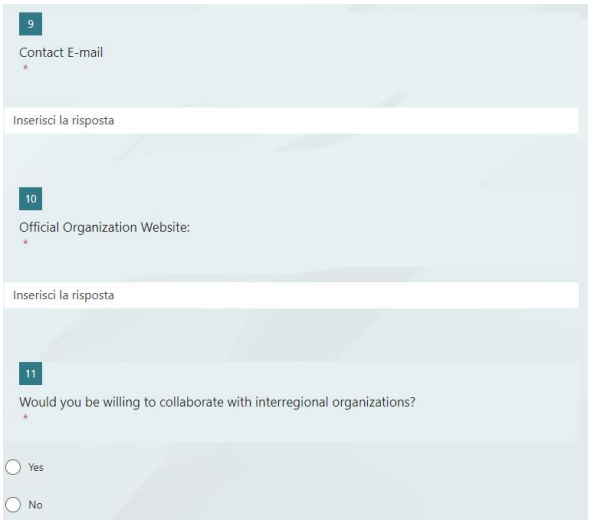


Figure 7: final information required in the Call for Offers

The developed online form allowed to display the results in an aggregate form and also individually and to export them via Excel to compare them also with forms and data collected by other partners.

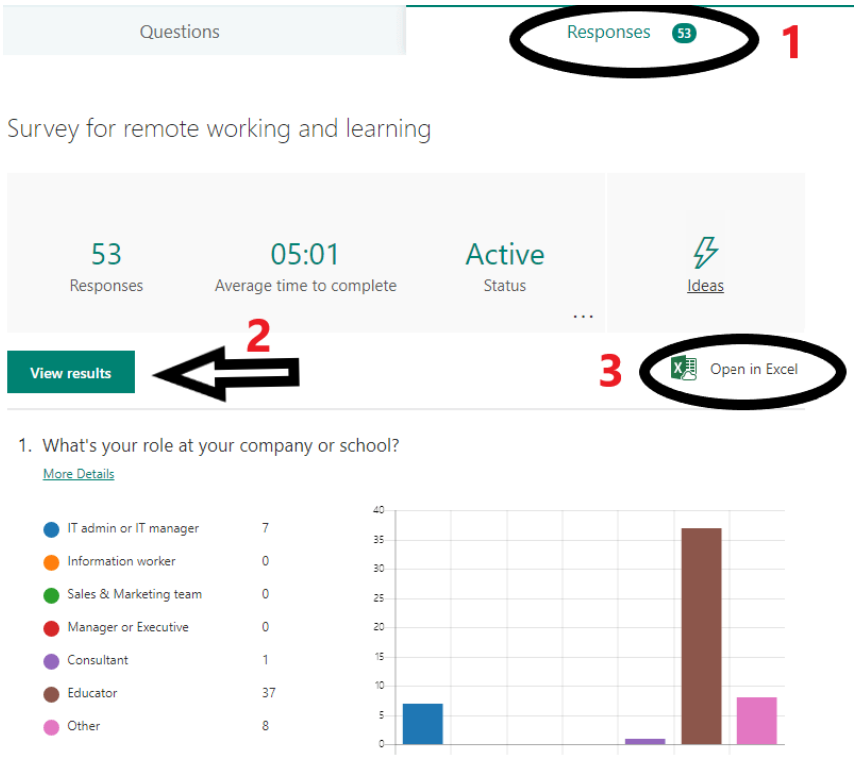


Figure 8: collection of data through the online form.

PPs were suggested to directly invite the organizations to fill the Call for Offer or, if PPs already knew the organization and its expertise, directly fill the Call for Offer on behalf of the organization and invite it to register into the Platform in the following stage. However, in this latter case, an initial contact with the company to inform about final intentions is mandatory. According to this, each partner was responsible for its regional applications and evaluated all the received applications to ensure a proper quality and to contact them for the following steps.

The results obtained through the Call for Offers are reported in an aggregated form in *Chapter 3.1 Data Collection*, *Chapter 4 Open Innovation Maps* and *Chapter 5 Comparative Analysis*.

2.2.2 Questionnaires

To provide more details about the identified Open Innovation actors and to allow a standardization of the collected information, a set of questionnaires have been designed. The questionnaires collected all relevant data to be integrated in GREENE 4.0 platform (that will be developed in A2.4 and will be called Be2GreenHub Platform), where solution seekers (that will be identified in A3.1) could understand and evaluate available solutions uploaded by identified technologies providers. The types of mapped solutions are different: technology providers companies, testing, simulation and demonstration centres, specialized experts, local, regional and national projects and financial supports as well as intermediaries and facilitators supporting the digital and green transition. Solutions could come both from industrial stakeholders and research centre and organizations, according to type of provided services. A schematic overview of this process is reported in Figure 9.

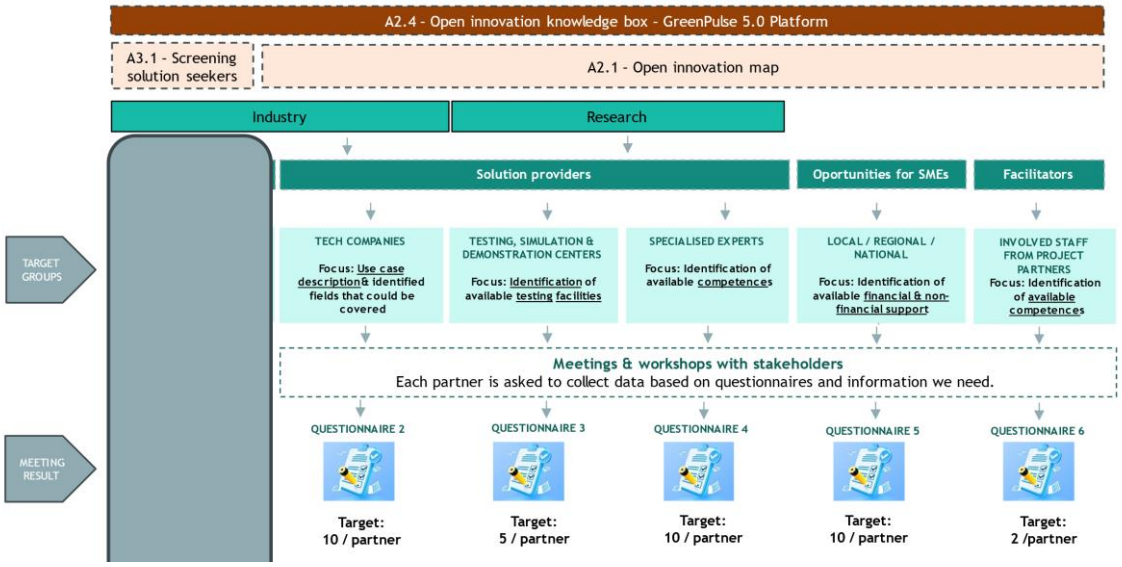


Figure 9: mapping of solutions through questionnaires.

IMECH/PP7 organized 1-to-1 meetings with all partners to explain the questionnaires and support them in their diffusion among regional stakeholders. Questionnaires could be also compiled autonomously by the interested organizations thanks to the **Introduction sheet**, where the objectives and requirements for the mapping are explained. In alternative, partners may pre-fill in the questionnaire based on the already available information and then ask solution providers to compile the missing parts.

The results obtained through the questionnaires are reported in an aggregated form in *Chapter 3.1 Data Collection*, *Chapter 4 Open Innovation Maps* and *Chapter 5 Comparative Analysis*.

2.2.2.1 Questionnaire #2: Data collection from digital or green technology providers

Questionnaire 2 is intended to map the innovation solutions developed by industry and research stakeholders that are ready for implementation into manufacturing **companies**. The documents should be completed by company's representatives (e.g., business development managers, technology officers) able to provide detailed information about the proposed solutions.

The questionnaire includes 4 sheets, the first two mandatory for the company:

I. **Company Info**
   Basic information of the company (name, address, country and website) and the reference contact point (contact person, role, email and phone number). The commitment of the company is important for its integration in the platform.

II. **Solution Info**
   Description of the technological solution highlighting its key features, customization possibility, available supportive services and trainings and link with regulations. The solution is then characterized as green and/or digital according to the technological areas it refers to and it is described in terms of TRL and expected benefits for manufacturing processes (Figure 10).

III. **Use case**
   The company has the opportunity to describe a use case, that means an example of a successful implementation of the solution in manufacturing companies, also connected to

European projects experimentation, as well as the impact of its adoption in manufacturing environment.

IV. ROI and costs

Finally, to the company is requested to estimate the return on investment and the costs to adopt and maintain the technology.

3) Please choose the focus area of the technological solution	
Digital Solution	☐
Green Solution	☐
4) Please choose the type of technological solution	
DIGITAL	
Digitalization and Connectivity Integration of digital technologies to connect and rationalize various aspects of production processes. *Technologies: IoT - Internet of Things, Edge computing, Digital Twin.*	☐
Automation and Robotics Implementation of automated systems and robotic technologies to increase efficiency and reduce manual work in production. *Technologies: Robotics, Automation.*	☐
Data Analytics and Artificial Intelligence Use of advanced analytics and AI algorithms to obtain in-depth analyzes and predictive models, optimize operations and make decisions based on data. *Technologies: Big Data Analytics, Machine Learning, Predictive Maintenance Plan.*	☐
Additive Manufacturing and 3D Printing Introduction of additive manufacturing techniques, including 3D printing for prototyping, customization and efficient production. *Technologies: 3D Printing, Rapid Prototyping, Digital Manufacturing.*	☐
Cyber Security and Digital Trust Implementation of robust cyber security measures to protect production systems, data and ensure digital trust between partners in the supply chain. *Technologies: Blockchain, Cyber Security, Security of IoT devices.*	☐
Other *Please describe here.*	☐

5) Please choose the development phase of the technological solution (TRL phase)	
TRL 6 – technology demonstrated in relevant environment (Technology development)	◉
TRL 7 – system prototype demonstration in operational environment (System development)	○
TRL 8 – system completed and tested (System tested)	○
TRL 9 – actual system launched on the market (System launched)	○
6) What benefits does the technological solution bring to the user?	
Increase production capacity	☐
Reduction of costs	☐
Improving productivity	☐
Improving the quality	☐
Improving reliability and risk reduction	☐
Higher flexibility	☐
Simplification of operations	☐
Improving business predictability	☐
Increased consistency of the process	☐
Greater accessibility to customers	☐
Turnkey solution	☐
7) On which BUSINESS PROCESSES does the solution have an impact and where can you bring improvements to the customer?	
INBOUND LOGISTICS process - activities related to receiving, storing, and distributing inputs or materials that are used in the production process.	☐
MANUFACTURING OPERATIONS process - activities involved in converting the inputs into finished products or services. This includes manufacturing, assembling, packaging, and testing.	☐
OUTBOUND LOGISTICS process - activities related to storing, distributing, and delivering the final products or services to customers.	☐
MARKETING & SALES process - activities related to promoting and selling products or services to customers. This includes advertising, sales force activities, pricing, and distribution channels.	☐
CUSTOMER SERVICE process - activities that support and enhance the value of the product or service after it is sold. This includes customer support, warranty services, repair, and maintenance.	☐
PROCUREMENT process - activities related to sourcing and purchasing inputs or materials needed for the manufacturing process.	☐
TECHNOLOGY DEVELOPMENT process - activities that involve research and development, innovation, and technological advancements to support the company's products or services.	☐

Figure 10: *Solution Info* sheet detail of Questionnaire 2.

2.2.2.2 Questionnaire #3: Data collection from Testing, Simulation & Demo Centers

Questionnaire 3 is intended to map the offerings of **demonstration, simulation and/or testing centres** that provide essential services for facilitating the digital and green transition within the manufacturing industry. The documents should be completed by company's representatives (e.g., business development managers, technology officers) able to provide detailed information about the proposed solutions.

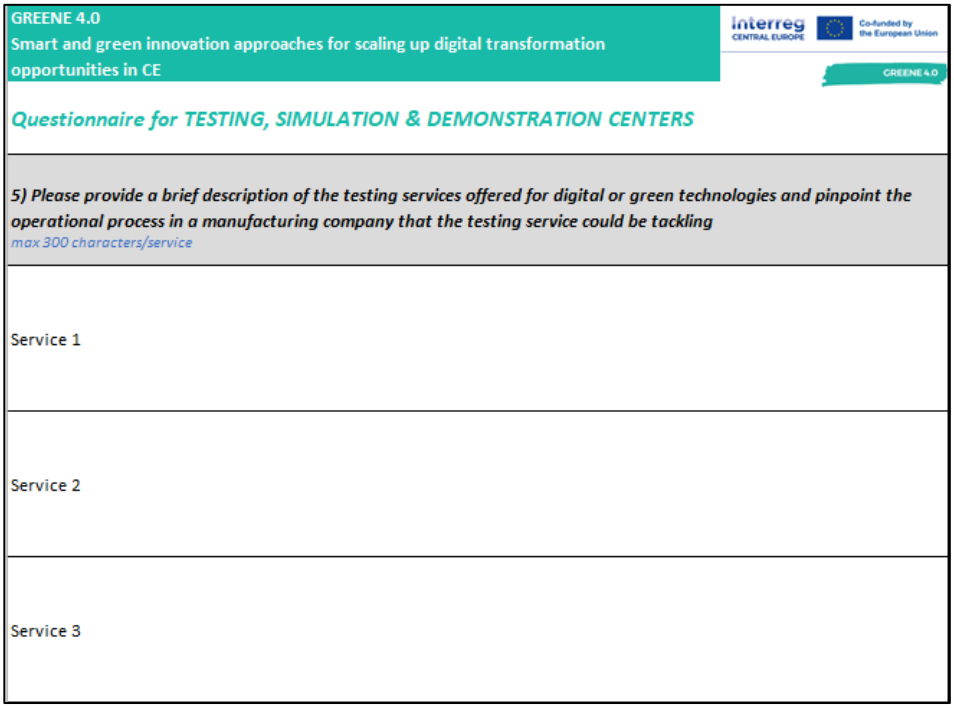
The questionnaire includes 4 sheets:

I. **Basic Info**
Basic information of the centre (name, brief description, year of establishment, address, country and website) and the reference contact point (contact person, email and phone number). There is also a multiple choice to define the manufacturing industries that the centre primarily serves (electronics, food and beverage, pharmaceutical and chemicals, metal, plastics and rubber, machinery and equipment and building materials and furniture).

II. **Facilities and Equipment**
The organization is characterized as green and/or digital according to the technological areas it refers to and it is described in terms of objectives and equipment or specialized tools available..

III. **Testing Services**
The centre is requested to provide a description of the offered testing services and how the companies can access the testing facilities, can receive the support, can interact with technical experts and can connect with potential partners and clients (Figure 11 and Figure 12). It is also requested if there are costs associated with centre's services.

IV. **References**
Finally, the organization could provide maximum 3 success stories or use case of companies that have benefited from the provided services, highlighting key outcomes or improvements achieved.



GREENE 4.0
Smart and green innovation approaches for scaling up digital transformation opportunities in CE

Questionnaire for TESTING, SIMULATION & DEMONSTRATION CENTERS

5) Please provide a brief description of the testing services offered for digital or green technologies and pinpoint the operational process in a manufacturing company that the testing service could be tackling *max 300 characters/service*
Service 1
Service 2
Service 3

Figure 11: *Testing Service* sheet detail of Questionnaire 3.

6) Please provide a brief description of the support offered to manufacturing companies before, during and after the testing phase *max 300 characters/service*	
Explain the process for companies to access the testing facilities.	
How does the center support companies throughout the testing process?	
Are there opportunities for companies to consult with technical experts?	
Are there networking events or platforms available for companies to connect with potential partners or clients?	
Provide any additional details or resources that may be useful for manufacturing companies considering the center's services.	

Figure 12: *Solution Info* sheet detail of Questionnaire 3.

2.2.2.3 Questionnaire #4: Data collection from Academy Experts (Digital)

Questionnaire 4 (Digital) is intended to map **expert competences in the dynamic fields of Digital Technologies**. The documents should be completed by senior consultants, academic staff and individual professionals having expertise on industrial digital transformation.

The questionnaire includes 12 sheets, at least two mandatory:

I. **Basic Info**
Personal data (title, name, email, phone number, city and country) as well as professional data (organization, educational qualification, license, ResearchGate and LinkedIn profiles) are requested. There is also a multiple choice to define the market areas of expertise (electronics, food and beverage, pharmaceutical and chemicals, metal, plastics and rubber, machinery and equipment and building materials and furniture) and digital expertise (digitalisation and connectivity, automation and robotics, AI and data analytics, additive manufacturing, cybersecurity and digital trust). This sheet is mandatory.

II. **11 Areas of Excellence: IOT, Digital Twin, Edge Computing, Automation, Robotics, Data Analytics, AI, Additive Manufacturing, Cybersecurity, Blockchain, Digital Trust.**
The expert compiles just the sheets corresponding to its areas of interest, at least one. For each sheet, there are 4 main sections:
    - Digital Transition Competences

For each domain, experts are asked to assess their own level of knowledge and expertise from 1 (delivered by a generalist) to 3 (highly specialized expertise, such as PhD or special trainings). Examples are reported in Figure 13, Figure 14 and Figure 15.

    - Services
      List of services that the expert could provide in the field of digital transition, such as advisory services, highlighting how the manufacturing company could take advantage of them.
    - Trainings
      List of trainings offered by the expert with title, objectives, target audience and duration.
    - Academic references
      List of the most important scientific publications with DOI or links, published patents and competences and skill or non-patented technologies of interest for the companies.
    - Industrial references
      List of collaboration projects with industrial partners and organizations, clarifying how customer use expert's services, how the developed/implemented solution solved the addressed problem and what is the added value for the customer.

DIGITAL TRANSITION COMPETENCES	Your competence level for service delivery to company (on a scale from 1 to 3)
Internet of Things	
IoT Strategy Development: Collaborating with manufacturing companies to develop comprehensive IoT strategies aligned with their business objectives, operational needs, and digital transformation goals. Conducting technology assessments, market analyses, and feasibility studies to identify IoT opportunities, prioritize investments, and develop roadmaps for implementation.	
IoT Solution Design and Architecture: Designing customized IoT solutions tailored to the specific requirements and processes of manufacturing operations, including sensor networks, connectivity infrastructure, data management systems, and analytics platforms. Developing scalable and interoperable IoT architectures that integrate with existing IT systems, manufacturing equipment, and enterprise applications to enable seamless data exchange and interoperability.	
Sensor Deployment and Connectivity: Providing expertise in sensor selection, installation, calibration, and maintenance to collect real-time data on manufacturing processes, equipment performance, environmental conditions, and product quality.Designing robust and secure communication networks, including wired and wireless protocols, edge computing devices, and industrial IoT gateways, to ensure reliable data transmission and connectivity across manufacturing facilities.	
Data Analytics and Insights: Implementing advanced data analytics and machine learning algorithms to analyze IoT data streams, identify patterns, trends, anomalies, and insights, and derive actionable intelligence for process optimization, predictive maintenance, and quality control.Developing custom dashboards, visualization tools, and reporting frameworks to visualize IoT data, monitor key performance indicators (KPIs), and empower decision-makers with real-time insights and situational awareness.	
Predictive Maintenance and Asset Management: Deploying predictive maintenance solutions leveraging IoT sensors, predictive analytics, and condition monitoring techniques to detect equipment failures, predict maintenance needs, and optimize asset reliability, uptime, and lifecycle performance. Integrating IoT data with enterprise asset management (EAM) systems, computerized maintenance management systems (CMMS), and predictive maintenance platforms to streamline maintenance workflows, prioritize maintenance activities, and optimize resource allocation.	

Figure 13: *IOT* sheet detail of Questionnaire 4 (Digital).

DIGITAL TRANSITION COMPETENCES	Your competence level for service delivery to company (on a scale from **1** to 3)
Robotics	
Robotics Strategy Development: Collaborating with manufacturing companies to develop robotics strategies aligned with their production goals, quality objectives, and automation requirements. Assessing the potential benefits, risks, and challenges of robotics adoption and developing roadmaps for phased implementation and deployment.	
Robotic Process Assessments: Conducting assessments of manufacturing processes, workflows, and tasks to identify opportunities for robotic automation, productivity improvements, and labor savings. Analyzing factors such as task complexity, repeatability, ergonomics, and safety requirements to determine the suitability of tasks for robotic automation.	
Robot Selection and Integration: Assisting manufacturing companies in selecting the most suitable robots for their specific applications, considering factors such as payload capacity, reach, accuracy, speed, and flexibility. Integrating robotic systems with existing production equipment, control systems, and automation infrastructure to enable seamless operation and data exchange.	
End-of-Arm Tooling (EOAT) Design and Development: Designing and engineering custom end-of-arm tooling (EOAT) solutions tailored to the specific tasks and requirements of robotic applications. Developing grippers, fixtures, sensors, actuators, and other end-effectors to enable robots to perform a wide range of manipulation and assembly tasks.	
Robot Programming and Simulation: Programming robots using offline programming (OLP) software, robot simulation tools, and programming languages such as teach pendant programming, ROS (Robot Operating System), and G-code. Simulating robotic tasks, trajectories, and workcells to validate robot programs, optimize cycle times, and ensure collision-free operation in virtual environments.	
Collaborative Robotics (Cobots) Implementation: Implementing collaborative robotics solutions for human-robot collaboration (HRC) in manufacturing environments, enabling robots to work safely alongside human workers. Designing safety systems, risk assessments, and collaborative workcells to ensure compliance with safety standards and regulations for human-robot interaction.	

Figure 14: *Robotics* sheet detail of Questionnaire 4 (Digital).

DIGITAL TRANSITION COMPETENCES	Your competence level for service delivery to company (on a scale from **1** to 3)
Additive manufacturing (including 3D printing)	
Technology Assessment and Feasibility Studies: Conducting assessments of additive manufacturing technologies (e.g., SLS, FDM, SLA) to determine their suitability for specific manufacturing applications. Performing feasibility studies to evaluate the technical, economic, and operational feasibility of implementing additive manufacturing solutions.	
Process Selection and Optimization: Advising manufacturing companies on the selection of appropriate additive manufacturing processes based on factors such as material requirements, part complexity, production volume, and post-processing needs. Optimizing additive manufacturing processes for efficiency, repeatability, and quality through parameter optimization, process validation, and workflow refinement.	
Design for Additive Manufacturing (DfAM): Providing design consultancy services to optimize product designs for additive manufacturing, including topology optimization, lattice structures, and part consolidation. Collaborating with design teams to leverage the capabilities of additive manufacturing technologies for complex geometries, lightweighting, and customization.	
Material Selection and Testing: Assisting manufacturing companies in selecting suitable materials for additive manufacturing applications based on mechanical properties, thermal characteristics, chemical compatibility, and regulatory requirements. Conducting material testing, characterization, and qualification to validate material performance and ensure compliance with industry standards and specifications.	
Prototype Development and Rapid Iteration: Facilitating rapid prototyping and iteration cycles using additive manufacturing technologies to accelerate product development, validate designs, and iterate on concepts quickly. Offering prototyping services for functional prototypes, proof-of-concept models, and visual prototypes to support design validation and stakeholder feedback.	
End-Use Parts Production: Supporting manufacturing companies in transitioning from prototyping to end-use part production using additive manufacturing technologies. Optimizing part designs, material selection, and manufacturing processes to meet performance, quality, and regulatory requirements for production-grade applications.	

Figure 15: *Additive Manufacturing* sheet detail of Questionnaire 4 (Digital).

2.2.2.4 Questionnaire #4: Data collection from Academy Experts (Green)

Questionnaire 4 (Green) is intended to map **expert competences in the dynamic fields of Green Technologies**. The documents should be completed by senior consultants, academic staff and individual professionals having expertise on industrial digital transformation.

The questionnaire includes 6 sheets, at least two mandatory:

I. **Basic Info**
Personal data (title, name, email, phone number, city and country) as well as professional data (organization, educational qualification, license, ResearchGate and LinkedIn profiles) are requested. There is also a multiple choice to define the market areas of expertise (electronics, food and beverage, pharmaceutical and chemicals, metal, plastics and rubber, machinery and equipment and building materials and furniture) and green expertise (renewable energy technologies, energy-efficient technologies, waste reduction and recycling technologies, green and sustainable materials, carbon capture and storage technologies). This sheet is mandatory.

II. **5 Areas of Excellence: Carbon Capture & Storage, Green & Sustainable Materials, Waste Reduction & Recycling, Energy Efficiency and Renewable Energy.**
The expert compiles just the sheets corresponding to its areas of interest, at least one. For each sheet, there are 4 main sections:
   - Green Transition Competences
     For each domain, experts are asked to assess their own level of knowledge and expertise from 1 (delivered by a generalist) to 3 (highly specialized expertise, such as PhD or special trainings). Examples are reported in Figure 16 and Figure 17.
   - Services
     List of services that the expert could provide in the field of green transition, such as advisory services, highlighting how the manufacturing company could take advantage of them.
   - Trainings
     List of trainings offered by the expert with title, objectives, target audience and duration.
   - Academic references
     List of the most important scientific publications with DOI or links, published patents and competences and skill or non-patented technologies of interest for the companies.
   - Industrial references
     List of collaboration projects with industrial partners and organizations, clarifying how customer use expert's services, how the developed/implemented solution solved the addressed problem and what is the added value for the customer.

GREEN TRANSITION COMPETENCES	Your competence level for service delivery to company (on a scale from 1 to 3)
Waste reduction and recycling technologies	
Waste Assessment and Management: Conducting comprehensive waste audits to analyze the composition, volume, and sources of waste generated by manufacturing operations. Developing waste management plans and strategies to minimize waste generation, optimize waste segregation, and maximize resource recovery. Implementing waste reduction initiatives, such as source reduction, product redesign, and process optimization, to minimize waste generation at the source.	
Recycling Technology Evaluation and Implementation: Assessing the feasibility and effectiveness of various recycling technologies for recovering valuable materials from manufacturing waste streams. Identifying suitable recycling technologies and equipment for specific waste streams, such as mechanical recycling, chemical recycling, and biological treatment processes. Providing guidance on the design, installation, and operation of recycling systems, including material handling, sorting, processing, and quality control measures.	
Circular Economy Solutions: Facilitating the transition towards a circular economy model by promoting resource efficiency, product reuse, and closed-loop material cycles. Developing circular economy strategies and business models to valorize waste streams as valuable resources, such as secondary raw materials or energy sources. Collaborating with stakeholders across the value chain to establish partnerships, networks, and infrastructure for circular material flows and sustainable supply chains.	
Waste-to-Energy and Alternative Conversion Technologies: Evaluating the potential for converting manufacturing waste into energy through technologies such as incineration, pyrolysis, gasification, or anaerobic digestion. Assessing the environmental and economic feasibility of waste-to-energy projects, including energy recovery efficiency, emissions control, and resource recovery potential. Providing technical expertise and project management support for the development, implementation, and operation of waste-to-energy facilities.	
Regulatory Compliance and Permitting Support: Assisting manufacturing companies in navigating regulatory requirements and obtaining permits for waste management and recycling operations. Ensuring compliance with environmental regulations, waste management standards, and permitting processes at the local, regional, and national levels. Providing guidance on waste classification, reporting obligations, and legal requirements related to hazardous waste management and disposal.	

Figure 16: *Waste Reduction & Recycling* sheet detail of Questionnaire 4 (Green).

GREEN TRANSITION COMPETENCES	Your competence level for service delivery to company (on a scale from 1 to 3)
Energy-efficient technologies	
Energy Audits and Assessments: Conducting comprehensive energy audits to evaluate the energy performance of manufacturing facilities, identify energy-saving opportunities, and prioritize efficiency measures. Performing energy benchmarking and comparative analysis to assess energy consumption patterns and identify areas for improvement relative to industry peers or best practices.	
Energy Efficiency Solutions and Retrofits: Developing customized energy efficiency solutions tailored to the specific needs and processes of manufacturing facilities. Recommending and implementing energy-saving retrofits, upgrades, and optimizations for equipment, HVAC systems, lighting, and building envelopes.Integrating advanced control systems, sensors, and automation technologies to optimize energy usage and improve system efficiency.	
Renewable Energy Integration: Assessing the feasibility and economic viability of integrating renewable energy sources, such as solar photovoltaics, wind turbines, biomass, or geothermal systems, into manufacturing operations. Providing technical expertise and project management support for the design, installation, and commissioning of renewable energy systems. Developing strategies to maximize self-consumption, optimize energy storage, and leverage grid interaction for renewable energy integration.	
Energy Management Systems (EnMS): Implementing energy management systems based on international standards such as ISO 50001 to establish systematic approaches for continuous improvement in energy performance.Developing energy management plans, policies, and procedures to set energy targets, track performance indicators, and monitor progress towards energy efficiency goals. Providing training and capacity building for staff to enhance energy awareness, foster energy-saving behaviors, and promote a culture of energy efficiency within manufacturing organizations.	
Demand-Side Management and Peak Shaving: Developing demand-side management strategies to optimize energy use and reduce peak demand charges through load shifting, demand response, and energy storage solutions. Implementing peak shaving techniques to manage energy demand during periods of high electricity prices or grid constraints, thereby reducing utility costs and improving financial performance. Integrating smart grid technologies, predictive analytics, and real-time monitoring systems to optimize energy consumption patterns and enhance grid reliability.	

Figure 17: *Energy Efficiency* sheet detail of Questionnaire 4 (Green).

2.2.2.5 Questionnaire #5: Data collection from Projects, Financing Programmes and events

Questionnaire 5 is intended to map **synergetic projects, green & digital grants, and events** that could be beneficial for manufacturing companies in their journey towards sustainability and digitalization. The documents should be completed by project coordinators or partners, programme managers and event organizers able to provide detailed information on the opportunities for manufacturing companies.

The questionnaire includes 3 sheets (Figure 18), according to the type of mapped data:

I. **Project**
This sheet aims at identifying projects that can share tools or other assets to facilitate the green and digital transition of SMEs. In particular, project programme, website, duration, synergies and contacts are requested.

II. **Grants**
Grants that can support the green and digital transition of SMEs are described and mapped in terms of programme, website, target group, budget, cofinancing rate and eligibility criteria.

III. **Events**
This sheet aims at mapping events that can increase the knowledge or awareness level of SMEs in the field of digital and green transition. The type of event, target group, organizers, registration requirements and contacts are the requested information.

Project acronym
Programme
Website (link if available)
Open / valid till DD.MM.YYYY
Synergies *(List the tools, trainings, funding opportunities or any other service offered by synergetic project for SMEs in their transition to digital and greene)*
Project partner's name
Country
Contact person
Contact email

Grant/Loan scheme title
Programme (cofinananced/sponsored by)
Website (link if available)
Target Group (beneficiary)
Max. Sum of a grant / loan
Cofinancing rate in % /grant Loan / interest rate in %
Open / valid till DD.MM.YYYY
Call description
Eligibility criteria
Project partner's name
Country
Contact person
Contact email

Event title
Type of event (drop-down menu)
Target Group (drop-down menu)
Organizer (Financed /sponsored by)
Website (link if available)
Registration open / valid till DD.MM.YYYY
Description of event
Project partner's name
Country
Contact person
Contact email

Figure 18: *Project, Grants* and *Events* sheets of Questionnaire 5.

2.2.2.6 Questionnaire #6: Data collection from Faciliators

Questionnaire 6 is intended to map **facilitators' competences** in supporting the green and digital transition journey of manufacturing companies. The documents should be completed by consultants and project managers acting as intermediary and facilitator for industrial green and digital transition.

The questionnaire includes 6 sheets, at least two mandatory:

I. **Basic data**
Personal data (title, name, email, phone number, city and country) as well as professional data (organization, educational qualification, license and LinkedIn profile) are requested.

II. **5 Competences: Green Competences, Digital Competences, Technology Transfer Competences, Business Competences_Start-up and Business Competences_ Growing.**
The expert compiles just the sheets corresponding to its competences, at least one. For each sheet, there are 4 main sections:
   - Competences
     For each domain, experts are asked to assess their own level of knowledge and expertise from 1 (delivered by a generalist) to 3 (highly specialized expertise, such as PhD or special trainings). Examples are reported in Figure 19 and Figure 20.
   - Services
     List of services that the expert could provide, such as advisory services, highlighting how the manufacturing company could take advantage of them.
   - Trainings
     List of trainings offered by the expert with title, objectives, target audience and duration.
   - Academic references
     List of the most important scientific publications with DOI or links, published patents and competences and skill or non-patented technologies of interest for the companies.
   - Industrial references
     List of collaboration projects with industrial partners and organizations, clarifying how customer use expert's services, how the developed/implemented solution solved the addressed problem and what is the added value for the customer.

TECHNOLOGY TRANSFER COMPETENCES	Your competence level for service delivery to company (on a scale from **1** to **3**)
Technology Assessment *Competences to understand and assess the technical feasibility, market potential, and commercial viability of the technology. To evaluate the strengths, weaknesses, opportunities, and threats (SWOT analysis) of the technology to identify its potential applications and value proposition.*	
Market Research and Analysis *Competence in conducting market research, analysing industry trends, and identifying target markets are crucial for assessing the demand for the technology being transferred. To identify potential customers, competitors, and market segments to develop effective commercialization strategies.*	
Business Development and Strategy *Competences to develop business plans, marketing strategies, and revenue models for the successful transfer and commercialization of technology. To identify growth opportunities, establish partnerships, and create sustainable business models.*	
Networking and Relationship Building *Building a strong network of industry contacts, potential partners, investors, and technology experts is crucial for facilitating technology transfer opportunities. To be able to actively engage in networking activities to connect technology developers with potential collaborators and commercialization partners.*	
Project Funding Applications & Management *Competences to find appropriate funding program, prepare project application and implement project management principles related to transfer process, coordinating activities, managing timelines, and ensuring successful project implementation at the company. To be able to organize and execute technology transfer projects efficiently and effectively.*	

Figure 19: *Technology Transfer Competences* sheet detail of Questionnaire 6.

BUSINESS COMPETENCES FOR GROWING COMPANIES	Your competence level for service delivery to company (on a scale from **1** to **3**)
Strategic Planning and Execution Competences to assist growing companies in refining their strategic direction, setting growth goals, and aligning organizational priorities. To help develop strategic plans, assess market opportunities, and execute growth initiatives to capitalize on emerging trends.	
Financial Advisory and Performance Improvement Competences to offer financial advisory services to help growing companies optimize financial performance, improve profitability, and enhance cash flow management. To assist in financial analysis, cost optimization, and revenue growth strategies to drive sustainable financial results.	
Process Optimization and Efficiency Operations *Competences to assist growing companies in streamlining operations, optimizing processes, and enhancing operational efficiency. To provide expertise in lean management, process reengineering, and supply chain optimization to drive productivity gains and cost savings.*	
Market Expansion and International Growth support *Competences to support market expansion efforts, assess international growth opportunities, and develop market entry strategies. To provide insights into global markets, regulatory requirements, and cross-border expansion considerations to help companies scale internationally.*	
Sales and Marketing Optimization *Competences to help growing companies enhance their sales and marketing performance by optimizing sales processes, developing marketing strategies, and improving customer acquisition and retention efforts. To provide expertise in lead generation, customer segmentation, and sales funnel optimization*	
Setting ISO Quality Standards processes to monitor KPIs & results *Competences to assist growing companies to improve the quality of their products and services to meet customers' expectations. To offer support in defining key business processes, their KPIs, business monitoring tools, customer feedback process, risk assessment, etc.*	
HRM Talent Scouting services & Measuring Employee Efficiency Support *Competences to support growing companies in finding and attracting new young talented professionals and to improve measuring process with key KPIs to track employee efficiency and to help companies to develop appropriate reward system to keep them at the company.*	

Figure 20: *Business Competences_Growing* sheet detail of Questionnaire 6.

3. Data Collection & Visualization

3.1 Data Collection

Information about the technology providers are collected during the “Acquire Data” and “Enrich Data” phases of the methodology through the use of available tools, in particular the online form and the questionnaires.

To ensure a good quality of mapped information, the **selection of significant regional stakeholders** to be invited to participate to GREENE 4.0 activities was carefully done by project partners. They leveraged on strategic networks to find suitable technology providers and/or innovation assets, such as the Vanguard Initiative, the Enterprise Europe Network, DIHs, EDIHs, etc. In particular, if partners know the organizations, they can make a preliminary internal assessment on the offered concrete solutions (products, services, PSS) to foster the twin transition, on the existing industrial use cases and on the willingness to collaborate with interregional companies to proceed to invite them. If, instead, new organizations were recommended by workshop participants, it is necessary to proceed with an initial assurance that the organization has specific expertise and scope of activities and then deepen the knowledge with direct contact. If after direct contact the company provides further proof of evidence, the organization could be finally included into the Open Innovation Map, compiling the questionnaires or the online form. All the organizations that are not eligible, instead, must be discarded from the mapping process.

The compiled questionnaires as well as all the materials produced during the A2.1 are stored in the internal repository, available for consultation to all partners.

3.1.1 Preliminary analysis of collected data

The preliminary analysis of collected information corresponds to the “Manipulate Data” phase of the methodology. The idea is to verify the collected information according to some identified relevant variables and to draft preliminary considerations useful for the creation of the Open Innovation Maps.

A first analysis of the mapped stakeholders, in particular resulted from the two regional Open Innovation Workshops organized in each partners country, has been done during the **Transnational Peer Review Seminar** organized in Italy on the 26th of March 2024 (Figure 21). All project partners analysed and peer reviewed the data and key results of the open innovation mapping with also the presence of Associated Partners, for a total of 23 participants. The event presented several sessions:

- *Welcome and Introduction*
- *Overview of the methodology used in mapping*
  Intellimech summarized the goal of the meeting as well as the work performed so far to perform the Open Innovation mapping process. In particular, the methodology structured was illustrated to external experts.
- *Detailed presentation of Open Innovation Mapping Projects in Project Regions*
  This session was devoted to show the Open Innovation mapping process. In particular, Project Partners presented collected information so far to provide an overview of the key regional technological expertise, the main target industrial sectors, the business area of main reference and the current technological offer.
- *Breakout groups for experts*

Participants were divided into specific regional groups with the goal to review and analyse the data presented by each PP and discuss strengths, weaknesses, and potential improvements of the specific project regions and their mapping activity. Experts suggested to leverage on regional technological clusters and other key network to enlarge the target mapping and engage key regional stakeholders, to focus not only on digital vs green solutions, but also on hybrid solutions and to establish more robust inter-regional networks, leveraging also on regular inter-regional meetings, and shared platforms for continuous communication and collaboration.

- *Group discussion on visualisation of the open innovation map on the Be2GreenHub platform*
  This session was mainly dedicated to the presentation of the next step of the Open Innovation Mapping process and the Be2GreenHub platform. In particular, PTP/Lead Partner shows the 6 questionnaires foreseen for finalizing the mapping process and introduced the main features of the platform that will be used within the GREEN Project.
  A fruitful discussion began among partners providing suggestions on the platform main functionalities, also leveraging on the back office research that was required to discover interesting open innovation mapping initiatives (presented in the next paragraph). This activity mainly addressed the platform user interface, interactions, main features and functionalities and addressed community.
- *Welcome to Kilometro Rosso*
  At the end of the meeting, participants visited 2 labs of the Innovation district, that are also Innovation assets Included In the Lombardy Open Innovation Map: the JOiiNT Lab “and the Lisa Tech “Living Space for Additive Technologies”.

Figure 21: pictures of the Transnational Peer Review Meeting in Italy.

As already mentioned, the Transnational Peer Review Seminar represented the opportunity the discuss the results of the first part of A2.1 activities. In particular, partners reported the first feedback collected during the regional Open Innovation Workshops, organized as in Table 1.

Table 1: organization of regional Open Innovation Workshops

COUNTRY	1ST REGIONAL INNOVATION WORKSHOP	2ND REGIONAL INNOVATION WORKSHOP
Austria	Date: 27.11.2023 Venue: FH Kufstein Tirol Participants: 16	15.02.2024 Venue: FH Kufstein Tirol Participants: 8
Czech Republic	Date: 13.12.2023 Venue: hybrid, Usti nad Labem Participants: 12	21.02.2024 Venue: hybrid, Usti nad Labem Participants: 10
Germany	Date: 10.01.2024 Venue: Online Participants: 11	05.03.2024 Venue: Online Participants: 9
Hungary	09.01.2024 Venue: Budapest Participants: 12	07.03.2024 Venue: Budapest Participants: 12
Italy	17.01.2024 Venue: Kilometro Rosso Lombardy Participants: 11	23.02.2024 Venue: Online Participants: 11
Poland	28.11.2023 Venue: Dobczyce Participants: 13	29.02.2024 Venue: Krakow Participants: 60
Slovenia	14.12.2023 Venue: hybrid, Murska Sobota Participants: 30	05.02.2024 Venue: Murska Sobota Participants: 14

The main outcomes emerged during the workshops were summarized through graphs and discussed together for a preliminary analysis of “Acquire Data” phase and to set next steps for the “Enrich Data” phase.

Slovenia, for example, during the regional Open Innovation workshop reserved a slot for industrial presentations, highlighting digital and green services and solutions. Additionally, they mapped services missing for regional SMEs circular transition, such as the waste and raw materials exchange, the management and implementation of control services or the best practices sharing. The preliminary Slovenia mapping performed in the initial phase of A2.1 is reported in Figure 22.

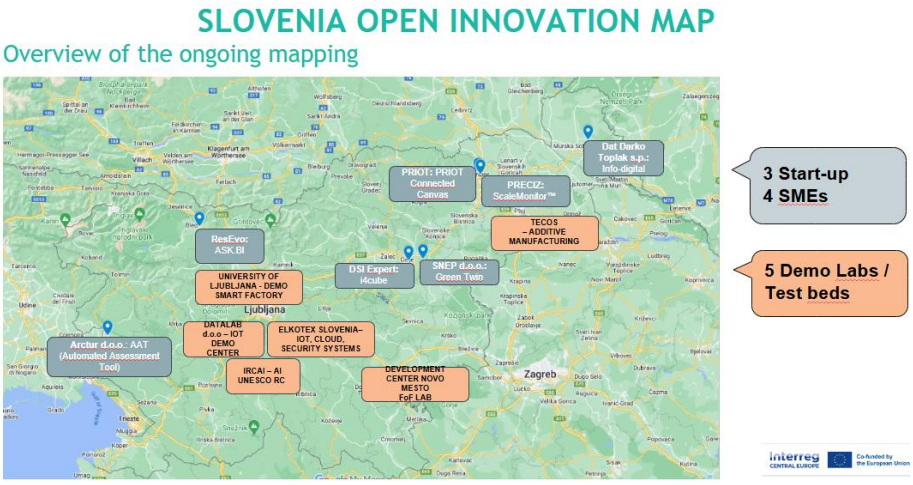


Figure 22: Slovenian preliminary mapping presented during the Transnational Peer Review Seminar.

Germany during the workshops identified two main areas of expertise, digital and smart production, both related to hardware and software aspects. They recorded some weaknesses in identifying initiatives and solution providers specifically aimed at improving sustainability, while there is a range of solutions and consultancy providers reflecting the strength of the metalworking and mechanical engineering sectors in Saxony.

The Austrian stakeholders showed some concern in the use of the platform by SMEs, that have no awareness of strategy or innovation and could not properly understand the benefit of interregional collaboration. In this case, it will be fundamental to support SMEs step by step during all the phases of GREENE 4.0 project to ensure their involvement. The workshop also focused on the identification of the main regional areas of expertise, reported in Figure 23.

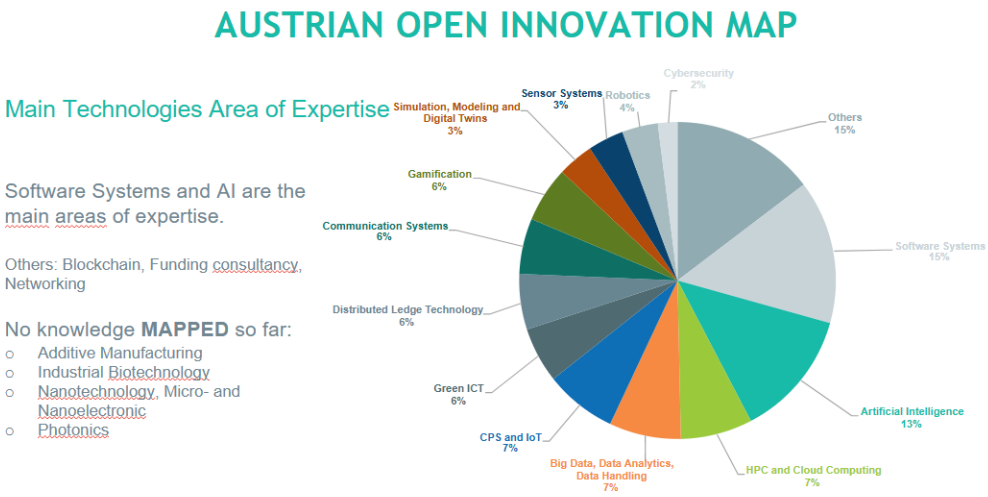


Figure 23: Austrian preliminary analysis presented during the Transnational Peer Review Seminar.

In Italy, technology providers companies are interested to gain visibility and to activate interregional collaboration opportunities. The same positive attitude is present in Poland, where the additional suggestion was to coordinate the platform with already existing initiative to maximize the impact. Both countries analysed the main sectors to which digital and green innovation technologies are address, as reported in the Polish example in Figure 24.

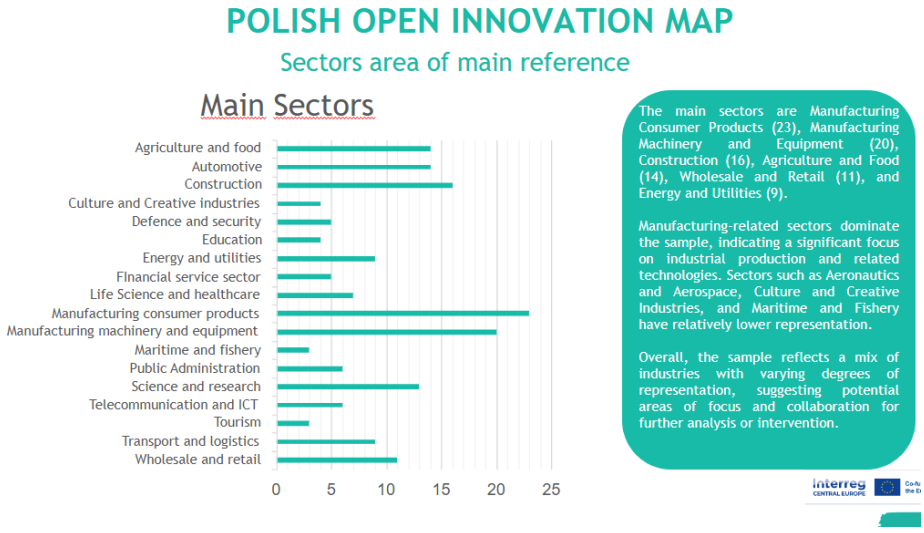


Figure 24: Polish preliminary analysis presented during the Transnational Peer Review Seminar.

Finally, in Hungary the participants highlighted the possibility to introduce a rewarding system to maximize SMEs involvement and their willingness to participate to the mapping activity. A further

analysis performed by all partners after the workshop was referred to the business area of main reference in each region, as the example reported in Figure 25.

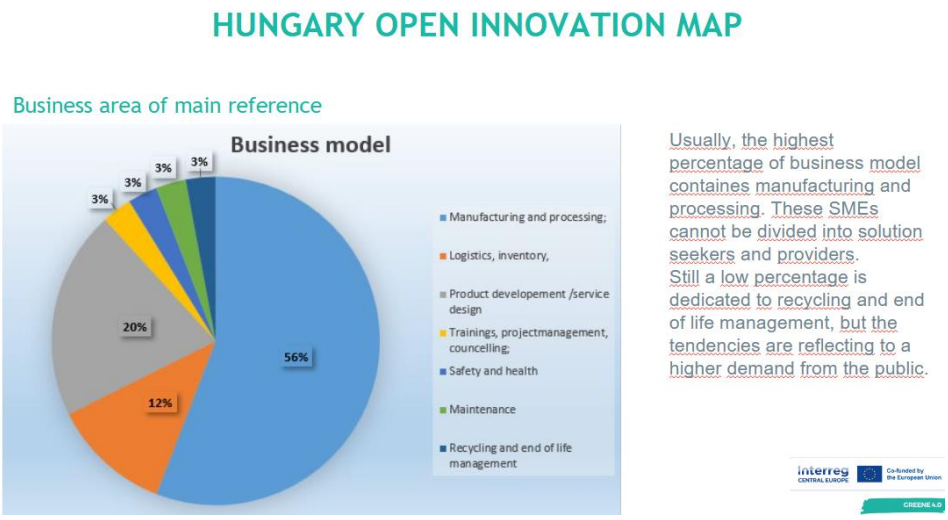


Figure 25: Hungarian preliminary analysis presented during the Transnational Peer Review Seminar.

After the preliminary and qualitative data acquisition during the regional Open Innovation workshops, discussed in the Transnational Peer Review Seminar, partners proceeded with the enrichment of data through the Online forms and/or the questionnaires. In Table 2 the major activities of partners are reported in terms of participants to the online forms, to the regional workshops and to the questionnaires (partners had the possibility to choose the best tools to be used in their own regions), as well as statistics in terms of mapped digital and/or green solutions and covered sectors.

Table 2: preliminary analysis of collected data per country.

COUNTRY	ONLINE FORM	REGIONAL WORKSHOPS	QUESTIONNAIRES	MAPPED TECH PROVIDERS AND DEMO CENTERS		COVERED SECTORS						
				GREEN	DIGITAL	ELECTRONICS	FOOD/BEVERAGE	CHEMICALS	METALS	PLASTICS/RUBBER	MACHINERY	CONSTRUCTION
Austria	21	24	36	Rvitalyze FlexCo, Makers Lab, EFIM Lab	anewo GmbH, UNIBERG GmbH, ARTI GmbH, GMD GMBH, FaceAR e.U., Atelier1337, Arva Digital GmbH, LEAN Lab, Finance Lab, Drone Lab, Digital Experience Lab, Automation Lab	X	X	X	X	X	X	X
Czech Republic	NA	22	36	TETRONIK, NOXEM s.r.o., HARDWARIO a.s., ČVUT UCEEB, New Water Group s.r.o.	TETA s.r.o., SOLEDPRO s.r.o., ECOdate s.r.o., Intemac Solutions, s.r.o., GoodAccess s.r.o., Evolution Design s.r.o., DigiLab, EDICH CTU	X	X	X	X	X	X	X
Germany	NA	11	25	ARNIO GmbH, DieEnergiekoppler GmbH, Kreissler24 KG, ManaTec GmbH, wetando Unternehmensberatung, Product and company related sustainability assessment and optimization, Simulation and evaluation of sustainable energy supply concepts	ManaTec GmbH, Polychip GmbH, AI Level Check, Inventory digitization, Learning factory for networked production (LVP), Mittelstand-Digital Zentrum Spreeland, Potential analysis for production systems with focus on factory layouts and intralogistics	X	X	X	X	X	X	X

				regarding costs and environmental impact								
Hungary	47	12	33	BL Épker Kft., Il Barbiere Kft., Naturtex Kft., Polymeron Ltd., UgrinPack-Erdősi Kft., Windcraft development Kft, Bálint Analitika, Bay Zoltán Nonprofit, PolymerOn	BarberCloud ltd., Mom Barber Kft., Seamasters products		X	X	X	X	X	X
Italy	19	22	34	Fibereuse Tech S.R.L., RESILCO SRL, SABIO SRL, Mixcycling srl, CIRCULAR MATERIALS SRL, AEP Polymers srl, CIRC-eV	FEELERA SRL, Proxima Robotics s.r.l., AISent S.r.l., JOiiNT LAB, Lisa Tech (Living Space for Additive Technologies), SMACT	X	X	X	X	X	X	X
Poland	45	73	37	Leango s.c. Joanna Sagan, Agata Pasicka, Hydropolis sp. z o.o., Tergo, Znika, Upthermo, Luna Scientific, Ecopolplast	OneMeter, Sustainable Fashion Institute, Reliability Solutions Sp. z o.o., Redigo Carbon Sp. z o.o., Waterly Sp. z o.o., Astor Innovation Room, Showroom Innowacji IoT, Astor Robotics Center, Factory of the Future, Showroom 4.0, Envirly (Quantifier Sp. z o.o.)	X	X	X	X	X	X	X
Slovenia	NA	44	40	Snep d.o.o. PE, Metronik Elementi In Sistemi Za Avtomatiko,D.O.O.	Netica d.o.o., Metronik Elementi In Sistemi Za Avtomatiko,D.O.O, OmniOpti, d.o.o., Preciz d.o.o., PRIOT Digital systems, ResEvo d.o.o.	X	X	X	X	X	X	X

3.2 Conceptual Design of the Open Innovation Maps

In the “Visualize Data” phase of the methodology, partners works for the effective data visualization of the Open Innovation Map. The digitalization will be done in Activity 2.4 “Setting up Transnational Open Knowledge Box”, starting in second half of Period 3. However, in A2.1 and the present deliverable the set of qualitative criteria and preliminary ideas for the Open Innovation Map visualization in the GREENE 4.0 platform has been collected and described.

During the Transnational Peer Review Seminar, a slot was dedicated to the analysis of existing mapping in the different regions and countries. The mapped initiatives were:

- ideXlab: OPENiSME platform, aimed at allowing SMEs to find information on technologies State-of-Art, share obtained results, formulate questions and interact with experts, identify need and search for supporting companies.
- IHK ecoFinder platform, the Germany's largest portal for organizations and companies from the environmental and energy sector where to find competent providers of products and services. It is managed by IHK Digital GmbH, a company associated with Germany’s national network of Chambers of Commerce.
- Enterprise Europe Network platform, that assists SMEs for internationalization and partners ooperation. In addition to the possibility to search for Innovation and Technologies, the platforms also allows the evaluation of innovation projects with regard to suitability for funding, the licensing and patent law documentation, and the development of measures to improve innovation management.
- Competence Atlas of Standortagentur Tirol, offering networking and transfer of knowledge and technologies in 6 different clusters: Renewable Energies, Information Technologies, Creativity, Life Sciences, Mechatronics and Wellness & Life Quality.

- WIPO GREEN – The Marketplace for Sustainable Technology platform, dedicated to technology exchange as it connects providers and seekers of environmentally friendly technologies. It operates with a database, a network and through various events and acceleration projects that catalyse green innovations.
- eDIH CTU (experts.ai) platform, where a team of experts helps companies and organizations to understand the benefits of AI in cooperation with the international scientific community. In particular, partnering services uses external platform Experts.Ai.
- Industry 4.0 Innovation Radar platform, a directory of young companies that provide modern solutions for manufacturing industry. Industry 4.0 Innovation Radar also functions as a paper publication and is updated every two years.
- Vestbee platform, connecting startups and scale-ups with investors and corporations. It serves as a matchmaking platform for businesses seeking funding or partnerships. Startups and scale-ups can showcase their projects, and investors or corporations can discover and connect with projects that align with their interests.
- European Digital Innovation Hubs Network (EDIH Catalogue) platform, created by the European Commission, aimed at finding siginifcant and relevant information about where and how the advanced technologies (e.g. big data, cyber security, logistics etc.) are being used in each region. The catalogue acts as a search engine to find and network with different local pioneers.

The analysis of the pros and cons of existing platforms allowed to define preliminary requirements for GREENE 4.0 Open Innovation Maps, so that the tool will be different from the existing ones and with increased functionalities. In fact, in alignment with the information required within the questionnaires and to facilitate the search for the most appropriate technology provider, some criteria have been identified:

- A *simple, easy to surf and user-friendly interface* where all the contents are clearly and effectively integrated. The user should be able to understand the main information in a simple and visual form, without specific digital competences and without an overwhelming amount of data. The use of different colours to identify sectors or other significant information will be evaluated. The possibility to distinguish between a quick or an advanced search is appreciated by the user, according to its specific needs. Information should be accessible from different devices.
- *Interactions* should be allowed directly in the platform with chats or communities or through the integration of links to the mapped stakeholders websites in order to easily obtained contact information (contact forms or emails). This could be done at platform level or integrating individual forms for messages in each company profile. The platform should offer a private area where an analytics' dashboard is available for each individual user profile (e.g., its submissions of needs, posted articles etc.). Company registration should be easy, but a standardized amount and type of info is required to present a solution or to describe a need (for example, every technology provider profile contains an assessment of its maturity stage based on TRL). The needed information are already embedded in the GREENE 4.0 questionnaires to facilitate the integration of the already mapped stakeholders in the platform. The presence of FAQ is appreciated.
- *Solution providers* should be able to edit and manage their own profiles via a user-specific backend. The immediate integration of the information and/or the fast approval of new stakeholders is fundamental to maintain updated the Open Innovation Maps. Not only technologies but also services should be mapped.

- *End-users* that will use the platform to search technology providers able to satisfy their needs should be supported and facilitated by the presence of keywords and/or filters searching tool (in terms of geographical positioning, sectors, available technologies, etc.). They should also have the possibility to access reports, ranking and analysis on the platform usage and on the mapped solution providers.
- *Openness* to different regions to represent and maintain a European community level. The use of English language is mandatory and, if possible, the platform should allow the implementation of versions also in local languages to promote the engagement. A proper visibility on organized matchmaking events should be ensured, as well as best practices and industrial use-cases promoted through the use of the platform itself. This will support the adoption of the platform by an always increasing amount of stakeholders.

The identified criteria have been discussed with all partners during the Brainstorming session on B2GreenHub platform functionalities during the project meeting in Slovenia (Portorož), on the 6th of September, 2024.

4. Open Innovation Maps

The Open Innovation Map is intended as a tool for locating sources of knowledge and innovation assets, their characteristics, classification and usage. It represents an inventory system of the main knowledge and innovation assets available in project regions and reveals weak links and bottlenecks in the flow of knowledge and market needs. It corresponds to the "Process Data" phase of the methodology, where useful, usable, understandable information for technology seekers have been extracted.

Each partner region defined an Open Innovation Map; therefore, overall, 7 Open Innovation Maps has been developed.

4.1 Austria

The identified Source of Knowledge and Innovation Assets are shown in the map and reported in the following tables.

Austria has several digital technology providers and innovation assets. Green technologies are increasing but still limited in the country, with a lower TRL. Digital technologies, instead, are widely deployed and cover several areas: IT, Artificial Intelligence, Robotics, automation, etc. The developed solutions are already available in the market, supporting the digital transformation of SMEs.

TECHNOLOGY SOLUTION PROVIDERS AND INNOVATION ASSETS			
GREEN TECHNOLOGIES			
COMPANY	TECHNOLOGICAL SOLUTION	TRL	BENEFIT
Rvitalyze FlexCo	White- label platform for selling stone and aggregates for construction purposes by digitising and streamlining the purchasing step. In addition, the platform connects surplus	6	Reduction of costs Improve productivity Operation simplification Business predictability Customers accessibility

	materials between construction sites and save CO_2 emissions and disposal costs.		
DEMO CENTER	**MISSION**	**SERVICES**	**INDUSTRIAL COLLABORATION**
Makers Lab	Access to modern technologies from the idea to the proof of concept, to the prototype and final product. The equipment includes 3D scanners, 3D printers, laser cutters, drilling machines and soldering stations.	Testing of sustainable materials Generative manufacturing processes Feasibility studies	Description of the requirements including a schedule to check the availability and needed equipment and prepare the offer.
EFIM Lab	Provide illustrative material for teaching, simulation environment for research staff.	Training Simulation	NA
DIGITAL TECHNOLOGIES			
COMPANY	**TECHNOLOGICAL SOLUTION**	**TRL**	**BENEFIT**
anewo GmbH	MES = (Manufacturing Execution System, MES); Production control system ERP (Enterprise Resource Planning); Resource planning	9	Increase production capacity Reduction of costs Improve productivity Improve quality Improve reliability and risk reduction Flexibility Operation simplification Business predictability
UNIBERG GmbH	UB-EDGE, an all-in-one Edge with integrated Private 5G Network. The local edge computing platform is ready to seamlessly run mission-critical applications, such as real time video analytics.	8	Increase production capacity Reduction of costs Improve productivity Improve quality Improve reliability and risk reduction Flexibility Turnkey solution
ARTI - Autonomous Robot Technology GmbH	AI software modules for mobile autonomous robots. The kits include mapping, localisation, navigation and fleet management.	8	Increase production capacity Reduction of costs Improve productivity Improve quality Improve reliability and risk reduction Flexibility Operation simplification Process consistency Turnkey solution
GMD GMBH	Prevention of natural hazards with self-sufficient, AI-based IoT sensor and radio networks with a machine learning GIS risk analysis platform to make natural events more predictable and offers and advises on customer-optimized climate change adaptation models for municipalities, ski resorts or infrastructure operators.	8	Reduction of costs Customers accessibility
FaceAR e.U.	Virtual try-on for online shops from the digitalization to the final integration.	9	Increase production capacity Reduction of costs Improve productivity Improve quality Improve reliability and risk reduction Flexibility Operation simplification

			Business predictability Process consistency Customer accessibility
Atelier1337	Custom AI Workshops to equip employees with the essential skills needed to harness the power of AI and AI Strategy and Product Development.	9	Increase production capacity Reduction of costs Improve productivity Improve quality Improve reliability and risk reduction Flexibility Business predictability Process consistency Customer accessibility
Arva Digital GmbH	Standardized IT solution "Arva Satellite" allowing firms to bring together various databases / IT systems within their and their clients' IT infrastructures and, thus, provides the basis for cloud connectivity, IoT devices, web apps and AI applications.	9	Reduction of costs Improve productivity Improve quality Improve reliability and risk reduction Flexibility Business predictability Customer accessibility

DEMO CENTER	MISSION	SERVICES	INDUSTRIAL COLLABORATION
LEAN Lab	Process analysis and optimisation through simulation. Tools such as Poka Yoke, KANBAN and digital assistance systems are introduced step by step.	Workshops for employee training, e.g. set-up time optimisation, production planning and control, etc.	Description of the requirements including a schedule to check the availability and needed equipment and prepare the offer.
Finance Lab	Quantitative and qualitative analysis of data. Additionally, seminar room, allowing topics such as Big Data Analytics, programming, etc., to be taught in a modern and professional setting.	Training Data analysis	Companies can use the infrastructure for data analysis and other purposes with the support of IT experts.
Drone Lab	Motion tracking system for movement detection. The space can be adapted and modified as required for various use cases (search missions, obstacle setups, etc.) in drone research.	Evaluation of Drone Algorithm for various use cases (Inspection, etc.)	Hydrogen Drone Research project Parallel Flight Research project (Specdrone, FFG)
Digital Experience Lab	Enhance the understanding of customers' digital experiences. To achieve this, the centre employs advanced technologies such as artificial intelligence and eye-tracking.	Eye-Tracking in various contexts AI consulting	Eye-tracking glasses to study the airport's advertising spaces. The aim of the project was to provide recommendations for optimal ad placement.
Automation Lab	Training and further education in the field of automation technology. The basics of electrical engineering, electronics, sensors & actuators and programmable logic controllers are covered.	Training and testing Comparison of robotic systems	Employee training for various companies in the Tyrol

Mapped experts are mainly academic representatives. In case of green technologies Austria is mainly focusing on renewable energy and energy-efficient technologies. The most commonly addressed digital technologies, instead, are AI and data analytics, and digitalization and connectivity.

EXPERTS			
GREEN TECHNOLOGIES			
NAME	**AFFILIATION**	**MARKET AREA**	**TECHNICAL EXPERTISE**
Christian Huber	FH Kufstein Tirol - University of Applied Sciences	Building Materials & Furniture	Renewable energy technologies Energy-efficient technologies
Alexander Steger	Sustainable Development Agency	Machinery & Equipment	Waste reduction & recycling techniques Green & Sustainable materials
DIGITAL TECHNOLOGIES			
NAME	**AFFILIATION**	**MARKET AREA**	**TECHNICAL EXPERTISE**
Thomas Grömer	easySAAS	NA	Digitalisation & Connectivity Cybersecurity & Digital Trust
Michael Kohlegger	FH Kufstein Tirol	Electronics Food & Beverage Chemicals Metal Plastics and Rubber Machinery & Equipment	AI & Data Analytics
Mario Situm	University of Applied Sciences Kufstein	NA	Digitalisation & Connectivity AI & Data Analytics
Christian Schmid	FH-Kufstein Tirol Bildungs GmbH	Metal Plastics & Rubber Machinery & Equipment	Additive Manufacturing
Birgit Oberer	ETCOP Institute for Interdisciplinary Research	Machinery & Equipment	Digitalisation & Connectivity AI & Data Analytics Cybersecurity & Digital Trust
Alptekin Erkollar	ETCOP Institute for Interdisciplinary Research	Metal Plastics and Rubber Machinery & Equipment	Digitalisation & Connectivity Automation & Robotics AI & Data Analytics Cybersecurity & Digital Trust

The mapped facilitators are represented by partners involved in GREENE 4.0 project, in the University of Applied Science FH Kufstein Tirol.

FACILITATORS			
NAME	**AFFILIATION**	**COMPETENCES**	**MAIN SERVICES**
Selina-Maria Schiller	FH Kufstein Tirol	Green technologies Technology transfer technologies Business for start-up	Networking with experts for evaluations of greenhouse gas (GHG) emissions Technologies assessment Business Plan Strategic Planning and execution Market expansion
Karin steiner	FH Kufstein Tirol Bildungs GmbH	Technology transfer technologies Business for start-up Business for growing companies	Strategic needs analysis Digital readiness evaluation Business objectives analysis Strategic Business Development for Growth Market validation

Austria is active in terms of inter-regional collaborations in European projects, mainly Interreg projects. In the following table are reported some examples where Austria is leading green and/or digital activities dedicated to SMEs transition. These projects also represent a concrete opportunity for external stakeholders in terms of awareness, identification of market needs, increase environmental sustainability, networking opportunities, etc. EIT Manufacturing is particularly addressed as funding opportunity in this country, also for the participation to events dedicated to manufacturing.

ADDITIONAL OPPORTUNITIES AND COMPETENCES		
PROJECTS	**GRANTS**	**EVENTS**
ADDCIRCLES - Interreg Slovenija - Österreich	Call for proposals 2025 – financed by EIT Manufacturing	Circular Week Tirol – B2B event organized by Standortagentur Tirol
BESOGREAT - Interreg Italia-Österreich	EITM Transform Call – financed by EIT Manufacturing	Family Business Day - B2B event organized by FH Kufstein Tirol
EEN (Enterprise Europe Network) - EU Cosme Programme		Manufacturing Day - transnational event organized by EIT Manufacturing East
ESG Starter		
Green at Heart – funded by EU		
MIT.IC.AT (Manufacturing. Innovation. Technology. InterConnect Austria) - Produktion der Zukunft		

4.2 Czech Republic

The identified Source of Knowledge and Innovation Assets are shown in the map and reported in the following tables.

Czech Republic has several digital technology providers and innovation assets. The majority of green technologies are not physical infrastructures, processes and materials, but still digital technologies

able to monitor the environmental impact (except for New Water Group s.r.o.). All the mapped solution are ready for the market with a TRL 9.

TECHNOLOGY SOLUTION PROVIDERS AND INNOVATION ASSETS			
GREEN TECHNOLOGIES			
COMPANY	**TECHNOLOGICAL SOLUTION**	**TRL**	**BENEFIT**
TETRONIK - výrobní družstvo Terezín	Monitoring and control systems for the automotive, construction, and manufacturing industries, where it optimizes logistics and improves the efficiency of production processes.	9	Increase production capacity Reduction of costs Improve productivity Improve quality Improve reliability and risk reduction Operation simplification Business predictability Process consistency
NOXEM s.r.o.	Production monitoring and downtime reduction, providing real-time insights into production processes, identifies the causes of downtimes, and offering options for optimizing production efficiency.	9	Increase production capacity Reduction of costs Improve productivity Improve reliability and risk reduction Operation simplification Business predictability Process consistency
HARDWARIO a.s.	CHESTER IoT Platform is a flexible IoT gateway that supports multiple IoT wireless connectivity options, including LoRaWAN for both local and public networks, as well as LTE-M and NB-IoT for public network connections. It captures important production or environmental data.	9	Increase production capacity Reduction of costs Improve productivity Improve quality Improve reliability and risk reduction Operation simplification Business predictability Process consistency
New Water Group s.r.o.	The MINT-COMORES treatment plant enables the production of high-quality and safe drinking water free from MICROPOLLUTANTS, using either municipal wastewater treatment plant (WWTP) effluent or a wide range of surface and groundwater sources. The MINT-POOL technology is developed as a highly efficient membrane-process-based system designed for wastewater from sand filters backwashing recycling in pools.	9	Reduction of costs Improve productivity Improve reliability and risk reduction Process consistency Business predictability
DEMO CENTER	**MISSION**	**SERVICES**	**INDUSTRIAL COLLABORATION**
ČVUT UCEEB	To link science with the commercial and public sectors, delivering innovative solutions for a sustainable future in building, energy, and environmental technologies.	Design of new products and building systems including simulations of mechanical behaviour. Monitoring and optimization of building operations,	Proposal for a lightweight panel-type exterior cladding solution based on wood. Micro-cogeneration unit Wave MoistureGuard system.

		energy savings, or improving the indoor environment.	

DIGITAL TECHNOLOGIES			
COMPANY	**TECHNOLOGICAL SOLUTION**	**TRL**	**BENEFIT**
TETA s.r.o.	Potatoes is our cloud based cable management system to record and monitor all cables (optical, electric, metalic etc.). It contains also location tracking.	9	Increase production capacity Reduction of costs Improve productivity Flexibility
SOLEDPRO s.r.o.	Selective protection of DNS translation, protecting the end users of the customer against an infection of their devices. Virtual security manager providing a continual overview of critical vulnerabilities and threats to the customer's IT environment.	NA	NA
ECOdate s.r.o.	The ERP system automates processes, eliminates paper circulation of documents, increases the efficiency of the work of users, i.e. employees. ERP system HELIOS with various extensions to production, HR, services, Document management system (DMS+OCR), EDI data exchange and others.	9	Increase production capacity Reduction of costs Improve productivity Improve quality Improve reliability and risk reduction Flexibility Operation simplification Business predictability Process consistency
GoodAccess s.r.o.	To secure access to IT resources for small and medium enterprises. Development of the most usable SaaS for zero trust access management on the market, which is easy to deploy, manage, and use.	9	Reduction of costs Improve productivity Improve reliability and risk reduction Flexibility Operation simplification
Evolution Design s.r.o.	Custom development of embedded systems using microcontrollers and microprocessors (Atmel/Microchip, ST Microelectronics). It includes PCB design, firmware development, switchboard design and assembly, PLC programming (B&R, Siemens, and others), and robot programming (ABB, Kuka).	9	Increase production capacity Reduction of costs Improve productivity Improve quality Improve reliability and risk reduction Flexibility Customer accessibility

DEMO CENTER	**MISSION**	**SERVICES**	**INDUSTRIAL COLLABORATION**
Intemac Solutions, s.r.o.	Competence and innovation centre for Industry 4.0, leading industrial companies to global excellence, strengthens their courage and expands their knowledge for the implementation of new technologies, leading to an increase in their efficiency and competitiveness.	Expert consulting Professional training R&D services, such as digital twin, flexible manufacturing test before invest	Automated workstation to identify handle types Increase efficiency of small batch production Construction of a highly automated turning cell for part production

DigiLab	This open facility consists of an electronics lab, a workshop with technologies for 3D printing and virtual reality, and a polytechnic workshop. It serves to popularize technical education and to realize innovative or entrepreneurial ideas from students, companies, and the broader public.	3D printing prototyping Virtual Reality Simulation Electronics testing and development	Reduced prototyping time by 50%, leading to faster product development and market entry. DigiLab offered its electronics testing facilities, enabling the startup to conduct comprehensive testing and make necessary improvements.
EDIH CTU at the Czech Institute of Informatics, Robotics, and Cybernetics	Provide advanced solutions in digital technologies, automation, AI and cybersecurity, focusing on enhancing efficiency, productivity, and sustainability in manufacturing processes. Facilitate the adoption of cutting-edge technologies and foster innovation.	Digitalization Assessment and Simulation. Energy-Efficient Process Simulation. Cybersecurity and Digital Trust Testing.	IoT sensors and data analytics to monitor and optimize production in real-time. Testing and implementation of renewable energy solutions, such as solar and wind energy integration. Comprehensive cybersecurity testing and implemented advanced security measures, including blockchain technology.

Mapped experts are mainly academic representatives focused on green technologies. The most commonly addressed topics are Waste reduction & Recycling Technologies in the green field and AI and data analytics, and digitalization and connectivity as digital aspects.

EXPERTS			
GREEN TECHNOLOGIES			
NAME	**AFFILIATION**	**MARKET AREA**	**TECHNICAL EXPERTISE**
Josef Trögl	Jan Evangelista Purkyně University in Ústí nad Labem, Faculty of Environment	Pharmaceutical and Chemicals	Renewable energy technologies Waste reduction & Recycling Technologies Green & Sustainable Materials
Jan Leníček	Collaborating with the Technical University of Liberec (TUL)	Food & Beverage Pharmaceutical and Chemicals	Waste reduction & Recycling Technologies Green & Sustainable Materials
Jiří Brejcha	UJEP	Pharmaceutical and Chemicals Metal Plastics & Rubber Machinery & Equipment	Waste reduction & Recycling Technologies Green & Sustainable Materials
Jiri Pecka	Elevion Group	Electronics Food & Beverage Pharmaceutical and Chemicals Metal Plastics & Rubber Machinery & Equipment Building & Furniture	Renewable energy technologies Energy-efficient technologies
Viktor Tóth	Rooty s.r.o.	Plastics & Rubber Machinery & Equipment	Waste reduction & Recycling Technologies Green & Sustainable Materials
Martin Volf	Czech Technical University in Prague, University centre for energy efficient buildings	Building & Furniture	Renewable energy technologies Energy-efficient technologies Green & Sustainable Materials
Robert Wawerka	CTU in Prague, UCEEB	Electronics Machinery & Equipment	Energy-efficient technologies

DIGITAL TECHNOLOGIES			
NAME	**AFFILIATION**	**MARKET AREA**	**TECHNICAL EXPERTISE**
Lukáš Eršil	Inovační centrum Ústeckého kraje, z. s.	Electronics	Digitalisation & Connectivity AI & data Analytics
Michal Lattner	Univerzita J. E. Purkyně v Ústí nad Labem	Metal Machinery & Equipment	Digitalisation & Connectivity Automation & Robotics Additive Manufacturing
Roman Vaibar	Datové centrum Ústeckého kraje p.o. DRAKISA s.r.o. ETIKOS s.r.o. RABIAV s.r.o.	Electronics Plastics & Rubber Machinery & Equipment	Digitalisation & Connectivity AI & data Analytics
Michal Švehla	Freelancer	Electronics Food & Beverage Pharmaceutical and Chemicals Metal Plastics & Rubber Machinery & Equipment Building & Furniture	Digitalisation & Connectivity Automation & Robotics AI & data Analytics Cybersecurity & Digital Trust

The mapped facilitators are represented by academia and research partners mainly providing technology transfer services and competences.

FACILITATORS			
NAME	**AFFILIATION**	**COMPETENCES**	**MAIN SERVICES**
Michal Pácal	Inovační centrum Ústeckého kraje, z. s. Univerzita J. E. Purkyně v Ústí nad Labem	Technology Transfer Competences: project funding applications and management, business development and strategies, networking and relationship building	Securing funding for Industry 4.0 and Grenn 4.0 topics in manufacturing Training
Zdeněk Hušek	Inovační centrum Ústeckého kraje, z. s.	Technology Transfer Competences Business Competences for start-ups Business Competences Growing	Technology Transfer Product Development Business Models, strategy and planning Adopters scouting High tech product launch

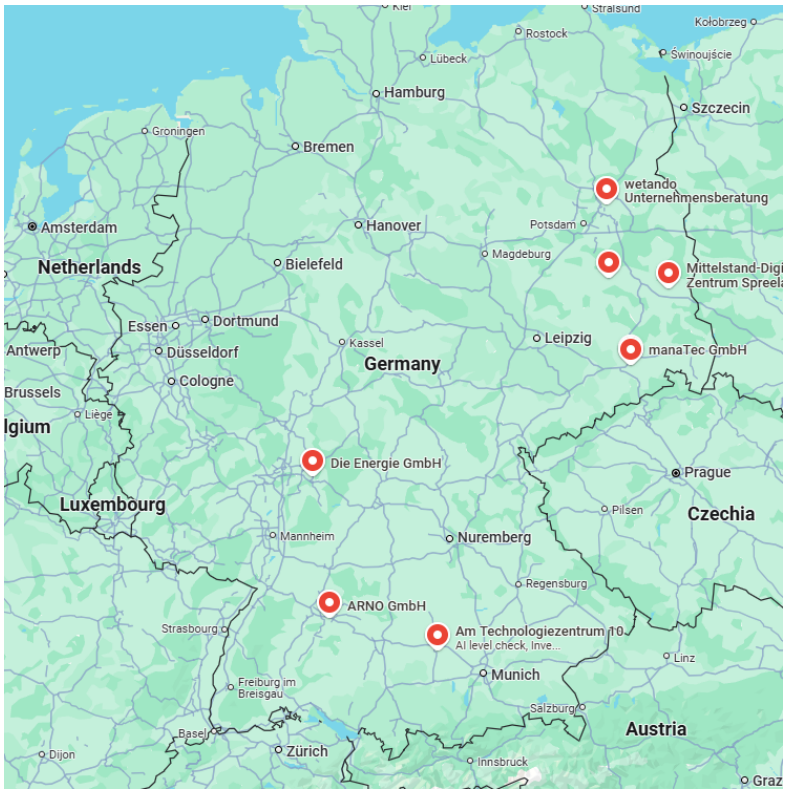
Czech Republic identified a couple of European Interreg projects that could represent a good opportunity for GREENE 4.0 cross-fertilization. The COEUS project, for example, supports the digital responsibility skills of SMEs proposing an approach that builds the capacity of SME employees to assess and take action to address identified issues. In addition, some national funding opportunities has been identified.

ADDITIONAL OPPORTUNITIES AND COMPETENCES		
PROJECTS	**GRANTS**	**EVENTS**
COEUS - Interreg Central Europe	High-speed internet, OP TAK (2021 – 2027) - Financed by Ministry of Industry and Trade of the Czech Republic	International Industrial Fair (Mezinárodní strojírenský veletrh) - Transnational fair organized by Veletrhy Brno, a.s.
StoreMore, DRP0200271 - Interreg Danube	NPO – DIGI pro firmu (Digi for company) – financed by European Union by Recovery and Resilience Facility	Amper – Smart & Connected World – transnational event organized by Veletrhy Brno, a.s. (Trade Fairs Brno a.s.)
Transformační centrum Ústeckého kraje - pilíř 2	Digital enterprise, OP TAK (2021 – 2027) – financed by Ministry of	

	Industry and Trade of the Czech Republic
H2CE project - Interreg Central Europe	Soft Loan for energy Saving Projects – financed by National Development Bank

4.3 Germany

The identified Source of Knowledge and Innovation Assets are shown in the map and reported in the following tables.



Germany has a strong presence of solutions providers and demo/lab both for green and digital technologies. In the first case, the mapped stakeholders mainly focus on energy consumption and environmental assessments. In the second case, digital technologies are less restricted and several tools and technologies are present, from AI to simulation, virtual reality, etc.

TECHNOLOGY SOLUTION PROVIDERS AND INNOVATION ASSETS			
GREEN TECHNOLOGIES			
COMPANY	TECHNOLOGICAL SOLUTION	TRL	BENEFIT
ARNIO GmbH	Engineering solutions to optimise products and processes in order to save resources and increase performance.	NA	Increase production capacity Improving productivity Flexibility Operations simplification Process consistency Customer accessibility
DieEnergiekoppler GmbH	Connection of renewable energy plants with the new-generation virtual	9	Improving reliability and risk reduction Flexibility

	power plant developed in-house, the flexibility plant, and enables renewable energy plants and battery storage systems to be marketed innovatively and efficiently on the energy exchange.		Customer accessibility Turnkey solution
Kreissler24 KG	Introducing new green materials in the distribution of lubricants, wheels and batteries	NA	NA
ManaTec GmbH	Emission Tracking to generate detailed CO2 footprints and GHG reports to analyse and understand the carbon impact. Strategic alignment to make informed decisions based on evidence-based emission calculation and thus increase the value of your products. Scenario Planning to explore strategies for reducing emissions through scenario planning tools.	8	Reduction of costs Improve reliability and risk reduction Improve quality Flexibility Operation simplification Business predictability Process consistency Customer accessibility
wetando Unternehmensberatung	Advise companies on the topic of sustainability and create a comprehensive sustainability strategy with an analysis of the actual situation, stakeholders and partners along the value chain as well as an individual concept (mission statement, CSR components, public relations, target control).	NA	NA

DEMO CENTER	MISSION	SERVICES	INDUSTRIAL COLLABORATION
Product and company related sustainability assessment and optimization	Evaluation of the environmental impact of products and production processes, including the carbon footprint. Integration of sustainability analysis.	Workshops Sustainability assessments Mapping and action plan Analysis of influencing factors	Product related sustainability assessment in automotive industry and wind power sector.
Simulation and evaluation of sustainable energy supply concepts regarding costs and environmental impact	Conceptual planning and assessment of the best suitable and sustainable energy supply solution for factory sites.	Energy monitoring systems Measurements protocols and tools Simulation for sustainable energy supply Roadmap for investment decisions	Supply of sustainable thermal and electrical energy and energy simulation for agricultural industry

DIGITAL TECHNOLOGIES

COMPANY	TECHNOLOGICAL SOLUTION	TRL	BENEFIT
ManaTec GmbH	Comprehensive ERP (Enterprise Resource Planning) solution designed to facilitate digitalization for	9	Production capacity increase Reduction of costs Improve productivity

	businesses of all sizes. It offers an integrated suite of applications that address various business needs, including accounting, inventory management, sales, HR, and more, all accessible through a single platform.		Improve reliability and risk reduction Improve quality Flexibility Operation simplification Business predictability Process consistency Customer accessibility Turnkey solution
Polychip GmbH	Confioty is an AI-based planning and configuration tool for IoT-systems and sensor networks. With a focus on industrial and manufacturing use cases, it saves time in planning, documentation, device setup and deployment.	9	Reduction of costs Improve productivity Improve reliability and risk reduction Improve quality Flexibility Operation simplification Business predictability Process consistency

DEMO CENTER	MISSION	SERVICES	INDUSTRIAL COLLABORATION
AI Level Check	Determining the current AI level of the company as well as identifying the most suitable applications and products for the company.	AI level assessment Existing potentials in production and task prioritization evaluation Individual goals and recommendations	Conducted AI level check to assess current state of a manufacturing company Anomalies detection for an automotive company
Inventory digitization	Digital survey of production and logistics facilities for future planning measures. Identification of relevant future use cases for the collected data.	Workshops and training Laser scanners to create point clouds with linked panoramic images Processing measures to create digital machine models	Recording of the factory's inventory in order to know the actual and current conditions. Use of the point clouds and models generated in this way as a basis for planning.
Learning factory for networked production (LVP)	Learning games and customised workshop to discussed technologies and their benefits. These include shop floor management, digital assistance systems, auto-ID (such as RFID and UWB), digital quality assurance, production data collection, etc.	Awareness impact of digitalisation on both economic targets and different areas of work Methods and tools for a target-oriented digitalisation of production	Learning game networked production for a manufacturing company Expert input on establishment of a digitalisation centre or suitable demonstrators
Mittelstand-Digital Zentrum Spreeland	Enhance the understanding of digital transformation in SMEs and support the implementation of future-proof digital applications.	Practical support through digital applications, demonstrations, experience rooms, custom offers, and numerous practical example.	Implementation of a chatbot in customer service to increase efficiency Experience the new premises in VR to increases customer's interest and anticipation
Potential analysis for production systems with focus on factory layouts and intralogistics	Identification of potential in production layout and intralogistics, enabling objective decision support. Additional tools such as material flow simulations, laser scans for digitizing existing machines, or digital planning tables/XR applications for intuitive planning are used.	Potential Analysis in Existing Factory Layouts Development of New Factory Layouts Development of a Holistic Digital Factory Planning Process	Digitized factory using laser scanning to create digital model and evaluated layout of a metal processing factory Development of a new Factory Planning Process for an Automotive Supplier

Mapped experts are mainly academic representatives focused on green technologies. All the different topics and expertise are represented in the country and are available for all different sectors, excluded building & furniture. Digital technologies are more mature and more integrated also at industrial level, therefore experts are more required for green technologies, still uncertain and difficult to be addressed by companies.

EXPERTS			
GREEN TECHNOLOGIES			
NAME	**AFFILIATION**	**MARKET AREA**	**TECHNICAL EXPERTISE**
Sebastian Härtel	Panta Rhei gGmbH	Metal Machinery & Equipment	Renewable energy technologies Energy-efficient technologies Waste reduction & recycling technologies Green & Sustainable materials
Christoph Hoffmann	Fraunhofer IPA	Electronics Food & Beverage Pharma & Chemicals Metal Plastics & Rubber Machinery & Equipment	Energy-efficient technologies
Jan-Philipp Jarmer	Fraunhofer IML	Electronics Metal Plastics & Rubber Machinery & Equipment	Renewable energy technologies Energy-efficient technologies Waste reduction & recycling technologies Green & Sustainable materials
Kerstin Dobers	Fraunhofer IML	Plastics & Rubber Machinery & Equipment	Renewable energy technologies Energy-efficient technologies Waste reduction & recycling technologies Green & Sustainable materials
DIGITAL TECHNOLOGIES			
NAME	**AFFILIATION**	**MARKET AREA**	**TECHNICAL EXPERTISE**
Christoph Hoffmann	Fraunhofer IPA	Electronics Food & Beverage Pharma & Chemicals Metal Plastics & Rubber Machinery & Equipment	Digitalization & Connectivity Automation & Robotics AI & Data Analytics Cybersecurity & Digital Trust

The mapped facilitators have different competences and services able to support companies' twin transition.

FACILITATORS			
NAME	**AFFILIATION**	**COMPETENCES**	**MAIN SERVICES**
Michael Kaiser	Smart Systems Hub GmbH	Digital competences Technology Transfer competences Business competences for start-ups and growing companies	Thin[gk]athon Digital product factory Testbeds and IoT lab S9 Company Builder

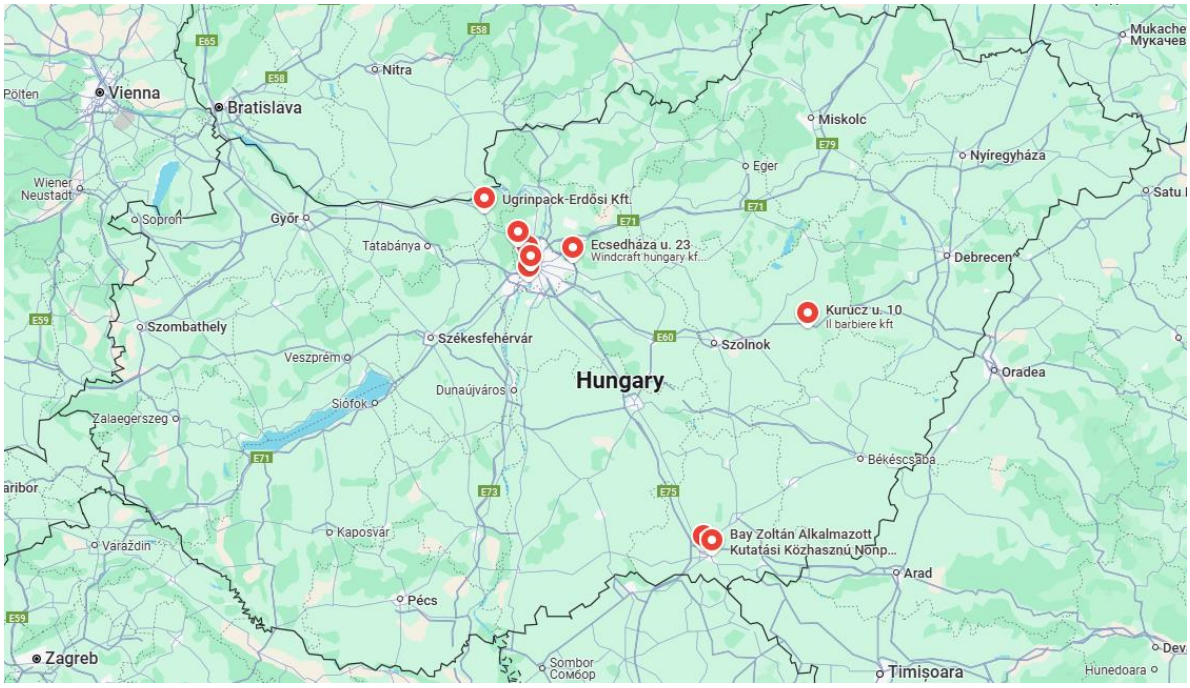
Anikó Lessi	Mittelstand-Digital Zentrum Chemnitz	Green competences Digital Competences Technology Transfer competences Business competences for start-ups and growing companies	Climate coaching Digitalization projects AI readiness assessment Technology foresight, strategy and impact assessment

Germany identified a couple of projects that could represent a good opportunity for GREENE 4.0 cross-fertilization. The EUROPE DIRECT Ostsachsen project, for example, promote inter-regional European collaboration explaining to citizens, companies and local governments the benefits to be part of the European Union and exploit national synergies. The Just Energy Transition Alliance (JETA),instead, formed within JETforCE project, is a regional association of civic, public and commercial stakeholders promoting the energy transition process and, consequently, the adoption of green technologies.

ADDITIONAL OPPORTUNITIES AND COMPETENCES	
PROJECTS	**EVENTS**
EUROPE DIRECT Ostsachsen - DG COMM (directly financed by commission)	Bautzen Energy Forum – national event financed by TGZ Bautzen
JETforCE - Just Energy Transition Alliance – Interreg CE	East Saxon Mechanical Engineering Days – transnational event financed by Interreg POL-SAX Project "Grüne Zukunft des Grenzraums"

4.4 Hungary

The identified Source of Knowledge and Innovation Assets are shown in the map and reported in the following tables.



Hungary has identified many different technology solutions providers and innovation assets dealing with green and digital technologies. Green technologies in two cases are less mature with a TRL 6-8, but in general the majority of mapped solutions are already commercialized and fully operative. Digital technologies are mainly focused on scheduling and production planning system.

TECHNOLOGY SOLUTION PROVIDERS AND INNOVATION ASSETS			
GREEN TECHNOLOGIES			
COMPANY	**TECHNOLOGICAL SOLUTION**	**TRL**	**BENEFIT**
BL Épker Kft.	Innovative solar roof system that integrates solar cells directly into roofing tiles, transforming rooftops into energy-generating surfaces without altering their aesthetic. The main objective is to provide an unobtrusive, eco-friendly alternative to traditional solar panels, making solar power more accessible to homeowners and businesses aiming to reduce energy costs and carbon emissions.	9	Reduction of costs Customer Accessibility
Il Barbiere Kft.	The AluCycle Refill System is a closed-loop, eco-friendly solution that utilizes reusable aluminum bottles for packaging barber products such as shampoos, styling gels, and conditioners. The primary objectives are to minimize single-use plastic packaging, reduce raw material usage, and offer customers a sustainable option at a competitive price point.	6	Reduction of costs Improve quality
Naturtex Kft.	The Thermal Water Cleaning System is a unique water-based technology to wash and disinfect feathers and down. Using crystal-clear thermal water heated to 32°C, this system ensures maximum cleanliness while meeting European environmental standards. The main objectives are to provide top-quality product hygiene, reduce chemical use, and uphold sustainability by purifying and reintroducing water back into nature at drinking-quality standards. The Buy-Back Programme is a sustainability initiative by Naturtex Ltd. that allows customers and partners to return used quilts and pillows for repurposing. The programme reduces the need for new raw materials, supports waste reduction.	9	Reduction of costs Customer accessibility
Polymeron Ltd.	The Real-Time Energy Monitoring and Material Planning System is designed to optimize energy consumption and improve efficiency. By equipping each machine with a power meter, the system provides continuous data on energy usage, allowing engineers to make adjustments based on material requirements. Additionally, PolymerOn strategically plans the order in which materials are processed, minimizing reheating times and reducing energy demands.	9	Reduction of costs Improve productivity Improve business predictability
UgrinPack-Erdősi Kft.	MonoMaterial is a sustainable packaging approach developed by UgrinPack Kft. that focuses on creating high-quality, customizable bags using single or multi-layer plastic films. MonoMaterial promotes recyclability	9	Reduction of costs Improve quality Customer accessibility

	and reduces environmental impact by simplifying disposal and recycling processes. The primary objectives are to enhance the sustainability of plastic packaging, support a circular economy, and offer clients adaptable and durable packaging solutions.		
Windcraft development Kft	Windcraft International has developed an innovative small-scale vertical axis wind turbine designed to provide efficient, sustainable energy in a compact, modular form. The turbine features a unique double-bladed design, modular scalability, and lightweight, recyclable aluminum materials. This solution aims to make wind energy accessible for various applications, enabling seamless building integration, low noise, and high performance even in non-direct wind conditions.	8	Reduction of costs Improve reliability and risk reduction

DEMO CENTER	MISSION	SERVICES	INDUSTRIAL COLLABORATION
Bálint Analitika	Bálint Analitika focuses on providing precise chemical analysis services to support quality control and regulatory compliance.	Chemical testing and certification for emission and waste reduction. Quality and safety test for recycled materials. Hazardous material identification.	NA
Bay Zoltán Nonprofit	Bay Zoltán aims to support Hungarian and international businesses through advanced R&D services, focusing on technology transfer, innovation, and industry collaboration.	Energy efficiency services. Mechanical testing for recycled materials. Green technology testing, such as environmental impact.	LCA and EDP certification for construction sector Prototypes of innovative electronics for sectors like healthcare and logisticsAlgae biomass production system that repurposes biogas plant byproducts
PolymerOn	Polymeron focuses on providing comprehensive material testing to ensure the quality and reliability of polymers, metals, and composites, supporting industries in quality assurance, defect detection, and material performance evaluation.	Testing for polymers, metals, and composite materials including automotive, construction, and manufacturing. Product prototyping	Composite material suitable for mass-producing automotive battery housings

DIGITAL TECHNOLOGIES

COMPANY	TECHNOLOGICAL SOLUTION	TRL	BENEFIT
BarberCloud ltd.	Digital platform designed for salons to streamline appointment management, customer interactions, and marketing. The main objectives are to enhance client satisfaction, improve operational efficiency, and maximize booking potential through intelligent scheduling, automatic reminders, and customer data insights.	9	Production capacity increase Reduction of costs Improve productivity Simplification of operations

Mom Barber Kft.	SmartFlow Scheduling Optimizer is a sustainable scheduling system designed to minimize energy consumption and optimize employee workflow. By clustering client appointments into efficient blocks, SmartFlow helps reduce energy use from equipment idle time and allows staff to avoid unnecessary waiting periods.	9	Increase production capacity Costs reduction Improve quality Simplification of operations
Seamasters products	The Production Management System is a digital solution designed to enhance Seamaster's pizza production by optimizing inventory, tracking waste, and predicting maintenance needs. Tailored for high-volume food manufacturing, this system aims to streamline resource usage, minimize waste, improve machine efficiency, and maintain compliance with food safety standards. The primary objectives are to support sustainable production practices, reduce costs, and ensure reliable output at high quality levels.	9	Production capacity increase Reduction of costs Improve productivity Improve reliability and risk reduction Improve quality Flexibility Operation simplification Business predictability Process consistency

DEMO CENTER	MISSION	SERVICES	INDUSTRIAL COLLABORATION
-	-	-	-

Mapped experts for green technologies have mainly competences on waste reduction and recycling technologies. Experts in digital technologies, instead, are mainly devoted to digitalization and connectivity, partially on automation and robotics and AI and data analytics.

EXPERTS

GREEN TECHNOLOGIES

NAME	AFFILIATION	MARKET AREA	TECHNICAL EXPERTISE
Eszter Balogh-Tanka	MGFU - Hungarian Economic Development Agency	Food & Beverage Plastics & Rubber Buildings & Furniture	Waste reduction & Recycling technologies
Peter Lankey	MGFU - Hungarian Economic Development Agency	NA	Waste reduction & Recycling technologies
Réti Éva	Újrahasznosító Akadémia	Plastics & Rubber	Waste reduction & Recycling technologies Green & Sustainable Materials

DIGITAL TECHNOLOGIES

NAME	AFFILIATION	MARKET AREA	TECHNICAL EXPERTISE
Ádám Szalai	Rock esports	NA	Digitalization & Connectivity Automation & Robotics
Anton Berzelius	Clearwater	Food & Beverage Metal Machinery & Equipment Building & Furniture	Digitalization & Connectivity
Döme Oláh	NA	NA	Digitalization & Connectivity AI & Data Analytics
Kovács Tamás	Self-employed	NA	Digitalization & Connectivity
Janek Bence	NA	NA	Digitalization & Connectivity
István Kovács	Vodafone	NA	AI & Data Analytics

The mapped facilitators have different competences and services able to support companies' twin transition, mainly focused on green technologies.

FACILITATORS			
NAME	**AFFILIATION**	**COMPETENCES**	**MAIN SERVICES**
Oliver Schiffer	MGFÜ Közhasznú Non-profit	Green Competences Business Competences for growing enterprises	Waste management Consulting Circular Economy Support Lifecycle analysis (LCA) Digital Transformation Consulting Sustainability Strategy Development
Novák Csaba László	MGFÜ Közhasznú Non-profit	Green Competences Business Competences for start-up Business Competences for growing enterprises Technology Transfer Competences	Waste management Consulting Circular Economy Support Lifecycle analysis (LCA) EU funding consultation and application support Strategic Planning for sustainable regional development & growth Navigating EU Funding for Local Projects

Hungary identified a list of national funding opportunities specifically dedicated to SMEs with the aim of increasing their productivity and added value through support for technological and organisational innovation. Furthermore, they identified two innovation projects: the flagship project of the Modern Sample Plant Programme I designed to bring Industry 4.0 opportunities closer to SMEs in the Convergence region and to set them on the path of development and EVOLUTION - Renewable Business Programme offering a comprehensive solution for businesses in generational change and in crisis.

ADDITIONAL OPPORTUNITIES AND COMPETENCES	
PROJECTS	**GRANTS**
Modern Mintaüzem Program - Modern Sample Plant Programme I	GINOP_PLUSZ-1.4.3-24 – financed by ERFA
EVOLÚCIÓ - Improving the operational and management practices of Hungarian SMEs	GINOP_PLUSZ-1.4.1-22 – financed by ERFA
	GINOP_PLUSZ-3.2.3-24 – financed by ERFA
	GINOP_PLUSZ-1.1.3-24 – financed by ERFA
	GINOP_PLUSZ-1.2.2-22 – financed by ERFA
	GINOP_PLUSZ-1.3.1-22 – financed by ERFA
	GINOP_PLUSZ-1.2.2-21 – financed by ERFA
	GINOP_PLUSZ-1.2.1-21 – financed by ERFA

4.5 Italy

The identified Source of Knowledge and Innovation Assets are shown in the map and reported in the following tables.

Italy has several technology solutions providers and innovation assets dealing with green and digital technologies. Green technologies in some case are less mature and strongly customized on specific products and materials, requiring physical assets. Digital technologies, instead, are flexible and infrastructures are related to specific areas, such as robotics and 3D printing.

TECHNOLOGY SOLUTION PROVIDERS AND INNOVATION ASSETS			
GREEN TECHNOLOGIES			
COMPANY	**TECHNOLOGICAL SOLUTION**	**TRL**	**BENEFIT**
Fibereuse Tech S.R.L.	Fibereuse Tech helps companies implement circular economy solutions in composite sector by transforming waste into new high-added value products.	6	Increase production capacity Reduction of costs Improving productivity Improving quality
RESILCO SRL	Technology for the recovery and valorization of industrial alkaline waste such as fly ash from Waste to Energy plants, steel slags, and dust abatement fumes.	6	Reduction of costs Turnkey solution
SABIO SRL	Design, development and production of materials that are responsibly sourced, completely recyclable and biodegradable.	9	Improving quality Customer accessibility
Mixcycling srl	All Mixcycling products are biocomposites. This means that they contain a percentage (from 10% to 70%) of organic fiber mixed with a polymer base that can be virgin, recycled or bio-based.	9	Customer accessibility Turnkey solution
CIRCULAR MATERIALS SRL	Patented technology for removing heavy and precious metals from industrial wastewater in a circular economy perspective.	9	Reduction of costs Improving reliability and risk reduction Turnkey solution

AEP Polymers srl	Starting from renewable resources, such as plant-derived fatty acid oils, bio-aromatics and lignin, chemically modifying and formulating into high bio-content resins, AEP is coupling the material selection and the synthetic approach to produce materials for industrial applications.	9	Process consistency Customer accessibility Turnkey solution

DEMO CENTER	MISSION	SERVICES	INDUSTRIAL COLLABORATION
CIRC-eV	European laboratory dedicated to the Circular Factory concept to help the manufacturing industry recover and reuse components and materials from hybrid and electric vehicles and promote new circular economy models for sustainable mobility.	Feasibility studies for Circular Economy Procedures and protocols for testing Reverse logistic Business Models	Disassembly process to dismantle battery packs Sorting and characterization of modules and cells Mechanical pre-treatment process

DIGITAL TECHNOLOGIES

COMPANY	TECHNOLOGICAL SOLUTION	TRL	BENEFIT
FEELERA SRL	One cloud platform to make easy and quick for every company in the supply chain sharing real time data on product, production, batches and their sustainability impact.	9	Improve the quality Higher flexibility Simplification of operations Customer accessibility Turnkey solution
Proxima Robotics s.r.l.	Software for mobile robotics, managing the single robot intelligence (safety, obstacle avoidance, optimal path planning) and the whole fleet (task assignment, traffic control, integration with machinery).	9	Reduction of costs Improving productivity Improving reliability and risk reduction Higher flexibility Improving business predictability
AISent S.r.l.	Meti aims to combine the know-how of the most expert operators with data. Using Causal Inference and AI the process is digitalized and the expertise present in the company to streamline processes, find the root cause of problems and restart production faster.	9	Increase production capacity Reduction of costs Improving productivity Improving quality Improving reliability and risk reduction Improving business predictability Simplification of operations Process consistency Turnkey solution

DEMO CENTER	MISSION	SERVICES	INDUSTRIAL COLLABORATION
JOiiNT LAB	Bridge research activities and industrial needs and create positive contamination. To facilitate technology transfer, the contribution of the whole innovation ecosystem is essential, and that involves research institutes, industrial partners, education hubs, and competence centres.	Test before Invest Co-design robotic solution Network of partner for deployment	Flexible and easily reconfigurable robotic workstation Robotic Assistant Robot Avatar for remote physical activity
Lisa Tech (Living Space for Additive Technologies)	Support companies and stakeholders concerning Additive Manufacturing: guide them in choosing the right material, the right technology, the right design, covering all the workflow steps	Education and training Consultancy and R&D Prototyping and production	Design optimization of an heat exchanger or the electric motor cooling jackets

	from the CAD design to the actual printing process.		
SMACT	Industry 4.0 Competence Centres grouping all the stakeholders with skills and experience in Digital Transformation, and wants to be the enabling platform that allows the entire production and social system to face the future and create value in the process.	Thematic demo factories where companies are guided to identify the most suitable development trajectories Digital Transformation Training	Demonstrate and test advanced automation on a real production cycle with advanced machine Demonstration of man-machine interface technologies (exoskeletons, laser guidance, AGVs, etc.) Digital Twin

Mapped experts are mainly academic representatives. In case of green technologies Italy is mainly focusing on waste reduction and recycling processes and green and sustainable materials. The most commonly addressed digital technologies, instead, are AI and data analytics, automation and robotics and digitalization and connectivity.

EXPERTS			
GREEN TECHNOLOGIES			
NAME	**AFFILIATION**	**MARKET AREA**	**TECHNICAL EXPERTISE**
Sarah Benham	STIIMA CNR	Electronics Machinery & Equipment	Waste reduction and recycling technologies
Marco Diani	Politecnico di Milano	Electronics Plastic and Rubber Building &Furniture	Waste reduction and recycling technologies
Marco Scatto	Università Ca' Foscari	Food & Beverage Plastics & Rubber Building &Furniture	Green and sustainable materials
Eleonora Di Maria	Università degli Studi di Padova	Plastics & Rubber	Green and sustainable materials
DIGITAL TECHNOLOGIES			
NAME	**AFFILIATION**	**MARKET AREA**	**TECHNICAL EXPERTISE**
Fabiana Pirola	Università degli Studi di Bergamo	Machinery & Equipment	Digitalization & Connectivity AI & data Analytics
Mirko Mazzoleni	Università degli Studi di Bergamo	Machinery & Equipment	Automation & Robotics AI & data Analytics
Francesco Ricca	University of Calabria	Machinery & Equipment	AI & data Analytics
Andrea Piccinini	Primopositum	Food & Beverage Machinery & Equipment	Digitalization & Connectivity Automation & Robotics
Sergio Gusmeroli	Politecnico di Milano	NA	Digitalization & Connectivity AI & data Analytics

Facilitators in Lombardy could be clusters, industrial consortia and consultancy companies that, not having technical expertise to directly develop and implement innovative green and digital technologies, could act as contact point among the different stakeholders of the ecosystem, supporting SME and facilitating their integration in a wider network.

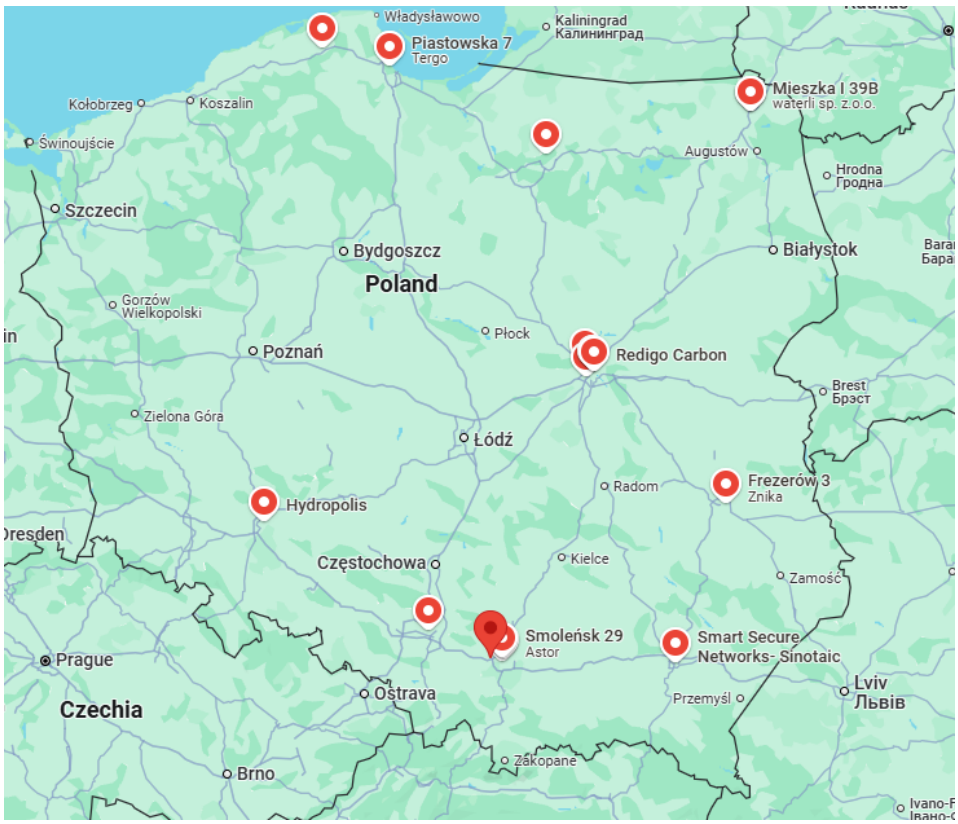
FACILITATORS			
NAME	**AFFILIATION**	**COMPETENCES**	**MAIN SERVICES**
Elena Mossali	Consorzio Intellimech	Waste management Circular Business Model Networking and relationship building	Opportunities scouting Market research Project management Trainings
Riccardo Varotto	NSBProject Srl	Circular Business Model	Advisory services on Circular Business Model Strategies CE Assessment Stakeholders' engagement

The northern regions of Italy are very active in terms of inter-regional collaborations in European projects. In the following table are reported some examples where Lombardy is leading green and/or digital activities dedicated to SMEs transition. These projects also represent a concrete opportunity for external stakeholders thanks to dedicated funding for the Open Calls, the development and availability of training materials, the organization of international events, etc. Together with European collaboration, regional funding opportunities are available to support SMEs twin transition and innovation.

ADDITIONAL OPPORTUNITIES AND COMPETENCES	
PROJECTS	**GRANTS**
AI-DAPT - Horizon Europe	COLLABORA & INNOVA - Financed by Lombardy Region within the PR FESR 2021-2027
AI REDGIO 5.0 - Horizon Europe	Interregional Innovation Investment (I3) Instrument Strand 1 – Financed by EU Commission
ARISE - Horizon Europe	
BATMASS – I3	
DEREMCO – I3	
EECONE - Horizon Europe	
PROSPECTS 5.0 - Horizon Europe	
SM4RTENANCE - Horizon Europe	

4.6 Poland

The identified Source of Knowledge and Innovation Assets are shown in the map and reported in the following tables.



Poland has mapped several solution providers both for green and digital technologies, with high TRLs. Demo centres and innovation assets, instead, are mainly digital covering Industry 4.0 topics. Several sectors are involved in the twin transition, well represented in the country. The main benefit of the proposed solutions are the reduction of costs, the improved quality and the increased productivity.

TECHNOLOGY SOLUTION PROVIDERS AND INNOVATION ASSETS			
GREEN TECHNOLOGIES			
COMPANY	**TECHNOLOGICAL SOLUTION**	**TRL**	**BENEFIT**
Leango s.c. Joanna Sagan, Agata Pasicka	IT tools for waste management are designed to automate and optimize waste handling processes. Targeted users include construction companies, waste management firms, and industrial businesses looking to streamline their waste management operations. The main objectives are to enhance operational efficiency, reduce costs, and ensure compliance with environmental regulations by providing real-time monitoring, precise data collection, and comprehensive reporting capabilities.	NA	Reduction of costs Improving productivity Improving reliability and risk reduction
Hydropolis sp. z o.o.	Vertical farming solutions through its Smart Crop and Plantainer systems. These solutions aim to revolutionize modern agriculture by providing efficient, scalable, and sustainable methods for indoor plant cultivation. The main objectives are to reduce water consumption, minimize the environmental footprint, and provide high-quality, pesticide-free produce year-round.	8	Increase production capacity Reduction of costs Improving productivity Improving quality Improving reliability and risk reduction Flexibility Improving business predictability Process consistency Turnkey solution
Tergo	Measure, maximize, and monetize their environmental actions. It provides tools to calculate and offset carbon footprints, promoting sustainable practices and reducing greenhouse gas emissions. The target users include both individuals seeking to reduce their personal carbon footprints and businesses aiming to achieve carbon neutrality and enhance their corporate social responsibility (CSR) profiles.	NA	NA
Znika	Znika offers innovative, biodegradable packaging solutions made from organic materials. The aim is to reduce plastic waste and provide sustainable packaging alternatives for various industries, including food, retail, and cosmetics. The solution targets businesses seeking environmentally friendly packaging options.	NA	NA
Upthermo	Organic Rankine Cycle (ORC) technology, which efficiently converts waste heat from industrial processes into clean electricity. By capturing and repurposing waste heat, our	9	Increase production capacity Reduction of costs Improving productivity Improving quality

	technology not only reduces energy wastage but also significantly contributes to lowering carbon emissions.		
Luna Scientific	Advanced aquaponic and hydroponic systems that optimize plant and fish production using IoT and AI. The systems address challenges in food production, especially in areas with limited water and energy resources. They target urban farmers, commercial growers, and regions with harsh agricultural conditions.	7	Increase production capacity Reduction of costs Improving productivity Improving quality Flexibility Operation Simplification
Ecopolplast	100% from recycled content - post-consumer recycled plastic and tyre rubber crumb, reduce CO2 emissions by up to 65% and save production costs. Lack of additives makes the Ecoplastomers easily recyclable and completely circular.	9	Reduction of costs Improving productivity

DEMO CENTER	MISSION	SERVICES	INDUSTRIAL COLLABORATION
-	-	-	-

DIGITAL TECHNOLOGIES

COMPANY	TECHNOLOGICAL SOLUTION	TRL	BENEFIT
OneMeter	OneMeter is a versatile energy monitoring system designed to read data from electric meters. It aims to provide real-time energy consumption insights and enhance energy management for various users, including residential, commercial, and industrial clients. The primary objective is to help users optimize energy usage, reduce costs, and support sustainable energy practices through accurate and timely data collection.	NA	Reduction of costs Improving productivity Improving quality Improving business predictability
Sustainable Fashion Institute	Supptrail is a comprehensive supply chain management platform designed for the apparel and textile industry. It focuses on enhancing transparency and traceability in the supply chain. The platform includes supply chain mapping, supplier assessment and selection based on sustainability indicators, carbon footprint calculations, and product tracking and authentication.	NA	Improving reliability and risk reduction Flexibility Improving business predictability Customer accessibility
Reliability Solutions Sp. z o.o.	RSIMS is a predictive maintenance platform: it utilizes AI and machine learning to predict and prevent equipment failures, optimize maintenance schedules, and enhance operational efficiency. The main objectives of RSIMS are to minimize unplanned downtime, reduce maintenance costs, and extend the lifespan of industrial assets.	9	Increase production capacity Reduction of costs Improving productivity Improving quality Improving reliability and risk reduction
Redigo Carbon Sp. z o.o.	The Net Zero Roadmap is a comprehensive platform to assist businesses in achieving carbon neutrality. It provides tools to calculate carbon footprint accurately, setting	9	Reduction of costs Improving reliability and risk reduction Flexibility

	emission reduction goals, and generating actionable plans to reach net-zero emissions.		Operations simplification Improving business predictability Turnkey solution
Waterly Sp. z o.o.	Real-time water quality monitoring using advanced buoys equipped with sensors that measure parameters like temperature, transparency, pH, oxygen levels, and conductivity. The data is transmitted to a central analytical platform, which processes it and provides user-friendly reports and alerts via a mobile app. This solution ensures continuous and accurate monitoring, enabling quick responses to changes in water quality, thus supporting environmental protection efforts.	7	Reduction of costs Improving productivity Improving quality Improving reliability and risk reduction Flexibility Operations simplification Process consistency Customer Accessibility Turnkey solution
Envirly (Quantifier Sp. z o.o.)	Envirly is a user-friendly web platform that simplifies ESG Reporting, Carbon Accounting, Product Lifecycle Assessment and CBAM. It facilitates comprehensive data collection, powerful analytics, target setting, and progress tracking, enabling effective sustainability initiatives.	9	Reduction of costs Improving productivity Improving quality Improving reliability and risk reduction Process consistency

DEMO CENTER	MISSION	SERVICES	INDUSTRIAL COLLABORATION
Astor Innovation Room	A state-of-the-art facility showcasing Industry 4.0 technologies in digitization, automation, and robotics. It offers interactive exhibits and workshops to inspire creativity and provide practical knowledge, serving as an educational hub for students, professionals, and industry leaders. AIR highlights the transformative impact of advanced technology on manufacturing.	Digital technology testing Optimizing energy consumption Operational processes in a manufacturing company	Accelerating deployment, improving safety, and optimizing production
Showroom Innowacji IoT	To showcase the latest Polish technological solutions in the IoT and Smart City domains. Its mission is to promote and demonstrate innovative industrial and business technologies		
Astor Robotics Center	Interactive showroom featuring over ten demo stations showcasing the latest robotics technologies. It offers tailored workshops and hands-on experiences with industrial robots and automation systems, promoting the adoption of robotics and Industry 4.0 solutions.	Optimizing internal logistics Automation of welding processes Robotization of product packaging	
Factory of the Future	The Factory of the Future, part of Bosch Rexroth in Warsaw, is an innovative lab showcasing Industry 4.0 technologies, offering hands-on experience with advanced automation to educate and inspire companies, partners, and students on digital transformation in manufacturing.	Testing IoT integration with production lines Testing advanced PLC control systems simulation and optimization of production processes	

Showroom 4.0	The Mitsubishi Electric Automation Center showcases Industry 4.0 technologies through interactive exhibits, featuring industrial robots and smart manufacturing solutions. It offers hands-on experiences with e-Factory concepts to inspire companies to adopt innovative automation and digitalization practices for improved efficiency and productivity.	Proof of Concept (PoC) and Pilot Deployments Testing of robotic production stations Monitoring and optimizing energy consumption

Mapped experts mainly support SMEs on energy-related topics and, in case of digital technologies, on cybersecurity and digital trust. They are affiliated to research organizations and clusters, able to connect the different stakeholders of the ecosystem.

EXPERTS			
GREEN TECHNOLOGIES			
NAME	**AFFILIATION**	**MARKET AREA**	**TECHNICAL EXPERTISE**
Joanna Kulczycka	Institut of Mineral Resources and energy management of the Polish Academy and Sciences, AGH University Science and Technology	Electronics Food & Beverage Pharmaceutical & Chemicals Metal Plastics & Rubber Machinery & Equipment Building & Furniture	Renewable energy technologies Energy-efficient technologies Waste reduction & Recycling technologies Green & Sustainable materials Carbon capture & Storage technologies
Janusz Kahl	South Poland Cleantech Cluster non-profit Sp. z o.o.	Electronics Metal Plastics & Rubber Machinery & Equipment Building & Furniture	Renewable energy technologies Energy-efficient technologies
DIGITAL TECHNOLOGIES			
NAME	**AFFILIATION**	**MARKET AREA**	**TECHNICAL EXPERTISE**
Marek Smolik	ICsec S.A.	Machinery & Equipment	Cybersecurity & Digital trust

The mapped facilitators are affiliated to the project partner Krakow Technology Park and offer networking services and competences to SMEs.

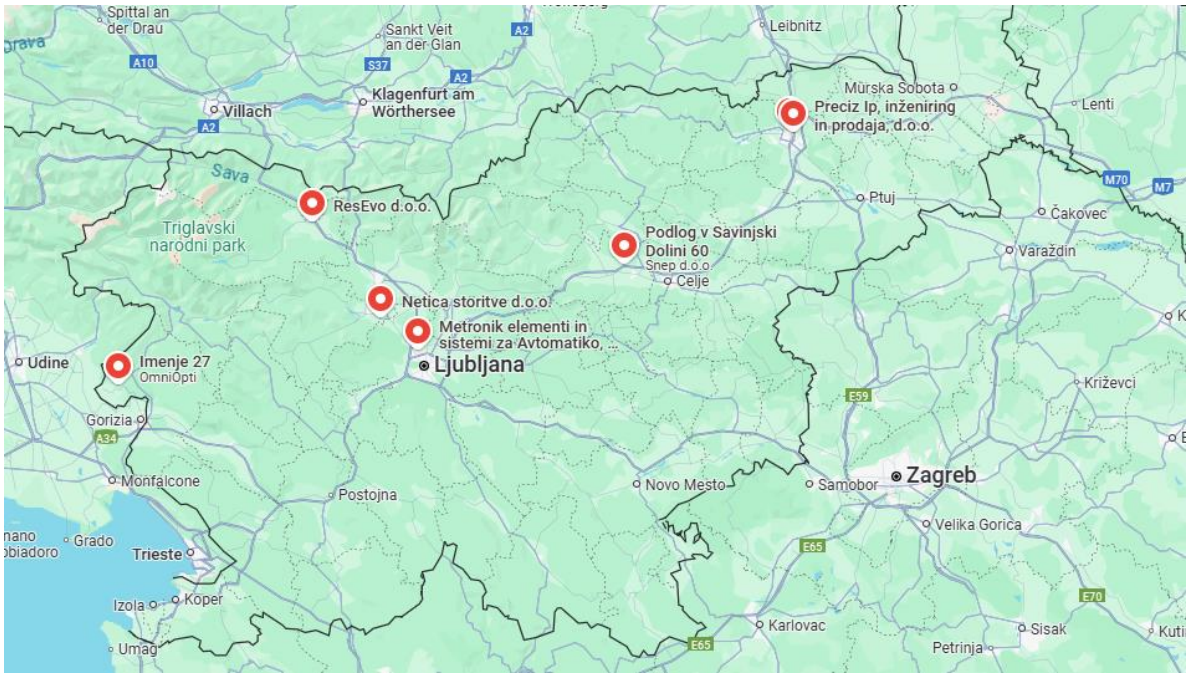
FACILITATORS			
NAME	**AFFILIATION**	**COMPETENCES**	**MAIN SERVICES**
Kacper Miodoński	Krakow Technology Park	Networking & Relationship Building	NA
Marcin Wilk	Krakow Technology Park	Business Planning and Strategies Strategic Planning and Execution	NA
Urszula Woźniak	Krakow Technology Park	Networking & Relationship Building	NA

Poland offers a variety of events, funding opportunities and collaborative projects where GREENE 4.0 could find synergies. The mapped projects are of different typologies, covering several EU programmes with different objectives (inter-regional collaboration methodologies, research and innovation actions, training and education, etc.).

ADDITIONAL OPPORTUNITIES AND COMPETENCES		
PROJECTS	**GRANTS**	**EVENTS**
SMART CIRCUIT- Interreg Centrale Europe	FENG Ecological loan- financed by European Funds for a Modern Economy (FENG) for 2021-2027	CIrcular week event with European Sustainability Congress 2024- organized by INNOWO
h4i, hub4inustry, eDIH- Digital Europe	FENG SMART Path- financed by European Funds for a Modern Economy (FENG) Program for 2021-2027.	Open Eyes Economy- organized by Foundation for Economy and Public Administration
AIRISE Open Calls- Horizon Europe	KPO A2.2.1 NCBR- implemented by the National Center for Research and Development (NCRD) is co-financed by the National Reconstruction Plan (NRP) and EU funds	2nd Distributed Energy Congress- organized by University of Krakow
IPR4SC- Erasmus+	Life Program- co-financed by the European Union European CINEA	
CIRCOTRONIC- Interreg Central Europe		

4.7 Slovenia

The identified Source of Knowledge and Innovation Assets are shown in the map and reported in the following tables.



Slovenia has several digital technology providers and innovation assets. Green technologies are increasing but still limited in the country. Digital technologies, instead, are widely deployed and cover several areas: IT, Artificial Intelligence, Robotics, automation, etc. The developed solutions are already available in the market, supporting the digital transformation of SMEs.

TECHNOLOGY SOLUTION PROVIDERS AND INNOVATION ASSETS

GREEN TECHNOLOGIES

COMPANY	TECHNOLOGICAL SOLUTION	TRL	BENEFIT
Snep d.o.o. PE	GreenTwin is a 3D digital twin platform for monitoring and managing everything from individual machines to the entire enterprise. The real-time 3D digital twin enables the management of facilities and assets, energy, carbon footprint monitoring, and OEE, ESG.	9	Increase production capacity Reduction of costs Improving productivity Improving the quality Improving reliability and risk reduction Higher flexibility Simplification of operations Improving business predictability Increased consistency of the process Greater accessibility to customers Turnkey solution
Metronik Elementi In Sistemi Za Avtomatiko,D.O.O.	MePIS Energy is advanced energy management software for efficient data collection and analysis to optimize energy consumption. It supports automatic and manual inputs, offers advanced analysis tools, and calculates specific consumption. Designed for diverse users, it includes a robust reporting tool.	9	Increase production capacity Reduction of costs Improving reliability and risk reduction Higher flexibility Simplification of operations Improving business predictability Increased consistency of the process Turnkey solution

DEMO CENTER	MISSION	SERVICES	INDUSTRIAL COLLABORATION
-	-	-	-

DIGITAL TECHNOLOGIES

COMPANY	TECHNOLOGICAL SOLUTION	TRL	BENEFIT
Netica d.o.o.	NetILab is a comprehensive data management and analytics platform designed to address the unique needs of the production industry. NetILab seamlessly integrates your internal and external data sources, providing a unified view for analysis.	9	Increase production capacity Reduction of costs Improving productivity Improving the quality Improving reliability and risk reduction Simplification of operations Increased consistency of the process Turnkey solution
Metronik Elementi In Sistemi Za Avtomatiko,D.O.O	MePIS MES simplifies managing material flow, operator activities, and machine efficiency in manufacturing. Key benefits include a centralized production overview, increased productivity through data integration, complete traceability of processes, enhanced production flexibility, and easier compliance with regulations and standards.	9	Increase production capacity Reduction of cost Improving productivity Improving the quality Improving reliability and risk reduction Higher flexibility Simplification of operations Improving business predictability Increased consistency of the process Greater accessibility to customers

			Turnkey solution
OmniOpti, d.o.o.	Stealth Routing is a fast, robust algorithm for multi-objective path optimization in networks. Currently applied to road transport, it identifies efficient alternative routes, reducing driven distance by 5-15%. The approach can also be used in areas like PCB design and vehicle wiring planning.	8	Reduction of costs Improving productivity Improving the quality Greater accessibility to customers
Preciz d.o.o.	Scale Monitor is a virtual scale indicator designed to simplify and digitalize the weighing process, adapt to workflows, and save time. It offers precise, fast, and cost-effective solutions without expensive equipment. Key goals include reducing carbon footprint, enhancing energy efficiency, and promoting sustainable, paperless operations.	9	Improving the quality Improving reliability and risk reduction Higher flexibility Simplification of operation Improving business predictability Greater accessibility to customers Turnkey solution
PRIOT Digital Systems	Solid Lab is a connected platform that digitizes and automates quality control in concrete production. It offers automated sampling, error reduction, full traceability, compliance with standards, and business analytics. Designed for large concrete plants, research institutions, and universities, it improves efficiency, ensures reliability, and fosters a sustainable, digital construction ecosystem.	9	Reduction of cost Improving productivity Improving the quality Improving reliability and risk reduction Simplification of operations Increased consistency of the process Greater accessibility to customers Turnkey solution
ResEvo d.o.o.	ASK.BI is a business intelligence platform that manages vast data, delivering tailored, relevant information within an organization's ecosystem. It simplifies access to data, enabling faster decision-making and improving real-time insights.	9	Reduction of cost Improving productivity Improving the quality Improving reliability and risk reduction Higher flexibility Simplification of operations Improving business predictability Greater accessibility to customers Turnkey solution

DEMO CENTER	MISSION	SERVICES	INDUSTRIAL COLLABORATION
Smart Factory Demo Center DC1	Pedagogical work (education of students in the field of production engineering) & research work in key areas such as distributed systems, edge computing and 5G technology, digitalization of production systems and processes, etc.	Development, testing, and validation of new architectural models for the Factories of the Future. Digitalization, Digital Twins Development, and Visualization.	Advanced Digital Twin system with AI for real-time worker guidance. Connection of the development department with the production line by restructuring the 3D product model into an assembly-focused structure tailored for manual worker guidance.
3DS demo lab	Innovation for evolving needs of the industry in the realm of 3D printing, 3D scanning and	3D scanning, 3D printing.	Optivus - picatinny rails for popular rifles, convenient

	reverse engineering revolutionizing various sectors.	Identification of materials, precise measuring. Reverse engineering, trainings.	clip-on adapters for night vision and thermal devices.
VIRS (Flex)	Virs specializes in automation /robotization of welding technologies in production processes practicing an individual approach for custom-designed tech solutions. Demo lab has evolved from show room to a test bed where multiple welding solutions are available for training, testing, including robotic welding cell.	Education & Training Practical testing Tailored/customized testing equipment setting (test before invest)	Automatic machine for flanging floorings of containers (2019). Flexible robot welding cell for adaptive welding (2018). Robot welding cell for welding BA activators (2020).
ABICOR BINZEL Varilna Tehnika d.o.o.	ABICOR BINZEL supplies for all working materials and applications the exact welding or cutting torch necessary. For the manual use or for the semi or full automatic operation. Air or liquid cooled. Wide range welding accessories as well as robotic peripheral systems.	Welding cobot cell - multiple welding techniques and sources, testing, custom adaptations. Plasma cutting cell. Welding virtual aids for specialized trainings and certification	Manual welding. Automated welding. Plasma simulation.
University of Ljubljana, Faculty of Mechanical Engineering - LASIM Laboratory	Reconfigurable modular production line with internal AGV and AMR logistics. There are 8 different production modules used for assembly, handling operations, warehousing, quality control, and material tracking.	Smart modular self-aware and self-recognition production lines. Connectivity, Communication, and Data Transfer Approaches. Digitalization, Digital Twins Development, and Visualization.	Daily energy consumption forecasting and metering system for IMP Armature d.o.o.

Green technologies experts mainly focus on machinery and equipment sectors to introduce green and sustainable materials, reduce waste and monitor energy-consumption. Digital technologies experts, instead, are more transversal and cross-sectorial, with particular expertise on AI and data analytics, digitalisation and connectivity.

EXPERTS			
GREEN TECHNOLOGIES			
NAME	**AFFILIATION**	**MARKET AREA**	**TECHNICAL EXPERTISE**
Žiga Jelen	Pomurje technology park, University of Maribor	Metal Machinery & Equipment	Waste reduction and recycling technologies Green & sustainable materials
Tanja Berglez Krivec	Chamber of Commerce and Industry of Štajerska	Machinery & Equipment	Green & sustainable materials Energy Efficiency Renewable Energy
Matej Zadravec	University of Maribor	Food & Beverage Pharmaceutical &Chemicals	Renewable Energy Waste reduction & Recycling technologies
Tanja Bagar	CEROP, ICANNA, PTP	NA	Carbon capture & storage technologies

Marko Šetinc	Geopolis d.o.o.	Pharmaceutical &Chemicals	Waste reduction and recycling technologies

DIGITAL TECHNOLOGIES			
NAME	**AFFILIATION**	**MARKET AREA**	**TECHNICAL EXPERTISE**
Ales Stempihar	Askit d.o.o.	Electronics Food & Beverage Pharma & Chemicals Metal Machinery & Equipment	Digitalisation & Connectivity Artificial Intelligence & Data analytics
Matej Zadravec	University of Maribor	Food & Beverage Pharmaceutical & Chemicals Machinery & Equipment	AI & data Analytics Digitalisation & Connectivity
Jure Trilar	University of Ljubljana	Electronics Machinery & Equipment Building & Furniture	AI & data Analytics Digitalisation & Connectivity
Muhamed Turkanović	University of Maribor	Electronics Food & Beverage Pharmaceutical & Chemical Metal Plastics & Rubber Machinery & Equipment Building & Furniture	Cybersecurity & Digital trust
Sandi Sukič	3DS d.o.o.	Metal Plastics & Rubber Machinery & Equipment	Digitalisation & Connectivity Additive manufacturing & 3D printing

Pomurje Technology Park and Askit d.o.o. act as facilitators, favouring the networking and relationship building activities as well as project funding application. Additional available services are Strategic Business Analysis, Digital Maturity Assessment, Mentoring and Consulting.

FACILITATORS			
NAME	**AFFILIATION**	**COMPETENCES**	**MAIN SERVICES**
Ales Stempihar	Askit d.o.o.	Technology Assessment and Selection; Digital Strategy Development; Provision of innovative& Emerging Technologies; Networking & Relationship Building	Strategic Business Analysis; Coaching; Mentoring & Consulting;
Maja Sušec	Pomurje Technology Park	Networking & Relationship Building Project Funding application	Digital Maturity Assessment Digital Strategy Preparation Digital Roadmap Creation
Sarah Vidmar	Pomurje Technology Park	Digital Marketing and customer Engagement Market Research Analysis Sales & Marketing Optimization	NA

Slovenia identified several projects related to green and digital technologies where SMEs are supported towards the twin transition. Furthermore, several national funding opportunities are available for local enterprises interested to innovation.

ADDITIONAL OPPORTUNITIES AND COMPETENCES	
PROJECTS	**GRANTS**
ARCHIMEDES - H2020	JR INVEST Sept 2024- financed by Ministry of Economy, Tourism and Sports (Slovene National)
CircThread -H2020	Incentives and loans for SMEs in Slovenia - P1 Plus 2024- financed by Ministry of Economy, Tourism and Sports (Slovene National)

DigiSocCirc - ESF	Incentives and loans for SMEs in Slovenia - P4LM 2024- financed by Ministry of Economy, Tourism and Sports (Slovene National)
F-Gases- LIFE	URE public tender and denunciation in industry - JR URE-Rvl- financed by Ministry of Economy, Tourism and Sports (Slovene National)
RESOURCE- H2020	V3 – Voucher for obtaining quality certificates- financed by Ministry of Economy, Tourism and Sports (Slovene National)
REUSE2030- Interreg Central Europe	
TANGO-Circular- Erasmus+	
TOP CLeveR - LIFE	

5. Comparative analysis

The Open Innovation Maps presented in the previous chapter are divided by country. In this final chapter, a comparative analysis among the different countries is performed to highlight the strengths and to share possible recommendations favouring interregional collaboration. It corresponds to the "Process Data" phase of the methodology.

A first consideration is about the **ability of partners to activate and involve the ecosystem**. More than 50 partners per country has been engaged through the usage of different tools: the online forms, the regional workshops and questionnaires. For Austria, Germany and Italy, the most effective tool were questionnaires, that means direct relationship with specific stakeholders through dedicated interviews to explore the proposed solutions. Poland and Slovenia, instead, exploited the regional workshops to involve the ecosystem, physically inviting the people and leveraging on the possibility of networking. These events could also merge several different opportunities to attract a consistent number of enterprises. Finally, for Hungary, the most effective tool was the online form thanks to the dissemination through social media and the website. This allowed to reach several stakeholders in their own network or through their contacts.

For the Open Innovation Maps, *the questionnaires* were chosen as the most relevant tool, because sufficiently detailed to describe the developed green and digital solutions to be added in the platform. A SME, in fact, should be able to understand and search specific technologies according to its needs in terms of location, technological requirements, availability, testing opportunities, etc. To do so, detailed information should be collected and integrated in GREENE 4.0 platform.

According to the mapped solutions summed up in Figure 26, it emerged that Austria mapped a limited number of **green technologies** that also appear less mature in terms of TRL. Also in Italy and Slovenia physical assets are strongly customized and depend on the type of product/material to be treated, but they have been mapped with a more significant number and involving different sectors. In Czech Republic, instead, it has been notice that some green technologies are digital ones, mainly related to the monitoring and assessment of companies' environmental impact. This allows TRL comparable with all the other digital technologies not strictly related to circular economy. Experts on green technologies are present in a predominant way in Germany, Czech Republic and Poland as a sign of an increasing industrial request of green expertise and competences. Enterprises are already familiar with digital technologies and search for more and more partnerships able to decrease their environmental footprint, filling the gaps that currently exist on that topics and integrating new competences.

Concerning **digital technologies**, they are in general well represented in each country, except for innovation assets of Hungary. In the future phases of the projects, Hungary will try to attract also this type of stakeholder in order to offer to local SMEs also the possibility to access to these infrastructures able to test innovative digital solutions before the industrial deployment. In all countries the main widespread expertise are focused on AI and Data Analytics and Digitalization and Connectivity. Poland also showed a strong interest for cybersecurity and digital trust.

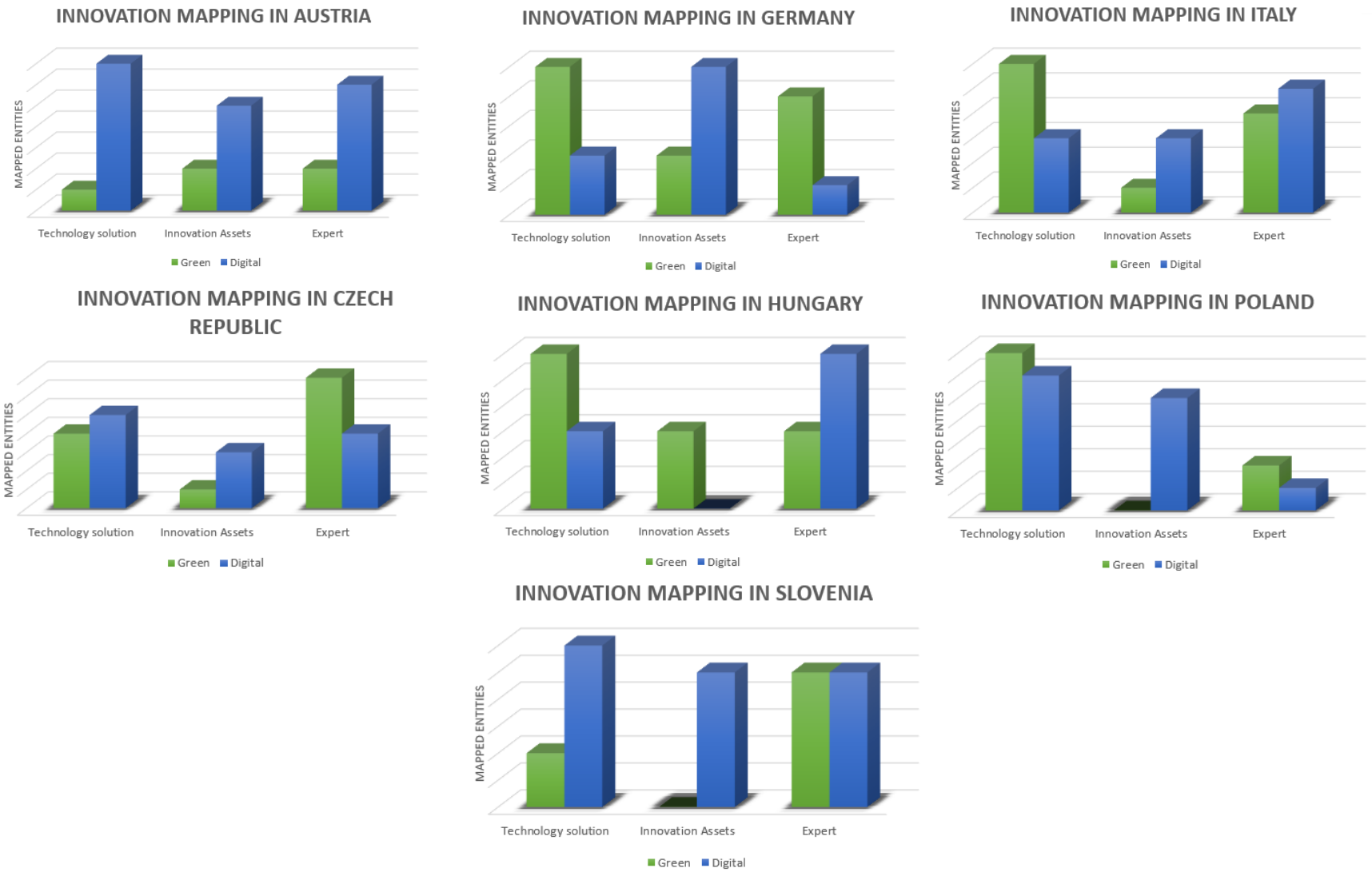


Figure 26: mapped solutions, assets and experts in each country.

Looking at the aggregated graphs in Figure 27, digital technologies appears in general widely deployed in all countries with solutions already present in the market and with high TRL. The variety of tool and mapped solutions is significative and they are more flexible and transversal with respect to green technologies. Flexibility is a key feature and physical infrastructure are required more for robotics and additive manufacturing areas. With respect to digital technology solutions, innovation assets and experts that will be well represented in GREENE 4.0 platform, green innovation assets are the category less represented. Project partners will increase efforts in this direction, trying to understand if it is due to a limited mapping activity or if it is an indication of real ecosystems, where this type of actors is still not diffused.

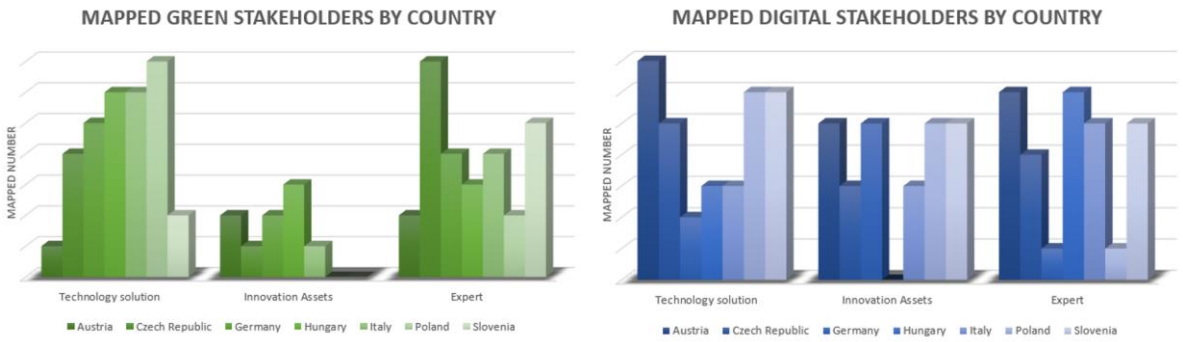


Figure 27: mapped green and digital stakeholders compared by country.

Detailing better the mapped technology solutions, it emerged that the main driver for their deployment at industrial level is the **reduction of costs**. In terms of green solutions, it is mainly related to the reduction of wasted materials and their expensive disposal, focusing on their recyclability, but also the possibility to unlock new businesses thanks to their reuse in other applications. For digital technologies, instead, costs reduction is a consequence of an increased efficiency of the process and the ability to predict and simulate each step maximising the scheduling of resources and reducing times. As reported in Figure 28, the other indicators have the same importance in the adoption of green solutions and, as mentioned before, flexibility is difficult to reach, because the technologies often focus on a specific product/sector with its peculiar characteristics.

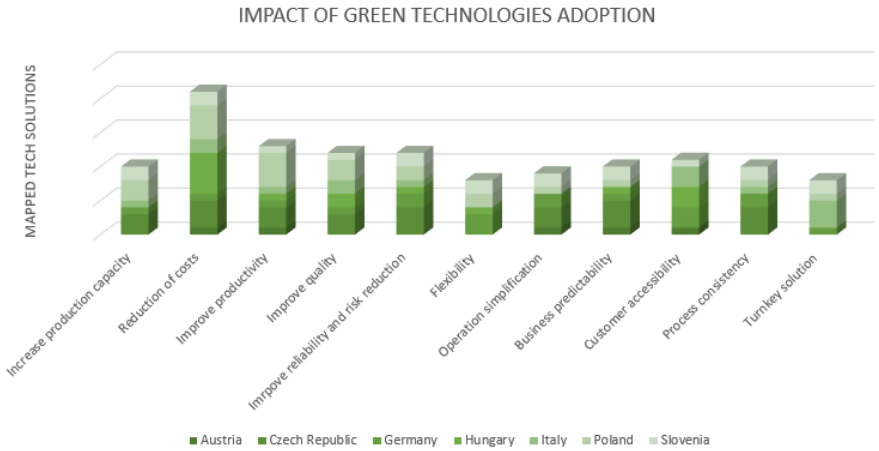


Figure 28: impact of mapped green solutions on industrial processes.

On the contrary, for digital technologies flexibility is one of the major drivers, as reported in Figure 29. SMEs are attracted by digitalization thanks to the possibility to easily customize solutions on their specific industrial context: the technology remains the same and, changing parameters, it could be applied to different productive scenarios. For this reason another driver frequently mapped was the improvement of reliability and the reduction of risk.

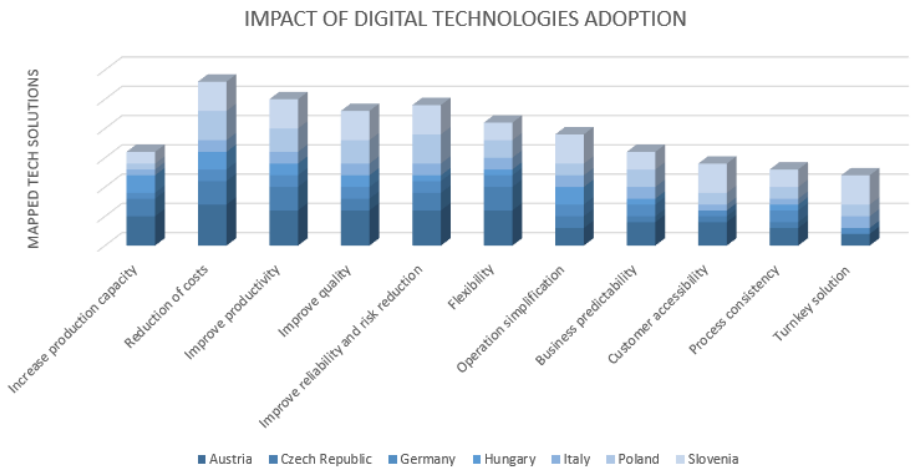


Figure 29: impact of mapped digital solutions on industrial processes.

Concerning the mapped innovation assets, one interesting factor to be analysed is the **sectorial coverage**. Green technologies are selective in terms of target sectors and electronics and plastics sectors resulted the most addressed (Figure 30). In general, high added-value products and materials allow the development of technically and economically feasible solutions, in particular in electronics, as well as the perspective of large volumes to be treated, as in case of metals and plastic sectors. In the most recent years, the interest is also stimulated by the increasing amount of normative involving Wasted Electronics and Electric Equipment (WEEE), batteries components and plastics. Food and beverage sector, instead, results more difficult to address due to stricter requirements in terms of food safety and compatibility.

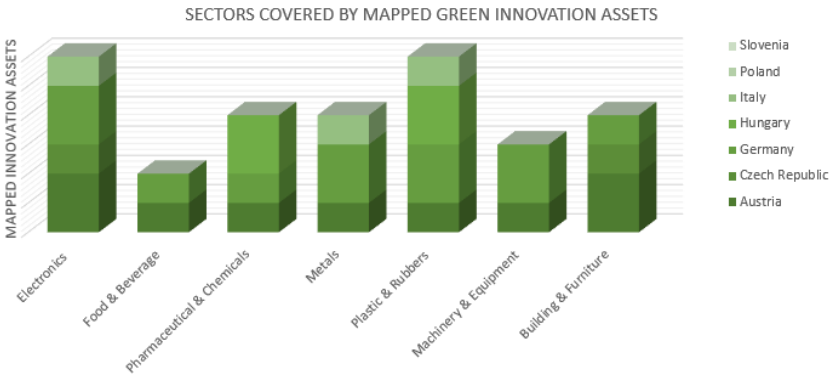


Figure 30: target sectors for the mapped green technologies.

Digital technologies, instead, could be applied in an easier way to several industrial sectors just changing requirements and working conditions. In general, machinery and equipment are a key focus area for all the mapped countries, dealing with a new idea of factory: smart, safe and human-centric, as stated by Industry 4.0 and 5.0 principles. In this sense the integration of digital technologies allow to support human operators during dangerous and heavy tasks, to increase the efficiency and reduce human errors, to reduce production times and to predict different scenarios to be able to face any kind of unexpected event. Electronics is the other addressed sector, also because it already integrates several digital features in its products, making the transition smoother than in other sectors and with already internal competences and expertise available in the company. Food and beverage and pharmaceutical and chemical sectors, instead, are less represented in this preliminary mapping, except for Austria, Germany and Poland.

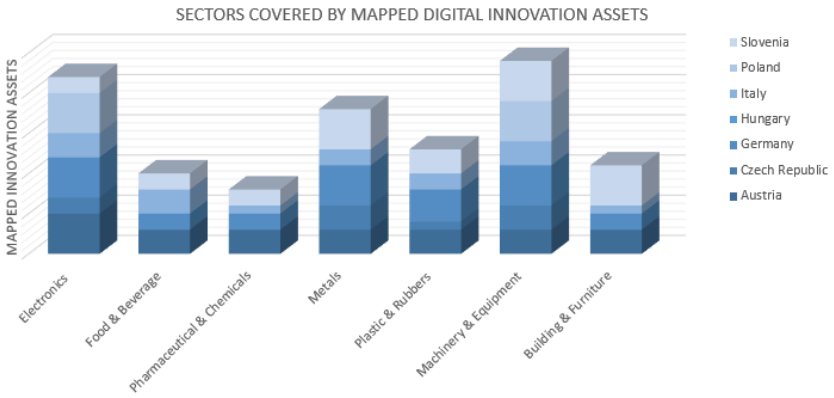


Figure 31: target sectors for the mapped digital technologies.

Of course, this analysis is performed on the mapped stakeholders preliminary involved and engaged by GREENE 4.0 partners. The identified solutions will represent the basis for the platform development and deployment and could attract always new technology providers and demo centres in the future, enlarging the community and the national ecosystem analysis. As can be seen by the maps created for each country and reported in Chapter 4, also the **geographical distribution** of the mapped actors differs a lot. Austria, Czech Republic and Italy identified actors mainly located in one specific region or area of the country. Slovenia, Germany and Poland, instead, mapped the main actors on the whole national territory.

Together with the presence of already developed solutions and the availability of innovations assets to perform some *test before invest*, the local ecosystem is also supported in the twin transition by the presence of **experts**, mainly academic people that foster research and innovation according to the evolution of industrial needs. In this case, they can offer services in terms of technological scouting, preliminary feasibility studies, consultancies, access to funding opportunities, networking and positioning at European level, etc. A different perspective that changes also the results of sectorial analysis with respect to the preliminary mapped innovation assets.

As reported in Figure 32, green experts are mainly interested in plastics and rubbers and machinery and equipment sectors, not fully addressed in the past years. On electronics and metals, in fact, lots of discussions has been done in the last decade towards circular economy and companies are already working in this direction, forced by the WEEE normative, the Extended Producer Responsibility issues, the limited primary raw materials available in Europe, etc. Composite materials, specific types of plastic products and machinery and equipment, instead, still need to identify technological solutions for recycling and reuse and solutions are still at low TRL phases, involving the academic and research organizations.

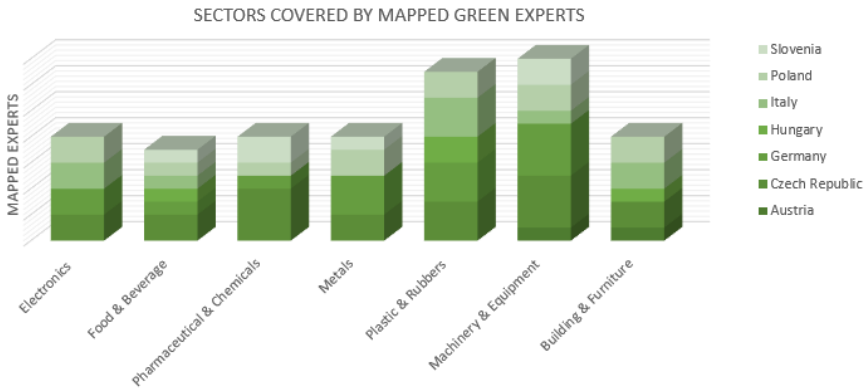


Figure 32: addressed sectors by the mapped green experts.

Concerning experts dealing with digital solutions, instead, machinery and equipment is the most addressed sector (Figure 33), the sector most closely identified with the traditional factory concept. Here the requests of competences for a digital transition are increasing, particularly in Austria, Czech Republic, Italy and Slovenia.

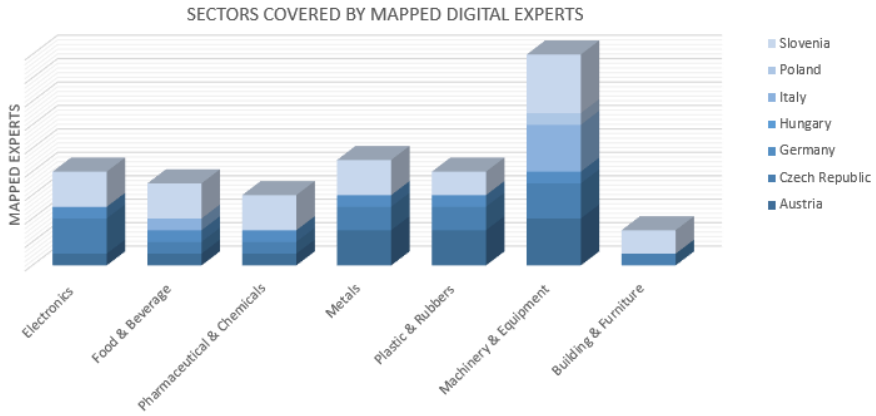


Figure 33: addressed sectors by the mapped digital experts.

Experts present in the Open Innovation Maps have been also analysed in terms of specific competences and **areas of expertise**. In case of green solutions (Figure 34), they mainly focus on waste reduction and recycling technologies, where there are representatives for each country. Also green and sustainable materials are well addressed, particularly in Czech Republic, promoting a good sharing of knowledge and best practices. Completely missing in the mapping, instead, experts on carbon capture and storage technologies that will be investigated in the future phases of the project. In general, Hungary is the country with a lower amount of mapped experts on green solutions.

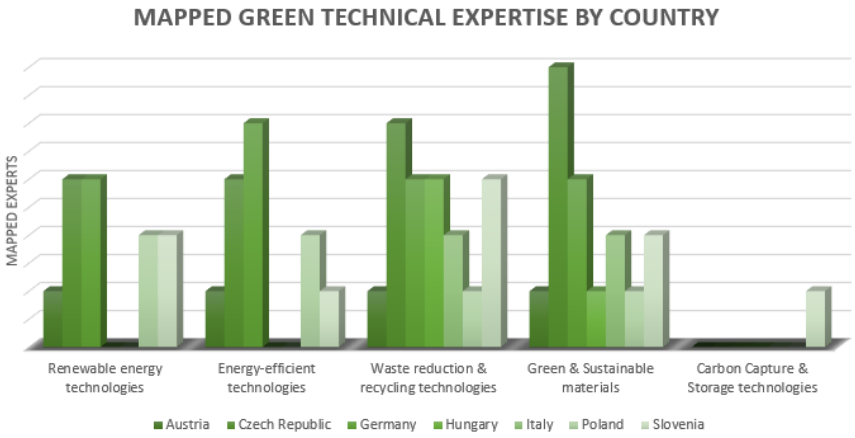


Figure 34: mapped green expertise.

The competences on digital solutions are mainly focused on digitalisation & connectivity and Artificial Intelligence & data analytics in all countries except in Poland, where the experts mostly focus on cybersecurity and digital trust. Additive manufacturing & 3D printing experts are not represented in Hungary, Italy and Poland, that will try to integrate also this type of competences during the following phases of the project. This could be observed in Figure 35 and, of course, is a consequence of the industrial needs and requests towards the concept of Industry 5.0, where machines and equipment are well connected and data are used for the monitoring and optimization of processes.

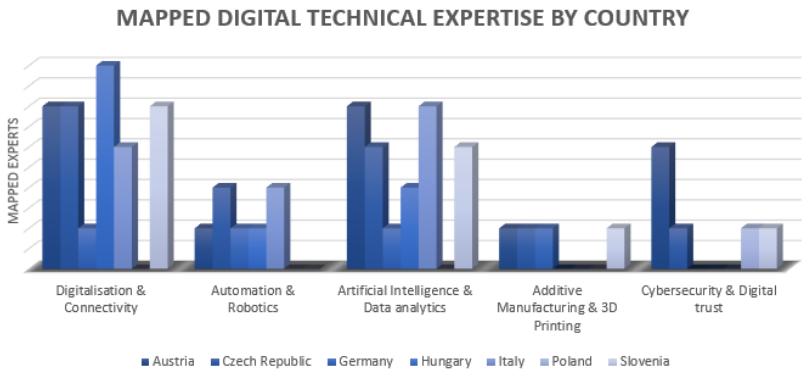


Figure 35: mapped digital expertise.

Finally, the exploitation of **synergies with other projects** could support the dissemination and diffusion of this mapping also outside the restricted ecosystem of GREENE 4.0 partners, in other regions and other European countries. For this reason, different EU projects have been reported as an additional opportunity for the project (Figure 36). All partners, in fact, are aware and involved in others inter-regional projects and initiatives on which they could leverage. Despite Austria and Czech Republic reported mainly Interreg projects, other partners showed a presence also in other EU funding programmes (Horizon, I3, Erasmus +, LIFE, etc.). This is encouraging and promising because Interreg projects are mainly collaborative initiatives connecting several EU countries able to disseminate GREENE 4.0 approach and tools, while HE projects are more technical and could be a source of innovative technologies to be mapped and put at disposition of SMEs for the green and digital transition. Furthermore, alternative funding opportunities have been identified, also at national and regional level (particularly in Czech Republic, Hungary, Italy and Slovenia).

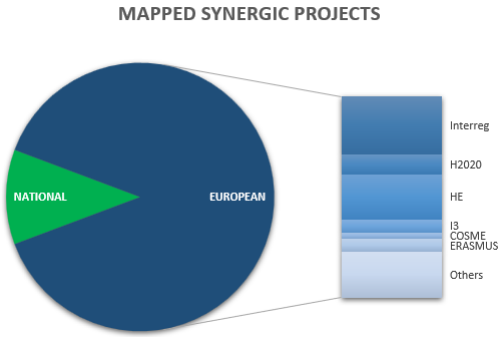


Figure 36: mapped synergic projects.

Finally, partners mapped grants and events as reported in Figure 37. Czech Republic, Hungary, Poland and Slovenia presented lots of local funding opportunities, at regional and national level, able to support the digital twin transition of SMEs. For events, instead, there is a good representativeness also at international level.

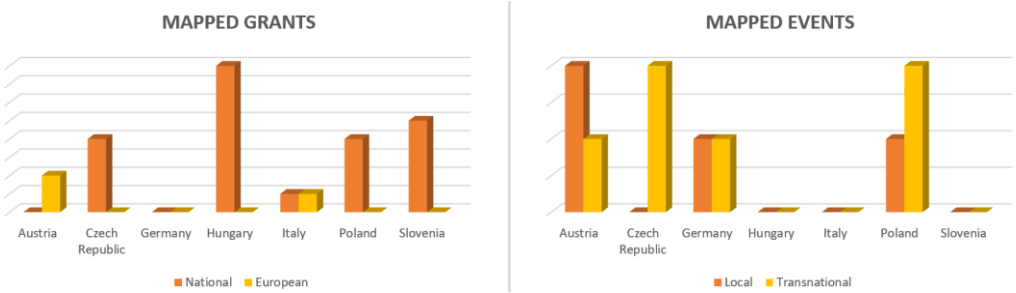


Figure 37: mapped grants and events in each country.

Conclusion

The purpose of this document is to map the regional innovation stakeholders that could support SMEs green and digital transition. Particularly, this Deliverable provides an overview on the GREENE 4.0 actions and developed tools during Period 2-3 for the *Activity 2.1 "Digital and Green Open Innovation Mapping"*.

In the first chapter GREENE 4.0 methodology has been explained through its iterative 6-step process: acquire data, manipulate data, store data, process data, visualize data and enrich data. The clear definition of the stakeholders to be mapped and the preliminary requirements to be considered, such as the addressed operational processes, the target green and digital focus areas and the priority market sectors, have been set to ensure partners' alignment in the collection phase. Then, the list of developed tools has been reported. For the regional Innovation Workshops, the deliverable describes the objectives, the target, the suggested structure and organization (also integrating brainstorming and focus group activities). Then the online form for the "Call for Offer" and the Excell questionnaires divided into 6 categories are reported.

The data collected and stored in the repository by each GREENE 4.0 partner have been used to create 7 national Open Innovation Maps. Different tables have been compiled to highlight the main characteristics of the mapped stakeholders. Technology providers and innovation assets has been described in terms of proposed solution and available infrastructures, Technology Readiness Level (TRL), benefits and existing industrial use-cases. Experts and facilitators are listed outlining their target markets and competences available for SMEs. Finally, the main ongoing projects, the most promising grants and the most interesting events have been collected as additional opportunities to exploit GREENE 4.0 project results.

The Open Innovation Maps also represented a way to understand the actual situation of the involved countries in terms of digital and green technologies: if one is more present than the other in a region, if there are specializations or missing areas, etc. Therefore, a final chapter was dedicated to a preliminary comparative analysis to highlight strengths, weaknesses and differences among the involved countries. This could act as basis for future inter-regional collaborations and promote the exploitation of transnational synergies towards a more competitive and resilient European industrial ecosystem.

The deliverable is a comprehensive document that describes the first mapped stakeholders, but the activity should not be considered closed. Until the end of the project, and even beyond, the partners will commit to engage more stakeholders from their own regional ecosystem, diffusing GREENE 4.0 objectives and opportunities in events, social media, website, etc. When the project platform will be available online (Activity 3.5 concerning the development of GREENE 4.0 innovation platform), a massive communication and dissemination will promote it and encourage always more technology providers and innovation actors to join this initial basis.