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REGIONAL MAPPING REPORT - ROMANIA

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TARGET GROUP ASSESSMENT

Has this deliverable addressed any of the target group indicated in the application form?

Yes / No

If yes, please describe the involvement of each individual target group in the table below.

Target group	Number reached by the deliverable	Description of target group involvement
SME	*53*	Representative for all development regions of Romania
Regional public authority	*1*	Development agency for the North West region
National public authority	*0*	
Higher education and research	*8*	Universities and research institutes
Business support organisation	*15*	Chamber of commerce, business associations and industrial parks

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1 Introduction

The objective of regional mapping is to provide insight into the current state of the manufacturing sector, particularly functioning of support environment in Romania from which production oriented small and medium enterprises (SME) can benefit on a long term. The regional report is drafted by following common methodology, which includes the analysis of supportive environment for manufacturing oriented companies - particularly smart specialization measures, priorities, indicators, implementation schemes, instruments, emerging trends in the manufacturing sector, analysis of existing support ecosystems and analysis of the main regional actors. Moreover, the supporting institutions and available support services are highlighted, in order to determine possible inclusion of these institutions in a common hub, and thus offer complementary services to SMEs and other target groups.

This report is provided as a single report, similar to reports from other countries, where each partner delivered mapping covering its own region. As a result, regional mapping reports are prepared for Austria, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Serbia, Slovakia and Slovenia.

After the introduction, Chapter 2 is providing information about Romanian strategy in research and innovation related to smart specialization and smart manufacturing at national level and connexions with international environment.

In chapter 3 are presented support environment and supporting actors like clusters, technology parks, R&D centres, competence centres, University incubators, Business incubators.

Chapter 4 presents Smart Factory support schemes and programmes including list of currently available or future programmes, grants, loans, etc. for Romania.

Trends in manufacturing sectors are presented together with relevant statistical data for Romania in chapter 5.

Chapter 6 provides national Smart Factory related projects.

Chapter 6 presents list of regional actors relevant for area of Smart Factory whereas actors are grouped by relevance (User, Solution provider or User/solution provider)

2 Strategic background

The main funding instruments for development for the 2014-2020 period are the Cohesion Funds, The European Regional Development Fund (ERDF) and the European Social Fund (ESF). These instruments finance 11 priorities that have been identified within the Union. The thematic objectives (TO) 1 to 4 (Figure 1) are directly related to the project objectives, the 8 to 11 thematic objectives are indirectly linked. The thematic objectives will be funded by:

- The ERDF will support all 11 objectives, but objectives 1 to 4 are the main investment priorities.
- The ESF will support the objectives from 8 to 11, although this Fund also supports Objectives 1 to 4.
- The Cohesion Fund will support the 4 to 7 and 11 objectives.

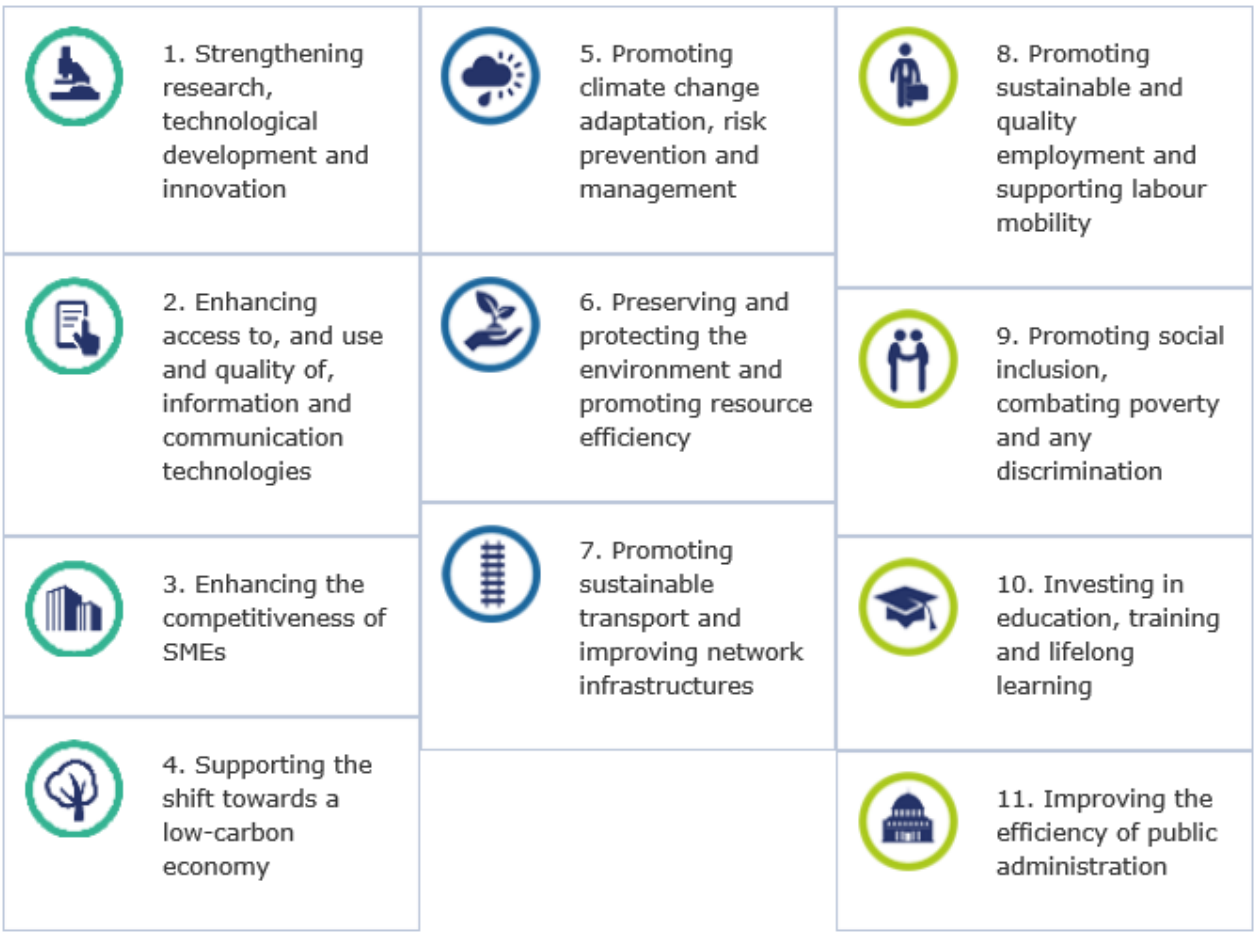

Figure 1: EU priorities for 2020

Currently the European Union is facing a series of challenges both in addressing a physical security of the Union`s space and in economic terms. New political movements such as Brexit or the recently presidential election in the US along with the rise of terrorism and migration introduced disruptive factors to the geopolitical and economic stability of the Union. To respond as effectively as possible, the Union must make consistent use of available resources and adopt

smart and sustainable development policies. A tool that will make a substantial contribution in achieving these goals is smart specialization. Thus, Europe`s weaker economic growth in comparison to its competitors on the global market is largely driven by a lower productivity. The lower productivity is influenced mainly by the low amount of investment in Research, Development and Innovation (RD&I) and the underutilized use of information and communications technologies. By developing a knowledge-based economy and long life learning, it is intended to keep the European population longer in the workforce, thus increasing the number of active people and lowering the pressure exerted on social protection systems. The aim is to create a unique digital market on interoperable applications based rapid and ultra-fast digital internet. Changes in regard to the research development and innovation policies are also taken into areas that bring direct benefits to society (efficient use of energy and resources, climate and demographic change, population health, etc.) strengthening the innovation chain starting from fundamental research to market implementation and marketing. Investment in education aims to increase up to 40% the number of higher education graduates from the 30-34 age group, the quality and prestige of European universities has constantly grown but still, there are only 2 European University in the top 20 international rankings according to the Shanghai Index – ARWU).

In terms of sustainable development, the EU needs to become more competitive with China and North America in terms of productivity and competitiveness and maintain its leadership in green technologies. The EU must implement an industrial policy to support enterprises, and especially SMEs, in their efforts to adapt to globalization and move to a low-carbon economy. The target of a 20% reduction in carbon emissions is becoming a major objective in the new political context in which the US could withdraw from the Paris Convention. On the other hand, the economic crisis has highlighted the degree of interconnection and dependence between Europe`s economies and this must stimulate the Union to create more competitive, more flexible, more technological advanced and increase the workforce employment numbers. Technology and ICT are tools that must be used effectively in the 2014-2020 period to ensure the success of the Europe 2020 program. Romania as an integral part of the EU has a number of advantages offered by the high-quality ICT infrastructure, good development of the IT sector and the automotive industry that are above the European average.

In Romania, the development direction of manufacturing development is the private investment sector with preponderance in the automotive industry. Romania will align with the European policies and will receive a generous funding that will enable it to further develop towards the Europe 2020 program. Supporting SMEs in adopting new technologies such as remote management, virtual reality, remote monitoring and control based on intelligent sensors, new production systems based on modularity and intelligent materials philosophy represents a governmental priority that is found in two strategic documents assumed by the Romanian government. These strategic documents are the National Competitiveness Strategy developed by the Ministry of Economy and Romania`s RD&I national strategy developed by Executive Board for Financing Higher Education, Research, Development and Innovation.

2.1 Romanian strategy in research and innovation [1]

Globalization has prompted European states to adopt common strategies and policies in many areas, including research and development. These must be appropriate and must respond to disruptive factors such as political and financial crises, challenges and technological advances of non-EU competitors, as well as the internal and organizational structure of the EU.

In Romania, the first national R&D strategy was developed for the 2007 – 2013 period by prospective methods, which was used for a broad consultation of stakeholders. With the transition to a new budget exercise coordinated with the need to correlate the national RDI strategy with the European one, in the context in which Romania has assumed a target of 2% of the GDP invested into RDI, a new strategy for the 2014-2020 period has been developed. This strategy was developed within a project funded with approximately 1 million euro, implemented by the Executive Board for Financing Higher Education, Research, Development and Innovation (UEFISCDI), together with a consortium of 11 partners and 142 associate partners, composed of research organizations, higher education institutes and research companies[2].

Within the project, opportunities were identified from which Romania can benefit, from the RDI perspective, and where it can contribute. One of the main identified directions is smart specialization. In the view of Romania's RDI national strategy, this "*involves a complex effort of exploration and selection of priority investment areas with economic and innovative potential, supported by well-targeted investments and accumulation of a critical mass of human resources, they have the ability to generate concentrations of competitive commercial activity, at regional or national level*"[3]. This will be supported by a set of measures covering the whole life cycle of a product / service (from idea to market), collaborations and partnerships between different entities will be supported for the development of smart specialization. Within this strategy, "*companies become key operators of innovation (innovative SMEs with global orientation and prospects, who have the interest and ability to enter the regional and global added value chains)*"[4]. The national RDI strategy is correlated with the National Competitiveness Strategy developed by the Ministry of Economy for correlating the financial support in order to increase the competitiveness of the Romanian economic environment. The elaboration of the competitiveness strategy starts from the premise that the share of Romanian industry in the European industry increased from 1.5% (2008) to 1.9% (2013), the share of Romanian agriculture in EU exports increased from 0.8% (2008) to 1% (2013) and the share of Romania's population in the EU population decreased by 0.3% to 3.9 in 2013. The correlation between the two strategies is presented in the table below[5].

[1] Sources:
https://www.google.ro/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwj-hKjzlefTAhUMG5oKHUs7B5MQFggIMAA&url=https%3A%2F%2Fwww.edu.ro%2Fsites%2Fdefault%2Ffiles%2F_fi%25C8%2599iere%2FMinister%2F2016%2Fstrategii%2Fstrategia-cdi-2020_-proiect-hg.pdf&usg=AFQjCNFdiHqc-kiL8ljcB1PDLdbKty1Mmw&sig2=0pzZqD4jdvPYDkmfAsl-Cg

[2] http://www.cdi2020.ro/

[3] http://www.cdi2020.ro/wp-content/uploads/2014/02/STRATEGIA_Versiunea-tehnica_Februarie-2014.pdf

[4] http://www.cdi2020.ro/wp-content/uploads/2014/02/STRATEGIA_Versiunea-tehnica_Februarie-2014.pdf

[5] http://www.minind.ro/PROPUNERI_LEGISLATIVE/2014/SNC_2014_2020.pdf

Table 1: Linking the competitiveness strategy to the RDI strategy 2014-2020

Fields of smart specialization from the 2014-2020 RDI strategy / Industrial policy directions		Bioeconomy	IT&C, storage and security	Energy, environment and climatic changes	Eco-nano-technologies and advanced materials	Healthcare
Economically important role and with influence on employment	Tourism and ecotourism	✓		✓		✓
	Textiles and leather goods				✓	
	Wood and furniture				✓	
	Creative industries		✓		✓	✓
Competitive dynamic	Auto and parts industry		✓		✓	
	Information technology and communications		✓			
	Food and drink processing	✓			✓	✓
Innovation, technological development and added value	Healthcare and pharmaceutical products				✓	✓
	Energy and environmental management		✓	✓		
	Bioeconomy (agriculture, forestry, fishing and aquaculture), biopharmaceutics and biotechnologies	✓		✓	✓	✓

2.2 Smart Specialisation in Romania

In Romania, the smart specialization strategy was developed at the region development level (Figure 9) according to the methodology presented in Figure 2. The deadline for completion of this strategy is December 2017 and by the time this report will be publish the definitive version of the report will not be available. The report was drafted based on the documents published by regional development agencies, these documents will form the basis of the country-specific report on smart specialization.
Table 2 lists Romanian S3 priorities as was encoded in the "Eye@RIS3" tool.

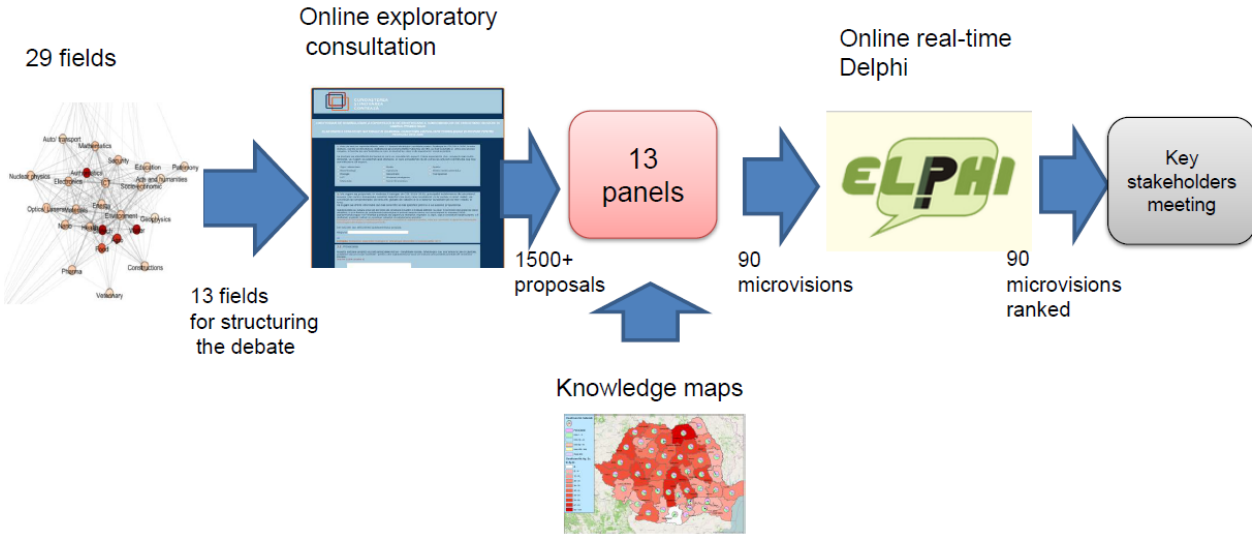

Figure 2 The process for identification of priorities[6]

Table 2 Romanian S3 Priorities as Encoded in the "Eye@RIS3" Tool[7]

Description	Capabilities	Target Markets	EU Priorities
Safe, accessible, nutritionally optimized food. Sustainable development in forestry. Zootechnics, veterinary medicine, fishing and aquaculture. New products, practices, processes and technologies in horticulture. Sustainable development of fields crops. Biotechnologies for agro-food. Nanobiotechnology. Environmental and industrial biotechnologies. Bioanalysis. Medical and pharmaceutical biotechnologies. In vitro/ in vivo assessment for generic drugs. Systemic, local and targeted drug delivery and technologies to optimize the biopharmaceutical and pharmacokinetic profile. Molecular design, (bio)synthesis, semisynthesis, high-performance screening.	1. Manufacturing & industry 2. Biotechnology	1. Manufacturing & industry 2. Food, beverage & tobacco products	1. KETs 2. Industrial biotechnology
Analysis, management and security of big data. Future internet. Software development technologies, instruments and methods. High performance computing and new computational models.	1. Information & communication technologies (ICT)	1. Services 2. Office administrative, office support & other business support activities	1. Digital Agenda

[6] Source : http://s3platform.jrc.ec.europa.eu/documents/20182/89935/Web_DUBLIN_Romania_30-06-2014.pdf/a89f5b7f-c7cb-4915-9d9e-1e80824d4b49
[7] Source : http://s3platform.jrc.ec.europa.eu/regions/RO?rel=1

Description	Capabilities	Target Markets	EU Priorities
Increasing end-use energy efficiency. Optimizing the use of conventional and non-conventional water resources. Substitution of critical materials and functional covering. intelligent cities.	1. Energy production & distribution	1. Energy production & distribution	1. Sustainable innovation
New-generation vehicles and ecological and energy-efficient technologies. Innovative technologies, equipment and technical systems for the generation of bio resources. Depolluting and waste reuse technologies.	1. Manufacturing & industry 2. Motor vehicles & other transport equipment's	1. Manufacturing & industry 2. Motor vehicles & other transport equipment's	1. Sustainable innovation 2. Resource efficiency
Service and process innovations for public sector improving the well-being.	1. Services 2. Other professional, scientific & technical activities	1. Human health & social work activities	1. Public health & security
Development of innovative space and security applications.	1. Public administration, security & defence	1. Public administration, security & defence	1. Aeronautics & space
Education and cultural and creative industries	1. Services 2. Education	1. Creative, cultural arts & entertainment 2. Libraries, archives, museums & other cultural activities	1. Cultural & creative industries 2. Support to link cultural & creative industries with traditional industries
Services	1. Public administration, security & defence 2. Public administration, justice, judicial, public order, fire service & safety activities	1. Services	1. Service innovation 2. New or improved service products (commodities or public services)

The outline of the intelligence specialization strategy for the Center region is presented in Figure 3, this was developed by capitalizing on the economic and social advantages specific to this region, having a center based on knowledge and environmental concern correlated with active participation of the region`s inhabitants and respecting the principles of cooperation and partnership.

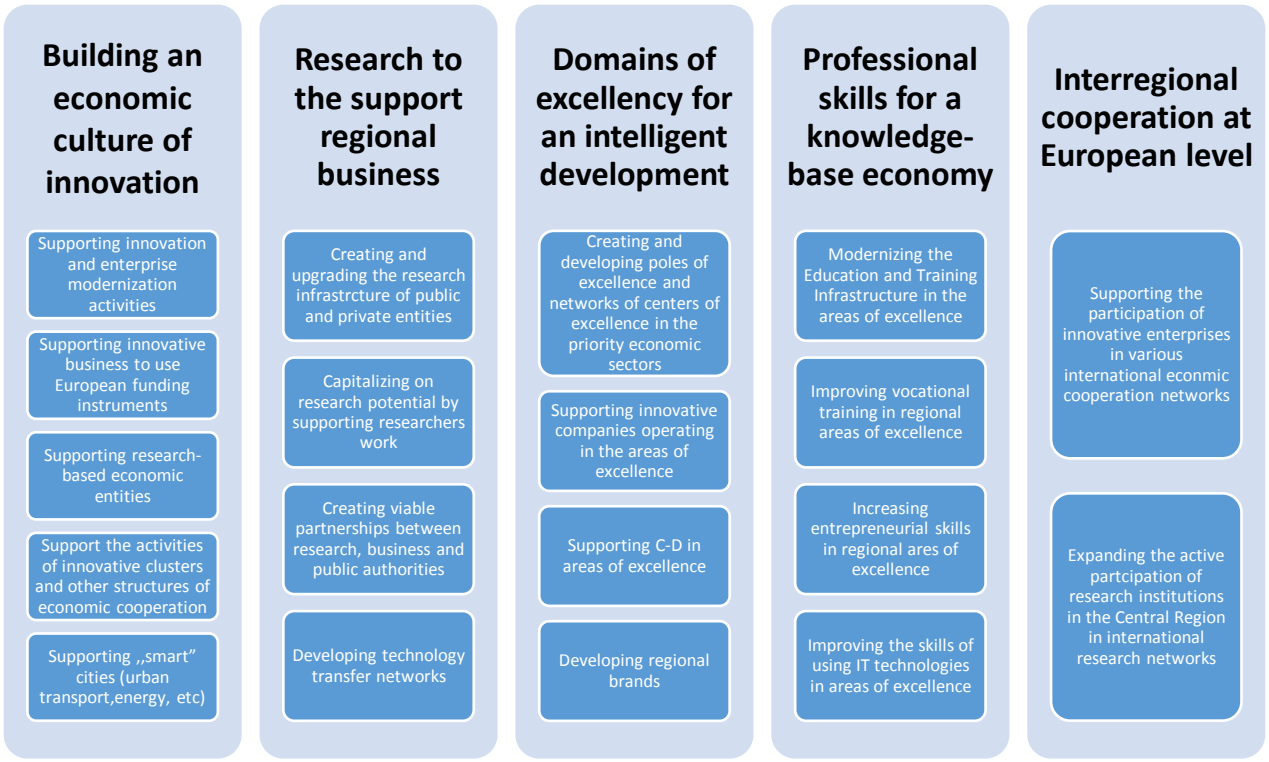

Figure 3 Smart specialization Center region[8]

For the North-West Region, the SWOT analysis that is leading to the smart specialization strategy highlighted the fact that the gap between the counties of the region increased in recent years especially the differences between the county of Cluj and Maramures, Satu-Mare and Salaj. The business environment is dynamic and is ranked second on Bucharest Ilfov in the top of the number of companies, 99% of which are in the SME category. Starting with 2014 there was an increase in the number of SMEs in the region, with 70% of them being established in the urban area, especially in Cluj and Bihor. The object of their activity is trade in 17.45% of cases and the industry 29.92%. The Smart Specialization Strategy for the North-West Region is presented in Figure 4 based on the Intelligent Specialization Strategy of the North-West Development Region[9].

The North-East Region is on the last place in terms of its contribution to Romania's GDP. Thus, for the North-East region, identified areas of interest for smart specialization are the following: agricultural, biotechnology, textiles and new materials, ICT, energy – environment, health and tourism Figure 5.

[8] Source : http://www.adrcentru.ro/Lista.aspx?t=StrategiaSpecializareInteligenta
[9] Available on-line :http://www.nord-vest.ro/s3/

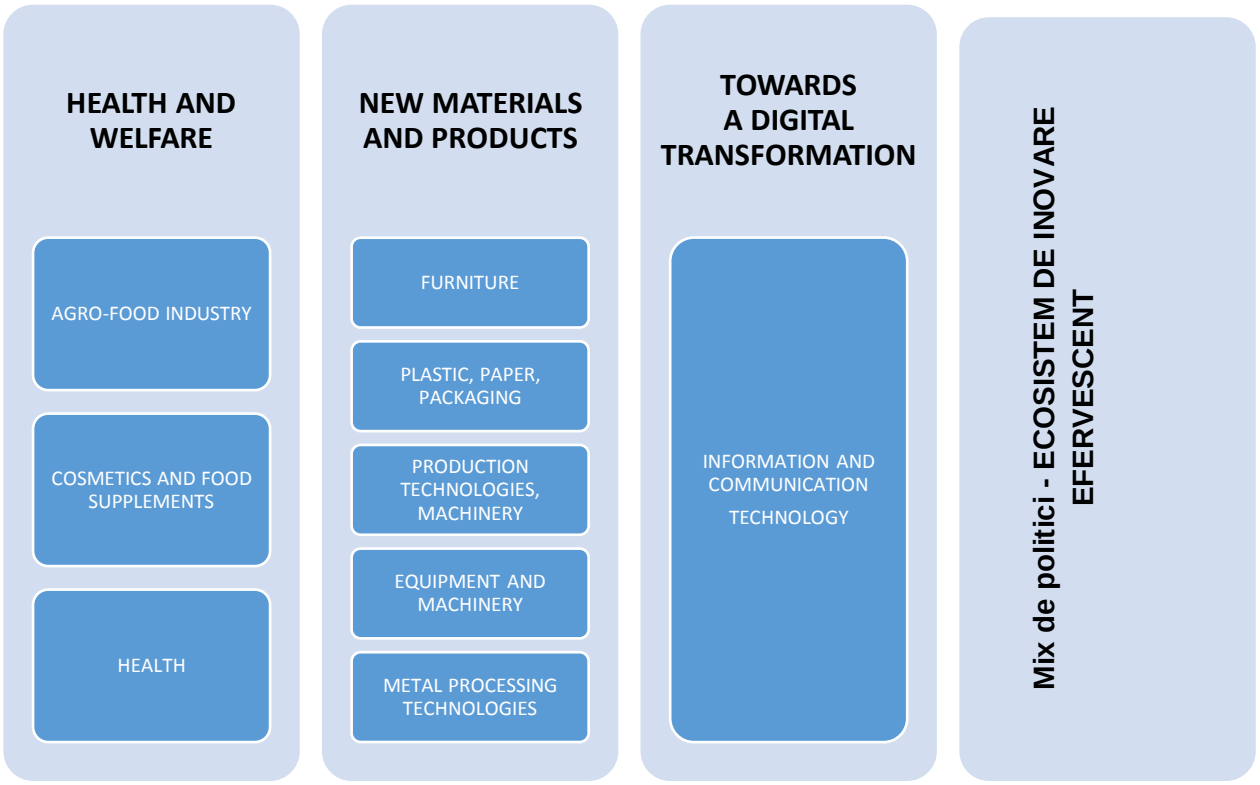

Figure 4 Smart specialization North-West region

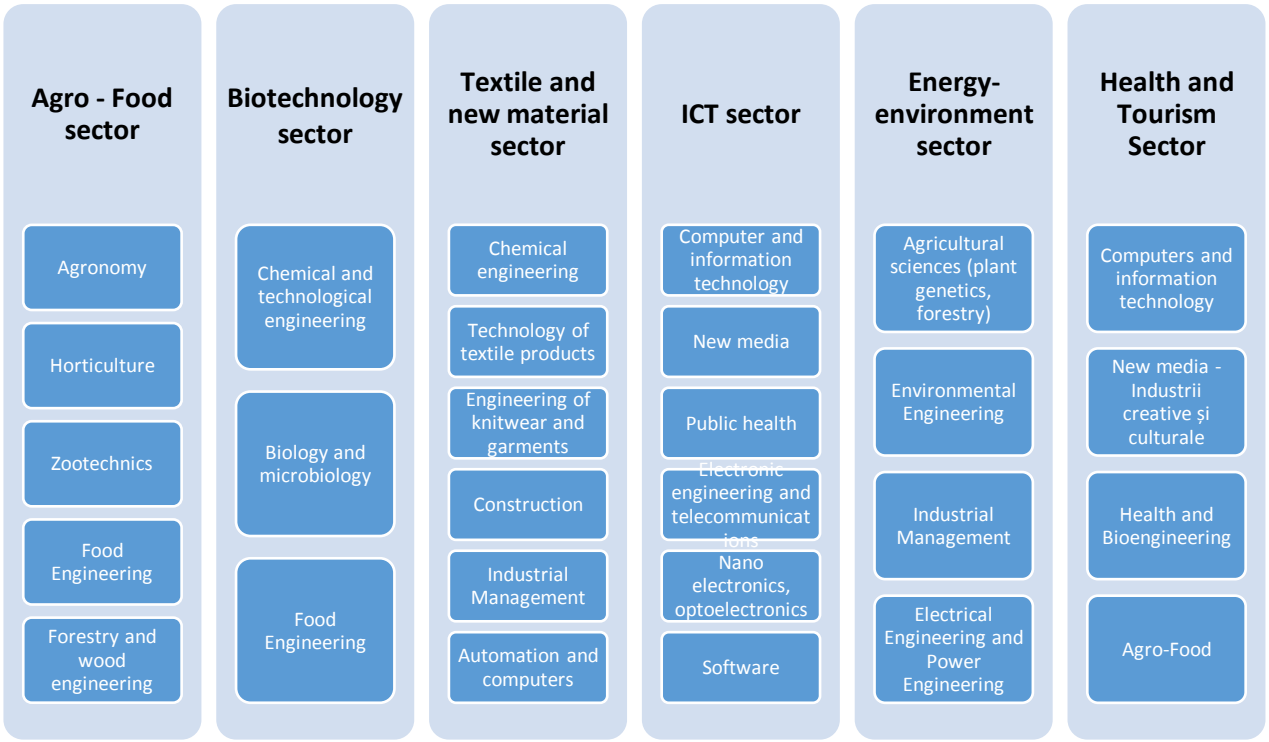

Figure 5 Smart specialization North-East region

For the South region, the key sectors and areas identified at regional level as the core of smart development by implementing the specific actions of the strategy, will influence the regional economy as follows:

- increasing the level of R& D and technological innovation and generating competitive and high added value products and services;
- generating competitive products and services both internally and externally, as well as related inclusive activities;
- stimulation of R& D activities, technological transfer in the other branches of the regional economy;
- increasing the attractiveness of the region for foreign markets, both production and sales;
- creating a favorable context for sustainable regional and national development[10].

The specialization model of the South Muntenia Region is presented Figure 6.

The priority areas for smart specialization of the South-West Oltenia Region were established based on the methodology[11] :

- Choosing the sectors with smart specialization potential based on quantitative and qualitative information from the Regional Analysis of Competitive Advantages and Innovation Potential and SWOT Analysis of the South-West Oltenia Region.
- Identification of sectors with intelligent specialization potential after analyzing the results of field research conducted through interviews with active regional actors in cluster development areas in the region and the results of surveys conducted within the regional business environment and among regional actors relevant to the field of smart specialization.
- Consult the relevant actors in the field of smart specialization within the established working group.

By correlating the information gathered in the above steps has enable the creation of a list of the areas with potential development that can provide intelligent specialization of the South-West Oltenia region (Figure 7):

1. Industrial Engineering and Transportation
2. Environment and sustainable energy
3. Fundamental innovative medicine and applicative medicine
4. Agriculture and food industry
5. Tourism and cultural identity

[10] http://www.adrmuntenia.ro/s955/strategia-pentru-specializare-inteligenta-a-regiunii-sud-muntenia-pentru-perioad/
[11] Source: http://www.adroltenia.ro/download/2025/

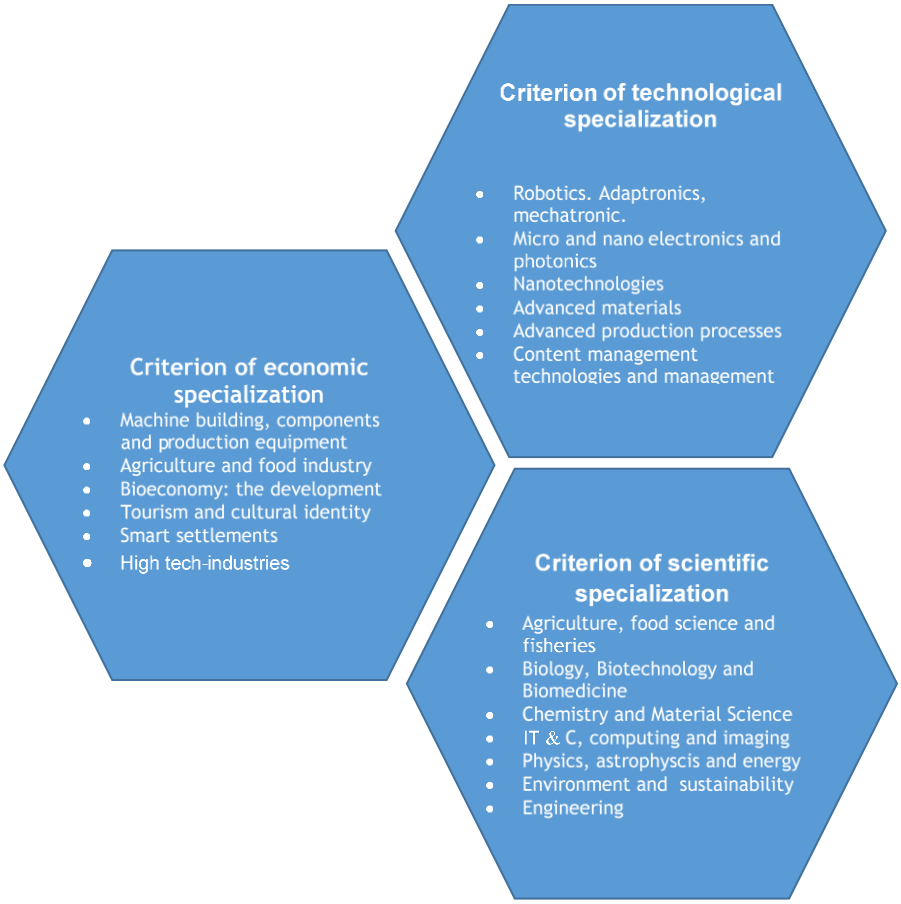

Figure 6 Specialization model of the South Muntenia region[12]

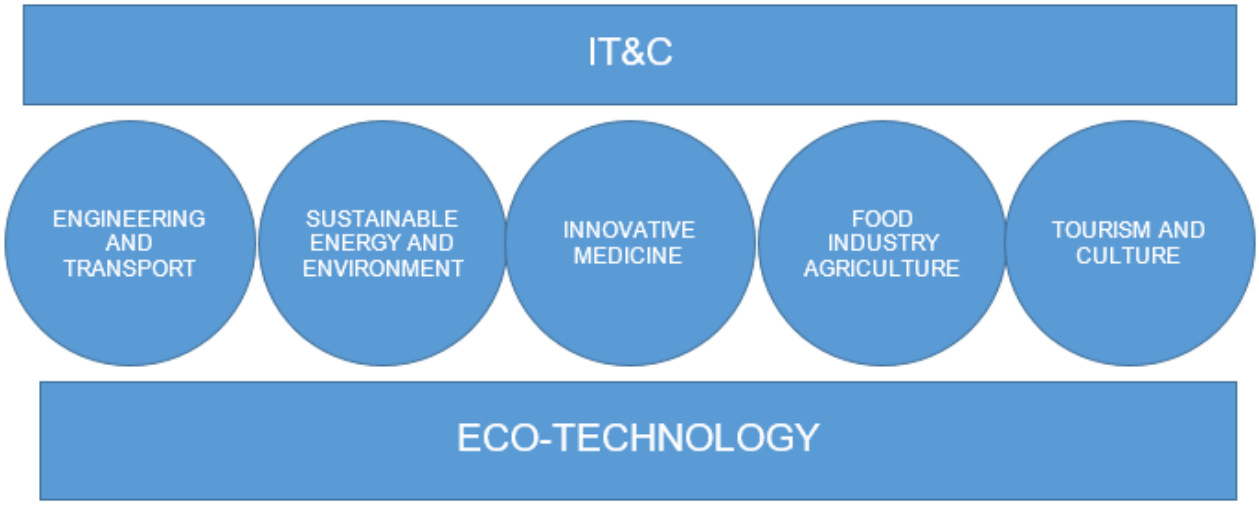

Figure 7 Intelligent Specialization Areas of the South-West Oltenia Region

[12] Source http://www.adrmuntenia.ro/imagini/upload/regioprint.pdf

In the national 2014-2020 RDI strategy, the areas of smart specialization are not treated strictly as scientific or technological domains, apart from the development and technological innovation smart specialization also supposes [4]:

- stimulating a certain type of economic behavior, with regional or global ambitions and orientation;
- understanding the social impact of science, technology and economic activities in the relevant sectors;
- interdisciplinary research and development, beyond traditional boundaries.

Consequently, the areas of smart specialization are open, in principle, to any scientific discipline. The entire automotive manufacturing chain is well developed in Romania covering both the R&D aspects (Ford and Renault R&D centers) as well as the manufacturing ones (finished products + components and spare parts). The automotive industry in Romania is internationally competitive and has engaged several industry branches for an accelerated development. Thus, the plastic industry, which in Romania had a tradition for manufacturing mostly consumer goods, turned into an industrial branch in which more than 50% of the products are intended for the auto industry.

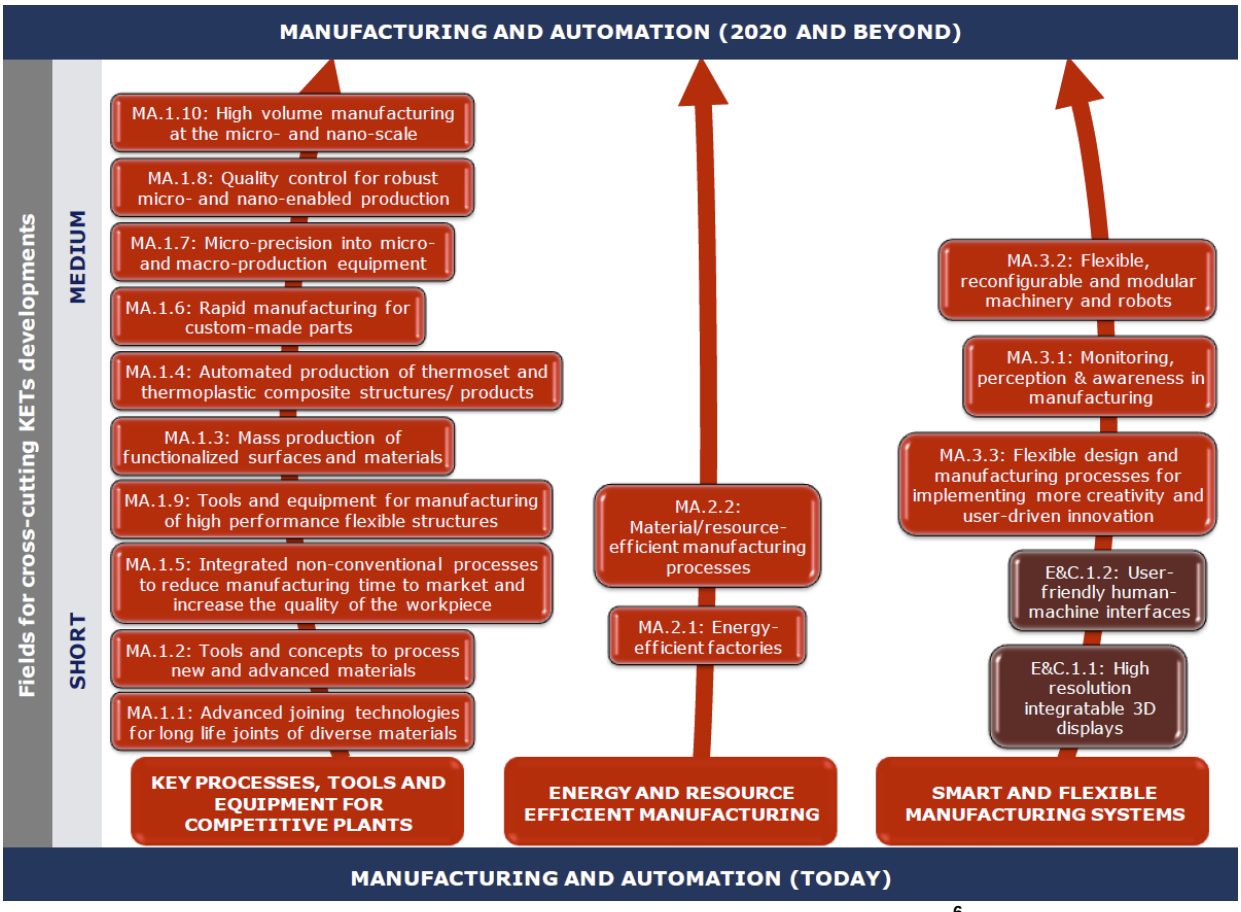

Figure 8: Key enabling technology for manufacturing[6]

The 2014-2020 RDI strategy identified as smart specialization areas, with immediate applicability, the eco technology, energy and environment sectors. It is expected that the development in these directions will lead to an auxiliary development in the field of agricultural machinery, in

which Romania had a rich tradition, but currently is almost non-existent. In this area, emphasis is placed mostly on new technologies and new materials that are supported by university education with research centers and results materialized in various patents and scientific papers.
The Romanian strategy in the field of smart specialization is in line with the directions identified by the European Commission and is presented in Figure 8[13].

A second important direction is energy and the environment considered local and global challenges in terms of energy efficiency, resource management and smart cities. In this direction, regarding smart specialization, it is to be expected the development of infrastructure serving the needs of the population in line with Industry 4.0 and smart home / smart city concepts.

Information Technology and Communications (IT&C) is another direction for the development of smart specialization in Romania. This domain is very well developed in Romania with mature software development centers in Bucharest, Cluj, Iasi and Timisoara, stimulated by the support of high quality higher education institutions as well as by the presence of prestigious multinational companies. Internet of Things – IoT is one of the subdomains of this direction with direct implications in manufacturing, other subdomains with direct applicability in smart manufacturing are big data, data security, cloud computing and fast simulation.

The main directions of action are oriented towards the development of projects initiated by firms; competence centers; innovation infrastructure: accelerators, incubators and transfer centers; doctoral and postdoctoral programs in priority areas; research infrastructures (national roadmap); organizational performance and concentration; a strategic orientation mechanism.[14]
The 2014-2020 National Strategy for Research, Development and Innovation was approved by the HG 929 law in October 2014, for its implementation the National Plan for Research, Development and Innovation (NPRDI III) was established for the 2015 – 2020 period, approved by the Government Decision no. 583 / 22.07.2015.

The National Plan for Research Development and Innovation is implemented by the UEFISCDI – the Executive Unit for Financing Higher Education for Research, Development and Innovation, through the following programs:[15]

Program 1: Development of the national R&D system

- Subprogram 1.1. Human resources (integral)
- Subprogram 1.3. Research and development infrastructures (partial)
- Subprogram 1.4. Support (partial)

Program 2: Increasing the competitiveness of the Romanian economy through research, development and innovation

[13] https://ec.europa.eu/growth/industry/key-enabling-technologies/eu-actions/ro-ckets_en
[14] http://www.cdi2020.ro/wp-content/uploads/2014/02/STRATEGIA_Versiunea-tehnica_Februarie-2014.pdf
[15] https://uefiscdi.ro/index.php?&wtok=3b83c9f320bead04178deb941a047fee70b75c33&wtkps=FcrBDYAgDEDRXToBtCmFdgd3AOFA9IYJB+Puwu0n/2UlfYeywnyue4B1pYgc0MY6MHqFXaiQckyh+ibCJCc78eKoeEbXSkgNt1tsNrDDvh8=&wchk=b986c8241bef367056a646ffaebf191662907421

- Subprogram 2.1. Competitiveness through research, development and innovation (partial)

Program 3: European and international cooperation

- Subprogram 3.1. Bilateral / multilateral (except the AUF bilateral program)
- Subprogram 3.2. Horizon 2020 (integral)
- Subprogram 3.5. Other European and international initiatives and programs (integral)
- Subprogram 3.6. Support (partial)

Program 4: Fundamental and frontier research (integral)

2.2.1 International dimension

Romania as a member of the EU is part of all programs for financing research, supported by European funds. Thus, in 2017 programs are financed by: Horizon 2020, Framework Programme 7 of the European Commission, Cooperation programme INTERREG EUROPE, Cooperation programme Danube Transnational Program, EEA Grants, ERA Net, INCOMERA, AAL Call, ERA MIN, EUREKA, MANUNET, QUANTERA, FLAG-ERA, NEURON ERA-NET, EUROSTRAS, SUSFOOD, FACCE SURPLUS, ERA MBT, CoBioTech, e-RARE, CHIST-ERA, EMN.
Researchers in Romania benefit annually from prestigious research scholarships offered through programs such as: Marie Skłodowska-Curie, Humbold, DFG, etc.
Romania is part of regional agreements, as well, (e.g. Agreements for the Danube or Balkan region, the Black Sea region, etc.), that offer support for collaboration between companies and research entities.

3 Support environment

In Romania support institutions for business oriented SMEs are: Chamber of commerce and industry, centres of excellence, research centres, development centres, competence centres, technology centres, technology parks, incubators.
Universities also offer direct SME support through various services provided by their specialists directly to SMEs in various forms of collaboration.
Other SME support elements are the Regional Development Councils and the Regional Innovation Consortia established alongside the 8 territorial development centres of the development regions.

Figure 9: The development regions of Romania [16]

3.1 Clusters

Clusters are regional associations of institutions and companies connected through common objectives operating in the same field or related interconnected domains. At European level, the "triple helix" model has crystallized so far, involving a cluster consisting of three distinct types of entities: enterprises (the cluster's economic side), universities and research institutes (the research, development and innovation side of the cluster) and local or regional public authorities.
In Romania, it was found that this model is not functional and does not match the cultural background of the country, so the "four clover" model was adopted, in which besides the three types of entities from the "triple helix" model there are also catalyst organizations – consultancy firms specialized in the field of technology transfer and innovation, technology transfer centres, etc. [17] .
Since 2008, the central public authorities have developed a national program aimed at identifying existing and emerging clusters in Romania. The public policies resulted in:[18]

- the development of the cluster chapter in the Industrial Policy Document, with the support of the German Society for Technical Cooperation (GTZ)

[16] Source Ministry of Regional Development
[17] http://clustero.eu/asociatia-clusterelor-din-romania/
[18] http://old.fonduri-ue.ro/poscce/fonduri_structurale/pdf/Analiza_clusterelor_30012012FINAL.pdf

- the “Inov Cluster” Project (2008-2010), within the Sectoral Research and Development Plan, which aimed at disseminating the concept of innovative cluster in Romania and the examples of international best practices, as well as stimulating economic operators to create and develop innovative clusters through the development of specific tools (guide, portal, consulting services).
- the “cluster mapping” exercise carried out by MECMA with the support of the German Society for Technical Cooperation (GTZ).
- the generation of potential competitiveness poles.

On July 1, 2011, the Association of Clusters in Romania was founded with 15 founding members, today associates comprise of 43 clusters.
In Romania following clusters are existing based on information from Chamber of Commerce and Industry of Romania[19] :

1. AUTOMOTIVEST Regional Cluster
2. ICT Regional Cluster
3. Dacia Renault Competitiveness Pole
4. PRO WOOD Regional Wood Cluster
5. Green energy innovative biomass Cluster
6. TURINN Cluster
7. Agro-Food Regional Cluster
8. Electro-technical Regional Cluster ETREC
9. ASTRICO Textile Cluster
10. Transylvania Furniture Cluster
11. Transylvania Aerospace Cluster
12. Carpathian Tourism Cluster
13. ELINCLUS Innovative Cluster
14. REN ERG Cluster
15. ICT – Regional Competitiveness Pole Oltenia Cluster
16. Romanian Water Cluster
17. Cluster Traditions Manufacture Future TMV Sud Est
18. REGIOFA Cluster
19. Romanian Textile Concept Cluster Bucharest
20. Geothermal Cluster
21. Maritime Cluster
22. ROSENC Cluster
23. IND AGRO Pol Competitiveness Pole
24. Tourism Regional Cluster
25. Romanian Aerospace Cluster Bucharest
26. Creative Industries Pole Iași
27. ALL Electric Pole
28. Tourism Oltenia Cluster
29. Automotive Sud Vest Oltenia Pole

[19] Source: http://www.minind.ro/reindustrializare/pdf/parcuri_industriale_si_clustere.pdf

30. TREC Transational Renewable Energies Cluster
31. Transylvania Textile & Fashion Cluster
32. Innovative Regional Cluster Packaging-Printing-Design
33. IT New Media Iași
34. Clusterul Ecoturistic
35. MedGreen Pole
36. MECATREC Regional Cluster
37. SIS-AUTOM-INT-POL-Bucharest
38. ICT Regional Cluster Cluj Napoca
39. SPRINT ACAROM
40. Romanian River Transport
41. Polaris
42. iTechSylvania
43. INOVTRANS

According to ESCA (European Secretariat for Cluster Analysis)[20] we have 10 cluster in silver category (Table 3) and 23 in broze category.

Table 3: Romanian cluster from silver category[16]

Name	Comparative portfolio	www
AgroTransilvania Cluster	Food industry	http://www.agrocluster.ro
ClujIT	ICT	http://www.clujit.ro/
Cluster Mobilier Transilvan	Production and engineering	http://www.mobiliertransilvan.ro
ELINCLUS - Electronic Innovation Cluster	ICT	http://www.elinclus.ro
Green Energy - Romanian Innovative Biomass Cluster	Energy and environment	http://www.greenenergycluster.ro
IND-AGRO-POL	Production and engineering	
iTech Transilvania Cluster	ICT	http://itech.aries-transilvania.ro/
PROWOOD Regional Cluster	New materials and chemistry	http://www.prowood.ro
Romanian Textile Concept	Textile industries	http://www.romanian-textile.ro
RosenC - The Romanian Sustainable Energy Cluster	Energy and environment	http://www.rosenc.ro

[20] http://www.cluster-analysis.org/silver-label/?country=9e8fb91d962048b699b90d7b063c5346
http://www.cluster-analysis.org/benchmarked-clusters/?country=8a21454fb8154208b59c972ad47bb4ed

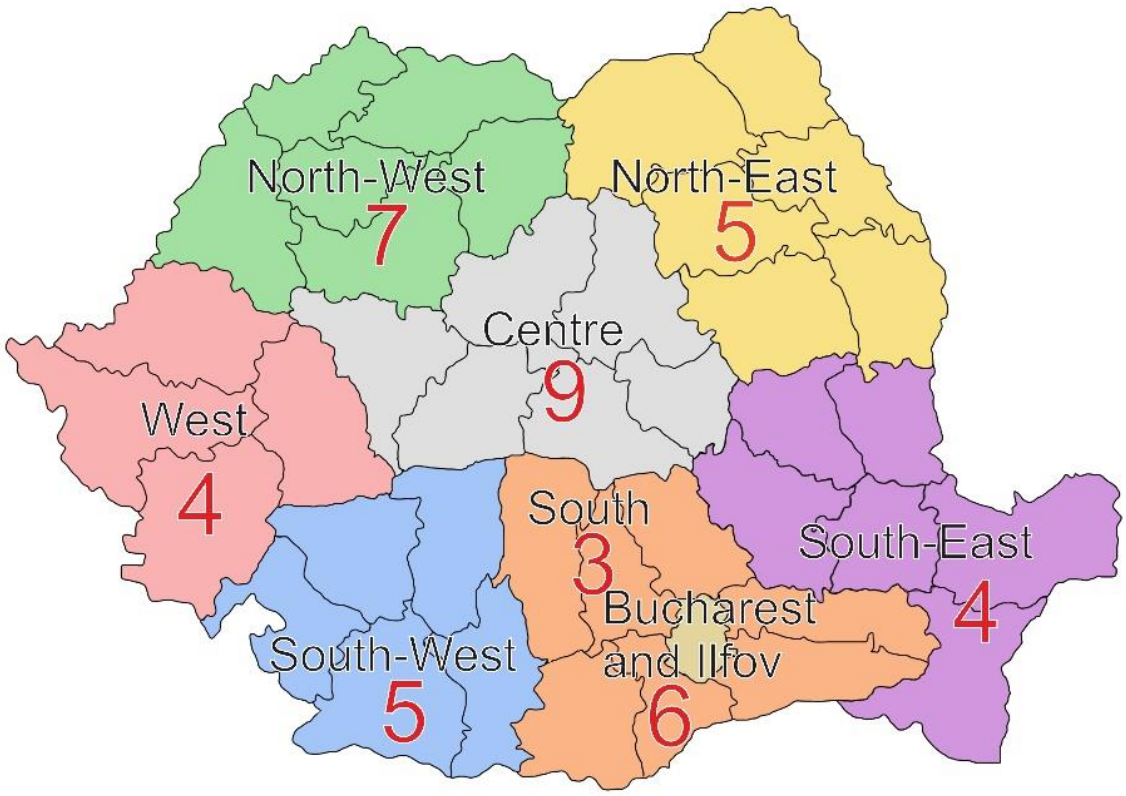

Figure 10: Distribution of clusters in Romania

3.2 Centres of excellence

The centres of excellence from Romania related to the project objective are:

The Centre of Excellence in Polymers
This centre addresses a series of research themes that involves polymers. The research themes are included in five interdisciplinary programs such as biomaterials, intelligent multifunctional polymeric materials, molecular systems, hetero-organic and organic compounds with liquid crystal properties and molecular modelling.
http://www.ch.tuiasi.ro/0632polimeri.html

The Centre of Excellence for Education and Research (CERFS)
The main research activities and directions of this centre are focused on the following fields: neuro-fuzzy systems, bio-informatics, bio-medical engineering, nonlinear dynamics, speech technology, space science and technology and virtual reality.
http://www.etc.tuiasi.ro/sibm/old/Cercetare/CERFS.htm

The Centre of Excellence in Measuring Systems and Innovative Materials (METROS)

This centre is focused on research activities that involve measuring systems and innovative materials.
http://www.ee.tuiasi.ro/structura/catedre/masurari-si-materiale-eth/

3.3 Competitiveness poles

In the Minister Order no. 363/2012, the competitiveness pole is defined as an association within a defined geographic space between enterprises, research entities, universities, local public authorities and catalysts that have a common development strategy in order to generate synergies around innovative projects oriented towards one or more markets. Competitiveness poles in Romania don't have a territorial constraint so a pole can be geographically located in several development areas. The agreed form of organization is association through partnership agreements or independent legal organization.
In order to achieve the competitiveness status, three elements have to be documented (MO no. 363/2012): the composition (the compulsory existence of two types of entities, namely enterprises and research organizations / universities and, optionally, local public authorities and catalysts), the association (resulting either in a company or an entity operating under a formal association agreement signed by the members of the competitiveness pole) and the pole development strategy, which is a formally assumed (i.e. signed) document by all members.

In the last financial exercise through the Sectoral Operational Program Increase of Economic Competitiveness Priority Axis 1. An innovative and eco-efficient production system for Key Area of Intervention 1.3 - "Sustainable Development of Entrepreneurship" Operation 1.3.1 - "Development of Business Support Structures of National and international Interest - Competitiveness Policies " funded 8 poles of competitiveness.
The objectives of these funding are:
• Supporting large-scale projects aimed at creating, developing and operationalizing competitiveness poles.
• Increased interactions between firms, academic, scientific institutions and other entities involved in supporting the business environment and the orientation of the private sector towards innovation and technology transfer.
• Increasing productivity and reducing gaps towards the European Union.

3.4 Research centres

In Romania research centres are organized and managed to a large extent by universities and national research institutes. They are funded by these entities from their own funds or through projects obtained in national or international competitions. A number of tax incentives granted to staff employed as a researcher stimulate the development of these centres.

1. **Quality Research Centre**
The centre responds to the continuously growing requirements regarding research activities, offering consulting and training in the field of quality, for various organizations
http://www.cedc.ro/

2. **Competence Centre of Metal Forming Research**
The Metal Forming Research Centre is a distinct research unit within "Lucian Blaga" University of Sibiu. This is one of the first centres of this kind within the Romanian higher education system and it was founded under the framework or the TEMPUS (JEP 2766-91) interuniversity cooperation programme, by means of the Minister of education order no. 8541/1991.
The structure and the activities of the centre were inspired from the metal forming research centres within the universities of Stuttgart and Hanover (Germany), namely Institut für Umformtechnik Stuttgart and Institut für Umformtechnik und Umformmaschinen Hanover. The centre has within its structure research facilities, laboratories, offices, library, which totals a surface greater than 400 square metres
http://sites.centers.ulbsibiu.ro/cscdp/indexe.html

3. **The Economic Research Centre of Lucian Blaga University of Sibiu**
The Research Centre has the following areas of expertise:
   - the development of theoretical and applied scientific research, with a strong novelty in the fields of Master and PhD programs of the Faculty of Economic Sciences, conducted involving students in such programs;
   - active contributions in the design and implementation of the regional research and developmental programs;
   - the implementation, independently or in partnership, of applicative research, whose results can be used by entities involved in the public administration of the economic field;
   - research contracts with legal entities which activate in the private sector for studies on topics of interest to them;
   - the cooperation with research units and nationally and internationally renowned specialists towards the achievement of complex inter and trans-disciplinary results;
   - the dissemination of the research results in prestigious economic publications.

   http://economice.ulbsibiu.ro/research/index_eng.html

4. **Image Processing and Pattern Recognition Research Centre (IPPRRC)**

The Research Centre has the following areas of expertise:

- Image processing and pattern recognition; Colour, grey scale and 3D image processing; Automatic image and media annotation;
- Stereovision based sensorial perception; Dense optical flow; Object detection, classification and tracking; Real-time computer vision;
- Advanced driving assistance and Autonomous mobile systems;
- Sensorial perception; Environment representation; Risk assessment;
- Medical image analysis; Segmentation; Recognition; Prediction; Structured reporting; Ultrasonography, CT, MRI;

http://research.utcluj.ro/tl_files/research/Research%20Domain/Computer%20Science/Nedevschi%20Sergiu_v4.pdf

5. Research Centre for Applied Mathematics in Engineering Sciences (RAMSES)

The Research Centre has the following areas of expertise:

- Numerical Analysis, New methods and tools in Approximation Theory, High degree quadrature formulas, new algorithms for energy-minimizing curves and surfaces
- Functional Equations, Differential and Integral Equations
- Programming, Calculus of Variations, Geometry of Image Formation
- Computer-aided surgery
- Nonlinear and Convex Analysis, Mathematical Programming/Optimization

http://research.utcluj.ro/tl_files/research/Research%20Domain/Matematica/1_Ivan.pdf

6. Research Laboratory and Sustainable Development in Electronics and Power Electronics (RLSDEPE)

The Research Centre has the following areas of expertise:

- DC and AC high efficiency converters;
- PWM and PFM converters control strategies;
- High Power factor and/or power conditioning converters;
- Power electronics for high efficiency lighting systems;
- High frequency, high power density converters for motor drive and renewable energy;

http://research.utcluj.ro/tl_files/research/Research%20Domain/Electrical%20Engineering/5_Marshalko.pdf

7. Centre of Applied Researches in Electrical Engineering for Sustainable Development (CCAIEDD)

The Research Centre has the following areas of expertise:

- Design, modelling and optimization of electrical machine & drives for energy efficient applications in industrial, automotive and renewable energy fields;
- Control of electric and electromechanical systems;
- Condition monitoring, fault tolerance and diagnosis of electromechanical systems;
- Power electronics for high efficiency lighting systems;
- Hardware-in-the-loop (HiL) simulation in hybrid-electric vehicles;

http://research.utcluj.ro/tl_files/research/Research%20Domain/Electrical%20Engineering/6_Szabo%20Lorand.pdf

8. **Information Technology in Electronics Research and Development Centre (ITEC-Embedded)**

The Research Centre has the following areas of expertise:

- Embedded systems for Automotive;
- Circuit design, system design, HW Application design, SW Application design, TW Application design, Training services;
- Power systems and SCADA systems;

http://research.utcluj.ro/tl_files/research/Research%20Domain/ETTI/2_Pitica.pdf

9. **Research Centre for Advanced Materials and Environmental Physics and Chemistry**

The Research Centre has the following areas of expertise:

- Structural characterization of materials;
- Characterization of physic-chemical properties of materials;
- Detection and measurements of some pollutants;
- Computational modelling of molecular structures of materials;

http://research.utcluj.ro/tl_files/research/Research%20Domain/Fizica/2_Culea.pdf

10. **Research Centre of Environmental Engineering (IngMed)**

The Research Centre has the following areas of expertise:

- Clean technologies, waste recovery, recycling materials;
- Ecological reconstruction, sustainable development, new materials;
- Sustainable energy, structural modelling, risk assessment, impact studies;

http://research.utcluj.ro/tl_files/research/Research%20Domain/Ingineria%20Materialelor/6_Dan%20Viorel.pdf

11. **National Centre of Innovative Manufacturing (FABRIN)**

The Research Centre has the following areas of expertise:

- Industrial Engineering (Laser Beam Machining, Water Jet Cutting, Electrical Discharge Machining, Rapid Prototyping of complex parts and master models for Rapid Tooling
- Flexible Manufacturing Systems, Production Engineering, Automotive Engineering, Composite Materials, Engineering and Technologies, biomedical Engineering;

http://research.utcluj.ro/tl_files/research/Research%20Domain/Industrial%20Engineering%20and%20Management/1_Berce_v3.pdf

12. **Research Centre in Sheet Metal Forming (CERTATE)**

The Research Centre has the following areas of expertise:

- Modelling of the material behaviour;
- Formability of metallic materials;
- Simulation of the sheet and tube metal forming processes;

- Virtual fabrication in metal forming;

http://research.utcluj.ro/tl_files/research/Research%20Domain/Industrial%20Engineering%20and%20Management/2_Banabic.pdf

13. Centre for Simulation and Testing for Industrial Robots (CESTER)

The Research Centre has the following areas of expertise:

- Tribological, rheological, mechanism, machinery, mechatronics;
- Industrial engineering, mechanical systems for energy conversion and transmission;
- Innovative development of robotic structures, simulation of complex systems, modeling and simulation of mechatronic systems with applications in aerodynamics and fluid flow or fluid modelling and simulation

http://research.utcluj.ro/tl_files/research/Research%20Domain/Industrial%20Engineering%20and%20Management/3_Pisla_v3.pdf

14. Research centre for engineering and management of innovation (RESIN)

The Research Centre has the following areas of expertise:

- Innovation in engineering;
- Innovation in management and economics
- Smart technologies and applications in robotics and production

http://research.utcluj.ro/tl_files/research/Research%20Domain/Industrial%20Engineering%20and%20Management/4_Brad_v3.pdf

15. Quality Engineering and management Research Centre (QEMRC)

The Research Centre has the following areas of expertise:

- Quality management and engineering;
- Customer oriented development;
- Industrial metrology;

http://research.utcluj.ro/tl_files/research/Research%20Domain/Industrial%20Engineering%20and%20Management/10_SPopescu_v3.pdf

3.5 Industrial parks

In Romania, the law no. 186/2013 regulates the establishment and operation of industrial parks and the conditions for granting the status of industrial park. According to the Ministry of Regional Development and Public Administration[21], the industrial park represents: *a delimited area where economic activities, scientific research, industrial production and services are carried out, capitalizing on scientific research and / or technological development, in a regime of specific facilities, in order to capitalize on the human and material potential of the area*.

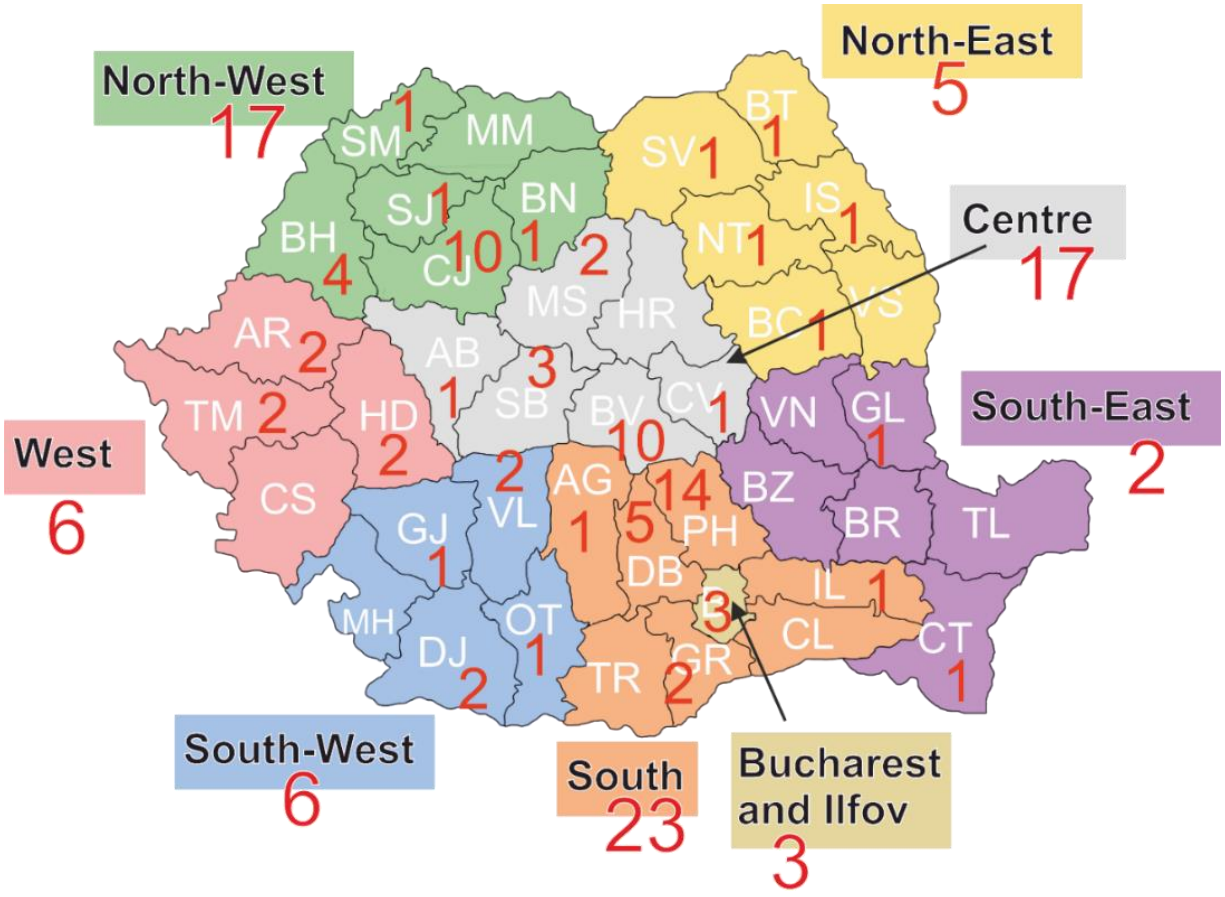

Figure 11: Distribution of industrial parks

Technology parks in Romania are presented in Table 4.

[21] http://www.mdrap.ro/administratie/-8388

Table 4: Technology parks

Country	NUTS2	Name	Institution type	Adress	e-mail	Webpage links
RO	RO121	Parcul Industrial Cugir	Technology park	Str. Victoriei, nr.8A, Cugir, cod 515600, Jud. Alba	parculindustrialcugir@yahoo.com	www.cjalba.ro/parcul-industrial-cugir/
RO	RO421	Parcul Industrial UTA 2 Arad	Technology park	Str. Barabas Bela nr. 23, cod 310005, Mun. Arad, Jud. Arad	office@ifmarad.ro	www.ifmarad.ro/
RO	RO311	Parcul Industrial WDP	Technology park	Str. Baia de Arama 1, cod 022204, Mun. București	valentin.stanciulescu@wdp.eu	www.wdp.eu
RO	RO321	Parcul Industrial București	Technology park	Str. Nanu Muscel nr.8, cod 050521, Mun. București	lhagea@universalproperty.ro	www.bucharestindustrialpark.com
RO	RO321	Parcul Industrial Sema	Technology park	Bld. Splaiul Independenței, nr. 319, cod 060029 Mun. București	dana.lazarescu@semaparc.ro	www.semaparc.ro/
RO	RO321	Parcul Industrial Metav	Technology park	Str. Biharia, nr. 67-77, cod 013981, Mun. București,	office@metav.ro	www.metav.ro
RO	RO211	Parcul Industrial HIT Hemeiuș	Technology park	Str. Gării nr.100, cod 607235, Loc. Hemeiuș, Jud. Bacău	adrian.iordache@hitpark.ro	www.hitpark.ro
RO	RO111	Parcul Industrial Oradea	Technology park	Str. Primariei nr.3, cod 410209, Mun. Oradea, Jud. Bihor	delia.ungur@adlo.ro	www.adlo.ro

3.6 University and Business incubators

In Romania Law no. 102/2016 regulates the legal regime for the establishment and operation of business incubators. Facilities are provided by central and local public authorities to stimulate their establishment and development in order to create new jobs, develop entrepreneurship and diversify economies at local and regional level.

If a business incubator is incubating at least 16 companies with at least 32 employees / incubation cycle (3 years), it can benefit from:

- tax exemption on land, corresponding to the land of the business incubator infrastructure;
- tax exemption on buildings, corresponding to buildings that are part of the business incubator infrastructure;
- exemptions from the payment of any fees due to local budgets;

According to the Law no. 102/2016 a business incubator is a "*business support structure, organized in the business incubator infrastructure in an appropriate space where the incubator residents, managed by an administrator, are located, aiming to create a favourable, sustainable environment for small and medium-sized start-ups, stimulating their development and viability potential, helping them to develop in the start-up period by providing common facilities and managerial support*."

University incubators in Romania are presented in Table 5.

Table 5: University incubators

Country	NUTS2	Name	Institution type	Adress	e-mail	Webpage links
RO	RO412	Incubatorul Tehnologic de afaceri UAV-IT Incubator	University incubator	Platforma Industrială Sud, DN 7, Jud. Arad		www.itauav.ro
RO	RO122	Incubatorul Tehnologic și de Afaceri ITA Pro-Energ	University incubator		incubator@unitbv.ro	www.unitbv.ro
RO	RO321	ASE Startup	University incubator	Str. Frumoasă nr.31, Jud. București	office@incubator.ase.ro	www.itauav.ro

In Table 6 Romanian Business incubators are presented.

Table 6: Business incubators

Country	NUTS2	Name	Institution type	Adress	e-mail	Webpage links
RO	RO113	Incubator de Afaceri Cluj	Business incubator	Str. Tăietura Turcului nr.47, Jud. Cluj	tetarom@tetarom.ro	www.tetarom.ro
RO	RO111	Incubatorul de Afaceri Vetiș	Business incubator		oradea.consultant@gmail.com	www.incubatorafacerism.ro
RO	RO113	Incubatorul de Afaceri Câmpia Turzii	Business incubator	Str. George Coșbuc, nr.24, Jud. Cluj	loana.rus@romactiv.ro	www.incubatorafacericampiaturzii.ro
RO	RO424	Incubatorul de Afaceri Timișoara	Business incubator	Calea Torontalului, Km 6. 1. Timisoara	office@incubatorafaceritm.ro	http://incubatorafaceritm.ro/?s=e-mail
RO	RO121	Incubatorul de Afaceri Alba Iulia	Business incubator	Bd. Alexandru Ioan Cuza, Nr. 23, Alba Iulia, jud. Alba	contact@profilesinternational.ro	http://www.aicar.ro/incubatorul_de_afaceri_alba_iulia.php
RO	RO125	Incubatorul de Afaceri Vidrașău	Business incubator	Parc Industrial Mureș, Platforma Vidrasau Ungheni, 1/G, cod poștal 547612	office@industrial-park.ro	http://bincub.ro/
RO	RO212	Incubatorul de Afaceri Dorohoi	Business incubator	Str. 1 Decembrie, nr. 24, Dorohoi, Jud. Botoșani	radu.onofrei@romactiv.ro	http://www.incubat.ro/index.php?language=ro&page=16
RO	RO211	Incubatorul de Afaceri Bacău	Business incubator	Calea Mărășești nr 6, cod 600017, etajul 2, camera 26, sediul Primăriei Municipiului Bacău	agentia@adlbacau.ro	www.incubatorafaceribc.ro
RO	RO123	Incubatorul de Afaceri Sfântu Gheorghe	Business incubator	str. Presei nr. 4 520064 Sfântu Gheorghe, județul Covasna	asimcov@asimcov.ro	www.incubatorafacericv.ro
RO	RO122	Incubatorul de Afaceri Brașov	Business incubator	Str. Turnului Nr.5, Etaj IV - 500152, Brasov	contact@incubatorbv.ro	www.incubatorbv.ro

Table 7 and Table 8 are presenting other Smart Factory relevant organisations in Romania.

Table 7: Business support organisations

Country	NUTS2	Name	Institution type	Adress	e-mail	Webpage links
RO	RO321	British Romanian Chamber of Commerce	Business support organisation	1-5 David Praporgescu Street Apart. 4, Sector 2, 020965 Bucharest, Romania	info@brcconline.eu	http://brcconline.eu/
RO	RO113	Cluj Chamber of Commerce and Industry	Business support organisation	3 Horea Street, 400174, Cluj-Napoca, Romania	office@ccicj.ro	www.ccicj.ro
RO	RO321	Belgian Romanian Business Association	Business support organisation	58 Dacia Blvd., 020061 Bucharest,	info@beroba.com	www.beroba.com
RO	RO113	Hungarian National Trading House	Business support organisation	13 Pitesti Street, Apart. 8, Cluj-Napoca, Romania	cluj@tradehouse.hu	http://www.tradehouse.hu
RO	RO113	Intercommunity Development Association-Cluj Metropolitan Area	Business support organisation	2 Unirii Sqaure, Apart. 4, Cluj-Napoca, Romania	adi@adizmc.ro	www.adizmc.ro
RO	RO113	League of Romanian Entrepreneurs	Business support organisation	NN Tăbăcarilor Street, River Flower, app. 210, 400379, Cluj-Napoca, Romania	office@lir.com.ro	

Table 8: Ministries and governmental bodies

Country	NUTS2	Name	Institution type	Adress	e-mail	Webpage links
RO	RO321	Agency for implementing projects and programs for SMEs	Ministry/Government	4 Poterasi Street, sector 4, Bucharest, Romania	cabinet.presedinte@aippimm.ro	http://www.aippimm.ro/
RO	RO113	Territorial offices for SMEs and cooperation branch Cluj-Napoca	Ministry/Government	13 Horea Street, 400174 Cluj-Napoca, Romania	oficiucluj@aippimm.ro	http://www.aippimm.ro/otimmc/cluj-napoca/
RO	RO122	Territorial offices for SMEs and cooperation branch Brasov	Ministry/Government	5 Turnului Street, Brașov, Romania	oficiubrasov@imm.gov.ro	http://www.aippimm.ro/otimmc/brasov/
RO	RO223	Territorial offices for SMEs and cooperation branch Constanta	Ministry/Government	79-81 Tomis Blvd., Constanta, Romania	oficiuconstanta@aippimm.ro	http://www.aippimm.ro/otimmc/constanta/
RO	RO411	Territorial offices for SMEs and cooperation branch Craiova	Ministry/Government	93 Stefan cel Mare Street, 200129 Craiova, Romania	craiova@imm.gov.ro	http://www.aippimm.ro/otimmc/craiova/
RO	RO213	Territorial offices for SMEs and cooperation branch Iasi	Ministry/Government	61A Elena Doamna Street, 700398 Iași, Romania	oficiuiasi@aippimm.ro	http://www.aippimm.ro/otimmc/iasi/
RO	RO125	Territorial offices for SMEs and cooperation branch Târgu-Mureș	Ministry/Government	22 Cuza Voda Street, 540027 Târgu-Mureș, Romania	oficiutargumures@imm.gov.ro	http://www.aippimm.ro/otimmc/targu-mures/
RO	RO424	Territorial offices for SMEs and cooperation branch Timisoara	Ministry/Government	22 Eroilor de la Tisa Blvd., 300575 Timișoara, Romania	oficiutimisoara@aippimm.ro	http://www.aippimm.ro/otimmc/timisoara

4 Smart Factory support schemes and programmes

This chapter describes financial environment, support schemes and programmes including relevant policies in Romania.

Romania is trying to make the transition from Industry 2.0 to 4.0 using all its strong points at the moment so as it minimizes the disadvantages caused by having a poor transport infrastructure and a much lower productivity than the European average, yet the labour force is rising.

One of the objectives of Industry 4.0 is to return the industrial production in Europe through its geographic position, human resource and natural resources available in Romania which is a good destination for production facilities. This trend is highlighted by the opening of production and development facilities such as: Autoliv, Continental, Renault, Ford, Bosch, De'Longhi, Emerson, Takata, Michelin, Porsche, ARRK, etc.

Romania has a number of advantages that make it a serious competitor in the Industry 4.0 race, one of this advantages is the Internet access infrastructure which positions Romania in the top of the European countries and on 10th place worldwide on the fastest connection list with a peak of 85 Mpbs according to the study published by www.akamai.com[22] In Romania over 94% of the internet connections offer a speed higher than 4 Mbps (6th in Europe and 12th in the world) and over 37% of the connections offer a transfer rate of at least 15Mbps (10th place in Europe and 16 in world). Basically, Romania is ready for the data traffic generated by Internet of Things which is one of Industry 4.0 pillars.

The well-developed network infrastructure coupled with the fiscal facilities offered by the Romanian state has attracted many large companies in Romania that have opened development centres: Microsoft, Oracle, IBM, Google, Bitdefender, SAP, Ubisoft, EEA Games, Gameloft, etc.

According to telusinternational-europe.com[23] Romania has an ever-increasing reputation as an attractive outsourcing destination. Indeed, the 2014 A.T. Kearney index ranked Romania 5th among the most attractive outsourcing destinations in Europe. Also, according to the Times Outsourcing Business supplement 2012, Romania occupies 6th position globally in the top 10 emerging outsourcing destinations. A study done in 2014 by KPMG ranked Romania as the fastest growing market in the European Union in terms of IT outsourcing services.

[22] https://www.akamai.com/us/en/multimedia/documents/state-of-the-internet/q3-2016-state-of-the-internet-connectivity-report.pdf
[23] http://telusinternational-europe.com/romania-preferred-outsourcing-destination/

CPS – Cyber Physical System is a pillar of Industry 4.0 for its implementation programmers in Romania are an important resource that can also offer IT security services, Big Data, M2M solutions, Artificial Intelligence, E-commerce, etc.

Another important element specific to the Romanian economy is the strong development of the automotive industry. In Romania, there are two automotive assembly plants (Renault and Ford), which has led to an intense development of parts and components suppliers for this industry. According to ACAROM - the Romanian Automobile Manufacturers Association 13 out of the top 20 global suppliers for the automotive industry are also present in Romania with production and development facilities.

Germany is the promoter of the Industry 4.0 concept and is also one of the largest investors in Romania. There are many German companies that are already using technology compatible with Industry 4.0 in some production facilities from Romania.

Last but not least, the possibility of accessing funds for the financing of the Industry 4.0 concept implementation activities and the good quality of the technical universities are arguments that make us to believe that Romania currently has all the resources necessary for the adoption of Industry 4.0.

4.1 Financial environment

The stability of the legislation on taxes in Romania is not a strong point of the central authorities, in recent years there have been significant changes even during the fiscal year. However, there are a number of incentives to stimulate the establishment and development of SMEs.

Thus, through Law no. 120/2015 on the stimulation of individual business angels, according to which the individuals who will invest in micro and small enterprises will be exempt from dividend income tax for a period of 3 years. Other tax incentives are provided for hiring young people, programmers or researchers in SMEs.

There is a financial support granted by the state, through programs aimed at developing production facilities in both rural and urban areas.

Banks in Romania have special programs dedicated to help financing SMEs. These financial schemes are attractive and relatively easy to access, they have an interest rate ranging from 3.5% to 9% and with repayment periods between 1 and 10 years. Banks grant special credits for the implementation of projects funded by national or European funds, accepting as the only guarantee for the return of the loan the financing contract. Most times, for these types of loans, the bank monitors the expenses made by the SME and approves each payment made from the credit to ensure that the money is used under the credit agreement signed between the parties.

Crowd funding is a fairly new financing tool in Romania that SMEs can use to raise funds and fund various projects. There are 8 platforms independent of Crowd funding so far.

Venture Capital is a financing tool used both internally and internationally.

According techcrunch.com UiPath[24], a startup out of Romania that builds apps for businesses to automate repetitive functions like processing insurance claims, or going through employee on boarding, has raised $30 million in a Series A round of funding led by Accel. The company has been around since 2012, now has 150 employees and until now had not announced any funding. This $30 million also includes a $1.6 million seed round it raised last year from Earlybird, Credo Ventures and Seedcamp.

At the national level, there are a number of platforms dedicated to venture capital funds such as: http://catalystromania.com/, http://3tscapital.com/ , http://www.ventureconnect.ro/,

Other sources of funding available are loans from the European Investment Bank or loans with 50% guarantee from the state. These funding instruments are available at various banks.

According to Ernst & Young's "Entrepreneurs Perception of Access to Financing" study, the decisive factor for Romanian entrepreneurs in choosing the financing type is the ability to preserve their independence in regards to the business decisions.

4.2 Support measures

Support measures relevant for research and Smart Factory are presented in Figure 12.

[24] https://techcrunch.com/2017/04/27/uipath-raises-30m-to-build-software-robots-for-internal-business-tasks/

In the 2014-2020 period for the smart manufacturing and smart specialization, a financing scheme has been developed that allows national funds and structural funds to be made available for both existing and newly established public or private entities. In parallel with the financing of the RD&I centers, the technological transfer will also be financed through various instruments (innovation circles, technology transfer centers, etc.) the human resource qualification will also be funded. A special focus is on enhancing the innovation circle and stimulating the market implementation of economically sustainable innovations. Thus, In Romania the patents development rates are lower than the European average and also the patent implementation rate is even lower. The innovation circle focus will also seek to stimulate the patents implementation rates and also increase the number of patents development by encouraging the collaboration between RD&I structures and companies in need of such services.

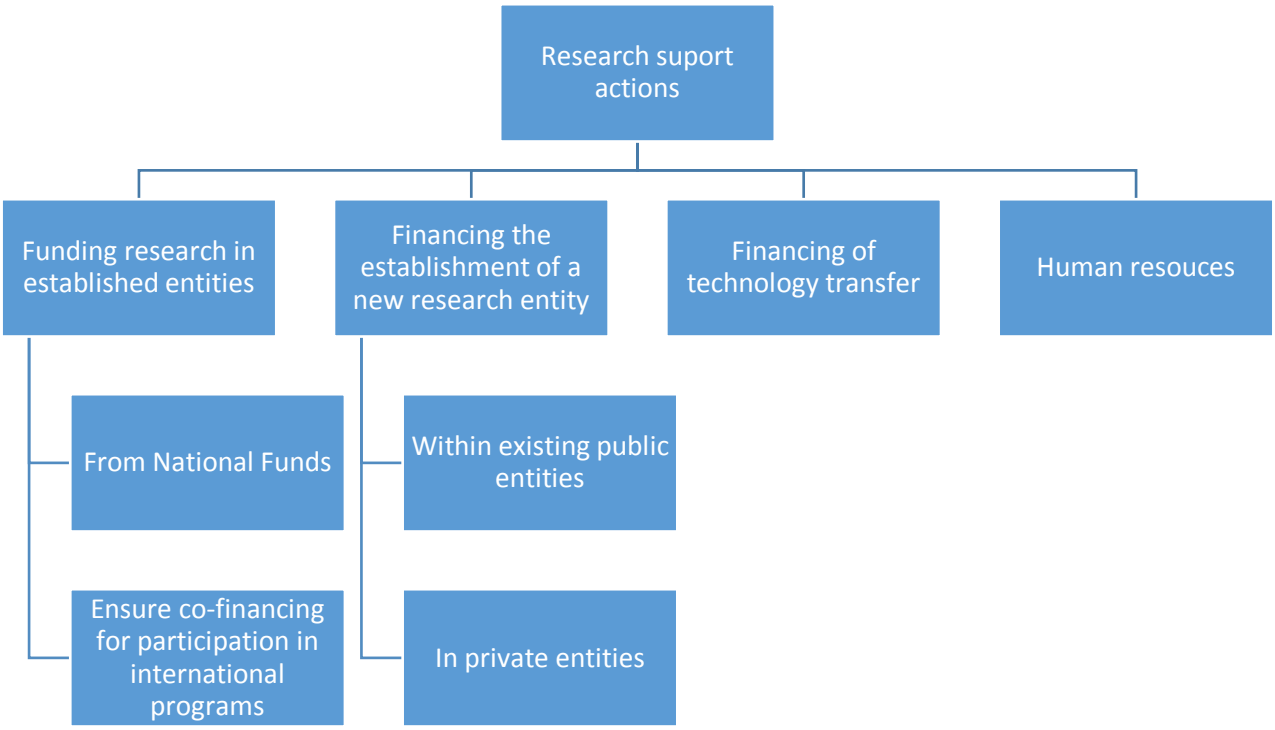

Figure 12: Research support actions Romania

4.2.1 Research, development and innovation

4.2.1.1 Basic science

In Romania, innovation research activities are funded both from national and international funds from both Europe and America or Asia.
UEFISCDI - The Executive Agency for Financing Higher Education for Research, Development and Innovation is the public institution that runs the majority of national funds allocated to research. UEFISCDI is a similar funding agency to those in other EU states that organize competitions and then monitors the implementation of projects accepted for funding. It is subordinated to the Ministry of National Education and the Ministry of Research and Innovation This institution coordinates programs from the National Plan for Research, Development and Innovation, managing about a quarter of national funds allocated to research, development and innovation.

Figure 13: Research support actions coordinate by UEFISCDI[25]

Other sources of funding for research activities is represented by the Competitiveness Operational Program 2014-2020, where Action 1.1.1 finances Investments for Business R & D departments or investment projects for public R & D institutions, the state aid scheme for Investment in RDI is another measure for the direct funding of research.

Indirectly by stimulating technology transfer a natural circuit of funding sources is created, POC proposes action 1.2.3 - Knowledge transfer partnerships and de minimis aid to support Knowledge Transfer Partnerships.

[25] https://uefiscdi.ro/

The Regional Operational Program provides financial support to technology transfer entities as well as the promotion of entrepreneurship, in particular by facilitating the economic exploitation of new ideas and by encouraging the creation of new businesses, including through business incubators.

Besides supporting research carried out in universities and national research institutes, an immediate priority is to finance and encourage the development of R & D facilities at private companies, to stimulate the transfer of knowledge and to encourage collaboration between state entities dealing with research and development of innovation with entities private.

There are also programs that support the participation of Romanian researchers and institutions in international programs, which ensure the co-financing required to participate in these programs.

4.2.1.1 Micro industrialisation program

In Romania, SMEs are supported through the multiannual national micro-industrial program which in 2017 has a budget of 74.3 million euros. Through this program, SMEs receive a non-repayable grant of up to EUR 55,000 for the purchase of equipment, machinery, equipment, workstations, measuring / control equipment and IT equipment, provided that they incorporate technology developed over the last 3 years. Thus, by supporting approximately 1,350 SMEs the capacity of the economic operators in the industrial production sectors is strengthened, the competitiveness of SMEs is increased and the Romanian producers' activity is being developed and modernized.

4.2.1.2 Start-up Nation Romania

The financing of newly established SMEs will be facilitated in 2017 through the Start-up Nation Romania program that has a budget of 377 million euros. The main objective of the program is to stimulate the setting up of new small and medium-sized enterprises. Other objectives are the followings: to improve the start-ups' economic performance, to increase the access to financing sources and to facilitate their access to credit. The program aims to increase the number of small and medium enterprises, to increase the number of jobs in the economy, to increase the degree of technology of newly established companies by acquiring new, innovative technologies. Each SME will benefit from a non-reimbursable grant of € 50,000.

4.2.1.3 Research, development and innovation in value chains and networks

Increasing the competitiveness of the Romanian economy through research, development and innovation

The call for projects aims to stimulate enterprise progress on value chains and partnerships with public universities by maximizing added value in the production goods based on scientific research. Another goal of the appeal is to increase the ability of enterprises to absorb the latest generation technology and adapt these technologies to the target market needs and create a stimulating environment for the private sector initiative. The call for projects also aims to support intelligence specialization processes and the development of RDI activities in areas of general social interest.

Competitiveness through Research, Development and Innovation - Innovation Circles

Smart factory and smart specialization is also supported by the innovation check tool dedicated to SMEs. This measure aims to support SMEs by funding high-innovation projects with concrete results and real market impact. Funded projects should lead to an acceleration of technology transfer between public research organizations and SMEs. Funding is given to address the innovation issues of the beneficiaries, which cannot be solved internally and require a real-life approach to new products / services that impact the market.

Support the creation and expansion of advanced production capabilities and services development

Improving economic competitiveness by increasing productivity in SMEs in the competitive sectors identified in the National Competitiveness Strategy. This call allows the financing of the modernization and expansion of SME's production facilities, the acquisition of technological equipment, machinery, specific plant equipment in order to achieve energy savings. It also finances the acquisition of patents and production licenses, certification activities for products and management systems as well as investments specific to the internationalization process (international participation at fairs, trade missions and exhibitions). Through this program, SMEs can acquire and implement the latest technology in their fields of activity and certify their products in the smart manufacturing area.

Innovative start-up and spinoff companies

The objective of this measure is to support SMEs in the development of new, significantly improved products, technologies / processes and / or services. The measure supports R & D activities - innovation (industrial research and / or experimental development). SMEs can benefit from innovation advisory services related to: technological assistance, technology transfer, the acquisition, protection and commercialization of industrial property rights, use of standards,

procurement of innovation support services related to testing in specialized laboratories; quality reports, testing and certification; market studies.
The measure directly supports the specific activities required for the introduction into production and to support product / process / technology / service innovation.

P1 - Development of the national CD system

The measure aims at developing human resources, infrastructure and institutions by increasing the number of researchers and creating a new generation of researchers for to the European and international scientific environment, in line with the objectives of the European Research Area and increasing the attractiveness of the research career by creating an institutional framework similar to the research organizations in developed countries (promotion based on ethical and performance indicators).
Another objective is to increase the attractiveness of the system and to open up research organizations to the international community;

- modernizing public administration in the research sector;
- improving the performance of research groups;
- the development and implementation of the National Register of Researchers.

P2 - Increasing the competitiveness of the Romanian economy through RDI

The measure aims at stimulating enterprise value chains and partnerships with public universities by maximizing added value in the production of innovative goods (technologies, products, services) based on scientific research (on their own or outsourced). Emphasis is placed on increasing the capacity of enterprises to absorb state-of-the-art technology and to adapt these technologies to the needs of target markets and to create a stimulating environment for the private sector initiative for partnerships with other economic operators, research organizations and knowledge dissemination and eventually local public authorities. The measure is relevant also because it aims to support smart specialization processes by concentrating resources in sectors of economic relevance and proven research potential through public-public and public-private partnerships - leading to concentration, efficiency and effectiveness in order to unlocked identified potential.

P3 - European and International Cooperation

The objectives of the program are to increase the international competitiveness of Romanian research in attracting external funding for research and strengthening the national R & D and innovation system by enhancing international scientific cooperation. The program supports Romania's participation in the EU Framework Program for Research and Innovation - Horizon 2020, Joint Programming Initiatives (JPIs), European Innovation Partnerships (EIPs), other European and international initiatives, programs, organizations and multilateral conventions.
This package is based on:

- Bilateral or multilateral cooperation in the field of scientific research;
- Strengthening the national RDI system by enhancing international cooperation - launching joint thematic calls in partnership with other countries, joint research activities, joint research teams to access other available R & D funds at international level;
- Strengthening scientific cooperation between Romania and partner countries through the financing of joint research projects.
- Supporting Romanian participation in European and international initiatives: EUREKA, EUROSTARS, NATO, art. 185 of TFEU and others;
- Stimulating the technological and economic performances of Romanian companies by financing those entities that have the capacity to transform ideas into innovative products and technologies with real market potential;
- The development of new products and technologies done by new economical operators, which are based on research results and which have potential for commercial exploitation in the domestic and international market;
- Stimulating SMEs to consider innovation as a development strategy, both by developing their own research capabilities and by accessing the experimental facilities available in Romanian research entities;
- Supporting the cooperation between research organizations and industry so that they collaborate in all stages, namely: idea, concept, design, experimental model, prototype, testing, technological design, serial production, promotion, marketing and sales of innovative products with Great added value;
- Supporting and strengthening the innovation capacity of enterprises to create new products / systems / technologies / based on the results of research activities.

P4 - Fundamental and frontier research

Maintain and develop the niche areas where Romanian fundamental research has a comparative advantage and a critical mass of researchers or where there are opportunities for international collaboration that adds to the Romanian fundamental research the "frontier" dimension, by obtaining top scientific and technological results with marketing perspectives.

It aims to develop fundamental research in areas where Romania has set national priorities through SNCDI 2020 and to increase the qualitative performance and to improve the international visibility of the scientific results in the areas where Romania has research potential and where results are comparable to those of other EU countries. The aim is to increase Romania's contribution to the development of the European Research Area (ERA);

Innovation and Commercialisation in the NMP thematic area" (Nanosciences, Nanotechnologies, Materials and New Production Technologies)

4.2.1.4 Complementarity with Horizon 2020 and international initiatives

The objective of INCOMERA (Innovation and Commercialization in the NMP thematic area" (Nanosciences, Nanotechnologies, Materials and New Production Technologies) is to reduce the gap between proof of the validated concept in the laboratory and its industrialization and marketing. Funded projects should use the results at the laboratory level by bringing them to the pilot level and / or functional product demonstration validated by end-users.
In terms of production, conditions will be created for continuous innovation and generic development of "goods" (technologies, organization and production facilities), meeting environmental and safety requirements and integrating technologies for industrial applications - focusing on new technologies, materials and applications in niche markets.
The consortium must include at least two independent partners from two different regions participating in the call, from different countries.

UEFISCDI - The Executive Agency for Financing Higher Education for Research, Development and Innovation financing a series of programs with the following objectives:

- increasing the international competitiveness of Romanian research in attracting external funding for research;
- strengthening the national R & D and innovation through enhanced international scientific cooperation;
- Romania's participation in the Framework Program for Research and Innovation EU - Horizon 2020 initiatives Joint Programming (JPI), the European Innovation Partnerships (EIP) on other initiatives, programs, organizations and European conventions and international bi and multilateral;
- Romania's representation in organizations and pan-European programs and international research;
- increasing the visibility of Romanian research, development and innovation.
- support for the formation of consortia with international partners;
- encourage participation and support Romania's representation in organizations, programs and international research initiatives.

4.2.1.5 Better utilisation and development of research infrastructure

The first initiative for more efficient use of RDI resources is the ERRIS (Engage in the Romanian Research Infrastructures System) platform developed in the "facebook of things" concept and supports the Romanian public / private research infrastructure coordinators and those who want to benefit from the services provided by these infrastructures, stimulating collaboration and participation in national and international networks of the Romanian scientific community. The platform is a method of promoting research infrastructure in Romania both at national and international level.

A second platform that enables the BrainRomania online platform is the worldwide community of actors in the Romanian innovation ecosystem. BrainRomania mission is to promote and share research results, innovative products, services, and collaborative and project funding opportunities.

Both platforms are available online and are free of service allowing the rapid availability of the equipment, services or human resources needed to implement a project.

4.2.2 Human resources

Human resource development priorities are built on the principle of sustainable development in the sense of promoting specific measures to balance economic, social and environmental needs; it is practically established that economic, social and environmental objectives cannot be separated.
The measures are aimed at:

- Promoting a quality initial and continuing education and training, including higher education and research;
- Promoting entrepreneurial culture and increasing the quality and productivity of work;
- Facilitating the insertion of young people and long-term unemployed into the labour market;
- Developing a modern, flexible and inclusive labour market;
- Promoting the insertion / re-entry into the labour market of inactive persons, including the ones from rural areas;
- Improving public employment services;
- Facilitating the access of vulnerable groups to education and to the labour market.

4.2.3 Romania support for development

4.2.3.1 Tax relief

In Romania, R&D companies or those that own intellectual property rights for some assets can benefit from tax incentives that consist in reducing taxes for employees involved in R&D activities and can obtain accelerated depreciation of used assets and an additional 50% deduction for eligible expenses regarding research and development activities.

4.3 Supporting schemes and measure for 2014-2020

For Romania, over 22 billion euros are available in the 2014-2020[26] period, some of this funding can be accessed for smart manufacturing development. This accessible funding are distributed as follows:

- Strengthening research, technological development and innovation (ERDF 973 million Euros + 93 million Euros from the European Agricultural Fund for Rural Development (EAFRD)
- Improving access, use and increase the quality of ICT (Information and Communication Technology) (101 million Euros)
- Improving the competitiveness of SMEs
- Promoting job sustainability, job quality and supporting labour mobility
- Investments in education, training, skills training and lifelong learning (1.6 billion Euros (EAFRD - 35,270,500 Euros , ESF - 1,257,101,071 Euros and ERDF 361,702,128 Euros)

All types of smart manufacturing activities can be financed, starting from RDI activities, training, production or infrastructure development.

Through the Regional Operational Program (ROP), the following results are envisaged in correlation with the project's objectives:

- Increase in the percentage of innovative SMEs open to mutual collaboration (+ 3.7%)
- Supporting over 5,000 SMEs, generating a 46% increase in labour productivity
- Increasing the survival rate of SMEs by 10%

Through the Operational Program for Competitiveness (POC) it is estimated that the following results will be achieved by 2020:

- Raising private investments for RD&I (target: 80% private investments compared to 66% in 2012),
- Improving collaboration between innovative SMEs and research organizations (target: 6.6% of all SME cooperation),
- Increasing the gross added value of IT&C, generated by the IT&C sector (target: 5% of GDP)

[26] http://ec.europa.eu/regional_policy/ro/funding/available-budget/

A summary of relevant support schemes, measures and calls including information about implementation body, available budget, eligible costs and other relevant data is presented in Table 9.

Table 9: National support schemes summary

1	Country	Measure/Call	Objective	Implementation body	Budget (Mio €)	Beneficiary	Financing rate	Eligible costs	Max. grant (€)	Year from:	Year to:
2	RO	Multi-annual national micro-industrialisation program	Supporting investments in the priority economic sectors by increasing the volume of activity and competitiveness of SMEs in these sectors	Ministry for the Business, Commerce and Entrepreneurship Environment	16,52	SMEs	Maximum 90% of the amount of eligible project costs	Technological equipment; Measuring, control, regulating and controlling apparatus and instruments; Vehicles of category N1, N2, N3; Investments in intangible assets relating to patents, product and service marks; Computing IT equipment; Purchase of workspaces; Production premises furniture; Office equipment; Making a web page;	Maximum 100.000 EUR	2017	2018
3	RO	The Start-up Nation Program	Stimulating the establishment and development of small and medium-sized enterprises and improving their economic performance, creating new jobs, placing disadvantaged people, unemployed and graduates on the labor market, increasing investment in innovative new technologies	Ministry for the Business, Commerce and Entrepreneurship Environment	380,84	Start-up SMEs	100% of the amount of eligible project cost	Technological equipment Purchase of workspaces, production areas and premises for service and trade Computing IT equipment Purchase of furniture, office equipment Salaries, utilities and expenses related to rents for workplaces, production spaces and service and trade facilities Intangible assets Value Added Tax	Maximum 44.000 EUR	2017	2018
4	RO	Implementing the UNCTAD / EMPRETEC Romania Program to support the development of small and medium-sized enterprises	UNCTAD / EMPRETEC-Romania Program is a program to encourage and stimulate the establishment and development of small and medium-sized enterprises, implemented by the Ministry of Business, Commerce and Entrepreneurship	Ministry of Business, Commerce and Entrepreneurship	0,11	5 centre EMPRETEC	100%	The expenses incurred by the workshop from the budget allocated to each of the 4 OTIMMC programs (publishing of promotional and presentation materials, editing / multiplication of course materials, support materials for practical exercises, supplies needed for the courses, rental of spaces for the development Workshops, transmission of invitations to organize and run workshops, payment of fees for trainers' fees, accommodation and meals of trainers as well as accommodation and mass of participants, including the costs of organizing conferences for launching / disseminating workshops)	9.230 EUR	2017	2018
5	RO	PROCEDURE for the implementation of the de minimis aid scheme provided for under the Program for the development of marketing activities for market products and services	The program for the development of marketing activities for market products and services is a multi-annual program for encouraging and stimulating the development of small and medium-sized enterprises, implemented by the Ministry of Business, Commerce and Entrepreneurship (MMACA)	Ministry of Business, Commerce and Entrepreneurship (MMACA)	11,00	SMEs	Maximum 90% of the amount of eligible project costs	Various categories	Loan: maximum 55.555 EUR	2017	2018

5 Trends in the manufacturing sector

Relevant manufacturing trends based on EUROSTAT[27] statistical data are presented in this chapter.

Figure 14 shows the number of active companies in Romania in the last reported period. In 2016, the Romanian economy had the fastest economic growth from the European Union. This is due, on one part, to large companies (about 4% of the companies on the market generate 92% of the total profit obtained by Romanian companies), but also to measures that support SMEs. Even if the largest part of profit is registered by large companies, their turnover represents only 41% of the turnover registered by all companies in the country[28]. Figure 14 shows the number of active companies according to their number of employees.

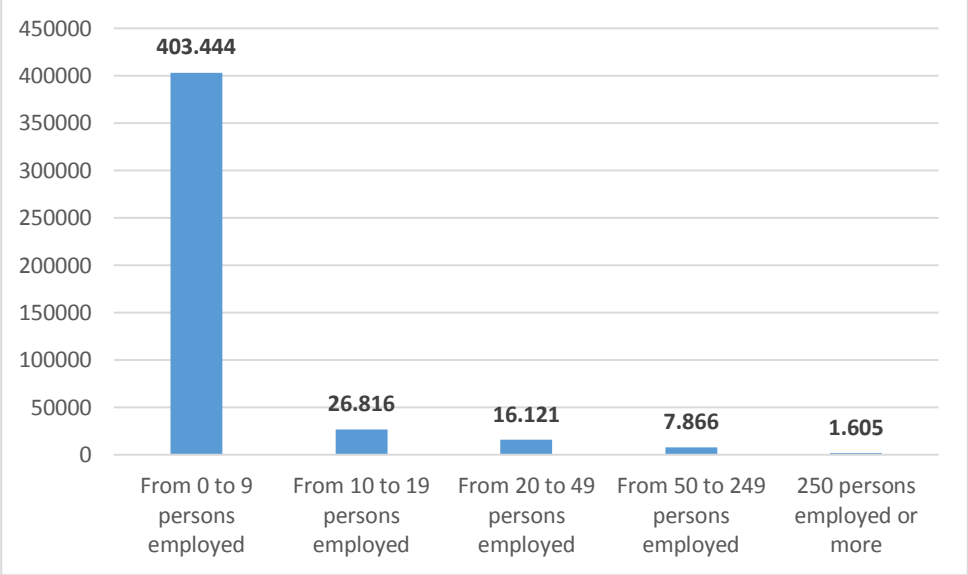

Figure 14: Romania - Number of enterprises in the non-financial business economy by size class of employment

As defined in Commission Regulation 1503/2006 of 28 September 2006[29] turnover comprises the total invoiced by the statistical unit (observation unit) during the reference period. It includes all charges such as packaging and transport even if they are listed separately in the invoice. Turnover does not include VAT and similar deductible taxes. Turnover index for Romania is presented in figure 8, the data is broken down by size classes of persons employed.

[27] http://ec.europa.eu/eurostat/guip/themeAction.do
[28] http://www.zf.ro/companii/retail-agrobusiness/romania-anului-2016-4-din-firme-realizeaza-92-din-profiturile-obtinute-in-romania-15976051
[29] http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Turnover_STS

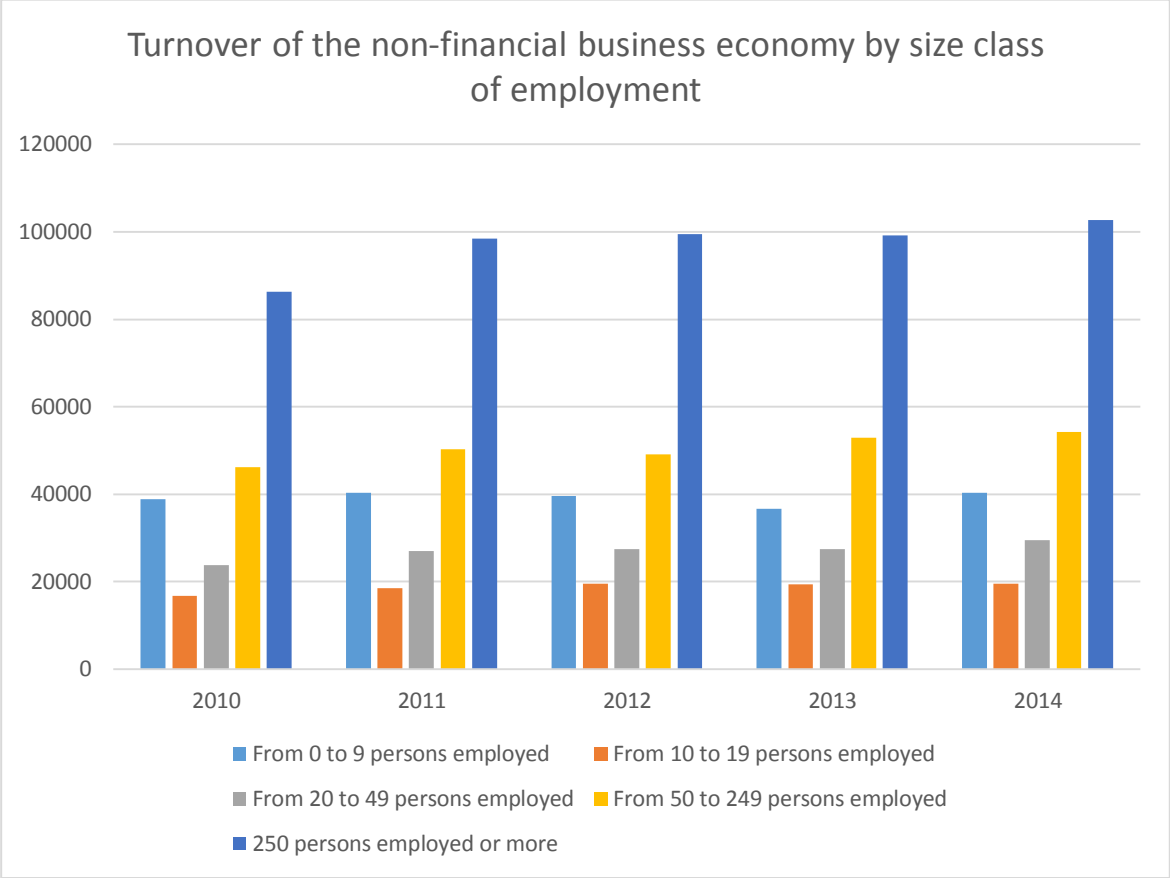

Figure 15: Romania - Turnover of the non-financial business economy by size class of employment - Millions EUR

According Eurostat[30] the Turnover Index presented on Figure 16 is a business cycle indicator showing the monthly evolution of the market of goods and services in the industrial sector. It also records the evolution of turnover over longer periods of time. The turnover of industry index is not deflated. It is therefore the objective of this indicator to measure the market activity in the industrial sector in value.

Data are compiled according to the Statistical classification of economic activities in the European Community, (NACE Rev. 2, Eurostat). Industrial turnover is compiled as a "fixed base year Laspeyres type volume-index". The current base year is 2010 (Index 2010 = 100). The index is presented in calendar and seasonally adjusted form. Growth rates with respect to the previous month (M/M-1) are calculated from calendar and seasonally adjusted figures while growth rates with respect to the same month of the previous year (M/M-12) are calculated from calendar adjusted figures.

[30] http://ec.europa.eu/eurostat/web/products-datasets/-/teiis170

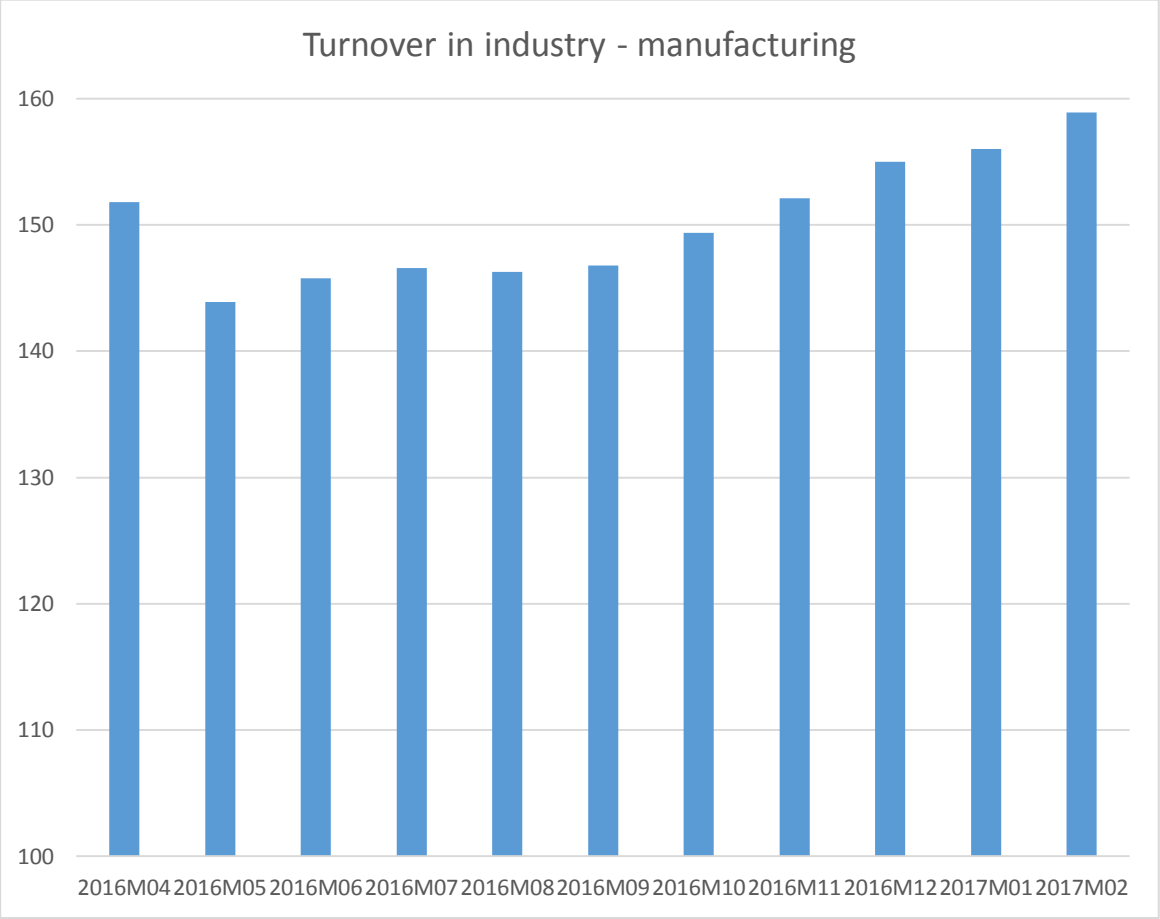

Figure 16: Romania - Turnover in industry - manufacturing

The industrial production index presented on Figure 17 shows the output and activity of the industry sector[31]. It measures changes in the volume of output on a monthly basis. Data are compiled according to the Statistical classification of economic activities in the European Community, (NACE Rev. 2, Eurostat). Industrial production is compiled as a "fixed base year Laspeyres type volume-index". The current base year is 2010 (Index 2010 = 100). The index is presented in calendar and seasonally adjusted form. Growth rates with respect to the previous month (M/M-1) are calculated from calendar and seasonally adjusted figures while growth rates with respect to the same month of the previous year (M/M-12) are calculated from calendar adjusted figures.

[31] http://ec.europa.eu/eurostat/web/products-datasets/-/teiis190

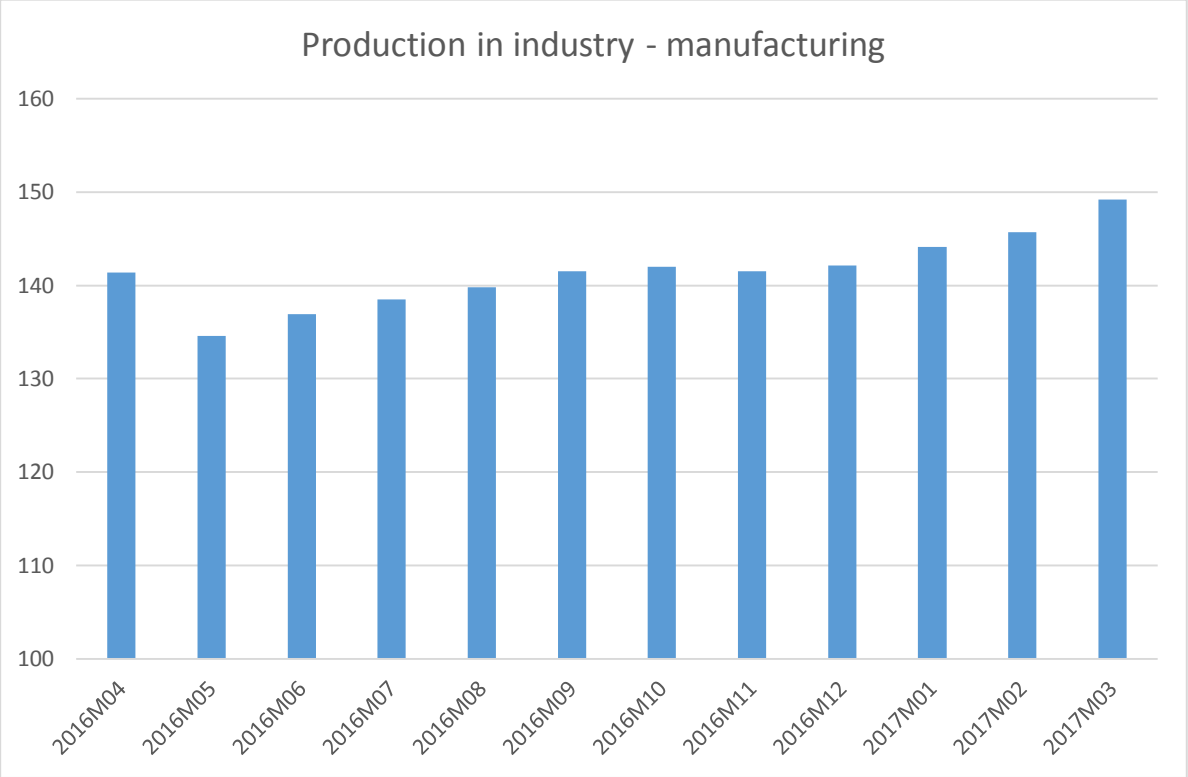

Figure 17: Romania - Production in industry - manufacturing

6 Smart Factory related projects

This chapter presents relevant national projects in execution by the partner or partnering organisations. Due to quantity of information in this chapter only an extract table is presented below and more data is included in Annex XLS file – sheet “Projects”.

Table 10: Smart Factory related projects - extract

Main applicant country	Project name	Programme name	Year from:	Year to:
RO	Clusterul Regional București-Ilfov MECHATREC – Vector integrator de Competitivitate, Ecoeficienţă și Inovare, pentru industria High-Tech de Mecatronică	POS CCE	2014	2015
RO	Fabrica de Eoliene	POS CCE	2011	2012
RO	Controlul informatizat pentru procese metalurgice complexe , cu sisteme distribuite de conducere si roboti industrial ice urmaresc scene in miscare prin tehnici de vedere artificiala	POS CCE	2010	2011
RO	Managing the Industrial Territory in the Knowledge Era (MITKE)	INTEREG	2008	2011
RO	Polul de Competitivitate ”Cluster Mobilier Transilvan	POS CCE	2014	2015
RO	T4	Erasmus+	2016	2019

7 List of regional actors

This chapter presents Smart Factory relevant actors identified by PTP.

Production oriented SMEs as potential users of solutions are presented in Table 11. The data is collected in Annex XLS file – sheet “Reg. actors”.

Table 11: List of regional actors – users

NUTS2	Name	Institution type	Industry sector	Service type 1	Service type 2	Adress	Webpage links
RO113	Napochim SA	Large Enterprise	Chemicals	Manufacturing	Services	Str. Luncii nr.19, Cluj-Napoca, România	www.napochim.ro
RO113	Gormet S.R.L.	SME	Mechanical engineering	Manufacturing	Services	B-dul Muncii nr. 18 B, 400641, Cluj-Napoca, România	www.gormet.eu
RO321	ASCENSORUL Romservice Company SA	SME	Mechanical engineering	Manufacturing	Services	Str. Prof Mitrita Constantinescu nr. 6, sector 3, Bucuresti - România	www.ascensor.ro
RO126	S.C. Romanelec S.R.L.	SME	Electrical and electronic engineering industries	Manufacturing	Manufacturing	Strada Garii Nr. 10, 551010 Mediaş, Sibiu, România	www.romanelec.ro
RO116	Tenaris Romania SA	Large Enterprise	Pressure equipment and gas appliances	Manufacturing	Manufacturing	Ml. Mihai Viteazul, 93, 450131, Zalău, Romania	www.tenaris.com/Romania/
RO113	Metalicplas Activ SA	SME	Mechanical engineering	Manufacturing	Manufacturing	Str. Vaii, nr.2, Dej, 405200 , Cluj, Romania	www.metalicplas.ro
RO222	GreenWEEE International SA	SME	Raw materials, metals, minerals and forest-based industries	Services	Services	Parc Industrial Frasinu,DJ 203D Buzau – Slobozia, km. 5-6,127642, Com. Tintesti, Buzau, Romania	www.greenweee.ro , www.greenweee.eu
RO215	SUCT SA	SME	Construction	Manufacturing	Services	Strada Aurel Vlaicu Nr. 46, 720092, Suceava, Romania	www.suct.ro
RO424	Leman Industrie	SME	Electrical and electronic engineering industries	Manufacturing	Manufacturing	Calea Buziasului, nr. 11 , 300714, Timisoara, Romania	www.leman-industrie.fr
RO411	Polystart SRL	SME	Electrical and electronic engineering industries	Services	Manufacturing	Str. Stirbei Voda 30, 200423, Craiova, Dolj, Romania	www.polystart.ro
RO421	PORTA KMI ROMANIA SRL	SME	Construction	Manufacturing	Manufacturing	Zona Industrială N-V, Str. III, nr. 11, 310491, Arad , Romania	www.portadoors.ro
RO125	S.C. Allstar Prod S.R.L	SME	Construction	Manufacturing	Manufacturing	Str. 8 Martie, Nr. 36A, 540229, Târgu Mureş ,	www.allstar.ro

NUTS2	Name	Institution type	Industry sector	Service type 1	Service type 2	Adress	Webpage links
						Mureș, România	
RO424	S.C. Recom Sid S.A.	SME	Construction	Manufacturing	Manufacturing	Strada Piata Iancu de Hunedoara, Nr. 1, 331031, Hunedoara, Romania	www.recomsid.ro
RO424	Uzina Mecanica Plopeni SA	SME	Defence industries	Manufacturing	Manufacturing	Str. Republicii nr.1, 105900, Plopeni , Prahova, Romania	www.ump.ro

Identified potential solution providers for Smart Factories are presented in **Table 12**.

Table 12: List of regional actors - solution providers

NUTS2	Name	Institution type	Industry sector	Service type 1	Service type 2	Adress	Webpage links
RO113	Proeli Concept SRL	R&D center	Mechanical engineering	Research and dev.	Manufacturing	Cluj-Napoca, Str. Branului 53C, Cluj-Napoca, România	www.proeli.ro
RO213	ATEXIS SRL	SME	Digital economy	Services	Engineering	Calea Chișinăului 23, Iași 700265, Romania	www.atexis.eu
RO125	CIE Matricon S.A.	SME	Mechanical engineering	Research and dev.	Engineering	str. Gheorghe Doja, 155, 54390, Tirgu Mures, Romania	www.cieautomotive.com
RO415	Institutul National de Cercetare-Dezvoltare pentru Tehnologii Criogenice si Izotopice	R&D center	Chemicals	Research and dev.	Services	Strada Uzinei nr.4 , Cod 240050, Rm. Valcea, Romania	www.icsi.ro

A number of companies presented in **Table 13** was identified for acting as potential user and also solution provider for Smart Factories.

Table 13: List of regional actors - Users/solution providers

NUTS2	Name	Institution type	Industry sector	Service type 1	Service type 2	Adress	Webpage links

RO113	THOMAS ROMANIA PLASTIC SRL	SME	Automotive industry	Manufacturing	Research and dev.	Bulevardul Muncii, Nr: 16, 400641 Cluj-Napoca, România	http://www.thomas-sa.com/
RO113	SC Emerson SRL	Large Enterprise	Mechanical engineering	Manufacturing	Research and dev.	Str.Emerson Nr.4, Parcul Industrial Tetarom II, 400641, Cluj-Napoca, Romania	www.emerson.ro
RO113	Robert Bosch SRL	Large Enterprise	Automotive industry	Manufacturing	Research and dev.	Strada Robert Bosch, nr. 1, 407350, Cluj-Napoca, Romania	www.bosch.com.ro
RO321	EATON ELECTRIC srl	Large Enterprise	Electrical and electronic engineering industries	Manufacturing	Research and dev.	Baneasa Business & Technology Park, Sos. Bucuresti - Ploiesti nr. 42-44, cladirea B2, etaj 3, 013696 Bucuresti, sector 1, Romania	www.eaton-electric.ro
RO321	LEONI Wiring Systems RO S.R.L.	Large Enterprise	Electrical and electronic engineering industries	Manufacturing	Research and dev.	Strada Drumul Tarpiului, Numărul 24 Bistriţa – 4200 62 (Bistriţa Năsăud) 460062, Bistrita, România	www.leoni.ro
RO321	Faur SA	SME	Automotive industry	Manufacturing	Research and dev.	Bl. Basarabia nr. 256, sector 3, Bucuresti, România	www.faur.ro
RO116	SC TAKATA ROMANIA SRL	SME	Automotive industry	Manufacturing	Research and dev.	Zona Industriala Vest, Str. III Nr. 9, 310375 Arad, Romania	www.takata.com

8 List of annexes

- XLS file “D3.2.1_Regional mapping Database_SFH_v06_PTP.xlsx”

Figure 18: FILE - D3.2.1_Regional mapping Database_SFH_v06_PTP.xlsx