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The Case of North East Romania

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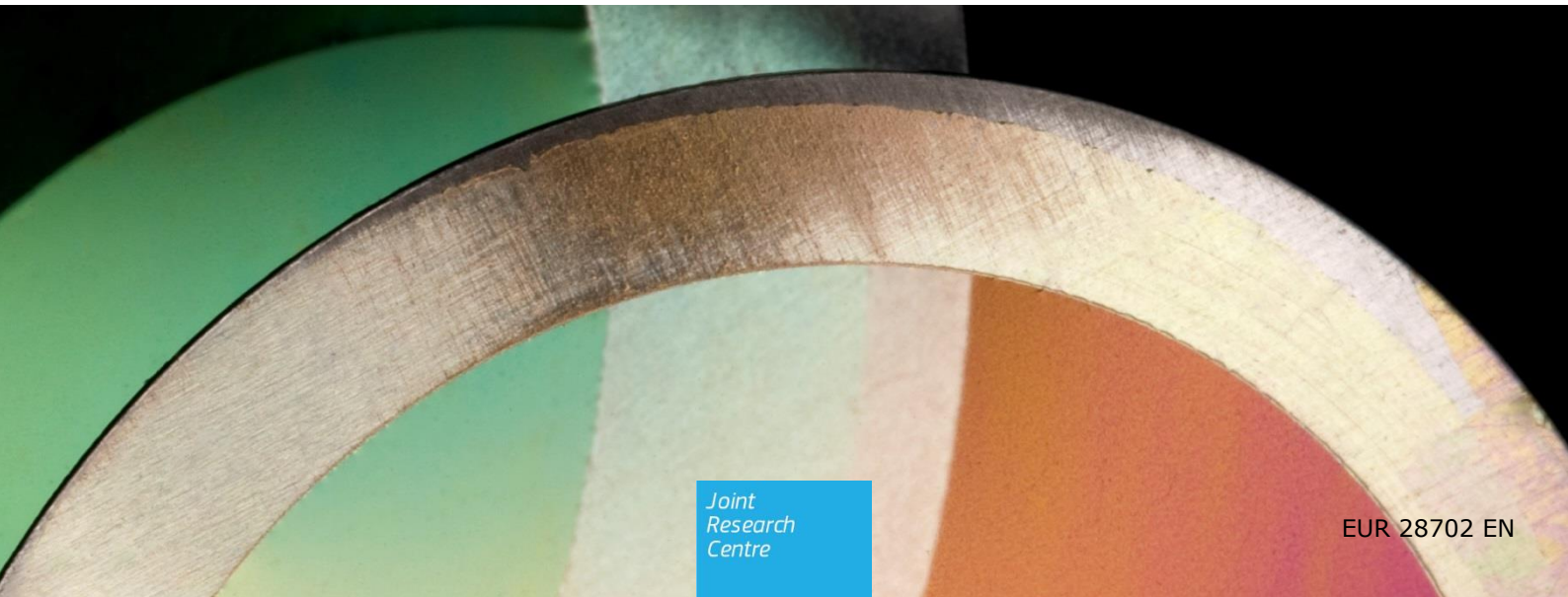

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Contents

Acknowledgements 2
Abstract 3
Executive Summary 4
1. Introduction 7
2. The Higher Education System in Romania 9
3. The Research and Innovation System in Romania 13
4. North East Romania: an overview 16
5. The HESS case study: Methodology and Results 22
6. Conclusions and policy implications 31
References 33
List of abbreviations and definitions 34
List of boxes, figures and tables 35
Annexes 36
Annex 1 Questionnaire of the self-assessment workshop 36
Annex 2. Questionnaire for semi-structured interviews 37
Annex 3.Methodology for collective story harvest and strategy café 40

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Abstract

This report synthesises the findings of the project Higher Education and Smart Specialisation (HESS)[1] in North East Romania, a region that has been examined as one of the case studies. The project analyses the links between the higher education (HE) system and the development and implementation of Smart Specialisation Strategies (S3). On the one hand, the report identifies the challenges that S3 and the shift towards place-based innovation raise for Higher Education Institutions (HEIs) in the region; on the other, it explores how HEIs' activities can best support S3 in a region with an early-stage regional innovation system. The case of North East Romania is particularly interesting, as the region hosts well-established universities[2], that are anchored to their traditional missions of teaching and research, while facing critical questions posed by S3. In particular the report explores how HEIs can contribute to knowledge-based regional development, not only through locally-relevant teaching programmes, but also through territorially grounded research, technology transfer and societal engagement. The case study has employed participatory and qualitative research methods, which have been complemented by desk based research on the policy and socio-economic context.

[1] The report benefitted from the policy analysis conducted under the activities conducted by the team "Targeted RIS3 support in Lagging Regions".

[2] As the population of HEIs in North East Romania is mainly represented by universities, in this report we use the terms "university" and "HEI" interchangeably.

Executive Summary

This report synthesises the findings of the project Higher Education and Smart Specialisation (HESS)[3] in North East Romania, a region that has been examined as one of the case studies. The project analyses the links between the higher education (HE) system and the development and implementation of Smart Specialisation Strategies (S3). On the one hand, the report identifies the challenges that S3 and the shift towards place-based innovation raise for Higher Education Institutions (HEIs) in the region; on the other, it explores how HEIs' activities can best support S3 in a region with an early-stage regional innovation system. The case of North East Romania is particularly interesting, as the region hosts well-established universities[4] that are anchored to their traditional missions of teaching and research, while facing critical questions posed by S3. In particular the report explores how HEIs can contribute to knowledge-based regional development, not only through locally-relevant teaching programmes, but also through territorially grounded research, technology transfer and societal engagement. The case study has employed participatory and qualitative research methods, which have been complemented by desk based research on the policy and socio-economic context.

Research objectives

- To identify, together with local HEIs and the Regional Development Agency, ways in which universities in North East Romania can engage in and support S3 through teaching, research, technology transfer and societal engagement.
- To develop a shared long-term vision for knowledge-based development in North-East Romania, including a clear understanding of the role of HEIs and other actors.

Policy context: EU, national and regional level

- The new Cohesion Policy of the European Commission, based around the concept of Smart Specialisation, places HEIs at the centre of knowledge-based regional development, enlarging their missions beyond the traditional core functions of teaching and research.
- Smart Specialisation policy in Romania is pursued at the national level, in the National RDI Strategy 2014-2020[5], which identified the priorities for investment.
- At the regional level, the eight Regional Development Agencies (RDAs) have been required to feed into the process by developing their own strategies.
- The North-East region, under the coordination of its RDA, is a front-runner in relation to smart specialisation, having autonomously developed its own S3 in 2013.
- Smart Specialisation policy is closely related to higher education, research and innovation policies, which are also organised at national level. This poses significant constraints on the implementation of the regional strategies.

[3] The report benefitted from the policy analysis conducted under the activities conducted by the team "Targeted RIS3 support in Lagging Regions".
[4] As the population of HEIs in North East Romania is mainly represented by universities, in this report we use the terms "university" and "HEI" as synonyms.
[5] In the form of four smart specialisation areas (Bioeconomy, ICT, Energy and Environment, and Eco-tehnologies) and three public interest priorities (Health, Space and Security, and National Heritage)

Key features of the case-study region

- North East Romania has the lowest GDP per capita among all the Romanian regions, with €4900 per inhabitant as compared to €8100 in Romania as a whole and €28900 in the EU28[6].
- The most important cities are Iasi, Suceava, Bacau, Piatra Neamt, Botosani and Vaslui.
- The economic structure of the region is concentrated in low-skilled, low-tech sectors. Manufacturing represents 20.2% of GVA, whilst professional, scientific and technical activities account for only 4.2% of GVA. While agriculture, forestry and fishing account for 8.5% of value added they account for 50.2% of employment.[7]
- The regional innovation system is in its early stages of development, with weak systemic links among knowledge actors, an emergent regional governance structure and limited tradition for knowledge and technology transfer.
- North East Romania is home to seven public and four private HEIs.
- Three of the regional universities rank among the top 10 in the country: University Ioan Alexandru Cuza from Iași (3) "Grigore T. Popa" University of Medicine and Pharmacy from Iași (7), and"Gheorghe Asachi" Technical University from Iași (10).
- Universities are mainly focussed on education, followed by research, with "third mission" activities (technology transfer and societal engagement) still at an incipient stage.

Methodology

The North East Romania case study explores how local HEIs can face the demands posed by S3, building on their traditional expertise in teaching and research while opening up to new activities, especially within the third mission.

The case-study report is organised along three logical and chronological steps, based on three different investigative methods, namely:

- a *self-assessment workshop* conducted by HEIs' representatives with the support of the JRC. This allowed HEIs to identify the key issues affecting their involvement in knowledge-based regional development and S3.
- a set of *semi-structured interviews* of HEI managers. This complemented the self-assessment workshop and allowed to explore in depth the afore-mentioned issues, highlighting policy relevant messages.
- a *leadership workshop* with HEI managers and the NE Regional Development Agency in which it was possible to validate previous findings and identify a shared vision and key operational steps.

Desk-based research has complemented these efforts, providing information on the national and regional policy, social and techno-economic context. Such information has been used to validate the results against the policy reality.

Key findings

HEIs consider themselves broadly aligned to the S3 priorities in their activities and their main channel of influence is through the production of graduates, as the legal framework

[6] Eurostat Gross domestic product (GDP) at current market prices by NUTS 2 regions, year 2015.

[7] Eurostat, Gross value added at basic prices by NUTS 3 regions, year 2013; Eurostat, Employment by NUTS3 regions, year 2013.

has so far given limited space to technology transfer and third mission activities, and research activities are not traditionally linked to the territory's needs.

- HEIs and the RDA agree on the importance of building a common strategic vision for the region under the S3 umbrella, and on the need to adapt teaching methods and improve technology transfer and increase societal engagement.
- In particular the following actions have been identified as promising, yet extremely challenging:
    - Teaching:
        - Developing modules based on experiential learning and innovative pedagogies
        - Involving the private sector in curriculum development
        - Implementing professional and life-long learning schemes
        - Facilitating transition of graduates to the labour market, improving internship schemes and building a regional observatory for local labour demand
    - Research
        - Strengthening efforts to engage with international peers
        - Balancing international and local research demands
        - Increasing inter-regional collaboration
    - Technology transfer
        - Understanding the situation by studying the potential demand and supply of technology transfer services
        - Building legal, administrative and technical capacities to support overcoming perceived and real obstacles
        - Engaging in communication and piloting activities with local stakeholders
    - Societal engagement
        - Recognising and formalising the current voluntary efforts made by academics

Conclusions

- HEIs in North East Romania have proved proactive and interested in engaging more in S3 and regional development.
- The new policy framework provides some opportunities and the RDA, HEIs and the S3 governance system should identify ways to exploit them building on the momentum created by HESS and the other activities conducted with the JRC.
- At the EU level results show that in peripheral regions, HEIs need significant support in building capacities to deploy their potential for regional development.
- Participation in international project consortia is critical in this respect and adequate instruments should be provided.

1. Introduction

The increasing importance of innovation in the EU's Cohesion Policy with the adoption of smart specialisation as key part of its reform has given universities and other Higher Education Institutions[8] an important role in knowledge based regional development (Kempton *et al*. 2013). Smart Specialisation Strategies (S3) are aimed at developing national/ regional competitive advantages following a vertical prioritisation logic based on the bottom-up identification of a set of investment priorities. Priorities are identified and pursued through the interaction of stakeholders across the quadruple helix of government, industry, academia and society at large. This is because entrepreneurial knowledge is most often distributed across a regional system. This continuous process is referred to as an Entrepreneurial Discovery Process (EDP). In this context, universities – among other stakeholders- have the opportunity to help define regional priorities, but also to support the implementation of the strategic vision embedded in the S3.

The involvement of universities in S3 is most often related to the so-called 'third-mission" of HEIs, which has grown in prominence in the past decades[9] (European Commission 2011, OECD 2007). The S3 debate has so far looked at universities mainly as creators of knowledge or as vectors of knowledge transfer. The higher education mission of universities has so far been largely neglected in the analysis and the HESS (Higher Education for Smart Specialisation) project aims at tackling this gap.

The HESS case study of North-East Romania[10], described in this report, explores with universities themselves, how they can best support S3 in a context anchored to old university models and in a policy environment that grants limited room for manoeuvre at the regional level.

Methodologically the case study has followed three steps:

1. An exploratory focus-group where the JRC, the North East Regional Development Agency (RDA) and representatives of the local HEIs discussed, in broad terms, the universities' engagement in S3 and identified the key elements for further investigation.
2. A set of in-depth interviews with HEI managers where the issues raised in the exploratory focus-group were explored in more depth.
3. A participatory workshop, with HEI managers, geared towards three goals:
   i. Validation of previous results
   ii. Identification of a long-term vision of HEIs involvement in knowledge-based regional development
   iii. Identification of a set of short-to mid-term recommendations on how HEIs can contribute to S3 implementation.

The three steps, supported by desk-based analysis of the Romanian policy context, have allowed the identification of perceived obstacles by universities in relation to their role in

[8] The term Higher Education Institutions (HEI) is often used to include a broader range of institutions than just universities. In this report the terms university and HEI are used interchangeably to mean all institutions that provide tertiary education services.

[9] This widened role has been highlighted in the agenda adopted by the Commission in September 2011 for the modernisation of Europe's higher education systems and has been promoted by the OECD in its Reviews of Higher Education in Regional and City Development which began in 2005 (European Commission, 2011, OECD, 2007).

[10] The case-study was defined by the JRC in close cooperation with the North East Regional Development Agency, to ensure that the analysis and the participatory elements of the research would be of policy relevance to the region as well as to the EC.

S3 implementation, as well as avenues for improvement of their activities and suggestions for new initiatives of regional value added. The results of the study differentiate between activities related to teaching, research and third mission (technology transfer and societal engagement).

The rest of the report is organised as follows:

- Section 2 and 3 summarise respectively the Romanian higher education and research systems.
- Section 4 focusses on North East Romania, describing its techno-economic level of development, its S3 and the local higher education system.
- Section 5 describes the HESS exercises, including more details on the methodological approach, and presents the results of the work.
- Section 6 concludes by highlighting the key lessons learnt and the policy implications of the research at the regional and broader EU level.

2. The Higher Education System in Romania

2.1 An underfunded, evolving system

The Romanian higher education system performs poorly in comparison to the EU average, both in terms of allocated resources and educational attainment. According to Eurostat educational expenditure statistics, Romania spends €1872.8 per tertiary education student. This is the second lowest level of spending among EU countries (by comparison Sweden, the top spender, invests €22843.7 per student). The public expenditure on tertiary education as a share of GDP is also one of the lowest in the EU (0.8% as compared to an average of 1.2% and 2.3% in Denmark, the highest performer), as is the proportion of 25-54 year olds with tertiary education (17.4% as compared to 30.7% in the EU for 2016) (EUROSTAT, Educational Attainment Statistics)[11].

In 2007-2011, Romania registered a significant increase in the share of tertiary education graduates, from 13.9% in 2007 to 20.4% in 2011, exceeding the forecasts made by the National Reform Programme (NRP) 2011-2013 (Gheorghiu et al., 2015). However, in 2011, Romania was still second from bottom among European countries according to this indicator. Furthermore, student numbers are in decline, falling from 661 241 enrolled in HEIs in 2011/2012 to 540 828 in 2013/2014 *(UEFISCDI – CNFIS, 2014)*.

Universities are the main institutions tasked with delivering higher education, and indeed, they are largely anchored to the role of teaching and training. Nevertheless, in the past few decades, they have undergone significant reform. According to Nicolae and Vitelar (2016), four waves of reform can be identified. Following the collapse the communist system, a first wave of reforms occurred between 1990-1995, aimed at clearing the curriculum from its heavily political components and introducing new subjects. A second wave took place between 1995 – 2002, when a set of systemic reforms aimed at developing higher education and research mainly based on programmes financed by the World Bank and geared towards increased autonomy for universities. A third wave took place between 2002 –2009, when the system focussed on changes triggered by the Bologna process. The period starting in 2009 is considered to be the fourth wave of systemic reforms in Romania, which are being implemented through the structural funds, and are strategically aligned to the EU2020 strategy of increasing competitiveness through knowledge-based development.

In 2015, there were 101 accredited Higher Education Institutions (HEIs) in Romania, 55 public universities and 46 private universities (Chioncel and Zifciakova, 2017). Although research and technology transfer are part of HEIs' mission[12], universities are primarily dedicated to teaching. Indeed, for public institutions, government funds –allocated according to the number of students- are the main source of income[13]. Universities do not receive any block-funding for research activities. Teaching duties are the only ones to be clearly defined in the education law, according to the function of each member of staff (Assistant, Lecturer, Associate Professor, and Professor). If the teaching load cannot be met, the difference may be supplemented with scientific research activities, with the

[11] Data refers to 2012.
[12] Technology transfer activities undertaken by public bodies in Romania are regulated by Art. 13 of Ord. 57 (16.8.2002) and Art. 117 of the National Education Law 1/2001. The latter includes knowledge transfer in the mission of Higher Education Institutions (HEIs).
[13] Indeed, higher education is free of charge for state-funded students, with the exception of fees for matriculation and the repetition of examinations. HEIs may accept a number of fee-paying students above those financed by the state budget.

approval of the faculty council and only up to 50% of the time.[14] Technology transfer and societal engagement activities are legally part of HEIs' missions, yet until now they have only been supported on a project-based manner. As indicated in Andreescu et al., (2012), the academic system is relatively homogenous in terms of organisational structures and learning experiences, providing little incentives or pressure to innovate.

In terms of teaching and learning methods, academic education still favours a theoretical approach and a traditional education-work life-cycle. At the regulatory level little attention has been paid to private sector involvement, and to life-long learning, though these aspects are becoming more relevant in the current programming framework (UEFISCDI – CNFIS, 2014). Similarly, there is no coherent or consistent framework for entrepreneurship education (Gheorghiou et al. 2016).[15] The system is also characterised by limited opportunities for mobility of students and academic staff, and a lack of attractiveness for foreign students to enter the Romanian university system, which is mainly due to the small number of study programs taught in other languages[16,17].

A remarkable worrying trend is the decrease in the employment rate of recent graduates: in 2014 the figure was 74.2%, down from 76.2% in 2013 and 81.9% for 2010, which is around six percentage points less than the EU average of 82%.

2.2 Strategic Policy objectives

The strategic objectives for higher education are set in the National Strategy on Tertiary Education adopted in July 2015. The strategy aims at making higher education more relevant to labour market needs and more accessible to disadvantaged groups. For the purpose of this report, it is important to highlight that the Strategy aims at boosting the engagement of HEIs towards the economic sector by promoting the:

1. Development of a national program for encouraging the dialogue between HE and the economic sectors;
2. Development/establishment of an institutional function/structure related to industry/ agriculture/ business in each HEI;
3. Development of training programmes in partnership, including for workplace learning programmes.
4. Involvement of employers in designing and delivering the study programmes, encouraging staff exchanges and integrating the practical experience in teaching activities.

The main instruments for implementation are:

- POCA -Administrative Capacity Operational Program
- POCU -Human Capital Operational, Program,Priority Axis 6
- POR -Regional Operational Program

[14] Informally, according to the interviewees of the case study, approximately 25% of their time is dedicated to research activities.
[15] Interestingly the EY Entrepreneurship Barometer (2015), which interviews entrepreneurs in Romania, feel that higher education on the issue is improving.
[16] UEFISCDI & Higher Education Evidence Based Policy Making. (2013) Internalization of Higher Education in Romania. In Higher Education Policy Series no. 5.
http://www.politici-edu.ro/wp-content/uploads/2013/10/Internationalization-of-HE-in-Romania.pdf
[17] Unsurprisingly, among EU countries, Romania has one of the largest scientific diaspora, with an estimated 15,000 active researchers working abroad (World Bank, 2011, 21, quoted in Gheorghiu et al., 2016).

2.3 Governance: A centralised system

The Romanian higher education and research system is characterised by a strong centralisation at the national level; indeed, while the country is formally divided into eight 'development regions', their administrative powers are very limited (see section 3 for further details).

In relation to higher education, the Ministry of National Education and the Ministry for Research and Innovation are responsible for:

- Overseeing HEIs as regards compliance with the law, ministerial codes and legal statutes.
- Formulating higher education policies that frame national or institutional strategic plans and development.
- Setting national strategic priorities and designing formal development plans for higher education.

The National Education Law no 1/2011, with its subsequent amendments, is the main legal framework regulating higher education. According to this law, universities have the right to establish and implement their own development policies, within the general provisions currently in force. Article 8 provides for the two major sources of funding in education (for all levels, including primary, secondary and higher education):

1. The state budget (base and supplementary, and complementary funding) and
2. An institution's own income, which may be used autonomously.

The national regulations delineate respective duties and responsibilities of different governance bodies, as indicated in the box below. Official regulations are usually supplemented by specific rules in the respective institutions' constitution or statutes. Figure 1 and Box 1 below provides a picture and a description of the key bodies involved in the governance of education.

Box 1: The governance of higher education in Romania

- The Romanian Agency for Quality Assurance in Higher Education (ARACIS), established in 2005, is an autonomous public institution, of national interest, whose main mission is the external evaluation of the Romanian higher education quality.
- The National Council of Rectors is a national-level, politically independent consultative body, comprising the executives of public or government-dependent private universities.
- The Executive Unit for Higher Education, Research, Development and Innovation Funding (in Romanian UEFISCDI) is the main RTDI funding agency. It is the executive agency for the National Research Council (CNCS), the National Council for Higher Education Funding (CNFIS), the National Council for Development and Innovation (CNDI). It also coordinates programmes of the National RDI Plan 2015 – 2020 in all scientific domains.
- The National Council for Attesting Titles, Diplomas and Certificates (in Romanian CNADCU) – regulates the HE teaching career progress and the habilitation (and more) and certification to supervise PhD theses.
- The National Authority for Qualifications (in Romanian ANC) validates HE qualifications.

Figure 1: The governance of higher education in Romania

3. The Research and Innovation System in Romania

3.1 An underfinanced system with limited private funding

The Romanian research and innovation system is heavily underfinanced. In 2014 gross domestic expenditure on R&D (GERD) was the lowest among all the EU Member States (0.38% of GDP compared to an EU average of 2.03% of GDP[18]).

This is despite the fact that a target of 1% was set since the programming period 2007/2013. The economic crisis that hit the country in 2009 and 2010 is partly to blame: Romania has registered annual economic growth rates of around 3% of GDP starting in 2013[19], but the cuts in public R&D expenditures have not been scaled back. Notably, Romanians have invested significantly in *research infrastructure* through structural funds, which however remain largely unused (Gheorghiou *et al.* 2016; Chioncel and Zifciakova, 2017).[20]

Unsurprisingly, the research and innovation performance of the country is low. The Innovation Union Scoreboard 2016 defines Romania as a modest innovator, ranking last among the EU Member States. As for quality of research, the percentage of publications in the top 10% most cited journals is 4.74%, less than half the corresponding EU28 figure of 10.51%.

This weak public investment is not compensated by the private sector: the percentage of GERD financed by industry is just below 33% as compared to nearly 55% in the EU as a whole. It accounts for 0.13% of GDP as compared to 1.07% for the EU in 2014 (OECD, Main S&T Indicators).

Furthermore, the country is characterised by limited collaboration between industry and research. According to the Innovation Scoreboard 2016 the proportion of SME innovation in house was 4.67% in Romania as compared to 28.68% in the EU as a whole, while the proportion of SMEs innovating with others was 1.2% as compared to 10.32% for the EU.

In order to increase private engagement in RDI, Romania has allocated 33.4% of its structural funds for R&D activities to "Technology transfer and university-enterprise cooperation primarily benefiting SMEs" in the 2014-2020 programming period, which is much higher than the EU average of 15.7% for the current programming period (Gheorghiu *et al.* 2016).

3.2 Research actors

The main research and development organisations are:

- the national R&D institutes (NRDIs), formerly the sectoral institutes of the communist-era (the majority, 42, subordinated to the Ministry of Research and Innovation)
- approximately 60 institutes of the Romanian Academy
- and the approximately 100 universities.

[18] Eurostat Science and Technology Statistics
[19] World Bank national accounts, data for 2016 and 2017 not available.
[20] Recent projects aim at tackling such underuse, such as The ERRIS (www.erris.gov.ro) an online platform listing all national research infrastructure.

Universities can access competitive funding for research, but they receive no institutional funding, which is reserved for the NRDI institutes and the institutes of the Romanian Academy. This is despite the fact that HEIs are the best performers in terms of ISI scientific publications (Chioncel 2009, Zulean *et al.* 2015).

3.3 Strategic Objectives and Smart Specialisation

The current strategic document for research and innovation is the National RDI Strategy 2014-2020. The vision for the strategy is to build a strong innovation ecosystem, which allows Romanian firms to upgrade in global value chains.

The strategy represents an effort to deal with research and innovation in an integrated manner, paying attention to private involvement in collaborative R&D projects, research and innovation infrastructure, as well as developing a legal framework geared at merging Public Research Organisations (PROs).

The national RDI Strategy identifies the following priorities for smart specialisation investment:

- Biochemistry,
- Information and communication technology, space and security,
- Energy, environment, climate change,
- Eco-nano-technologies and advanced materials.

Furthermore, three public priority areas, i.e. areas of the general competence of the state, are also taken into account:

- Health
- Heritage and cultural identity,
- New and emerging technologies.

Under the 2014-2020 National Strategy for RDI, smart specialisation is supported through a mix of instruments intended to apply to a broad range of activities considered relevant to the improvement of Romania's competitiveness.

The main two implementing tools of the current national strategy are the:

- National Research – Development and Innovation Plan III for 2015 -2020 and
- The OP Competitiveness (axis 1)

However, other OPs are also relevant[21], including:

[21] As indicated by Gheorghiou et al. 2016, the remaining instruments to implement the National Strategy for Research and Innovation are: (a) The sectoral plans of various branch ministries, (b) The Research Plan of the Romanian Academy and its institutes, (c) Other sectoral policies (coordinated by NCSTIP but not specified in the Strategy).

- The Operational Programme Human Capital, mainly through Priority Axis 6 – Education and competencies
- The Operational Programme Regional Development, Priority Axis 1 – Promoting technological transfer
- The Operational Programme Rural Development, component on 'Investment in agriculture and rural development'

3.4 The governance of research and innovation

The main actors in the RDI system are the Ministry of National Education (MNE) and the Ministry of Research and Innovation (MRI), which, as far as research and innovation is concerned, deploy deploys their mission through its National Authority for Scientific Research and Innovation (NASRI). NASRI coordinates the implementation and evaluation of the National RDI Strategy.

According to the strategy, the consulting bodies for RDI are the Advisory Board for Research, Development and Innovation (ABRDI) and The National Council for Scientific Research (NCSR). These boards are supported by NASRI and, respectively, by the Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI) and they contribute directly to the management of the programmes of the National RDI Plan, through developing professional procedures for project financing, whist having limited power in determining the flow of resources. In general, the public R&D system is dominated by institutional funding, with limited scope for competition among actors.

The centralisation of research and innovation policy generates particularly complex patterns in the case of smart specialization, where the regional dimension has no political representation. Indeed, in Romania, the regional tier is purely administrative, consisting of eight development regions (at the NUTS2 level) and four macro-regions (at NUTS1 level) mainly responsible for co-ordinating development projects.[22] Each development region has a Regional Council, which approves regional development programmes and strategies, and a Regional Development Agency (RDA) which implements them as independent bodies. Typically, RDAs rely on technical assistance funds from the EU's Structural Funds for their operations, alongside any projects or programmes they are able to successfully secure from national programmes. However, the RDAs, which are the main territorial actors in terms of regional development, are not under the responsibility of MRI, but the Ministry of Regional Development, which has so far been marginal to the S3 process. This fragmentation of the governance of the innovation system makes the implementation of Smart Specialisation particularly challenging and provides an interesting case study for HESS.[23]

[22] The three primary tiers of government in Romania are national, county and local (municipality, city or commune).
[23] Incidentally, one of the objectives pursued by the activities of "Targeted RIS3 support in Lagging Regions" is precisely to bridge the different elements of the system involved in RIS3 at the cross-ministerial level and at national-regional level.

4. North East Romania: an overview

4.1 Techno-economic overview of North East Romania

The North East Romania development region is located on the eastern periphery of the EU. It is bordered to the north by Ukraine and to the east by Moldova. The region is made up of six counties (Bacău, Botoșani, Iasi, Neamț, Suceava and Vaslui), with the principal urban areas located in Iasi and Bacău. Iasi, the economic capital of the region, is the fourth largest city in Romania with a population of over 382,000. The population of the region is, as of 2016, 3,256,282 representing 16.5% of the national population (Eurostat, 2016).

North East Romania has the lowest GDP per capita among all the Romanian regions, with €4,900 per inhabitant as compared to €8100 in Romania as a whole and €28.900 in the EU28[24]. The economic structure of the region is concentrated in low-skilled, low-tech sectors. Manufacturing represents 20.2% of GVA, whereas Professional, Scientific and Technical Activities account for only 4.2% of GVA. While Agriculture, Forestry and Fishing account account for 8.5% of value added, they account for 50.2% of employment[25]. The region ranks 251 out of 263 regions, in the EC Regional Competitiveness Index (2017). Only 1.2% of employment is in technology and knowledge intensive sectors (as compared to 7% in the region of Bucharest).[26]

Regarding educational attainment of the local population, in 2016, the percentage of 25-64 years-old with tertiary education was 11.5%, as compared to 17.4% in Romania and 30.7% in the EU.[27] As for research and innovation activities, the region's total intramural R&D expenditure accounted for 0.28% of the GDP in 2014. This amounts to 74% of the national average and 14% of the EU28 average. In the same year, the R&D expenditure of the business enterprise sector was at 0.06% of the GDP, as compared to 0.16% in Romania and 1.3% in the EU.[28]

4.2 The research and higher education system in North East Romania

Despite lagging behind economically, the region is home to a large higher education community and its capital, Iasi, is considered a cultural centre of national relevance. The first higher education institute within the territory of Romania was the Academia Vasiliana founded in 1640, followed by the Princely Academy of Iasi (1707), the first school of land surveyors and civil engineers with instruction in the Romanian language (1813), the Academia Mihaileana (1835), the University of Iasi (1860) and the Polytechnic Institute (1912).

The historical tradition in higher education is reflected in the high positioning of local HEIs in national rankings. Three of the regional universities are among the top 10 in the country: University Ioan Alexandru Cuza from Iași (3) "Grigore T. Popa" University of Medicine and Pharmacy from Iași (7), and"Gheorghe Asachi" Technical University from Iași (10). 1 below, identifies the public research and higher education institutions in the region.

[24] Eurostat Gross domestic product (GDP) at current market prices by NUTS 2 regions, year 2015.
[25] Eurostat, Gross value added at basic prices by NUTS 3 regions, year 2013; Eurostat, Employment by NUTS3 regions, year 2013.
[26] European Regional Competitiveness index, Average for the years 2013-2014.
[27] EUROSTAT educational attainment statistics.
[28] Eurostat Regional Science and Technology Statistics.

The region educates 13% of the national population enrolled in HEIs by using 18% of the country's teaching staff. The higher education sector employs 76% of the regional headcount of researchers, followed by the government sector with 15%.29 Of the 56,175 students enrolled in higher education in the Region, 2,620 were PhD candidates (UEFISCDI – CNFIS, 2015). In terms of training, the table below indicates that 55% of the graduates with a bachelor's degree, 60% of the graduates with a master's degree and 58% of the new PhDs in 2014 studied Natural Sciences, ICT, Engineering, Agricultural/Veterinary Sciences and Medical Sciences, suggesting an overall good match between graduates' production and S3 fields.

Table 1: Public Research and Higher Education Entities (Source: Tolias, forthcoming)

Institution Type	Entity	Location
NIRDTP (ANCSI)	National Institute of Research & Development for Technical Physics	**Iasi**
Romanian Academy	Institutul de Arheologie Institutul de Cercetări Economice şi Sociale "Gh.Zane" Institutul de Filologie Română "A. Philippide" Institutul de Informatică Teoretică Institutul de Istorie "A. D. Xenopol" Institutul de Matematică "O. Mayer" Secția de Antropologie Centrul de Cercetări Biomedicale Centrul de Cercetări pentru Oenologie Centrul de Istorie și Civilizație Europeană Colectivul de Geografienstitute of Archaeology at Iasi	**Iasi**
University	Univ Al.I.Cuza	**Iasi**
University	Technical Univ Gh. Asachi	**Iasi**
University	Univ of Medicine and Pharmacy Gr.T Popa	**Iasi**
University	Univ "Vasile Alecsandri"	**Bacau**
University	Univ "Stefan cel Mare"	**Suceava**
University	Univ Agricultural and Veterinary Sciences "Ion Ionescu de la Brad"	**Iasi**
University	Univ of Arts "George Enescu"	**Iasi**

While there is little information on research quality at the regional level, in terms of technology transfer activities, Tolias (forthcoming) finds that the number of patent applications to the national office by Romanians per million inhabitants is five percentage points higher than the national average; however, the same metric for EPO applications is 50% of the national average which, in turn is very low when compared to the EU28 average. Both of these findings suggest that patenting activity has more to do with using patents as a measure of research performance to substitute research publications, rather than trying to secure intellectual property rights in international markets and deriving revenue from research commercialisation. In other words, applied research is effectively

[29] As indicated by Tolias (forthcoming) a considerable gap is noticed between then headcount of teaching staff in tertiary education reported by the National Statistics Agency (5 092) and the headcount of researchers reported by EUROSTAT in higher education (2 585). This suggests that almost half of the teaching staff is not directly involved in research.

low in the region and does not feature among HEIs core activities.
All the public universities participated in the HESS study and more information is provided in the table below. In addition, there are also five private universities operating in the region (Mihail Kogalniceanu, Petre Andrei, Apollonia, Stefan Lupascu in Iasi and George Bacovia in Bacau). Among the latter, George Bacovia is the only one to have taken part in the HESS project.

Table 2: Graduates in Tertiary Education, NE Romania, 2014

International Classification of Educational Standards (ISCED-F 2013)	*Bachelor*	*Master*	*PhD*	*Total*
Education science	350	129	0	479
Arts and humanities	1 006	517	132	1 655
Social sciences, journalism and information	593	354	28	975
Business, Management and Law	2 690	1 222	91	4 003
Natural Sciences, Mathematics and Statistics	846	449	89	1 384
Information and communication technologies (ICTs)	600	153	10	763
Engineering, processing and construction	2 147	1 337	64	3 548
Agriculture, forestry, fishery and veterinary science	647	172	57	876
Health and social care	1 898	1 585	126	3 609
Services (includes environmental protection)	378	230	0	608
Totals:	11 155	6 148	597	17 900

Source: INSEE Tempo Database

Table 3 Universities participating to the HESS study in North East Romania

Name	Faculties	Faculties	Doctoral Schools	PhD Students	Location
Ioan Alexandru Cuza	Biology, Chemistry, Computer Science, Economics and Business Administration, Geography and Geology, History, Law, Letters, Mathematics, Orthodox Theology, Philosophy and Social-Political Sciences, Physical Education and Sports, Physics, Psychology and Education Sciences, Roman-Catholic Theology, Centre for European Studies	16	13	748	Iași
"Gheorghe Asachi" Technical University	Automatic Control and Computer Engineering, Civil Engineering and Building Services, Architecture "G.M. Cantacuzino", Chemical Engineering and Environmental Protection, Machine Manufacturing and Industrial Management, Electronics, Telecommunications and Information Technology, Electrical Engineering, Hydrotechnical Engineering, Geodesy, Environmental Engineering, Material Science and Engineering, Mechanical Engineering, Textiles, Leather and Industrial Management	11	12	849	Iași
"Grigore T. Popa"	Medicine, Dentistry, Pharmacy, Biomedical Engineering.	4	1	307	Iași
"Ion Ionescu de la Brad"	Agriculture, Horticulture, Animal Husbandry, and Veterinary Medicine.	4	2	264	Iași
"George Enescu"	Music Performance, Composition, and Music Studies, Theatre Faculty, Visual Arts and Design	3	4	109	Iași
"Stefan cel Mare"	Physical Education and Sports, Food Engineering, Electrical Engineering and Computer Science, Mechanical Engineering, Mechatronics and Management, History and Geography, Letters and Communication Sciences, Forestry, Economics and Public Administration, Educational Sciences, Law and Administrative Sciences	10	2	271	Suceava
"Vasile Alecsandri"	Engineering, Letters, Sciences, Economic Sciences, Movement, Sports and Health Sciences	5	1	72	Bacău
"George Bacovia"	Economic, Law and Administrative Sciences (private)				

Source: UEFISCDI – CNFIS, 2015

4.3 S3 in North-East Romania: priorities and governance structure

As indicated by Healy (2017), the North East RDA has a strong legacy of progressive actions in the field of regional innovation. Indeed, it was one of the first RDAs in Romania to begin the process of developing a regional S3, helped by the knowledge developed in previous involvement in EU projects and regional innovation networks, as well as its experience with consultative and bottom-up approaches (*ibid*).

While the region started working on its strategy back in 2013, since 2016 it has been developed further by partnering with the European Commission's Joint Research Centre. The NE Romania S3 is constituted by thematic and horizontal priorities, as reported in the table below.

Table 4 S3 Priorities in North East Romania

Horizontal Priorities \ Vertical Priorities	Agro-food	Biotechnologies	ICT	Textiles and new materials	Tourism	Environment
Development of innovation competencies amongst new generation	**S3 Projects portfolio**					
Supporting the innovative enterprises in North-East Region						
Supporting the initiatives of clusterization and internationalization						
Technical assistance						

Source: North East Regional Development Agency (working document, 2016).

HEIs in the region have been among the actors involved in the identification and refinement of priorities, throughout the so called Entrepreneurial Discovery Process. Indeed, the priorities chosen reflect the area of expertise of the universities in the region, as indicated in the table below.
HEIs are also actively involved in the governance of S3. In particular, academics are part of the Regional Innovation Consortium, the partnership structure coordinating the governance of the Smart Specialization Strategy. The Consortium provides feedback on the structure and mix of policies in the strategy, potentially proposing updates or revisions and identifying relevant sources of funding. The consortium has an Advisory Commission to indicate the funding possibilities for the S3 project portfolio and to provide information on the implemented projects. Furthermore, the governance structure also includes an Academic Task Force, comprising the academic representatives of the Regional Innovation Consortium, which has an evaluation and advisory role.

With its long-rooted tradition of HEIs in the region, its pro-active RDA and its challenging economic environment, the North East Romanian case provides an interesting opportunity to understand the role that universities can play in implementing S3 and contributing to knowledge-based regional development.

Table 5 Public Universities' links to S3 priorities

HE Institutions	S3 Priority Areas
"Alexandru Ioan Cuza" University	ICT, Tourism , across all priorities through interdisciplinary and entrepreneurship courses
"Gheorghe Asachi" Technical University	Textile, ICT,
"Grigore T. Popa" University of Medicine and Pharmacy	Biotechnology (Pharmaceutical); ICT (Public Health); Tourism(Medical recovery)
"Ion Ionescu de la Brad" University of Agricultural Sciences and Veterinary Medicine	Agro-Food, Biotechnology, Tourism (Slow food/Healthy food)
"George Enescu" National University of Arts	Tourism (New media/Creative and Cultural Industries)
"Stefan cel Mare" University	ICT, Tourism, Agrofood, Biotechnology(Pharmaceutical)
"Vasile Alecsandri" University	Environment, Tourism (kineto therapy and medical recovery)

5. The HESS case study: Methodology and Results

5.1. Methodological overview

The case study explores in depth both the traditional and new university missions in North East Romania. It looks mainly at how universities can support S3 in a context where the long-standing tradition in teaching and research is not matched by the level of development of third mission activities. The HESS case study in North East Romania builds on three chronological and logical steps:

- A self-assessment workshop which allowed HEIs to evaluate their role in S3, held in June 2016
- A set of semi-structured in-depth interviews to HEI managers, held in November 2016
- A leadership workshop with HEI managers and the NE Regional Development Agency, held in December 2016.

In a nutshell, the self-assessment workshop provided a broad understanding of where HEIs fit in S3 design and implementation. It emerged that HEIs are broadly aligned to the S3 priorities and their main channel of influence is through the production of graduates, as the legal framework gives limited space to technology transfer and third mission activities, and research activities are not traditionally linked to the territory's needs. At the same time, the event highlighted the need for HEIs to find a common voice and coordinate their engagement with the regional. These findings shaped the in-depth fieldwork: All the regional universities participated in semi-structured interviews and discussed the issues raised in the self-assessment. The Leadership workshop allowed the validation of the results as well as the identification of actionable steps and a shared vision of HEIs engagement in regional, knowledge-based development.

Step 1 - Exploratory workshop: narrowing down the research topic and starting a policy reflection

The first step of the case study was an exploratory workshop on how the HE system was integrated into the S3 policy mix and how HEIs are contributing to S3 implementation. The event was held on 7th June 2016 with the support of the North-East Romania RDA. A total of 42 representatives from the local universities and the RDA took part. The event aimed to narrow down the analytical objectives of the case-study and initiate a process of self-reflection to address the implications of S3 at the level of individual HEIS and at the regional level as a whole. During the event participants were split into two working-groups to discuss a self-evaluation questionnaire, prepared by the JRC with support from the RDA. The questionnaire (reported in Annex 1) contained open-ended questions around the following themes:

- Knowledge generation
- Knowledge absorption and transfer
- Teaching and Learning
- Cooperation
- Organisation of HE systems
- Funding

The exercise revealed a strong interest for the HESS project and showed a good alignment between the strength of local HEIs and the S3 priorities.

All the universities agreed that that their main source of support to S3 lay in their teaching activities, as the main channel through which universities contribute to regional development is through graduate production. Teaching activities, especially for STEM (science, technology, engineering and math) and IT faculties were very much aligned with the strategic needs of the region. However, a gap was identified in relation to interdisciplinary training on entrepreneurship. Also, there appeared to be a demand on more flexible learning modules, not addressable under the current rigid legislative framework. The IT sector emerged as particularly important and more advanced in terms of interaction with industry for training purposes. In terms of technology transfer and outreach activities, local universities appeared less engaged, perceiving the legal framework as unfriendly and feeling unsupported in terms of policies, while at the same time acknowledging that they lacked competences at the institutional level and had little experience of applied research.

The event allowed the research team, together with the RDA, to better plan the subsequent stages of the project. In particular the good alignment of the local teaching activities with S3 priorities and the poor development of the third mission, made it clear that the HESS project needed to investigate the role of HEIs in a holistic manner, taking into account the well-established traditional missions and the less developed new ones.

Step 2 – In depth semi-structured interviews: understanding the issues at stake

The second step of the field-work was a series of semi-structured interviews, conducted by Professor Cosmina Mironov with the support of the RDA and the JRC. All the rectories of the region were contacted to arrange meetings with representatives of the university management. Seven public and one private university were contacted, of which all participated in our study. The participants were usually rectors and vice-rectors, deans and/ or vice-deans and university professors of representative faculties, specifically:

- 11 rectors and vice-rectors in the areas of RDI and knowledge transfer; international affairs, university promotion and student affairs; institutional strategy, academic evaluation, relations with student organizations, trade unions, NGOs and local community;
- 6 deans and/ or vice-deans of representative faculties;
- 4 university professors from the S3 fields.

The participants were representatives of the fields connected with the regional priorities or S3 fields:

- ICT and Computer Engineering and Automatic Control
- Medicine, Pharmacy, Chemistry
- Agricultural Sciences and Veterinary Medicine
- Engineering
- Textile Industry, Chemical Engineering (e.g. Biosynthesis and Food industry) and Environmental Protection
- Geography and tourism
- Economy and tourism
- Sports, kineto-therapy
- Arts: Visual Arts and Design, Drama, Music, etc.

The interview-guide (annexed to the report in English - *Appendix 2*) was sent to the interviewees in advance. The interviews were held face-to-face during two periods of

time (in November 2016 – in Iași and Bacău; and in December 2016 in Rădăuți) and lasted around two hours each.

The goal of the analysis was to identify how HEIs in the North-East Romania are contributing to the implementation of S3 in the region, across their three missions and to identify relevant and viable policy suggestions.

Step 3 - Leadership Workshops: validating results and discussing actions

The Leadership Workshop, held during the 9th and the 10th of December in Rădăuți, applied participatory research methods to complement the field-work analysis. Twenty-five participants attended the workshop, of which 18 from the eight HEIs had been involved in the semi-structured interviews, two from the RDA, two from the JRC and three experts.

The leadership workshop for HE management served the purpose to validate the results from the previous steps, to discuss them with a focus on policy and strategy implications and to consolidate them in a vision statement. The workshop also provided an opportunity for trust-building among HEIs and with the RDA to tackle the challenges and opportunities posed by S3.

The workshop unfolded mainly around two participatory moments, namely:

1) A *Story Harvest* targeted at sharing and co-developing a vision for NE Romania and its universities. Two visions on the role of HEIs in S3 were presented by the RDA and Prof. Mironov (based on the results from the semi-structured interviews). The two visions provided the input for discussion among participants, under the moderation of the JRC.

2) A *Strategy Café* in which participants debated the four topics below, previously-selected on the grounds of the interviews and the objectives of the case-study:

- Teaching and lifelong learning
- Human resources development, researchers mobility and international networks
- Technology transfer: Potential, obstacles and challenges
- External engagement with government, industry and society

Participants rotated along the four discussing tables and discussed, in each of them:

- Its contribution to the vision
- The actions that need to be taken to implement the vision
- The governance and organisation that could support the implementation of the proposed actions

Appendix 3 provides more methodological details on the two tools.

5.2. Results

The HESS case study produced two types of outputs: On the one hand, it identified the mechanisms (and the challenges thereof) through which universities can support S3 across their different missions. On the other, it contributed to building a community of practice, composed of academics and regional-development practitioners engaged in S3 and sharing a common vision for North-East Romania.

The results are organised around the concepts of first, second and third mission (i.e education, research, and technology transfer and external engagement). The current scholarly debate, challenges this terminology as it implies a hierarchical relationship between the functions and clear boundaries between them (Goddard et al., 2016). While acknowledging the importance of such academic discussion, the hierarchical distinction between first, second and third mission is reflected in the Romanian policy framework as well as in the way of thinking of local HEIs. Therefore, notwithstanding the important debates about the conceptualisation of the university, the analytical distinction of three different missions has been retained in this case study as it allows a better framework to analyse the findings and recommendations against the policy context.

5.2.1 Higher Education for S3

The fieldwork identified four key ways in which Higher Education can support S3 implementation. These are:

- Introducing new elements in teaching
- Increasing the involvement of the private sector in the design of courses
- Catering for different type of students
- Supporting graduates' entry in the local labour market

Introducing new elements in teaching: Interdisciplinarity, Entrepreneurship, International Exposure and New teaching methods

Universities are aware of their important role in terms of training and human capital development and the alignment of their supply with the regional priorities of S3. The current supply of courses comprises university level qualifications (Bachelors, Masters, PhDs), post-university and professional (re)conversion courses (including an upgrade of the already existing qualifications by means of pre- and in-service training programmes).

Nevertheless, there was a shared recognition of several gaps in the current approach to teaching. HEIs agreed on the need to further inter-disciplinary courses on entrepreneurship and business management. Cuza University is currently developing this area of work within the Faculty of Economy and Business Administration and highlighted the importance of building partnerships with other HEIs to cater for the needs of different sectors.

HEIs also endorsed the teaching philosophy embedded in EU programmes such as ERASMUS+ (e.g. Knowledge Alliances), based on international collaboration and interaction with other stakeholders in developing teaching programmes. Several participants in the study actively took part in such schemes, although they highlighted that, due to the legal requirements of the system and to unavoidable institutional inertia, it is often difficult to introduce locally the novelties learnt abroad.

Last but not least, increasing the international exposure of students is also considered important: however, as the ERASMUS student exchange programme can only partially fulfil this need (the grant is often insufficient to cover students' costs), efforts should be made to increase international supervision of Master's and PhD thesis as a more cost-effective way to increase students’ opportunities.

Increasing engagement of the private sector in the design of courses in S3 priority areas

HEIs agreed that much effort is needed to improve engagement with the private sector (and other regional actors) when designing study programmes across the whole spectrum of academic and professional qualifications. Again, EU experiences such as Knowledge Alliances provide a relevant blueprint. Involvement of the private sector would be particularly beneficial to graduate programmes, and should allow developing more specialised Master degrees targeted to regional S3 priorities. Nevertheless, the input of the private sector is seen as crucial also in delivering short-term professionally-oriented courses. Such efforts would not need to start from scratch: they would build on already existing initiatives, which are especially common in the ICT field. For instance, it is relatively normal practice to invite representatives of local and regional actors to act as trainers, mentors, tutors or professional councillors in different settings (masterclasses, workshops, laboratories, summer schools), as well as to engage students in work-placements as part of their study programmes (this latter aspect is explore in more depth below). Private-sector engagement in course-design, while not uncommon, appears largely left to the initiatives of individual professors with no formal structure to facilitate such processes. An effort to coordinate and support such ad-hoc personal initiatives, either within each HEI or across them, appears important to maximise and scale-up their impact. HEIs pointed out that, in building such structures, adequate incentives for the private sector (such as honorary recognition or fiscal advantages when recruiting students) should be embedded to ensure their sustained participation.

Catering for different types of learners: life-long learning and in-service training

Critical for S3 implementation is the issue of continuous-education and lifelong learning as the workforce needs to keep skills up-to-date and develop new competences. While the legislative framework has typically not allowed much experimentation, some flexibility is currently being introduced. HEIs highlighted the opportunities of e-learning and blended learning should be explored, taking into account the necessary limitations for distance training for technical and engineering fields and S3 priorities like textile, agriculture, etc.

Similarly HEIs noted the importance of developing in-service training, including for employees that do not have higher education diplomas. Along the same lines, in engineering departments, short modules should be produced to respond to very specific needs, such as the introduction of new machinery. Last but not least, HEIs should establish teaching and training partnerships with the high-school and the vocational training system.

Graduates entry in the labour market: gathering intelligence, building on current partnerships and opening new collaborations with the private sector

Understanding the process of graduates' entry into the labour market is critical for S3 implementation as graduates are a crucial vector of knowledge transfer. A smooth transition into employment signals a functioning and continuous learning process from the higher education sector to the labour market. Conversely, frictions in the process may foretell difficulties in implementing the strategic vision embedded in S3.

In general universities in North East Romania feel they have limited room of manoeuvre to facilitate graduates' transition into local employment. The regional economy does not offer significant opportunities for graduates and the universities themselves do not have in-depth knowledge of local labour demand. Nevertheless, HEIs highlighted that there is a shortage of Engineering, Medical and IT graduates (amplified by brain-drain), and a relative oversupply of economics, law and biology graduates and an even larger oversupply of graduates in the social sciences and humanities. As reported by one of the professors in the exploratory workshops, in the IT sector it is estimated that against a supply of 800 graduates per year, there is a demand for 3200. Interestingly, while in the textile sector graduates are in high demand, it is difficult for the university to recruit students.

Against this background, HEIs reflected on both the long-term/strategic needs of tackling this issue and on the operational tools currently available or viable to implement it.

At the strategic level, HEIs agreed on the importance of developing a system to monitor local market and employment trends, as well as to analyse technological and social tendencies. Such system would be useful to evaluate whether the labour force is being prepared for the strategic needs of the region in the mid-long term and to review study programmes on time.

At the operational level, one of the tools HEIs employ to facilitate graduates' transition into employment is that of student placements. Cooperation with industry for placements is reported as common across universities, yet those operating in the IT sector appear to stand out in that respect. Despite their importance and frequency, however, student-placements tend to be organised on ad "ad-hoc" basis, building on personal networks of professors. HEIs agreed on the need to reflect on whether such a model is optimal. There could be scale and efficiency advantages in trying to coordinate these "ad-hoc" efforts, providing support through an adequate institutional structure within HEIs. Another interesting suggestion was to develop a regional programme of internships based on the ERASMUS model, but catering for local needs and attempting to include also SMEs – traditionally not involved in such schemes. The regional outlook of such programmes would have the advantage of being less costly for the students, for whom ERASMUS grants do not cover all the costs of living. Other tools that could support graduates' entry into the labour market include targeted job-fairs between employers and students in fields relevant to S3 implementation and the creation and exploitation of alumni networks.

5.2.2 Research: the challenge of increasing intraregional and international collaborations

While the core impact of research activities for S3 occurs through technology and knowledge transfer (discussed extensively in the next session), basic academic research as such, is also important as it ensures that the region retains its knowledge creation and absorption capacity, as a precondition for any innovation activity.

Universities in North East Romania reported a close alignment of their research activities with the S3 priorities. However, it must be reminded that universities currently do not receive institutional funding specifically for such activities. Furthermore, there is limited evidence on the quality of research conducted in the region by S3 priority area and little

tradition of applied collaborative research, although with some exceptions in the IT sector.

In general, HEIs pointed out that S3 poses new pressure on research performance and considered it beneficial to access international research networking in relevant fields. Nevertheless HEIs highlighted difficulties in winning H2020 grants (with the exception of the IT departments in the Technical Universities in Iasi) and were more geared towards national funding programmes.

HEIs stressed that S3 also puts new demands on the topics of research, demanding that more attention be paid to local socio-economic challenges (for instance, specific health issues in rural areas remote from cities). To this aim, it emerged as important to increase intra-regional and interdisciplinary collaboration among HEIs. This is nevertheless extremely challenging, as local universities do not have a tradition of collaboration, nor do funding streams encourage such approaches.

5.2.3 Third mission – Technology Transfer and engagement with socio-economic actors

Technology transfer

As highlighted in the previous sections, the regional innovation system in North East Romania is at an early stage of development, with weak systemic links between HEIs, the private and public sector and limited opportunity for and awareness of technology transfer. According to HEIs, legislative, economic and cultural factors underpin the limited technology transfer activities in the region.

a. Legislative: As highlighted above, while the higher education legislative framework includes technology transfer among the HEIs missions, the core of resources are dedicated to teaching activities and technology transfer has not received institutional funding. Indeed, while HEIs have technology transfer offices, and while there is evidence of different TT mechanisms in place (Tolias, forthcoming), they are currently not a stable part of the administrative apparatus of HEIs.

b. Economic: HEIs also stressed that the local economic structure specialised mainly on low-tech activities also does not favour TT activities, all the more as they still do not constitute a cultural norm, and socio-economic actors lack the awareness of the potential benefits of engaging with the research sector.

c. Business and research culture: In general HEIs reported that firms prefer ready-made solutions to engaging in research with local HEIs due to the uncertainty of the process. At the same time, as indicated above, local universities have not developed strong capacities in applied research. A cultural shift needs to occur in the private and higher education sectors that encourages new approaches to jointly solving emerging techno-economic problems.

In this context it is unsurprising that universities have not developed the administrative, managerial and legal capacities to engage meaningufully in TT activities. In light of the afore-mentioned policy-developments, with the Regional OP devoting significant resources to Technology Transfer, HEIs highlighted the importance of maximising current opportunities by devising and participating activities to the S3 governance structure.

Against this complex background, HEIs reflected on various steps to be taken. HEIs should pro-actively engage in capacity-building and promotional activities. These should start from an institutional reflection on HEIs own needs and capacities and should be followed by networking activities with stakeholders to understand their explicit and potential requirements for applied research. Within this context, clusters and demonstration-projects should be used to diffuse innovative approaches, particularly in the primary sector.

At the strategic regional level, a first step necessary step is a stock-taking exercise to evaluate the potential for technology transfer supply and demand by local actors to feed into the development of research commercialisation strategies for each S3 priority.[30]

Engagement with local government and society

HEIs reported a strong shared recognition of the university's role as a boundary spanner and of the value of engagement with the public sector and with society at large, especially when implementing a transformational strategy such as the Smart Specialisation approach.

University staff is voluntarily involved in different decision making committees at local and county level. HEIs showed awareness of the importance of being present in different organizations (including NGOs, civil society etc.) in their field of interest. However, these activities are pursued on an ad-hoc, individual basis.

Academics engaging with the society do so because they are personally motivated, rather than because there is institutional or sectoral encouragement. Indeed, there are no structural or career incentives to that end and the existing systemic links among actors are not fully developed, nor institutionalised. HEIs are nevertheless conscious of the importance of finding ways to exploit the bonds between HEIs and other actors and the bridges they can form to reach into other sectors and places (e.g. help to attract investment).

Geographically, the interaction between HEIs and local actors/local government (municipalities) is limited to the actual counties in which HEIs are located (i.e. three out of the six counties in the region). In terms of actionable proposals, the study indicates a need for capacity-building process to improve engagement, as well as awareness-rising to recognise the effort of HEIs participating in activities with the territory.

Building a vision for an emerging community of practice

The three investigative steps produced both intangible outcomes and concrete outputs. As for the former, they contributed to building a community of practice of regional academics, working around S3. Indeed, local universities do not traditionally collaborate, nor are policy incentives provided to foster intra-regional links. The HESS case study, contributed significantly in this respect, providing opportunities for academics to interact with the local RDA and to think systemically about the challenges faced at the regional level.

The community of practice revolves around the vision developed throughout the "Leadership Workshop" and reported in the box below.

[30] A stock-taking exercise on the supply potential of technology transfer activity has since been conducted, in collaboration with the JRC (Tolias, forthcoming). A symmetric study on the demand side is currently being undertaken with the support of DG Regio.

Box 2 Mid-term vision for universities' role in regional development

Universities are cooperating more, are specialized but flexible, take more advantage of new opportunities, promote change, are a true brain for the region, a laboratory that contributes to entrepreneurial discovery, multidisciplinary training and creative development, attracting funds and promoting quadruple helix interaction.

Such vision is already being engrained in the local S3 governance structure. Indeed, it is after the HESS Leadership Workshop that the region started identifying and building the Academic Task Force supporting the Research and Innovation Council, described in 4.3. While much remains to be done, HESS has certainly planted important seeds.

6. Conclusions and policy implications

The HESS project in North East Romania has explored ways in which HEIs can support S3 implementation in North East Romania.

The issue is particularly relevant in the region, in which a difficult economic situation, an embryonic innovation system and limited room for policy decisions are coupled with a strong presence of higher education and a very proactive RDA.

The HESS fieldwork explored how HEIs can support S3 across their three lines of activities, those related to teaching, research, and "third mission", mainly technology transfer.

The results from the fieldwork show that there is significant potential for universities in North East Romania to supply the human capital needed to increase innovation and implement the region's S3. The universities provide high quality education and attract students to its main cities. There are positive examples of engagement with business, whether through student placements or co-design of courses. Yet a lack of structured cooperation at an institutional level limits their impact. There is openness among the staff to contribute to entrepreneurial education, lifelong learning and professional training, outside the traditional course structure and student profile. Finally, increased capacity at regional level for tracking graduates and understanding the labour market seems to be essential for progress. It is critical that the RDA and the other actors governing S3 are able to capitalise on the willingness of local HEIs and find ways to implement the lines of activities identified through the HESS project. It is particularly important to explore the opportunities offered by the Human Capital OP, the Administrative Capacity OP and the Regional OP and understand whether this source of funding can support HEIs in their S3 implementation efforts. At the same time, it is critical for HEIs to keep building capacity to take part into relevant EU initiatives, such as those under the ERASMUS+ programme, which have been repeatedly cited as relevant by local HEIs.

While building basic research is not a priority for most S3 in Europe, it seems that a certain level of upgrading is essential to allow universities to participate more in international networks, and to build the capacities for knowledge absorption. However, this upgrading should still have a spatial element, perhaps by centring research efforts around local challenges (societal, techno-economic, environmental or health-related) and fostering collaboration among regional research actors. As local HEIs feel that applying to H2020 calls is not a good investment in time –due to the low success rate- it is important to find ways to attract national competitive research funds in line with local S3 priorities, while increasing capacity-building efforts to apply for EU funds.

Technology transfer also received significant attention during the HESS project, as significant resources from the ERDF Regional OP have been allocated to these activities. The very limited development of TT in the region places local HEIs in a difficult position. On the one hand they are important research actors, on the other they have had limited incentives, limited capacity and limited (and intermittent) policy support to engage in technology transfer. The fieldwork showed that HEIs are willing to cooperate with the RDA and other stakeholders to strengthen their abilities, and maximise the impact of the new opportunities offered by the current policy framework. As a first step, HEIs have already taken part in a first mapping exercise (Tolias, forthcoming) of TT activities which

will support the RDA in applying for the afore-mentioned ERDF funds. Furthermore, they are willing to engage in capacity building and promotional activities.

While the HESS fieldwork was extremely fruitful and identified relevant avenues for policy decisions, its most important outcome is the definition of a strategic vision for regional development among HEIs and with the RDA. HEIs have perceived themselves not only as providers of human capital, but also as critical actors for regional development.

This is an achievement not to be underestimated and it is especially relevant for the EU's peripheral regions. Indeed, it suggests that the concept of smart specialisation and stakeholders' collaboration is appealing and gathers commitment also in areas that have little tradition of dialogue and cooperation in innovation, where university are strongly anchored to traditional models.

This case study also highlighted other relevant lessons for the EU: the capacities required from HEIs to engage actively in Smart Specialisation are not to be underestimated. Innovating in the teaching approach, keeping up with the research frontier and engaging with private and societal actors requires being plugged to international networks, learning from other regions and adapting to local circumstances. Adequate EU instruments should be put in place to ensure that the potential of HEIs' contribution to Smart Specialisation is not missed, especially where it is most needed.

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List of abbreviations and definitions

ABRDI	Advisory Board for Research, Development and Innovation
ANC	The National Authority for Qualifications (in Romanian ANC)
ARACIS	Romanian Agency for Quality Assurance in Higher Education
CNADCU	The National Council for Attesting Titles, Diplomas and Certificates
CNCS	National Research Council
CNDI	National Council for Development and Innovation
CNFIS	National Council for Higher Education Funding
EDP	Entrepreneurial Discovery Process
ERDF	European Fund for Regional Developmen
ESIF	European Structural and Investment Funds
EU	European Union
GDP	Gross Domestic Product
GERD	Gross Expenditure on Research and Development
HE	Higher Education
HEI	Higher Education Institution
HESS	Higher Education for Smart Specialisation
MRI	Ministry of Research and Innovation
NASRI	National Authority for Scientific Research and Innovation
NE-RDA	North East Romania, Regional Development agency
NRDI	National RDI institutes
NUTS	Nomenclature of Territorial Units for Statistics
OP	Operational Programme
POCA	Administrative Capacity Operational Program
POCU	Human Capital Operational, Program,Priority Axis 6
POR	Regional Operational Program
PRO	Public Research Organisation
R&D	Research and Development
RDI	Research Development and Innovation
RDA	Regional Development Agency
S3	Smart Specialisation Strategy
UEFISCDI	Executive Unit for Higher Education, Research, Development and Innovation Funding

List of boxes, figures and tables

Box 1 The governance of higher education in Romania 11
Box 2 Mid-term vision for universities' role in regional development.....30

Figure 1 The governance of higher education in Romania 12

Table 1: Public Research and Higher Education Entities (Source: Tolias, forthcoming) ..17
Table 2: Graduates in Tertiary Education, NE Romania, 2014 18
Table 3 Universities participating to the HESS study in North East Romania 19
Table 4 S3 Priorities in North East Romania 20
Table 5 Public Universities' links to S3 priorities.....21

Annexes

Annex 1 Questionnaire of the self-assessment workshop

Objectives:

The HESS self-assessment exercise has two main functions:

- ✓ An opportunity for regions to undertake a self-assessment of how higher education is integrated into the S3 policy mix and how Higher Education Institutions (HEIs) are contributing to S3 implementation. This objective is to initiate a process of self-reflection that will bring about changes to policy approaches.
- ✓ A starting point / baseline for the HESS project. The objective is for the JRC and external experts to understand the regional context, maturity of the research and innovation system, the role played by higher education in development and innovation, as well as the opportunities, challenges and barriers to the territorial engagement of HEIs and their role in 53 implementation. It will allow the research team, together with the regional authorities, to better plan the next stages of the project.

Guidelines:

The reply to this questionnaire should be coordinated by the regional authorities responsible for smart specialisation; which is usually the contact point held by the 53 Platform. It should be completed at least a month in advance of the expert and peer field work. We highly recommend consulting stakeholders before replying, especially the HEIs themselves. This could be the result of a long standing dialogue or a dedicated workshop. The exercise has two complementary elements:

- Open ended questions on the perspectives, concerns and visions of both the regional authority and its stakeholders
- A rating tool (HESS self-assessment wheel') which involves the scoring of your region's current situation with regard to the role played by higher education and HEIs in the implementation of S3.[31]

Questionnaire:

Background

- In your opinion, what has been the level of engagement of HEIs in the regional development strategies so far?
- Which are the enablers/facilitators of the engagement of the HEI in regional development? Give some examples.

1. Knowledge generation

- To what extent is the knowledge produced by HEIs relevant to addressing regional priorities?
- How would you describe the role of HEI in the Entrepreneurial Discovery Process and Smart Specialisation Strategy definition?

2. Knowledge absorption and transfer

- What are the existing tools to support the generation of new companies from HEI (spin-offs)

31 The rating tool was ultimately not deemed necessary.

- Are there examples of universities transferring knowledge to the region from outside the region (knowledge importation)?

3. Teaching and Learning

- To what extent do the curricula of degree programmes in HEIs match regional priorities?
- Do you think that the region has access to the appropriate quantity and quality of graduates?
- Which specific tools have been promoted to enhance the development of human capital and skills in response to regional development needs? Which further tools would be needed to enhance it?
- Do HEIs promote an entrepreneurial spirit among the academic community and the students? Which further tools would be needed to enhance it?

4. Cooperation

- Which have been the specific tools develop to increase the cooperation of HEI with other research and innovation stakeholders?
- How would you describe the connections of the HEI to other stakeholders of the territory (research and technology centres, regional authorities, companies, clusters, etc.)?
- Which specific barriers/challenges have been encountered to improve the coordination of the HEI with other stakeholders of the territory?
- How do HEI contribute to the overall vision and marketing of the region?

5. Organisation of HE systems

- Are existing universities complementary between themselves and to other vocational training or education institutions of the territory?
- How is the role of HEI in the regional development strategy influenced by national rules and policies? What is the degree of autonomy of the HEI to adapt their activities to regional development needs?
- How is the performance of HEIs measured? How these influences on the way they engage in regional development?

6. Funding

- What is the level of engagement of HEIs with international research networks (H2020, etc.)?
- What is the level of engagement of the university sector in international teaching/learning networks (Erasmus+, knowledge alliances, etc.)?
- Are the examples of universities using international / national funding programmes in synergy with regional funds (including the ESIF?) How could this be improved?

Concluding questions

- Overall, which of the three missions of HEI (education, research, outreach) has been better integrated in the S3? Why?
- Which could be the potential specific mechanisms that would be needed to optimize HEI involvement in the implementation of RIS3 and make it sustainable over time?
- Which are the key future challenges to improve the role of HEI in the RIS3 of the region?

Annex 2 Questionnaire for semi-structured interviews

I. In general, the university can play an important role in its community, as well as within a larger, regional ecosystem. One of its key functions is that to support and coordinate the regional, social and community development.

- In your opinion, to what extent is your university involved in the regional and/ or local development so far?
- Is your university involved in the regional policies development?
    - What kind of in-put do you offer?
    - Is your expertise being used one way or another? Please give examples.

II. Collaboration, engagement and information sharing with local and/ or regional stakeholders, with different industries, with the public sector is important for a university that aims to become a driving force for the region in which it acts.

- Does your university have any departments/ organizations acting as knowledge transfer actors or which are required by businesses to provide different services? Please give examples.
- What would be helpful to boost the transfer knowledge, from the legal framework perspective or otherwise?

III. The mobility of human resources, especially researchers, between the private and research sector is a critical element of knowledge transfer.

- How much does your university promote/ take part into exchanges of personnel?
- What tools/ information/ policy support would you need to enhance this type of knowledge transfer?

IV. One of the conclusions of the self-evaluation exercise, implemented in an earlier stage of the research, states that the main channel through which universities contribute to regional development is through graduate production.

- Which are the main drivers and barriers for realistically defining the demand and supply needs at local and/ or regional level, considering the programmes of studies from your university?
- Do you use specific tools to enhance the development of human capital and skills in response to regional development needs? Which further tools would be needed to enhance it?
- Are the local and/or regional partners involved in the process of designing and implementing study programmes (any cycle – B, M, PhD)?
    - Do you find solutions for integrating the experiences and the expertise of the local and/ or regional partners in designing and delivering didactic activities, extracurricular activities or support services?
    - Are there recruited at the university level relevant persons, with significant expertise form the local/ regional area?
    - Are there developed post-university programmes of study (especially) based on requirements expressed by local/ regional organizations?
    - In order to develop the professional competences of students which is the perspective for the professional practice? Strengths and weaknesses, opportunities and threads.

- How does your university respond to the development of cross-curricular of competences including the entrepreneurial ones?
    - Are there projects or programmes or any other initiatives within your university focused on this issue?
    - Does your university offer opportunities, formal or non-formal contexts for the development of an entrepreneurial thinking and other related skills?
    - Are there available programmes of mentoring or of personal/ professional development delivered by persons with expertise either in academic field or in the related professional area?

V. The partnership between the university and the community can be strengthen by reciprocal involvement at management/ administrative level, by coordination specific activities, by developing and implementing strategies focused on regional and/ or local development.

- Does your university support different collaborative partnerships with the local communities and organizations, the central and local administration, chambers of commerce and industry and alumni of the institution? Please give examples.
- Do you think that there might be useful for your university to involve the local/ regional partners in some kind of consultative body that might contribute to the development of strategies and practices focused on the regional/ local development? Which might be the pros and cons.
- What about involving your university in the local governance together with other stakeholders within the regional/ local ecosystem?
    - What kind of input can your university offer?
    - Which might be the instruments that you could use in this context?

VI. Projects represent a tool for creating partnerships and by which the universities can contribute to reaching some goals related to the regional and/ or local development

- In your opinion, to what extent the projects in which your university is involved have a direct impact on the regional and/ or local development?
- What kind of funding do you access for these projects?
- What incentives might there be put in place in order to boost the interest for this kind of projects?
- How does the process of building up partnerships with local and/ or regional stakeholders work?
    - Which are the barriers and which are the motivator factors?
- Did you use or intend to develop a strategy or tools to increase the cooperation of your university with other research and innovation stakeholders in the region (business incubators, technological parks and other external initiatives)?

Annex 3 Methodology for collective story harvest and strategy café

Collective story harvest

Overview of the session

1) A moderator provides an introduction to the exercise
2) Story telling in one plenary sessions
    a. A representative of the RDA and a neutral expert with knowledge of the regional HEIs share their view on HEI and regional development in an informal, personal, story-telling style (no ppts yes notes), they have approx. 15minutes each.
    b. Participants (including RDA staff) will be given coded paper to take notes related to specific themes (randomly assigned)
3) Convergence Harvest (30 minutes)
    a. All individuals, grouped by themes, share their comments on the story under moderation.
4) Two external experts sum the discussion and propose a "vision" taking into account the two stories and the the comments from the participants.

Guidelines for Story-tellers

Story title: Your vision for HEIs engagement in Regional Development in 10 years.

Process:

You will have **15 minutes** to talk comfortably about what you think the vision for HEIs engagement in Regional Development in 10 years should be and how you came to shape this vision.

This is not a presentation of results and/or policy suggestions. It will be an informal account of your experience and desires and how you came to shape your views around this topic.

Please consider tackling:

- Who are you? (name, position, academic background and whatever other info you deem relevant)
- Why you think it is important to talk about HEIs engagement in regional development.
- What is your vision and why do you hold such vision? Please articulate the vision across several dimensions. Here are some suggestions: teaching (traditional and new modes), life-long learning, human resources development, mobility, engagement in international networks, technology transfer, brain drain, specific projects you have in mind, etc.
- Who is involved in your story and why?
- How you came to shape your vision. Was any episode particularly important?What parts of your academic, personal and professional background make you think a certain way. Where there defining moments/experiences that shaped your thoughts (i.e. getting to know a given person/ having a give experiences/imagining a results, etc.)

- When thinking about your vision, how would you like the next 10 years to unfold? what are the challenges you foresee?

Set aside some time to think about your story and bring your notes if you want. We suggest **not** to have a presentation as we want to stimulate an informal environment.

Guidelines and themes for participants

Participants can have two roles, which will be assigned randomly:

1) **General listeners:** they will pay attention to the story and will take notes on the aspects most relevant to them. The notes must include some reflections on their own experience, not just capture what the story-teller is saying.

2) **Wisdom catchers:** "Wisdom catchers" will need to focus and take notes on the themes they are assigned. The notes must include some reflections on their own experience, not just capture what the story-teller is saying.

The themes include:

- Opportunities and benefits
- Challenges and obstacles
- What is missing from the vision
- Who will be involved

Participants need to hand-in the notes (in English) to the moderator.

Guidelines and themes for moderators:

There will be one moderator (EM) and two rappourteurs (YT and LK)

Phase	Moderator	Rapporteurs/ External Experts
Story-telling	• Introduce the process in plenary and manage the split of the group • Ensure time-keeping • Take notes	Take notes
Convergence harvesting	• Group the participants by theme • Ask each participant what they picked up from the story • What they think about this specific aspect in relation to their experience • Any other comment • Ensure time-keeping • Collect participants' notes	Take notes Focus on the elements that generated more interest. •
Conclusion	• Invite moderators to share their "middle-ground" vision	External experts comment on the session, highlighting the key features of both stories and of the discussion and propose a vision that takes all the issues into account.

Materials:

For rapporteurs/External experts: Computers to take notes

For the participants: One sheet of paper with the theme and the instructions, as summarised in the table below.

Themes	instructions
Opportunities and benefits	Please take notes on the opportunities and benefits that the visions proposed raise. Please reflect on your own experience, bring your own personal view. Please write clearly and in English.
Challenges and obstacles	Please take notes on the challenges and obstacles that the visions proposed raise. Please reflect on your own experience, bring your own personal view. Please write clearly and in English.
What is missing from the vision	Please take notes on what is missing from the visions proposed. Please reflect on your own experience, bring your own personal view. Please write clearly and in English.
Actors involved	Please take notes on which actors should be involved in the visions proposed. Please reflect on your own experience, bring your own personal view. Please write clearly and in English.

Strategy café

This part of the workshop is intended to take forward the visions expressed in the collective story harvest previously. The Café proceed will be hosted by a coordinator and will proceed as follows:

The participants will be asked to sit down at one of four tables in groups of four or five. Each table will have a moderator and a note-taker who will use a flipchart:

1. Teaching and lifelong learning
2. Human resources development, researchers mobility and international networks
3. Technology transfer: Potential, obstacles and challenges
4. External engagement with government, industry and society
    -

- If the tables are unbalanced the host will ask for volunteers to change, stressing that they will be moving tables anyway after 20 minutes. Each table will have some issues to stimulate conversation in case this is needed.
- At the beginning of the conversation the table host will ask for another participant to report on the conclusions at the end.
- Conversations will then pursue structure in three stages of 20 minutes each, addressing the following subjects:
    - Contribution to the vision
    - Actions that need to be taken
    - Governance and organisation
- At the end of the first 20 minutes, one of the participants should volunteer to stay at the table as the host for the following two sessions. The other participants are 'travellers' and should choose another table.

- At the beginning of the second and third stages, the table host should briefly summarise what was discussed and agreed.
- After the third round of discussions, there will be a ten minute break when the table host and note taker agree on the main conclusions from the theme.
- Feedback from each table will then be shared in plenary by either the table host or the note taker (or both).

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