THINKING SMART
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Toolkit for the engagement of
HEI in regional growth

Guidelines for the contribution of

HEI to RIS3

Output 2.3

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ABSTRACT

This document finds its foundation on the results of Task 2.1 and Task 2.2. These tasks include the research on best practices for the contribution of Higher Education Institutions to the Smart Specialization Strategies, as well as the elaboration of ten case studies across Europe. The results presented in the output 2.1 "Best practices for the contribution of HEI to RIS3" provide the collection and analysis of best practices and lessons learnt implemented by higher education institutions in Europe with regard to their involvement, participation and contribution to regional development, with a special focus on smart specialisation strategies. Based on this previous work and the reflections of the project consortium, consequence of all the documentation and case studies worked out, this deliverable provides some step basic guidelines to be accounted for the contribution of higher education institutions to the smart specialization strategies.

These guidelines provide alternatives to implement an entrepreneurial discovery process in higher education institutions in order to identify the regional needs, priorities and opportunities and its critical mass. Additionally, they intend to support the introduction of smart changes in HEI at the strategic and operational level to allow their alignment with regional needs.

1. INTRODUCTION

1.1. R+I Smart Specialization Strategies as seen from Higher Education Institutions

According with the practical guide: "Connecting Universities with Regional growth" (September 2011) research and development play a key role in regional development, providing the basic knowledge that supports innovation.

In fact, one of the ways in which universities can contribute to the development of its region is by giving access to its research to regional actors in the private and public sector and contribute to innovate their linkages to regional growth. Hence, it is important to design contributions to drawn that university research into the regional innovation process by demand from the Quad-Helix actors (industry, administration, HEIs and society). University expertise is relevant to business and household activities, areas that the actives of the university contributions can be mobilised – for example in relation to regional innovation, social innovation and public policy. The contribution of the university research to regional growth in this form is multi-disciplinary, based in experience and focused in his strengths.

Therefore, it is crucial to identify actions or programs addressed to improve the role of universities in regional development. In this way to enhance regional innovation through research activities, to promote enterprise, business development and growth, to contribute to the development of regional human capital and skills, and to improve social equality through community development and 'place making', they can help to unlock the knowledge and expertise of the university for the benefit of local businesses.

The above actions can be delivered in response to business request in the region and be supported it with specific projects that stimulates the demand for university research instead of industry for this research. Also they can give support to SMEs to purchase that can range from addressing problems in the business operations to helping unlock innovations in products or services helping to build a deeper understanding of the actions and demands. Other actions encourage the mobility of human capital between the university and local businesses. Graduate (often post doc) staff from the university may work on research projects (usually for 1-3 years) within a local company and get commercial and academic supervisors. As well as the obvious

benefits of diffusing research into commercial arenas. Also can develop soft skills among the people involved in the project which leads to improved relationships between the university, local companies, government and society; and creates greater opportunities for future collaborations. The reliance on human capital and 'soft skills' in the success of RIS3 is seen as complex but potentially transformational activity for the beneficiaries.

Actions like Science Parks and Research and Technology Centres require significant capital investment. However, what takes place within them that has the potential to have a transformational impact. Science parks are in general stablished to house new and existing businesses in a 'hub', often with strong links to research centres and universities. Their aim is at supporting the exploitation of research that has already proven to have commercial applications. In contrast, Research and Technology Centres generally support technologies at a much earlier stage in development or technological 'readiness'. They provide a focus for the downstream investment in new technologies emerging from the research base in universities in order to bring them closer to market commercialisation and bridge the gap between research and its application.   Universities are therefore more likely to be involved in the activities of research and technology centres than science parks. There will tend to be a high level of public investment in the activities in such centres. This is natural as they play important roles in supporting the development of national innovation and competitiveness and consequently they quite often regard being regional stakeholders.

In addition, the Europe 2020 strategy clearly signalled the importance of industrial competitiveness for growth and jobs as well as for Europe's ability to address grand societal challenges in the coming years. Mastering and deploying Key Enabling Technologies (KETs) in the European Union is central to strengthening Europe's capacity for industrial innovation and the development of new products and services needed to deliver smart, sustainable and inclusive European growth.

The practical guide "Connecting Universities with Regional growth" (September 2011) these actions vary in their depth, complexity and the time it takes to establish and maintain them, and so it may be necessary for the region and the HEI to think in terms of an evolutionary process. This agrees with what we have observed in the ten case studies proposed and analysed under the umbrella of thus "Thinking Smart project".

When designing actions, we need recognising that the regional innovation systems operates in a wider national and international context. So to promote and develop those that enhances regional development; it is important to be aware of strategic influences of national and regional innovation policy regarding:

- **Technology readiness**: stages between basic research and 'market ready' products and services and recognise the danger of a 'missing link' between the two stages, where activities are too far from basic research to interest universities and too far from market to interest private companies. This innovation chain will be sector specific and it is therefore important to understand the nature of each of the stages in relation to the industrial development policies of the region in order to determine where public investments is needed.

- **CONSULTANCY SERVICES**: It enables businesses to access the vast knowledge resources of the university and helps to embed university expertise within the private sector, thus demonstrating impact of their research. Businesses that engage with universities are more likely to be innovative and growth oriented and therefore have the potential to make a greater contribution to their local and regional economy.

- **Innovation Vouchers**: Encouraging businesses to engage in innovation will be for many a step into the unknown. Universities with their research orientation and curiosity driven cultures have a large role to play in fostering innovation in their regions.

- **Knowledge Transfer Partnerships**: an important tool in disseminating research from universities into local businesses and communities. These ensure that maximum 'value' from the investment in research goes into the region. Researchers who are not subject to daily commercial pressures of running the business can be highly skilled in helping to identify and overcome endemic problems. Furthermore, universities may be working with a number of businesses in the same industry, so can diffuse learning between them. University researchers may be operating in a much broader geographic sphere than SMEs and therefore can bring global experience and expertise to help address local issues.

- **Science and Technology Park**s: Science parks usually have formal and operational links with centres of knowledge creation, such as universities, and create some mechanism designed to exploit research carried commercially out there. Science parks are often

built around an industry specialism that a region or area is trying to develop or exploit, and as such can act as a showcase for the region in marketing itself and a means of attracting new investments. The underlying theory behind Science parks is that there will be agglomeration affects from collocating research intensive businesses that will benefit the wider economy.

- **Research and Technology Centres:** These centres are an important part of the innovation system, with potential to make a major long-term contribution to economic growth. They enable businesses to access equipment and expertise that would otherwise be out of reach, as well as conducting their own in-house R & D. They also help businesses access new funding streams and point them towards the potential of emerging technologies.

Summing up, Higher Education Institutions (HEI) see R+I smart specialization strategies (S3) as an increasing opportunity to be recognised by political actors at European, national and regional levels of their key role in the definition, implementation and impact enhancement of RIS3 strategies.

Although in many European region universities have taken an increasingly active role in the design and implementation of RIS3, in other regions progress has been slower.

The recognition that universities are a key partner for regional development is not yet a general reality across Europe and more needs to leverage the benefits that higher education institutions bring to regional development across Europe. In these cases, HEI feel that continuous political support is required to ensure an ongoing dialogue among relevant stakeholders in regional innovation.

Platforms for dialogue bringing together universities, public authorities and industry at national, regional or national levels should be encouraged, along with focused oversight groups that include significant university representation.

1.2. Role of HEI in the RIS3 elaboration and implementation as seen by government and industry

The practical guide "Connecting Universities with Regional growth" (September 2011), and the case studies analysed under Thinking Smart project, confirm that many universities offer short term placements with regional companies as part of their industrial activity. This is beneficial in a number of ways, not least by giving students an insight into the workings of the regional industry which may result in them being more inclined to stay in the region and work rather than be attracted to large corporate firms (who may be located elsewhere), so this can help retain talent in the region. For the industry, they can benefit from someone bringing new skills, insights and approaches to the business (which might not have employed graduates normally), also gaining an important link back in to the university, which might make the business more likely to engage in the future. For the region a new generation emerges, people who understand and can operate in both the academic public sector and business worlds, and create a multidiscipline interface of the sectors.

In addition to promoting the development of entrepreneurial skills and providing students with an opportunity to try the entrepreneurial 'experience', universities often contribute to the development of the business base in the region by supporting staff and students to start a business. These are important contributions to the local economy as evidence shows a positive correlation between levels of academic achievement and the likelihood of starting a 'high growth' business. Furthermore, academic 'spin outs' are an important mechanism for the diffusion of research and innovation into the local economy and of course ensuring that talent and intellectual property remains in the region.

Universities quite often enjoy a high corner to observe the emergence of new clusters in a region through the networks they form when working with companies on research programmes. The University can therefore act as a catalyst or facilitator in the development of network and cluster organisations. These are particularly important as they can aggregate demand from a number of firms for innovation and thus strengthen the ties between university research activity and commercial exploitation. Nevertheless, HEIs can go beyond this by promoting cooperation between clusters, from European perspective of regional development.

By their presence in a region and through their research activities HEIs can also stimulate the development of intellectual property within the region as empirical evidence that shows a positive correlation between numbers of people with higher education in a region and patent applications.

Many universities reach far beyond their regional or even national borders through attracting students from other regions and countries by the provision of high quality and specialised teaching programmes, and/or by working with other researchers (academic or private) around the world on collaborate research projects or as consultants. These internationally linked universities are a huge asset for their regions if these linkages can be harmonised for the benefit of the development of the region, either attracting investment, linking local companies to international research excellence and expertise or attracting talented individuals to the region to work or study at the universities.

However, the 'flip' side of this is that researchers tend to be spatially blind when it comes to their work – they want to collaborate with the best people and companies, wherever they are located. In regions where there is little R&D activity and where the business base is primarily comprised of micro and small enterprises, regionally based world class researchers will be inclined to look for partners in other places, causing knowledge and innovation to spill away from their own region.

Regarding the vision of governments, the region needs strategic alignments with HEIs and actions that guarantee regional development, paying special attention to the following potential impacts:

- **Graduate Enterprise (training, placements, new firms):** Universities that are actively promoting and supporting entrepreneurship amongst students and graduates are supporting their local and regional economies in two key ways: firstly by adding the pool of businesses in the economy; and secondly, by retaining high skilled individuals in the region.

- **University Spin offs and Spin Outs**: these companies are innovative, high-tech, growth orientated and generally embodying all the desirable traits of 'knowledge economy'. They quite often are regarded a relatively cheap way to promote the development of

their economies by some policy makers, as the knowledge and human capital is already present in the region.

- **Network and Cluster Development**: Cluster development can help identify a region's economic strengths, identify realistic ways to shape the region's economic future and help distinguish itself from other regions. It creates synergies within sectors, as local firms trade with each other, collaborate on projects and provide a platform for shared marketing activities. There can be other less direct benefits for the region as well. Networks and cluster groups provide a medium for intelligence gathering the sector for regional policy makers. For example, networks and clusters have been pivotal in developing demand led skills strategies in some local areas and regions. Effective network and clusters can develop and grow with minimal ongoing public investment, as companies are willing to pay for membership of groups that bring tangible benefits.

- **Encouraging Intellectual Property Development**: Patenting and IP protection are vital ways to foster continued national innovation. Research shows a positive correlation between high levels of patent applications and regional and national economic growth. IP protection is an important source of revenue for many research institutions, and a stimulus to further research and innovation and to science/industry partnerships.

- **International Linkages**: A globally   connected university acts as a 'window' on the region, and builds and enhances the image and reputation of the region to the wider world. This can facilitate the development of the region in a number of ways: by connecting people from all over the world with the region and acting as a vehicle for future cooperation. Attracting researchers from around the world who will contribute to the development of new technologies may result in new, innovative spin out firms established; act as a lever for international investment as firms grow around areas of international specialism and expertise.

Government and Industry see HEIs as essential actors for smart specialization strategies (S3) related to culture, economy and mostly to technology. In fact, HEIs are seen one of the engines of Key Enabling Technologies (KET), which are investments and technologies that will allow European industries to retain competitiveness and capitalise on new markets.

This smart specialization makes intensive use of knowledge associated to a high intensity of research, development and some cycles of fast innovation. HEI provide the knowledge base that may accompany the high expenditure of capital and need of very qualified labour. Fields where this is clear are such as biotechnology, nanotechnology, micro- and nano-electronics, photonics, advanced materials, and advanced manufacturing technologies. The KET are incorporated in many different industry sectors and value chains and given their cross cutting nature are fundamental to the modernization of many other industrial sectors.

This relevance is recognised. Its potential impact in the economy, generating new products, goods or services with properties and characteristics strongly innovative, and the consequent generation qualified jobs.

Universities can play a key role in defining a regional S3 by contributing:

- A rigorous assessment of the region's capabilities and competencies,
- The regional entrepreneurial discovery process by bringing global awareness and partnerships across regional borders
- Providing specialist research expertise and links to national and international networks of knowledge
- Providing qualified labour through their teaching programmes
- Capacity building on the demand side through new business formation, student enterprise, and graduate placements
- Encouraging staff to engage with local businesses.
- Building the social relations that underpin the regional innovation system for the formulation and indeed, implementation of S3.
- Meeting major societal challenges that have both global and local dimensions.
- The needs and realise the opportunities of an ageing population.
- Local knowledge creation and its translation into innovative products and public and private services.
- Engaging creative arts and social sciences as well as technical and natural scientists.

2. Entrepreneurial discovery process in HEIs

2.1. Diagnosis of the cooperation among the HEI, government and industry

Collaboration between HEI, government, industry and society (the Quad-Helix) has not been always as fluent as expected and quite often universities have behaved as an ivory castle while industry has quite often to train to professional after graduating a 5 or 6 year's degree.

Therefore, the appearance of RIS3 was a keystone in order to encourage and enable public authorities to promote the active engagement of universities and other higher education institutions in regional innovation strategies for smart specialisation, in cooperation with research centres, businesses and other partners in the civil society.

In this line, we find the wonderful publication EU Guide "Connecting Universities to Regional Growth" which in fact can also be used by academic and economic partners to explore the benefits they can expect from working together for regional development. In its presentation written by Johannes Hahn, Commissioner for Regional Policy, and Androulla Vassiliou, Commissioner for Education, Culture, Multilingualism and Youth, they assert that in order to maximise the effectiveness of universities in contributing to regional growth, the aforementioned guide provides an analysis of their possible role and presents a range of delivery mechanisms. It explores how to overcome barriers, to build capacity and to implement partnerships and leadership processes to interconnect the partners in regional innovation systems. It is a practical tool with recommendations, part of a series of guides prepared in the framework of the Smart Specialisation Platform set up by the Commission for providing methodological assistance and practical guidance to national and regional policy makers involved in designing and delivering innovation strategies for smart specialisation.

The goal was to facilitate discussions between the stakeholders so that it might facilitate the preparation of the programming period 2014-2020 as a reliable aid after the proposals adopted by the Commission for the future Cohesion Policy Regulations.

All the regions can make a smart use of the possibilities of RIS3 by proposing a structure on which to rebuild the competitive advantages of their strengths thanks to the support for research and innovation.

Based on business cooperation and the creation of synergies between public and private agents that form our innovative ecosystem, it is possible to achieve an economic system which follows manufacturing, but in a much more efficient and innovative form, with maximum use of multiplier capabilities digitisation, which regenerates and attracts productive clusters.

2.2. How to identify HEI capabilities and barriers

Universities dealing with economics, public policy and administration, as well as those dealing with specific policy areas (such as industry, health, agriculture, environment and culture) can provide government, industry and society with strategic advice, as well as experts to work directly on regional development priorities. Universities are a critical 'asset' of the region due to the linkage that continuously maintain with the region, the government, and the society trough their students.

The broad experience of the universities while teaching and researching can map the capabilities of the region and the barriers to face while implementing RIS3. Some of the characteristics identified for regional development are:

- Regions experience a process of convergence in the area of labour productivity in the last few years. During the period of economic growth, the increase in the employed population could not followed by higher levels of production per hour worked due to a specialization towards less productive sectors.

- Regions present a productive structure and services (trade, hotel, transport and construction), basic engines of the economy with highest impact of the economic crisis. The progressive loss of impact of industry in the regional economy requires a different strategy for economic relaunch based on the promotion of intensive industrial technological activities and the development of advanced and intensive human capital.

- Regions with a industrial market tradition, reflected bigger impact of employment in sectors like ceramic industry, chemistry, metallurgy, the automobile industry; as well as footwear, textiles, tiles, toys and furniture among others.

- Industrial regions must improve its productivity levels in the industrial sectors mainly through two lines of action: the first one: improving in sectors with a high weight in the regional economy and whose productivity is lower than the national average of the same sector; and second, increasing the presence in the region of more productive industrial activities.

- Region with an important tourist attraction at international level. Despite the arrival of the crisis, the volume of tourists has continued its trend of growth and, at the same time, the offer and the demand has diversified.

- Logistics networks in the regions provides an attractive location for locating multinational companies with a high degree of national and international accessibility, defining it as a key point of the region.

- Regions with strong entrepreneurial culture must obtain financial support to develop R+D+I projects in their processes and products, and even in their capacity to export abroad.

- Highly qualified human resources increase the productive industry of the region. Since the beginning of the 21st century, a key aspect for the incorporation of knowledge into the productive mass is the specialization in activities of technological content that makes the degree of utilization of this human capital relatively low, causing a loss of talent to the outside in search for a job opportunity.

- Important network of knowledge-generating institutions forms the technological map of the region (technological institutes, research centres) and promote R&D&I and its application in the productive industry.

- Regions that has suffered with greater intensity the hardness of the economic crisis across Europe has caused the loss of some of its engines, such as residential construction, public and private investment, industrial activity and domestic demand.

- Regions with industrial clusters, technologically powerful when corresponding to the branch of the activity, and there is still ample space to carry out partner actions in multiple directions: technological, commercial, shopping, brand, marketing, etc.

- Regions should take advantage of the growth of non-market services (health, social assistance and education) to enhance the capacity of the regional productive fabric by incorporating applied R+D+ I to the hospitals, centres and public or private institutions involved in these activities.

- Regions have to develop projects of green economy so that great social interests find solution to problems of energy efficiency and sustainability of the environment.

- Regions can exploit its geographic location by achieving logistical advantages in the national and European markets, offering a logistics service with lower costs and a high level of quality in its execution.

Following the "Guide to Research and Innovation Strategies for Smart Specialisations (RIS 3)", there is a range of mechanisms by which universities can contribute to regional development. Universities can increase the entrepreneurial spirit of their staff and students, provide advice and services to SMEs, and participate in schemes promoting the training and placement of highly qualified graduates in innovative businesses. They can also host incubators for spin-offs in science and technology parks and provide valuable input to innovative clusters and networks. These mechanisms can be stand-alone projects or within wider strategies. The latter is the ideal and will ensure maximum impact but is difficult to achieve as there are many barriers to overcome and there are few good practice examples to draw on. Furthermore, Universities and Businesses should directly cooperate in curricula design and curricula delivery to ensure that graduates have the right skills and transversal competences. By having businesses cooperating with the educational side of Universities, talent attraction and retention would enhance in the region. Universities can also play an important role in the field of vocational training.

Improving the contribution of universities to regional growth by implementing such mechanisms requires the interconnection of the partners in the innovation systems. 'Disconnections' may occur between the partners and the barriers to overcome are of a different nature. They can be internal to the university and involve the capacity to 'reach out' to the wider region (i.e. supply side). For instance, universities are usually focused on teaching and research (driven by

academic outputs) and are part of national academic systems that are not targeted to respond to regional needs. As a result, some universities are considered being 'in' the region but not 'of' the region where they are located.

Barriers and enablers may be organised as forming the following topics:

- ✓ Perceived institutional purpose
- ✓ Channels of engagement
- ✓ Funding sources
- ✓ Operating principles
- ✓ Industrial composition
- ✓ Link between systems
- ✓ Collaborative capacity and skills

Here each of them may be seen from an internal perspective (i.e. supply side) or as it pertains to the external environment (i.e. demand side).

Usually academic institutions do have a great inertia and are not receptive to innovation. This happens even in young universities. Thus, an introspective questioning is essential in order to identify HEI barriers.

The answers we might find in search of these barriers should consider the due perspective about if such identification takes into account the HEI capabilities.

In search of identifying HEI capabilities and barriers a number of questions must be arisen concerning several issues, many of them being pointed out in the aforementioned Guide.

Within this *Thinking Smart* we find relevant to study the answers to the following questions:

- Will the HEI create new or strengthen existing mechanisms for cooperation between businesses, sectors and/or universities
- Will research/technology resources, and infrastructure of HEI, have a higher effect on industry/society?
- Will synergies and coherence between ongoing HEI projects, programmes and policies improve?
- Will HEI improve conditions for entrepreneurship, incubation, spin out and spin off?
- Will HEI enhance human capital in the region, facilitating mobility of professionals across innovative domains and attracting skilled migrants to the region?
- Are likely to be smoothened the pathways for industry to access innovation assets in the universities?
- Will HEI have easier access to finance and investment?
- Will off the region investment be attracted?

- In what fields will HEI projects and programmes support the region to address societal challenges?
- How will HEI's support visualize?
- Will HEI increase its cooperation with other universities and businesses in the region, especially with indigenous SMEs?
- Will HEI facilitate detecting champions to lead the tasks involved in cooperating with partners?

2.3. Putting the HEI in action

There are number of ways to put HEI in action. For it we should have in mind that HEI can play a key role in helping public authorities to build smart strategies by enhancing the skills and competencies of their staff working in the field of economic development through consultancy services and training of graduates. Here almost any university department might be involved: those with scientific or technological feature as well as those related to fields such as economics, geography, planning, public administration, business management, health, agriculture, environment, culture…

In fact, it might be sensible to have some organisational unit just to bring these academic skills together. Within each of these roles, as mentioned, there is a variety of mechanisms to employ, either as individual projects or collectively as part of a wider programme to support a research smart specialisation strategy.

Some of these actions will arise in a natural way since they will involve a regional impact of through the standard HEI activity visible as part of its teaching, education, research and purposive regional interventions initially funded and there will be mechanisms that will make use of external funding sources and then embed into the HEI structure.

 The Guide to Research and Innovation Strategies for Smart Specialisation (RIS3); (May 2012) proposes the following actions:

- establishing a regional higher education partnership to better understand the regional situation and to overcome the barriers, with a possible technical assistance budget,
- ensuring mechanisms allowing universities and business in the region to cooperate in curricula design and in jointly delivering education in an innovative way, fostering graduates with regional relevant competences and with transversal skills including entrepreneurial attitude,

- mapping the regional higher education system in terms of their degree-awarding ability, research activities and possible cooperation with regional partners,
- assessing the connectivity of the universities to the regional public and private sectors to move towards a situation where universities are key players,
- selecting, designing and evaluating interventions that strengthen the connectivity of universities in the region to the region, by moving from simple to complex projects.
- In the future programming period 2014-2020, support under the European Agricultural Fund for
- Rural Development (EAFRD) could be provided to Universities in the following areas: Knowledge transfer and information actions for the provision of vocational training and skills acquisition actions, demonstration activities and information actions. These should be provided for persons engaged in the agriculture, food and forestry sectors, land managers and other economic actors which are SMEs operating in rural areas;
- Advisory services for the improvement of the economic and environmental performance as well as the climate-friendliness and resilience of the farms, forest enterprises and rural SMEs, and/or relevant investments;
- Studies and investments associated with the maintenance, restoration and upgrading of the cultural and natural heritage of villages and rural landscapes, including related socio- economic aspects;
- Co-operation among different actors in the Union, agriculture, food chain, forestry sector and among other actors (including Universities) that contribute to achieving the objectives and priorities of rural development policies (e.g. pilot projects; new products, processes and technologies; public-private partnerships; etc.) This also covers support for clusters and networks, and for Operational groups under the European Innovation Partnership where universities could also take part.

Thinking Smart project has identified, through the study of ten case studies, some mechanisms that demonstrate the contribution and integration of universities in/to regional development and S3. These Universities cover different scenarios in different regions of Europe and have successfully integrated the smart specialisation strategies in their strategic orientations (with an especial attention to its impact in educational offer), having an active role in the smart specialisation of their region.

The actions taken under HEI management are a good example of a rich variety of interventions from around Europe, some of which have been funded from EU support instruments, while others have not. All of these are concerned with promoting research, innovation, competitiveness, human capital or improved mobility. They all are natural HEI objectives and

thus they provide examples on how HEI have been put into action when action has not in fact been stimulated by its own entrepreneurship.

The actions are identified in the following areas and related with the ***Potential impact for regional development***:

- Understanding the role of universities in regional development
    - Tapping into the knowledge base about the role of universities in regional
    - Why universities are important for regional development
    - Universities and regional innovation
    - Human capital and skills
    - Social and economic development
    - The university drivers
    - Building regional capacity
    - The mechanisms by which universities can and do contribute to regional development

- Enhancing regional innovation through research activities
    - Consultancy Services
    - Innovation Vouchers
    - Knowledge Transfer Partnerships
    - Science and Technology Parks
    - Research and Technology Centers

- Promoting enterprise, business development and growth
    - Graduate Enterprise (training, placements, new firms)
    - University Spin Outs
    - Network and Cluster Development
    - Encouraging Intellectual Property Development
    - International Linkages

- Contributing to the development of regional human capital and skills
    - Workforce Development (skills development programs)
    - Increasing Mobility of Staff and Students (internship and placement)
    - Talent Attraction and Retention (incoming mobility, fellowship)

- Improving social equality through community development and 'place making'
    - Student Volunteering and Community Work
    - Widening Student Participation to under-represented social groups

THINKING SMART BEST PRACTICES: Areas and potential impact in regional development:

Polytechnic City of Innovation CPI_ UPV Science Park, CV Region. Spain

- ➤ *Brief*: The CPI is built on a model of Open Collaboration Network, flexible configuration, which brings together public and private agents who share their knowledge and resources on a voluntary basis. Three main agent compose the base of CPI: Research centres, Innovation Antennas, Entrepreneurial Innovation centres. CPI works in close relationships with private companies, public Valencian bodies, Spanish I+D+I body and international agencies to promote global innovation.
- ➤ *Area*: Research, Transfer of knowledge & Technology
- ➤ *Potential impact for regional development*:
  - o Consultancy Services.
  - o Innovation Vouchers.
  - o Knowledge Transfer Partnerships.
  - o Science and Technology Parks.
  - o Research and Technology.
  - o Network and Cluster Development.
  - o Encouraging Intellectual Property Development International Linkages.

Start-up ecosystem, CV Region. Spain

- ➤ *Brief*: STARTUP project concerns promoting and assisting students and graduates in entrepreneurial technological activities. All the initiatives, projects and companies that belong to STARTUPV become links in an enterprising value chain, which pull one from another. As part of this entrepreneurial ecosystem, the entrepreneurial projects, start-up and companies benefit and benefit from the institutional support, the services of the UPV and the network of experts of the UPV Ideas Institute. Likewise, entrepreneurs must bring their experience and time to the ecosystem for the benefit of others.
- ➤ *Area*: PROMOTING ENTERPRISE, BUSINESS DEVELOPMENT AND GROWTH
- ➤ *Potential impact for regional development*:
  - o Graduate Enterprise (training, placements, new firms).
  - o University Spin Outs.
  - o Network and Cluster Development.
  - o Encouraging Intellectual Property Development.
  - o International Linkages.
  - o Workforce Development (skills development programmes).
  - o Talent Attraction and Retention.
  - o Student participation

Valencia Space Consortium (VSC), CV Region. Spain

- ➤ *Brief*: VSC carries out scientific research and technological development services in any field related to the space sector, increasing safety and quality of production of space systems as well as conducting all activities aimed, directly or indirectly, to achieve social and economic progress in Europe in the space sector
- ➤ *Area*: enhancing regional innovation through research activities

➢ *Potential impact for regional development:*
  o Network and Cluster Development.
  o International Linkages. Workforce
  o Development.
  o Talent Attraction and Retention (incoming mobility, fellowship).
  o Social and economic development.
  o Knowledge Transfer Partnerships.
  o Innovation Vouchers.

Bank of patents of the Valencian Innovation System, CV Region. Spain

➢ **Brief**: The Patent Bank is a joint program of the *Generalitat Valenciana* and the public research bodies of the Region of Valencia, which aims to facilitate the meeting between entrepreneurs, entrepreneurs and innovative knowledge generation centres, to facilitate the transfer of the technological results generated by scientists to the productive and service sectors. It aims to value the potential of the Region in the hand of the business and industrial fabric together with our excellent R & D & I network, fostering a rapprochement between companies and universities in order to strengthen their relationships, in which the university is a source of technological solutions for our companies. It aims to be a unique window in which all the research results of universities and public research organizations are found and thus facilitate the supply of patents and technologies pending licensing.

➢ **Area**: understanding the role of universities in regional development

➢ **Potential impact for regional development:**
  o Tapping into the knowledge base about the role of universities in regional.
  o Universities and regional innovation**.**
  o Social and economic development**.**
  o Building regional capacity**.**
  o The university drivers.
  o Innovation Vouchers.
  o Workforce Development (skills development programmes)**.**
  o Talent Attraction and Retention (incoming mobility, fellowship)**.**
  o Encouraging Intellectual Property Development.
  o University Spin Outs.

The UV Science Park (PCUV), CV Region, Spain

➢ **Brief**: PCUV is an initiative aimed at strengthening links between the university's scientific potential and the productive system, generating knowledge, fostering innovation processes, promoting the creation of science-based companies and contributing, thus, the economic and social development of our environment. In an academic environment, together with other research centres of the University of Valencia and the *Consejo Superior de Investigaciones Cien*tíficas (CSIC, Scientific Research Higher Council). PCUV provides spaces and services to companies derived from university research -spin-off- and to external companies or Business R & D departments

with content related to the nature of this agency for innovation. Its mission is to generate employment, wealth and welfare through the social profitability of knowledge.

➢ *Area*: Promoting enterprise, business development and growth
➢ *Potential impact for regional development*:
- o Graduate Enterprise (training, placements, new firms).
- o University Spin Outs. Network and Cluster Development.
- o Encouraging Intellectual Property Development. International Linkages.
- o Consultancy Services.
- o Innovation Vouchers.
- o Knowledge Transfer Partnerships.

Observatory of Professional Insertion and Labour Advice (OPAL), CV Region, Spain.

➢ *Brief*: The Observatory of Professional Insertion and Labour Advice (OPAL) aims to help all students and graduates of the *Universitat de València* in the labour market and improve their professional possibilities within the regional needs aimed to fulfil the strategic position of their graduates into *Comunitat Valenciana* and their companies.
➢ *Area: Contributing to the development of regional human capital and skills*
➢ *Potential impact for regional development*:
- o Workforce Development (skills development programs).
- o Increasing Mobility of Staff and Students (internship and placement).
- o Talent Attraction and Retention (incoming mobility, fellowship).
- o Student Volunteering and Community Work.
- o Widening Student Participation to under-represented social groups

"Commitment 2020": entrepreneurship and territorial cohesion forum, Duoro Region, Portugal.

➢ *Brief*: In an unprecedented initiative, in Portugal, higher education institutions, inter-borough communities of Northeast and Chamber of Commerce and business association teamed up to sign a Commitment Letter ("Commitment 2020": entrepreneurship and territorial cohesion forum) to promote a Development program for Trás-os-Montes and Alto Douro region. In this letter, the signatories pointed out that the presence of the higher education entities, in the Trás-os-Montes and Alto Douro region, continues to have strong challenges in the reinforcement of competitiveness and economic, social and territorial development. Following the letter, two forums were recently organized. Considering the region to be a land of opportunity, the forum intended to create a space for participation and sharing of ideas and concerns that could generate clear ideas and proposals, and promote more complicity and cooperation among the regional actors.
➢ *Area: Understanding the role of universities in regional development*
➢ *Potential impact for regional development*:
- o Social and economic development
- o The mechanisms by which universities can and do contribute to regional development
- o Consultancy Services

- o Knowledge Transfer Partnerships
- o Encouraging Intellectual Property Development
- o International Linkages
- o Workforce Development (skills development programs)

"UNorte.pt Consortium": pioneer initiative and inspiring others, Duoro Region, Portugal.

- ➢ **Brief**: The "UNorte.pt Consortium" is a strategic partnership between the public universities of Northern Portugal: Porto, Minho and UTAD. This consortium is considered a "pioneer initiative" and "inspiring for other institutions" for improving organizational communication, efficiency and implementing a regional strategy.
  The three universities in Northern Portugal have been working together, in order, to cement efforts and align proposals for developing projects that will combine scientific merit with an effective impact on the region´s economic and social development and subsequently strengthening the probability for success in obtaining national and international funding.
- ➢ **Area:** Enhancing regional innovation through research activities
- ➢ **Potential impact for regional development:**
  - o The mechanisms by which universities can and do contribute to regional development
  - o Research and Technology Centres
  - o Graduate Enterprise (training, placements, new firms)
  - o Talent Attraction and Retention (incoming mobility, fellowship)

Régia Douro Park – Science and Technology Park, Duoro Region, Portugal.

- ➢ **Brief**: The *Douro Régia Park* –Science and Technology Park - focusses on agro-food, agro-industrial, oenology, viticulture, green economy, environmental enhancement and agro-environmental technologies. This park runs under the promotion of Vila Real Municipality, UTAD and *Portuspark* (Network of and Incubators and Technology Parks). It stands as a beacon for integrated economic development, investing in the strong valences of UTAD and the region. It constitutes a new business centrality for the Douro region.
  The Park has multiple valences to support entrepreneurs and companies, business projects, national and international investors, research promotion, and development and transfer of technology and knowledge.
- ➢ **Area:** Promoting enterprise, business development and growth
- ➢ **Potential impact for regional development**:
  - o Building regional capacity
  - o Consultancy Services
  - o Network and Cluster Development
  - o Workforce Development (skills development programs)

A University Foundation as a strategic tool for smart specialisation, Lombardi Region, Italy.

- ➢ **Brief**: *Politecnico di Milano* founded in 2003 Fondazione *Politecnico di Milano*, as the result of a joint effort between the Athenaeum and some of the most relevant city and regional institutions and corporations. It is an explicit tool to set up a stable Quadruple Helix collaboration in terms of entrepreneurial discovery. In order to develop this major

challenge, the Foundation main role is that of developing innovating projects both for large and small and medium firms and European projects, able to extend at the European scale the existing collaborative networks of the athenaeum and the local enterprise system. In this perspective since 2013, the Foundation is in charge for the management of *Politecnico* business incubator unit, *Polihub*. In addition to that, in order to develop the relationship with the wider society, Fondazione is also in charge of developing third mission's projects, "involving teachers and students in the drive for civil and communal change", in particular with a strong focus on cooperation with emerging countries (POLISOCIAL PROJECT).

➢ *Area*: Promoting enterprise, business development and growth
➢ *Potential impact for regional development:*
  o Tapping into the knowledge base about the role of universities in regional
  o Why universities are important for regional development
  o Universities and regional innovation
  o Human capital and skills
  o Social and economic development
  o The university drivers
  o The mechanisms by which universities can and do contribute to regional development

POLIHUB: a university incubator to support entrepreneurial discover, Lombardi Region, Italy.

➢ *Brief*: *PoliHub* is the Start-up District & Incubator of Politecnico di Milano. It offers support not only to start up but also to existing high tech companies, with the objective of "Sharing of expertise, and providing access to the network of one of the best European technical universities in order to relaunch the new entrepreneurship".. POLIHUB in fact is the more recent evolution of the *Politecnico Acceleratore d'impresa*, founded in 2000. It works with a bottom up perspective being open and looks for new start up companies to support or existing high tech companies to further support on the base of *Politecnico* expertise and competencies. The rationale of POLIHUB is to create an urban district favouring innovation and located in the city of Milan; actually, it is the most relevant action developed in this sense at urban level, whereas other initiatives have failed such a result. The support provided by the city of Milan has consolidated this urban role.

➢ *Area:* Promoting enterprise, business development and growth
➢ *Potential impact for regional development:*
  o Tapping into the knowledge base about the role of universities in regional
  o Why universities are important for regional development
  o Universities and regional innovation
  o Human capital and skills
  o Social and economic development
  o University Spin Outs
  o Network and Cluster Development
  o Encouraging Intellectual Property Development
  o International Linkages
  o Workforce Development (skills development programs)

CAMPUS SOSTENIBILE: the university as the testing field of innovative co-design processes), Lombardi Region, Italy.

> *Brief*: *Campus Sostenibile* is an initiative started in 2010 and originally focused on the historical university campus and aiming at achieving a sustainable university campus. Launched by the Rectorate, it spent its first year in developing new approaches (and practices) to energy consumption inside the campus (promoting rules and procedure to reduce energy consumption). After a first phase, the project was opened to the university community, in order to involve its capacity to design and implement innovative solutions. Later on, it developed into a more ambitious project, on the base on the interaction with a EU funded research project focussed on the role of Living Lab in Smart Communities. As such it provided a test field for the idea of Smart cities and communities starting from the real community of research of the university and the real community of practices of students, faculty and citizens. The goals of the project are to test innovations developed by scientific research; to promote life style transformation and more liveable spaces; to become a positive example for the entire city; to cope with the international network of sustainable campuses. Developing the Smart city approach it can be considered a valuable bottom up initiative to implement in an operative way a smart specialisation strategy
> *Area:* Enhancing regional innovation through research activities
> *Potential impact for regional development:*
>   o   Tapping into the knowledge base about the role of universities in regional
>   o   Why universities are important for regional development
>   o   Universities and regional innovation
>   o   Social and economic development
>   o   The mechanisms by which universities can and do contribute to regional development
>   o   Knowledge Transfer Partnerships

Lapland of Expertise, Lapland Region, Finland.

> *Brief*: Expertise is one of the six cornerstones of Lapland's Smart Specialisation Strategy. Expertise in Lapland rests on the network of higher education institutions, vocational institutes and sector research institutes, which cover the whole region. In particular, Lapland's expertise base is strengthened by extensive research into natural resources, which is pursued by separate regional units in the sectorial institutes
> *Area*: Enhancing regional innovation through research activities
> *Potential impact for regional development*:
>   o   Tapping into the knowledge base about the role of universities in regional development
>   o   Human capital and skills
>   o   The mechanisms by which universities can and do contribute to regional development:
>   o   Research and Technology Centres

International Lapland, Lapland Region, Finland.

➢ *Brief*: Although Lapland is already an international region, internationalisation is planned to develop further until 2030, so as to bring distinct economic added value to the business sector. Accessibility is one of the six cornerstones of Lapland's Smart Specialisation Strategy. Internationalisation is a clear policy target at several distinct levels, including the setup of interdisciplinary cooperation groups across scientific and artistic fields, strengthening the acquisition of EU funds in support of Arctic growth, business cooperation within the Arctic Macroregion(s), global marketing of Arctic tourism, international transport routes and information networks.

➢ *Area*: Promoting enterprise, business development and growth

➢ *Potential impact for regional development*:
  o Universities and regional innovation
  o Building regional capacity
  o The mechanisms by which universities can and do contribute to regional development
  o International linkages

Lapland University Consortium's Joint Innovation Programme, Lapland Region, Finland.

➢ *Brief*: Lapland's Arctic Specialisation Programme issued in November 2013 by the Lapland Regional Government places a special emphasis on the contributions received from the Lapland University Consortium. Since 2008, the consortium has defined and executed a Joint Innovation Programme, with its embedded priorities of research, development and innovation.

➢ *Area:* Understanding the role of universities in regional development

➢ *Potential impact for regional development*:
  o Tapping into the knowledge base about the role of universities in regional development
  o The university drivers
  o The mechanisms by which universities can and do contribute to regional development
  o Knowledge Transfer Partnerships

Drawing on university capabilities for smart specialisation analysis, North East of England Region, England

➢ *Brief*: The smart specialisation priorities adopted by NELEP were preceded by an analytical report that was completed in December 2013. The team that produced this report was led by Newcastle Science City - an economic development partnership vehicle between Newcastle University and Newcastle City Council. It also involved researchers from two parts of the University - the Centre for Urban and Regional Development Studies and the Business School - and a consultancy firm (Innovation Bubble). The analysis of the economic strengths of the region's economy in this report identified the four areas of activity that have become the smart specialisation priorities of the LEP. This report therefore is featured as a good practice example of a university

supplying the analytical capabilities that at the time (when NELEP was still in the early stages of becoming operational) were lacking in the relevant regional authority.

➢ *Area*: Understanding the role of universities in regional development
➢ *Potential impact for regional development:*
   o Tapping into the knowledge base about the role of universities in regional development.
   o The university drivers.
   o The mechanisms by which universities can and do contribute to regional development.
   o Consultancy Services

Attracting national centres to strengthen regional innovation capabilities, North East of England Region, England.

➢ *Brief*: In the UK a formal RIS3 was only produced for submission to the European Commission at the level of England, Scotland, Wales, and Northern Ireland. The role of LEPs like that covering the North East of England (not including Tees Valley) in developing smart specialisation priorities are important in helping to deliver the strategy at a sub-national scale, but it is important to view their activities within this national (English) framework. This best practice therefore focuses on the contribution of Newcastle University to the implementation of the national industrial and innovation strategies that underpinned the RIS3 in England. More specifically, it focuses on the recent award by the central government of two national centres to the University: the National Centre for Ageing, Science & Innovation (NASI) and the National Institute for Smart Data Innovation (NISDI). NASI was announced in 2014 with a £20 million investment from central government (match funded by the University). NISDI was announced in 2016 with a £30 million investment from central government. Despite their national status, these institutes do play into two of the smart specialisation priorities of NELEP (respectively Life Sciences and Healthcare, and Creative, Digital, Software and Technology Based Services). They have also engaged a wider consortium of local actors beyond Newcastle University.

➢ *Area*: Enhancing regional innovation through research activities
➢ *Potential impact for regional development:*
   o The university drivers.
   o Building regional capacity.
   o Research and Technology Centres.
   o Network and Cluster Development

The 10 Professors Programme: building research capability and regional alignment, Värmland Region, Sweden.

➢ *Brief*: The RIS3 for Värmland builds on a process of strengthening relationships between Region Värmland and Karlstad University that began developing following an OECD review in 2005/2006. In the period leading up to the development of the RIS3 (2010-2014) this process was formalised through a Collaboration Agreement between the two parties. The main tangible product of this agreement was an initiative to create 10 new professorships within the University in areas that were deemed relevant by the Region and the 4 cluster organisations mentioned above. The aim of this was to help develop

strong research environments in the University while also increasing potential for knowledge co-production with other regional actors. So while this initiative preceded the RIS3 in Värmland, it is a crucial part of a longer process of developing smart specialisation in the region (also see Kempton, 2015).

➢ *Area:* Enhancing regional innovation through research activities
➢ *Potential impact for regional development:*
   o Building regional capacity.
   o Network and Cluster Development.
   o Talent Attraction and Retention (incoming mobility, fellowship).

Smart Specialisation Academy: structuring the relationship between Region and University, Värmland Region, Sweden.

➢ *Brief*: The Smart Specialisation Academy is the latest manifestation of the formal collaboration between Region Värmland and Karlstad University, and is funded by the partners for the period 2016 to 2020. It can be seen as an extension of the 10 Professors Programme, but it is guided by a clearer strategy and expectations around collaboration between university and regional actors. The formation of the Smart Specialisation Academy after the RIS3 also means there is a direct focus on the specific priorities identified through the entrepreneurial discovery process and an intention to build a critical mass of research capability in these six areas.

➢ *Area:* Understanding the role of universities in regional development
➢ *Potential impact for regional development:*
   o Building regional capacity.
   o The mechanisms by which universities can and do contribute to regional development.
   o Research and Technology Centres.
   o Network and Cluster Development.

Promoting Gender Mainstreaming through Smart Specialisation, Värmland Region, Sweden.

➢ *Brief*: A distinctive feature of the RIS3 for Värmland is that Gender Mainstreaming within the labour market is an essential part of its strategy, not just as an add-on to the prioritisation of smart specialisation domains but an integral thread throughout the whole document. The strategy claims that Värmland is the first region in Europe to have incorporated such an analysis and policy focus into their RIS3 (Region Värmland, 2015). This direction was decided upon as part of a review of the region's planned RIS3 with the European Commission Smart Specialisation Platform based in Seville. While this focus does address a social challenge – related to a currently gender-segregated labour market – the strategy mainly emphasises the potential economic benefits for the key industries in the region that will follow from gender mainstreaming. Karlstad University was not central to the analysis and entrepreneurial discovery process for this gender mainstream dimension of the RIS3, but have subsequently become involved in its implementation.

➢ *Area:* Contributing to the development of regional human capital and skills

> - *Potential impact for regional development:*
>   - ○ Tapping into the knowledge base about the role of universities in regional development.
>   - ○ Human capital and skills.
>   - ○ Social and economic development.

The practical courses of study based on regional specializations, Lodzkie Region, Poland.

> - *Brief*: According to the Europe 2020 Strategy, effective use of public funds for projects that are based on a strong partnership between businesses, research institutions and public institutions especially in the area of science and business will create smart specialization. The primary effect of such actions is to stimulate entrepreneurship both in the local and regional level. University of Lodz also joined into activities whose aim was creating smart specialization. Cooperation between science and business with the use of European funds allows developing practical courses of study based on regional specializations. These activities will allow for the effective learning professionals who directly after graduation can support the company based on regional specializations
> - *Area*: Contributing to the development of regional human capital and skills
> - *Potential impact for regional development*:
>   - ○ Why universities are important for regional development.
>   - ○ Universities and regional innovation.
>   - ○ Social and economic development.
>   - ○ Building regional capacity.
>   - ○ The mechanisms by which universities can and do contribute to regional development.
>   - ○ Workforce Development (skills development programs).
>   - ○ Increasing Mobility of Staff and Students (internship and placement).
>   - ○ Talent Attraction and Retention (incoming mobility, fellowship)

The HEI as platform for exchange of views on the development of regional specializations between key stakeholders, Lodzkie Region, Poland.

> - *Brief*: The team, consisting of professors, doctors and experts at the University of Lodz under the guidance of Professor Zofia Wysokińska had a huge contribution in the development of smart specialization. Involvement in the work of the team led to the development of the main priorities for regional specialization in the Lodz region. The University of Lodz has become a platform for exchange of views on the development of regional specializations between key stakeholders. Joint scientific conferences, symposia enabled to adjust priorities to the strengths of the region. The cooperation of the University of Lodz with other stakeholders in the region formed the basis for the development strategy of regional specialization.
> - *Area*: Understanding the role of universities in regional development

➢ *Potential impact for regional development*:
  - o Why universities are important for regional development.
  - o Universities and regional innovation.
  - o Human capital and skills. Social and economic development.
  - o Building regional capacity.
  - o The mechanisms by which universities can and do contribute to regional development.
  - o Science and Technology Parks.
  - o Research and Technology Centres.
  - o Network and Cluster Development.

Significant impact on regional strategies, Lodzkie Region, Poland.

➢ *Brief*: The new strategic documents (both the Regional Development Strategy for the Lodzkie Region 2020 and the Regional Innovation Strategy for the Lodzkie Region 2030) updated and drafted by the regional authorities have been highly praised and recommended as presenting an innovative and territorial approach to development. This was possible because of wide consultations and close cooperation between various parties involved in drafting the documents. Above all, close cooperation with representatives of leading academics from the universities (including the Lodz University of Technology), helped to shape and tailor the documents to fit the needs of the region.

➢ *Area*: Understanding the role of universities in regional development
➢ *Potential impact for regional development*:
  - o Why universities are important for regional development.
  - o Universities and regional innovation.
  - o Human capital and skills.
  - o Social and economic development.
  - o Building regional capacity.
  - o The mechanisms by which universities can and do contribute to regional development.
  - o Consultancy Services.
  - o Knowledge Transfer Partnerships. Science and Technology Parks.
  - o Research and Technology Centres.
  - o Network and Cluster Development.
  - o Encouraging Intellectual Property Development.

Active participation in clusters, Lodzkie Region, Poland.

➢ *Brief*: It is a common practice at the Lodz University of Lodz that respective Faculties, Departments or Institutes are active members of the clusters corresponding to their scientific potential and experience. Such participation results in R&D cooperation between the other members of such clusters (mainly the enterprises) and the University units. The cooperation is based mainly on development of collaborative projects (both EU and national), contracting the research from the side of the companies to the respective Departments/Institutes and offering of different courses that match the needs of the companies. Examples of the clusters connected with the S3 strategy in which Lodz University of Technology is an active member

are the Lodz Construction Cluster and the Cluster of Advanced Technologies of the Textile-Clothing Industry.

➤ *Area*: Promoting enterprise, business development and growth
➤ *Potential impact for regional development*:
  o Why universities are important for regional development.
  o Universities and regional innovation.
  o Social and economic development. Building regional capacity.
  o The mechanisms by which universities can and do contribute to regional development.
  o Consultancy Services.
  o Knowledge Transfer Partnerships.
  o Network and Cluster Development.
  o Encouraging Intellectual Property Development.

Alignment of the R&D projects with S3 strategy, Lodzkie Region, Poland.

➤ *Brief*: One of the goals of any university is the realisation of R&D projects. The Lodz University of Technology is particularly active in this field, and as there is an increasing number of calls for proposals launched by the regional government bodies, connected with S3 strategy, the projects developed by the respective Faculties/Departments/Institutes have to be aligned with the S3 of the region. Otherwise it would be much more difficult to obtain financing from such calls. The projects that are not connected with S3 can still be developed, however, the financing will not come from the regional institutions, but the national ones.
➤ *Area*: Enhancing regional innovation through research activities
➤ *Potential impact for regional development*:
  o Why universities are important for regional development.
  o Universities and regional innovation.
  o Social and economic development.
  o The university drivers. Building regional capacity.
  o The mechanisms by which universities can and do contribute to regional development. Research and Technology Centres

3. Strategic alignment of the HEI with the RIS3

3.1. Benefits for the HEI

Following "The role of Universities and Research Organisations as drivers for Smart Specialisation at regional level"; we can affirm that HEIs are an effective mean of promoting interactions and translating intellectual and scientific potential into commercially successful new products and services. It may help in overcoming the obstacles involved in the innovation chain and may therefore contribute to the success of RIS3. Particular features of innovation clusters are their thematic focussing and geographic proximity.

Clusters are defined by the co-location of producers, service providers, educational and research institutions, financial institutions and other private and government institutions related through linkages of different types. There is huge diversity among clusters: they differ in terms of their stage of development along the cluster life cycle.

Several innovation clusters are the first entities to have been organized on a regional basis. Their members operate in partnership under a common development strategy focusing on generating synergies on R & I for entering potential markets. The underlying element is the achievement of critical mass and adequate innovation capacity for facing global competition. This dovetails with the objectives of RIS3 and simultaneously bridges gaps in the innovation chain.

Regional or national clusters may operate at a national level as technology platforms, and may be linked at a European level forming transnational technology platforms.

Universities span a wide range of technology areas and play an important role by developing joint visions, setting Strategic Research and Innovation projects and contributing to the definition of the research priorities of the region. They develop strategies and provide coherent business-focused analysis of research and innovation bottlenecks and opportunities related to societal challenges and industrial leadership actions. They can mobilise industry and other stakeholders within the region to work in partnership, share information, enable knowledge transfer and deliver on agreed priorities. Furthermore, HEIs, government, industry and society have established technological plans that mirror for building capacity and enabling their

research to influence and participate in the region, or to align their thematic activities with a shared strategic vision. Due to their features, HEIs may have an important role in realizing the goals of RIS3 in scaling-up processes at regional level.

Linking Regional, Inter-regional, National and Global Interactions

The knowledge creation process has a global character but in the context of RIS3 its application needs to be regional. There is a clear role for HEIs for satisfying this need. At the same time, in many cases the role of HEIs in RIS3 extends much beyond the regional or national boundaries. This is particularly so in regions, which have research-intensive HEIs but limited absorptive capacity for R & D, results in either their private or public sectors. Due to their competitive presence and international networks, such HEIs can act as conduits linking and scaling-up at inter-regional, national and global levels. This may have indirect, not immediately obvious benefits in feedback transformational processes, which may facilitate the implementation of RIS3. For example, HEIs with an international visibility may act as poles of attraction for young talented researchers and eminent scholars and scientists and thereby contribute greatly to reversing brain drain from the region. Furthermore, they may enrich the available human capital by producing well-trained researchers and highly skilled personnel (the educational and training issue). As noted previously, indications are that international corporate research managers view such high calibre human capital as a principal contribution to companies rather than the specific knowledge generated by research. For these reasons, HEIs may have a significant role in the formation of R & I ecosystem by attracting science-based companies or subsidiaries and/or creating spin out companies, which may facilitate the economic transformation of the region, as aimed for by RIS3.

HEIs also play a role as links for effective technology transfer and adaptation of R & I activities, either originating from other regions or transferred to other regions. Their ability to identify and respond rapidly to developments in the R & I open environment is important for making appropriate adjustments for the optimal implementation of RIS3. Similarly, if necessary, they can assist in identifying the best exit strategy.

HEIs initiatives may play a catalytic role for the linking-up processes of R & I in the region. The early development of new, effective financing and operational mechanisms will be critical for

the success of this endeavour. The Regions of Knowledge action, which has supported projects for transnational cooperation in clusters involving HEIs on the one hand and industry, society and government on the other, has also strong elements which, with appropriate adaptations, may support linking up processes within RIS3.

Several obstacles hinder the scaling up process. A major consideration is the management of funding of RIS3 initiatives only by the regional authorities, since the potential benefits of scaling-up may be diffused and not immediately visible within the region. Regulations for the use of Structural Funds for interregional actions may help resolve such issues.

The concentration of the research community in HEIs on the global impact of their work, a usual prerequisite for promotion in academia, may be prohibitive for their engagement in regional issues. This also relates to the phenomenon whereby an invention created in a region, becomes under exploitation elsewhere, especially if the absorptive power for R & D in the region is limited. This form of scaling-up is contrary to the objectives of RIS3.

In conclusion, the interplay between the regional, national and global role of HEIs and ROs should be recognised as a positive element both at the design phase of RIS3, the 'entrepreneurial discovery process', and in its implementation.

3.2. Strategic actions

Several strategic actions have been identified within the analysis of the ten Case Studies.

Alignment

While allowing for flexibility, alignment means that HEIs within the system support strategic goals of the larger system, and that the units within the university support campus goals.

Directors and deans of university schools and degrees could define their own ways to establish goals, and choose what is important to them within the framework of the university-wide strategic planning process. This fosters a feeling of ownership of the process, and personal contribution to it.

Smart frameworks for RIS3

As a place-based strategy, and given the diversity of European regions in terms of the structure of their economies, their history, prevailing culture and traditions, and their social and ethnic

fabric, there can be no one-size-fits-all approach to RIS3. There is also regional diversity in terms of the amount and diversity of the available HEIs provision. Moreover, as a bottom-up place-based strategy, notions of RIS3 prototypes may be misleading insofar as they may blur or lose the specificity issues of a region. Policy strategies may, however, provide interesting pointers.

HEI as a research university.

The concept of being a *research universit*y does not presuppose regional specialisation (the identification and selection of a limited number of regional features to work on with other partners). It is possible for a HEI to be entrepreneurial (like in the commercialization of its research results through patents), without being involved in any regional efforts based on the idea of selective specialisation.

RIS3 links to a specific policy context in the EU, including the principle of smart specialisation strategies as an "ex-ante conditionality". Individual HEIs can be successful in RIS3 without defining themselves as entrepreneurial universities. It is possible, for example, for a research university, which does not call itself entrepreneurial, to engage successfully in RIS3 initiatives.

Action Plan

The Action Plan must be coherent and balanced, accessible from the budgetary point of view, and well cohesive to try to enhance the synergistic effects of each instrument on the surrounding actors. The proposals in many cases arise from the ideas of the potential beneficiaries of the regional stimulus policies and require a logical sifting.

The deployment of possible actions starts from the priorities selected. However, RIS3 has a comprehensive and welcoming vocation of all policies to promote growth through research and innovation, so that progress develops the rest of actions in this scheme that can contribute to the achievement of the objectives of the same.

In a simplified way, the Action Plan is integrated in the strategic scheme as follows:

- ✓ **Vision**: how we want the productive system of the region
- ✓ **Mission**: what can be done and how from the point of view of RIS3 for a smart specialization
- ✓ **Values**: what are the most authentic values of the region, what makes it unique.
- ✓ **Strategic objectives**: how to define concrete achievements and how to achieve them
- ✓ **General objectives**: areas of specialization

✓ **Specific objectives**: Development axes and priorities.

The actions initially proposed are organized in programs and, at a more general level, in policies. This organization responds not only to the integration in the strategic scheme, but also to a logic of management of the actions according to its relation with the process of entrepreneurial discovery, the origins and participants in the financing, the most common instruments for its application, and the agents responsible for its execution.

Following the order of the proposals, the first addresses policy orientation of scientific and technological needs of society resources. It has been subdivided into three programs:

The first is dedicated to infrastructures and equipment for research and innovation, which, while taking into account the possibility of developing or completing specific infrastructure with resources from the Structural Funds or other funds.

A second program brings together research actions of excellence in specific fields linked to the priorities for regional development. These are actions to support the fundamental research that is considered a priority, as well as leverage actions through regional resources to maximize the participation of HEI knowledge generating agents in projects of interest within the framework of the Quad-Helix. This program will concentrate the part of the budget with more potential, insofar as these are actions that aim for competitive financing.

Thirdly, a program for the promotion of technology transfer and knowledge valorisation is proposed, taking advantage of unique network of infrastructures available in the regions: Technological Institutes, Science and Technology Parks), which must be reoriented towards a better satisfaction of the social-business demand. Also included is the business use of knowledge generated by universities and research centres.

The second policy aims at enhancing R & I within the company. To this end, several types of action are grouped together in the following programs:

A series of actions to improve the qualification and increase of human resources dedicated to R+D+I in companies, both introducing highly qualified and experienced ("senior technologists") and young people in pre or post doctoral period, Unemployed, using the synergies that the resources of employment promotion funds can generate.

On the other hand, a second program will promote R & D business projects, incorporating awareness-raising actions for research and cooperation, individualized advice for access to finance and knowledge and use of tax incentives. And finally, support for individual entrepreneurial R & D projects and in cooperation with prioritization criteria based on business impact and the use of the research and transfer generated.

Finally, a specific program responsible for promoting business participation in national and European projects, through awareness-raising, guidance and project preparation aids, as well as for knowledge-generating agents.

The third policy is aimed at diversification and modernization as a result of research and innovation. It intends to be the closest to the social and market demand from the point of view of the process of entrepreneurial discovery.

To this end, four programs are established, starting with one to support innovative entrepreneurship, in their creation, growth-acceleration and internationalization phases, with complementary aids and funding lines, and orientation to both industry and tourism services.

Another set of actions will revolve around an innovative investment program for reinvestment based on knowledge and transfer development and aimed at reorienting mature enterprises and locations with large development options through new processes and materials.

The unique characteristics of the services prioritized in RIS3 advise, finally, to group in two specific programs of development of a system of technological innovation in health and innovation in the tourism field.

Finally, the policies linked to the development of the digital society, due to their singularity includes the actions foreseen in this area grouped in programs related to citizenship, economics and digital administration.

4. Step-by-step guidelines to engage HEI with the regional RIS3

The definition of the necessary steps to engage a HEI with the regional RIS3 varies significantly depending on the history of cooperation of the HEI institution with the other actors of the quadruple helix, and the commitment of the institution in the cooperation with the industry.

A HEI engaged with the regional priorities and other elements of the quadruple helix may be essentially very different from a traditional HEI typical of the beginning of the second part of the twentieth century. Some of the identified best practices and lessons learnt during the development of the WP2 tasks reflect the previous existence of cooperative engagement of some HEI with the social and economic challenges. However, there are case where, apparently, the HEI is more oriented to its own internal priorities and not very much connected with the rapid changes that happen in the society.

In this section, the basic steps and actions for the RIS3 engagement are defined in the form of a concept framework that provide the basic guidelines to any HEI to delineate its own step-by-step plan. It is not possible to define these guidelines as a general chronogram applicable to every HEI; in fact, that is not the objective foreseen in the development of the project.

The situation across Europe for different regions and HEI reflects a highly heterogeneous situation. Among the more than forty studied regions identified for which it is possible to access documents and reports regarding their smart-spec strategies (see O2.2), and the ten elaborated case studies centred on HEI (see also O2.2), there is a great variety of situations.

Some HEI have a sounded trajectory of cooperation with governments and industry. In these cases, the RIS3 engagement is realised in a quite natural way by implementing changes of priorities, defining incentive programs, promoting intensive debates and disseminating the RIS3 in the institution, creating specific internal instruments to follow up the engagement with the smart-spec strategy, etc.

On the other side, some HEI have never engaged to cooperate with the industry or had a relation with the administration different from the standard one based almost only on the regulatory and/or financing framework.

In these cases, the HEI usually present poor knowledge transference indicators, maintaining an internal policy and strategy centred on the development of the academic tasks in order to issue diplomas without real concerns on how curricula respond to society needs and challenges.

Finally, in the previous outputs of WP2, we have identified several best practices that provide good examples throughout we get hints on how to define general engagement guidelines.

The analysis of these best practices allow to identify the main types of actions taken by HEI with different degrees of engagement with RIS3; in some cases, moderate engagement and in others quite developed. These actions are:

(1) The constitution and operation of science parks, or similar structures (sometimes foundations), that provide an interface University-society-industry to promote and channel more cooperation and engagement of the HEI with the regional challenges. The motivation to use this kind of quasi-independent external structures seem to be the need to develop more stable programs, sometimes introducing external actors in the governance and decision making, and the creation of more flexible structures not constrained to the frequently rigid procedures that rule public HEI. These external entities can also support and manage other programs as fund raising, host industry labs, etc.

(2) Programs and structures to promote entrepreneurship. There are examples recently started initiatives – usually quite centralized within the institution – that promote the education in entrepreneurial skills, the creation of start-ups, incubators, support mentoring to entrepreneurs and similar activities, and of other developed ecosystems in which the program has penetrated considerably the HEI having a quite distributed management structure. These programs frequently connect, and this is a necessity, with the local and regional actors (industry and administration).

(3) Identification of existing HEI capabilities to engage RIS3 strategy. This is an initial action previous to starting more ambitious developing programs.

(4) Creation of observatories of the region to monitor and characterize HEI and industry behaviours, outputs, achievements, etc. that provide insight to better engage the actors of the quadruple helix.

(5) Programs to align the research and innovation activity of the HEI with the RIS3 priorities. They can be set up in a coordinated way with the administration and industry. The initiative comes sometimes from the administration and in other cases from de HEI. When coming from the administration they can involve several HEI in the region.

(6) Constitution of consortia among different regional actors, sometimes with participation of organisms external to the region, that provide an added value to the summation of partners through their interaction to cooperate within the RIS3 priorities. These consortia might include only HEI, or HEI plus Industry, or administration together with academia and industry. They might need the animation of the activity through specific programed actions or some strategic goals planning. The participation of HEI in industry technological centres or in clusters might another form of association.

(7) Programs to promote technology transfer coordinated by the administration and participated by the industry. These programs can go from the dissemination of HEI research results to make them more available, to a more active scheme in which the academia develops solutions to challenges communicated by the industry.

(8) Specific programs in which the HEI addresses important social issues like sustainability or the gender gap, within the priorities of the Smart-Spec strategy of the region.

(9) Alignment of the educational offer with the priorities of the regional RIS3.

(10) Internationalization programs to attract external industry. The HEI can play an important role in the internationalization of the region due the tradition in the academia of international cooperation and its participation in international strategic alliances with other HEI, the links established through international research projects, or the exploitation of the important relationship capital that many lecturers and research hold due to their experiences and international mobility.

We will gather in a table the above action types with the different BPs identified in O2.2.

In it we will follow the notation B_i_j where i stands for the case, $1 \leq i \leq 10$, and j, $1 \leq j \leq 30$, for each of the 30 best practices, all of them developed in some of the 10 cases analysed.

Best Practice
BP_1_1: Polytechnic City of Innovation CPI_ UPV Science Park
BP_1_2: UPV Start-up ecosystem
BP_1_3: Valencia Space Consortium (VSC)
BP_1_4 Bank of patents of the Valencian Innovation System
BP_2_5: "Commitment 2020": entrepreneurship and territorial cohesion forum
BP_2_6: "UNorte.pt Consortium": pioneer initiative and inspiring others
BP_2_7: Régia Douro Park – Science and Technology Park
BP_3_8: A University Foundation as a strategic tool for smart specialisation.
BP_3_9: POLIHUB: a university incubator to support entrepreneurial discovery
BP_3_10: CAMPUS SOSTENIBILE: the university as the testing field of innovative co-design processes
BP_4_11: Lapland of Expertise
BP_4_12: International Lapland
BP_4_13: Lapland University Consortium's Joint Innovation Programme
BP_5_14: drawing on university capabilities for smart specialisation analysis (NC)
BP_5_15: Attracting national centres to strengthen regional innovation capabilities (NC)
BP_5_16: The 10 Professors Programme: building research capability and regional alignment (SW)
BP_6_17: Smart Specialisation Academy: structuring the relationship between Region and University (SW)
BP_6_18: Promoting Gender Mainstreaming through Smart Specialisation (SW)
BP_7_19: The practical courses of study based on regional specializations
BP_7_20: The HEI as platform for exchange of views on the development of regional specializations between key stakeholders
BP_8_21: Significant impact on regional strategies
BP_8_22: Active participation in clusters
BP_8_23: Alignment of the R&D projects with S3 strategy
BP_9_24: Social value creation through evidence-based lighting design
BP_9_25: Smart and Green Mobility as a result of cross-sectorial collaboration for smart specialisations
BP_9_26: Smart Specialisations in sustainable energy, mobility and IT technology for Smart Cities Development
BP_10_27: The UV Science Park (PCUV)
BP_10_28: Observatory of Professional Insertion and Labor Advice (OPAL)
BP_10_29: Bank of patents of the Valencian Innovation System
BP_10_30: Valencia Space Consortium (VSC)

With the above notation, in the following table "X" refers to core action in the BP, and "A" to other actions or potential actions in the BP.

Best Practice	(1) Sci. parks & others	(2) Entrepren programs	(3) HEI self-analysis	(4) Observatories	(5) R&I alignment	(6) Consortia	(7) Knowledge and technology transfer	(8) Specific transversal programs	(9) Curricula alignment	(10) International
BP_1_1	X	A		A			A			A
BP_1_2	A	X					A			A
BP_1_3						X	A			
BP_1_4				A	A		X			
BP_2_5					A	X			A	
BP_2_6					A	X				
BP_2_7	X						A			
BP_3_8	X				A					
BP_3_9		X					A			
BP_3_10		A			A		A	X		
BP_4_11					X		A			A
BP_4_12					A					X
BP_4_13					A	X	A			
BP_5_14			X		A				A	
BP_5_15					A	A				X
BP_5_16					X		A		A	
BP_6_17					X	A	A		A	
BP_6_18			A	A	A			X	A	
BP_7_19									X	
BP_7_20				A	X	A			A	
BP_8_21					X				A	
BP_8_22					A	X	A			
BP_8_23					X		A			
BP_9_24				A				X	A	
BP_9_25				A			A	X	A	
BP_9_26					A			X	A	
BP_10_27	X	A			A	A	A			
BP_10_28				X					A	
BP_10_29				A	A		X			
BP_10_30						X	A			

In view of the above analysis, the information reflected in smart-spec documents analysed in the project (O2.2), and other conclusions from interviews to stakeholders, the following guidelines are proposed giving below a proposal of step-by-step structured process for its implementation:

(a) **Participation of the HEI in the RIS3 development**: The HEI has to be global and at the same time local. Globalism is an intrinsic and necessary characteristic of the academic activity. It is difficult to develop up-to-date research and curricular programs of quality without maintaining strong international interactions and cooperation links. At the same time HEI are inserted in a region and in a city, or urban environment, being an important part of this ecosystem. The academic activity, research and innovation and knowledge transference are essential parts frequently of great impact in the ecosystem in which the HEI is inserted. Besides, the HEI might be public, and funded by the local administration, has a must of service to the community. Moreover, the HEI is an essential part of the regional and local quadruple helix that cannot be replaced by other distance HEI. Thus, the institution has to be involved in the design of the smart-spec strategy providing ideas, scientific views and debate. The debate must be internal to the institution and external, in the sense that the HEI should engage in a public dialogue with the industry and the administration for the definition of the RIS3. The internal mobilisation of the academic and research staff is of paramount importance to reach the basic goal of bringing the HEI community to interiorize and believe the importance and usefulness not only for the region but also for the HEI itself.

(b) **SWOT analysis**: In terms of the priorities identified in the RIS3, the HEI must perform a deep SWOT analysis to understand its Strengths and Weaknesses, and for identifying both the Opportunities open by the smart-spec strategy and the Threats that has to face. SWOT is particularly powerful because can help to uncover opportunities that the HEI is well-placed to exploit, and by understanding the weaknesses of the institution, the organization can manage and eliminate threats and re-orientated if necessary its strategic direction. This does not mean that the

HEI has to put apart R & I thematic areas that are not central to the RIS3, but the existence of the strategy provides a stable framework to orientate important activities and investments of the organization.

(c)   **Strategic planning**: HEI should elaborate strategic planning that include the engagement with regional strategies based on their own SWOT analysis.

(d)   **New culture creation**: Building interest, motivation and commitment of the HEI staff – lecturers, researchers and R & I managers - to boost the participation of everybody in the regional strategy developing programs, creating the conditions to organize programs that align the HEI with the smart-spec strategy. The creation of an adequate working atmosphere is of paramount importance. Sometimes this can imply the creation of a new culture that does not exist previously in the institution that motivates the HEI community to search for the utility and application of the R&I projects and challenges and of the creation and updating of curricula, including LLL.

(e)   **Staff involvement recognition**: Creation of systems to assess and recognize the performance of the university staff in focussing smart-spec priorities and knowledge transfer achievements (patents, R & I contracts, creation of spin-off companies based on research results, cooperation with enterprises to solve industrial and social challenges, etc.)

(f)   **Participation in implementation**: HEI have to be permanently involved in the regional instruments foreseen in the strategy to follow up the strategy and update it. They should be involved in the implementation of the strategy, at least in those actions where the R & I system plays an important role.

(g)   **Industry-HEI confidence building**: Modern Universities and HEI, when they are active as dynamic agents of the R & I regional system, are a very valuable agent to identify the RI needs of the industry. This requires an effective engagement of industry – University where trustful relationship has been built. The creation of this confidence industry-University must be a priority for the administration.

(h)   **Joint ventures and association academia-industry-administration**: The participation of HEI or universities in industry associations that have the mission of supporting R&I specifically attend needs of Small and Medium Enterprises (SME) is

an instrument to mobilize HEI researchers to focus better on industry problems. Some technological centres across Europe are examples of these practices.

(i) **Graduates observatory for curricula adaptation**: HEI and more specifically, universities, must continually follow the success of their graduates when incorporated to the labour market through surveys and other similar tools. This has to be a source of information to upgrade exiting curricula and to generate life-long-learning (LLL) flexible educational offers in order to improve and build the necessary capabilities and skills according to the needs of industry and society.

(j) **Industry inputs for curricula adaptation**: HEI must also connect with the industry, directly or through industry associations or platforms, to study the creation of new academic curricula able to respond to the skills demanded by the society and industry. This should be a fundamental source of information to generate new curricula for undergraduate, master and doctorate degrees, as well as for LLL.

(k) **Better access to continuing education**: Universities must create programs that respond to the society and industry demands, as identified in the RIS3, but at the same time the configuration of these programs must be flexible enough to allow the incorporation of part-time students that might be administration or industry employees seeking for opportunities to increase their skills and promote in their jobs. These must include also LLL offers. Programs within industry to promote and give incentives to continuing education focussed on RIS3 priorities should be also implemented.

(l) **Industry staff lecturers**: A very useful practice would be to incorporate professionals from the industry and administration to give specific lectures within the curricula. There are few examples in which this type of actions have been coordinated and promoted with funding incentives from the administration.

(m) **Mobility industry – academia**: Another important way to connect RI in University with industry needs is the creation of mobility programs University-Industry, so far very uncommon. In fact, the research positions in HEI tend to be quite rigid in the sense that taking a leave usually causes disadvantages for the progression in the professional career when back to the HEI. However, well organized programs that allow researchers and/or lecturers staying closer to the real problems in industry,
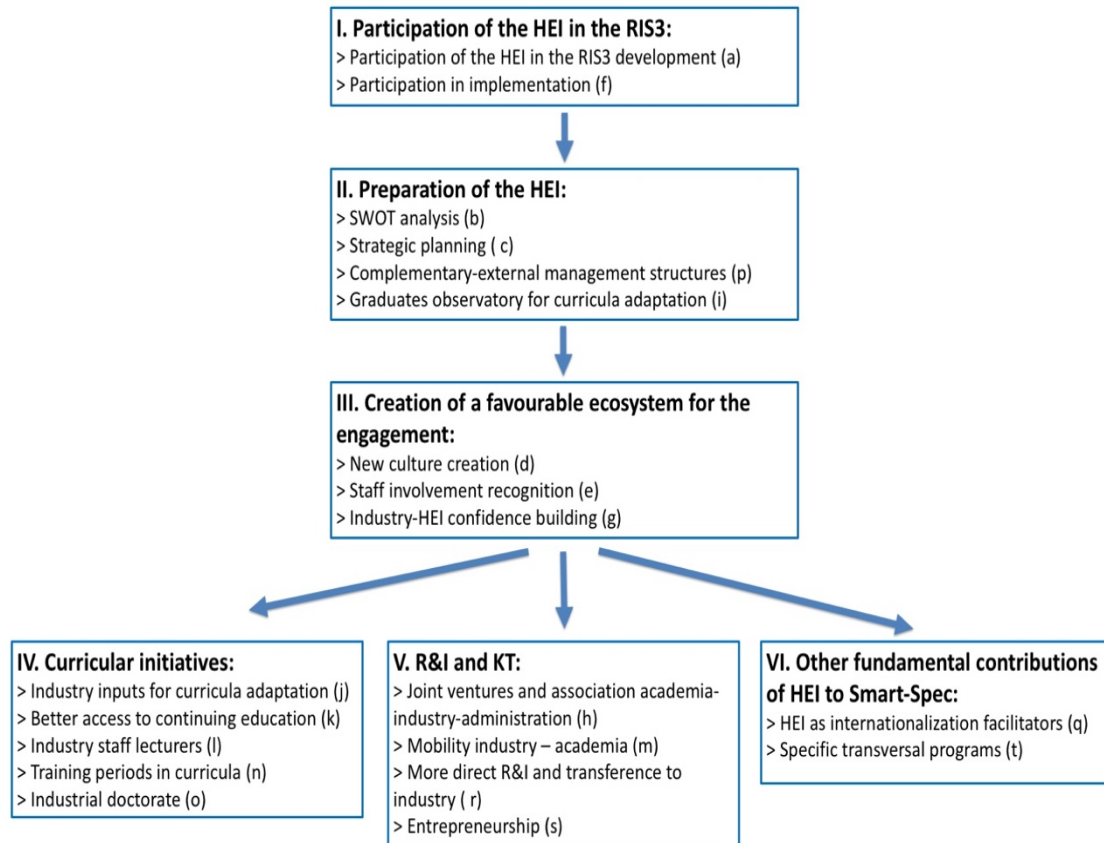
and build trust with industry staff, would be a very a very powerful instrument for increasing the relation and complementarity between academia and industry.

(n) **Training periods in curricula**: Almost every undergraduate student should have the opportunity to go thorough spend training periods in the industry or administration. Ideally, these periods should be of one semester. Academic regulatory bodies might help introducing these periods in the curricula and administrations might provide grants to support these stays.

(o) **Industrial doctorate**: The industrial doctorate should be a priority in HEIs. Not many implementations of this type of doctorate programs can be found in Europe because it requires building a strong and trustful relationship between the University and Industry, and well organized programs funded by public bodies. With the help of these programs – that HEI should request from their local/regional governments – universities might supervise research developed within the industry solving real problems connected to RIS3 priorities, contributing more intensively to innovation and increasing the capabilities and opportunities of their future PhD graduates.

(p) **Complementary-external management structures**: If necessary the HEI should consider the creation of new management structures/organisms to facilitate the cooperation with the industry, knowledge transference and a closer relation to industry. These structures can be fully or partially controlled by the HEI but it is advisable to allow industry and/or administration entering the governance and strategic direction of them. They should be constituted to have some stability regarding the changing of strategic direction, some independence from the HEI government, flexibility to make decisions and implement work programs, and possibilities to be a real interface between the HEI and industry. Typical structures of this type are de Science Parks or other foundations that can be found in universities around Europe.

(q) **HEI as internationalization facilitators**: HEI are a great opportunity to find ways for the internationalization of regions. Though not usually considered by regional authorities, the internationalization potential of HEIs is to receive consideration in joint programs with administration and industry. This can be a way to attract talent

to the local industry, and also investments. At the same time, it can provide new perspectives, opportunities and relations to commercialize goods and services.

(r) **More direct R & I and transference to industry**: Creation of programs to promote the use of HEI capabilities to solve industrial and social challenges, and to make available R & I results for transference. These might include, for instance, calls for project proposals focused on the resolution of specific challenges, banks of patents organized by the administration, economical aids to fill the gap among initial R & I results and market-ready products/services (proof of concept projects), etc.

(s) **Entrepreneurship**: The promotion of entrepreneurship, in general, and of the creation of spin-offs based on R & I results should reach every single thematic area within the HEI. Both undergraduate and graduate students, as well as the HEI staff should be targets of these programs. HEI offer unique opportunities to create an entrepreneurial eco-system with students eager to learn, permanent search of solutions to problems through R & I, research infrastructures, internationalization, etc. These programs can include maintaining incubators, regular mentoring, accelerator programs, joint programs with external venture capital associations, etc.

(t) **Specific transversal programs**: Within the HEI community, and linking the strategic priorities of the institution with transversal priorities of the smart-spec strategy, there can be many opportunities to develop programs that face transversal questions that are hot societal topics today. Among them, it is worth mentioning sustainability issues, energy efficiency, climate change, gender equity, etc. Besides, these programs can also offer an opportunity to modernize curricula through the introduction of specific actions to develop transversal skills, design thinking, etc.

Taking into consideration the above guidelines, we propose the following step-by-step scheme to be followed for the engagement of the HEI to the RIS3 strategy. It includes three basic steps (with several guidelines included), followed by three parallel areas of actions. This scheme should be adapted to the existing conditions of the HEI entering the engagement process.

I. Participation of the HEI in the RIS3:
> Participation of the HEI in the RIS3 development (a)
> Participation in implementation (f)

II. Preparation of the HEI:
> SWOT analysis (b)
> Strategic planning (c)
> Complementary-external management structures (p)
> Graduates observatory for curricula adaptation (i)

III. Creation of a favourable ecosystem for the engagement:
> New culture creation (d)
> Staff involvement recognition (e)
> Industry-HEI confidence building (g)

IV. Curricular initiatives:
> Industry inputs for curricula adaptation (j)
> Better access to continuing education (k)
> Industry staff lecturers (l)
> Training periods in curricula (n)
> Industrial doctorate (o)

V. R&I and KT:
> Joint ventures and association academia-industry-administration (h)
> Mobility industry – academia (m)
> More direct R&I and transference to industry (r)
> Entrepreneurship (s)

VI. Other fundamental contributions of HEI to Smart-Spec:
> HEI as internationalization facilitators (q)
> Specific transversal programs (t)

5. Conclusions

This deliverable provides some step basic guidelines to be accounted for the contribution of higher education institutions to the smart specialization strategies. In order to settle them we have identified a set of institutional characteristics that seem essential for achieving good results in RIS3. Among them there are some actions taken by HEI with different degrees of engagement with RIS3 in the best practices analysed in this project that seem good catalysts to RIS3:

(1) Operating science parks or similar structures that facilitate a constant relationship between university, society and industry.

(2) Promoting entrepreneurship in a variety of forms such as encouraging the education in entrepreneurial skills, the creation of start-ups, incubators or support mentoring to entrepreneurs and similar activities.

(3) Identification of existing HEI capabilities to engage RIS3 strategy.

(4) Creation of observatories of the region to monitor and characterize HEI and industry.

(5) Programs to align the research and innovation activity of the HEI with the RIS3 priorities.

(6) Constitution of consortia among different regional actors, with only HEI, or HEI plus Industry.

(7) Programs to promote technology transfer.

(8) Specific programs in which the HEI addresses important social issues like sustainability or the gender gap.

(9) Alignment of the educational offer with the priorities of the regional RIS3.

(10) Internationalization programs to attract external industry.

With these actions carried out, we obtain an environment where higher education institutions and research organisations are more easily able to engage in RIS3.

In Section 4, we have detailed a structured process with 20 steps as guidelines for its implementation, also providing a flow sequential scheme. A summary of it would lose some of the steps. Despite it, we will conclude by pointing out several key factors that we may recognise when higher education institutions and research organisations are engaged in RIS3:

- They are aware of the policy framework with regard to smart specialisations; they know and understand how this framework applies at various levels: local, regional, national, European.

- They explicitly and actively address regional development in their core institutional mission and include regional development aspects in their strategic development plans. They include regional stakeholders in the process of developing their overall institutional strategies.

- They include regional engagement aspects in their institutional evaluation policies and processes, along with the evaluation of teaching/learning, research, and broad contribution to the society. They have adopted specific indicators, metrics, to assess success in regional engagement.

- They develop effective partnerships: are able to select the right external partners for RIS3; develop appropriate infrastructures and processes to sustain effective communication and coordination with these partners.

- They identify, in cooperation with other partners, distinct regional features that support smart specialisations initiatives.

- They are not ancillary partners in RIS3, but play a key role, from the design to implementation and assessment.

- They have internal organisational and governance structures specifically designed to promote regional engagement. Employ specialized staff with appropriate training and responsibilities inside the organisation. Have an internal, adapted system of incentives to promote engagement in regional development efforts.

- They address matters of regional engagement/RIS3 based on a concern for sustainability, as opposed to an attitude driven by the availability of individual project funding.

- They pay special attention to the use of ICT as part of their regional engagement strategies and activities do not compromise on other institutional functions that are not relevant for RIS3.

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