THINKING SMART

Toolkit for the engagement of HEI in regional growth

Work Package 3 – Entrepreneurial Discovery in HEIs

Summary Report (Deliverable 3.4)

October 2017

Paul Vallance and Louise Kempton

Table of Contents

Abbreviations used in the report

Abbreviations for the partner institutions

NU – Newcastle University

POLIMI - Polytechnic University of Milan

ULODZ – University of Lodz

UPV – Polytechnic University of Valencia

UTAD - University of Trás-os-Montes and Alto Douro

Other common abbreviations used

EDP(s) – Entrepreneurial Discovery Process(es)

HEI(s) – Higher Education Institution(s)

NUTS - nomenclature d'unités territoriales statistiques

RIS3 – Research and Innovation Strategy for Smart Specialisation

Entrepreneurial Discovery in HEIs – Summary Report

1. Introduction

This synthesis report summarises the results of the third work package of the Erasmus+ Thinking Smart project. The focus of this work package for each of the five participating partners (NU, UTAD, UPV, POLIMI, ULODZ) was the facilitation of a collaborative dialogue between their higher education institution (HEI) and its regional stakeholders. This form of 'entrepreneurial discovery process' (EDP) aimed to explore:

- The previous role of the partner HEI in the design process for the RIS3 and its current (research and teaching) activities that are contributing to the implementation of the strategy.
- Remaining gaps in research and development, human capital, and other innovation resources and other challenges within the regional economy that need to be addressed for the successful implementation of the RIS3.
- The research and teaching capabilities of the partner HEI that could be mobilised to help fill these gaps.
- Ways in which these capabilities could be more effectively mobilised, and current barriers within the institutions or higher education systems that may be inhibiting this from occurring.

This exercise in action research was, therefore, oriented towards supporting the further development of the existing RIS3 through an exploration of how the contribution of one HEI in the region to this strategy could be enhanced. More generally, the work package was concerned with cooperation between the HEI and the relevant regional authority and other stakeholders, and key underlying issues were the building of greater trust, alignment of priorities, and awareness of respective institutional drivers and barriers between these parties.

The methodology followed by each of the five HEIs was guided by a series of steps outlined by the leaders of the work package (NU). These steps involved four main stages:

1) Creation of a collaborative working group of HEI and regional stakeholders, and holding a 1st mind setting workshop focused on the identification of key regional needs, challenges, and opportunities for the further development and implementation of the regional RIS3.

2) Mapping and critical analysis of the HEI's capabilities and offer through desk-based research and interviews or a survey with members of the institution.

3) Holding a 2nd mind setting workshop focused on co-generating ideas about how the HEI can contribute to the further development of the regional RIS3.

4) Carrying out a matching exercise between regional/local needs and priorities and the HEIs capabilities.

These four stages resulted in the production of a report by each partner of around 30 pages, which used a standard structure also defined by the work package leaders. This overall report summarises the contents of these five documents.

Each partner did, however, to a certain degree adapt the above methodology to their specific circumstances and what was possible to organise in the timeframe available. In particular, most partners held the two workshops on the same day due to the difficulties of bringing together the same group of stakeholders more than once. Other variations on the process above, and the reasons for this in each case, are outlined in the summaries of the EDP in the partner institutions below (section 3) which along with the cross-partner analysis (section 4) forms the core of this report. Before this, as way of background, Section 2 will briefly explain the concept of entrepreneurial discovery processes in smart specialisation and how this relates to the level of individual HEIs.

2. Background – the Entrepreneurial Discovery Process and HEIs

The entrepreneurial discovery process (EDP) is a core element of the smart specialisation approach to such an extent that the two ideas have become almost synonymous. This has ensured that the concept of the EDP has received significant attention in the academic and policy literature (e.g. Kyriakou *et al.*, 2017). However, it is still necessary to qualify what this means in the context of this report. This is because, while the concept normally refers to a process taking place at a territorial level (i.e. a given region or country developing a RIS3), the primary unit of analysis here are individual HEIs (albeit situated within their regional context). Therefore, this brief section will explain how the EDP concept still has relevance when applied in this way.

According to Foray (2015), the development of smart specialisation originates with the 'entrepreneurial discovery' of innovation domains that represent opportunities for structural change within a regional economy. This is a process that, he emphasises, can occur through purely private sector activity that catalyses growth through the agglomeration effects of firm entry and knowledge spillovers around the domain in question. However, the presence in most economies of some form of market or coordination failure acts as a barrier to this occurring spontaneously, and generates the need for government intervention (here in the form of regional innovation policy measures) to stimulate these dynamics. Of particular relevance amongst these market failures is the fragmented nature of economic knowledge relating to technological and market opportunities that arises from its distribution across numerous weakly connected actors (*ibid.*, p.30). This helps explain why, within the wider guidance of developing a smart specialisation process, the EDP is defined as a collective exercise that brings together multiple stakeholders within the region to select the optimal domains in which public research and investment funds should be concentrated (Foray *et al.*, 2012).

Universities (and related higher education or public research institutions) are amongst the key sources of knowledge generation and dissemination in most regions, and therefore undoubtedly important actors within smart specialisation. A regional EDP should not, however, be driven by the research strengths of local universities alone (Vallance *et al.*, 2017). The innovation domains identified as strategic priorities should in most cases represent opportunities for the transformation of existing economic activities in the region through processes of technological upgrading or path diversification (Foray, 2015). This is so that smart specialisation can be considered "a process addressing the missing or weak relations between R&D and innovation resources and activities on the one hand and the sectoral structure of the economy on the other" (Foray et al., 2011, p.5). For universities, therefore, this will clearly favour fields of research that are in some way directly connected to innovative activities in the regional economy. However, this alignment between knowledge generated in universities and the knowledge required by local firms is often not strong, particularly in peripheral or less developed regions (Bonaccorsi, 2017). To enhance the ongoing contribution of higher education institutions to smart specialisation, therefore, an extension of the EDP may be required that will focus on uncovering previously unrecognised or unexploited ways in which the diverse resources of local universities can be mobilised to support innovation in the domains already identified within the regional RIS3. Consistent with the principle behind smart specialisation, this process should be attuned as much to the novel use of research for the technological upgrading or diversification of traditional industries within the region as it is to the genesis of new knowledge-intensive science or technology-based industries.

Previous research on this subject has underlined that for universities to contribute effectively to smart specialisation they need to be embedded within a regional innovation ecosystem of dense organisational interconnections (Markkula and Kune, 2015; Virkkala *et al.*, 2017). The form of EDP being proposed should not therefore just be conceived as a predominately technical exercise of matching academic resources to capability gaps identified in the regional economy, but should also address the accompanying issues of

how the relations between the university and regional partners that are needed to take advantage of these opportunities can be established and maintained. This will require mutual understanding of the drivers and barriers on both sides of this collaboration (Kempton, 2015).

For this reason, this work package is focused around a series of EDPs that are intensively focused upon a single HEI and its regional linkages. This is, however, with the full recognition that most regions (including all those covered here) contain multiple HEIs that will contribute (both individually and collectively) to the RIS3. The next section summarises the findings of each partner from this process.

3. Summary of Entrepreneurial Discovery in Partner Universities

This section consists of brief outlines of key points from the reports produced by each of the 5 partner universities. Each sub-section will first describe the specific methodology used by the partner. The main findings of the exercise will then be summarised based on the following sections in each report:

- overview of the regional RIS3;
- the role of the HEI in RIS3 design and implementation;
- gaps, barriers, challenges;
- identified opportunities for further/future involvement of the HEI;

3.1 - UTAD (University of Trás-os-Montes and Alto Douro)

3.1.1 - Introduction and methodology

UTAD is a relatively young university located in the Douro Region (NUTS 3), which is a sub-territory of the Northern Region of Portugal (NUTS 2). The relevant RIS3 covers the latter area, which is a relatively large region of over 3 and half million inhabitants that includes the second largest city in the country (Porto) and a number of HEIs of different types. However, UTAD has a particularly strong attachment to the Douro locality as it is the only HEI based in this sub-region. This geography is reflected in the discussion of the contribution of UTAD to the regional RIS3 below.

UTAD organised their two WP3 'mind setting' workshops on the same day to ensure sufficient levels of participation. The focus of these two workshops followed that outlined in the overall work package guidance: respectively, the identification of key regional needs, challenges, and opportunities for the further development and implementation of the regional RIS3 (1st workshop); and co-generating ideas about how UTAD could contribute to the further development of the RIS3 (2nd workshop). The working group assembled for these workshops had representatives of UTAD, the regional development

government agency responsible for producing the RIS3 – the Northern Portugal Regional Coordination and Development Commission (CCRD-N), a chamber of commerce, tourism business association, consultancy firm, non-profit organisation, business incubator park, and civil society organisation. As part of stage 2 of the process (mapping and critical analysis of HEIs capabilities and offer) a questionnaire was circulated to members of the university, which received 14 detailed responses. For the final stage (matching between regional/local needs and priorities and capabilities) a further focus group was held with members of the working group.

3.1.2 - Overview of the regional RIS3

The RIS3 for the Northern Region was produced by CCDR-N within the context of the NORTE 2020 initiative, which is a regional strategy for the Horizon 2020 funding programme period (2014-2020) that is aligned with the Europe 2020 goal of 'smart, sustainable and inclusive growth'. The process of developing the RIS3 involved input from a range of relevant organisations and experts through surveys, forums, thematic workshops and other meetings. This consultation led to the identification of eight quite broad priority areas for the region as a whole, including life and health sciences, sea-related economic activities, and advanced manufacturing. However, the Douro sub-region in which UTAD is located is a mainly rural area with an economy based primarily on agriculture and wine production. There are, therefore, a select number of the above RIS3 priorities that are of more direct relevance here. These are identified in the report as: i) Agriculture Environmental Systems and Food; ii) Symbolic Capital, Technology and Tourism Services; and iii) Human Capital and Specialised Services.

3.1.3 - The role of the HEI in RIS3 design and implementation

UTAD were amongst the regional stakeholders who engaged with CCDR-N during the RIS3 consultation period and this participation took place at the level of senior management (e.g. vice rector/pro rector) and academics. As the only HEI in the Douro

sub-region, UTAD has existing research and teaching strengths that correspond with the mainly agricultural focus of the local economy. This includes "a significant portfolio of research projects and strategic partnerships established with the companies in the region with a focus on the agri-food, forestry and tourism sectors" (p.10). Hence the contribution of UTAD to the RIS3 design and subsequent implementation is focused on these areas. The report states that of the RIS3 priorities, only Agriculture Environmental Systems and Food has a strong alignment with the main strengths of UTAD. Symbolic Capital, Technology and Tourism is also mentioned as having some important links. This relatively narrow range of specialisation is unsurprising given that UTAD is a comparatively small university with a low level of research-intensity (see appendix table 1). In relation to the first of these smart specialisation priorities (Agriculture Environmental Systems and Food), it is reported that "UTAD participated in the design of the programmes in research and development for the agro-food sector with CCRD-N and other partners" and that "this type of cooperation and participation in the decision-making resulted in a change for the Douro region in the reception of funds for agricultural development with greater involvement of regional businesses, civil society, local governments and chambers of commerce" (p.19).

3.1.4 - Gaps, Barriers, Challenges

The main constraints to the successful implementation of the RIS3 in the region as a whole were summarised in the report as:

> [a] lack of qualified critical mass; the weakness of the industrial and business sector; lack of skilled employment; the lack of scale at the level of some regional products/producers in face of the requirements of internationalization and the competitiveness of the markets. Also, the weak support for voluntary social support measures that foster intergenerational transfer of knowledge and promote integration and social cohesion. (p.20).

In relation to the role of UTAD in the implementation of the RIS3 more specifically, notwithstanding the progress in cooperating with regional actors mentioned above, the report notes that there are points of collaboration that could be reinforced to help fill some of these gaps. It states that "UTAD's main gap is not in research, but in innovation – that is in the transfer of technology to businesses or, more concretely, in how to bring the businesses to a competitive point for using technologies to innovate" (p.20). This finding reflects a common challenge for universities in interacting with businesses, particularly in traditional sectors (such as agricultural) where many firms will have a limited absorptive capacity for new knowledge or technology (Bonaccorsi, 2017).

3.1.5 - Opportunities for future involvement of the HEI in the RIS3

A number of areas are identified throughout the report where it is suggested an improvement could help enhance the contribution of UTAD to the RIS3 in the future. These include:

- Regional stakeholders could be more active in identifying training needs (e.g. in the field of agriculture and rural/agrarian management) (p.7).
- In addition to the focus on contributing to the Douro Region's main assets in fields related to agriculture and winemaking, UTAD could reinforce their training offer in complementary areas related to traditional arts and crafts, the natural and cultural heritage of the region, and activities such as hunting and fishing. Related to this, if tourism is considered a potential growth industry for the Douro region, UTAD could contribute to through the supply of relevant qualifications and support for innovation in this sector (p.21).
- UTAD should look for opportunities to involve their academics and students from fields such as sociology, liberal arts, and economics in activities related to their RIS3, as this is currently focused heavily on technology, agricultural

science and tourism. The RIS3 demands more of an interdisciplinary approach (p.23).

- There should be a monitoring and dissemination unit at the UTAD to assist in innovation, i.e. a kind of entity that could function as a liaison office between the university and businesses/associations and civil society (p.23).

3.2 – UPV (Polytechnic University of Valencia)

3.2.1 - Introduction and methodology

UPV held their workshops as part of a larger meeting with a total of 130 participants from the higher education, government, and industry sectors in the region. Following an introduction, and a presentation of the Valencian Community RIS3 from the regional government, the first workgroup was on the topic of "Exploring University capabilities to contribute to the Valencian RIS3", and the second workgroup was on the topic "Alignment of Universities with the priorities of the RIS3". In addition, a follow-up survey of meeting attendees received 42 responses.

3.2.2 - Overview of the regional RIS3

The RIS3 for the Valencian Community adopted an approach that "considers not only sectoral economic areas, but also inter-sectoral spaces" (p.3). This took the form of a matrix approach, with one axis consisting of three 'priority development hubs' and the other of technological or transversal areas of expertise. The three priority development hubs were:

1. **Quality of Life**

    1.1 Agricultural, cosmetics and household products

    1.2 Health promotion and efficient public healthcare

1.3 Tourism and quality of life

2. **Innovative products**

2.1 Customised consumer goods

2.2 Habitat: the housing and its environment

3. **Advanced manufacturing processes**

3.1. Automation and mobility

3.2 Equipment goods

The areas of technological expertise were

- Advanced materials and nanotechnology

- Advanced manufacturing

- Information and communication technologies

- Biotechnology

- Micro- and nano-electronics, and photonics

- Energy and environmental technologies

- Logistics

Various priority areas for research and innovation in the region were identified where these sectors and key enabling technologies intersect. More specifically, the regional government translated these into focal policies to help simplify this complex scheme. These foci still, however, do not exclude the open exploration of other opportunities in the regional environment as part of the approach to RIS3.

3.2.3 - The role of the HEI in RIS3 design and implementation

The report does not present much clear evidence of UPV having been closely involved in the design process for the RIS3 described above, apart from as a member of a regional association of universities for the promotion of research (RUVID). It does, however, make clear that the Valencian Government sees HEIs (particularly UPV and the other

four public universities in the region) as having an important role to play in the ongoing implementation of the strategy. Amongst their roles identified are: "the generation of knowledge, providing expert research experience, providing companies with support …, helping to identify niches of competitiveness, facilitating the absorption of knowledge (improving skills), … collaboration with industry … , [and] leadership" (p.9). For this to happen, however, it is recognised that there is a need for greater university-industry interaction in general.

In relation to UPV, existing examples of initiatives to increase this link to industry are provided such as a science park, technological centres, and a 'start-up ecosystem' for university spin-offs. However, issues around trust, misalignment and low incentives for engagement by universities are all raised as issues that need to be addressed for stronger university collaboration with industry in the region.

3.2.4 - Gaps, barriers, challenges

The main challenges for the RIS3 identified in the report are around low productivity in the Valencian economy, which is caused by the prevalence of employment in low-value manufacturing industries (e.g. ceramics, chemicals, food and beverages). This means that, despite a large number of graduates from local universities entering the labour market, this source of human capital is underexploited and many skilled workers leave the region. It is, therefore, important that the RIS3 helps to address this productivity problem by stimulating structural change in the regional economy through technological upgrading and modernisation. This objective does, however, have to be achieved with relatively low levels of R&D spending in comparison to advanced regions, which is also identified as a weakness.

3.2.5 - Identified opportunities for further/future involvement of the HEI

The report points to a broad connection between research and innovation strengths in UPV and priority areas identified through the Valencian Community RIS3. Based on current levels of technology transfer, however, it is estimated that "there is a margin of opportunity to intensify the involvement of the HEI with regional priorities" (p.19). The table below summarises the author's evaluation of where, for four key areas of research and innovation activity in UPV, there are opportunities for greater cooperation with industry in relation to RIS3 priorities. These opportunities are adjudged to be either high (H), medium (M), or low (L).

	Information and communication Technologies	Industrial Technologies	Agriculture, food technologies and biological sciences	Civil Engineering and architecture
Axis 1. Quality of life				
1.1 Agricultural, cosmetics and household products	H	M	H	L
1.2 Health promotion and efficient public healthcare	L	H	M	L
1.3 Tourism and quality of life	M	H	M	H
Axis 2. Innovative product				
2.1. Customized consumer godos	H	M	M	L
2.2. Habitat: the housing and its environment	M	M	M	H
Axis 3. Advanced manufacturing processes				
3.1. Automation and mobility	L	L	L	H
3.2. Equipment goods	L	M	M	L

According to the report, UPV has programmes to encourage the "matching of industrial needs with HEI capabilities, cooperation for joint applications to R&I competitive

programs, help to commercialize patents, … [and] the creation of technology based companies" (p.21). These are not, however, specifically targeted at the RIS3 priority areas. When this does happen it is driven by the regional government implementation of the strategy, and not the strategy of UPV. The authors point out that "[a]s a public university, the autonomy of UPV to re-direct priorities is limited by the [research and innovation] sources of funds which come from the government, from other regional, national and international actors requesting UPV services, and from [research and innovation] competitive calls" (p.21). In summary, the key barrier to the HEI adopting an explicit strategy to re-orientate their research and innovation activities to the RIS3 are the constraints imposed by funding opportunities only being available in certain areas that do not necessarily match up with the identified priorities for the regional economy.

In comparison, teaching in UPV is reported to be more closely connected to research and innovation strategies in the region. As well as having undergraduate and postgraduate teaching programmes that align with the different priority areas in the regional RIS3, UPV also has "a diverse and big offer of short courses and diplomas for life-long learning that are continuously evolving to respond to local formation needs" (p.21). However, the implementation process for new undergraduate and postgraduate programmes is described as difficult and slow, and driven by their potential attractiveness to students. Hence, thus far no programmes have been introduced in response to RIS3 priorities.

The report also highlights that a substantial proportion of UPV's interaction with industry is with firms outside of the region, and more specifically, around a third of this is with firms outside of Spain. While this global connectivity is rightly identified as bringing potential benefits for the region as well as the HEI, it does challenge the assumption that all of UPV's engagement activities should be directly aligned with the region's RIS3 priorities.

The report concludes by outlining the measures planned to implement the RIS3 on a regional level. In terms of encouraging closer relationships between different actors as part of this process, the importance of building trust between industry and the research and innovation system, and of setting out clear and consistent management objectives, is emphasised.

3.3 – NU (Newcastle University)

3.3.1 - Introduction and methodology

NU held two 'mind-setting' workshops held on the same day (20th of July 2017) and attended by 29 people from the University and region. The first workshop consisted of group discussion around presentations given by representatives of NU, the main economic development agency for the region (the North East Local Enterprise Partnership), and the Higher Education Funding Council for England. In the second workshop the participants were split into two groups who identified the challenges and opportunities involved with NU assuming a greater role in the further development of the regional RIS3. The workshop was preceded by an online survey of academics in NU which received 20 responses.

3.3.2 - Overview of the regional RIS3

In contrast to the situation in most European countries, there was no requirement to produce a regional RIS3s in the UK (instead strategies for England, Scotland, Wales and Northern Ireland were submitted to the European Commission). However, Local Enterprise Partnerships (LEPs) at the sub-national level in England were encouraged to align themselves with the national RIS3 as part of their preparation of Strategic Economic Plans. The North East LEP (covering Newcastle upon Tyne and six other local authority areas) has gone further than most other English LEPs in their efforts to develop their own RIS3. This was partly in response to an Independent Economic Review of the North East

led by a former government minister that called for the region to become an 'international exemplar in smart specialisation, open innovation systems and culture' (Adonis et al., 2013, p.16). The North East LEP commissioned a smart specialisation report (prepared in-part by members of NU) that was published in December 2013. The analysis in the report focused on four areas of economic activity in which the North East had existing strengths or strong potential for growth: passenger vehicle manufacturing; subsea and offshore technology; life sciences and healthcare; and creative, digital, software and technology based services. These four areas have subsequently been adopted as smart specialisation priorities by the LEP, and placed at the centre of its innovation programme as well as being embedded in its other programmes for business growth and skills development. Despite this commitment to the smart specialisation agenda, because the LEP is a relatively new organisation with limited resources at its disposal, it has not thus far been able to put a fully developed strategy into practice. As part of a recent update of its Strategic Economic Plan, however, the LEP has made progress by initiating a process of convening working groups to develop sub-strategies for each of the four priority areas. This has been completed for the life sciences and healthcare area, but the sub-strategies for the other three areas are due to be delivered over the following year. Hence, during the Thinking Smart workshop, smart specialisation was described the LEPs Innovation Director as a still "emerging intervention framework".

3.3.3 - The role of the HEI in RIS3 design and implementation

A team of researchers from NU made a significant contribution to the identification of the region's research and knowledge strengths as part of the RIS3 development process through their input into the 2013 analytical report for NELEP. However, it should be noted that this team were not formally representing NU in this capacity, nor were they requested to participate in this exercise by the institution. Instead, this was a case of the university researchers helping to supply an analytical capability at a time (when the LEP was still in the early stages of becoming operational) that this was lacking in the relevant

regional authority. Correspondingly, this process was not directly plugged into the management of the University as a whole.

The smart specialisation priorities contained in this report correspond, to a large extent, with research strengths in the four universities in the North East LEP area. NU is one of only two research-intensive universities in the region and has relevant specialisations in fields of engineering, medical sciences, and computer science. This means that there is good alignment between three of the four smart specialisation priority areas (subsea and offshore technology; life sciences and healthcare; and creative, digital, software and technology based services) and the research and teaching strengths of the University. Beneath this high level, however, the smart specialisation priorities promoted by the LEP have yet to drill down to connect with the more specific research strengths of NU within their broad areas of excellence. This dimension of the EDP was beyond the remit of the 2013 smart specialisation report and NELEP has only recently established a mechanism to do this themselves in the form of the working groups for each of the four areas. Correspondingly, the impact of the adoption of smart specialisation by NELEP on the strategic alignment of NU has so far been negligible. The survey carried out for the Thinking Smart project indicated that, although many academics from NU are actively engaged with industry both inside and outside the North East, they currently have a low awareness of the emerging smart specialisation strategy.

3.3.4 - Gaps, barriers, challenges

The North East of England is an old industrial region that for around two decades has made the promotion of innovation a centrepiece of its economic development policy. Despite this, the region still faces considerable challenges in building an economy around high-value, knowledge-intensive manufacturing and service industries. The Independent Economic Review mentioned above identified key weaknesses in the regional economy including low skill levels, low enterprise and innovation rates, a concentration of

employment in low-value sectors (all contributing to an underperformance in productivity and Gross Value Added per capita), and a high dependency on the public sector for employment, investment capital, and spending on research and development (Adonis *et al.*, 2013). Participants in the workshop reflected these challenges by acknowledging that, with the exception of the public-sector anchored life and health sciences, the areas selected as smart specialisation priorities for the region currently struggle to generate a critical mass of innovative activity within the region around which clusters could develop. Other gaps and challenges identified during the workshop included:

- a relative shortage of science parks, business incubators/accelerators, and related innovation and enterprise supporting infrastructure.
- a lack of awareness and promotion of strong industrial niches in the region arising from an absence of effective ongoing monitoring of the local economy.
- a continuing lack of regional-level political autonomy and leadership within the highly centralised English system of government which inhibits the region from leveraging external resources.

Universities (and especially NU) are a particularly important component of the North East's innovation system, and due to the underdevelopment of corresponding activity in the private sector they account for a disproportionate share of R&D spending in the region. This dependency is the source of other challenges as these academic capabilities are not necessarily directed towards supporting innovation activity within the wider regional economy. Broadly this is because the contemporary environment in which the University competes does not serve to incentivise this regional engagement over other demands placed on HEIs (especially those related to promoting research excellence). Although NU is a research-intensive institution, a proposition generally accepted in the workshop was that it arguably makes a more significant contribution to the regional economy through its teaching and education activity. Again, however, this is despite a national higher education system that makes little explicit provision to ensure that university teaching directly responds to local labour market demand. Even if NU sought to act against this system and vary its student numbers to respond to specific labour

market demand in the North East, it was observed that there is currently no formal medium through which local industry is able to communicate these needs to the University in a systematic way. As many of the domestic as well as international students that attend NU are originally from outside the region, there is also no guarantee that they will remain within the North East to work after graduation. A further challenge raised was the decentralised structure of NU that restricts the ability of management to mobilise staff towards meeting specific strategic goals. This is significant as it means that for NU to align activities towards regional smart specialisation priorities, it will be necessary to engage more extensively with members of faculties and departments further down the institutional hierarchy.

3.3.5 - Identified opportunities for future involvement of the HEI

During the workshop a number of opportunities through which NU could become more closely involved with supporting the local innovation strategy around smart specialisation were identified. These opportunities, which relate to currently unexploited capabilities within the University and emerging developments in the wider policy landscape, include:

- NU has recently been awarded right to host two national innovation centres in ageing science/innovation and smart data. Although these centres will by definition have a national focus, they do align with smart specialisation priorities in the region and have involved engagement with regional actors.

- The University has an existing mechanism to engage with business and other external stakeholder through 'Professor of Practice' positions in strategic fields. In the workshop it was suggested that this model (or something similar) could be deployed to increase alignment of individual faculties or departments with the smart specialisation priority areas.

- The further development of the RIS3 sub-strategies currently being carried out by the LEP should help to highlight more specific needs for the regional economy. If these include labour market needs, the focus could create a mechanism around which the University can enter into dialogue with local employers about how its

teaching offer could be adapted to help meet specialist local demand for skills and knowledge related to the smart specialisation areas. On the part of the University, this should include a consideration of how students from fields such as the creative arts and humanities, and not just the sciences and engineering, could be of value in the region economy.

- The future status of the EU smart specialisation agenda in UK government policy is unclear. Therefore, to ensure the sustainability of its own RIS3 agenda, it is important that the North East LEP also aligns it with other relevant policy developments such as Science & Innovation Audits and the recently introduced national Industry Strategy programme. This wider context may also help increase the relevance of the LEP strategy to academics in the University for whom the new Industrial Strategy represents a potential source of future funding.

3.4 – ULODZ (University of Lodz)

3.4.1 - Introduction and methodology

The two ULODZ workshops for WP3 were held on separate dates around three months apart. They were attended by representatives of business, local government, and universities/scientific institutes. These workshops were followed by interviews with people in ULODZ working as directors or vice-directors of organisational units.

3.4.2 - Overview of the regional RIS3

The Regional Innovation Strategy for Lodzkie includes 6 regional Intelligent Specialisations:

- modern textiles and fashion industry (including design)
- advanced building materials
- medicine, pharmacy, cosmetics
- power engineering, including renewable energy sources

- innovative agriculture and food processing
- IT and ICT.

This overall strategy was subsequently supported with sector policy documents for each of the six specialisations, setting out a vision, key aims and actions for that area of industry. The report emphasises that these sector strategies especially promoted cooperation between the public administration, science and research institutions, and private sector entrepreneurs. This approach explicitly drew on the principles of entrepreneurial discovery underpinning smart specialisation.

3.4.3 - The role of the HEI in RIS3 design and implementation

Various individuals from ULODZ were engaged in the development of the above strategy, including those in management roles (vice-rectors), the director of the Technology Transfer Centre, and academic researchers from across a number of Faculties. Their contribution to this process took the form of undertaking supporting research and expert reports for local government and also participating in discussions with the team responsible for developing the strategy. Despite this extensive involvement in the development of the RIS3, the report states that the University itself does not yet have its own strategy for organising the activities of their different Faculties to be more closely aligned with this regional strategy. It is noted that the forthcoming prospect of new legislation affecting the higher education sector in Poland (due to be announced in September 2017) has been a factor in preventing the University from implementing any significant restructuring up to now.

3.4.4 - Gaps, barriers, challenges

The report details a number of barriers to interaction between universities/scientific institutes and industry identified in the Lodzkie region. These cover:

- barriers to cooperation between scientific and business organisations - e.g. limited commercial offer from research institutes, low awareness of mutual offers, lack of evaluation mechanisms to validate industrial/commercial focused research, varying objectives of partners from science and industry, limited opportunities for entrepreneurs to make contact with people from scientific institutes.
- barriers to commercialisation of university research – e.g. lack of agreements and experience around patenting of intellectual property, unwillingness to change bureaucracy of universities/R&D institutes to facilitate technology transfer, limited absorptive capacity of local firms restricting market for technology transfer, a public procurement system that favours proven solutions over supporting innovative products;
- barriers to matching of education provision to labour needs of businesses due to poor connection of university curricula to practical issues for younger higher education students and a lack of programmes for the retraining of older people to fit new labour market requirements.

Amongst other consequences, this lack of cooperation is reported as having the effect of undermining the potential for large projects (including interregional and international projects) in the region, which it is suggested may restrict its capability to develop its areas of specialisation into strengths on a national scale. A dependency on EU funding is also identified as a threat to the building of sustainable innovation centres in the region.

Overall, therefore, the report emphasises the need to create new intermediary mechanisms to encourage the bringing together and sustainable cooperation of university/scientific institutes and businesses. This perhaps reflects the institutional system present in Central and Eastern European former communist countries such as Poland that have not undergone a transition to fully conform with the corresponding science and innovation systems found in Western Europe. It shows that in this context smart specialisation may

need to address these fundamental challenges before university-industry alignment around specific priority areas can be achieved (Vallance et al., 2017).

3.4.5 - Identified opportunities for future involvement of the HEI

In line with the analysis above, the opportunities for further involvement of ULODZ in the regional RIS3 relate to the considerable tasks of increasing levels of technology transfer, cooperation with the regional authority, and collaboration with companies. A practical suggestion from the report focused on facilitating these processes is for the various stakeholders involved in the smart specialisation process (local government, HEIs, businesses) to create a shared internet portal or platform for the exchange of relevant information. In addition, the report highlights the potential for vocational education to be adjusted to more closely meet market needs and for paid internships for students to be introduced by companies or local authorities in areas that are covered by the RIS3. A further requirement for closer involvement in the RIS3 would be for ULODZ itself to become more flexible and responsive to the needs of the region. Again, there are deeply-entrenched structural barriers working against this, but the report does tentatively indicate that the recently announced national higher education legislation may create opportunities for HEIs to move in this direction. Finally, the report points to the need for increased cooperation between the different HEIs in the region (e.g. between ULODZ and the Lodz University of Technology) in order to deliver research projects of value.

3.5 - POLIMI (Polytechnic University of Milan)

3.5.1 - Introduction and methodology

POLIMI hosted three different workshops that provided the basis for their WP3 report. The first was a larger gathering, including representatives from the Lombardy government, the 13 HEIs in the region, and the 9 Technological Cluster organisations (see below). The second took the form of a seminar by Professor Andrea Bonaccorsi from the

University of Pisa as part of the Thinking Smart consortium meeting in Milan, attended by project partners, advisory board members, and academic staff from POLIMI. The third was a 'closed door' meeting for key staff members (e.g. Heads of Departments) from POLIMI.

3.5.2 - Overview of the regional RIS3

Lombardy first published its RIS3 in 2013 and has already revised this several times. The strategy has seven 'vertical' priority areas. Reflecting the size of the regional economy, these refer to relatively broad industry areas – Aerospace, Agri-Food, Green Industry, Creative and Cultural Industries, Health Industries, Advanced Manufacturing, and Sustainable Mobility. Most of these priority areas are closely matched to one or more of the nine Regional Technological Clusters who (predating the RIS3) are central to the strategic approach taken in the region. However, the report emphasises that the RIS3 has been used as a vehicle to move away from the previous vertical logic of research and innovation strategy in the region, and aim to develop cross-sectoral competences and collaborations. Accordingly, the strategy also has a cross-cutting, horizontal priority – smart cities.

3.5.3 - The role of the HEI in RIS3 design and implementation

The design of the RIS3 for Lombardy was shaped by input from various local stakeholders, including all the HEIs in the region. This included representatives from POLIMI, who participated in several of the thematic working groups established as part of this strategy formation process. Related to this, members of POLIMI are also closely involved in the Regional Technological Clusters who are integral to the RIS3. This ongoing engagement in the strategy is, however, mainly by individual academics rather than as an institution-wide response. The report emphasises that POLIMI is far from a monolithic institution, and although strong regional collaboration is present, this is predominately at the departmental level.

3.5.4 - Gaps, barriers, challenges

Related to the preceding point, the main challenge identified in the report is that University research, teaching and engagement initiatives relevant to the RIS3, while positive, "lack both an adequate dissemination and a connection to the "broad picture" of a strategic, long term alignment of POLIMI to the RIS3 implementation process" (p.9). The report also identifies the possibility that the deep embeddedness of POLIMI within the current innovation system of Lombardy (including very strong ties to the Regional Technological Clusters) may prevent members of the institution from adapting to new demands (e.g. for teaching provision in new areas, applications of research in new market areas) that may arise from the regional policy process. Other challenges identified in the report include a paucity of good data to evaluate levels of HEI impact on the economy and the need for members of regional HEIs to promote their engagement initiatives in terms framed by the RIS3.

3.5.5 - Identified opportunities for further/future involvement of the HEI

The authors note the opportunities generated by a new (November 2016) regional government bill promoting "strategic partnerships between public and private stakeholders on research topics and priorities of direct interest and relevance for the resolution of societal challenges" (p.9). This bill introduces of several new coordination instruments to enhance the relationship between HEIs and the social and economic actors in the region (e.g. an expert group, an open data policy framework). The report also identifies a greater focus in the latest iteration of the regional RIS3 on the need to identify emerging industries of strategic importance to the region, and therefore a continuation of the entrepreneurial discovery process. This ensures the existence of future opportunities (including the future actions of the Thinking Smart project) for POLIMI to become more closely aligned with the RIS3.

4. Cross-partner analysis

This summary section will identify common themes across the five reports under each of sub-headings used above. In addition to aiming at consolidation of the key work package findings, it will be sensitive to divergences between the partners that relate to their very different institutional and territorial contexts. As supporting background information, an appendix following this section presents some standard quantitative information about each of the partner institutions (table A.1) and their regions (table A.2) that has been collated from publicly available sources by the authors of this synthesis report.

4.1 – Regional RIS3s

There are notable differences between the five RIS3s covered here that reflect varied regional governance systems, economic circumstances, and approaches to innovation policy. All five regions have a smart specialisation strategy of some form, but these are at different stages of development. For instance, in the North East of England, this is still emerging as a strategic framework due to the voluntary nature of the requirement to produce a regional-level RIS3 in England, and the relatively limited resources at the disposal of the relevant economic development vehicle (the North East Local Enterprise Partnership). In contrast, the strategies are far more advanced in terms of implementation and subsequent revision in the cases - Lombardy, Valencian Community, and Lodzkie - where strong regional government institutions with responsibility for economic development are present. For the Northern Region in Portugal, this role was fulfilled by CCDR-N, a well-established government body that coordinates planning and economic development strategy for this region.

The content of the strategies are also quite varied, particularly in terms of the granularity of the smart specialisation priorities identified. In some cases, these priorities refer to a range of quite broad sectors (e.g. North East England, Lodzkie, Northern Portugal). Valencia is the main exception here in emphasising 'inter-sectoral spaces' as smart

specialisation opportunities where their sectoral and technological capabilities interconnect. Lombardy also signalled an interest in moving towards a strategy focused on cross-sectoral competences, but their main priorities are still 'vertical' industry areas that correspond with established Regional Technological Cluster organisations and sectoral strengths within its economy.

4.2 – Role of the HEIs in RIS design and implementation

The contribution of each of the five HEIs covered in this report to the design and implementation of the RIS3 was framed by its specific relationship with their region. This relationship was in-part shaped by the size of the regional higher education sector. In the larger regions of Lombardy and Valencia (both encompassing a major metropolitan area), there are a number of HEIs, which means that the impact of a single university on the regional strategy is relatively limited. However, in both cases the university in question did provide an input to the formation of this strategy. For UPV this was predominately on a collective basis as part of a regional association of universities. The five public universities in the region (including UPV) have also been recognised by the Valencian Government as having an important role to play in the implementation of the strategy. For POLIMI, the contribution to the regional RIS3 was mainly reported to occur through the activities of individual academics, including through their involvement in the activities of the Regional Technological Clusters.

By contrast, in the North East of England and Lodzkie regions there are fewer HEIs. This means that the universities in question (Newcastle and Lodz), both of which are leading research-intensive institutions within their region, were more central to the development of the RIS3. For ULODZ, this involved participation from numerous senior management members and academic experts from the institution. For NU, it was largely restricted to a team of researchers who prepared a report that directly informed the initial strategy, but this did represent a crucial source of intelligence for the Local Enterprise Partnership at a

point in time when they were still building their capabilities in this area. In both of these cases, however, it is noted that the subsequent alignment of the institution to the implementation of the strategies has been limited.

Northern Portugal has a number of HEIs (largely due to a concentration of these within the city of Porto). Despite its relatively small size, UTAD does however have a distinctive role within the RIS3 of this region relating to its status as the only HEI in the predominately rural Douro sub-region. This means it has made a specific contribution to the implementation of the RIS3 focused on the few smart specialisation priorities in the wider strategy that correspond to the agricultural economy in which UTAD has specialist strengths.

4.3 – Gaps, barriers, challenges

Significant barriers to innovation exist in the case study regions that a successful implementation of their RIS3 will have to overcome. Notably, four of the five regions have a GDP per capita that is lower than that of their respective countries (see table A.2). The exception here is Lombardy, which is a major economic centre of Italy. The relatively less-developed regions include two old industrial regions (North East England and Lodzkie), a region with large rural areas (Northern Portugal), and a region that is reported to be heavily dependent on low-value manufacturing activities (Valencian Community). These regional economic characteristics are, in turn associated with structural weaknesses - including low productivity, skills, enterprise, R&D spending, and ability of firms (particularly SMEs) to absorb new knowledge – that prevent the building of innovation capacity.

The presence of universities (including the case study HEIs) in these regions represent an indigenous capability that can potentially be leveraged to help address some of these gaps

in the innovation system. However, the effective connection of university resources to the regional economies is in itself a source of further challenges within the case study regions. For UTAD, UPV, and ULODZ, this includes fundamental challenges of university-industry collaboration such as lack of alignment, trust, and capacity to engage in technology transfer on both sides. These issues are also partly rooted in the prevalent drivers for universities in national higher education systems. For instance, in the UK system in which NU operates, the dominant incentives are for promoting excellent research and teaching that, despite a growing 'impact' agenda within UK higher education policy, are not strongly connected to regional economic needs or strategies. Similarly, for UPV the key barrier to aligning itself more towards the regional RIS3 is the lack of funding opportunities from government that are oriented towards research in the priority areas identified in the strategy. The decentred organisational structure of research universities is also recognised as a challenge to institution-wide mobilisation in response to regional strategic goals. For instance, POLIMI has had extensive engagement with regional activities promoted through the RIS3, but this has mainly been by individual academics rather than at an institutional level. By contrast, the still provisional nature of the RIS3 in the North East of England, means that this has yet to reach a stage where it becomes relevant to academics in NU beyond a small number with a direct interest in smart specialisation.

4.4. – Future Involvement of the HEIs in RIS3

The RIS3 are recognised as representing an ongoing opportunity for the five case study universities to deepen their involvement in helping to support innovation in their region. Where a well-developed set of smart specialisation priorities are developed, such as in the case of UPV, this can be used to identify specific areas where the HEIs capabilities can be applied. More generally, the priority domains can act as focal areas around which the university and region can concentrate on strengthening their collaboration in the future. A number of the reports highlighted possible coordination mechanisms through which this could be achieved. For instance, shared forums for information exchange with

local firms, visiting professor positions for individuals with industry experience relevant to smart specialisation domains, systems to better monitor developments in the regional economy and progress against RIS3 goals, and paid internship schemes for students in innovative firms.

Notably, many of these ideas about where collaboration with business can be increased relate to the teaching rather than research activities of the case study HEIs. This reflects a growing recognition that, although smart specialisation was introduced as a concept to guide research and innovation strategies in Europe, putting these strategies into practice raise new questions about the local availability of advanced skills and knowledge to which higher education provision is central. However, there is still a need for further understanding of how universities can most effectively identify and respond to this specialist labour demand in emerging smart specialisation domains as part of a joined-up regional strategy (Vallance *et al.*, 2017). The findings from across this work package have contributed to this by highlighting the need for increased dialogue with local employers around their current and future labour needs, and for dedicated mechanisms such as placements or internships through which higher education teaching can incorporate learning of practices within industry. The UTAD report, in particular, foregrounds teaching as the key mission of this HEI. This suggests the possibility of extending the areas in which the institution offers training support beyond their current focus on agricultural and winemaking to also include related areas (e.g. traditional arts, craft and heritage) that are relevant to the local economy. In cases such as UPV and NU, however, the difficulty of universities introducing new teaching programmes within inflexible systems for funding higher education are highlighted when these do not coincide with existing student demand. UTAD and NU both also identify the potential contribution of graduates from their HEIs in areas such as creative arts, humanities, and social sciences that may not be associated with smart specialisation areas focused more directly on, for instance, engineering or life science related fields.

Finally, several of the reports recognise the importance of shifting national or regional policy landscapes to the unfolding of smart specialisation in their specific context. For instance, this includes a fundamental reform of the national higher education system (ULODZ), a regional bill aimed at enhancing HEI social and economic engagement (POLIMI), and the revival of a more interventionist national Industrial Strategy agenda (NU). These changes may disrupt relationships that HEIs have already established, but also may provide new opportunities to align more strongly with smart specialisation priorities in their region.

Appendix – Background Information on case study HEIs and Regions

Table A.1: Key characteristics of featured HEIs

HEI	Foundation Year	Taught Students (ISCED 5-7)	PhD Students (ISCED 8)	Academic Staff (FTE)
NU	1834[1]	20,500	1,900	2,300
UPV	1971	32,500	Missing	2,200
POLIMI	1863	41,600	1,100	2,500
UTAD	1979[2]	6,900	200	500
ULODZ	1945	38,800	1,300	2,200

Data source: ETER project. Download date 15th March 2017". Data for 2013. All figures have been rounded to an appropriate level.

[1] Became an independent university in 1963.

[2] Recognised as a university in 1986.

Table A.2: Key characteristics of featured regions

Region (Country)	Population (2016)[a]	Population Density (Inhabitants per KM²)[a]	GDP (PPS per inhabitant 2014)[a]		Innovation Scoreboard Category (2016)[b]		Quality of Government EQI100[c]	
	Regional	Regional	Regional	National	Regional	National	Regional	National
North East England[1] (UK)	2,632,000	307	21,800	29,900	Strong	Strong	81.81	81.76
Valencian Community (Spain)	4,933,000	213	22,000	25,000	Moderate	Moderate	65.50	62.30
Lombardia (Italy)	10,008,000	419	34,700	26,400	Moderate	Moderate	46.76	39.21
Norte (Portugal)	3,604,000	170	17,800	21,400	Moderate	Moderate	54.68	61.61
Lodzkie (Poland)	2,479,000	137	17,400	18,600	Moderate	Moderate	43.91	41.91

Data Sources: [a] Eurostat. [b] Hollanders *et al.* (2016). [c] Charron *et al.* (2012).

[1] Note, this refers to the NUTS1 North East region, which is slightly larger than the North East LEP area covered by the RIS3.

References

Adonis, A., Mottram, H., Curry, D., Hutton, W., Rosewell, B. and Ruffer, J. (2013) *North East Independent Economic Review Report.* Newcastle, NELEP.

Bonaccorsi, A. (2017). Addressing the disenchantment: universities and regional development in peripheral regions, *Journal of Economic Policy Reform* 20 (4), 293-320.

Charron, N., Lapuente, V. and Dijkstra, L. (2012). *Regional Governance Matters: A Study on Regional Variation in Quality of Government within the EU*. Working Paper 01/2012, Directorate General for Regional Policy. Brussels: European Commission

Foray, D. (2015). *Smart Specialisation: Opportunities and Challenges for Regional Innovation Policy*. Routledge: Abingdon.

Foray, D., David, P. A. and Hall, B. H. (2011). Smart specialization: from academic idea to political instrument, the surprising career of a concept and the difficulties involved in its implementation, MTEI-WORKING_PAPER-2011-001.

Foray, D., Goddard, J., Goenaga Beldarrain, X., Landabaso, M., McCann, P., Morgan, K., Nauwelaers, C. and Ortega-Argilés, R. (2012). *Guide to Research and Innovation Strategies for Smart Specialisation (RIS 3)*. European Commission: Brussels.

Hollanders, H., Es-Sadki, N. and Kanerva, M. (2016). *Regional Innovation Scoreboard 2016*. European Commission: Brussels.

Kyriakou, D., Martínez, M. P., Periáñez-Forte, I., & Rainoldi, A. (Eds.). (2017). *Governing Smart Specialisation*. Routledge: Abingdon.

Markkula, M. and Kune, H. (2015). Making smart regions smarter: smart specialization and the role of universities in regional innovation ecosystems. *Technology Innovation Management Review* 5 (10), 7-15.

Vallance, P., Blažek, J., Edwards, J., Květoň, V. (2017). Smart specialisation in regions with less-developed research and innovation systems: a changing role for universities?, *Environment and Planning C; Politics and Space* doi.org/10.1177/2399654417705137 [Advance Access].

Virkkala, S., Mäenpää, A. and Mariussen, Å. (2017). A connectivity model as a potential tool for smart specialization strategies, *European Planning Studies* 25 (4), 661-679.