UNIVERSITY-INDUSTRY COLLABORATION

A Policy Brief from the Policy Learning Platform on Research and innovation

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Interreg Europe

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Summary

The innovation process requires frequent and iterative interactions among innovative actors, in which universities and private companies are central. For regional policymakers, university-industry collaboration is a key component of the regional innovation policy-mix as the successful exploitation of R&D results is fundamental for regional competitiveness. The effective design and implementation of place-based innovation policies to limit market and system failures related to university-industry collaboration requires an excellent knowledge of the regional institutional context. The regional approach that must be taken to find effective policy solutions for university-industry collaboration makes Interreg Europe projects the ideal space for policy learning. This policy brief features six policy recommendations using the experience of Interreg Europe projects dealing with university-industry collaboration to offer regions a path towards better regional innovation policymaking.

1. University-Industry Collaboration in the Innovation Process

University-industry collaboration is emerging as a critical component of the innovation process. Regional policymakers are thus devising policy instruments to promote knowledge transfer between science and industry to strengthen their regional innovation systems. The emergence of this policy trend comes from the wide acceptance in innovation studies of the non-linear model of innovation to explain the innovation process.

Linear model vs non-linear model in the innovation process

The **linear model of innovation** was widely adopted after World War II to explain the innovation process. The concept was developed in ***Science, the Endless Frontier***, a report published in 1945 at the request of President Roosevelt to understand how the lessons learned from the wartime organisation of science and engineering could be applied in times of peace. The breakthrough innovations that occurred during World War II, such as the atom bomb, radars, and penicillin, suggested that innovations were the outcomes of the following cause and effect relationships: basic research made in large universities or government research institutes or private R&D laboratories, was followed by innovation, and by their diffusion for military or civil uses.

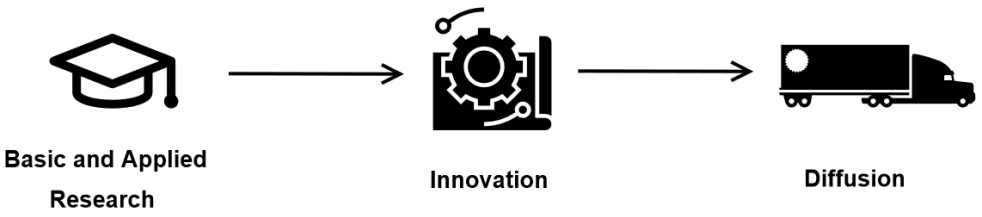


Figure 1. The linear model of innovation. Source: the authors.

In the 1980s, the **non-linear models of innovation** were the responses to the shortcomings and overly simplistic linear model of innovation. Indeed, the non-linear models of innovation point out the importance of **feedback mechanisms** among the different parts of the innovation process and flow paths of information and cooperation (Kline & Rosenberg, 1986). In the non-linear models of innovation, it is recognised that science emerging in universities and technology emerging in industry are often separate entities. Indeed, there exist lags between science and technology that are more or less wide depending on the technologies (OECD,

2006). The objective of knowledge transfer is to optimise the innovation process that is systemic, non-linear, and involves diverse quadruple helix innovative actors, among which university-industry actors.

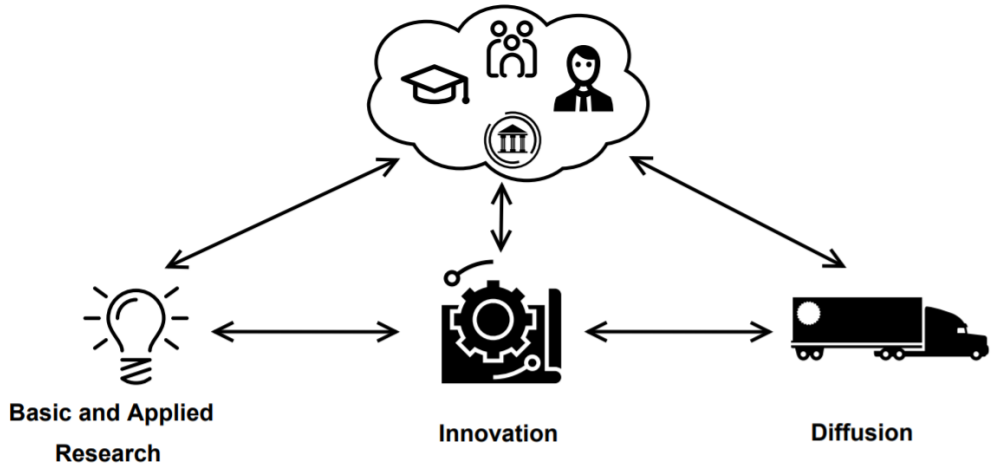


Figure 2. The non-linear model of innovation. Source: the authors.

As a result, new models of innovation have been introduced to stress the importance of interactions between science and industry to promote knowledge transfer. The concept of **triple helix model** of innovation highlights the importance interactions among universities, the private sector and public institutions (Etzkowitz & Leydesdorff, 2000). The **open innovation model** stresses the importance of knowledge transfer to build internal capabilities for companies with high research and development (R&D) needs (Chesbrough, 2006). Moreover, innovation system literature argues that successful regional innovation systems are characterised by effective interactions among regional innovative actors (Braczyk, Cooke, & Heidenreich, 1998).

Box 1. Towards the Entrepreneurial University

The importance of university-industry collaboration and interactions for fostering innovations has led universities to rethink their purposes. Indeed, universities are increasingly participating in regional development through diverse initiatives such as technology transfer offices (TTOs), licensing, intellectual property rights (IPRs), consulting services, collaborative research, start-up incubators, spinoffs... Universities are not only responsible for developing human capital (Education – the first mission) and for producing new knowledge (Research – the second mission), but also must engage in regional development (Regional development – the third mission). **This third mission for universities to actively participate in regional development requires them to act more entrepreneurially**, such as in creating spinoffs, promoting an entrepreneurial culture among students, and/or participating in the elaboration of smart specialisation strategies (Fonseca, 2019).

2. Rationale for Policy Intervention

There are many benefits to enhancing collaborative innovation activities between universities (public laboratories, research institutes and higher education institutions) and industry (private companies). The benefits include to achieve a critical mass in research activities, to overcome fragmentation caused by distance and a smaller resource base, to bring together different perspectives, experience, skills and knowledge, to break down specialist silos and restrictive organisational boundaries, to foster cross-disciplinary interactions, to encourage skills and knowledge transfer, to promote mutual understandings, and to manage risks associated with R&D (**O'Kane, 2008**).

University-industry interactions, however, requires policy intervention. The rationale for policy intervention to promote university-industry collaboration resulting in knowledge transfer lies on different assumptions, they are:

- **Research and Development (R&D) activities are essential for the competitiveness of private companies** (**Freeman & Soete, 2004**). R&D activities are especially important to generate radical innovations, which are innovations that have a significant impact on a market by offering customers and users higher benefits relative to existing products, services, or processes, and, as a result, significantly impacting the economic activity of firms in that market (**OECD, 2005**). Radical innovations require large investment in R&D and a higher tolerance of firms for uncertainty since radical innovations have a lower chance of success.

- **There is a lack of incentives for private companies to participate in R&D activities.** However, private firms conducting R&D activities have difficulties to fully appropriate the returns on their investment since that knowledge—which is non-rival and partially non-excludable in nature—will spill over to other firms. Additionally, it is difficult for private companies to have access to external funding since R&D outcomes are risky and uncertain (**OECD, 2016**).

- **There is a lack of absorptive capacity of private companies.** The innovation process results from the interactions between scientific and technological knowledge. However, private firms must have the capacity to access and absorb knowledge that is generated in universities (**Rosenberg, 1990**). The concept of absorptive capacity stresses that the firm must have the ability 'to recognise the value of new, external information, assimilate it and apply it to commercial ends' (**Cohen & Levinthal, 1990, p. 128**).

- **There is asymmetry of motives between university and industry to collaborate.** Universities are primarily driven to create new knowledge and to educate, whereas private firms are focused on economically capturing useful knowledge to gain a competitive advantage. Universities are motivated to collaborate with industry to access industrial capabilities and resources, to commercialise research ideas or test their commercial potential, to develop 'real-world' links, or to develop potential career pathways for students. On the other hand, private companies are motivated to collaborate with universities to access leading-edge research knowledge, research infrastructures or research services, to develop in-house capabilities, or to identify potential future employees (**Cunningham & Gök, 2016**). Policies can thus overcome information and behavioural barriers to cooperation between universities and the private sector.

- **Technological innovation is key for regional competitiveness.** University-industry collaboration develops stronger channels to facilitate the flow of knowledge and technology from public research organisations to public and private companies. Additionally, it allows universities to conduct problem-focused research, which might expand academic effort devoted to user-oriented research, that accelerates technological breakthroughs in strategic regional sectors (**Hagedoorn, Link, & Vonortas, 2000**).

Box 2. Interview with Arno Meerman - co-founder and CEO of the University Industry Innovation Network (UIIN).

***Research and Innovation thematic experts*:** what are the major barriers for university-industry collaboration?

***Arno Meerman*:** There is a strong consensus on the main barriers towards university-industry engagement from university stakeholders regardless of country, type or size of the university or leadership structure. Lack of time and funding, too much bureaucracy and limited resources are most frequently seen as the key elements hindering collaboration.

Research and Innovation thematic experts: how to address those barriers?

***Arno Meerman*:** Although there is no such thing as a one-size-fits-all solution, in looking at good practices from around the globe, the common denominator in most of these examples is people… It is about hiring professional, engaged personnel with industry experience, about enabling academics through less bureaucracy and different metrics for success and providing them with the independence and time to develop trust and mutual commitment with industry.

3. Finding the Right 'Policy-Mix'

Regional policymakers must design place-based policies adapted to their regional institutional contexts. As a result, a regional diagnostic of the state of university-industry collaboration must be undertaken to select the most effective policy-mix. The term 'policy mix' is used to refer to the policy instruments implemented to deliver public action in this specific policy domain and their interactions.

The **OECD report on University-Industry Collaboration** offers a comprehensive overview of 21 policy instruments to promote university-industry collaboration. The 21 policy instruments can be divided into financial, regulatory, or soft instruments.

- **Financial instruments** include R&D and innovation grants, funding support for infrastructures and intermediary organisations, tax incentives with a focus on collaboration, direct financial support for spin-offs, and financial support to recruit PhDs or postdoctoral students.
- **Regulatory instruments** aim to provide incentives to the different parties involved in science-industry knowledge transfer, including intellectual property (IP) rights regime, regulations regarding the creation of spin-offs by researchers, and sabbaticals and mobility schemes for researchers.

- **Soft instruments** include less interventionist models of public policy focused on awareness building, networking events, and the development of guidelines, standards and codes of conduct.

Additionally**, university-industry knowledge transfer can happen through formal and informal channels.** Formal channels include collaborative research, contract research, academic consultancy, intellectual property (IP) transactions, researchers' mobility, academic spin-offs. Informal channels include publication of public research results in scientific journals and other specialised media, conferences and networking, facility sharing between industry and public research, and courses and continuing education (OECD, 2019).

Financial Instruments	Regulatory Instruments	Soft Instruments
R&D innovation subsidies/grants for industry-science research	IP regulations publicly-funded research	Outreach activities to raise awareness of science-industry opportunities
Tax incentives for companies purchasing research from universities	Regulation of spin-offs founded by researchers & students	Training programs on knowledge collaboration
Grants for IP applications from universities	Sabbaticals & mobility schemes for researchers to work in industry	Collective industry-science roadmapping & foresight
Financial support to academic spin-offs	Career rewards for researchers engaging in knowledge collaboration	Guidelines, standards, & codes of conduct for science-industry collaboration
Financial support to firms to recruit PhDs & post-docs	Open access & open data provisions for publicly-funded research	Networking support to build science-industry linkages
Financial support for universities to host industry researchers		
Public procurement of university research		
Innovation vouchers for R&D services from universities		
Performance-based funding systems for university linkages with industry		
Public-private partnerships creating joint research laboratories		
Funding of infrastructures & intermediaries for collaboration		

Table 1. List of the 21 policy instruments. Source**:** OECD, 2019.

There are emerging policy approaches to promote university-industry collaboration knowledge transfer that include:

- **Support for science industry knowledge co-creation**. The notion of co-creation stresses the interactive and collaborative nature of knowledge transfer between universities and industry. For instance, policymakers can create collaborative research centres (CRCs) such as Centres of Competence (CoC) and Centres of Excellence (CoE) to engage in applied research in strategic regional sectors in close relationship with leading businesses. CRCs aim to build a critical mass of competitive research and foster a high level of international visibility. Moreover, policymakers can develop collaborative and knowledge exchange research projects that involve one or more

business partners with one or more public research institutions to engage in a specific R&D project with commercial ambitions.

- **The creation of intermediary organisations that help match supply and demand for new technologies** that can take the form of R&D centres for science industry collaboration or business incubators.

- **The use of open digital innovation platforms** to connect research centres with SMEs.

  The development of new programmes to support university spin-offs, which is defined as 'new firms created to exploit commercially some knowledge, technology or research results developed within a university' (**Pirnay, Surlemont, & Nlemvo, 2002**), as those spin-offs directly exploit knowledge coming from university.

- **The use of pre-commercial procurement (PCP).** PCP is an activity that is undertaken, usually by a government or a public-private partnership, to support innovation through the purchase of R&D services, which normally includes the delivery of a prototype (**Rigby, 2016**). Pre-commercial procurement can favour university-industry collaboration.

From those policy instruments (see Table 1), regional policymakers can design the most effective policy-mix to address their specific policy challenges. **The design of a coherent and effective policy-mix implies that regional policymakers are dealing with a high level of policy complexity.** For instance, the combination of several policy instruments may create synergies but also weaken the success of individual instruments. Complex policy mixes can also create coordination failure as it requires the regional government to effectively coordinate multiple actors, and through multi-level governance (**OECD, 2019**).

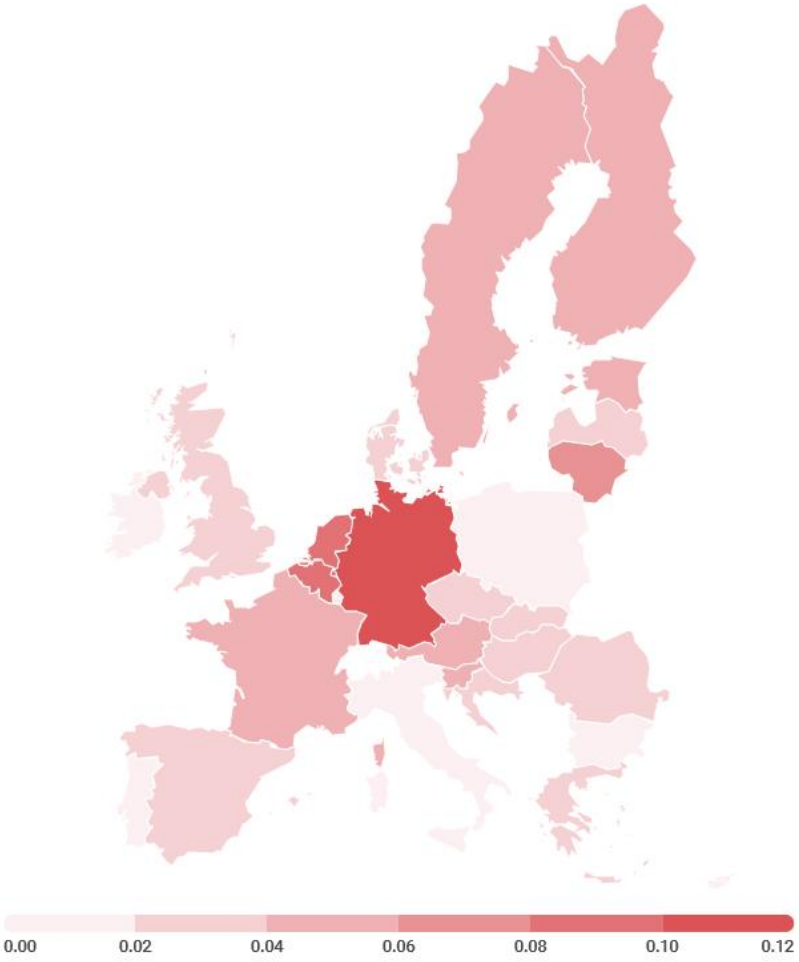
Box 3. How can the Policy Learning Platform support?

The **Interreg Europe Policy Learning Platform** can help policymakers in sharing experiences on designing instruments to promote knowledge transfer. The **Interreg Europe Policy Learning Platform good practice database** allows to have access to a large number of good practices from different institutional contexts dealing with university-industry collaboration, thus providing a rich policy database to get inspired and to improve their policy mix. In addition to the good practice database, the **Policy Learning Platform** can provide a forum for direct discussions in thematic workshops, peer review learning or online discussions, and provide access to expert advice.

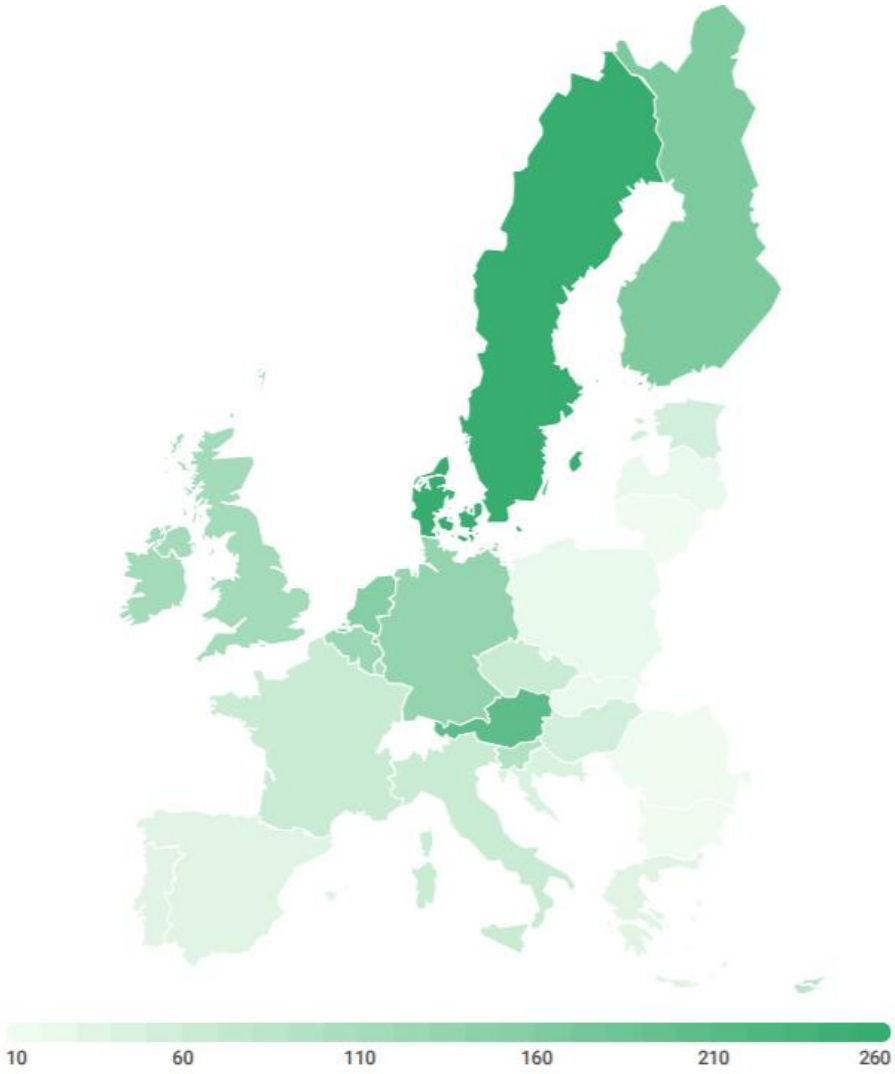
4. University-Industry Collaboration in the European Union

In 2000, the European Union (EU) made innovation a priority with the Lisbon Agenda and the Europe Horizon 2020 strategy, which set a target for 3% of the EU's GDP to be invested in R&D, along with a diverse range of innovation policies to close the EU's technological gap with the United States and thus become 'the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion' (**European Parliament, 2000**).

In 2017, however, the R&D expenditure in the European Union only reached 2.07% of its GDP, ranging from 3.33% in Sweden to 0.5% in Romania (European Commission, 2019). In the European Innovation Scoreboard 2019, science-industry collaboration varies a lot among and within countries (see Maps 1 and 2). Overall, the European Union is lagging behind the United States in producing technological innovations. Although the European Union is leading in top-level scientific outputs compared to the United States, the EU has not been able to transform these scientific outputs into innovations (Dosi, Llerena, & Labini, 2006). **This 'European Paradox' is due to a weaker system of scientific research and a lower capacity of the European Union's innovative companies to successfully convert scientific outputs into successful technological innovations.** University-industry collaboration is thus seen as a path towards catching-up technologically with the United States, and to a lesser extent, China, Japan, and South Korea.



Map 1. Private co-funding of public R&D expenditures as percentage of GDP in 2016. Source: European Innovation Scoreboard 2019.



Map 2. Public-private co-publications per million population in 2018. Source : **European Innovation Scoreboard 2019**.

Horizon 2020 and Horizon Europe

In the European Union, the EU framework programme for research and innovation for the programming period 2014 to 2020, **Horizon 2020**, and the next one for the period 2021-2027, **Horizon Europe**, address the policy challenge to promote university-industry collaboration through different initiatives such as **Erasmus+** and the promotion of '**mission-oriented innovations**'.

In **Horizon 2020**, **Erasmus+** promotes university-industry collaboration within the **key action 2 – Cooperation of innovation and the exchange of good practices** through the **knowledge alliances and the strategic partnerships**. The **knowledge alliances** target higher education institutions and private companies to develop new, innovative, and multidisciplinary approaches to teaching and learning; to stimulate entrepreneurship and entrepreneurial skills of higher education teaching staff and company staff; and to facilitate the exchange, flow and co-creation of knowledge. The **strategic partnerships** aim to develop initiatives addressing one or more fields of education, training, and youth and promote

innovation, exchange of experience and know-how among different types of relevant organisations.

Horizon 2020 and Horizon Europe aim to promote 'mission-oriented innovations' and generate disruptive technological breakthroughs and scientific discoveries to tackle '**Grand Challenges**', including social, environmental, and economic challenges. They have developed some initiatives to make it easier for the public and private sectors to work together on grand challenges. In Horizon Europe, the European Innovation Council (EIC) aims to support top-class innovators, entrepreneurs, small companies, and scientists working on grand challenges **with funding, advice, and networking opportunities**. **The High-Level Group of Innovators**, a group composed of 15 leading entrepreneurs and technologists headed by the Dr Hermann Hauser, Co-founder of Amadeus Capital Partners, advises the European Innovation Council (EIC) on strategies to foster disruptive and breakthrough innovations.

The partnerships with industry and member states aim to facilitate collaboration between science and industry to tackle the grand challenges of tomorrow. There are seven partnerships set up by the Commission to implement Horizon 2020: Innovative Medicines Initiative 2 (IMI2), Fuel Cells and Hydrogen 2 (FCH2), Clean Sky 2 (CS2), Bio-based Industries (BBI), Electronic Components and Systems for European Leadership (ECSEL), Shift2Rail, and the Single European Sky ATM Research (SESAR). Partnerships with the industry are established in the form of Article 187 Joint Undertakings (JUs). Horizon 2020 has two other public-private initiatives, namely contractual public-private partnerships (cPPPs) and Public-public partnerships to tackle grand challenges.

Other initiatives

The European Institute of Innovation and Technology (EIT) supports knowledge innovation communities (KICs) to bring together leading business, education and research organisations to find solutions to some of the most pressing global challenges, from climate change to the sustainable supply of raw materials. The EIT has created eight KICs focusing on different sectorial challenges such as Climate, Digital, Food, Health, InnoEnergy, Manufacturing, Raw Materials, and Urban Mobility, bringing together over 1,000 partners from leading business, education, and research organisations across Europe. The KICs' main objective is to strengthen Europe's ability to innovate by overcoming the fragmented European innovation landscape to form dynamic cross-border partnerships. The KICs organise activities such as training and education programmes, and incubation and acceleration to support the development of innovative products and services, to start new companies, and to empower entrepreneurs and innovators.

While the European Union is promoting university-industry collaboration on grand challenges and large European technological initiatives, **regional policymakers can experiment place-based innovation policies to promote university-industry collaboration.** The great disparities among European regions (see Maps 1 and 2) show that there is no one-size-fits-all policy to promote university-industry collaboration thus requiring a deep understanding of the regional institutional context. As highlighted in Table 1, the 21 policy instruments show that regional policymakers have a vast set of tools at their disposal to design a coherent policy-mix to reinforce innovation.

Box 4. How can the Policy Learning Platform support? The Peer Review Exercise in Bulgaria.

An **Interreg Europe Policy Learning Platform peer review** was organised for the Executive Agency Science and Education for Smart Growth Operational Programme, Ministry of Education and Science of Bulgaria, on 18-19 June 2019 in Sofia, Bulgaria. The peer review focused on the management models, governance structures, private sector involvement, extra-regional cooperation, and financial models related to Centres of Excellence and Centres of Competence in Bulgaria. During the **interregional peer review**, the peers coming from the Interreg Europe projects **BRIDGES** and **INNO INFRA SHARE** suggested ways to effectively foster science-industry collaboration. For instance, they recommended for the Centres of Excellence and Centres of Competence to hire key account managers to work on expert level with private companies and to involve the private sector in the definition of services.

5. Interreg Europe Projects

Many Interreg Europe projects from the Thematic Objective Research and Innovation tackle specific policy challenges related to **university-industry collaboration** (See Annex 1). For many, this is fundamental to promote better regional innovation ecosystems, in particular to reinforce the role of universities in the **Entrepreneurial Discovery Process (EDP)**[1], to favour and accelerate the exploitation of research and development (R&D) results for SMEs, and to foster more collaborative innovative projects.

Policies focusing on the triple or quadruple helix in EDP and more generally on reinforcing the innovation ecosystem are at the heart of **INNOHEIS,** aiming to encourage higher education institutions (HEIs) and their research and innovation infrastructures (RIIs) to participate as enablers of **Smart Specialisation Strategy (S3)** and the **entrepreneurial discovery process (EDP). BEYONDEDP** aims to promote efficient understanding and implementation of the EDP among actors of innovations. **HIGHER** aims to improve the design and implementation of policy instruments to promote innovation projects that involve research centres, the private sector, and public authorities.

Accelerating the exploitation of research and development (R&D) results for private companies remains a crucial objective for innovation policies at regional level. The project **INKREASE** looks at improving regional innovation delivery capacity in reinforcing science-industry collaboration and in the exploitation of research results. Working closely with research and technology organisations (RTOs) and universities, **INNOBRIDGE**'s objective is to develop policy instruments to support the conversion of R&D results into commercial successes. **ECORIS3** aims to support knowledge transfer from RTOs and HEIs to private companies through promoting interactions and knowledge flows among key S3 innovative stakeholders. **TITTAN** fosters technological innovations in the European healthcare sector using innovative

[1] **Smart Specialisation Strategy (S3)** is a place-based policy concept to support regional prioritisation in innovative sectors, fields or technologies through the **entrepreneurial discovery process (EDP),** a bottom-up approach to reveal what a region does best in terms of its endowments in science and technology (**European Commission, 2016**). At the regional level, **the EDP aims to select and prioritise regional technological trajectories** that should be supported through research and innovation policy instruments by the regional government. The EDP implies the **collaboration of regional quadruple helix actors**—namely, the private sector, universities, the public sector, and civil society—in the definition of the S3.

procurement practices, such as pre-commercial procurement (PCP) and public procurement of innovative solutions (PPI) to reduce the gap between research and market in the healthcare sector. Finally, **AGRI RENAISSANCE** aims to improve public-private R&D collaboration in the agri-food sector.

…and they bring policy changes…

In **ECORIS3**, the Lithuanian partner Science and Technology Park Sunrise Valley introduced '**InoStartas LT**', an innovation voucher scheme to support commercialise R&D products and R&D investments to promote university-industry collaboration. Sunrise Valley was inspired by the 'technology voucher' scheme presented by the council of San Sebastian that focused on higher technology readiness levels.

In **INNOBRIDGE**, the partner Pannon Novum, the regional innovation agency of West-Transdanubia in Hungary, revised its **innovation voucher scheme** in order to target more participants. The scheme aims to stimulate collaboration between companies and R&D+I providers. The policy change was made possible thanks to project's workshops and discussions with Lower Austria, the Malopolska Region (Poland), and Tampere Region (Finland).

6. Policy recommendations

This policy brief provides six policy recommendations, from more general to more specific advices depending on the regional contexts. They are illustrated with interesting practices coming from within and outside Interreg Europe projects.

Policy recommendation 1. To create centres of competence.

The first policy recommendation is for regions to support the creation of centres of competence to strengthen university-industry collaboration on applied and business-oriented research in strategic regional sectors. The main characteristic of centres of competence is their close links with the private sector.

Centres of competence are collaborative research centres that are usually located in universities. They tend to focus on regional strategic sectors in applied research projects in collaboration with leading regional businesses. In centres of competence, the university-industry collaboration is reinforced through:

- Having the private sector in the management and governance structures,
- Dedicating services to the private sector,
- Steering the academia's work towards more applied research,
- Facilitating interregional linkages thanks to the participation of international companies.

Box 5. A centre of competence for the food sector

From the NICHE Interreg Europe project, the BioCC OÜ is a **competence centre in the food sector in Estonia.** The competence centre provides support **from basic research to market commercialisation** thus covering the full spectrum of product development. BioCC OÜ involves a triple-helix model of collaboration among Estonian companies, universities (University of Tartu), and public organisations in the frame of the Estonian Competence Centre Programme. In the BioCC OÜ, 20 food SMEs are working with academics to generate new product food innovations. The competence centre was successful in developing new food products, such as the cheese HARMONY™ that containing probiotic strain L.plantarum TENSIA® to stabilise blood pressure.

Policy recommendation 2. To create web platforms to map university-industry collaboration.

The second policy recommendation is **to create web platforms to map all the regional science-industry collaborative initiatives** thus allowing the public and private sectors to have an overview on the current and future science-industry collaborative opportunities. Web platforms allow regions to showcase to the private sector, the existing regional research capabilities and infrastructures.

Regional policymakers can create web platforms to map research conducted in the regional research units, the current and future science-industry collaborative research opportunities, the regional science-industry intermediary organisations, and the region's world-class leading research units. Moreover, social network analysis (SNA) tools could be used to map existing research activities and interactions across the regional research units.

Box 6. Webservices for a stronger awareness of Brittany's R&D potential

From the INKREASE Interreg Europe project, the "Plug in Labs Ouest" is a webservice to showcase scientific and technological capabilities of all research units in Brittany. The webservice has three objectives: (1) to facilitate private sector engagement with the scientific community, (2) to encourage science-industry collaborative projects, and (3) to showcase services and scientific infrastructures available to the private sector. Moreover, the webservice tool has demonstrated its transferability to other European innovation players such as with the Plug in Labs University of Paris-Saclay launched in 2017.

Policy recommendation 3. To create intermediary organisations.

The third policy implication is to **create intermediary organisations** to facilitate university-industry collaboration to respond to specific weaknesses in the regional innovation ecosystems. Intermediary organisations have the capacity to understand both the scientific and business worlds and they may act as linkages, interface agencies, bridging institutions, technology brokers, transfer offices, gatekeepers, and transfer agents.

Intermediary organisations offer possible solutions to the market and system failures that hinder university-industry collaboration. In Scotland, for instance, the innovation ecosystem is characterised by a high proportion of SMEs disconnected from the academic world and fragmented higher education institutions. The intermediary organisation, **Interface**, is supporting small and medium enterprises (SMEs) to engage with the academic world through different types of incentives such as science-industry networking opportunities, access to specialist facilities, supporting SMEs to adopt university developed technology, matching opportunities between business and academics, and offering innovation vouchers to SMEs to connect with higher education institutions.

Box 7. An intermediary to bridge research and industry

From the **BEYOND EDP** Interreg Europe project, in 2013, **FEMTO Engineering**, an intermediary organisation that is composed of business development engineers, was created to capitalise on the experience of **FEMTO-ST** in involving the industry in research projects. **FEMTO-ST** is a centre of competence located in Bourgogne Franche-Comté (France) that has developed an expertise in transferring scientific knowledge to industry. The centre of competence has promoted the creation of spin-offs while aligning spin-off activities with the regional smart specialisation strategy (S3). FEMTO Engineering offers specific and high-level engineering services based on the research conducted at **FEMTO-ST** to SMEs and large companies on five broad technological fields, namely energy; optics, photonics, and laser machining; electronics and hyper frequencies; micro-technologies for cleanrooms; and robotics.

Policy recommendation 4. To attract international researchers.

The fourth policy recommendation is for regions to **attract international researchers to work in industry**. This is relevant when the region's private companies are reluctant to hire R&D researchers and to conduct R&D, and the region already has a high capacity to bring applied research to the market.

Labour inter-sectoral mobility is the main carrier of knowledge and networks. As a result, R&D employees coming from research institutions will have a greater capacity to collaborate with universities. With the overall objective to improve university-industry collaboration, facilitating the employment of international researchers in private companies also aims: (1) to improve the capacity of the innovation ecosystem to acquire, absorb, and diffuse extra-regional knowledge, (2) to generate formal and informal extra-regional knowledge networks, (3) to change attitudes of private companies in their hiring practices.

Box 8. Financial support to R&D jobs in private companies

From the **S3CHEM** Interreg Europe project, the program **TECNIOspring** is a mobility scheme to attract international researchers to develop R&D projects in Catalonia, Spain. The programme provides 100% financial support to offer fellows 2-year employment contracts to develop applied research projects with focus on technology transfer. **TECNIOspring** is an example of a technology push initiative that gives financial incentives for private companies to conduct and to invest in R&D. In addition to incentivise private companies, the programme allows for extra-regional knowledge flows and linkages with other R&D centres.

Policy recommendation 5. To launch calls for pre-commercial procurement requiring university-industry collaboration.

The fifth policy recommendation is **to use pre-commercial procurements** that require university-industry collaboration. These types of pre-commercial procurements can boost university-industry collaboration especially related to risky and uncertain R&D projects such as the development of new pharmaceutical drugs.

The use of pre-commercial procurements (PCPs) are novel and complex policy schemes that require a strong leadership from the public administration. Additionally, a mapping of the needs and benefits of all the stakeholders should be undertaken to encourage technical dialogue and commitment for such programmes.

Box 9. Pre-commercial procurement in the healthcare sector

From the **TITTAN** Interreg Europe project, the **Pre-Commercial Procurement (PCP) Niguarda** is a pilot programme to boost pre-commercialisation practices in public hospitals in Italy. The tender to purchase smart systems for hospital beds was organised by the Central Purchasing Body (ARCA). Pre-commercial procurements have the objectives to reduce wasteful spending and increase healthcare quality services. The PCP was organised along three phases: (1) a feasibility study, (2) solution design, and (3) prototyping and field testing.

Policy recommendation 6. To create regional competition awarding successful university-industry collaboration.

The sixth policy implication is to create regional competition awarding successful university-industry collaboration. This soft measure is especially relevant when universities and private companies have a negative perception of university-industry collaboration.

Social norms can be powerful obstacles to innovation and technological change (**Mokyr, 1990**). As a result, negative or positive attitudes from private companies and universities can help or hinder collaboration. Competitions can showcase to universities and private companies

the range of possibilities in developing successful university-industry collaboration and generate behavioural changes.

Box 10. Awards for promoting university-industry collaboration

The **INNOBRIDGE** Interreg Europe project has the objective to develop policy instruments to support the conversion of R&D results into commercial successes, especially for SMEs. Soft policy measures have been identified to generate positive attitudes towards university-industry collaboration such as **National Contest for discovery and popularisation of successful innovation models (InnoAwards),** which awarded 90 innovative companies, and the **University-Business Challenge**, which received 204 applications between 2013 and 2016 and awarded 18 R&D projects.

Sources of further information

- European Commission (2019) - **European Innovation Scoreboard 2019**
- European Institute of Innovation and Technology - **EIT**
- Freeman and Soete (2004) – **Economics of Industrial Innovation**
- Horizon 2020 - **Horizon 2020**
- Horizon 2020 - **Erasmus+**
- Horizon 2020 research project on 'The Role of Universities in Innovation and Regional Development' - **RUNIN**
- Horizon Europe - **Horizon Europe**
- Mazzucato (2018) - **mission-oriented innovations**
- OECD (2005) – **OSLO Manual**
- OECD (2019) - **OECD report on University-Industry Collaboration**
- Public-private partnerships – **partnerships with industry**
- University Industry Innovation Network - **UIIN**

Annex 1: Selection of relevant Interreg Europe projects dealing with university-industry collaboration

Project	Policy Objective
AGRI RENAISSANCE	To improve public-private R&D collaboration in the agri-food sector
BEYOND EDP	To improve the design and implementation of the Entrepreneur Discovery Process (EDP)
BRIDGES	To enhance industry-led Centres of Competence (CoCs) as RIS3 implementation units.
ECORIS3	To support knowledge transfer from RTOs and HEIs to regional private companies.
HIGHER	To improve the design and implementation of policy instruments to promote collaborative innovation projects.
INKREASE	To reinforce the collaboration between research and business communities and favour the exploitation of research results.
INNOBRIDGE	To support the conversion of R&D results into commercial successes, especially for SMEs.
INNOHEIS	To encourage higher education institutions (HEIs) and their research and innovation infrastructures (RIIs) to participate as enablers of S3 and the EDP.
SMARTPILOTS	To support effective Shared Pilot Facilities (SPF) for the bio-based economy.
TITTAN	To reduce the gap between research and market in the healthcare sector.
TRACS3	To support regional innovation infrastructures to build research excellence.

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#ResearchAndInnovation #InterregEurope

#University #industry

#universityindustrycollaboration #policylearning

Thematic experts:

Arnault Morisson & Marc Pattinson

a.morisson@policylearning.eu m.pattinson@policylearning.eu

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