

JASPERS-Lot 5-Knowledge  
Economy-R&D/Innovation

**Analysis and Evidence Base of the  
R&D&I Market in Romania –  
part 2**

Inception Report

Issue 1 | 25th June 2013

DRAFT

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 227231-01

**Ove Arup & Partners Ireland**

**Arup**  
50 Ringsend Road  
Dublin 4  
Ireland  
[www.arup.com](http://www.arup.com)

**ARUP**

# Document Verification

# ARUP

<b>Job title</b>		Analysis and Evidence Base of the R&D&I Market in Romania – part 2		<b>Job number</b>		227231-01	
<b>Document title</b>		Inception Report		<b>File reference</b>			
<b>Document ref</b>							
<b>Revision</b>	<b>Date</b>	<b>Filename</b>					
Issue 1		<b>Description</b>	Issue 1				
			Prepared by	Checked by	Approved by		
		Name	Clive Winters	Sean Mason / Daniel Cosnita	Sean Mason		
		Signature					
		<b>Filename</b>					
		<b>Description</b>					
			Prepared by	Checked by	Approved by		
		Name					
		Signature					
		<b>Filename</b>					
		<b>Description</b>					
			Prepared by	Checked by	Approved by		
		Name					
		Signature					

**Issue Document Verification with Document**



# Contents

---

	Page
<b>1 Background</b>	<b>1</b>
1.1 Introduction	1
1.2 Assignment Methodology	1
1.3 Report Overview	3
1.4 European Structural Funds and Cohesion Fund 2007 to 2013	3
1.5 European Structural Funds and Cohesion Fund 2014 to 2020	4
1.6 Outline Objectives for Research Technological Development and Innovation	6
1.7 National Strategy for Research and Development	8
<b>2 Overview of Romanian Research, Technological Development and Innovation System</b>	<b>11</b>
2.1 Introduction	11
2.2 High Tech Industry and Knowledge Intensive Services	11
2.3 Funding for Research, Technology Development and Innovation	12
2.4 Research, Technological Development and Innovation Performance	13
2.5 Summary of Key Challenges	13
<b>3 Core Priorities for Romanian Research, Technological Development and Innovation : Discussion</b>	<b>15</b>
3.1 Introduction	15
3.2 Potential Investment Priorities	15
3.3 Funding Investment Priorities	18
<b>4 Next Steps</b>	<b>21</b>

# 1 Background

---

## 1.1 Introduction

OVE ARUP and Partners Ireland (Arup) has undertaken an assignment under the Framework agreement for technical assistance to JASPERS beneficiary countries to support the review and analysis of the Research, Technological Development and Innovation (RTDI) based activities within Romania referred to as the 'Analysis & Evidence Base of R&D&I Market in Romania'.

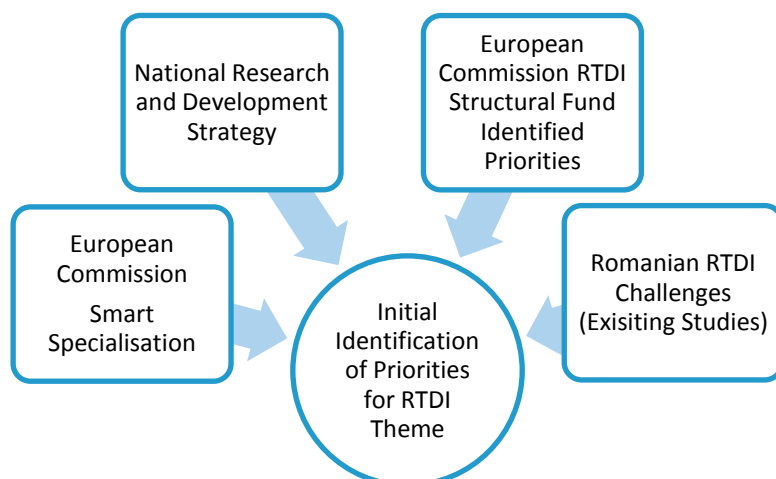
This assignment will highlight core priorities for the Research, Technological Development and Innovation priority axis of the Romanian Operational Programme of the Structural and Cohesion Funds for 2014 to 2020. In the context of research, technological development and innovation the cohesion and structural funds can be used to finance a variety of interventions and actions. In the context of RTDI these could include; Stimulating Business Demand for Innovation; Stimulating Knowledge transfer; Promoting Graduate Placements and Entrepreneurship and Building Demonstrator Facilities. The assignment will also include the profiling of project interventions. Example projects will be identified under each proposed action within the priority axis. Utilising a standardised template each project will be profiled.

## 1.2 Assignment Methodology

The assignment consists of three tasks:

**Task 1: Analysis of Key Documentation:** The JASPERS project team will conduct an analysis of identified project documents and undertake an interview with the project team developing the Romanian National Research, Development and Innovation Strategy for 2014 to 2020. The JASPERS project team will produce an inception report (this report) that will highlight our initial thinking on the core priorities for the priority axis of the operational programme for 2014 to 2020.

**Figure 1: Task 1 - Methodology Overview**



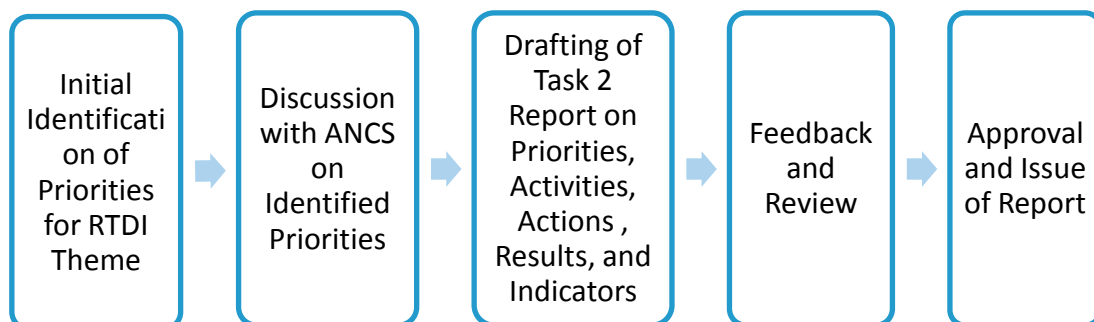
The approach to the delivery of this task (Figure 1) will include an overview of the published challenges for the Research, Technological Development and Innovation system of Romania and a summary of the actions and activities highlighted by the European Commission within its Smart Specialisation approach, the view of the European Commission communicated to Romania on priorities for RTDI and the priorities highlighted from the Romanian National Strategy for Research and Development which will be open to consultation in late July 2013. These inputs provide the core information required to propose in the inception report (this document) the views of the ARUP team for the priorities for funding for discussion with ANCS and to aid discussion regarding the development of task 2.

The outcome of task 1 will be a project inception report (this document).

### **Task 2: Profiling Funding Interventions**

The JASPERS Team will produce a report providing an overview of proposed activities to be supported, an indicative list of specific actions and indicative results and indicators, evaluation criteria for projects submitted and a list of eligible activities under each proposed action. This report can be used as the basis for inclusion into the operational programme.

**Figure 2: Methodology for Completion of Task 2**



The process for the delivery of this task (Figure 2) will lead from the development of the draft priorities (the outcome of task 1). This is then followed by discussions with ANCS regarding the priorities and the production of the priorities which will be subject to review and feedback by ANCS.

The outcome of task 2 will be a funding priorities report.

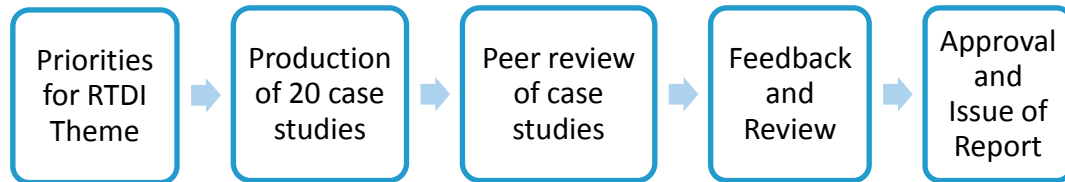
### **Task 3: Profiling Project Interventions**

Task 3 will provide 20 example projects that align with the priorities identified. Each case study profile will include; short description, background, aims and target, funding, strategy and actions, monitoring and evaluation, sustainability, achievements, success factors, impacts, strengths and weaknesses and transferability.

The delivery of this task will be driven by the identification of priorities for the RTDI theme and will be commenced following discussion with ANCS on the identified priorities. The case studies will be subject to peer review within the ARUP project team

and feedback and review prior to approval and issue. The methodology for task 3 is highlighted in figure 3.

**Figure 3: Methodology for Task 3**



### 1.3 Report Overview

This inception report is the outcome of task 1 of this assignment. It provides an overview of the published challenges for the Research, Technological Development and Innovation system of Romania and a summary of the actions and activities highlighted by the European Commission within its Smart Specialisation approach, the view of the European Commission communicated to Romania on priorities for RTDI and the priorities highlighted from the Romanian National Strategy for Research and Development which will be open to consultation in late July 2013. The report concludes with an initial perspective on the core priorities for the priority axis of the operational programme for 2014 to 2020.

The report has been delivered through desk research, a meeting with the team developing the National Strategy for Research and Development and a meeting with ANCS who will be responsible for the development of the theme for Research, Technological Development and Innovation within the Romanian Structural and Investment Fund programme. These meetings were held in Bucharest on the 19<sup>th</sup> June 2013.

### 1.4 European Structural Funds and Cohesion Fund 2007 to 2013

The Structural Funds and the Cohesion Fund are financial tools set up to implement the regional policy of the European Union. They aim to reduce regional disparities in terms of income, wealth and opportunities. Europe's poorer regions receive most of the support, but all European regions are eligible for funding under the policy's various funds and programmes. The current Regional Policy framework is set for a period of seven years, from 2007 to 2013. The Structural Funds are made up of the European Regional Development Fund (ERDF) and the European Social Fund (ESF). Together with the Common Agricultural Policy (CAP), the Structural Funds and the Cohesion Fund make up the great proportion of EU funding, and the majority of total EU spending.

The total budget of the European Regional Development Fund (ERDF) Operational programme for Romania for the period 2007-2013, entitled "Operational Programme Increase of Economic Competitiveness" is around EUR 3 billion and community

assistance amounts to EUR 2.5 billion (approximately 12.7% of the total EU money invested in Romania under Cohesion policy 2007-2013).

The general objective of the programme is to increase the productivity of Romanian companies' in compliance with the principles of sustainable development, and reducing the disparities compared to the average productivity of the European Union. The target is an average annual growth of GDP per employed person by about 5.5%. This will allow Romania to reach approximately 55% of the EU average productivity by 2015.

The current priority axis for Research, Technological Development and Innovation for Competitiveness focuses on several issues meant to contribute to the following aims: the increase of research capacity by investing in the development of R&D infrastructure and attracting young researchers and high-level specialists both in R&D institutions (universities and research institutes) and in companies with research departments; the strengthening of knowledge supply from universities and research institutes; the stimulation of the technology transfer based on the cooperation between R&D institutions and enterprises; the stimulation of innovation demand of enterprises; the creation and reinforcement of high-tech firms and the development of poles of excellence and competitiveness

Regarding actions dedicated to supporting innovation and Research and Development (R&D), the funds were designed to contribute to increase the private expenditures in that sector, by €270 million in 2015, but also allow further patent applications to be issued (50). 400 new jobs are also expected to be created in this area.

## **1.5 European Structural Funds and Cohesion Fund 2014 to 2020**

In October 2011, the European Commission presented a new draft legislative package which will frame cohesion policy for 2014-2020. The proposals were designed to reinforce the strategic dimension of the policy and to ensure that EU investment is targeted on Europe's long-term goals for growth and jobs ("Europe 2020"). The next generation of cohesion policy programmes will operate from 2014 to 2020.

Every European region may benefit from the support of ERDF and ESF. However a distinction between less developed, transition and more developed regions will exist in order to ensure concentration of the Funds according to the level of Gross Domestic Product (GDP). Supporting the less developed regions will remain an important priority for cohesion policy. The catching-up process of less developed regions will require long-term sustained efforts. This category concerns those regions whose GDP per capita is less than 75 % of the average GDP of the EU-27. Minimum shares for the ESF will be established for each category of region (25 % for less developed regions; 40 % for transition regions; and 52 % for more developed regions) resulting in a minimum overall share for the ESF of 25 % of the budget allocated to cohesion policy, i.e. EUR 84 billion.

In the European Commission's proposal for cohesion policy in 2014-2020 (European Commission, 2011) it is a precondition for using the European Regional Development

Fund (ERDF) that investments in research, development and innovation are made based on a smart specialisation strategy that supports integrated, place-based economic transformation. The adoption of a smart specialisation strategy will:

- Focus policy support and investments on key national/regional priorities, challenges and needs for knowledge-based development.
- Build on each country or region's strengths, competitive advantage and potential for excellence.
- Support technological as well as practice-based innovation and stimulate private sector investment.
- Engage stakeholders and encourage innovation and experimentation.
- Be evidence-based and include sound monitoring and evaluation systems.

Promoting "Smart Specialisation" strategies is a novel way national and regional governments are attempting to enhance the competitiveness of firms and clusters. As highlighted in the European Commission Guide to Research and Innovation Strategies for Smart Specialisation (RIS3) (European Commission, 2012) "Priority setting in the context of RIS3 entails an effective match between a top-down process of identification of broad objectives aligned with EU policies and a bottom-up process of emergence of candidate niches for smart specialisation, areas of experimentation and future development stemming from the discovery activity of entrepreneurial actors. It is of crucial importance that RIS3 governance bodies focus on a limited number of innovation and research priorities in line with the potential for smart specialisation detected in the analysis phase."

The European Commission Guide to Research and Innovation Strategies for Smart Specialisation (European Commission, 2012) outlines the development of a strategy as an economic transformation agenda based on four general principles:

1. *(Tough) Choices and Critical mass*: limited number of priorities on the basis of own strengths and international specialisation – avoid duplication and fragmentation in the European Research Area – concentrate funding sources ensuring more effective budgetary management.
2. *Competitive Advantage*: mobilise talent by matching RTD + I capacities and business needs through an entrepreneurial discovery process.
3. *Connectivity and Clusters*: develop world class clusters and provide arenas for related variety/cross-sector links internally in the region and externally, which drive specialised technological diversification – match what you have with what the rest of the world has.
4. *Collaborative Leadership*: efficient innovation systems as a collective endeavour based on public-private partnership (quadruple helix) – experimental platform to give voice to unusual suspects.



## 1.6 Outline Objectives for Research Technological Development and Innovation

The economic rationale outlined by the European Commission in their factsheet on Smart Specialisation provides valuable input on the potential objectives of the new priority for Research, Technological Development and Innovation.

### **To develop and implement strategies for economic transformation**

RIS3 requires an integrated and place-based approach to policy design and delivery. Policies must be tailored to the local context, acknowledging that there are different pathways for regional innovation and development.

These include:

- a) Rejuvenating traditional sectors through higher value-added activities and new market niches;
- b) Modernising by adopting and disseminating new technologies;
- c) Diversifying technologically from existing specialisations into related fields;
- d) Developing new economic activities through radical technological change and breakthrough innovations; and
- e) Exploiting new forms of innovation such as open and user-led innovation, social innovation and service innovation.

### **To respond to economic and societal challenges**

Europe faces relentless global competition for talent, ideas and capital. At the same time, fiscal austerity requires governments to focus oftentimes scarce resources on a few areas and measures that have genuine potential to create sustainable jobs and growth. Most regions can only acquire a real competitive edge by finding niches or by mainstreaming new technology into traditional industries and exploiting their 'smart' regional potential. Smart specialisation strategies can also be a powerful instrument to tackle social, environmental, climate and energy challenges, such as demographic change, resource efficiency, energy security and climate resilience.

### **To make regions more visible to international investors**

By focusing on what gives a region its greatest competitive potential, smart specialisation helps position the region in specific global markets/niches and international value chains. To attract private investment and to get the attention of international investors it is important to brand a region's expertise in a specific knowledge sector or niche market and to provide solid, integrated support to help strengthen this specialisation.

### **To improve a region's internal and external connections**

Improving internal connections has long been a trademark of innovation policy (e.g. triple or quadruple helix networks, knowledge triangles, university-business cooperation, clusters, etc.). However, regions also need to be outward looking, to position themselves in European and global value chains, and to improve their connections and cooperation with other regions, clusters and innovation players. This is

important for the internationalisation of their companies, to achieve a critical potential of cluster activities and to generate inflows of knowledge relevant to the region's existing knowledge base.

#### **To avoid overlaps and replication in development strategies**

In the past, regions facing development challenges have often tried to replicate the same or similar priorities as other, leading, regions, even when they had few assets and little chance of becoming world leaders in their chosen fields. RIS3 encourages regions to adopt policies realistically tailored to their capabilities, opportunities and needs. International differentiation and technology diversification are key to (re-)positioning a region in a global, highly dynamic and changing context, and to making its strategy stand out from that of other regions.

#### **To accumulate a 'critical mass' of resources**

RIS3 can ensure that research and innovation resources reach critical mass, i.e. sufficient momentum to become self-sustaining, or critical potential, supporting them through targeted action to boost human resources and knowledge infrastructure. It clearly pays to focus on areas of real potential and strength rather than spreading investments thinly over unrelated areas. Critical mass/potential can be accumulated either internally within the region or via insourcing and cooperation with other regions.

#### **To promote knowledge spillover and technological diversification**

The most promising way for a region to promote its knowledge-based growth is to diversify into technologies, products and services that are closely related to existing dominant technologies and the regional skills base. Knowledge spillover is most successful if it is within related industries (as opposed to a diversity of unrelated sectors).

New industries will grow out of the most successful existing clusters, but only if sectoral boundaries are abandoned. What matters is not diversification *per se* but rather specialised technological diversification in emerging economic activities. This starts from existing regional knowledge and economic capabilities and aims for related but higher value-added activities. Regions should thus prioritise complementarity between related economic activities, and find better ways to combine their strengths so as to create new industrial capability in areas with high growth potential (e.g. cross-clustering).

The Research, Technological Development and Innovation thematic objective has three specific priorities; to increase private research and innovation development; support research and innovation infrastructure and capacity to develop excellence centres and promoting an innovation friendly environment for business.

Communication from the European Commission to Romania (European Commission, 2012) has identified specific objectives for this thematic priority which reflect country specific challenges.

#### *Increasing private research and innovation development*

- Develop incentives for research collaboration between large domestic or foreign companies and SMEs with an innovative approach, involving where appropriate universities and other resource institutions, encouraging start-ups and spin-offs;
- Increase the research and innovation capacities of firms, including SMEs, supporting technological and applied research and investing in pilot lines and early product validation actions, especially with the aim of creating new products and technologies protected by various forms of IPR (patents, licenses) and boosting high-tech exports;
- Improve the matching of skills produced by universities and higher education institutions with market needs and promote internships based on collaboration between universities and firms.

#### *Supporting research and innovation infrastructure and capacity to develop excellence centres*

- Promote the capacity of R&D Romanian institutions to integrate with international networks and the capacity of Romanian R&D institutions to efficiently network with other EU and international partners participating in transnational programmes fostering also Romania's inclusion in the digital European Research Area and e-science;
- Further strengthening the administrative capacity, streamlining the sectoral governance, including ensuring the role of education for R&I, and concentrating the public resources on the most promising and capable beneficiaries which may include setting competitive working conditions to attract leading scientists.

#### *Promoting an innovation friendly environment for business*

- Revise the intellectual property rights framework with the view of increasing commercialisation of research and innovation by public and private stakeholders;
- Promote the transfer of knowledge and innovation in rural economy through the European Innovation Partnership for agriculture and sustainability;
- Foster the development of clusters and cooperation between clusters organisations and knowledge institutions, including in the maritime, agricultural and green growth sectors ;
- Provide high quality shared access facilities and full package of services tailored to match the needs of innovative companies, including promotion of commercialisation.

## **1.7 National Strategy for Research and Development**

Romania is currently developing its national strategy for research and development for 2014 to 2020. Alignment between the development of the research and development priorities within the operational programme and the strategy is particularly important. While there is significant alignment and commonality it should be noted that the national strategy has a focus that includes exploratory research and research of national

importance which may be outside of the remit of the structural and investment funds. In addition the remit of the structural and investment funds and the theme for Research and development and innovation has a focus on innovation which is currently outside the remit of the research and development strategy. While there are slight differences in remit it should be noted that there are significant commonalities and alignment which should enable the financing of activity in support of the national research and development strategy through the operational programme during the 2014 to 2020 period.

The team developing the national strategy have elaborated a vision which is that **“In 2020 Romania is regionally and globally competitive through innovation supported by research and development, thus generating wellbeing and prosperity for its citizens.”**

They also highlight that “competitiveness is fed by an innovation ecosystem in which *research and development* supports the advance along global value chains. In this environment *excellence* and entrepreneurship mobilize a critical mass of actors”. This aligns well with the context of the operational programme.

The team has also established 3 pillars which highlight the key challenges for Romanian Research and Development and potential support actions for the Research and Development Strategy.

#### **Pillar 1. Business firms become key actors in innovation**

- Fiscal instruments stimulate the risk-taking necessary for innovative endeavours, which are further supported by both public and private financial instruments.
- In a dynamic and open knowledge market, the results of public research are easily accessible, while the IP regime encourages equitable competition.
- Interfaces – such as transfer centres, facilitators etc. – between research organizations and businesses ensure the correlation of researchers, technology developers, and innovators.

#### **Pillar 2. The RDI sector is a space of opportunity for the talented**

- The Romanian research sector is internationally open and attracts talented researchers from the global academic community and the scientific diaspora.
- Exploratory research is fed by a stable stream of projects and supported by competitive national research infrastructures and by open access to the large European infrastructures.
- Education in all its stages supports creative, entrepreneurial behaviour.
- The training and upgrading of researchers – though doctoral and postdoctoral programmes, mid-career training etc. – is concentrated around the strategic domains.
-

### **Pillar 3. Breakthroughs in priority domains**

- Strategic domains are supported by long-term programmes for both basic research and key technologies, often undertaken as part of international partnerships.
- Translational research is an active link in innovative processes, capitalizing on the knowledge generated in basic research through practical applications.
- The rewards of excellence motivate organizational leadership, spur institutional differentiation – as manifested, for instance, in the rise of research universities and the growth of private research – and incentivize the competition for international talent.
- The regional and trans-border dimensions of the strategic domains stimulate partnerships among research organizations, business, and local administration.

The strategy team have also sought to identify priority sectors based on projects, academic publications and patents. This has resulted in a list of 29 areas being reduced to a current list of 12 sectors which will be refined to a list of 5. The current 12 sectors are; Agro-Food, ICT, Intelligent systems, Health, Pharmaceutical, Environment, Security Space, Materials, Biotechnology, Transport and Socio-economic. This sector list is generally consistent with the work delivered by ARUP in the first part of this assignment providing an analysis for the basis of smart specialisation. Specifically Space, Security and Socio Economic areas were not prioritised by ARUP and other traditional sectors were included based on an economic and research activity analysis.

Overall the work being delivered for the national strategy will be continued throughout and beyond the period of this assignment with panel meetings of each sector taking place during July.

## 2 Overview of Romanian Research, Technological Development and Innovation System

---

### 2.1 Introduction

The Global Competitiveness index 2011-2012 (World Economic Forum, 2012) positions Romania as a 'stage 2 - efficiency driven economy' with a requirement to focus on higher education and training, goods market efficiency, labour market efficiency, financial market development, technological readiness and market size within the 12 pillars of competitiveness.

Analysing the Romanian RDTI capacity, capability, adoption and commercialisation is an important starting point. Romania is ranked 77<sup>th</sup> overall on the global competitiveness index and is ranked 95<sup>th</sup> out of 142 countries in the global competitiveness index for innovation. This accounted for its lowest score (2.9) out of all the 12 competitiveness pillars.

The positioning of Romania as an efficiency driven economy highlights the importance of having a well-educated and trained workforce that is adept at absorbing new technologies where there is sufficient financing for research and development and with an environment where it is possible to commercialise innovation. In this context the major improvements should be targeted at goods market efficiency, labour market efficiency, financial market development where the country is lower ranked and technological readiness where although the country ranked higher in the index its score was low. In particular the country rankings for availability of technology and firm level technology absorption were low (115<sup>th</sup> and 117<sup>th</sup> respectively). The innovation performance was low across all the indicators but particularly important is the issue of university-industry collaboration (ranked 115<sup>th</sup>) and the procurement by government of advanced technology (ranked 111<sup>th</sup>). In comparison the availability of scientists and engineers ranked and scored well (59<sup>th</sup>).

### 2.2 High Tech Industry and Knowledge Intensive Services

Data from Eurostat (Eurostat, 2012) on High Tech Industry and Knowledge Intensive Services and from the community innovation survey provide for comparison between Romania and the EU27. Employment in Romanian high-tech and medium-high tech manufacturing was 5.6% in 2008 and 5.66% in 2007 which is comparable against an EU average of 6.69% for the EU 27 in 2007. However significant differences appear in the area of employment in Knowledge Intensive Sectors where employment in Romania was 14.84% in 2008 and 14.4% in 2007 against an EU 27 average of 32.96% for 2007. Regional differences should also be noted. Employment in high tech sector's within the

NUTS 2 regions for 2008 varied significantly with Bucuresti Ilfov (6.55%) and Vest (4.16%) having the highest levels of employment in high tech sector's with the remaining regions varying from Sud Vest Oltenia (0.95%) to Nord Vest (2.03%).

The impact of this is reflected in both the turnover from innovation and high-tech exports. In 2008 Romania outperformed the EU27 average in Turnover from Innovation in both industry and services with 14.9% against 13.3% for the EU27. However a clear and significant gap is visible in export performance with Romania achieving 3.85% of exports from high tech in comparison to 16.65% for the EU27.

## **2.3 Funding for Research, Technology Development and Innovation**

The Innovation Union Competitiveness Report 2011: Country Profile – Romania (European Commission, 2011) recognises that R&D intensity has increased from 0.37% in 2000 to 0.48% in 2009. Despite this Romania remains one of the lowest ranked countries in Europe for R&D intensity. Investment in R&D has been significantly impacted by the economic downturn; however a target of 2.0% R&D intensity as a percentage of GDP is being targeted by 2020.

Funding for Research and Development in Romania in 2011 is mainly (49.1%) supported by Government with Business Enterprise funding increasing in 2011 to 37.4% (Eurostat, 2012). In comparison for 2010 the EU27 average was 34.6% for Government and 53.9% for Business Enterprise. Interestingly international R&D funding into Romania (12.1%), was larger than the EU27 average of 8.9% for 2010.

Overall research and development expenditure in Romania remains low at 0.48% of GDP in 2011 in comparison to the EU27 average of 2.03% (Eurostat, 2012). Given the dominance of Government support to research and development in Romania the overall funding level still remains low at 0.2% of GDP in comparison to 0.26% for the EU27. The largest difference however is in business enterprise expenditure which is 0.17% in comparison to 1.26% for the average of the EU27.

The low levels of funding for Romanian research and development is reflected in the data (Eurostat, 2012) for Human Resources in Science and Technology. For Romania in 2011 25.8% of the economically active population is employed in science and technology in comparison to an average of 42.3% for the EU27. Yet there are significant regional variances at the NUTS2 level with Bucuresti Ilfov exceeding the EU27 average with 46.7%, with the remaining regions varying between 17.7% in Nord Est to 25.1% in the Vest region.

## 2.4 Research, Technological Development and Innovation Performance

The performance of the Research and Development system is reflected in multiple indicators. The Regional Innovation Scoreboard 2012 (European Commission, 2012) classifies European regions into four innovation performance groups, "innovation leaders", "innovation followers", "moderate innovators" and "modest innovators". The assessment of the regions in Romania is relatively homogeneous where most regions are considered modest innovators. Relative strengths are in finance and support and outputs. Relative weaknesses are in open, excellent and attractive research systems, linkages & entrepreneurship, intellectual assets and innovators. High growth is observed for Public R&D expenditure, community trademarks and community designs. A strong decline is observed for non-EU doctorate students. Growth performance in finance and support and intellectual assets is above average. In the other dimensions it is below average (Pro Inno Europe, 2011).

This modest innovation is also reflected in patent performance where in 2009 Romania produced 0.299 high tech patent applications per million inhabitants in comparison to the EU27 average of 9.536. Once again there are significant regional variations with Bucuresti Ilfov the highest of the regions submitting data at 1.518 with the remainder reporting between 0.1 and 0.4.

The Innovation Union competitiveness report 2011 (European Commission, 2011) highlights key challenges in the Romanian Research and Innovation System including:

- The large number of universities, research institutes and institutes of the Romanian academy, and
- The quality of research results resulting in publications and patent applications.

From the business perspective concern is raised both at:

- The level of business research and development expenditure, and
- The framework conditions for business investment in research and development.

In the context of international cooperation, the Innovation Union competitiveness report additionally identifies that collaboration between researchers in Romania within the European Union is low. Main partner countries for research are France, Germany, Italy, UK and Spain and for patenting Germany and Ireland.

## 2.5 Summary of Key Challenges

Detailed research reports including the ERAWATCH Country Report for 2011 (European Commission, 2012), Inno Policy Trend chart (Pro Inno Europe, 2011) World Bank (World Bank, 2011) and the Mid-Term Evaluation of the National Strategy and of the National RD&I Plan 2007-2013 (Technopolis, 2012) have been delivered which consistently highlight the key issues for the Romanian RTDI system.



The ERAWATCH Country Report for 2011 (European Commission, 2012) specifically identifies the main structural challenges of the Romanian RDTI system as:

- Poor synergy between the RDTI system and the rest of the national socio-economic system, arising from flaws in the RDTI systems governance, institutional set-up, policy mix and coordination,
- Sharp cuts in R&D funding induced by the economic crisis, further reducing Romania's already low R&D Intensity,
- Low levels of innovation, especially in the private sector, and business investment in R&D,
- The supply and demand of human resources for Science and Technology (HRST)

The recent evaluation of the Romanian RDI system performed by the World Bank (World Bank, 2011) provides four main recommendations:

- Strengthen the governance of the RDI system
- Strengthen the performance of R&D activities within the public sector itself
- Accelerate the translation of R&D into innovation in the private sector
- Increase the level of private sector R&D

In the Romanian context, there are key challenges in the nature of funding for Research and Development. In particular there is little motivation among business to invest in domestic Research and Development and a preference for external technology acquisition. Businesses are reluctant or unable to take on financial and commercial risks arising from R&D, largely because of the virtual absence of financial services and instruments to mitigate the risk (e.g. private venture capital, risk capital), etc. The venture capital market is at an early stage due to the un-favourable tax regime for private equity investment and underdeveloped domestic fund structure for private equity and venture capital.

Businesses and SMEs in particular, have limited financial resources and find it difficult to access bank loans and public funding for research, development and innovation, in particular from the EU Structural Funds, given the high levels of paperwork and bureaucracy including reimbursement of funds.

The limited funding for research, technological development and innovation has inhibited the development of human resources for research in Romania. In particular the international visibility of many Romanian R&D centres and their participation in international networks is limited. In part this is due to a lack of linguistic and cooperation skills among researchers.

Romanian research organisations are having to compete with limited resources (reduced budgets, reduced personnel, and under-investment in infrastructure) resulting in a lack of young people pursuing research careers and poor marketing of research capability within the external marketplace.

## 3 Core Priorities for Romanian Research, Technological Development and Innovation : Discussion

---

### 3.1 Introduction

The identification of core priorities for Romanian Research, Technological Development and Innovation is not straightforward given the challenges including limited business investment, limited national financing of research and innovation and lack of human resource.

It must be remembered that this funding for Research, Technological Development and Innovation is being provided within the framework of the European Structural funds with their focus on growth and economic and social restructuring.

Section 1.6 of this paper highlighted the key objectives of a smart specialisation approach and initial thinking from the European Commission on the priorities for Romania. These objectives and challenges include; establishing a critical mass, supporting diversification, encouraging connectivity and collaboration, supporting international linkages, developing clusters and shared access to facilities, supporting knowledge transfer and enhancing skills. Alongside this the National Strategy for Research and Development has established three pillars which focus on business innovation, the development of research environment and support for breakthrough research

In comparison, section 2 of this paper highlighted the weaknesses of Research, Technological Development and Innovation. These include knowledge absorption, SME financing, university-industry cooperation, R&D financing, international collaboration, support for entrepreneurship, the development of the research system, low patent applications and business expenditure on research and development.

Maximising the impact of investment is fundamental to achieving positive outcomes and delivering sustainability of investment. Considering the Romanian situation consideration should be given to how interventions can be 'packaged' to provide a 'critical mass' of activity and support with connections that are 'hard-wired' rather than projects and programmes delivered in isolation. The following areas have been initially identified by the authors based on their country knowledge, innovation literature, smart specialisation objectives, European Commission input and input on the National Strategy for Research and Development as key investment priorities for Romania:

### 3.2 Potential Investment Priorities

**Investment Priority:** Establishment of Technology and Innovation Centres in identified priority sectors and clusters

**Overall Aim:** To support the development of sector and cluster based research and development and demonstrator centres to support the development of high-potential ideas into new products and services and to provide an environment for the testing of such products and services.

In this context the focus would be on the economic areas identified within the development of the Romanian Smart Specialisation Strategy e.g. Food and Agriculture, ICT, Engineering and Technology, Energy and Environment and Health.

**Indicative Actions:**

**Technology and Innovation Centres (TICs):** A TIC is a physical centre (or hub and spoke network) where the very best businesses, scientists and engineers work side by side on late-stage research and development - transforming "high potential" ideas into new products and services to generate economic growth. TICs would provide a critical mass of expertise to support commercialisation of research and development including; technology, processes, regulatory approval or supply chain development.

**Demonstrators:** Demonstrators enable the large scale testing of new products and services in the real world and support the validation of ideas, the overcoming of barriers and the wider application of products and services. The demonstrators would offer access to equipment and specialist facilities to test ideas in reality

**Cluster / Sector Based Research and Development Grants:** Cluster based research and development grants would provide funding for business innovation that aims to support the development and strengthening of clusters of high-tech companies in specific theme areas and geographical locations. They would provide base funding for approved research and development projects and act as a catalyst to help the companies behind the projects to attract more investment.

**Research and Development Commercialisation Grants:** These cluster and sector based grants would provide funding support for Universities and research institutes to further develop research to commercialisation. Grants would be based on a commercial opportunities appraisal. Grants would not need to include commercial business partners.

**Investment Priority: University-Business Cooperation / Collaborative R&D Strand**

**Overall Aim:** To support the development of innovation and knowledge and technology absorption of Romanian businesses in key priority sectors and clusters through University-Business cooperation in Research and Development.

**Indicative Actions:**

**Collaborative R&D Grants:** By financing projects involving partnerships between businesses and between business and academia, collaborative R&D reduces financial and technical risk and encourages knowledge exchange, supply chain development and parallel working on complex challenges.

Innovation Vouchers / Research Vouchers: Innovation Vouchers are designed to encourage businesses to look outside their current network for new knowledge that can help them to grow and develop. The voucher would have three key criteria; the idea should be a challenge for the business that requires specialist help; it should be the first occasion in which the business has worked with the knowledge supplier and the idea should be applicable to one of the priority sectors / clusters.

**Investment Priority: International R&D Collaboration**

**Overall Aim:** To support Romanian business in accessing European research, development and innovation funding and access to global innovation and R&D markets.

**R&D International Missions:** This action would deliver entrepreneur 'missions', in which the pick of innovative and often early-stage companies in the identified priority areas would travel to countries strong in innovation and enterprise, such as the US, to make new connections and meet potential investors, suppliers and customers.

**Accessing European Research, Development and Innovation Funding:** This action would support Romanian businesses in accessing European Research funding through the Horizon 2020 programme and additional funding streams (e.g. currently Eurostars and ERAnets) as appropriate. The support would include, guidance on choosing thematic priorities and instruments and advice on administrative procedures and contractual issues.

**Investment Priority: Enhancing Applied Research Skills**

**Overall Aim:** To enhance the skills base of Graduates, Academics and Researchers to support knowledge and technology transfer activities with business

**Indicative Actions:**

**Knowledge Transfer Partnerships:** Developed in the UK, Knowledge Transfer Partnerships (KTP) helps businesses to improve competitiveness, productivity and performance by accessing the knowledge, technology and skills that are available within the Knowledge Base (universities, colleges and research organisations), through the development of collaborative partnerships which stimulate innovation and can transform the participating organisations.

They offer businesses the opportunity to work in partnership with an academic institution to obtain knowledge and expertise to which they currently have no access, to address their business challenges and embed sustainable innovation. The knowledge sought is embedded into the company through a project or projects undertaken by a recently qualified person (known as the KTP Associate) recruited specifically to work on that project and supervised by both an academic and business representative.

**R&D Commercialisation Training:** This action would link the requirement of enhancing skills and entrepreneurship. It aims to improve the awareness of, and support for, commercial development of research universities. It would be designed with the aim of

fostering a climate of entrepreneurship and to deliver a cultural change that will boost commercial awareness and to embed that awareness within the universities. It would train academics and researchers in enterprise and entrepreneurship, so that they understand the process of exploiting science and technology in a commercial context. By training researchers, this knowledge is embedded in the academic departments.

**Investment Priority: Support for Entrepreneurship and Intellectual Property Commercialisation**

**Overall Aim:** To enhance the commercialisation potential of research and development activities in both the public and private sectors

**Indicative Actions:**

Enterprise Fellowship Scheme: An enterprise fellowship scheme provides university graduates with the opportunity to work on developing a commercial business proposition in collaboration with a host University. The scheme would provide a one-year basic salary to the enterprise fellow along with access to small grant support, business training, access to mentors, business experts and advisors and access to University laboratory facilities and office space. An equity stake is taken in the business to be supported.

R&D Grants for Start-Up's and Established Businesses: This action would support R&D and innovation led start up enterprises and existing businesses to secure investment, enabling innovation, growth and job creation. The action would; support start ups and established SMEs to develop robust financial plans and support approaches to banks and equity investors; provide small scale start up grants offered at a 40% intervention rate and provide access to finance for established businesses looking to invest and grow. Grants would be available at different intervention rates (10 - 30%) depending upon size and location of business. Grants would help with investments in: premises, machinery and resource measures.

### 3.3 Funding Investment Priorities

It is expected that most funding within the theme for research, technological development and innovation will be grant based. In the current and previous programmes grants have been provided to eligible businesses for individual projects working with universities or research institutes. In considering the design of the new programme it is important to reflect on alternative funding mechanisms for the delivery of activity.

**Grant Funding**

A key challenge identified is the establishment of critical mass. While this can be achieved by the design of investment priorities it can also be driven by approaches to grant funding.

Lead Organisation and Partners: The potential investment priorities outlined in section 3.2 include indicative actions that will require the development of collaborative projects

e.g. Technology and Innovation Centres and Demonstrators. Collaborative projects developed under these actions will require a lead organisation that is contractually accountable for the financing received and for the delivery of outputs. However such projects can include partners from other institutions from both the public and private sector that will either be involved in direct delivery or in a supportive capacity. This is particularly important in a smart specialisation context where support could be provided through a hub and spoke network approach enabling businesses to draw on the most appropriate expertise from a range of institutions. In this context the lead organisation would establish a formal agreement with its partners and would distribute grant to them on an agreed basis.

**Intermediary Organisation:** The potential investment priorities include actions (e.g. Innovation Vouchers) where the level of grant support being provided to SMEs is at a level where it would result in excessive administration for the SME to apply directly to the Managing Authority and where the cost of administration by the Managing Authority would be excessive in comparison to the level of grant being provided. In this context a project can be established by an intermediary organisation who would contract with the managing authority and be financially responsible for the management and audit of grants and the recording of contracted outputs.

**Direct financing to SMEs:** Grant applications are currently received by SMEs. The potential investment priorities do include grants for collaborative research and development, grants for start-ups and grants for commercialisation. While these could be managed by an intermediary organisation they could also be base on applications to the managing authority with contracting directly with SMEs.

### **Risk Sharing Financing Facility**

The RSFF is an innovative, debt-based financial instrument, supported by contributions from the European Union's Seventh Framework Programme (FP7) and the EIB's own funds, which allows the Bank to provide loans to higher-risk, but potentially also higher-reward innovative projects undertaken by research-intensive companies and organisations.

The 'risk-sharing' element of the RSFF is based on the European Investment Bank and the European Union providing up to EUR 1 billion each of capital to the RSFF, creating a reserve of EUR 2 billion to serve as a cushion to cover potential losses on lending operations. The EU provides its share from FP7, and the EIB from its own funds. This 'capital cushion' allows the EIB to provide up to EUR 10 billion as loans or guarantees for RDI projects.

The RSFF involves loans that bear interest and must be repaid — it is a debt-based instrument with no elements of grant or subsidy. Loan repayments can be used to fund further RSFF loans. The RSFF funds up to a maximum of 50% of the project costs, while the beneficiary must provide the other 50% from own resources or other investors. The

RSFF is demand-driven by the financing needs of RDI project promoters and works on a 'first come, first served' basis.

The application of an RSFF facility within the theme for Research and Development and Innovation could provide a useful mechanism for the development of projects and sustainability of activity. Critical issues for the application of this will be whether a critical mass of funding can be established to support its development and the desire of Romanian businesses to access funding through this mechanism.

## 4 Next Steps

---

As outlined in the introduction to this report, in the context of research, technological development and innovation the cohesion and structural funds can be used to finance a variety of interventions and actions.

In the next task within this assignment, the JASPERS Team will produce a report providing an overview of proposed activities to be supported, an indicative list of specific actions and indicative results and indicators, evaluation criteria, technical selection criteria, eligibility criteria, state aid schemes, expenditure, example beneficiaries for projects submitted and a list of eligible activities under each proposed action. This report will be based on input from meetings with ANCS in June 2013 and can be used as the basis for inclusion into the operational programme.

Following on from this, the assignment will also include the profiling of project interventions. Example projects will be identified under each proposed action within the priority axis. Utilising a standardised template each project will be profiled. 20 example projects will be profiled. Each case study profile will include; short description, background, aims and target, funding, strategy and actions, monitoring and evaluation, sustainability, achievements, success factors, impacts, strengths and weaknesses and transferability.

The overall timeframe for completion is the 6<sup>th</sup> August 2013.



## References

---

European Commission. (2012). *Guide to Research and Innovation Strategies for Smart Specialisations*. IPTS, European Commission.

European Commission. (2011). *EU Cohesion Policy 2014-2020: Legislative Proposals*. European Commission.

European Commission. (2012). *Guide to Research and Innovation Strategies for Smart Specialisations (RIS3)*. European Commission.

European Commission. (2012). *Position of the Commission Services on the development of Partnership Agreement*. European Commission.

European Commission. (n.d.). *Smart Specialisation Platform - Home*. Retrieved March 1, 2013, from Smart Specialisation Platform: <http://s3platform.jrc.ec.europa.eu/home>;