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RESPONSIBLE INNOVATION ROAD MAP FOR KOŠICE REGION (SLOVAKIA)

Author:

Agency for Support of Regional Development Košice

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Introduction

The diffusion of Responsible Innovation (RI) in the business sector requires the development of specific strategies and actions in individual companies, but also the creation of a policy environment which stimulates, steers and sustains over time companies' commitment to RI. An essential part of this environment is constructed by public policy and regional decision makers and public authorities play a key role in shaping these policies.

The objective of the RI Road Map is to assess the current capabilities, activities, and necessities of companies implementing (or willing to implement) RI, and for matching them with the policies, measures, and programs which regional decision makers presently plan and execute.

The intermediate result of the road-mapping process is to chart the opportunities and resources which public policy makes available to companies, and to identify the gaps between firms' needs and the existing regional policies. The Roadmap should contribute to fulfillment of these gaps and to alignment of companies' motivations, plans, and practices in RI and regional programs and strategies, in order to enable and sustain firms' efforts. The Roadmap includes a set of Actions which regional policy makers and public authorities can implement to complement, integrate and/or re-orient their policies in a way that is supportive to the diffusion of RI in the business sector.

1. Regional Innovation Policy Context

1.1. National/regional innovation initiatives and strategies

Research and Innovation Strategy for Smart Specialization of the Slovak Republic

A basic precondition for elaboration of a smart specialization strategy is that the Slovak Republic demonstrates its ability to strategically manage and concentrate permanently limited sources with the aim of sustainable development and develop the country in harmony with principles of smart, sustainable and inclusive growth in order to strengthen the competitiveness of the Slovak Republic and the European Union.

Main vision of national strategy

"To drive a structural change of the Slovak economy towards growth based on increasing innovation capability and R&D excellence to promote self-sustaining growth in income, employment and standard of living."

By 2020 through achieving this vision a transformation of Slovak economy towards knowledge economy will occur. Main industrial sectors will be structuralized towards the higher valued added production. Sub-supplier companies operating in automotive and electro technical industry, ICT and other sectors in Slovakia will be reflecting the global trends and there will be higher involvement in cooperation with MNC and a designation of new strategic segments. New strategic segmentation will allow rebuilding of own value chains, exploiting new market opportunities (niche markets) and opening new markets. Domestic research and development workplaces will be incentivized towards cooperation with local companies during the realization of their development and innovation activities in order to make production and logistical process more effective, which will result in lower overall energy intensity and last but not least in the implementation of information and communication technologies into intelligent applications in industry. Companies will also realize research, development and innovation activities in the areas of materials research, especially in the area of metals (steel, light metals and its alloys), plastic materials and compression molding and joining of materials with the aim of improving the overall products and increasing quality and durability of produced goods. Research and development will be realized in new business research and development centers. Research and development of steel in cooperation with the producers will be oriented towards improving the properties, specific properties, better welding and steel joining. In the area of plastics research will be oriented towards using biodegradable plastics, which allows the production of ecological products with lower impact on environment after the expiration date and new kinds of polymeric materials for specific applications. There will be the development of automation sector, robotics and digital technologies, which uses new materials and ICT for creation of new innovative solutions. R&I activities will be focused on automatic, robotic reconfigurable and smart systems of production and logistic tools.

Due to product and process innovation the companies will become globally competitive and will be linked to supply chains of other MNCs in broader region, especially with the perspective in fast growing markets. The shift within the value chains of MNCs will create the preconditions for better cooperation with MNCs during the realization of innovative solutions. Besides that the companies will pinpoint perspective strategic segments through cooperation in clusters and as a result there will be diversification of productive portfolios of perspective sectors. Innovative solutions will be implemented

not only in industry, but also utilized in global markets. An employment in the sophisticated production sector, ICT and knowledge intensive services will be increased. In order to eliminate adverse trends of lagging behind in innovation and marginalization of businesses, an effective systemic support of businesses will be created, based on the combination of long-term expert help and financing.

By 2020 the companies will use capacities of research, development and innovation centers built for the needs of smart specialization sectors, which will develop next generation demand products, technologies and materials.

Mechanisms that motivate technical universities and selected SAV institutes to cooperate with businesses on innovative solutions as well as mechanisms for knowledge transfer will be implemented. The best universities and SAS institutes will be equipped with state-of-the-art technologies that will allow world-class scientific work and they will attract high-tech companies. In the area of automation, robotics and digital technologies, infrastructure capacities of R&D public and private sector workplaces will be created that will be useful for innovative solutions with low barriers to achieve spill-overs (effects in the alternative sectors or alternative applications). Capacities will be also used for solving all-society problems connected with active life and ageing and medical diagnostics. It is exactly this area that can intersect with practice and use the results of research and development that is carried out in medical research centers as a promising smart specialization area. Medical research will have its use in practice by knowledge transfer through selling patents and licenses, but also through direct commercialization by setting up spin-off and innovative start-up companies. This kind of companies will be one of the ways to commercialize the results of research and development in other promising areas as well. Strengthening cooperation between research and development organization in the area of agriculture and environment and businesses will contribute to an increase in the quality of life and in self-sufficiency in the production of good-quality food. Concurrently, there will be a better use of domestic natural resources. Individual areas will be supported by newly developed technologies in the area of energy production and distribution. Other sectors will also be developed, e. g. creative industry. For the necessity of economic growth with the smart specializations sectors in mind, there will be a creation of conditions for academic sector and secondary education, conditions for solving scientific tasks also within international cooperation, conditions for accomplishing the goals for the EU strategy for the Danube region and transnational programs e. g. OP Central Europe and OP Danube and for the flow of graduates employable in practice with a shorter period of adaptation into business processes.

Strategic objective 3: Creating a dynamic, open and inclusive innovative society as one of the preconditions for an increase in the standard of living

Transformation of the economy from production oriented towards knowledge oriented demands the change across the whole society, which enables effective support for the commercialization of R&D results and an implementation of various innovation activities.

Partial objectives for accomplishing the strategic objective

a) Creating conditions for enterprises (especially SMEs) to increase their innovation capacities

Innovation performance of companies reflects predominantly the low share of investments into own innovation activities. The current share of innovative enterprises (in house) is 15 %. The aim is to stimulate the businesses to increase their own innovation performances across the whole socio-economic spectrum to 20 %. Simultaneously it is necessary to increase the dynamics of start-up and spin-off businesses creation and create the possibilities of better utilization of financial engineering tools.

d) Support for the implementation of various kinds of innovations into practice for the needs of society

There is an insufficient extent of application and support of eco-innovations and social innovations in Slovakia, including ICT innovations. Systemic supportive tools will be created to increase their applicability in practice with a positive impact on economy and society.

Regional Innovation Strategy of Košice Region

Regional Innovation Strategy of Košice Region 2020 was created to significantly help the Košice Region to strengthen its research excellence and innovation performance. The Košice region is represented by organizations of public administration, university and academic environment, as well as private research institutes and innovative companies, which together create good conditions for the emergence of a quality innovation ecosystem of European importance. The development of this strategy results mainly from the need to respond to new EU trends and initiatives and the need to update the region's strategy in accordance with the principles of "smart specialization", the requirements placed on the structure and content of a modern innovation strategy and the process of its creation and implementation.

Main mission and vision

Košice region is growing economically and has developed innovative base and open cooperation in research, development and innovation. The main vision is to achieve prosperity of Košice region by using internal innovation potential and available financial resources.

Strategic objective and key area of change C: To create suitable conditions for the development of innovative business to support the key and promising sectors of the region's economy

Reason: The objective is to create the preconditions for the emergence of innovative firms, the development of corporate value-added supply chains and the use of available R&D infrastructure that is and will be further developed in the region. Kosice Region RIS 2020 will create a roof framework to support prospective industries in terms of the Smart Specialization Strategy of the Slovak Republic.

Activity: Individual business advice on innovation management

The activity builds on the activities related to the implementation of innovation education for SMEs and further extends it to activities related to specific individual guidance for innovative companies in the form of planning, implementing and managing innovation and innovation processes.

Regional Innovation Initiative: Building an ecosystem to support innovation and a creative economy in the Košice region

The aim of the project was to gain concrete experience and recommendations for the Košice Region from the South Moravian Innovation Center based in Brno (JIC), which has already had 15 years of rich experience in building an ecosystem of innovation. The implementation of the project should also contribute to the development of further cooperation in the exchange of experience, sharing useful information and promoting the actors and outputs of the knowledge and creative economy.

1.2. Regional Innovation Ecosystem of Košice Region

The Košice region is represented by all organizations of public administration, university and academic environment, as well as private technology development centers, innovative clusters and innovative companies, which work together to develop an innovative ecosystem of European importance. This ecosystem is under the umbrella of universities such as TUKE (the Technical University of Košice), UPJŠ (the Pavol Jozef Šafárik University in Košice), UFVL (the University of Veterinary Medicine and Pharmacy in Košice), and the Regional Centers of the SBA (Slovak Business Agency) and SIEA (Slovak Innovation and Energy Agency). In the framework of the ecosystem, there are activities organized with aim at supporting the identification and specification of business plans, the preparation of business plans, support in the form of "introduction to business" training, provision of premises for company headquarters, support for obtaining information for the implementation of administrative and economic processes at the start-up stage of the company, support in obtaining spin-off financing (especially support in finding and negotiating with investors).

Within the direct technology transfer activities are carried out through the universities TUKE, UPJŠ and their university science parks TECHNICOM and MEDIPARK, together with specialized departments responsible for technology transfer in the following areas:

- Joint Research - focused on collaboration between two or more entities to achieve agreed research results. Each entity allocates the necessary personnel, financial and material resources. Each entity has the means to conduct research and has the opportunity to participate in research. Every research participant usually has the right to use research results.
- Contract research - focusing on research tasks or activities by one entity performing the order of the other entity, as a rule, only the client has the right to use the research results, unless otherwise agreed by mutual agreement.
- Consultation - by providing the knowledge to one subject, which is carried out on the basis of the order of the other entity, the rights to the created intellectual property are usually performed by the consultant.

Research and Technology Transfer Association

An important element of the innovative ecosystem in Košice Self-governing Region is TECHNICOM as an internationally recognized research and technology transfer association in the areas of information and communication technologies, electrical engineering, automation and robotics, engineering, construction and environmental engineering, through innovative applications supporting knowledge technologies.

The purpose of the association is to:

- Ensure a high innovative potential of R&D results.
- Collaborate with each other and with practice in joint applied research, innovation projects and technology transfer.
- Building the TECHNICOM Association and its University Science Park (UVP) as a nationally and internationally recognized innovation structure guaranteeing top-targeted applied research and development.
- Support the creation of joint research and development workplaces and innovative projects with practice.
- Contributing to accelerating the formation of business plans to create spin-offs and start-ups based primarily on research and development knowledge.

- Support for the continuous development of cutting-edge research and development and all available forms of its effective transfer to social and economic practice within the region, Slovakia and abroad.

Main characteristics of Regional Innovation Ecosystem of Košice Region

- Strong position of the region's economy in the national context in industry (metallurgical, engineering), ICT, construction, trade and logistics
- Dynamically developing region's strong position in the ICT industry coordinated by Košice IT Valley
- Very strong position of the region in automation, robotics coordinated by cluster AT + R
- An evolving modern base of material engineering, biomedicine and biomedical engineering
- Strong ICT infrastructure in Košice
- Relatively good workforce availability and mobility
- Fast tempo of labor productivity growth
- Balanced growth in real wages in industry and services
- Long-term trend of increasing employment in prospective segments
- The presence of research-oriented universities
- Presence of a spectrum of vocational training centers
- Košice as a metropolitan city with a traditional innovation oriented industry is the second most important economic, research and innovation center in the Slovak Republic
- The existence of the Košice-Prešov agglomeration as an innovative development pole of international importance
- The existence of research and development infrastructure elements of European importance
- Existence of business and university centers supporting the establishment of start-up and spin-off companies (e.g. TUKE Start-up Center)
- The existence of innovation centers to promote technology transfer
- Existence of clusters bringing together significant innovative companies in the region (Košice IT Valley, Cluster AT + R) in key sectors of regional economy of Eastern Slovakia and Košice region
- Attractive cultural infrastructure and infrastructure for creative industry in Košice
- The existence of business incubators

1.3. Public administration entities

Košice Self-governing Region

Košice Self-governing Region supports the development of a regional innovation ecosystem, applied research, effective transfer of knowledge, products and technologies to companies, cooperation between universities, research institutions and firms in a market based on mutual partnership. In cooperation with universities, it contributes to strengthening the awareness and development of innovative oriented firms by institutional support for the development of effective acceleration pre-incubation services linked to the subsequent external spin-off or start-up business, respectively institutions.

Košice city

The metropolitan city of Kosice's vision of promoting entrepreneurship and innovation is to build a modern city with a highly skilled workforce with high innovation and creative potential concentrated in the innovative district of Kosice. The city therefore creates favorable conditions to support entrepreneurship, in particular by creating links and contacts to available clusters, the Chamber of Commerce, research organizations and other support innovation institutions. The key development goal is to support science and innovation parks within the "Kosice Science City" initiative.

1.4. Universities

Košice is an important university education and research supra-regional center.

There are 3 public universities in the Košice Region:
- Technical University of Košice - 9 Faculties
- Pavol Jozef Šafárik University in Košice - 5 Faculties
- University of Veterinary Medicine and Pharmacy in Košice

Technical University of Košice

University research centers
- Competence Center of Knowledge Technologies for Innovation of Production Systems in Industry and Services
- Research Center for the Integration Efficiency of Combined Renewable Energy Systems

Research centers of Faculty of Mechanical Engineering
- Prototype and Innovation Center
- Design and prototype lab
- Automotive Testing Laboratory
- Specialized workplace of metrotomography
- Center of Applied Biomedical Engineering
- Specialized department of implantology
- Laboratory of Digital Dental Production
- Laboratory of modern optical methods
- Institute of Management, Industrial and Digital Engineering
- Teaching center of Institute of Automation, Robotics and Mechatronics
- Specialized center of pneumatic systems
- Specialized center of industrial robotics
- Specialized center of mechatronics and service robotics

Research centers of Faculty of Materials, Metallurgy and Recycling
- Waste processing center
- Industrial waste processing laboratory

Research centers of Faculty of Construction
- Center of Excellence of Advanced Construction Structures, Materials and Technologies

Research centers of Faculty of Manufacturing Technologies
- Laboratory of Advanced Technologies

- Virtual Reality Laboratory
- Laboratory of mechatronics, cybernetics and artificial intelligence
- Lean Manufacturing Laboratory
- Joining and splitting laboratory
- Laboratory of non-destructive material testing
- Plastics and Composites Testing Laboratory
- Laboratory of computer simulations and analyzes
- Integrated Mobile Process Analysis Laboratory
- Computer Support for Manufacturing Technologies Laboratory
- Reverse Engineering Laboratory
- Laboratory of diagnostics of operating states of technical systems
- Renewable Energy Laboratory

Research centers of Faculty of Electrical Engineering and Informatics
- Energy Efficient Electrical Equipment Center
- SMART GRID Center
- EMC Center
- Center for Advanced Materials, Technologies and Their Applications in Electronics
- Center for Industrial Electrical Engineering

Research centers of Faculty of Aeronautics
- Aircraft Engine Intelligent Control Laboratory

TECHNICOM University Science Park

The aim is to provide an incubation environment to ensure the acceleration process for the emergence and development of small and medium-sized hi-tech companies, respectively start-up and spin-off companies, in particular on the basis of relevant research and development results realized within TUKE research and innovation activities.

TECHNICOM provides an effective support platform that guarantees the required infrastructure for collaborative applied research and development (R&D) with a link to practical support for relevant innovation activities, business acceleration and knowledge and technology transfer.

The Business Acceleration Unit is a central element of the technology transfer and innovation ecosystem built on the basis of TECHNICOM. It consists of the Startup Center TUKE and the TUKE Incubator. It offers business acceleration and research services. These services are mainly aimed at professional counseling, coaching and mentoring; business models evaluation; services leading to the emergence of new start-ups and spin-offs.

Pavol Jozef Šafárik University in Košice

A functional system of unique laboratories and devices is built at the university:
- Analytical cytometry laboratory
- Nuclear Magnetic Resonance Laboratory
- Nano-laboratory
- Metallographic Laboratory
- Ferromagnetic Laboratory
- Joint Transmission Electron Microscopy Laboratory
- Proteomics Laboratory

- Laboratory of Intelligent Data Analysis
- Laboratory of Experimental Phonetics and Communication
- Television and film studio
- Psychological laboratory
- Structural Analysis Laboratory
- Laboratory of cell and tissue cultures
- Electron paramagnetic resonance laboratory
- Laboratory of Biomedical and Clinical Microbiology
- Specialized laboratory of morphology
- Laboratory of mass spectrometry and metabolomics
- Laboratory of translational research of respiratory and metabolic diseases
- Laboratory of genomics and transcriptomics
- Laboratory of UHV STM Institute of Experimental Physics and Institute of Physical Sciences

Research topics of Medical Faculty

Research topics include regenerative medicine, the area of chronobiology, cardiovascular diseases and respiology and metabolism, research on antitumor effects of some plant extracts, epileptic conditions and degenerative brain diseases, as well as research on new biocompatible materials in skull reconstruction operations, research on probiotics and others.

Research centers of Faculty of Natural Science

- Laboratory of Intelligent Data Analysis
- Geographic Information Systems Laboratory
- Development laboratory for information and knowledge systems
- Laboratory of Perception and Cognition
- Laboratory of haptics and virtual reality
- Unified Communications Laboratory and Video Conferencing Systems
- Cyber Security Laboratory
- Computer modeling and simulation laboratory

All laboratories use Computing and Network Nodes. Selected laboratories form the basis of the Center for Informatics and Information Technologies of UPJŠ Technology and Innovation Park.

Medical University Science Park in Košice – MEDIPARK

The MediPark features more than 6,000 square meters of laboratory space and includes a data center, a laboratory of pharmacogenetics and individualization of treatment, a laboratory for research on metabolism and atherosclerosis, a laboratory for regenerative medicine and stem cell research, and a space for a scientific incubator and development of commercial research activities.

UPJŠ Technology and Innovation Park and its centers

The aim of the establishment of Technology and Innovation Park is to develop activities primarily in the area of translational research and development of new technologies and thus contribute to the development of the Pavol Jozef Šafárik University in Košice as a modern university, based on the synergy of three pillars: education, science and technology transfer, with an emphasis on development modern teaching, capitalizable science and a creative environment for the emergence of innovative high-tech firms in the region of Eastern Slovakia, with an overlap into other regions, including abroad.

TIP centers:

- Center of interdisciplinary biological science

- Center of experimental, transfer and clinical medicine
- Informatics and information technology center
- Center of progressive materials

University of Veterinary Medicine and Pharmacy in Košice

It is the only institution of international importance of its kind in Slovakia, educating future veterinary professionals. Currently, education in accredited study programs provides general veterinary medicine, food hygiene, cynology, feed and food safety, pharmacy, market and food quality and animal production health and environmental protection. It has top-quality equipment that creates the prerequisites for direct links to Medipark areas such as indigenous and regenerative reproductive medicine. The equipment allows for a wide range of animal testing and invasive experiments, animal model development and curative work.

1.5. Institutes of Slovak Academy of Sciences

The Slovak Academy of Sciences (SAS) is represented by its excellent workplaces allocated in Košice:

- Institute of Materials Research
- Institute of Experimental Physics
- Institute of Geotechnics
- Institute of Neurobiology
- Institute of Parasitology
- Institute of Livestock Physiology
- Institute of Social Sciences

1.6. Research Center for Progressive Materials and Technologies for Present and Future Applications – PROMATECH

Promatech is a cutting-edge international research center in the field of progressive materials that operates on the basis of an integrated and interdisciplinary center. In PROMATECH, there is research materials and technologies for current and future applications implemented, to generate scientific and research results with high innovation potential and short application times to industrial practice.

1.7. Entities providing innovation support and business development services

Slovak Business Agency (SBA) - National project "National Business Center"

Main focus is to provide comprehensive, systematic support and expertise for:

- small and medium-sized enterprises,
- people interested in business (individuals - non-entrepreneurs),
- creative and innovative people thinking about commercializing their idea or product

- also disadvantaged social groups such as women, students, young people, employees who think about doing business but don't know how to do it, seniors / generations of 50+, social and handicapped people, etc.

Slovak Innovation and Energy Agency (SIEA) - National project "Increasing the Innovation Performance of the Slovak Economy"

Main aim:

- Increasing the innovation performance of the Slovak economy through the implementation of targeted activities in all regions of Slovakia.
- Raising awareness of the importance of innovations among Slovak micro, small and medium-sized enterprises and also among secondary school and university students in all regions of Slovakia.
- Creation of regional consulting centers for the provision of innovative advice.

Slovak Innovation and Energy Agency (SIEA) - National project "Support for the Development of Creative Industry in Slovakia"

Within the project, activities are focused on:

- support the creation of new business models
- promoting the networking of creative industries
- stimulating the innovation process using the outputs of the creative industry - the key activity will be to provide creative vouchers

Creative Industry Košice (CIKE)

They are the catalyst for creativity in Slovakia. They help people from cultural and creative backgrounds to become professionals, open up and educate international markets. Their role is also to create suitable conditions for cooperation with the private sector and its involvement in urban cultural life. At the same time, they help the city and the region to develop policies and sustainable regional development by advising and consulting strategic documents.

Eastcubator

Eastcubator promotes collaboration in business development. It offers its services to start-ups, freelancers and students. It offers space rental, coworking, advisory services, access to potential investors, mentoring, networking in a startup community, organizes events and training sessions.

Tabacka Kulturfabrik

It is a unique cultural center and open zone for art, creativity and cooperation in Košice. Tobacco supports a multicultural society, an open mindset, experiment and creativity. It is a place for meeting people, sharing knowledge, creating ideas together.

Cultural and creative factory was established thanks to a breakthrough decision of the Košice Self-governing Region to support the development of a creative economy in the region and at the same time to invest in the renewal of its assets.

1.8. Clusters and cluster initiatives

Košice IT Valley

Cluster Košice IT Valley plays an important role in the development of IT industry in the Košice region. The association was founded in 2007 as a joint initiative of educational institutions, public administration entities (Košice Self-governing Region and the City of Košice) and leading IT companies. In 2012, the association was transformed into a cluster. In the year 2015, cluster got certificate „Cluster Management Excellence Label GOLD“ as first in Central Europe and is one of three certified clusters in the ICT field. The association contributes to building an innovative ecosystem in the region and creates a communication platform between public administrations, the business sector and educational institutions, leading to the acceleration of the development of ICT industry in the region.

Automation + Robotics Cluster AT + R

The cluster aims to concentrate development capacities and deepen domestic trade union profiling and participation in international clusters in the area of AT + R. The basic goal of cluster participants is to perform their own activities more efficiently and dynamically, allowing them to enter the domestic and foreign markets in the areas of robotics, automation and AAL systems more comprehensively.

2. Regional RI Maturity: Mapping of current situation in the area of responsible innovation in Košice Region

2.1. Self-assessment tool

The RI Maturity in Košice Region began with Self-assessment tool, which was aiming at identifying which RI goals and elements matter to specific organizations, as they represent areas where they can make a difference in contributing to sustainable and inclusive development and drivers they can effectively leverage on to manage their innovation processes responsibly.

Specifically, the assessment was carried with reference to:

- The impact of innovative products and services on sustainable and inclusive development vis a vis the UN Sustainable Development (macro) Goals; and
- The capacity to shape the innovation process according to the RI themes proposed by the EU Commission within the H2020 framework.

Thus reflecting:

- Areas of improvement of the innovation process and/or the features of the innovative product/service towards a fuller contribution to sustainable and socially desirable growth and development;
- Drivers/enablers of responsible innovation that can be rely onto or that need to be developed/achieved manage the innovation process so that its results contribute to sustainable and socially desirable growth and development.

Self-assessment tool responses

In the following table, the list of SMEs and other regional actors participated on self-assessment tool is reflected.

Table 1. List of SMEs and other regional actors participated on self-assessment tool

TRADE NAME	TYPE OF ORGANISATION	INDUSTRY	
kamelot.sk,s.r.o.	SME (less than 10)	Business and tourism	
BodyFix Technologies s.r.o.	SME (less than 10)	Business and tourism	
Qynace s.r.o.	SME (less than 10)	Business and tourism	
Gabriela Sotáková GAROMI	SME (less than 10)	Business and tourism	
Ing, Melánia Kováčová	SME (less than 10)	Business and tourism,	Services and other
Richard Feltovič - REKO - Build	SME (less than 10)	Construction	
PRORAX, s.r.o.	SME (less than 10)	Construction	
BUSINESS ELECTRICITY SOLUTIONS TEAM, s.r.o., v skratke B.E.S.T., s.r.o.	SME (less than 10)	Construction	

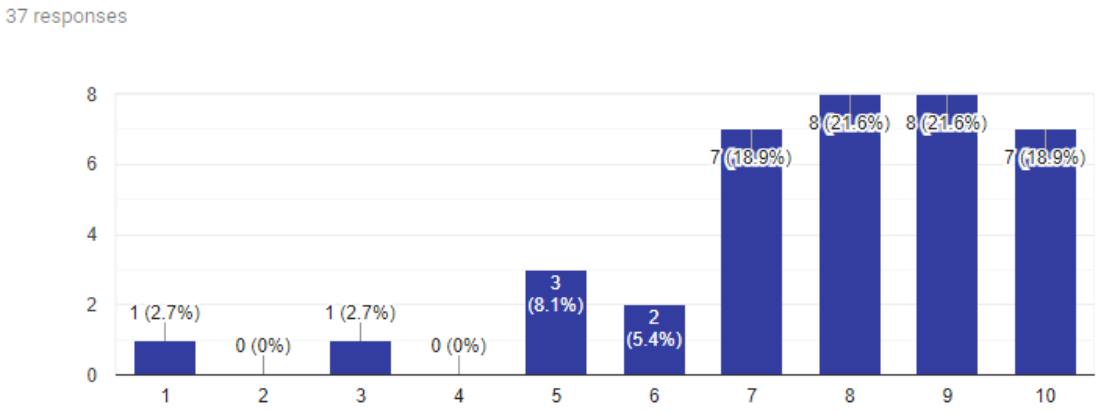
Biomedical Engineering, s.r.o.	SME (less than 10)	Industry (Manufacturing, Food, Mining)
Gobles s.r.o.	SME (less than 10)	Industry (Manufacturing, Food, Mining)
SONAS	SME (less than 10)	Services and other
EEE - AudiCert, s.r.o.	SME (less than 10)	Services and other
INNOVIS, s.r.o.	SME (less than 10)	Services and other
ERANET, s.r.o.	SME (less than 10)	Services and other
E-zone Technologies, s.r.o.	SME (less than 10)	Services and other
CLIENT ZLÍN, s.r.o.	SME (less than 10)	Services and other
Chargebrella, s.r.o.	SME (less than 10)	Services and other
Hipstersaurus Rex Apps	SME (less than 10)	Services and other
Tonio, s.r.o.	SME (less than 10)	Services and other
IHNYPRO	SME (less than 10)	Services and other
STAMIS GASTRO s.r.o.	SME (less than 10)	Services and other
Asing, s.r.o.	SME (less than 10)	Services and other
CEDS, s.r.o.	SME (less than 10)	Services and other
RNDr. Gejza Legen - IRBISCOM	SME (less than 10)	Services and other
Kanocz Consulting s.r.o.	SME (less than 10)	Services and other
Ing. Milan Soták	SME (less than 10)	Services and other
e-pro group, a.s.	SME (less than 10)	Services and other
Valeria Frischova	SME (less than 10)	Services and other
pharmanet s.r.o.	SME (less than 10)	Services and other
VZT Mont, a.s.	SME (between 10 – 50)	Construction
TOKAJ MACIK WINERY	SME (between 10 – 50)	Industry (Manufacturing, Food, Mining)
GM Rock s.r.o.	SME (between 10 – 50)	Services and other
Uranpres, spol. s.r.o.	SME (more than 50)	Construction
2J Antennas, s.r.o.	SME (more than 50)	Industry (Manufacturing, Food, Mining)
Slovanet	SME (more than 50)	Services and other
RRA Dolny Zemplin	Boundary organisation / development agencies / innovation support centres	
Self-governing Region Kosice	Public administration	
Technická univerzita v Košiciach	Academia / Research	

Few statistics of self-assessment tool

Influence of organizations on industry, innovation and infrastructure

Most of the SMEs have positive influence on building resilient infrastructure, promote sustainable industrialization and foster innovation.

Graph 1. Influence of organizations on industry, innovation and infrastructure (%)

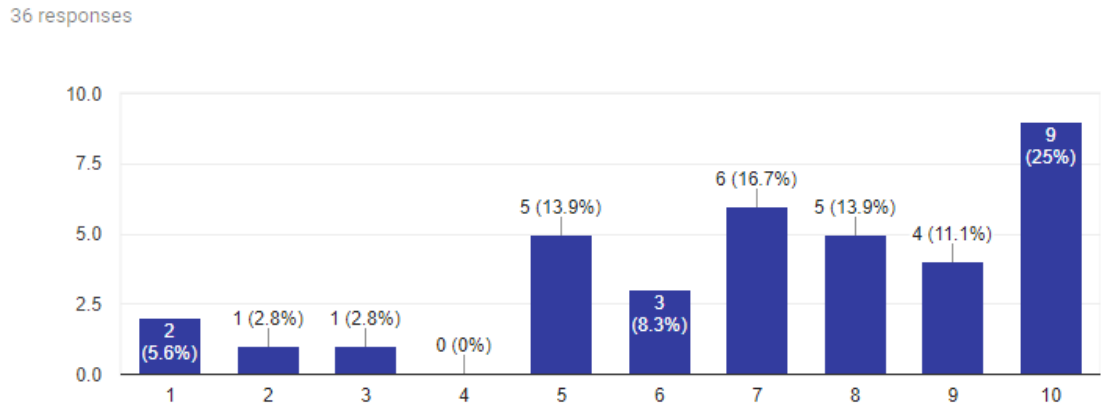


Source: own processing based on primary research

Influence of organizations on sustainable cities and communities

Negative impact on the Sustainable Cities and Communities is almost not seen and on the other hand SMEs are usually trying to make cities inclusive, safe, resilient and sustainable.

Graph 2. Influence of organizations on sustainable cities and communities (%)

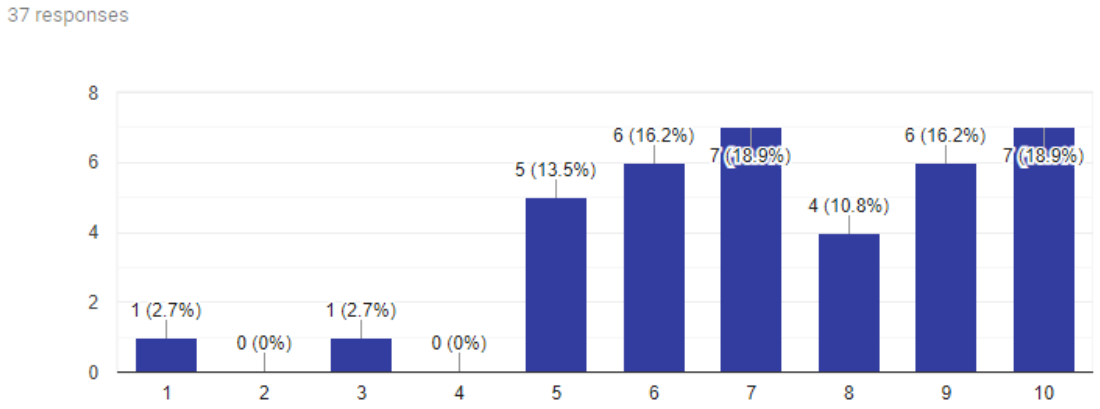


Source: own processing based on primary research

Influence of organizations on responsible consumption and production

Almost every SME which responded is trying to produce their products responsibly and to ensure sustainable consumption.

Graph 3. Influence of organizations on responsible consumption and production (%)



Source: own processing based on primary research

2.2. Evaluation and prospection of regional RI maturity

Indicators are the instruments which firms and regional public authorities can use to evaluate their positioning with regard to RI. Concerning the former, the evaluation indicators chart firms' performance against the various components of RI, identifying their capabilities, necessities, and strategies. Concerning the latter, the evaluation indicators describes the policies, measures, and programs which regional policy makers presently plan and execute, assessing to what extent these measures are enabling factors for firms' implementation of RI.

Tables provide a list of the RI components and the related indicator. For each RI component, the table illustrates:

- the description of the corresponding indicator;
- the type of indicator (qualitative/quantitative);
- the metric, i.e. how the indicator is measured;
- the source, i.e. where data can be found to provide a measure for each indicator.

Two different lists of indicators are provided, one for firms and one for regional policy makers. The logic to have two distinct lists of indicators is twofold. Firstly, indicators are specific to the two types of actors: on the one hand (firms), they refer to the level of individual organizations; on the other hand (regional policy makers), they refer to the regional level. Secondly, many indicators describe their reciprocal complementarities, too. For instance, indicator PE2 (public engagement) for regional actor concerns the "Formalization and extent of public involvement in regional science and technology decision-making ". Indicator PE2 for firms regards companies' "Participation in public-sponsored engagement projects on R&I". In this way, firms' activities in RI can be related to regional policies on RI, which can be seen as (part of) the enabling environment of the former. Matching the results of the evaluation for firms and regional policy makers, allows the assessor to identify gaps between what is provided by regional policy makers and the RI performance of firms. These gaps represent the policy areas to be primarily addressed in the Roadmap.

The indicators grid allows to identify the RI positioning of firms and regional policies. Examining the results for each of these categories and confronting them, there can be identified:

- areas of RI where firm's performance is strong and regional policy makers display significant policies;
- areas of RI where firms perform well, but the regional policy framework is not sufficiently developed to support them;
- areas where there are relevant regional policy initiatives, but firms have no significant involvement,
- areas where neither firms nor regional policies are sufficiently active.

Depending on the assessment, regional policy makers can then define measures and actions either to strengthen the alignment of public policies and firms' activities, to fill the gaps in public policy, or to elaborate initiatives to stimulate firms' commitments.

2.2.1. Purpose: Motivation for doing/supporting research/innovation

RI PERFORMANCE OF REGIONAL POLICY MAKING					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Purpose	**Motivation for doing/supporting research/innovation**	M1: Integration of innovation/S&T in policy planning and strategies	Qualitative	Inclusion of innovation/S&T components in the official policies of the organizations (e.g. strategic plans, policy documents, etc.)	Regional policy/planning documents – Partners'/Experts' assessment
ASSESSMENT (Modest/Moderate/Substantial)			**SHORT DESCRIPTION**		
5					

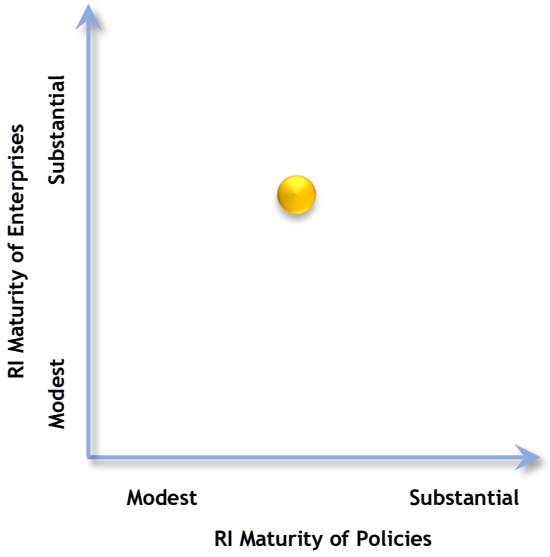
RI PERFORMANCE OF ENTERPRISES					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Purpose	**Motivation for doing/supporting research/innovation**	M1: Integration of innovation/S&T in corporate planning and strategies	Qualitative	Inclusion of innovation/S&T components in the official planning of the organizations (e.g. strategic plans, vision and mission statements, etc.)	RRI Development plan, "1. Formulate your goal"
ASSESSMENT (Modest/Moderate/Substantial)			**SHORT DESCRIPTION**		
6					

LOCAL RI MATURITY LEVEL

Category
Purpose

Component
Motivation for doing/supporting research/innovation

RI positioning of firms and regional policies
firm's performance is strong and regional policy makers display significant policies



2.2.2. Purpose: Motivation for engaging with RI

RI PERFORMANCE OF REGIONAL POLICY MAKING					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Purpose	**Motivation for engaging with RI**	M2: Integration of RI components in policy planning and strategies	Qualitative	Inclusion of RI components in the official policies of the organizations (e.g. strategic plans, policy documents, etc.)	Regional policy/planning documents – Partners'/Experts' assessment
ASSESSMENT (Modest/Moderate/Substantial)			**SHORT DESCRIPTION**		
3					

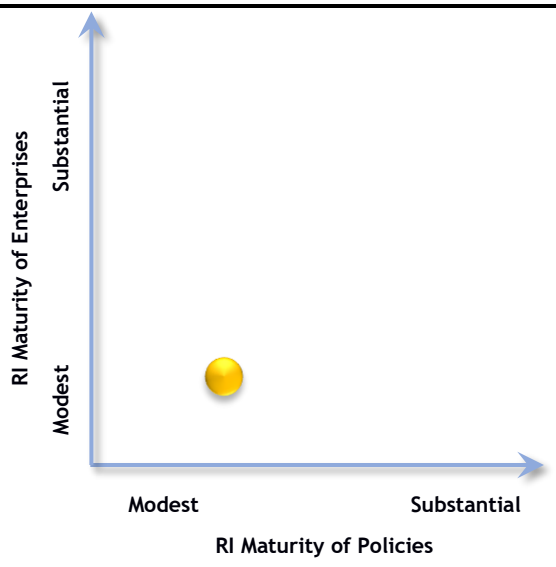
RI PERFORMANCE OF ENTERPRISES					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Purpose	**Motivation for engaging with RI**	M2: Integration of RI components in policy planning and strategies	Qualitative	Inclusion of RI components in the official planning of the organizations (e.g. strategic plans, vision ad mission statements, etc.)	RRI In-depth Assessment Tool
ASSESSMENT (Modest/Moderate/Substantial)			**SHORT DESCRIPTION**		
2					

LOCAL RI MATURITY LEVEL

Category
Purpose

Component
Motivation for engaging with RI

RI positioning of firms and regional policies
neither firms nor regional policies are sufficiently active



2.2.3. Purpose: Motivation for engaging with RI

RI PERFORMANCE OF REGIONAL POLICY MAKING					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Purpose	**Motivation for engaging with RI**	M3: Financial commitment on RI components	Quantitative	Budget allocation for RI components in the budget of regional policy makers: (a) presence of specific budget headings for RI or its components; (b) annual amount (%, or €); (b) evolution (increase, decrease, stable over the last 3 years – or other programming period where appropriate)	Budget documents – Partners'/Experts' assessment
ASSESSMENT (Modest/Moderate/Substantial)			**SHORT DESCRIPTION**		
1					

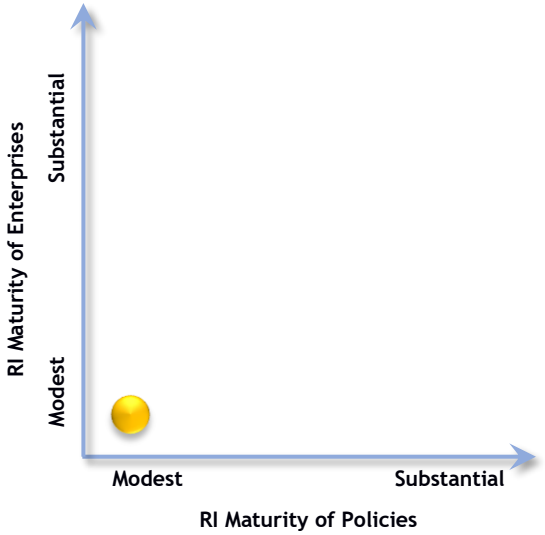
RI PERFORMANCE OF ENTERPRISES					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Purpose	**Motivation for engaging with RI**	M3: Financial commitment on RI components	Quantitative	Budget allocation for RI components in companies' budget: (a) presence of funded programs targeting (selected) RI components; (b) annual amount (%, or €); (b) evolution (increase, decrease, stable over the last 3 years – or other programming period where appropriate)	Self-assessment (*)
ASSESSMENT (Modest/Moderate/Substantial)			**SHORT DESCRIPTION**		
1					

LOCAL RI MATURITY LEVEL

Category
Purpose

Component
Motivation for engaging with RI

RI positioning of firms and regional policies
neither firms nor regional policies are sufficiently active



2.2.4. Purpose: Ethics (justification of intended outcomes)

RI PERFORMANCE OF REGIONAL POLICY MAKING					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Purpose	**Ethics (justification of intended outcomes)**	E1: Significance of UNDGs in policy planning and strategies	Qualitative	Reference to UNDGs in regional policy documents (e.g. strategic plans, policy documents, etc.)	Regional policy/planning documents – Partners'/Experts' assessment
ASSESSMENT (Modest/Moderate/Substantial)			**SHORT DESCRIPTION**		
3					

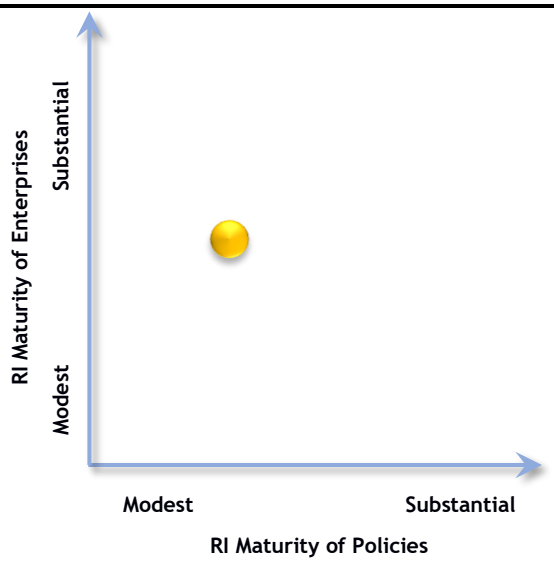
RI PERFORMANCE OF ENTERPRISES					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Purpose	**Ethics (justification of intended outcomes)**	E1: Significance of UNDGs in companies' activities and strategies	Qualitative	Participation in programs and schemes, and adoption of instruments both mandatory and voluntary relevant for the achievement of the UNDGs (e.g. ethics codes, voluntary guidelines, certifications, standards)	Self-assessment(*)
ASSESSMENT (Modest/Moderate/Substantial)			**SHORT DESCRIPTION**		
5			- Clear ethical rules in SMEs - Preparing of Code of Conduct		

LOCAL RI MATURITY LEVEL

Category
Purpose

Component
Ethics (justification of intended outcomes)

RI positioning of firms and regional policies
firms perform well, but the regional policy framework is not sufficiently developed to support them



2.2.5. Process: Anticipation

RI PERFORMANCE OF REGIONAL POLICY MAKING					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Process	**Anticipation**	A1: Foresight and strategic planning activities (e.g. Scenario building, delphis, etc.) (adapted from Eastwood et al. 2017)	Quantitative/Qualitative	Number of foresight and strategic planning activities in the current and preceding governing period (e.g. regional legislature, depending on local regulation) [Presence/Absence of activities if the number is not available]	Regional policy/planning documents – Partners'/Experts' assessment
ASSESSMENT (Modest/Moderate/Substantial) 6			**SHORT DESCRIPTION** Presence of national and regional strategies and innitiatives: - Research and innovation strategy for smart specialization of the Slovak Republic - Regional innovation strategy of Košice Region - Regional innovation initiative: Building an ecosystem to support innovation and creative economy in the Košice Region		

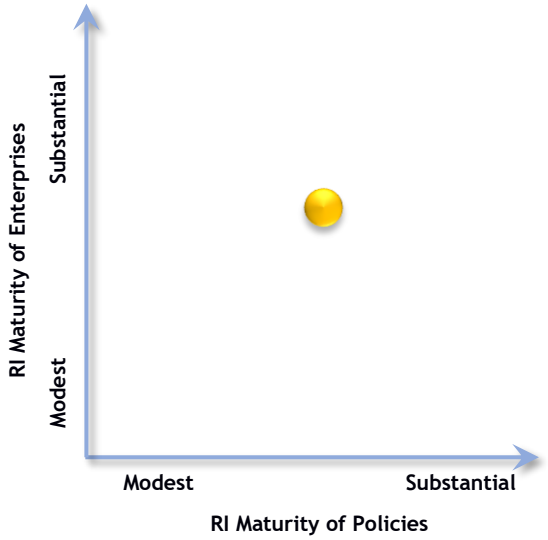
RI PERFORMANCE OF ENTERPRISES					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Process	**Anticipation**	A1: Foresight and strategic planning activities (e.g. Scenario building, delphis, etc.) (adapted from Eastwood et al. 2017)	Quantitative/Qualitative	Number of foresight and strategic planning activities in the current and preceding planning period (specify the relevant planning period) [Presence/Absence of activities if the number is not available]	Self-assessment(*)
ASSESSMENT (Modest/Moderate/Substantial) 6			**SHORT DESCRIPTION** - Presence of strategic planning documents - Log-term foresight of possible negative side effects		

LOCAL RI MATURITY LEVEL

Category
Process

Component
Anticipation

RI positioning of firms and regional policies
firm's performance is strong and regional policy makers display significant policies



2.2.6. Process: Public engagement

RI PERFORMANCE OF REGIONAL POLICY MAKING					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Process	**Public engagement**	PE1: Public perceptions on public involvement in science and technology (Tsanos and Apospori 2017)	Quantitative	% of respondents who stated that "the public should be consulted and public opinion should be considered when making decisions about science and technology"	Special Eurobarometer 340 (national data), p. 87.
ASSESSMENT (Modest/Moderate/Substantial) 1.4			**SHORT DESCRIPTION** According to Special Eurobarometer in Slovakia, only 14% of respondents stated that "the public should be consulted and public opinion should be considered when making decisions about science and technology".		

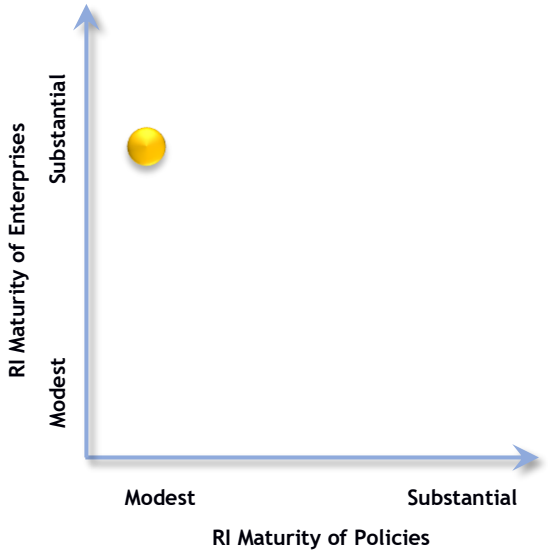
RI PERFORMANCE OF ENTERPRISES					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Process	**Public engagement**	PE1: Users' involvement in design and development processes	Qualitative	Qualitative discussion and self-assessment of the companies' experience in users' engagement techniques (e.g. living labs)	RRI In-depth Assessment Tool
ASSESSMENT (Modest/Moderate/Substantial) 6			**SHORT DESCRIPTION** - Many discussions and meetings - Dialogue with regional stakeholders		

LOCAL RI MATURITY LEVEL

Category
Process

Component
Public engagement

RI positioning of firms and regional policies
firms perform well, but the regional policy framework is not sufficiently developed to support them



2.2.7. Process: Responsiveness

RI PERFORMANCE OF REGIONAL POLICY MAKING					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Process	**Responsiveness**	RES1: Potential to adapt policies and strategies (adapted from Eastwood et al. 2017)	Qualitative	Existence of stakeholder/public feedback mechanisms in policy/strategy implementation	Regional policy and strategy documents/ Partners'/Experts' assessment

ASSESSMENT (Modest/Moderate/Substantial)

SHORT DESCRIPTION

In the region, there exist stakeholder feedback mechanisms via:

- Regional innovation ecosystem,
- Technicom,
- Clusters Košice IT Valley and Cluster AT + R

These entities represent a platform for communication of companies and regional stakeholders.

RI PERFORMANCE OF ENTERPRISES					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Process	**Responsiveness**	RES1: Potential to adapt production processes and business strategies (adapted from Eastwood et al. 2017)	Qualitative	Implementation of users/communities feedback mechanisms in companies' operations	RRI In-depth Assessment Tool /Self-assessment

ASSESSMENT (Modest/Moderate/Substantial)

SHORT DESCRIPTION

The SMEs are usually applying feedback from their stakeholders for improving of developed product or innovation process.

LOCAL RI MATURITY LEVEL

Category

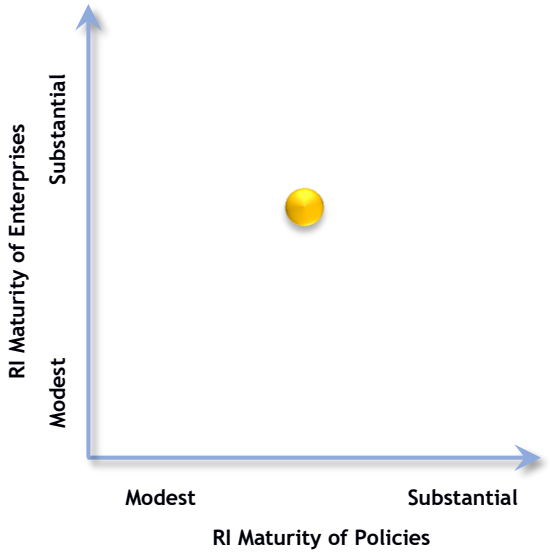
Process

Component

Responsiveness

RI positioning of firms and regional policies

firm's performance is strong and regional policy makers display significant policies



2.2.8. Process: Responsiveness

RI PERFORMANCE OF REGIONAL POLICY MAKING					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Process	**Responsiveness**	RES2: Openness and transparency of the planning and policy process (adapted from Eastwood et al. 2017)	Qualitative	Existence of stakeholder/public communication mechanisms in policy/strategy implementation procedures	Regional policy and strategy documents/ Partners'/Experts' assessment

ASSESSMENT (Modest/Moderate/Substantial)

SHORT DESCRIPTION

In the region, there exist stakeholder feedback mechanisms via:

- Regional innovation ecosystem,
- Technicom,
- Clusters Košice IT Valley and Cluster AT + R

These entities represent a platform for communication of companies and regional stakeholders.

RI PERFORMANCE OF ENTERPRISES					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Process	**Responsiveness**	RES2: Openness and transparency of corporate operations (adapted from Eastwood et al. 2017)	Qualitative	Adoption of CSR instruments, such as social budget, sustainability reporting etc. detailing the social/ environmental value of corporate operations to customers and stakeholders	RRI In-depth Assessment Tool /Self-assessment

ASSESSMENT (Modest/Moderate/Substantial)

SHORT DESCRIPTION

During the innovation process, companies take into consideration environmental aspects, they also employ disadvantaged persons and take care of gender balance.

LOCAL RI MATURITY LEVEL

Category

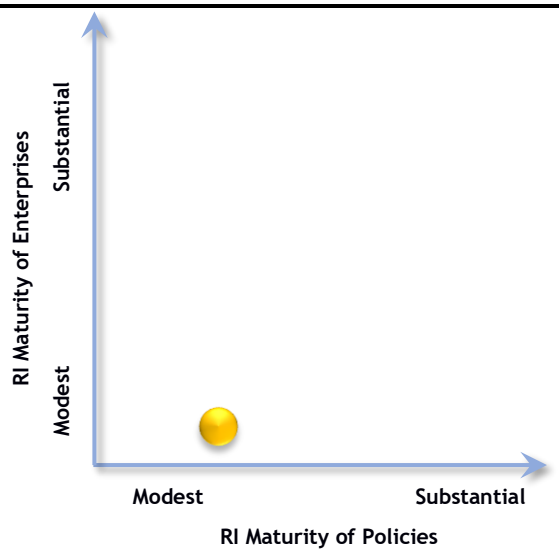
Process

Component

Responsiveness

RI positioning of firms and regional policies

neither firms nor regional policies are sufficiently active



2.2.9. Process: Reflection

RI PERFORMANCE OF REGIONAL POLICY MAKING					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Process	**Reflection**	REF1: Reflexive guidance in regional policy/strategy on RI (adapted from Eastwood et al. 2017)	Qualitative	Existence of offices, fora, committees, etc. for the monitoring and assessment of program/project implementation activities involving RI and its components	Regional policy and strategy documents/ Partners'/Experts' assessment

ASSESSMENT (Modest/Moderate/Substantial)

2

SHORT DESCRIPTION

In the region, there are entities which represent a platform for communication of companies and regional stakeholders, but they are not dealing specifically with RI:

- Regional innovation ecosystem,
- Technicom,
- Clusters Košice IT Valley and Cluster AT + R

RI PERFORMANCE OF ENTERPRISES					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Process	**Reflection**	REF1: Reflexive guidance in companies strategies (adapted from Eastwood et al. 2017)	Qualitative	Existence of/participation in offices, fora, committees, etc. for the monitoring and assessment companies activities relevant to RI	Self-assessment(*)

ASSESSMENT (Modest/Moderate/Substantial)

2

SHORT DESCRIPTION

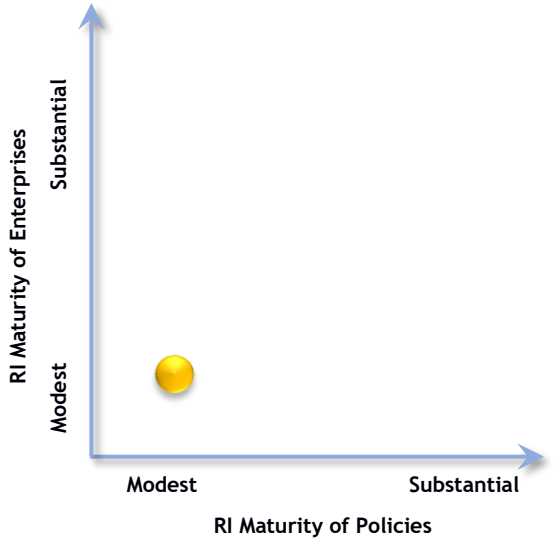
Strategic plan of companies is consulted with regional stakeholders, but RI are not specifically involved in this plan.

LOCAL RI MATURITY LEVEL

Category
Process

Component
Reflection

RI positioning of firms and regional policies
neither firms nor regional policies are sufficiently active



2.2.10. Process: Governance

RI PERFORMANCE OF REGIONAL POLICY MAKING					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Process	**Governance**	G1: Extent of R&I networks (e.g. platforms, hubs, incubators, accelerators) promoting / supporting RI in the region (Tsanos and Apospori 2017)	Quantitative/Qualitative	Self-assessment in terms of: - Number of networks [Existence of networks if the number is not available] - Extent of involvement of regional policy makers in these networks - Formal / informal character of networks	Regional policy and strategy documents/ Partners'/Experts' assessment

ASSESSMENT (Modest/Moderate/Substantial)

5

SHORT DESCRIPTION

- Regional innovation ecosystem is developing,
- Technicom,
- Clusters Košice IT Valley and Cluster AT + R
- Slovak Business Agency
- Slovak Innovation and Energy Agency – 2 national projects
- Creative Industry Košice
- Eastcubator
- Tabaco factory Kulturpark

RI PERFORMANCE OF ENTERPRISES					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Process	**Governance**	G1: Participation in R&I networks (e.g. platforms, hubs, incubators, accelerators) promoting / supporting RI in the region (adapted from Tsanos and Apospori 2017)	Quantitative/Qualitative	Self-assessment in terms of: - Number of networks joined [Existence of networks if the number is not available] - Extent of involvement of companies in these networks (e.g. leading working groups, participating in exchanges of best practices, etc.) - Formal / informal character of netwoks	Self-assessment(*)

ASSESSMENT (Modest/Moderate/Substantial)

4

SHORT DESCRIPTION

Some innovative SMEs, at least pilot SMEs are part of clusters and other platforms mentioned above.

LOCAL RI MATURITY LEVEL

Category

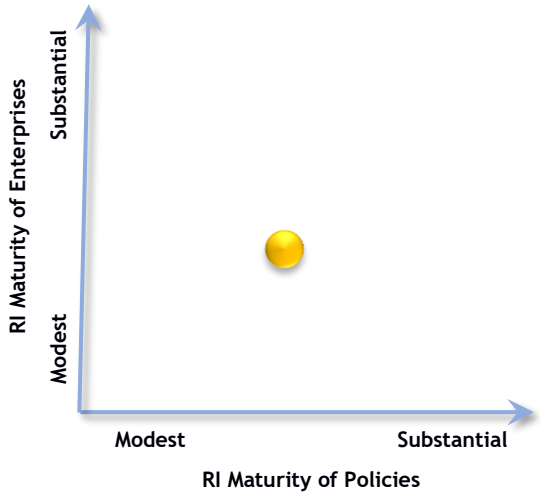
Process

Component

Governance

RI positioning of firms and regional policies

regional policy initiatives are relevant, but firms have no significant involvement



2.2.11. Products: Gender/equality and diversity

RI PERFORMANCE OF REGIONAL POLICY MAKING					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Products	**Gender/equality and diversity**	GE1: Gender gap of core human resources in science and technology (Tsanos and Apospori 2017)	Quantitative	% difference between the share of economically active population for women and the share of economically active population for men in science and technology	EU regional statistical yearbook 2015, p. 256

ASSESSMENT (Modest/Moderate/Substantial)

SHORT DESCRIPTION

According to EU regional statistical yearbook 2015, in Slovakia there is 5 – 10% difference between the share of economically active population for women and the share of economically active population for men in science and technology.

RI PERFORMANCE OF ENTERPRISES					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Products	**Gender/equality and diversity**	GE1: Gender gap of human resources in companies' R&D/technical offices/divisions (adapted from Tsanos and Apospori 2017)	Quantitative	% female employee in R&I roles in companies	RRI In-depth Assessment Tool / Self-assessment

ASSESSMENT (Modest/Moderate/Substantial)

SHORT DESCRIPTION

SMEs usually haven't R&D divisions, but number of male and female employees is balanced.

LOCAL RI MATURITY LEVEL

Category

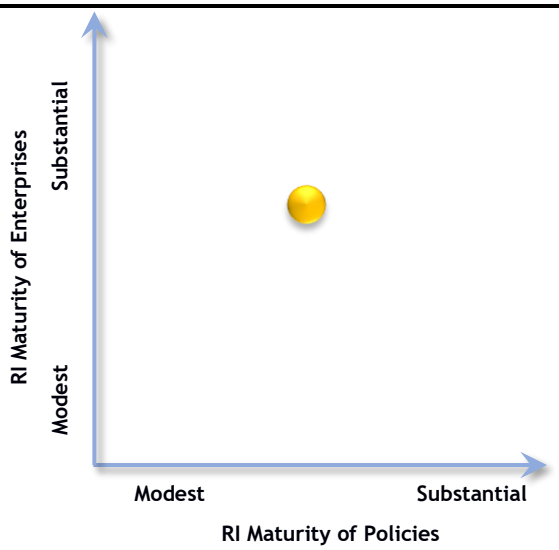
Products

Component

Gender/equality and diversity

RI positioning of firms and regional policies

firm's performance is strong and regional policy makers display significant policies



2.2.12. Products: Gender/equality and diversity

RI PERFORMANCE OF REGIONAL POLICY MAKING					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Products	**Gender/equality and diversity**	GE2: Support for gender equality in regionally funded R&I projects (adapted from Tsanos and Apospori 2017)	Quantitative/Qualitative	Number of regionally funded R&I projects supporting gender equality and/or creating of RDI jobs that employ women [Existence of funded projects, if the number is not available]	Regional policy and strategy documents/ Partners'/Experts' assessment

ASSESSMENT (Modest/Moderate/Substantial)

SHORT DESCRIPTION

In the Košice region, there are initiatives that support gender equality in R&D projects.

RI PERFORMANCE OF ENTERPRISES					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Products	**Gender/equality and diversity**	GE2: Companies' programs/measures to support for gender equality in R&I activities/functions	Quantitative/Qualitative	Number of companies' initiatives supporting gender equality and/or creating of R&I jobs that employ women [Existence of initiatives, if the number is not available]	RRI In-depth Assessment Tool / Self-assessment

ASSESSMENT (Modest/Moderate/Substantial)

SHORT DESCRIPTION

- gender balanced teams
- there is no distinction between gender but the expertise of employees
- gender balance is a natural part of corporate culture

LOCAL RI MATURITY LEVEL

Category

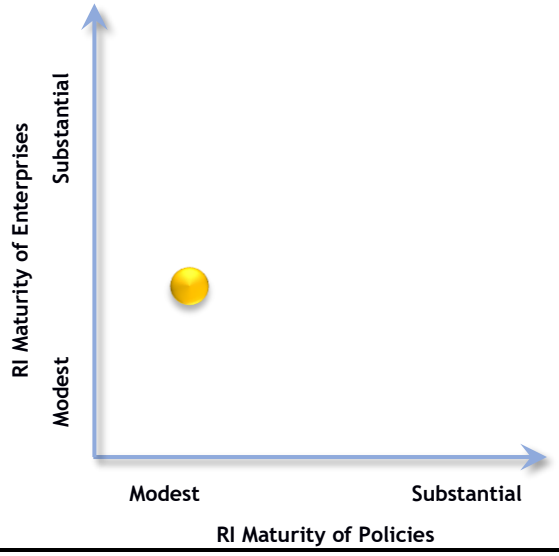
Products

Component

Gender/equality and diversity

RI positioning of firms and regional policies

neither firms nor regional policies are sufficiently active



2.2.13. Products: Open access

RI PERFORMANCE OF REGIONAL POLICY MAKING					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Products	**Open access**	OA1: Regional policies for dissemination of and open access to scientific, technical and economic information (adapted from Tsanos and Apospori 2017)	Qualitative	Qualitative discussion and self-assessment in terms of: - Existence of a regional policy for open access - Regional institutional mechanisms for establishing, maintaining and monitoring open science and innovation	Partners'/Experts' assessment
ASSESSMENT (Modest/Moderate/Substantial) 1			**SHORT DESCRIPTION**		

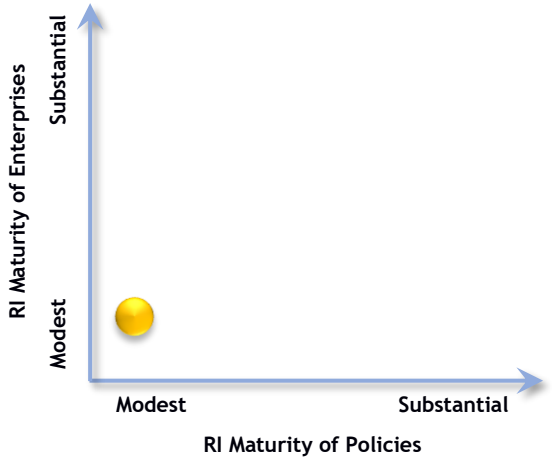
RI PERFORMANCE OF ENTERPRISES					
RI Category	**RI Component**	**Indicator**	**Type of measurement**	**Metric**	**Data source**
Products	**Open access**	GE2: Companies' programs/measures to support for gender equality in R&I activities/functions	Qualitative	Qualitative discussion and self-assessment in terms of the frequency of using open access/open data sources to know up-to-date research outputs for the business operations	RRI In-depth Assessment Tool / Self-assessment
ASSESSMENT (Modest/Moderate/Substantial) 2			**SHORT DESCRIPTION** Data are shared only with few stakeholders.		

LOCAL RI MATURITY LEVEL

Category
Products

Component
Open access

RI positioning of firms and regional policies
neither firms nor regional policies are sufficiently active

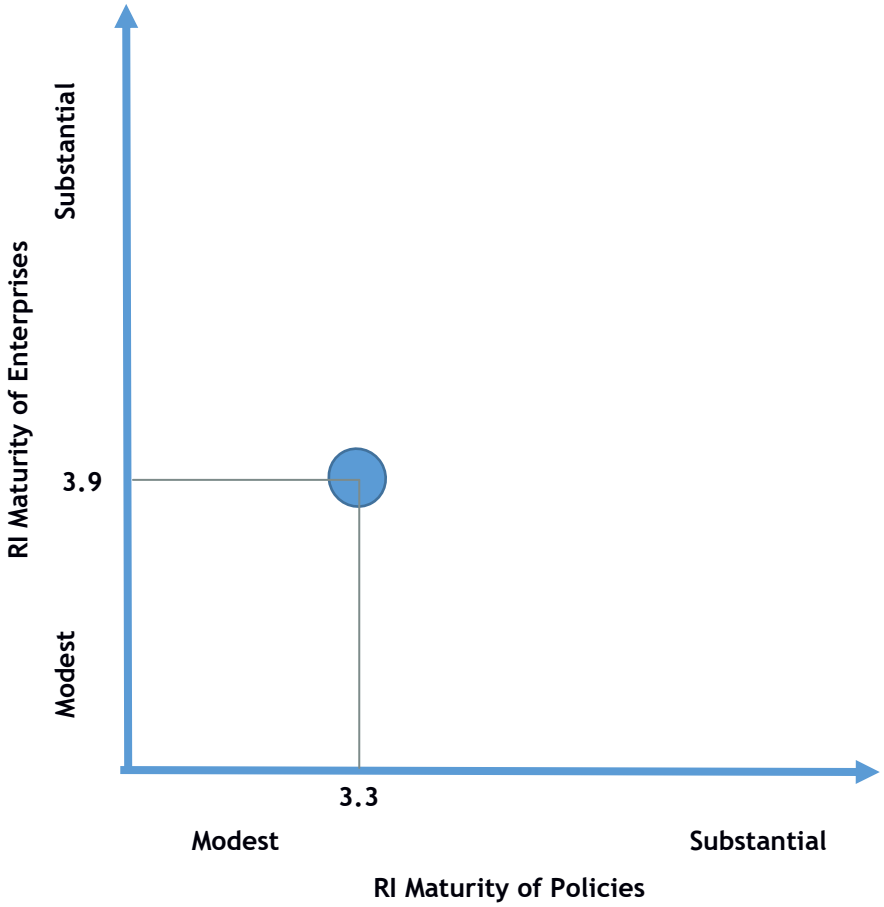


Regional RI Maturity Level

The indicators grid allows to identify the RI positioning of firms and regional policies. Depending on the assessment, regional policy makers can then define measures and actions either to strengthen the alignment of public policies and firms' activities, to fill the gaps in public policy, or to elaborate initiatives to stimulate firms' commitments.

In the case of RI Maturity Level of Košice Region (*see Graph 4*), the strategy should be to develop regional policies for RI and start target engagement/communication initiatives to raise firms' awareness on the matter.

Graph 4. Alignment of regional policies and firms' activities in RI



Source: own processing based on RI Road Map Template and Guidelines

3. Priorities for Action - Specific objectives and activities to improve responsibility in innovation process in Slovakia

Depending on the assessment and discussions with regional stakeholders and experts, following priorities have been identified:

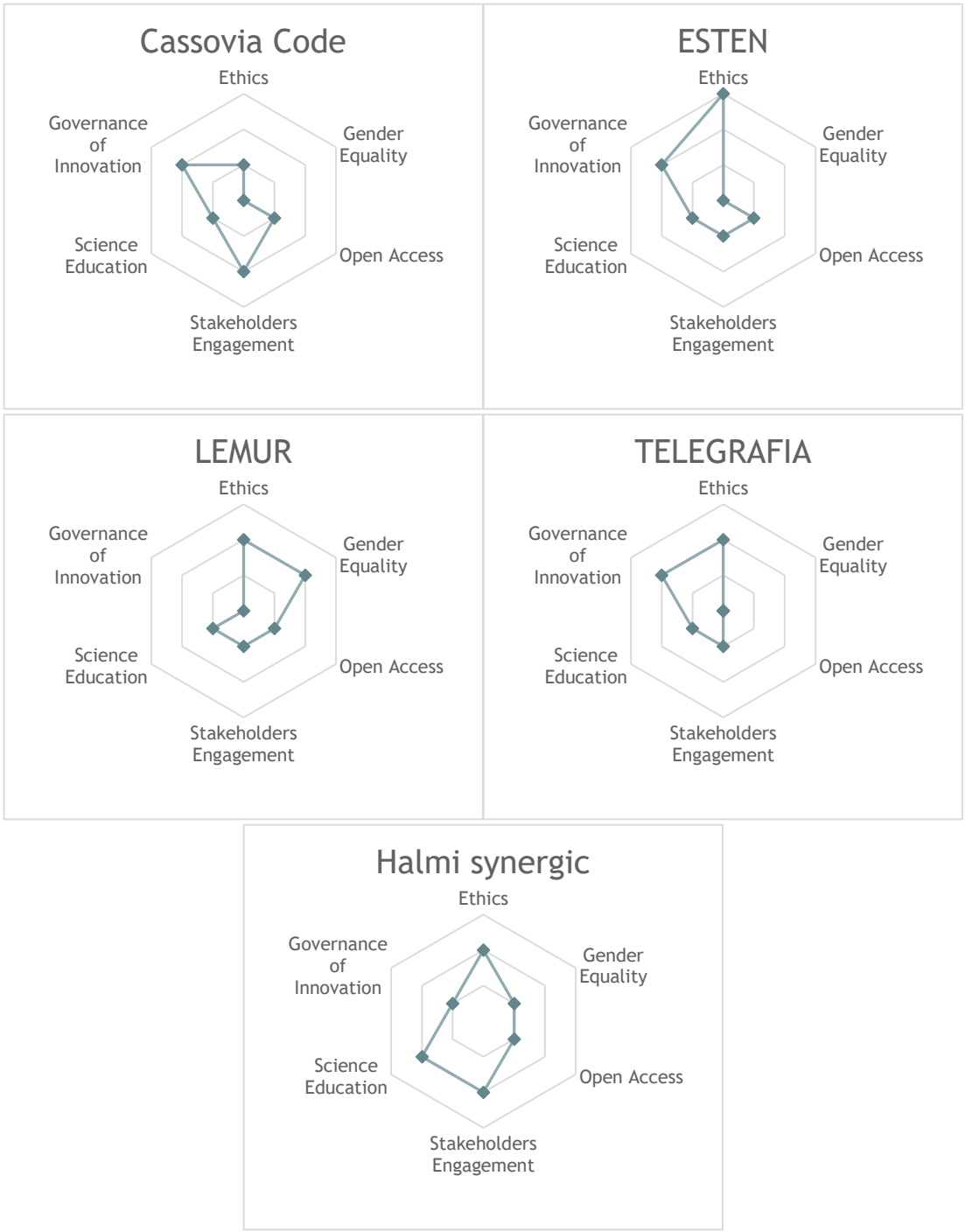
I. Promoting responsible innovative entrepreneurship and core and perspective sectors
II. Excellence in research
III. Commercialization of research and innovation
IV. Quality human resources to increase the region's innovative and technological performance

4. Lessons from the Pilot Actions

Firstly, seminar for pilot companies was organised. The seminar was focused on the topic of design thinking, since this tool should help them to implement responsible innovation in praxis in company philosophy. This seminar helped the companies to better understand main meaning of responsible innovation. The main thing important to understand was, that during innovation process the company manager and employees responsible for development of innovation take into consideration also opinions and ideas of regional stakeholders.

After the seminar, the round of individual consultations with company manager has begun. With help of In-depth self-assessment tool, RI situation in companies was analysed. The analysis of the implementation of six keys of Responsible Innovation (Ethics, Gender equality, Open access, Stakeholders Engagement, Science Education and Governance of Innovation) helped to identify areas for improvement in each company (*see Graph 5)*. Well-developed and poorly-developed RRI key topics were identified. Based on the analysis, temporary list of priority for action in terms of RRI keys have been identified (see *Table 2*). Each company with help of RI consultant prepared development plan.

Graph 5. Initial assessment of innovation practices against the six RI keys



Source: own processing based on quali-/quantitative analysis from on-field work with SMEs

Table 2. List of priority for action in terms of RRI keys to be addressed locally

RRI Key	Priority from 1 to 6	Notes
Ethics	1	Clear ethical rules in SMEs.
Gender Equality	2	SMEs managers don't think, it is important to deal with this key topic.
Open Access	5	The level of open access in SMEs is low.
Stakeholders Engagement	3	SMEs are trying to consult innovation with their stakeholders and the level of their engagement is quite satisfying.
Science Education	3	The level of Science Education in SMEs is moderate.
Governance of Innovation	2	Well developed in SMEs usually via discussions and meetings with regional stakeholders.

Source: own processing based on quali-/quantitative analysis from on-field work with SMEs

4.1. Improvement plans of pilot SMEs

Based on this findings, RI consultant has worked with each company to formulate their objectives in order to integrate the concept of Responsible Innovation into their Improvement plans and finally into the business model of the company.

Improvement Plans for each company (Cassovia Code s.r.o., ESTEN s.r.o., LEMUR, s.r.o., Halmi synergic s.r.o., TELEGRAFIA, a.s.) were elaborated and finalised.

Cassovia Code s.r.o. - Innovation process

GOAL

Our company is a software development company which is developing unique products for customers. We are considering making a new product, but the innovation process within our organization is not set and is driven by an agile approach.

We plan to develop a new process or framework on how to innovate within our company.

We have seen that it is crucial to involve as many customers as possible and also educational institutions. Thanks to the design thinking workshops. This approach can provide us proper stakeholder's engagement together with the impact on the educational environment in our region.

STRATEGY - PEOPLE

Customer is the most critical stakeholder in the whole process. Before we can develop the new governance model, we need to talk to them in the first place. Good involvement can bring us proper inputs for our internal process.

University in our city is the driver of innovation. We need to involve the important stakeholders from this environment as well. We are considering also involving students and lectors from the universities. Their fresh minds can bring a new way of thinking.

Students can work on the prototypes in connection with respective educational institutions on the innovations, which cannot be covered by internal staff.

In the development, we want to involve women as a part of the stakeholders' meetings, and we have made sure that our development will not foster the stereotypes regarding the use of our innovation process.

STRATEGY - RESOURCES

Since we are a software development company, we are planning to use the internal staff, as well as students. We will also involve an external company, which help us with the process itself. Budget allocation in our case for this topic is a maximum of 2000 EUR for external services.

Our primary investment will be the time of our experts. We are planning to have several meetings with respective stakeholders to help us comment on the draft of our process.

We are planning to delegate the maintenance of this process to the respective employee of our company to ensure sustainability.

STRATEGY - INSTITUTION

The first and critical success factor is the support of the top management of the company.

The management of the company has had this plan in the pipeline. This approach is beneficial for every side.

From a business perspective, we can create a new source of income and thanks to the new process. People inside the company can much better understand how to develop their business idea. If they follow a new process, every idea should also be heard inside the company.

The goal of the innovation process is to encourage employees to develop also open-source applications.

STRATEGY - TASKS AND TIMEFRAME

An action plan is the road map we need to set and follow that will get us to our goal as the first thing. This will help ensure us we don't miss any important steps. We will be creating mini-goals, breaking bigger objectives into smaller steps. By doing this, our goal will seem less daunting and more attainable.

After the action plan, we need to set up a team that will push this idea into reality. It is very important in each step not to lose the connection with the responsible stakeholder's group. We need to communicate and socialize our ideas with them, so we can then prevent possible setbacks in the release period.

STRATEGY - OPPORTUNITIES

From our observation from other IT companies, there are not so many, that have innovation process implemented. Especially in terms of small companies with less than 100 employees.

We see the opportunity to create this document as an open-source initiative that can be shared within other companies, and they can involve it in their processes.

The good thing about that is that we can use the environment and ecosystem, which is concentrated in the Košice IT Valley cluster.

We are attending several networking activities in the area, where we can share our plans and get help from the local community if needed.

ESTEN s.r.o. - Create a new product with high public engagement

GOAL

Our company is primarily focused on software development for industry-oriented customers. We have been considering having our product for a long time.

We plan to develop a new product, not primary for the industry customers, but the general public. We are planning to have a service web-application in the timeframe of the year 2020.

Thanks to the design thinking workshops, we have seen several problems that can be addressed by the new application. After the consideration, we have decided to come up with an app that will solve the problem for restaurants and pubs.

Crucial in this whole process was high stakeholders' engagement. Due to new products, we have considered implementing the government of innovation.

STRATEGY - PEOPLE

For our company, people mean customers. Customer is the most critical stakeholder in the whole process. We have learned that on the design thinking training. Before we can develop the new product - web-based application, the most important thing is to have an excellent interview with potential customers to emphasize the needs and problems they are facing.

We can divide the customers into two groups — users who will be using our application as consumers and business owners. Inside our company, we should form a small team that would consist of one project manager and one or two developers. Those will be core members of our project.

In the development of the new project, we have involved women as a part of the stakeholders' meetings, and we have made sure that our progress will not foster the stereotypes regarding the use of our new application.

STRATEGY - RESOURCES

Since we are a software development company, we are planning to use the internal staff.

Our primary investment will be the time of our experts and web developers who will be working on the new project for 25% of their working time.

That means that each developer will invest approximately 10 working hours of their time per week for the new product project. Each software product needs special care after the release.

Sustainability in that terms means that we are planning to involve one developer for the project after the release to maintain the application. We are considering that our project can be released as an open-source, but we need to be sure that our investment will be profitable also under these conditions.

STRATEGY - INSTITUTION

The first and critical success factor is the support of the higher management of the company. The good thing is that the idea of the new product development came bottom-up from the employees.

The top management of the company also has this plan in the pipeline. This is beneficial for every side. Management doesn't need to push the employees, and employees want to work on the product. From a business perspective, we can create a new source of income.

Due to this situation, we are planning to implement new governance of innovation. In the development of this document, we will apply the lessons learned from our current innovation process.

STRATEGY - TASKS AND TIMEFRAME

An action plan is the road map we need to set and follow that will get us to our goal as the first thing. This will help ensure us we don't miss any important steps. We will be creating mini-goals, breaking more significant objectives into smaller steps. By doing this, our goal will seem less daunting and more attainable.

After the action plan, we need to set up a team that will push this idea into reality. It is essential in each step not to lose the connection with the customer. We need to communicate and socialize our ideas with them, so we can then prevent possible setbacks in the release period.

STRATEGY - OPPORTUNITIES

Our product can be considered as a startup. The good thing about that is that we can use the environment and ecosystem, which is built-in Košice.

We will be attending several networking activities in the area, where we can share our plans and get help from the local community if needed.

LEMUR, s.r.o. - Code of Ethics

GOAL

LEMUR is a creative company with a focus on publishing and public relations. Regarding responsible innovation, we are trying to set a code of ethics within our company.

Since our employees can come to situations that may not be very clear for them, this document can set a guideline on how to behave.

A code of ethics is a guide of principles designed to help professionals conduct business honestly and with integrity. A code of ethics document may outline the mission and values of the company or organization, how professionals are supposed to approach problems, the ethical principles based on the organization's core values, and the standards to which the professional is held.

Design thinking workshop has shown to us how the customer is important, but in our case, the code of ethics should be an internal document of the company. In these terms, we are not planning to involve our customers as a part of the stakeholder group but create their own stakeholder group within our company. That does not mean that we will not include external experts on this topic.

STRATEGY - PEOPLE

Customer is the most critical stakeholder in the whole process. As was stated before, in our case, it is the most valuable customer of the internal employee team. Each member must be part of the development or of the creation of the code of ethics document. Good involvement can bring us proper inputs for our internal process.

We want to involve also in the process proper experts in this topic, who can facilitate the discussions upon the document creation.

In the development, we want to involve women as a part of the stakeholders' meetings, and we have made sure that our progress will not foster the stereotypes.

STRATEGY - RESOURCES

We are planning to use internal staff. We will also involve an external company, which helps us with the process itself, facilitate the meeting, and even create the code of ethics document.

Our primary investment will be the time of our employees and the financial expenses of the experts. We are planning to have several meetings with respective stakeholders to help us comment on the draft of the document.

We are planning to delegate the maintenance of this process to the respective employee inside our company. This approach will help to ensure sustainability.

STRATEGY - INSTITUTION

The first and critical success factor is the support of the higher management of the company.

The management of the company has this plan in the pipeline. This is beneficial for every side.

There is not a primary business perspective from the creation of a code of ethics. This document should help us with the internal environment of the company, set clear rules for the employees, and create a better working environment, which can attract more talented persons on the HR market.

The goal of the innovation process is to encourage employees to develop also own inputs in the document. We are planning to set a transparent process of how the document can be updated, and each employee has the power to make changes in the document. This should be a part of the open culture as a part of this innovative initiative within our company.

STRATEGY - TASKS AND TIMEFRAME

An action plan is the road map we need to set and follow that will get us to our goal as the first thing. This will help ensure us we don't miss any essential steps. We will be creating mini-goals, breaking more significant objectives into smaller steps. By doing this, our goal will seem less daunting and more attainable.

After the action plan, we need to set up a team that will push this idea into reality. It is very important in each step not to lose the connection with the responsible stakeholder's group. We need to communicate and socialize our ideas with them, so we can then prevent possible setbacks in the release period.

STRATEGY - OPPORTUNITIES

We are not aware of other companies within our community that faced the issue of creating the code of ethics document.

Some documents are not in our language, which can be an inspirational source for our organization.

We see the opportunity to create build up this document on other open-source initiatives that already faced this issue. We will also share our outputs on the community level and show the benefits of the creation of the code of ethics.

We are attending several networking activities in the area, where we can share our plans and get help from the local community if needed.

Halmi synergic s.r.o. - Enhance product with responsible innovation

GOAL

Company Halmi synergic s.r.o. co-operates with several companies. One of the clients is the company that currently ranks among the largest providers of advice and services in the General Data Protection Regulation (GDPR Regulation) and Act No. 18/2018 Coll. on the protection of personal data and on amendments to certain laws.

We plan to update our product with high stakeholder engagement using the knowledge of the design thinking methodology, we have learned about on the consultations.

Thanks to the knowledge of new methodology, we have realized that doing just a simple innovation is not enough. We are planning to implement different stakeholder groups and public opinion.

Together with new product implementation, we are considering also implement the government of innovation in the future.

STRATEGY - PEOPLE

Before we can update our product, the most important thing is to have a good interview with our potential and current customers. It will help us to emphasize the needs and problems they are facing using the knowledge we gain in the process of design thinking during the consultations.

We know that first of all we need to find a problem which our customers are facing during their daily work.

Inside our company, we should form a small team that would consist of one project manager and one or two developers that will continuously work on the project during the time.

We are also planning to hire an external expert in the user experience area, who will do research. Thanks to this research, we will have enough data that will help us improve our product.

In the development of the new project, we have involved women as a part of the stakeholders' meetings, and we have made sure that our development will not foster the stereotypes regarding the use of our new application.

STRATEGY - RESOURCES

Since our company does not have a team of our own developers, we need to hire external experts who will take a lot of our project costs.

Our estimation is that the update of our product will consume around 400 hours, so approximately 15 000 EUR in cash.

This project is very important to have an external UX expert. The hour estimation regarding this expert is around 75 hours, about 2000 EUR in cash.

Our full product, we are trying to innovate in this project is built on the expertise of our internal experts. Therefore, we need to allocate enough time for experts. We plan to have at least 100 hours dedicated to supporting this project from the expertise point of view.

Since the product we are innovating is our core business, the sustainability of the output will be provided and ensured by our internal team, including the high management team.

STRATEGY - INSTITUTION

The key success factor is the support of the higher management of the company. This responsible innovation was made as an output of the consultations. Where we have learned about the design thinking methodology.

Since that fact, the internal team saw from the input of the customers that it is important to innovate the product. The top management of the company also has this plan in the pipeline. This is beneficial for every side. Management doesn't need to push the internal team, and employees want to work on the improved version of the product.

From a business perspective, we can improve our source of income.

Due to this situation, we are planning to implement new governance of innovation. In the development of this document, we will apply the lessons learned from our current innovation process.

STRATEGY - TASKS AND TIMEFRAME

An action plan is the road map we need to set and follow that will get us to our goal as the first thing. This will help ensure us we don't miss any important steps. We will be creating mini-goals, breaking bigger objectives into smaller steps. By doing this, our goal will seem less daunting and more attainable.

After the action plan, we need to set up a team that will push this idea into reality. It is very important in each step not to lose the connection with the customer. We need to communicate and socialize our ideas with them, so we can then prevent possible setbacks in the release period.

STRATEGY - OPPORTUNITIES

Our product is unique. Competitors in this field are only on the level of law expertise, and we are not able to share our know-how because of this fact.

On the other hand, we are planning to network with the university environment and also the developer's community and other IT companies on the meetups with the specific topic of web development and user experience.

This can open our stakeholders' group to several impressive outputs, which can be beneficial for all sides.

TELEGRAFIA, a.s. - Innovation governance model

GOAL

Our company is a software development company focused on exceptional products in the security field. When we are considering making a new product, we need to take into account our special and security-sensitive environment. This situation complicates our innovation process a lot.

We plan to develop a new framework document on how to innovate within our company.

Thanks to the design thinking workshop, we will set up personas and the problems we are facing during the innovation process. Next, the plan is to use the inputs from the ideation phase to come up with the prototype document.

This prototype document will be tested inside the company, and thanks to that, we can ensure proper stakeholder engagement.

STRATEGY - PEOPLE

Customer is the most critical stakeholder in the whole process. Before we can develop the responsible innovation approach, we need to talk to our customers, but also our internal team. People usually have a fear of any change. Since our product is exceptional, good involvement can bring us proper inputs for our internal process, and customers will understand the inner mindset inside our company.

We need to involve essential stakeholders from the educational environment as well. On the one hand, it is good to have lectors included, but we also need to think about students. In our governance model, we need to find a way, how to engage them properly.

Students can produce prototypes on which we are not able to allocate enough resources internally.

In the development, phase it is very important to involve women as a part of the stakeholders' meetings, and we have made sure that our progress will not foster the stereotypes regarding the use of our innovation process.

STRATEGY - RESOURCES

We are planning to use the internal staff as well as students. We will also involve an external company, which help us with the process itself. On this level, there is a plan to allocate around 100 hours internally and also include external expertise (40 hours) to help us set up a document like that.

We are planning to have several meetings with respective stakeholders to help us comment on the draft of our process.

We are planning to delegate the maintenance of this process to the respective employee of our company to ensure sustainability.

STRATEGY - INSTITUTION

The first and critical success factor is the support of the higher management of the company. The idea to implement the innovation governance came from the management, which has this task in the pipeline. This situation benefits all sides.

From a business perspective, we can improve our source of income. Thanks to the new process, people inside the company can understand much better how to develop their innovational idea. If they follow a new process, every idea should also be heard inside the company.

Due to the nature of our security product is unfortunately not possible to publish our innovations as an open-source application.

STRATEGY - TASKS AND TIMEFRAME

An action plan is the road map we need to set and follow that will get us to our goal as the first thing. This will help ensure us we don't miss any essential steps. We will be creating mini-goals, breaking more significant objectives into smaller steps. By doing this, our goal will seem less daunting and more attainable.

After the action plan, we need to set up a team that will push this idea into reality. It is very important in each step not to lose the connection with the responsible stakeholder's group. We need to communicate and socialize our ideas with them, so we can then prevent possible setbacks in the release period.

STRATEGY - OPPORTUNITIES

From our observation from other IT companies, we don't have information about companies that have innovation processes implemented. Especially companies of our size.

We see the opportunity to open this topic on the meetings inside the Kosice IT Valley cluster, which we are a member of. This discussion can provide interesting inputs for our document and share our experience within the IT ecosystem in the Kosice area.

Our company is attending several networking activities in the area where we are able to share our plans and get help from the local community if needed.

5. Lessons from the Study Visits

5.1. Study Visit I.

The first Transnational Study Visit (SV01) of ROSIE project took place in Milan (IT), at Milan-Monza-Brianza-Lodi Chamber of Commerce (Via Meravigli, 9/b), on Tuesday 9th October 2018. Three Horizon2020 projects active in the field of RI were invited to participate and present their experiences.

Horizon 2020 PRISMA project (http://www.rri-prisma.eu/)

PRISMA partners decided to focus on the field of Transformative Technologies (TT) and in particular, on the sectors of nanotech, synthetic biology, IoT and automated vehicles. Their aim is to define an exemplar road map as a methodology / tool supporting companies in defining RRI strategies. This will be achieved thanks to specific activity in the framework of 8 individual pilot road-maps.

Overall, PRISMA road mapping activity has three key objectives:

- Understand how RRI can improve the innovation process and its outcomes;
- Integrate RRI in the R&I and CSR policies of companies active in the field of TT;
- Develop a CSR/RRI exemplar roadmap to help industries implement RRI in their R&I activities.

The road-mapping methodology developed by PRISMA builds on 6 steps: i) commitment; ii) assessment; iii) reflect and define; iv) experiment and engage; v) road-mapping; vi) measure.

Horizon 2020 COMPASS project (https://innovation-compass.eu/)

COMPASS aims at inspiring, guiding, coaching SMEs to implement RI and embed it in their business strategies and innovation processes. The project adopts a sector approach and focuses on business belonging to 3 sectors: cybersecurity, nanotechnology and biomedicine.

COMPASS partners have developed with and for European SMEs a set of tools and methodologies supporting them to manage their research, development and innovation activities in a responsible and inclusive manner.

The project adopted a co-creation approach, involving business actors and other target stakeholders in dedicated webinars and workshops, to develop a set of tools to guide SMEs along the path towards RI (from gathering evidence to launching).

The self-check tool is one of these. It is a diagnostic tool that aims to help SMEs in highly innovative sectors assess their strengths and potentials for improvement. Moreover, it provides companies with specific measures and concrete examples of how to reach their goals in terms of RI. The purpose is not to “certify” SMEs, but to help them learn about RI and benchmark themselves against best practices and competitors.

Horizon 2020 SMART-Map project (http://projectsmartmap.eu/)

The objective of SMART-Map was to design specific road-maps for the responsible development of technologies and services in three key game-changing fields: precision medicine, synthetic biology and 3D printing in the biomedical field.

To achieve this objective, SMART-Map partners have adopted a co-creation approach, mobilising all relevant stakeholders and key actors across all project implementation phases.

In the framework of SMART-Map, the initial stakeholders mapping activity played a key role, paving the way for subsequent project work. Partners mapped more than 700 entities in their regions, for a total

of over 900 individuals. This helped them identify 3 main categories of stakeholders to be involved in project activities: industry, civil society organisations (CSO) and other (i.e. policy, research). These stakeholders were invited to participate in the industrial dialogues, one of the key co-creation tools of SMART-Map, and to contribute to the design of project tools.

Inspiration from the study visit

Sector approach has proved to be a key success factor when addressing RI. Therefore, focusing on specific sectors of local economy (i.e. tourism) and of regional smart specialisation strategies can help ROSIE partners engage a wide number of stakeholders and SMEs.

Networking among SMEs must be encouraged. To this end, an active role must be played by local / regional authorities and business intermediaries (i.e. Clusters, Regional government…).

When working with stakeholders, it is important to identify potential barriers to the engagement of specific groups of actors and to define, if needed, alternative ways to engage them.

5.2. Study Visit II.

Study visit, which took place in Arena Lublin on April the 4th 2019, focused on the experience of the local pilot SMEs with the aim of providing all partners with an insight on what SMEs see in responsible innovation in terms of opportunities and what they need to face in order to implement it. Sharing this knowledge is beneficial to the running of pilot actions in all other territories.

The following companies were invited to share their experience:

- Biotop (environmental protection supplies);
- Eureka (food processing);
- Industi (medical solutions and equipment);
- Groupa Azoty (chemicals).

Biotop

- They are environmental protection equipment suppliers since 1988;
- They also offer consulting and designing services and supervise investment projects;
- Their mainly supply renewable energy sources, sewage systems, air protection solutions.

Their mission is to deliver sustainable innovations. Specifically, they designed an innovative sewage system for rural areas that:

- Optimises the cost of operations, as it is easier to maintain and more affordable, making it accessible to more communities and households;
- Reduces impact on the environment by smaller excavations and fewer cuttings);
- Is safer, as it reduces leaking risks;
- It improves working conditions, as it does not require inspections of underground wells;
- Improves the quality of underground water.

As a ROSIE pilot, they now are going to develop an ethical code of conduct and more long-term strategic approach to their company development.

Their pilot experience focused on a living lab: a sewage system was given for free to a municipality to install and to citizens to use. Stakeholders were involved in all stages of the innovation process: they reached out to them using social media. Users were trained to make them more aware of sustainability and have a consistent everyday behaviour. They also applied a design thinking methodology to avoid stereotypes on users.

Eureka

- The company originated from a family farm, when the current owner achieved his engineering university degree in food processing plants;
- They have a partly automated food processing process;
- They cooperate with several universities and research centres;
- They focus on safety and sustainability: food safety is a huge social responsibility, but health is also affected by the quality of the environment;
- They developed a new breakfast cereal processing machine, through cooperation with scientists, users and other stakeholders. Opening their innovation process was key to develop a good product, as the CEO's point of view cannot be inclusive of every standpoint.

Through their participation in ROSIE, they developed a better organisational culture, also with reference to gender equality, and inclusion and non-discrimination, which enabled a better understanding of market needs and segments and the development of different products for different niches.

They claimed more support by institutions is needed: SMEs have a high innovation potential, but they need services and financial support.

Industi

- It is a young firm, with lots of energy and seventy employees;
- They supply medical IT solutions (web and mobile apps) and equipment as subcontractors;
- They plan to build their own brand by broadening the scope of their internal expertise;
- They have problem-solving approach and cooperate with universities at local and national level;
- When developing new solutions, they focus on the possible environmental challenges;
- They publish the results of their innovation and research, which embeds testing with end users, besides validation by experts (stakeholder engagement and open science already in place!);
- They employ people with different personal background and geographical origin, as they believe it adds value to the innovation process. Also, they believe ethical employers attract the best human resources;
- They also bring dreamers in their teams: it is important to have people that are able to look far into the future and come up with ideas that might be crazy, yet the future in unknown but approaching fast.

They took part in ROSIE pilot, because they wanted to develop better innovation management skills. There are many ideas being continuously proposed by staff members: choosing which ones to pursue is a challenge and they needed a strategic approach to it. They needed the ability to envision the impact of the different ideas.

They are looking at the bigger players, scouting for methodologies, but are aware of the challenges of being an SME. ROSIE was an opportunity to learn about an SME-tailored approach to responsible innovation management.

Azoty S.A.

The company produces mainly fertilisers: some are specifically designed to support reducing carbon emissions, while others come from by-products and waste from other processes.

Heat generated during the production processed is supplied to the city for heating of buildings and air pollution is reduced.

Using patents and hiring the best resources in the past set the tone for a permanently stimulating working environment: second and third generation employees are now part of the company. Cooperating since the beginning with universities and research centres was key: a branch of the Marie Curie University is within the company lab. The company has been able to raise some over 11ml zlot of EU funds until now. Also, this supported the evolution towards biotech as an enabler of more sustainable solutions.

The company engages in educating the final users, the farmers, to make them understand the importance of innovation and the importance of sustainability.

Since 2017, the company has been committed to contributing to Agenda 2030 SDGs and they were part of Polish delegation in NY in 2018 (only Polish business, besides a start-up). Precisely, they are working on the following SDGs: 2 zero hunger, 6 clean water, 8 industry and growth, 9 industry innovation and infrastructure, 12 responsible consumption, 13 climate action.

Also, they have a product stewardship certificate by a third party, attesting the quality of the product from sourcing of raw materials to distribution.

They joined the Global Compact and were rewarded during COP 24.

They launched the following initiatives:

- IDEA 4 to scout innovative ideas;
- ARP Innovation Peach to support start-ups;
- SatAgro for satellite-enabled precision agriculture;
- Know your soils is about education and involves farms. It included sampling soil from farms so that they understand better was fertilising solutions better suits them.

Inspiration from the study visit

Trust issue is key. When working with SMEs it is important that company management and all key business functions are well aware of and fully support the path towards RI. They should be willing to work with the RI consultant, who should, at the same time, be able to show them the benefits that RI can bring to their companies.

To consult RI with SMEs, a combination of various approaches should be used, since every company manager is different.

The way, the Polish SMEs adopted RI philosophy was really inspiring and we can communicate it to our regional SMEs.

5.3. Study Visit III.

Study visit took place in Nova Gorica (SI) on October the 1st 2019. Three SMEs which acted as a pilot in ROSIE project were presented as three case studies:

- Rihemberk Castle and the Vipava Valley design thinking effort;
- The Strategic Research Innovative Partnership for Sustainable Tourism;
- Naš borjač / Our Courtyard.

Rihemberk Castle and the Vipava Valley design thinking effort

The objective of this part of the study visit was to provide an example of how historical heritage provides solid grounds for economic development when renovations are matched with ethnographic research and efforts are delivered through joint public and private efforts in a view to include all stakeholders and to create a sense of community.

Responsible innovation, although instinctively linked to technological innovation, should not be limited to the world of tech. As a matter of fact, UN Agenda 203 SGDs provide reference to a much wider understanding of economic development as a balance between progress and protection of natural resources along with ensuring decent living conditions. Large part of (rural) Europe might benefit from an understanding of responsible innovation as a going back to the roots of the local culture and make it available for locals and tourist while ensuring sustainability and inclusiveness. Cultural and creative industries have long been recognised as key sectors and in looking for profitable business models, responsibility must be factored in.

Renovation of the castle is made possible by local and EU funds (including Interreg CE Restaura), while the cultural experience in delivered by SVITAR, as Ms Bojana Čibej explained. The programme that is offered to the visitors is part of a comprehensive effort to re-think the Vipava Valley as a touristic "product". The effort benefited also from ROSIE and open-innovation, design-thinking methodologies.

The Strategic Research Innovative Partnership for Sustainable Tourism

The Tourism and Hospitality Chamber of Slovenia and the Ministry of Economic Development and Technology of Slovenia developed a comprehensive plan for 2017-2020 to relaunch tourism through 5 pillars: gastronomy, human resources, digitalisation and technology, sustainability, research and development. Sustainable tourism is a RIS3 priority.

Relevance to ROSIE is linked to the multi-stakeholder approach that was put in place to design the strategy, but also being implemented in designing the single initiatives that stem from it.

The idea is to both increase and "sell" the local quality of life and to this extent innovation is needed and must be steered within a framework of sustainability and inclusiveness.

Naš borjač / Our Courtyard

The challenge behind Naš borjač – and therefore its relevance to ROSIE – was to put the living lab model at the heart of a process of restructuring the local tourism sector and managing the touristic offer.

The result is an on-line as well as off-line platform where local businesses meet on a regular basis among themselves to generate ideas and initiatives that are then transformed in touristic products (accommodation, events, etc.). The platform offers training and resources (digital tools and competences) to improve the work and performance of local small businesses and builds a sense od

community which, besides the added value of dialogue, exchange and benchmarking among local enterprises, delivers an added value for tourist, wanting to experience the real Vipava Valley mood.

Inspiration from the study visit

Responsible innovation offers a framework also for service design and creative and cultural industries.

Designing the regional strategies, but also the single initiatives that stem from them, requires the multi-stakeholder approach.

6. The Roadmap

6.1. SWOT analysis of responsible innovation in Košice Self-governing Region

Strenghts, weaknesses, opportunities and threads are analysed as a complex innovation system of Košice Region and responsible innovation as a part of it. The term responsible innovation is getting gradually into awareness also thanks to the ROSIE project.

Strengths	Weaknesses
- The dynamically developing strong position of the region in the field of ICT industry coordinated by the IT Valley cluster - Very strong position of the region in automation, robotics coordinated by the AT + R cluster, - Developing modern base of materials engineering, biomedicine and biomedical engineering - Strong ICT speed and capacity infrastructure in the city of Košice - Presence of research-oriented universities - Presence of a portfolio of vocational training centers - The city of Košice as the second most important economic, research and innovation center in the Slovak Republic - Existence of business and university centers supporting the creation of start-up and spin-off companies - Existence of innovation centers to support the implementation of technology transfer - Existence of clusters uniting important innovative companies in the region (IT Valley, AT + R Cluster) - Attractive cultural infrastructure and infrastructure for the creative industry in Košice - Existence of business incubators - Many SMEs use some of the elements of RI	- Absence of a central coordinating body for research, development and innovation policies - Complete absence of regional innovation management bodies - Absence of regional innovation centers supported by the Structural Funds - High administrative burden and rigidity of schemes supported by the Structural Funds - Unused research and innovation potential of institutions focused on biomedicine and food security - Weak institutional position and support of key clusters - Inadequate share of investments with high added value in industry and services corresponding to the potential of the region - Weak Regional Innovation Knowledge System (RIZS) - Underdeveloped cooperation of research universities with the business environment - Insufficient connection of education with the needs of practice - Insufficient competence in the field of innovation management - Lack of regionally oriented venture capital funds and credit resources for responsibly innovative companies
Opportunities	**Threats**
- Completion and operationalization of the responsible innovation ecosystem in the Košice Region, including the Technicom, Medipark and Promatech university parks and their full operation	- Delayed announcement of Structural Funds calls, in particular under the Research and Innovation Operational Program - Complicated and not very clear law on public procurement also in connection with research and innovation projects with an emphasis on responsible innovation projects

- System support of key clusters IT Valley, AT + R and Advance manufacturing, Biomedical cluster, Cluster of green technologies, Aviation cluster from the national level with the support of Košice Self-governing Region - Position of the regional support system through micro-vouchers - Use of responsible innovative investment holding tools for SMEs - Support for the use of energy efficiency of buildings and the use of renewable energy sources in the region - Take advantage of cross-sectoral cooperation - Completion of top research infrastructure of excellence development centers - Development of sectors with higher added value, e.g. biomedical engineering, knowledge technologies, ICT, robotics and automation - Possibility to use structural funds and international grants - Active participation in international research projects, technology platforms, European clusters - Support for the creation of spin-off companies from universities and commercial companies - Development and improvement of advisory services for SMEs - Increasing communication and cooperation between successful responsibly innovative companies	- Insufficient coordination and ability to communicate and cooperate between the national management and decision-making units responsible for innovation - technology, business and research - Insufficient ability to accept and coordinate support for responsibly innovative ecosystems - Insufficient funding to support innovation and regional innovation initiatives with an emphasis on responsible innovation - Insufficient political leadership to support strategic projects for the development of a regional responsible innovation ecosystem - Ineffective national innovation policy of the state

6.2. Action plan

Priority I.: **Promoting responsible innovative entrepreneurship and core and perspective sectors**

Action I.A.: **Individual business consulting in the field of responsible innovation management**

The Goal

The Goal:

Create suitable conditions for the development of responsible innovative business to support the main and promising sectors of the region's economy

What will be achieved:

Trained employees of companies or research organizations who will gain an overview and practical experience in managing responsible innovation, which they will use in the design and development and commercialization of their innovative projects, products and technologies

Timeframe:

2026

The Strategy	
The people	Academic and scientific sector, clusters, associations, business incubators, technology transfer centers
The resources	Kosice Self-governing Region internal resources Resources of universities and research organizations Business resources SBA / SIEA resources Grant resources
Tasks and timeframe	– Elaboration of the content of the educational program and consultancy in the field of responsible innovation management for companies (especially SMEs) and for other target groups (students with start-up potential, researchers, employees) – Reaching potential participants (media campaign and other forms) – Addressing educational and counseling agencies with the required expertise and experience – Finding sources of pre-financing of the educational program and counseling from grant programs – Preparation of grant projects, through which it will be possible to refinance and implement these educational programs and individual counseling – Implementation and evaluation of education and counseling – In parallel with the preparation of grant projects, the implementation of commercial training and consulting, where it will be necessary to look for private resources of companies, clusters and other institutions that will be able to refinance the costs of implementing training and consulting

Priority II.: **Excellence in research**

Action II.A: **Support for more active building of joint research teams and basic and applied research laboratories between industry and the university environment and their involvement in national and international strategic research projects**

The Goal

The Goal:

Achieve an increase in the quality and number of scientific outputs and unique development solutions in the field of responsible innovation

What will be achieved:

Effective partnership of representatives of the university / academic and industrial environment in defining joint research topics and subsequently effectively used and developed laboratories, which will develop topics of basic and applied research of high importance for the development of excellent research capacity of the Košice region

Timeframe:	
2026	
The Strategy	
The people	Academic and scientific sector, clusters, associations, business incubators, technology transfer centers
The resources	Kosice Self-governing Region internal resources Resources of universities and research organizations Business resources SBA / SIEA resources Grant resources
Tasks and timeframe	– Support for involvement in national strategic research projects and Horizon Europe projects (2021 - 2027) – Organization of workshops with the participation of representatives of universities / institutes of the Slovak Academy of Sciences, which would discuss mutual possibilities, involvement of specific entities in the use of top laboratories and in defining joint projects of basic research and applied research, implementation and dissemination of outputs from national projects in priority areas of economic and innovation potential of the region – Elaboration of a memorandum of cooperation between the relevant university / institute of the Slovak Academy of Sciences and an industrial enterprise on the sharing and use of a top laboratory – Validation of the proposed project at the level of the university / institute of the SAS and also of the industrial enterprise – Search for possible grant schemes to refinance part of the project preparation costs for Horizon Europe (2021 - 2027)

Priority III.:	**Commercialization of research and innovation**
Action III.A:	**Support for the preparation of joint research and innovation projects between industry and academia** **Implementation of applied research projects in the field of robotics, automation and production technologies** **Implementation of applied research projects in the field of knowledge technologies and ICT** **Implementation of applied research projects in the field of life sciences (biomedicine and biomedical engineering)** **Implementation of applied research projects in the field of metallurgical industry and new materials**
The Goal	
The Goal:	

To increase the efficiency of applied research and development and its share in responsible innovations using current scientific and development infrastructure

What will be achieved:

Application outputs of projects applicable in socio-economic practice with a supra-regional impact on the growth of Slovakia's competitiveness, which is the main purpose of investments in research and development

Timeframe:

2026

The Strategy	
The people	Academic and scientific sector, clusters, associations, business incubators, technology transfer centers
The resources	Kosice Self-governing Region internal resources Resources of universities and research organizations Business resources SBA / SIEA resources Grant resources
Tasks and timeframe	– Creation of project consortia of the academic and industrial spheres with an emphasis on the creation of sustainable links and models for the effective commercialization of the achieved outputs – Preparation of project plans in terms of the focus of university science parks and research centers as well as other workplaces of universities and institutes of the Slovak Academy of Sciences in the Košice region – Submission of project proposals within the operational program Research and Innovation in the context of sustainability of university science parks and research centers – In case of project approval, contracting of projects – Implementation of projects in terms of defined goals and schedule of activities

Priority III.: **Commercialization of research and innovation**

Action III.B: **Creation of a regional shared prototype workshop for advanced production and technology**

The Goal

The Goal:

To increase the efficiency of applied research and development and its share in responsible innovations using the built scientific and development infrastructure

What will be achieved:

A large number of prototypes of developed products, which will be intended for further development or for their subsequent testing, modification and adjustment. This will lead to a better interaction with the industrial sphere, which will assign research and development tasks to university workplaces and institutes of the Slovak Academy of Sciences and other research organizations.

Timeframe:

2026

The Strategy	
The people	Academic and scientific sector, clusters, associations, business incubators, technology transfer centers
The resources	Kosice Self-governing Region internal resources Resources of universities and research organizations Business resources SBA / SIEA resources Grant resources
Tasks and timeframe	– Addressing partners from the university, academic and industrial spheres to define their requirements for the technological equipment of the Technology Center and at the same time to define current and future research products and technologies that will be implemented / constructed within the Center – Creation of a project proposal for the creation of a prototype workshop containing a construction and technological part, in the case of a construction part, selection of a suitable location for the location of the center and equipment of the building permit – Preparation of the project plan of the prototype workshop intended for financing within the operational program Research and Innovation or other grant programs – Submission of the project plan and, in case of project approval, contracting of the project – Project implementation in terms of defined goals and schedule of activities

Priority III.: **Commercialization of research and innovation**

Action III.C. : **Creation of the KRINIT regional technology platform**

The Goal

The Goal:

To increase the efficiency of the responsible innovation system in the region using the built scientific and development infrastructure

What will be achieved:

The platform will enable a comparative assessment of the region's performance and the possibility to compare it with other regions in Slovakia, as well as regions of EU Member States and selected third countries in the field of research and innovation.

Timeframe: 2026	
The Strategy	
The people	Academic and scientific sector, clusters, associations, business incubators, technology transfer centers
The resources	Kosice Self-governing Region internal resources Resources of universities and research organizations Business resources SBA / SIEA resources Grant resources
Tasks and timeframe	– Start-up processes for the creation of the regional technology platform associating industrial enterprises, financial institutions, public administration bodies, associations, business incubators, technology transfer centers involved in research, development and innovation in strategically important technological areas and the national player SARIO. – Grouping of key players in Kosice Region – Necessary setting of Kosice Region processes, system and policies – Regaining the confidence of the business sector - key players (Top Ten in Kosice Region) – Acquisition of the status of a Public Sector Partner - scientific publications – Establishment of a pilot laboratory in cooperation with foreign countries (EPMA, INSTM) – Meeting of platform members, min. 4 times a year, this can be associated with the organization of other events and activities – Create a common vision of "key players" (industry, public administrations, research companies, civil societies ...), implementation of proposed solutions or specific incentives for cooperation – Activities focused on important issues such as growth, competitiveness and sustainable development depending on R&D in the medium to long term – Education, training, communication and dissemination of results

Priority IV.:	**Quality human resources to increase the region's innovative and technological performance**
Action IV.A.:	**Student internships in industrial companies focused on mastering technologies and solving simpler development tasks. Elaboration of diploma and bachelor theses on the basis of assigning the solution of a real development task from practice**

The Goal
The Goal: Create conditions for continuous improvement of the quality of human resources to increase the responsible innovative and technological performance of the region's economy

What will be achieved:

- connection of assigned student works to practice (solution of real situations)
- the opportunity to monitor the real life of the company during the internship, work on real problems
- faster adaptation of students and graduates to the work environment
- the possibility of using university laboratories to solve practice problems
- attractiveness of study for young people, if it is connected with work / internship for companies

Timeframe:

2026

The Strategy	
The people	Universities, secondary schools (Košice region), Slovak Chamber of Commerce and Industry, companies, clusters, associations, business incubators, technology transfer centers
The resources	**Financial resources:** Companies: costs associated with the admission of a student for an internship, mentoring, participation fee for a hackathon, Universities: costs associated with the implementation of the task at the university, Grants: especially necessary in case of increased costs for the internship or student task - travel, materials, etc., Sponsorship of hackathons
Tasks and timeframe	– student work for some of the responsible innovative companies in Kosice Region – hackathon - realization of company assignments during a time-limited event

Priority IV.: **Quality human resources to increase the region's innovative and technological performance**

Action IV.B.: **Cooperation of subjects in setting the content and implementation of education in the area of responible innovation in accordance with the needs of practice and the labor market in order to increase the quality of professional competencies and professional skills**

The Goal

The Goal:

Create conditions for continuous improvement of the quality of human resources to increase the responsible innovative and technological performance of the region's economy

What will be achieved:

- study programs that more reflect the needs of practice and the topicality of technologies in the area of responible innovation
- better preparation of secondary school students before coming to university

– skills in technologies in the area of responible innovationused in practice – increased attractiveness of education for students	
Timeframe: 2026	
The Strategy	
The people	Kosice Self-governing Region as a mentor, schools and universities, companies
The resources	**Financial resources:** Kosice Self-governing Region + high schools Universities Companies (material and technical resources, time)
Tasks and timeframe	– allocation of a Kosice Self-governing Region employee as a facilitator – mapping existing cooperation in this area and creating guidelines on how to do it – an overview of available experts and capacity options of companies – design of a platform for communication and preparation of changes to curricula and syllabi – proposal of curriculum modifications and implementation of changes

6.3. Monitoring system

The aim of monitoring and evaluation of the Road Map is to realistically assess the benefits of the strategy for the area of responsible innovation in the Košice Region and to provide feedback for its further direction.

Based on its average performance score calculated using a composite indicator - the aggregate innovation index. The index helps to assess the areas on which our efforts need to be focused in order to improve the parameters of innovation performance. The Annual European Innovation Scoreboard (EIS) according to the Research and Innovation Analysis in the European Semester 2019 Country Reports, EUROPEAN COMMISSION DIRECTORATE-GENERAL FOR RESEARCH & INNOVATION, provides a comparative assessment of EU Member States 'and selected third countries' research and innovation performance, as well as the relative strengths and weaknesses of their research and innovation systems. The framework for measuring the performance of innovation systems distinguishes between four main types of indicators and the ten dimensions of innovation, and a total of 27 different indicators (key performance indicators - KPIs) are monitored.

Another way to evaluate the Road Map is to get feedback from the business environment. In addition to obtaining information on current problems and challenges of entrepreneurs, we can also obtain an opinion on the suitability of individual measures and implemented tools. This feedback is ideally obtained through direct contact with companies, especially by implementing various discussion formats. To a limited extent, it can also be carried out by short questionnaire surveys.

6.4. Dissemination

In order for the strategy to be not only widely accepted but also to be informed about its goals and results, it is necessary to continuously implement effective communication not only with innovative players but also with the general public.

Road Map Dissemination Tools

Networking events, conferences - an ideal tool for presenting the best that is happening in the field of responsible innovation and entrepreneurship in the region. The target group is not only the professional public and those interested in information from the general public from Košice Self-governing Region, but also from other regions or countries who would like to learn something about new approaches, technologies, etc. The tools are a great opportunity to make contacts.

Innovation Portal - provides a one-stop comprehensive view of the regional responsible innovation ecosystem. It informs about entities operating in the region, about their activities and projects. All responsible innovation players in the region should have editorial rights to create content on the portal. In addition to regular news, there is space for the creation of relevant content - e.g. an overview of university research services, current offers of company cooperation, possible grants, etc.

Innovation newsletter - is an additional service of the Innovation Portal. Its aim is to inform the target group (customers) about news in the region by directly contacting them and attracting them to the source of information on the portal.

Innovation Award - can be a tool to publicly appreciate the efforts and achievements of the best responsible innovators in the region. In addition to the possible financial Košice Self-governing Region, it is mainly about the visibility of interesting promising companies and projects. Last but not least, the event creates a space for mutual acquaintance of innovative players. Both companies and local governments or non-profit organizations.

Leaflets, brochures - these communication tools are especially suitable as additional in the implementation of events, where they can provide participants with a lot of information that is not space in the presentations. Their primary role should be to arouse interest and motivate the target group to seek more detailed information on topics related to responsible research, responsible innovation and responsible entrepreneurship.

Media outputs of activities and events in regional and national media - in contrast to social networks, traditional media (TV, dailies, weeklies, radio) still dominate in terms of intervention of the general public.

Social networks - many organizations and companies today use increasingly intensive social networks (especially Facebook, Twitter, LinkedIn) to communicate with their partners or customers.