ECOS4IN SWOT ANALYSIS MAŁOPOLSKA

Deliverable D.T2.2.1

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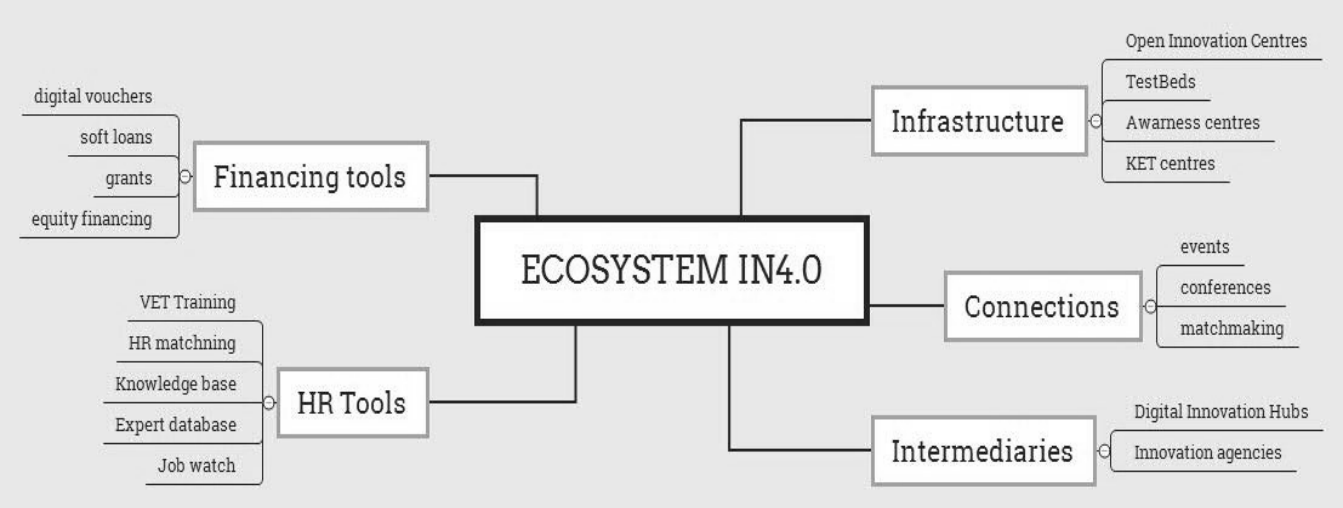
1. Reason

Each partner region will perform SWOT analysis, Deliverable T 2.2.1., delivery date 04/2020.

Analysis will provide mode detailed information how the partner regions currently handed with Industry 4.0 transformation.

2. SWOT Structure

There is first simple ecosystem model. Deeper description will be available soon.



Please prepare SWOT analysis for each mind map branches, see templates below.

3. Templates

3.1. Infrastructure

Strengths	Weaknesses
1. High number of R&D centers (195, 2nd position in the country), of international concerns (Ericsson R&D Center, Samsung R&D Institute Poland, TechnipFMC, BWI Poland Technologies Sp.z o.o., ABB Corporate Technology Center, APTIV Tech Center Krakow, Motorola Solutions Systems Polska.)	1. Very low number of industrial robots per 10,000 employed in industrial plants. According to IFR data, in Poland in 2018 it was 42 works per 10,000 industrial workers.
2. The share of outlays on fixed assets in total outlays on innovation activity of industrial enterprises is decreasing (from 79% to 68%) and shifts towards research and development activity (31%).	2. Over the last decade there has been no clear increase in the level of innovation of industrial enterprises (oscillated between 15.5 and 22.8%), and in the case of service enterprises it has significantly decreased (from 14 to 9.36%).
3. Małopolska compared to other Polish regions has a very high GERD value (internal expenditure on R&D in relation to GDP), which in 2016 amounted to 2.16% (almost PLN 874 per capita in 2017, which puts the region high above average for the country: PLN 536).	3. Unfavorable situation of Małopolska in terms of the participation of innovative enterprises as well as expenditure on innovative activities.
4. The level of employment in R&D is a derivative of the number of entities operating in this area - in Małopolska there are 10% of Polish companies conducting R&D activity (502 companies out of 5100 in Poland).	4. The level of employment in the R&D sector is changing rapidly and depends largely on the support provided under EU funds, currently focused on increasing innovation.
5. 4th place of Małopolska in 2017 in terms of outlays on innovative activity (PLN 3.6 billion), increasing it almost 2.5 times compared to 2008. (8th position).	5. The existence of an infrastructural barrier in access to broadband Internet, especially in rural areas and in small towns.
6. The highest rate of university students per 10 thousand population in Poland, especially in the fields related to smart specialisations of the region	6. Low share (6%) of companies from among large companies in Poland that have invested in the Krakow metropolitan area.
	7. There are no KET Centers operating in Lesser Poland.

7. A large number (99) of accredited research laboratories on the Polish scale based on the PN-EN ISO / IEC 17025 standard (4th position in PL) (RSI)	8. A significant group of inhabitants of rural areas and small towns of Małopolska are deprived of the possibility of using modern telecommunications solutions.
8. Małopolska is one of three regions of Poland (Śląskie, Mazowieckie), where the largest number of enterprises dealing with the integration of industrial plant systems (automation integrators) is located	
9. There are the most (5) CTTs operating as part of universities in Małopolska.	
10. High research potential of Małopolska universities and other scientific institutions (32 universities; 5th position in Poland). (RSI)	
11. Strong position in terms of location of National Scientific Lead Centres (3 of 10 in Poland).	
12. Significant potential of the professorial staff (2630 professors, 2nd position in Poland).	
13. There are 4 Regional Innovation Centers in Małopolska.	
14. As part of the "SPIN - innovation transfer model in Lesser Poland" project, 4 knowledge transfer centers were created, operating under three regional specializations, namely life science, sustainable energy, and information and communication technologies.	
15. Locating open studios/laboratories in Kraków: hub:raum coworking space and 3 Fabrication Laboratory (operating for 2 to 7 years).	

16. Krakow is a leader in terms of the number of employees in business service centers (64,000 people work here)	
Opportunities	**Threats**
1. Increase in the share of investment outlays on research and development activity in total outlays on innovative activity of industrial processing companies. 2. Increasing expenditure on the development of infrastructure of scientific institutions aimed at research and dissemination of knowledge - and not only at didactics. 3. Attracting more large foreign investors, especially in innovative sectors (Industry 4.0). 4. Change in state policy regarding the development of solutions in the field of Industry 4.0. 5. Increasing expenditure on research based on cooperation with industry. 6. Implementation of mechanisms stimulating cooperation of enterprises with R&D units and universities in the field of transfer and absorption of innovations and new technologies. 7. Implementation of the smart city concept based, among others on modern ICT technologies. 8. Increase business productivity with technologies available at 5G gigabit speeds.	1. Lack of support and sufficient financial outlays for the development of Industry 4.0 technology by the State. 2. The high costs of automation and robotisation of enterprises in comparison with the costs of employment are one of the basic barriers to the development of modern infrastructure of production companies. 3. Maintaining a low ratio of expenditure on R&D in relation to GDP indicating insufficient level of funding in this sphere. 4. Despite the high expenditure from the EU budget on innovation, it is not possible to reduce the distance to innovation leaders, i.e. the USA and Japan. 5. Lack of activities aimed at remodeling EU policies in the field of innovation (too broad and general formulation of priorities in R&D, the existence of significant disparities between research and development, and insufficient translation of the strategy into specific sectors and regions, and an excessively complicated management structure). 6. Insufficient use of modern research infrastructure to conduct high-quality research, including research carried out in terms of implementation in industry.

9. A growing trend of companies that declare that they are fully automated. 10. A noticeable increase in enterprises conducting big data analysis. 11. Moving away from the current system of innovation support, which in economic terms was based on EU funding.	7. The threat of cyber attacks, hacking into company IT systems. 8. Maintaining too slow pace of commercialization of R&D results.

3.2. Connections – networks

Strengths	Weaknesses
• Centrum Business in Malopolska (since 2009) has been conducting promotional activities aimed at attracting foreign investors. • 2nd place for Małopolska in the category of Foreign Direct Investment Promotion Strategies, Top 5 Eastern Regions FDI Strategy ranking. • In Małopolska in 2017, 8.1% of industrial enterprises active in innovation cooperated in various types of initiatives; the region was ranked 1st among all regions in Poland. • Very active Małopolska startup community, in 2018 over 800 events organized by and for 29 startup communities took place in Kraków. • Since 2010, the Małopolska Innovation Festival has been taking place - a cyclical, week-long event during which innovations, entrepreneurship, cooperation between science and business are being promoted, • Several editions of the "Małopolska innovator" competition promoting innovative activities of SME companies and other competitions promoting innovation have been held. (e.g. National Contact Point for Research Programmes of the EU) • KPT ScaleUP Acceleration Programme,	• The cluster system is underdeveloped • No regional events of national character (only rotational 'Impact') • Weak cooperation between science and business, no big events are held in our region • Lack of important, cyclical networking events for people and companies in the area of Industry 4.0 • No matchmaking events for economic cooperation • Many innovation fairs are held outside Krakow [International Fair of Innovative Industrial Solutions (Warsaw 11.2020) or Computerworld Industry 4.0 (25.11.2020 Warsaw)].

provides expert and financial support for start-ups in the 'Industry 4.0' area and enables the establishment of contacts with large enterprises, including state owned companies.	
Opportunities	**Threats**
• Improving scientific-research cooperation with other foreign and national research centres. • Improve collaboration and networking in the provision of regional start-up support. • Well-developed hotel and conference infrastructure, thanks to which specialised conferences can take place (e.g. Digitalfest - technology in business, Krakow 2019) • ImpactCEE -- annual conference on the latest technology business model of the digital economy. Impact brings leaders at the forefront of innovation from many sectors together to explore the opportunities for creating global digital future.	• No industry-leading event 'Industry 4.0' • Risk that such important events, conferences will not take place in our region

3.3. Intermediaries

Strengths	Weaknesses
1. Krakow Technology Park, supporting innovative small and medium-sized companies (including using a technology incubator and accelerator). 2. The Digital Innovation Hub launched by KPT acts as a comprehensive support point (the so-called one-stop-shop) for companies from all over southern Poland. 3. A high number of business environment institutions (45 BEI; 4th position in Poland) including 38 are working for the ICT industry. 4. The Center for Technology Transfer at the Cracow University of Technology has an Enterprise Europe Network center supporting companies in acquiring or selling modern technologies, as well as knowledge of EU legislation and programs. 5. There are 10 key cluster organizations operating in Krakow, including the Life	1. The number of Małopolska BEI has been on a downward trend in recent years (68 in 2012, 45 in 2017) due to difficulties in financing activities. 2. The DIH system in Poland has been operating for several months and is at an early stage of operation. 3. The level of development of modern technology clusters is lower than it would appear from the scientific potential. 4. Functioning cluster initiatives in recent years have been characterized by varying levels of activity.

Science Kraków Cluster and Digital Economy Cluster, which both have important ongoing activities to favor collaboration among enterprises, higher education institutions, regional government and other organizations regionally, national and internationally. 6. There are 195 business service centers in Krakow.	
Opportunities	**Threats**
1. The need to implement a new model of supporting entrepreneurship in the region, which will be based essentially on repayable support instruments and an active business environment. 2. Support for smaller centres in the whole voivodship, tightening of cooperation with partners in the region (territorial self-government units, economic self-government, business support institutions). 3. Greater activity and cooperation of bottom-up and functioning clusters and cluster initiatives in key areas for the region, designated, among others intelligent specialization of the region. 4. Building a network of technology transfer centers based on an integrated information management system. 5. Strengthening the industry potential of the region by strengthening enterprises in the cluster is an opportunity to increase the competitiveness potential of a given region.	1. Too much dependence on EU funding. 2. Subjective and not resultant support for business environment institutions. 3. The current cluster policy does not sufficiently stimulate their creation and development. 4. Insufficient inclusion or lack of cluster policy support in regional innovation strategies.

3.4. HR tools

Strengths	Weaknesses
1. High quality of university education (2nd places in Poland) 2. the highest number of Science and IT students in the country and a rising trend in these fields of study 3. the growing percentage of human resources for Science and Technology (in the active population) in Małopolska between 2009 and 2017 has significantly increased from 40% in	1. high labour costs in comparison with other metropolises in Poland (salaries of IT specialists are among the highest in the country) 2. poor motivation of university researchers to cooperate with the business sector. 3. Weak international position in terms of the number of R&D workers per 10k

2009 to 55% in 2017. In 2012, it exceeded the average for Poland and recorded large increases every year. 4. The increase in total expenditure on R&D in relation to GDP and high dynamics of employment growth in this sector (3rd place in 2015 and promotion from the 10th position in 2008). 5. In Małopolska are located 10% of Polish companies conducting R&D activity (500 companies out of 5100 in Poland). 6. Projects related to the improvement of employee qualifications conducted by MARR (2014-2020) with a total value of about 120 million PLN (about 30 million EUR) 7. A commercial project 'Academy of Industry 4.0' delivers a high quality training for companies 8. Małopolska Voivodeship implements numerous projects related to the transfer of knowledge, bringing scientific achievements of higher education institutions closer to students with the use of information and telecommunication technologies, projects related to support for students and doctoral students, and modernisation of vocational education in Małopolska.	inhabitants (over 1/3 lower than the European average). 4. in 2018 about 25%. employees in Małopolska have completed university degree however, quantitative indicators do not translate into the quality of education; the ratio of the number of new PhD graduates to the number of people aged 25-34 is one of the lowest in the EU. In 2017, for the first time in the whole analysed period (2008-2017), there was a decrease in the number of participants in doctoral studies per 10k population. 5. Insufficient scope and quality of education of personnel for 'Industry 4.0' including those related to technologies crucial for regional specialization; the system of financing awards the fields of study which are popular and not those which respond to the demand of employers. In the result there is an unemployment and shortage of employees in selected industries. 6. in terms of adult 25+ participation in education and training, the region is below the unijnej average, but also below the Polish average. 7. Low awareness of the benefits of lifelong learning among SMEs 8. Insufficient cooperation between universities and the employer community (because of system, mental, technical and organisational problems).
Opportunities	**Threats**
1. The opportunity to develop an industry focused on implementing innovative telecare and telemedicine solutions dedicated to the elderly. 2. Further increase in the economic activity rate in the region (level close to the national average). 3. Upward trend in the number of participants in post-graduate studies in the region 4. the decreasing share of traditional forms of lifelong learning - in favour of non-formal learning in the form of training, internships and apprenticeships, as well as	1. Lack of system adaptation of the process of higher education to the needs of companies in the region, including practical education. 2. Lack of systemic activities shaping entrepreneurial attitudes in curricula 3. Policy-makers, regulators and educators do not play a fundamental role in helping those who retrain to acquire new skills 4. Lack of adaptation of the regional labour market to current and prospective needs related to the consequences of demographical and technological changes (e.g. automation of work) 5. Lack of adjusted offer of vocational

correspondence and e-learning courses 5. There are the need to place greater emphasis on soft skills such as creativity, originality and initiative, critical thinking, persuasion and negotiation, flexibility and complex problem-solving. Emotional intelligence, leadership and social influence as well as service orientation also see an outsized increase in demand relative to their current prominence.	education to the growing expectations of employers, related to the change of work organization, 6. Skills gaps both among workers and among the leadership of organizations can pose barriers to the adoption of new technologies and therefore impede business growth. 7. The 'demographic trap' - we currently have 7 million people in pre-productive age (0-17 years), in 20 years' time it will be 5.6 million -> fertility rate 1.5 (2018)

3.5. Financial tools

Strengths	Weaknesses
1. A fairly wide range of repayable instruments - six loan funds operate in Małopolska. The region is at the forefront in terms of the number of loans granted and the value of loans granted (2017) 2. Easier access to financing for startups - separate loan funds for companies operating up to 24 months and above 24 months. 3. Preferential loan system (preferential interest rate) for companies and investments that are aligned to at least one of the region's seven smart specialisations 4. Małopolska is second region in Poland based on number of participations in Horizon 2020, and third based on funding received from Horizon 2020 5. Małopolska is one of the most active regions in obtaining funds from national Innovative Economy Operational Program (programme directed mostly to all entrepreneurs who want to implement	1. Lack of knowledge of financing opportunities among entrepreneurs, 2. Lack of complexity of systems to access public financing support, 3. The process of acquiring the funds is not simple or quick 4. Insufficient funding for the commercialisation of university technology 5. Some forms of funding are not currently working well enough, for example business angel finance (unfavourable taxation) and crowdfunding (underdeveloped) 6. The condition of the Polish venture capital sector depends on the inflow of public capital 7. A small number of Venture Capital funds are able to invest more than EUR 1 million to a single company.

innovative projects connected with research and development, modern technologies), 6. There is an increasing number of accelerators and venture capital funds in the region. (The venture capital market in Poland is growing, and the number of active venture capital funds has tripled in three years (to 130 in 2019) The dynamic increase in the number of funds is mainly due to public money) 7. Małopolska compared to other Polish regions is characterized by a very high GERD value – 2,16% (almost PLN 874 per capita in 2017, which puts the region high above the average for the country, i.e. PLN 536).	9. There is one active regional guarantee fund in Małopolska 8. Insufficient Polish Participation in Horizon 2020: 15 out of 28 ranking position based on participations in H2020 for a country 15 out of 28 ranking position based on funding received from H2020

Opportunities	Threats
1. Use after 2020 of repayments from 2007-2013 and 2014-2020 financial perspectives at the disposal of the voivodship for supporting innovative actions of firms, including research and development (which may involve the need to establish regional instruments such as seed or venture capital funds) 2. Developing the offer and improving the availability of repayable financing instruments for enterprises, including loan and guarantee funds. 3. Increasing the amount of expenditure on R&D as a percentage of Polish GDP 4. Increasing the number of participants from the region in European research programmes (Horizon Europe) 5. Favorable tax regime, tax incentives to support innovation and investments:	1. Probable decrease in availability of Structural Funds support after 2020, 2. Probable decrease in availability in Poland of projects and funds from European Bank for Reconstruction and Development (EBRD) and World Bank 3. Entrepreneurs' own funds are the main source of financing their innovative activities 4. Complex and variable regulations as well as a high level of risk aversion and unwillingness to change limit the level of investment of enterprises 5. As the system of financial support is considered, numerous national institutions act separately from institutions at regional, there is lack of coordination between those two groups.

Polish Investment Zone and R&D tax relief 6. The Capital Markets Union project that is aimed to make it easier for EU companies to get the finance they need to grow both from individual and institutional investors. 7. Directing funds from next long-term EU budget 2021-2027 to innovations and R&D works 8. Stimulating innovative activities in a group of smaller entrepreneurs 9. Inclusion of private capital in financing the development of the region, including innovative investments	6. A multitude of institutions acting in the same field and their individual priorities have negative impact on efficiency and effectiveness of fund spending 7. The role of the capital market in financing enterprises is too small. (Shares traded on the stock exchange and debt instruments as a % of financing: Poland 30%, average in the EU 42%, USA 70%) 8. Employment in the R&D sector is changing rapidly and depends to a large extent on support provided by EU funds, which is currently focused on increasing innovation