



PRIORITY: INNOVATION AND KNOWLEDGE DEVELOPMENT

Interreg 
CENTRAL EUROPE
European Union
European Regional
Development Fund

ECOS4IN



INNOVATION CAPACITY BUILDING FOR INDUSTRY 4.0

INTRODUCTION

ECOS4IN project connected the partners from CE countries that have specific idea about expected impacts of Industry 4.0 implementation and wants to involve the entities from other regions dealing with similar problems. There is a strong common intention of partners to find new creative ways how to use the opportunities of Industry 4.0 and other technologies called “advanced manufacturing systems” while eliminating the risks. Different European Community and OECD studies show the most of countries in CE need to improve the innovation ecosystem and platforms for stakeholders to become involved into Industry 4.0.

The 4th industrial revolution is inevitable and will affect all industrial sectors. The impacts of the Industry 4.0 depend on readiness of regions to respond, accept and adopt the changes. Our model supports the sustainable cooperation of actors of innovation systems to strengthen and prepare the regional innovation capacities in CE area for such changes.

The information gained by ECOS4IN analysis was used in the process of describing the Industry 4.0 ecosystem model, which defines the components and links among them. Partners adjusted this general model to the regional conditions and context in the work package of pilot testing.

Our ecosystem model is built on six main pillars:

1. Infrastructure – shared labs, open facilities,
2. Critical Interdependencies – different type of connections promoted by events, workshops, conferences.
3. Intermediaries like different business support organisations, clusters, digital innovation hubs, regional development agencies, usually with function of regional information hub.
4. Knowledge Agents – Universities and R&D centres (public, private), knowledge databases etc.
5. Financial tools - public and private resources for bridging the gaps in digitization implementation.
6. Job Tools – different tools for skills identification, HR motivation and matchmaking.

Central Europe is very heterogeneous area consisting of developed regions with well performing innovation systems characterized by strong links among its actors as well as of mostly rural and peripheral regions characterized by low level of research and development and weak linkages within the innovation system. We have recognized that there are some differences in focus/target which is conditioned by innovation performance/digital ecosystem maturity.

- Well-developed regions focus on strengthening collaboration between local and International players and „fine tuning” of regional network. Important is also focus on segment SME/micro companies.
- Middle developed regions focus on awareness actions and support tools development. Main target groups seem to be midcaps and SME, important is also increasing number of knowledge agents.
- Less developed regions focus on strengthening role of intermediators, awareness action and promotion of successful pilots (early adopters’ actions).

In workpackage 3 ECOS4IN partners identified some pilot actions which bridged the gaps between situation in region and “ideal ecosystem model”:

Partner	Actions
USTI REGION- LEAD PARTNER - CZECH REPUBLIC	Establishment of Digital Innovation Hub, Awareness actions, I 4.0 expert’s database
CÀ FOSCARI UNIVERSITY OF VENICE - ITALY	Development of virtual tools for ecosystem development
PANNON NOVUM INNOVATION AGENCY – HUNGARY	Regional contact point, Education activities, Support for intra ecosystem communication, Networking.
BUSINESS UPPER AUSTRIA – AUSTRIA	Digital Information Hub, website digitalregion.at, I4.0 digital maturity model, networking
ENTER KOPRIVNICA D.O.O. – CROATIA	Establishing Digital Information Hub
GIACOMO BRODOLINI FOUNDATION - ITALY	Regional Info Hub Milano, TecniMetro – HR tool wide spreading, communication activities
MAŁOPOLSKA REGIONAL DEVELOPMENT AGENCY- POLAND	Information Hub, Educational activities, regional Events

Workpackage 4 focused on development of actions plan for digitization support. Each partner have different role in ecosystem development (knowledge agents, ecosystem orchestrators, business support organisation), so each organisation developed action plan in accordance with their role in ecosystem. There are different gaps and action ideas for WPT4, but it seems that some approaches will be same for each region.

- Open Innovations environment – sharing knowledge and infrastructure between regions.
- Life-long learning – not only universities but also vocational and non-formal learning.
- Technology acceptance especially in micro companies and SME – tailor-made tools for this target group.
- Support from public government is welcome especially for SME/micro companies and R&D/intermediaries’ sector.

In this brochure you will find more information about our best practises and action plan ideas.

We hope to find inspiration to further develop your regional ecosystems and strengthen the role of your organization in the joint efforts to introduce Industry 4.0 technologies and tools.

ECOSYSTEM MODEL FOR INDUSTRY 4.0

ECOS4IN intent was the strengthening the regions' ecosystems supporting the adoption of industry 4.0 technologies among SMEs and, more generally, SMEs' digital transformation. The word "ecosystem" is often used in a variety of debates: academic, wherein researchers in economics and business use the word to denote territorial systems populated by a variety of actors who interact to develop and commercialize innovation or to favor the entrepreneurial exploitation of existing knowledge; professional, wherein experts of innovation and start-ups focus on the importance of attracting given types of actors (e.g.: talent, higher education institutions, research centers, venture capital, technology providers); policy-related, wherein administrations and their exponents formulate strategies to attract, retain and nurture a lively set of innovative actors so to favor local economic and social development.

Despite its currency in these debates, the term ecosystem applied to the Industry 4.0 environment still lacks clarity in its definition and required, at the beginning of the project, an effort aimed at modeling it to collect actionable information from the different regions. The first two work packages of the project, thus, were devoted to the alignment of partners on a shared definition of the concept of ecosystem and on the consequent mapping of the regional ecosystems within the areas represented in ECOS4IN.

As far as the definition is concerned, the project focused on the concept of ecosystem intended as the set of "species" and "relations" among them that allow the attainment of a given innovation outcome. In our case, in particular, the aim of the proposed model was that of capturing:

1. The formal institutions, sustaining region-level efforts to favor industry 4.0 adoption;
2. The economic actors involved in triggering the adoption of such technologies (e.g. fund providers, both public and private, investors);
3. The institutional actors generating and processing valuable information, knowledge and contributing to the development of adequate competence and professional profiles (e.g. Universities, post-secondary education institutions, TVET organizations, research centers)
4. Firms (SMEs in particular) and their representative associations;
5. Technology providers, both intended as firms involved in the development and commercialization of technologies and consultancies specialized in mentoring SMEs towards mature models of IT adoption;
6. Programs, initiatives and policies aimed at supporting the adoption of industry 4.0 technologies;
7. Local communities, generally intended as the stakeholders feeding many of the underlying processes of innovation and having expectations on the results of policies and initiatives.

The elaboration of such a definition allowed the Ecos4in partners to map their ecosystems, singling out actors, flows among them and policy-making initiatives that characterize the local environment. The partners mapped their regions focusing on three main areas: the economic structure of the region, the species (that is, the type of actors populating a given area) and the policies, as symbolized in fig. 1.

Fig.1: Mapping ecosystems in ECOS4IN

METHODOLOGY

ECONOMIC STRUCTURE	SPECIES	POLICIES
<p>Aim:</p> <ul style="list-style-type: none"> • Mapping the economic and social structure of the region • Unpacking data and figures related the current readiness of economic operations Industry 4.0 as well as to the indicators of potential evolution • Comparing regional data 	<p>Aim:</p> <ul style="list-style-type: none"> • Mapping actors / institutions involved Industry 4.0 / digital initiatives • Focus on universities and education institutions: research centers/labs (private and public), technology transfer entities, consultancy firms, technology providers public institutions 	<p>Aim:</p> <ul style="list-style-type: none"> • Unpacking the most relevant policies and initiatives related to Industry 4.0, particularly for (not not limited to) SMEs • Understanding the state of implementation of Industry 4.0 in the partners regions, their receptiveness and narrative around its objectives and importance, and the result achieved

As far as the economic structure of the regions, what stood out is the relative position of each one when it comes to their innovation potential and endowment of innovation-fostering capabilities, as expressed in fig. 2.

Fig. 2: ECOS4IN regions' innovation performance

<p>INNOVATION PERFORMANCE GROUPS (2019)</p> <p>Source: RIS 2019 Definition: Grouping based on each region's innovation performance relative the EU average.</p> <ul style="list-style-type: none"> • Strong Innovators: Performance more than 20% above the EU average and between 90% and 120% of the EU average • Moderate Innovators: performance between 50% and 90% of the EU average 		
	Strong +	Upper Austria (Ostösterreich) (AT)
	Moderate +	Lombardia (IT) Vento (IT)
	Moderate	Malopolskie (PL) North Croatia (Kontinentalna Hrvatska) (HR)
	Moderate -	Usti Region (Severozápad including Karlovy Vary region) (CZ) West Transdanubia (Nyugat-Dunántúl) (HU)

In terms of species, the analysis allowed to size the types of actors populating the regions belonging to the project partnership.

As fig 3 summarizes, technology providers and large firms are the predominant actors across the regions, followed by a variety of other actors and institutions.

Fig. 3: species and actors in the ECOS4IN project



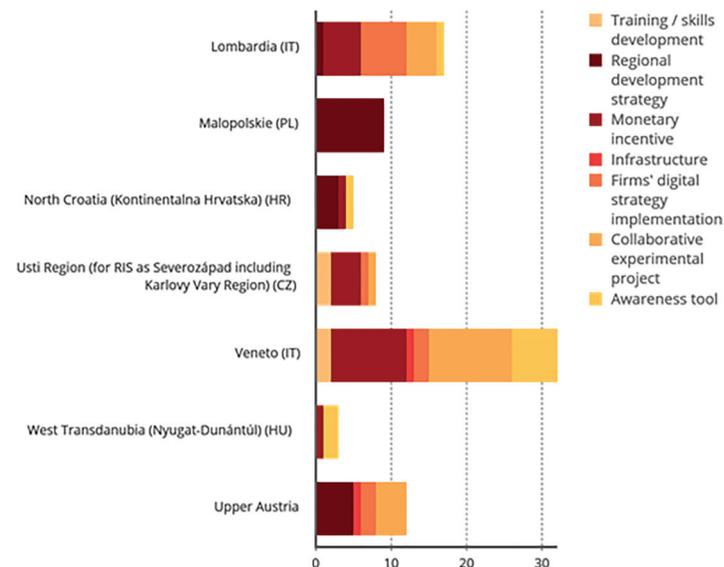
An analysis of the relative specialization of each actor allowed also to produce a wordcloud that transmits the intensity of the concentration of actors across the partnership on single technology areas, as expressed in fig. 4.

Fig. 4: Technology areas in ECOS4IN Ecosystems



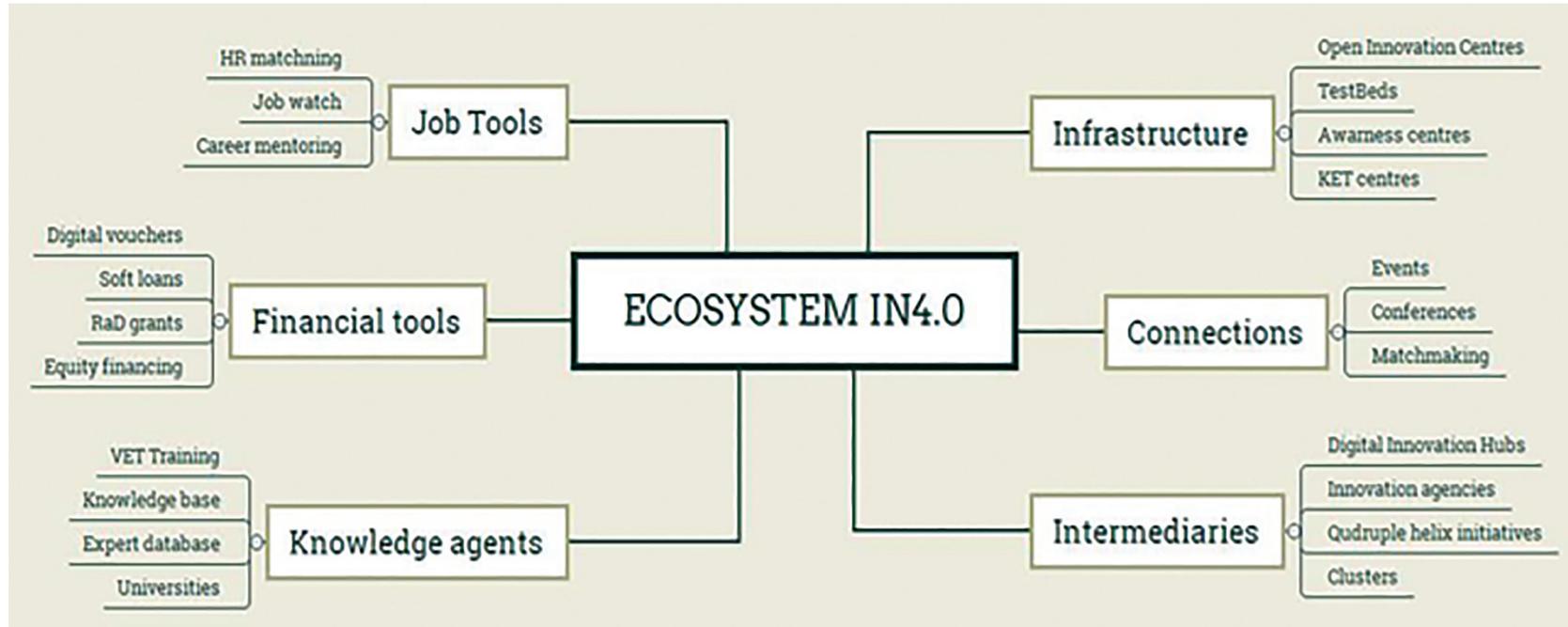
The mapping effort allowed also to identify the different typologies of policies and support initiatives enacted in each region. A synthetic view on the results is given in fig. 5.

Fig. 5: typologies of policy initiatives to support Industry 4.0 in ECOS4IN regions



The fine-grained analysis of cases and best practice both in Europe and outside Europe allowed to finally come to a general model of an ecosystem supporting industry 4.0, whose main features are synthesized in fig. 6.

Fig. 6: ECOS4IN ecosystem model



The model has a twofold utility for the present project and future initiatives aimed at favoring the diffusion of digital technologies among companies, especially small and medium-sized ones. The first is that it provides European regions with a standardized framework to analyze, map, assess and compare different regional setups in terms of actors, institutions and initiatives allowing firms to embark into mature processes of industry 4.0 adoption. Second, it allows to appreciate, in a single view, the interdependencies of policies and initiatives started in one area or the other. For instance, the constitution and strengthening of digital innovation hubs might require a smooth and efficient market for technology services and consulting, so to speed up the process with which experimentations created in one area of a region can scale up to the entire geographical context. That is to say that strengthening digital innovation hubs might have consequences in terms of the actions to be undertaken to improve the quality and quantity of knowledge agents in a given region. Similarly, interventions on the skill pool of a region might require financial tools and funds to allow firms to either hire novel human capital or collaborate with it across virtual and physical networks.

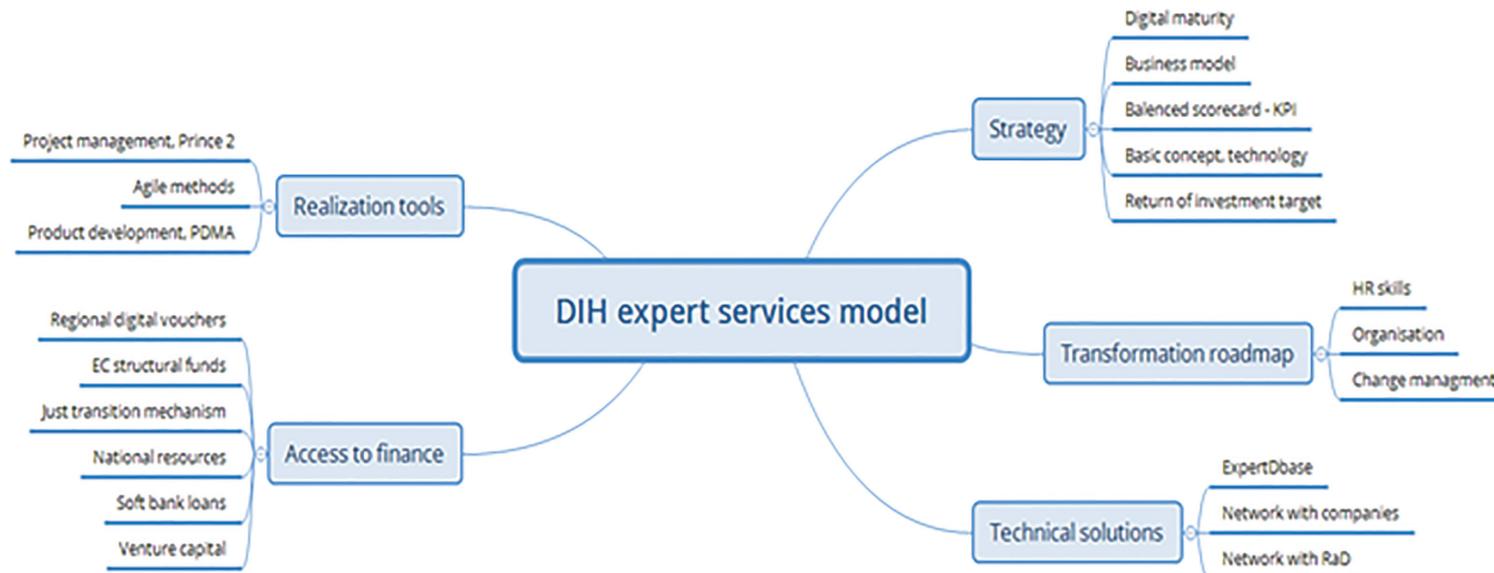
From a policy-making perspective, the model allows policy-makers and authorities to proceed towards planning novel initiatives and programs with a firm grasp on complementarities and interdependencies, so to avoid repetitions and inefficiencies.

USTI REGION - Digital Innovation Hub

One of the main results of ECOS4IN project in Usti region is strengthening role of Digital Innovation Hub. This is our main communication channel for Industry 4.0 promotion (Information Hub).

The mission of DIH (hosted by Innovation centre Usti region – ICUK) is to popularize the introduction and implementation of research activities in the fields of industry 4.0, Smart City, and the Internet of Things. The primary goal is to provide services and support to start-ups and small to medium-sized enterprises in the digitalization of manufacturing.

During project we have developed DIH service model, including typical activities of business support organisations (BSO).



One of important findings was relatively limited role of digital maturity models. Company needs tools for evaluation relationships between digitization product/process innovations, investment, and profit changes. This is usually nonlinear mathematical dependencies. In cooperation with small academic spin off company Science dynamics, we have initiate development of digitization decision support system called BusinessSim.

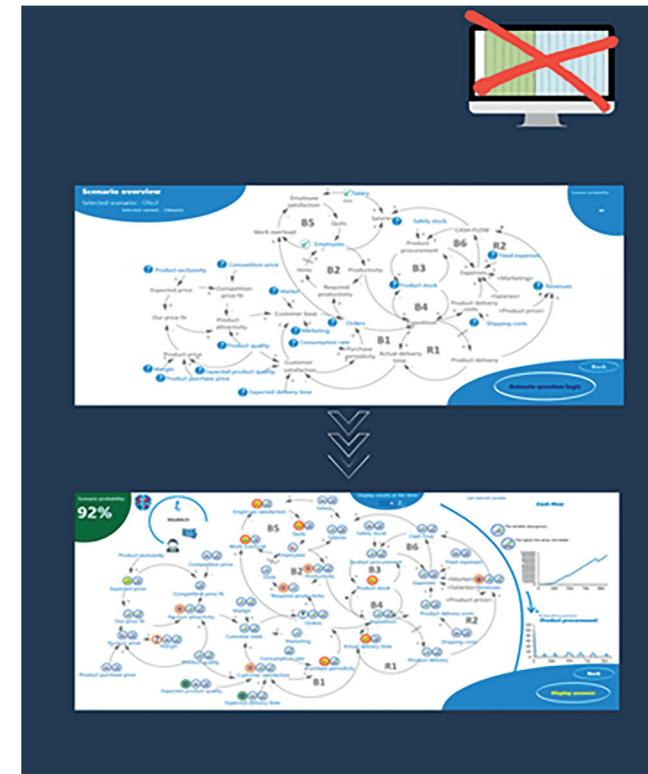


Software contains artificial intelligence capable work with incomplete data, ideas, plans and “dreams”. Business Sim easily reveals bottlenecks, obstacles, perils, constraints, and flaws of strategy.

System displayed the recommended solutions (strategies) to the submitted question and produce output report of your digitization scenario (product/processes improvement versus impact to cash flow, profit).

System is working with dynamics casual loops (see picture) which is not possible to modelling with excel sheets.

During last stage of ECOS4IN project we have applied together with our lead partner, Czech Technical University Prague for eDIH project. Main reason is development of business support tools like BusinessSim, wide spreading knowledge base with new knowledge agents and as well further internationalization of our network.



The PID project was selected from a number of good practices in the Veneto region. PID stands for Punto Impresa Digitale (Digital enterprise point). Since 2015, funds arriving from the Ministry for Economic Development were used to create a network of points in chambers of commerce whose mission was the mentoring SMEs, providing them with information and services to access to funding and grants.

In 2018, the local Chamber of Commerce (Venice and Rovigo) and Ca' Foscari University of Venice entered a formal partnership wherein they modified the original design of the PID and created a format that is being now replicated and adapted to the renewed context of digitization and response to Covid-19 crisis.

The project consisted in a three phase activity:

1. Scouting of 80 SMEs interested in using digital (I4.0) technologies to revise their positioning and their business models;
2. Definition of the technological priorities for each firm;
3. Execution of a series of co-design workshops, wherein groups of firms sharing strategic and technological needs co-designed and co-developed "prototypes" of applications and digital architectures;
4. Individual mentoring after the workshop, oriented towards the definition of a pilot and a blueprint for each firm.

The main objectives of the initiative were manifold. First, the Chamber and the University aimed at creating a culture of digital technologies among a population of firms that is often recalcitrant towards the adoption of these tools. Second, the partnership aimed at smoothing out the process of matching the potential of technologies –often developed on the specificities of large firms– and the prerogatives according to which small and medium-sized (often micro) function and work. Third, the team aimed at mentoring firms, not just train them: the idea, in fact, was to use design thinking workshops and then individual sessions of co-design to provide each firm with a blueprint of a digitalization process.

80 firms entered the project and successfully completed it. 20 of these firms, in addition, travelled to Berlin in 2019 to visit excellence hubs and competence centers for Industry 4.0. Several formal and informal networks were created among firms to collaborate on projects that entailed the use of digital technologies to increase competitiveness.



WESTERN TRANSDANUBIA - Mobilis Science Center

Mobilis Science Center opened in 2012 as the first science centre in Europe focusing on motion, mobility and automotive industry with 74 interactive exhibits on 1200 m². Mobilis aims at raising and deepening interest, orientation towards STEM and technical-scientific careers through experience-based learning – „making science fun“. The centre is a long-term tool for regional economical development and the entry point of Győr Automotive Career Path.

Mobilis won the category Innovation of Vocational Award by German-Hungarian Chamber of Commerce and Industry in 2016 for its extensive guidance activities.



Innovative guidance activities provided by the centre:

1. Guidance roadshows at schools in collaboration with companies to presenting technologies and career opportunities
2. Development of interactive exhibits: portable, medium-sized exhibits for different engineering fields
3. Guidance competitions in cooperation with Autopro automotive internet portal: TechTogether - annual competition between the best engineering teams of the Hungarian technical universities; TechTogether Junior - competition between the high school and secondary school students of the region
4. Experiment Bazaar: the most talented, innovative school teams present their favorite experiments and/or self-developed tools in April each year
5. STEM for girls: special events and programs for girl students
6. LEGO-robots: robotics study groups, racing teams for FLL and WRO competitions, mentor program for sponsoring school teams, co-organizer of WRO Hungary 2019
7. Guidance Consortium: good practice in Hungary, a county-level cooperation for guidance, Mobilis's the engine, coordinated actions of the stakeholders
8. Labor market services: information point, individual and group counseling and mentoring.
9. Engineering thematic day: tinkering activities, professionals from multinational companies and SME-s, visiting laboratories at the university
10. Mobilis Student Laboratory: Development of experiential science education programmes in Győr and its region
11. Digital Maker Space: introduction to 3D creation, laser cutting, sewing, robotics, coding, microcontrollers, automation for students and teachers.

UPPER AUSTRIA - Digital Check - Starter.Kit

As part of the ECOS4IN project, the I4.0 maturity model was further developed according to the current state of the art. Companies were able to use the “Digital Check - Starter.Kit” to determine their maturity level and derive initial optimization approaches.

The Mechatronics Cluster operates an Industry 4.0 maturity model, which makes advanced manufacturing measurable and helps companies to gain knowledge about their I4.0 potentials, gives them concrete implementation recommendations for I4.0 measures and benchmarks them within their industry or within their application field.

First the University of Applied Science Upper Austria, Campus Steyr was commissioned for optimizing and expanding the maturity model according to the latest technological developments and some foresights considerations and further more for pilot testing the new reference tables.

Lack of knowledge about the possibilities of I4.0 and on its benefit for the entrepreneurs are still identified as barriers to the first steps towards digitization. We understand the I4.0 maturity model as feasible solution for handling this problem.

After successful testing of the technological aspects a strategy for promotion, trainings and application of the model - especially in the target groups of SME – was needed. Therefore the “DIGITAL CHECK - STARTER.KIT” was designed to serve as an attractive offer for a first-time consulting and to increase the application of the I4.0 maturity model at companies.

Six test applications of the “Digital Check – Starter.Kit” were piloted to prove this new service for attractiveness, functionality and customer benefits.



“The results of the Digital Check give companies a new perspective on their workflows. Enriched with basic considerations on product and market as well as the elaboration of improvement measures, the Digital Check provides the basis for the formulation of a digital strategy. In addition, the Digital Check is an excellent tool for further use in funding applications related to digitization projects.”

Daniel Plankensteiner, Managing Director and Master Timber Constructions, Plankensteiner Holzbau GmbH



“Through the ‘Digital Check - Starter Kit’ we were able to work out a concrete use case in a practical way in the company. By looking at a process together with an expert, I had the opportunity to observe him in his methodology and thus take away a lot for future analyses / current status observations. Especially the heat map gives clarity in the definition of measures afterwards.”

Peter Heise, Deputy Head of Quality Assurance, KOWE CNC GmbH



“In frame of the Digital Check , a subarea of the company was analyzed. The check is an effective instrument for quickly and efficiently identifying the areas in the company where improvements can be made. An important finding for our company is that digital transformation can only go hand in hand with a change in the employees’ mindset.”

Mag. (FH) Andreas Draxler, Board Member, A.B.S. Factoring AG

As part of the project work, services and tools for improving I4.0 competencies have been (further) developed, the accessibility of I4.0 solutions got improved in order to make companies fit for the digital transformation.

NORTHERN CROATIA - OMCO and L&P Tehnologije LLC

Omco Croatia

OMCO Croatia is 100% ownership of Belgium Company and finances 75% of its total assets from its own sources. It represents state-of-the-art metal machining plant with state-of-the-art technology and equipment and as such is a centre of excellence and a place of education and training for the young people who make up the majority of the factory's employees. The company has a R&D department who deals with the automation and robotization of the manufacturing process, the automation and robotization of metrology and quality control, the modernization and expansion of the machine fleet, Industry 4.0, and environmental protection and energy efficiency. With 100 employees - they have grown to more than 700. OMCO Croatia has leading position in the OMCO Group with more than 50% of total production.



From one of the most modern facilities in Croatia - exported to all continents and hold one tenth of the world market. And they are three times larger than their first competitor, the one from China. Company exports 97% of its production and has only one customer in the Croatian market and is technology provider and example of industry 4.0 in Croatia. The Company has recognized the importance of Industry 4.0 and that it's increasingly affect current and future R&D activities.

Legett and Platt

L&P Tehnologije LLC (abbreviated LPT), with its head office in Prelog, was founded in the year 2000 as a sister company in the 100% ownership of the multinational corporation Leggett & Platt, whose head office is located in Carthage, Missouri, USA. Today, LPT employs more than 470 people, 370 of them being employed in the manufacture of innerspring units, and 100 of them in the machine production. In the spring production program LPT has gained the status of the largest Croatian and regional manufacturer of various types of spring units for mattresses and furniture.

In addition to the basic functionality of the machine LPT touched on the industry 4.0 by implementing various functionalities in terms of monitoring the operation of that machine (the machine generates some pulses, data to some higher system that is intended to control the work). In LPT there are different communication protocols to communicate with other computers or communication is through a physical connection.

LPT is exporting in most of the EU countries, as well as in other parts of the world. There are several mechanical engineering production programs of which the most financially significant one is the machinery and equipment for mattresses production, which are under name Gateway sold all over the world. Apart from this program, machinery, equipment and machine parts for springs production and Automotive industry are also manufactured, but exclusively for the sister companies around the world. LPT constantly continues to serve its customers and expand the market.



MAŁOPOLSKA - Showroom factory of the future

Showroom Factory of The Future is a joint initiative of companies that support the implementation and development of new technologies in Industry 4.0 in enterprises.

It was created as part of the hub4industry Digital Innovation Hub, whose representatives are Polish company Astor, international telecom T-Mobile, and Cracow Technology Park.

The Factory of The Future is located in Krakow in two remote Astor headquarters, managed simultaneously thanks to 5G network connection. Further, this is Poland's first robot connected to the 5G network.

It is a unique place on the map of southern Poland, where manufacturing companies can learn about Industry 4.0 technologies and see their practical usage within running applications. It addresses the key technologies and solutions of the Factory of the Future:

- 5G network connectivity, automation, and robotics,
- Internet of Things (IIoT),
- artificial intelligence (AI),
- augmented and virtual reality (AR and VR),
- cloud computing,
- BIM technology,
- 3D printing.

hub⁴industry

Digital Innovation Hub

Companies can learn, among other things, how to robotize specific industrial processes (e.g. welding or product packaging), how to automate production and improve material properties. In addition to industrial machines, one can see AR glasses, autonomous mobile devices, and data analysis and simulation systems.

Last year the Factory organized six regular Open Days -the meetings were hosted live and online.

Currently, interested visitors can book a visit to the Showroom. The showroom tour is free and open to all industry members.

ACTION PLAN IN USTI REGION

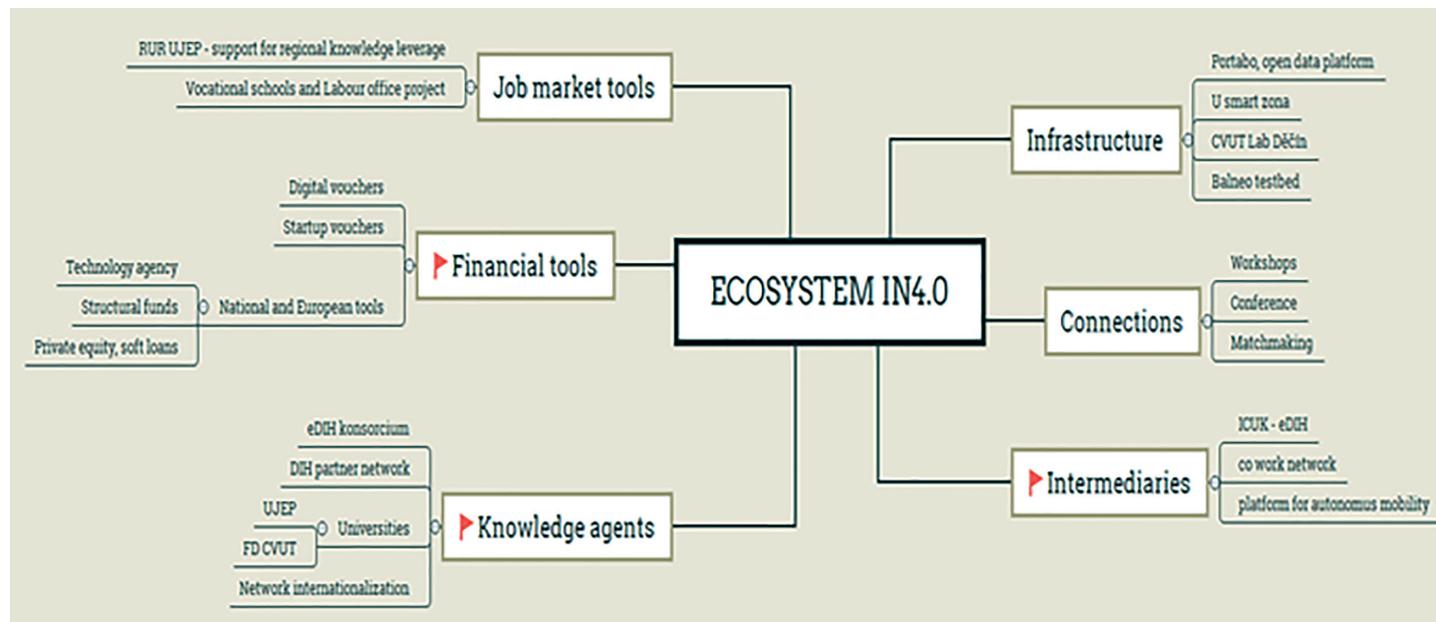
During analytic phase of project was recognized, that main gaps for Industry 4.0 implementation in Usti Region economy are:

- need for intermediators reinforcement
- open regional ecosystem for knowledge agents from other regions and internationally
- awareness actions and trainings

On this topic was concentrated our pilot actions, establishing ICUK – digital innovation hub, wide spreading expert network and also some promotional actions/events.

Action plan define main priorities, marked in red flag in our ecosystem map.

1. Internationalization of our intermediary organisation, leveraging our DIH to European eDIH
2. Further wide spreading partner knowledge network
3. Financial tools, especially for bridging first steps in SME digitization



Usti region Industry 4.0 ecosystem mind map

Ad 1)

Digital innovation Hub is hosted by Innovation Center of Usti region (ICUK) and now consist network of 25 partners. eDIH application is led by Czech Technical University and involved six partners in consortia including for example Industrial Association of Czech Republic. Main tools/actions used by our DIH will be: digital maturity model, Business Simulator – dynamic software for modelling digitization ROI, external expert's network, events and technology promotion.

Ad 2)

Above mentioned network will be wide spread with different action:

- cooperation agreement with platform for Autonomous mobility
- expert network "Ynnovate" (now six regions lead by South Moravia Innovation center)
- eDIH network, which will be focus on Artificial Intelligence
- cooperation with Silicon Saxony network /Germany/ and other international activities/project, for example with University Passau and further cooperation with ECOS4IN network.

Ad 3)

Main financial toll will be digital voucher, „small“ tool for first steps in digitization, with budget for one case between 10-15.000 EUR. Beneficiaries receive funding for:

- Digital maturity testing
- Feasibility studies
- Basic design, technical concepts
- ROI evaluation
- Internal „change“ plans

Conclusions

Action plan will consist also some other actions, covering all ecosystem pillars, like open data platform "Portabo" in infrastructure pillar etc. But red flagged ecosystem components are definitely our priority. Action plan will be approved by Competitiveness Council of Usti region authority as well as by Regional Council, as a part of Regional Innovation strategy (smart specialization), where we define digitization as one of key enabling technology.

ACTION PLAN IN VENETO REGION

The unit of Ca' Foscari University had to face two challenges when developing the Pilot Action. The first was that of thinking about a novel form for a contact point in a region that already has a number of one stop shops for digitalization in local Chambers of Commerce, in the local Competence Center. The network of Digital Innovation Hubs might be considered then as a network of contact point, as the network of associations of craft firms and small firms. Thus, rather than duplicating efforts, the team aimed at federating all the existing contact points and deliver value in an original way. The second challenge was the Covid-19 epidemic which, suddenly, made it difficult to organize meetings, events and definitely slowed activities down.

As a result of the two challenges, and inspired by the PID best practice, the pilot action was organized as follows. First, a call for interest was launched for SMEs in the region who were thinking about the digitalization of their strategies or of some of their processes. The 50 firms that answered to the call were then interviewed to understand their strategic and technological trajectories.

Then, after the analysis was done, the firms participated in online workshops aimed at allowing them to simulate the process of digitalization of operations or strategies: they co-design scenarios, they co-defined challenges and hurdles, they identified the constraints and the opportunities related to the introduction of a new technology and finally they thought about a digitalization plan and were guided in defining its costs and the needs of resources (human and financial).

Three of these collective workshops were organized in 2021: A fourth one was organized because of the firms' requests for additional information and mentoring. Each workshop had the duration of two working days, organized in chunks of 4 hours online. To facilitate collaboration and co-design, two designers and three facilitators were animating the sessions and conducting firms towards the definition of their digitalization strategy.

The contents delivered in these sessions were completed by other pre-recorded contents that were stored in the University's Moodle platform: firms were then free to go deeper in their exploration of given technological areas and had the opportunity to see these videos realized by experts and professionals in the Industry 4.0 area.

After the workshops closed, the firms were again interviewed to assess the results of the intervention and to give them "personalized" suggestions on how to proceed in their digitalization strategies, on the sources of funding –both public and private– that were available and on the additional services that the University and other institutions might give them to support them.

The pilot was the occasion to finalize and standardize a format of mentoring activity that does more than just providing information and directions as a traditional contact point does. First, it transfers competences and abilities to firms, as in the case of co-design methods. Then, it mentors them by closing the gap that often exists between the way of thinking and acting of small firms and the requests and imperatives posed by industry 4.0 technologies. Finally, the workshops allowed to provide firms with directions towards other financing schemes and

supporting initiatives thanks to the definition of a precise plan for each firm. Thus, rather than giving general directions, each firm could receive customized indications, thus federating the actors in the ecosystem and making their search for information and contacts more effective.

As far as the sustainability of the pilot is concerned, the actions taken were the following.

First, the team was stabilized and was allocated to further develop the hybrid forms of the workshops (online and offline). They also planned for the replication of the format in other initiatives and with other stakeholders. Then, the format was exposed and presented to a variety of stakeholders in the Region and public institutions. Currently, the initiative is being replicated with funds coming from the Chamber of Commerce of Venezia and Rovigo and thanks to funds coming from Cna, the national association of small firms.

As per the long-term sustainability of the scheme, the University will use the format of the Pilot action (thus a set of online recorded content, a set of design thinking and co-design workshops and individual mentoring) in all the initiatives that will see it collaborate with public institutions in pushing the digitalization agenda. For instance, the format will be part of the next partnership between the university and the National Association of Chambers of Commerce for the digitalization of the processes of the Chambers. It will also be the central format used for the digitalization initiatives within the National Plan for Resilience and Recovery, wherein the university of Venice and other 8 universities will collaborate on the creation of an innovation ecosystem in the North East of Italy.

ACTION PLAN IN WESTERN TRANSDANUBIA

The aim of the action plan is to contribute the implementation of industry 4.0 in the region and strengthen the role of Pannon Novum Western-Transdanubian Regional Innovation Nonprofit Ltd. in the regional innovation ecosystem.

The first action is about strengthening the coordination activities and spreading the information related to Industry 4.0. Collection of I4.0 news, services and other relevant information from the West Transdanubian I4.0 ecosystem, and make it accessible to the target groups. Entrepreneurs can get advice in the proper selection of tools and solutions which will be optimal for their development and at the same time they can get support to access the R&D infrastructures and capacities of universities and public research institutions. Website of Regional Information Hub was created as a subsite of Pannon Novum website.

The second aims at expanding industry 4.0 knowledge in vocational training and higher education. Pannon Novum organized workshop for students aged



12-18 in the ECOS4IN WPT3 pilot phase to discover and learn playfully in I4.0 digital and technological world. Students and teachers could increase their skills and competences in an inspiring environment where they could not only see but also try robots, modern tools or even real industrial machines that is important in terms of a successful future workforce.

Third action supports the cooperation between the actors of regional innovation ecosystem.

Three main sub-actions were defined to intensify the cooperation between the actors of innovation ecosystem, research institutions and companies:

- Organizing Digithons (brainstorming workshops) and webinars between IT service providers and users (SMEs)
- Pilot implementation of the elaborated Concept for distribution of Innovation Voucher by utilizing a digital platform in Hungary
- Inspiring and feeding the concept and service portfolio development of Science Park in Győr by Austrian good practices (Softwarepark Hagenberg, Center for Smart Production, Mechatronics Centre of Linz)

ACTION PLAN IN UPPER AUSTRIA

Upper Austria has a well-developed innovation ecosystem nevertheless the GAP analyses performed in regard to the ideal ECOS4IN – model identified topics and needs for improvement. Those targeting the digital transformation of SME were considered to be most important. They were further processed in order to strengthen Upper Austria's ecosystem for I4.0 transformation. These are:

- Transfer of scientific results to SME: Many of Upper Austria's scientific institutions have excellent competences in the context of I4.0, but cooperate mainly with large companies. This is critical insofar as around 80 % of the companies in Upper Austria are SME.
- Practical and application-oriented formats: Companies must be given the opportunity to try out and test I4.0 technologies. There are many possibilities in Upper Austria, like robotic workshops, AI user seminars, factory visits, Open Labs etc., but SME often don't know about the offers and the advantage of taking part.
- Consider I4.0 aspects in all training areas and sectors: I4.0 know-how must not be restricted to classical technical oriented professions and branches.
- Missing single point of information/I4.0 contact point: Due to the fact that Upper Austria has a large number of facilities, institutes and initiatives in the field of I4.0 and possesses corresponding competencies and capacities the ecosystem should have a contact point which tackles adjustment and networking between all players in order to increase capacities a coordinated way without building double structures.

The pilot activities performed on basis of the GAP analysis showed as well that the target group of actions needs to be SME.

The important question is to identify how SME can be supported on their digitization journey. What helps them to transform their business models and in general the way they do and think business so that they can adapt to changing or new needs of customers that emerge because of an ongoing digitization process in many aspects of society.

Therefore the International Institute for market and social analysis (IMAS International) was commissioned to conduct a SME survey on what SME prevent from starting their digitization journey. 300 Upper Austrian companies were asked about their opinion on “Digitization: importance, engagement, knowledge/use of support offers, contact with service providers and expectations”.

The study provides insights on the current situation and is the basis for evidence-based actions.

- An important and positive finding is that a majority of the asked SME believe that the impact of digitization on the company in the next three to four years will be very strong.
The most important obstacles that prevent SME to take up supporting services in the field of digitization are:
 - The actual business model of the company works well, so they don't think there is a need to make changes
 - There is simply no time to deal with digitization or
 - The costs are too high to afford dealing with digitization in the company
- The majority believes further that it is important for their financial success to think about and implement digitization in their company.
 - Most SME tend to focus on monetary incentives rather than cooperation with scientific institutions or the use of existing knowledge provided by other companies/ institutions.
- The relative majority awarded the highest score when it comes to assessing the importance of digital change for the economic success of their own company.
 - But the majority of the SME is not very well informed about the services and offers in the area of digitization.
 - The most important reasons why SME did not have contact with services and offers in the area of digitization are that there was no necessity or need for them to deal with this topic.
 - The other main reason is that there is an information deficit. They simply don't know that there are supporting offers and services for activities towards digital transformation of their company.

Concluding the above mentioned, the Upper Austrian actions plan will focus mainly on increasing visibility of support and tools for digital transformation of SME, sustainable running of online platform digitalregion.at as a single point of information, networking activities and exchange. These measures comply with general (desk research) observation, are in line with the Upper Austrian business and research strategy #upperVISION2030, based on the findings of the GAP analyses of the regional ecosystem and the experiences of the pilot activities and further more they are underpinned with a comprehensive SME survey and evidence based external recommendations.

ACTION PLAN IN NORTHERN-CROATIA

The main goal of the Action plan (AP) is to set up clear activities, related to RIS3 design and implementation, with intention to improve skills of the users of AP and its possible partners in design and deployment of RIS3 in Croatia. The AP will set up some basic services of the up-

coming upgrade of ENTER services provided on a regional level. It will be based on some of the commonly used and latest developments for RIS3/S3 design and implementation.

When it comes to Smart Specialization Strategy of Croatia, it is important to state that the Croatian S3 is designed and implemented on a national level (given Croatia's population of 3,88 million, for comparison similar to Malopolska region), regional development and the complexity of National innovation system.

In this AP we will explain the latest state of play regarding the implementation of Croatia's smart specialization strategy 2016 – 2020, design and latest developments for future Smart specialization strategy 2029, instruments designed to impact COVID-19 pandemic and fast economic recovery, and latest development in regional policy, all of which will have significant impact to the deployment of I 4.0. We will try to elaborate and make connections of the proposed AP measures with the future development of the national and regional innovation system and how we can impact their development and implementation, including future S3 2029.

The AP itself consists of two actions. One is well known from the beginning to this new innovation development paradigm called smart specialization (FORAY, D., DAVID, P. A. & HALL, B. 2009. Smart Specialization – The Concept) and is called Entrepreneurial Discovery Process (EDP). We will introduce the EDP process through the activities of ENTER and this AP in order to help the promotion of I4.0 among the stakeholders (as well as to familiarize them with the mechanics of smart specialization development) of our region and get a real-time feedbacks (bottom-up) of their needs, problems, challenges and aspirations.

The second tool is recent development of the process of updating and revising of the existing smart specialization strategies in Europe, and is based on the most recent work of the most profound scientist behind this concept: Prof.Dr.Dominique Foray. The most recent findings on the smart specialization strategies impact will be described in our AP as second action: Transformational Roadmap and pipeline.

We believe these two tools/actions well reflect on the constant need to keep the process of smart specialization live and to prepare and keep the most relevant project pipeline that we can use for our work at ENTER. Additionally, the AP will describe in detail all the possibilities for the regional development of Industry 4.0 and tools that are currently available (or will become available in the next five years), and proposal of linking our AP actions with these implementation possibilities.



The AP purpose is twofold:

1. To create a tool that is based on regional discoveries and data that would make impact on strategic planning on national and regional level;
2. To increase the awareness on opportunities that I4.0 can bring to entrepreneurs and other stakeholders in the region. For the sake of the objectives of the AP regarding the ECOS4IN project, we will provide basic steps and information of how these tools can be used by other partners and other regions.

ACTION PLAN IN LOMBARDIA

In the framework of the ECOS4IN project, Fondazione Brodolini designed and implemented a one point access for INdustry 4.0 and digital fabrication at Milano Luiss Hub, that operates as ecosystem for a set of activities. From one side, it is now used to deliver capacity building programs for SMEs on industry 4.0 and digital revolution, that will allow the participating companies to better include and work with digital transformation to boost their businesses; on the other side, Human Capital Hub ECOS4IN aimed to design and implement solutions that could solve digital challenges SMEs (particularly in food&hospitality sector) are meeting and solve them with the contribution of technologies 4.0. Lastly, the pilot project sought to facilitate the creation of new synergies between SMEs, community and students through contamination activities, events and webinars.

The pilot program can be divided into four phases: the first one is dedicated to education, the second is focused on assessing the skills, the third one consists in a serie of co-design activities that see SMEs working together with students in the design and implementation of solutions and the last one together with Hackability consists in a serie of co-design activities and the implementation of a methodology to prototype being inclusive.

The pilot project Human Capital Hub ECOS4IN represents an innovative methodology thanks to which knowledge and skills related to Industry 4.0, digital revolution and new technologies could be easily transferred to relevant sectors of the society: SMEs and students.

The design of an InfoHub 4.0 and ECOS4IN methodology responded to two key concepts, "sustainability", meaning that the the project had to consistently incorporate and accompany the provisions of the regional strategies of intelligent specialization (RIS3) and the "transferability" trying to create a sort of "instruction booklet" for the Region itself, aimed at achieving the objectives set out adopting the ECOS4IN approach and methodology in ITS courses and vocational training.

ACTION PLAN IN MALOPOLSKA

Dynamic technological, social and economic changes force decision-makers to make decisions to create conditions for business develop-

ment. In the face of dynamic changes, the challenge is to prepare conditions for the development of Industry 4.0 and to build an innovation support ecosystem in the region. There is a need to prepare a conceptual model of implementation of Industry 4.0 in the regional innovation ecosystem of Małopolska and possible solutions for promotion and popularisation of Industry 4.0 in Małopolska.

The following should be identified as the most critical regional activities to promote and popularise Industry 4.0:

- construction and launch of a regional, coherent programme for the promotion of Industry 4.0 in Małopolska,
- promotion of best practices and management standards in innovative enterprises,
- development of a research programme, with analyses and diagnoses, focused on the identification of best practices in management and methods of skill support for entrepreneurs and managers,
- promotion of technologies and new solutions in the 4.0 standard,
- building a regional network of Industry 4.0 experts and developing cooperation of enterprises, cluster initiatives, hubs, business institutions and NGOs to build competencies.

The initiative must be focused on building awareness of the importance of 4.0 standards in creating modern and competitive enterprises, highlighting the role of new technologies and effective marketing solutions. Elements of Industry 4.0 standards should focus on: building a leadership position in the processes of creation, development and transformation of a 4.0 enterprise, creating the development of competencies under Industry 4.0 standards, promoting the need for change in attitudes and behaviours of employees, promoting the standards of a 4.0 manager.

The Action Plan, developed within the ECOS4IN Project, considers the above regional conditions and identifies the areas of MARR S.A. activity that are key to building, developing, and effectiveness of the Industry 4.0 ecosystem in the Małopolska region.

The activities planned for MARR focus on three main areas: education, entrepreneurship, and regional development. Each area was assigned a group of stakeholders, tasks, expected impact on the region and sources of financing. As part of this study, the leading MARR clients were taken into account, i.e. persons planning to set up a business and entrepreneurs, local government units, and non-governmental organisations.

In education, the following tasks were identified: Information, advisory, training, financial services provided by MARR S.A.; Active participation of MARR S.A. of the European Network of Living Labs (ENoLL) network.

In the area of entrepreneurship, the following tasks were identified: the offer of reimbursable financing services or digital vouchers (co-financed from public funds) aimed at implementing Industry 4.0 solutions in Małopolska enterprises and MARR S.A. as the creator and leader of the Małopolska Living Labs 4.0 Network or development of the current FabLab.

In the area of regional development, the following task has been identified: launching a comprehensive programme for the promotion of Industry 4.0 and best practices and management standards in innovative enterprises; information and advisory support in the field of intellectual property protection (IPR) as well as building and managing a database of Industry 4.0 experts.

Usti Region- Lead Partner - Czech Republic

Cà Foscari University of Venice - Italy

Pannon Novum Nonprofit Ltd - Hungary

Business Upper Austria - Austria

Enter Koprivnica - Croatia

GIACOMO BRODOLINI FOUNDATION - Italy

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