

# REALISATION OF THE MAPPING OF REGIONAL STAKEHOLDERS' NEEDS AND TRANSVERSAL CHALLENGES

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## 1. WP 5.3 INTRODUCTION

Work Package 5.3 is a sub-objective of WP5 dedicated to social engagement, particularly with society and external stakeholders, focusing on student entrepreneurship.

The overall objective of WP5.3 is to foster a sense of collaboration and unity among the Circle U. universities and their surrounding territories. This will be achieved by creating challenge-based/project-based learning activities aligned with regional strategies to support regional social innovation. Circle U. universities will map regional societal needs for innovation in cooperation with local governments, identify common innovation priorities, and engage relevant regional stakeholders, which will strengthen this collaborative approach. Furthermore, an interview-based data collection method is employed to help a more profound understanding of this additional objective. A preliminary questionnaire is currently being distributed to several regional officers (for details, please see "ANNEX") representing the universities participating in the Circle U project. Implementing these measures will facilitate a consortium-wide approach to addressing shared challenges, fostering a sense of inclusivity and community among all stakeholders.

The present document provides an overview of the steps leading to this work and highlights the results obtained from the first steps taken. Therefore, the present report will be divided into four different sections:

- First, the theoretical background will highlight the reasons and purposes for the Smart Specialization Strategy's support of social innovation and the critical role of higher education institutions in sustaining the design and implementation of this policy for regional social innovation.
- Second, we will give an overview of the research design guiding both desk and field research.
- Third, we will provide an overview of the results obtained from mapping regional and national priorities for each university involved in the Circle U. project.
- Finally, we will discuss the significant challenges faced during the first steps of the research in the context of the Circle U. partnership to identify the best way to proceed with the field research in strict collaboration with regional stakeholders.

## 2. THEORETICAL BACKGROUND

This section provides an overview of the Smart Specialisation Strategy and the role of Higher Education Institutions in supporting the regional innovation policy.

In the first case, the information provided focuses on the role of the Smart Specialisation Strategy for regional innovation and emphasises its contribution to social innovation by fostering the resolution of pressing societal challenges, thus becoming a transformative tool for our societies. It will also emphasise the structure guiding the design and implementation of the Smart Specialisation Strategy and the challenges that might hinder the overall process.

In the second case, the information provided focuses on universities' role in supporting social innovation and sustainability, starting from their *third* and *fourth mission* and engagement with the surrounding territory. This section will also provide an overview of their specific contribution to the design and implementation of the Smart Specialisation Strategy policy.

### 2.1. THE SMART SPECIALISATION STRATEGY: FROM INNOVATION TO SOCIAL INNOVATION FOR SUSTAINABLE DEVELOPMENT

Being among the most prominent European policies to boost regional innovation towards sustainable and inclusive growth (European Commission, 2020), the *Smart Specialisation Strategy* (S3) gained momentum in the scientific debate about the effectiveness of regional policies on sustainable transitions (Kogut-Jaworska & Ociepa-Kicińska, 2020; Kruse, 2023; Veldhuizen, 2020): the S3 is a governance concept designed and implemented by the European Commission to accelerate regional economic growth by ensuring sufficient resource allocation to all European countries (McCann & Ortega-Argilés, 2015). As specifically defined by the European Commission's original policy documents, the S3 refers to "a set of priorities [designed] in order to build competitive [regional] advantage by [...] matching research and innovation [...] to address emerging opportunities and market development coherently, while avoiding duplication and fragmentation of efforts," (European Commission, Reg No. 1303/2013, 2013). Indeed, the specific S3's development strategy relies on the identification and enhancement of areas of economic and innovative potential through a collaborative process where local stakeholders comprising businesses, governments, research institutions, and civil society collaborate to define a shared vision for regional development, thus building place-based competitive advantages (Foray, 2019; Foray et al., 2009). However, considering the current challenges driven by climate change, inequalities, poverty, and pollution (Schot & Steinmueller, 2018), the S3's goals are increasingly directed at solving the so-called "grand challenges" (Schot & Steinmueller, 2018) by making the specific societal needs produced locally the starting point for leveraging regional development and competitiveness (Landabaso, 2014; Schot & Steinmueller, 2018). This makes innovation a concrete tool for sustainability governance. (Landabaso, 2014) by converting the Smart Specialization Strategies (S3) into a Smart Specialization Strategy for Sustainable Development (S4) (Neto et al., 2018) aimed at achieving the objective of smart, sustainable, and inclusive growth (European Commission, 2010).

According to Foray (Foray, 2019, p.3), the S3 is unfolding according to three consequent steps, namely:

- (1) *the identification of thematic priority areas*, which is led by the so-called "*Entrepreneurial Discovery Process*" (EDP), a self-discovery approach participated by multiple "entrepreneurial stakeholders"

(where the term “entrepreneurial” does not refer to the nature itself of the social actors involved, but rather to the set of regional development areas and skills) to define the regional investment priorities in line with the specific transformative goals (Foray et al., 2009). This process—essential to defining the “directionality” of a shared vision for development—builds a “transformative hope” for change.

- (2) *Translating the priority areas into transformational roadmaps*, which define “the nature, scope, and meaning of the investments for transformation and transition within the considered sector(s)” (Foray, 2019, p.4). Therefore, in this phase, it is crucial to follow the direction for transformation, which will bring together projects and actors committed to changing one or more industries targeted by the identified priority.
- (3) *Implementing the transformational activities with an action plan focusing on implementing the transformative activities* through mobilising financial instruments and project activities. In this phase, it is essential to implement functional feedback mechanisms to provide a clear overview of the process.

Although the S3 follows a linear and coherent structure, its effectiveness in addressing the societal needs derived from the *grand challenges* is still an open question. Indeed, the development of innovations to solve societal challenges and current unsustainable practices produces inevitable changes in the entire local socio-technical systems, intended as the interrelationship between the society and the technological product developed (Veldhuizen, 2020). This means that the production of technological innovations alone is insufficient but needs to be framed within a process of social transformation to ensure the viability and social usefulness of the innovation (Schot & Steinmueller, 2018). Such types of innovations – which reshape simultaneously the regional technological and social structures – are better known under the term “social innovation”, which, according to the European Commission (2013) are “new ideas (products, services, and models) [both] social in their ends and means, [meaning that they] meet social needs (more effectively than alternatives) and create new social relationships or collaborations. They are innovations that are not only good for society but also enhance society’s capacity to act” (p. 7). Consequently, measurement tools to assess the actual transformative power of S3 policy must look at the whole change process by considering aspects related to the production and implementation of technological innovation and social transformation (Schot & Steinmueller, 2018). Therefore, some questions remain open: What has happened to the “transformative hope” generated since identifying thematic priorities? Moreover, when and how is the transformative process activated by S3 successful? These questions are crucial to allow a deeper understanding of the mechanisms generated locally by the S3, aiming for universities and other local actors to support the process better.

## **2.2. THE ROLE OF HIGHER EDUCATION INSTITUTIONS IN SUPPORTING THE S3 AND SOCIAL INNOVATION FOR SUSTAINABLE DEVELOPMENT**

Universities are crucial in local sustainable development (Kempton et al., 2013). In the context of regional development strategies such as the S3, Higher Education Institutions (HEIs) have the critical function of guiding and supporting regional growth and social innovation through their civic engagement (Goddard & Kempton, 2016; Edwards et al., 2017; Tomasi et al., 2021). This activity is formally recognised among the different HEIs’ missions, which, alongside teaching (first mission) and researching (second mission), encourage more significant interaction with the surrounding territory (Molas-Gallart et al., 2002) and involvement in context-based challenges (Goddard & Kempton, 2016): indeed, universities can engage in a “productive transformation of knowledge” (third mission) though transferring the technology to the regional productive sectors or by creating owned spin-offs, thus giving rise – among others – to the concept of “entrepreneurial university”. In doing so, universities partner with industries and local governments (Triple Helix Model of innovation, see Leydesdorff, L., & Etzkowitz, H., 1998) to efficiently exploit the knowledge and technology generated (Leydesdorff & Meyer, 2003). However, in response to the challenges of our times, universities are called to directly intervene in identifying and responding to the specific local societal needs to

define more sustainable pathways (Trencher et al., 2013; Cavicchi et al., 2013; Trencher et al., 2014 a,b; Rinaldi, 2018). This last model, referred to as “co-creation for sustainability”, is at the core of the so-called “fourth mission” (Trencher et al., 2013, 2014a, b), guided by a more holistic approach to development and a transparent engagement with societal concerns. Here, universities act as “civically engaged” (Edwards et al., 2017) and indeed “transformative institutions” (Trencher et al., 2013). According to Goddard et al. (2016), seven are the dimensions characterising the civically engaged university (Goddard et al.; Tomasi et al., 2024):

<b>Sense of purpose</b>	The civic university understands “not [just] what is good at, but what is good for.” It has a sense of action for solving the area's social and economic challenges, and it creates meaningful local networks that do not merely receive knowledge from universities but are involved in the true co-creation of knowledge and actions.
<b>Active engagement</b>	The civic university is actively engaged in its surrounding territory. It creates local and international collaborations to benefit the area's societal and economic challenges.
<b>Holistic approach</b>	The civic university has individuals or teams willing to engage within their territory, where the engagement itself is not seen as an addition to their “core” activities but as an opportunity to jointly develop them for their mutual benefit.
<b>Sense of place</b>	The civic university is aware of its work within a specific territory and its peculiarities. It is aware that its activities are deployed within a living laboratory, working together with other actors, and it puts its infrastructure at the community's disposal to benefit the territory.
<b>Willingness to invest</b>	The civic university is willing to invest in its territory with knowledge and by attracting funding for projects and activities, fostering the development of boundary spanners between different sectors.
<b>Transparency and accountability</b>	The civic university's mission on the ground is transparent and accountable. It makes the purposes and vision of its actions transparent to society and intervenes to encourage feedback and assessment of its work.
<b>Innovative methodologies</b>	The civic university encourages innovative methodologies for identifying social challenges, fostering understanding, and facilitating teamwork operations to solve local problems.

Table 1: The civic university and its engagement within the territory (Goddard et al., 2016)

Based on systematic action, the S3 policy framework leaves universities extensive room for (inter)action within their surrounding territory (Edwards et al., 2017). In particular, they become a crucial factor for innovation within the *Research and Innovation Strategies for Smart Specialisation (RIS3)*, where they guide an informed process for innovation within an innovation ecosystem together with businesses, governments, and civil society (according to the so-called “*Quadruple Helix model of innovation*”, see Carayannis, & Rakhmatullin, 2014). The European Commission (Edwards et al., 2017; Rinaldi et al., 2018) identified four specific roles for universities to engage in the design and implementation of the S3 according to their capacities, namely *generative, absorptive, collaborative, and leadership*:

<b>Generative</b>	<ul style="list-style-type: none"> <li>- Research related (but not limited) to regional priorities</li> <li>- Multi- and cross-disciplinary</li> <li>- Connectivity – knowledge nodes supporting regional analysis</li> </ul>
<b>Absorptive</b>	<ul style="list-style-type: none"> <li>- Help build capacity to ensure local firms absorb knowledge</li> <li>- Stimulate demand through teaching and learning activities</li> <li>- Knowledge exchange and transfer through mobility of staff and students</li> </ul>
<b>Collaborative</b>	<ul style="list-style-type: none"> <li>- Acting as neutral regional brokers</li> <li>- Reach out – boundary spanners</li> <li>- Reach in – co-production of knowledge</li> </ul>
<b>Leadership</b>	<ul style="list-style-type: none"> <li>- Support regional vision and partnership</li> <li>- Propose joint activities</li> <li>- Place marketing</li> </ul>

*Table 2: different roles of universities in supporting the Smart Specialization Strategy (Edwards et al., 2017)*

Through their civic engagement, HEIs can certainly contribute to socially innovative practices by playing a transformative role in fostering the coordination of activities and creating new institutions able to change social power relations (Benneworth & Cunha, 2015). However, when it comes to social innovation, there is no single socially innovative solution or model that could be easily transferable among contexts of different natures. On the contrary, Social Innovation requires a focus on the transformative potential of specific local resources, actors, and places (Terstriep et al., 2022). HEIs engaged in socially innovative development must consider that, despite being slow, SI brings on a continuous process based on trustworthy relationships and a collectivist rather than individualist perspective (Arocena & Sutz, 2021). Scientific literature highlights some key elements that HEIs, in their engagement within the territory, should take into account in order to ensure a smooth process and reduce the risks of failure (Fonseca, 2019), namely:

1. *The role of individual agency*: it must be said that although the engagement for sustainable development is formally an institutional HEI's mission, the execution of related activities strictly depends on the individuals' "agency" involved in the process. Therefore, factors such as the commitment to work in the specific area, the ability to nurture local networks and trustworthy relationships, the interest in the local specialisations, as well as the permanence for the long term within the territory are among the variables to consider in order to ensure the continuity of the co-creation process in the pursuit of a shared vision for development (Fonseca, 2019).
2. *The setting up of meaningful collaboration*: Scientific literature shows that HEIs are currently highly involved in carrying out project activities in support of the RIS3 implementation. However, stakeholder involvement is mainly facilitated by the presence of personal contacts or previous collaboration, which, despite speeding the process, also limits the involvement of necessary actors, allowing a transformative change (Tomasi et al., 2024).
3. *The need for innovative methodologies*: HEIs' contribution to the S3 goes far beyond their specialisations and technologies by helping to generate local-based knowledge through trans-disciplinary approaches required by the complex societal challenges (Rinaldi et al., 2018; Tomasi et al., 2021). This favours the "directionality" of the development vision and the coherence of activities to implement it. Here, HEIs can implement innovative methodologies, often considered by partners

as valuable tools for strengthening networking and social cohesion in the long run (Tomasi et al., 2024).

4. *Diversity in regional development needs*: The level of participation also depends on regional development needs. Research shows that this depends on the local socio-economic conditions, thus highlighting differences not only between urban and rural settings but also among more and less developed areas (Fonseca et al., 2019; Tomasi et al., 2021).
5. *Innovation policies' extent*: some HEIs operate in a context of centralised innovation policies, where it is more challenging to integrate regional peculiarities unless national RIS3 and place-based regional characteristics are better balanced (Tomasi et al., 2024).

This report outlines the background context and methodological basis for understanding S3's priorities and activities in each region where Circle U. universities are embedded and the drivers and barriers that have affected the effectiveness of the S3 policy's design and implementation so far.

### 2.3. RESEARCH DESIGN

This study adopts the action-research approach on multiple case studies (Yin, 2003) represented by the European areas where the HEIs in the Circle U. operate. Action research is a widespread methodology in social sciences used to favour societal transformative change by alternating steps of taking action within the community investigated and researching while intermediating a process of reflection upon the results obtained to inform further cyclical processes (Lewin 1946). Action research methodology has proven to be particularly suitable for allowing the knowledge produced to impact capacity building and region-HEIs partnerships (Edwards et al., 2017).

The present research consists of two main steps:

1. The first relates to a systematic review of the main S3 priorities identified in the 2021—2027 programming period by the European regions where the Circle U. universities operate. Desk research is conducted by querying and screening the S3 CoP Observatory. The Observatory “is intended to provide a core and accessible set of information for S3s around the EU, as it allows users to intuitively compare the specialisation areas of EU regions and member states and provide contact points and links to the strategy. The observatory was built in collaboration with DG REGIO G1, DG REGIO country desks, and the S3CoP Secretariat. The project team identified S3 priorities directly from regions' and member states' S3 documents and deployed tools from Artificial Intelligence (AI), including Generative AI and entity extraction and disambiguation for automatic topic tagging and classification” ([https://ec.europa.eu/regional\\_policy/sources/policy/communities-and-networks/s3-community-of-practice/S3-Observatory-Methodological-Guidelines.pdf](https://ec.europa.eu/regional_policy/sources/policy/communities-and-networks/s3-community-of-practice/S3-Observatory-Methodological-Guidelines.pdf))
2. To inform and complement this process, a pilot questionnaire (in the form of an online form) was administered to several regional officers involved in S3 planning and/or implementation. Respondents provided information related to the main priorities identified for the target region and are currently engaged in an in-depth S3 survey process in the form of in-depth interviews to understand the main drivers and barriers of S3 implemented so far and to clarify the potential contribution that Circle U. universities could provide to their territories.
3. The next step involves conducting in-depth interviews with regional officers to identify drivers and barriers to the design and implementation of 2021—2027 S3 programming and capture insights concerning the usefulness of universities' role in supporting regional development policy through collaborative activities with regional governments and local actors. This activity will lead to Deliverable 5.3, “Report with a matrix of Regional Stakeholders and Challenges,” expected at month 16.

The following section will provide an overview of the results from the systematic review of the priorities identified from the different regions within the framework of the S3.

### 3. S3 PRIORITIES

The present section provides an overview of the S3 priorities of the regions (or nations because the S3 can be developed at the regional and/or national level), where it insists on the work of the universities involved in the Circle U. program. The S3 priorities listed below result from systematic desk research on different areas. The information has been retrieved from the S3 Platform at the following link: [https://ec.europa.eu/regional\\_policy/assets/s3-observatory/index\\_en.html](https://ec.europa.eu/regional_policy/assets/s3-observatory/index_en.html).

The regional priorities are presented in tabular form and classified according to the NACE and NABS systems,<sup>1</sup> where applicable.

#### 3.1. AARHUS UNIVERSITY, DENMARK

The Danish system of science, technology, and innovation is overseen at the national level by the Ministry of Higher Education and Science. This ministry oversees university education, research, and funding programs for research and innovation. The S3 strategy is implemented both at national and regional levels, combining decentralised business development with sector-specific focus areas. The strategy is prepared and managed by the Danish Business Authority, which manages the EU Structural Funds in Denmark. Another pertinent entity in business development is the cluster initiative, which encompasses 14 sectors and is delineated in the Danish Strategy for Decentralized Business Promotion. The strategy covers Denmark's national, regional, and sectorial business development, including the ESF+ and ERDF programs (Danish Business Authority, 2020). Aarhus University is a constituent member of the inter-municipal Chamber of Commerce Midtjylland, whose members are appointed by KKR Midtjylland and Region Central Jutland.

Table 2.1 illustrates the thirteen national priorities. Aarhus University is mainly associated with priority number three: “In the area of food, there is close cooperation between the raw material producers, the largest food companies, the network of smaller companies, the equipment industry and the research and development functions at central Jutland's knowledge and research institutions, such as Aarhus University” (Denmark's Business Promotion Board, 2020, p.66). Furthermore, Aarhus University is regarded as a strategic initiative to enhance the STEAM competencies of the younger workforce in Central Jutland.

S3 PRIORITY	ECONOMIC CLASSIFICATION (NACE SECTION & DIVISION)	SCIENTIFIC CLASSIFICATION (NABS DIGIT 1 & 2)
<b>1 Environmental technology</b> Environmental technology, water, air, and soil purification, waste management, circular economy, climate adaptation, resource	<b>J - Information and communication technologies</b> J.62 - Computer programming, consultancy and related activities	<b>6 - Industrial production and technology</b> 06.62 - Manufacture of furniture

<sup>1</sup> NACE (nomenclature statistique des activités économiques dans la Communauté européenne) is the acronym used to designate the various statistical classifications of economic activities developed since 1970 in the EU, which is mandatory within the European Statistical System. For more information: [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=NACE\\_background](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=NACE_background)

The nomenclature for the analysis and comparison of scientific programmes and budgets (NABS) is a functional classification used by the European Union for the analysis of public financing of research and development (R&D) based on socio-economic objectives pursued by central governments. For more information: <https://data.europa.eu/data/datasets/nabs2007?locale=en>

efficiency, and process optimisation.		
<b>2 Energy technology</b> Energy production technologies, energy-efficient solutions, energy infrastructure, energy storage, energy transportation, energy conversion, energy planning, electrification, sector coupling, and system integration.	<b>D - Electricity, gas, steam and air conditioning supply</b> D.35 - Electricity, gas, steam and air conditioning supply	<b>5 - Energy</b> 05.32 - Energy efficiency - consumption
<b>3 Food and bio-resources</b> Agroecology, biorefining, sustainable fishing, life cycle analysis, food ingredients, feed enzymes, food enzymes, environmental technology, waste management.	<b>A - Agriculture, forestry and fishing</b> A.01 - Crop and animal production, hunting and related service activities	<b>8 - Agriculture</b> 08.76 - Food productivity and technology
<b>4 Maritime industries and logistics</b> Sustainable and green solutions for maritime industries, renewable energy sources, and greenhouse gas emissions reduction.	<b>H - Transportation and storage</b> H.50 - Water transport	<b>1 - Exploration and exploitation of the earth</b> 01.07 - Sea and oceans
<b>5 Life science and welfare technology</b> Somatics, bioscience, biotechnology, medical devices, pharmaceuticals.	<b>Q - Human health and social work activities</b> Q.86 - Human health activities Q.87 - Residential care activities Q.88 - Social work activities without accommodation	<b>7 - Health</b> 07.65 - Health promotion 07.69 - Public health legislation and regulations 07.70 - Public health management 07.71 - Public health services
<b>6 Building and construction</b> CO2 reduction, resource conservation.	<b>F - Construction</b> F.41 - Construction of buildings F.42 - Civil engineering F.43 - Specialised construction activities	<b>4 - Transport, telecommunication and other infrastructures</b> 04.23 - Civil engineering 04.24 - Construction and planning of building
<b>7 Design, fashion and furniture</b> Graphic design, visual design, product design, furniture, interior, textiles, fashion items, bags, footwear, watches, and jewellery production.	<b>C - Manufacturing</b> C.13 - Textiles C.31 - Furniture	<b>6 - Industrial production and technology</b> 06.62 - Manufacture of furniture

<p><b>8 Advanced productions</b> High-tech industrial products, high-quality industrial products, innovation and development, competitiveness.</p>	<p><b>C - Manufacturing</b> C.25 - Fabricated metal products, except machinery and equipment C.26 - Computer, electronic and optical products C.27 - Electrical equipment C.28 - Machinery and equipment n.e.c.</p>	<p><b>6 - Industrial production and technology</b> 06.38 - Increasing economic efficiency and competitiveness 06.39 - Improving industrial production and technology</p>
<p><b>9 Digital technologies</b> Artificial intelligence, robotics.</p>	<p><b>J - Information and communication technologies</b> J.62 - Computer programming, consultancy and related activities</p>	<p><b>4 - Transport, telecommunication and other infrastructures</b> 04.27 - Telecommunication systems</p>
<p><b>10 Finance and fintech</b> Big data, biometrics, artificial intelligence, identity control.</p>	<p><b>K - Financial and insurance activities</b> K.64 - Financial service activities, except insurance and pension funding K.65 - Insurance, reinsurance and pension funding, except compulsory social security K.66 - Activities auxiliary to financial services and insurance activities</p>	<p><b>11 - Political and social systems, structures and processes</b> 11.92 - Public administration and economic policy</p>
<p><b>11 Tourism</b> Tourism infrastructure, accommodation capacity, and upgrading of the tourism product.</p>	<p><b>R - Arts, entertainment and recreation</b> R.91 - Libraries, archives, museums and other cultural activities</p>	<p><b>10 - Culture, recreation, religion and mass media</b> 10.85 - Cultural services</p>
<p><b>12 Robotics and drone technology</b> Robot industry, automation industry, computer science research, robotics, and control systems.</p>	<p><b>C - Manufacturing</b> C.28 - Machinery and equipment n.e.c.</p>	<p><b>6 - Industrial production and technology</b> 06.59 - Manufacture of machinery and equipment n.e.c.</p>
<p><b>13 Animation, games and film</b> Animation, games, film industry.</p>	<p><b>J - Information and communication technologies</b> J.59 - Motion picture, video and television programme production, sound recording and music publishing activities recording and music publishing activities</p>	<p><b>10 - Culture, recreation, religion and mass media</b> 10.84 - Broadcasting and publishing services</p>

Table 2.1 S3 priorities of Denmark (Denmark's Business Promotion Board, 2020)

### 3.2. UNIVERSITY OF BELGRADE, SERBIA

In 2016, Serbia incorporated the Smart Specialisation approach into its innovation policy. Subsequently, the Joint Research Centre has provided guidance and technical assistance following the Smart Specialisation Framework for the EU Enlargement and Neighbourhood Region. In order to facilitate the coordination of the Smart Specialisation process, Serbia established a National Smart Specialisation Team, which was responsible for overseeing its implementation until the strategy was formally adopted in February 2020. The University of Belgrade directly identified the country's economic strengths and formulated the S3 strategy (Radovanovic et al., 2021).

In general, the business sector has a relatively low proportion of employees with a university degree. Many companies, representing over 15% of the total, have no employees with higher education qualifications. However, it is notable that most of these businesses are small. Most medium-sized business entities employ between one and four per cent of highly educated employees. In comparison, nearly one-third of large business entities employ between ten and twenty-four per cent of highly educated employees (Radovanovic et al., 2021, p. 29). The Belgrade region represents the Republic of Serbia's most robust economic and academic hub. The proportion of university-educated employees is especially notable in the information technology sector, financial services, scientific and technical activities, public administration, and education, where it exceeds 60% (Radovanovic et al., 2021, p. 52). Belgrade is home to the most highly qualified workforce in the Republic of Serbia, coupled with a considerable scientific capacity. In June 2015, a collaboration between the Government, the City of Belgrade, and the University of Belgrade led to the establishment of the inaugural Science and Technological Park in Belgrade (Radovanovic et al., 2021, p.34).

The priorities identified for the S3 in the Belgrade region are listed in Table 2.2.

<b>S3 PRIORITY</b>
<b>1 Computer programming and ICT</b>
<b>2 R&amp;D and technical consultancy</b>
<b>3 Creative economy</b>
<b>4 Monetary intermediation</b>

Table 2.2 S3 priorities for Belgrade region (Radovanovic et al., 2021)

### 3.3. HUMBOLDT-UNIVERSITÄT ZU BERLIN, GERMANY

In Germany, the policy of R&I is overseen at both the national and regional levels, with a system of coordination and collaboration between the various stakeholders. The Länder are vested with complete competence in matters of educational policy, and they play a pivotal role in formulating R&I policies within their respective jurisdictions. They financially support universities, research institutions, and innovation clusters within their respective jurisdictions.

The High-Tech Strategy (HTS) 2025 represents Germany's overarching R&I strategy. In addition to the national strategy, each federal state develops its own R&I strategy, which is sometimes specifically titled a smart specialisation strategy.

The Circle U. reference university is the Humboldt-Universität zu Berlin. The capital region of Berlin-Brandenburg is an innovative location with numerous strong and dynamic companies, research beacons and world-renowned scientific institutions (innoBB, 2025).

Table 2.3 illustrates the five regional priorities.

<b>S3 PRIORITY</b>	<b>ECONOMIC CLASSIFICATION (NACE SECTION &amp; DIVISION)</b>	<b>SCIENTIFIC CLASSIFICATION (NABS DIGIT 1 &amp; 2)</b>
<p><b>1 Healthcare Economy</b> Translational medicine, prevention, diagnosis, systematic and secure use of medical data.</p>	<p><b>Q - Human health and social work activities</b> Q.86 - Human health activities Q.87 - Residential care activities Q.88 - Social work activities without accommodation</p>	<p><b>7 - Health</b></p>
<p><b>2 Energy technology</b> Energy technology, smart grids, storage concepts, synchronising energy demand and supply, renewable energies.</p>	<p><b>D - Electricity, gas, steam and air conditioning supply</b> D.35 - Electricity, gas, steam and air conditioning supply</p>	<p><b>5 - Energy</b> 05.37 - Renewable energy sources</p>
<p><b>3 Transport, mobility, logistics</b> Road transportation, rail transportation, air transportation, future transportation systems, intelligent and sustainable mobility.</p>	<p><b>H - Transportation and storage</b> H.49 - Land transport and transport via pipelines H.50 - Water transport H.51 - Air transport</p>	<p><b>4 - Transport, telecommunication and other infrastructures</b> 04.28 - Transport systems</p>
<p><b>4 Information and communication technology, media, and creative economy</b> Software, digital services, design.</p>	<p><b>J - Information and communication technologies</b> J.60 - Programming and broadcasting activities J.61 - Telecommunications J.62 - Computer programming, consultancy and related activities J.63 - Information service activities</p>	<p><b>4 - Transport, telecommunication and other infrastructures</b> 04.27 - Telecommunication systems</p>
<p><b>5 Optics and photonics</b> Photonics, laser technology, photonics for communication and sensing, light technology, optical analytics, biomedical optics, and microsystems technology.</p>	<p><b>C - Manufacturing</b> C.26 - Computer, electronic and optical products</p>	<p><b>6 - Industrial production and technology</b> 06.57 - Manufacture of computer, electronic and optical products 12 - General advancement of knowledge 12.107 - Physical sciences</p>

Table 2.3 S3 priorities for the Berlin-Brandenburg region (innoBB, 2025)

### 3.4. KING'S COLLEGE LONDON, UK

Smart Specialization's concept complements and enhances existing policies, structures, and funding programs. In England, Smart Specialisation employs an approach tailored to the country's unique circumstances. Innovation policies are developed at the national level in collaboration with businesses and research institutions nationwide. Concurrently, Local Enterprise Partnerships (LEPs) bring together business and civic leaders to set economic strategy at the local level and are empowered to make decisions that will allow their area to thrive. The government has requested that LEPs prepare Strategic Economic Plans, which include proposals to support innovation (Department for Business Innovation & Skills, 2015).

Table 2.4 illustrates the five regional priorities. London's area of specialisation is the information economy.

S3 PRIORITY
<b>1 Information economy</b>
<b>2 Aerospace</b>
<b>3 Automotive</b>
<b>4 Life Sciences</b>
<b>5 Energy</b> Offshore Wind, Oil & Gas, Nuclear
<b>6 Agri-tech</b>
<b>7 Professional Business Services</b>
<b>8 Construction</b>

Table 2.4 S3 specialisation in the UK (Department for Business Innovation & Skills, 2015)

### 3.5. UC LOUVAIN, BELGIUM

The project to renew Wallonia's Smart Specialization Strategy (S3) was initiated in 2019, building on the pilot project's findings on industrial transition in which Wallonia participated. This process revealed the necessity to refine the preceding S3 in several respects, to align it with the challenges confronting Wallonia and reflect the evolving priorities and policies at the European level. In particular, it was paramount to guarantee that the strategy followed the European guidelines for the 2021—2027 programming period.

UC Louvain is Belgium's largest French-speaking university. The University actively participates in the development of the strategy. For example, it is a partner in the "CONNECT" (construction 4.0) project, which aims to demonstrate and experiment with digital technologies for the Construction sector. It will be the reference centre for digital construction on a European scale (Wallonie, 2021).

Table 2.5 illustrates Wallonia's five regional priorities.

S3 PRIORITY	ECONOMIC CLASSIFICATION (NACE SECTION & DIVISION)	SCIENTIFIC CLASSIFICATION (NABS DIGIT 1 & 2)
<p><b>1 Circular materials - Circular economy</b></p> <p>Upcycling, sustainable production, resource lifecycle.</p>	<p><b>E - Water supply, sewerage, waste management and remediation activities</b></p> <p>E.36 - Water collection, treatment and supply</p>	<p><b>6 - Industrial production and technology</b></p> <p>06.40 - Recycling waste</p>
<p><b>2 Innovations for enhanced health</b></p> <p>Biomedical technology, wearable health tech, genetic research, health Diagnostics.</p>	<p><b>Q - Human health and social work activities</b></p> <p>Q.86 - Human health activities</p> <p>Q.87 - Residential care activities</p> <p>Q.88 - Social work activities without accommodation</p>	<p><b>7 - Health</b></p> <p>07.70 - Public Health Service</p>
<p><b>3 Innovations for agile and safe design and production</b></p> <p>Rapid prototyping, lean manufacturing, safety engineering, flexible production.</p>	<p><b>C - Manufacturing</b></p> <p>C.25 - Fabricated metal products, except machinery and equipment</p> <p>C.26 - Computer, electronic and optical products</p> <p>C.27 - Electrical equipment</p> <p>C.28 - Machinery and equipment n.e.c.</p>	<p><b>6 - Industrial production and technology</b></p> <p>06.39 - Improving industrial production and technology</p>
<p><b>4 Sustainable energy and housing systems</b></p> <p>Energy storage, energy-efficient appliances</p>	<p><b>D - Electricity, gas, steam and air conditioning supply</b></p> <p>D.35 - Electricity, gas, steam and air conditioning supply</p>	<p><b>5 - Energy</b></p>
<p><b>5 Future Agri-Food chains and innovative management of the environment</b></p> <p>Sustainable farming, ecosystem services, food traceability, biodiversity conservation.</p>	<p><b>A - Agriculture, forestry and fishing</b></p> <p>A.01 - Crop and animal production, hunting and related service activities</p> <p>A.02 - Forestry and logging</p> <p>A.03 - Fishing and aquaculture</p>	<p><b>8 - Agriculture</b></p> <p>08.73 - Agriculture, forestry and fishery</p>

Table 2.5 S3 specialisations in Wallonia, Belgium. (Wallonie, 2021)

### 3.6. UNIVERSITY OF OSLO, NORWAY

Norway lacks a dedicated document outlining the Smart Specialization Strategy (S3) specifics. However, the implications of this strategy have been incorporated into an active project that commenced in 2018. This project is known as the 21 Processes (with a perspective up to 2050). The main task is to provide strategic advice and recommendations on how Norway can best achieve the goal of sustainable growth and minimal emissions in the process industry.

Table 2.6 illustrates Norway's five priorities.

S3 PRIORITY
<b>1 Waste management</b>
<b>2 ICT</b>
<b>3 Health</b> Medical technologies, e-health and welfare technology.
<b>4 Urban energy solutions</b> Smart and Sustainable Cities

Table 2.6 S3 specialisations of Norway (Process21, 2021).

### 3.7. UNIVERSITÉ PARIS CITÉ, FRANCE

All French regions developed an S3 strategy during the 2014—2020 programming period. The Regional Smart Specialization Strategy is a supplementary strategic document containing the Regional Plan for Economic Development, Innovation and Internationalization (SRDEII). The SRDEII has been prepared in collaboration with local authorities, interest groups, and chambers of commerce. Furthermore, it is a legally binding document, which implies that local authorities (such as departments, except for metropolitan authorities) must adhere to its guidelines. In contrast, the S3 represents a non-binding strategic framework prioritising regional research and innovation actions.

Table 2.7 illustrates the six regional priorities of the Île de France.

S3 PRIORITY	ECONOMIC CLASSIFICATION (NACE SECTION & DIVISION)	SCIENTIFIC CLASSIFICATION (NABS DIGIT 1 & 2)
<b>1 Digital, data industry, and creative industry</b>  Culture, tourism, sport, innovation, technology, sustainability, digital sector.	<b>J - Information and communication technologies</b>  J.59 - Motion picture, video and television programme production, sound recording and music publishing activities	<b>4 - Transport, telecommunication and other infrastructures</b>  04.27 - Telecommunication systems

	<p>J.60 - Programming and broadcasting activities</p> <p>J.61 - Telecommunications</p> <p>J.62 - Computer programming, consultancy and related activities</p> <p>J.63 - Information service activities</p>	<p><b>6 - Industrial production and technology</b></p> <p>06.57 - Manufacture of computer, electronic and optical products</p>
<p><b>2 Eco-construction, sustainable and smart city, green and low-carbon energies</b></p> <p>Green building, urban planning, smart infrastructure, renewable sources, energy efficiency, sustainable materials, urban gardens, smart grids, and low-emission technologies.</p>	<p><b>M - Professional, scientific and technical activities</b></p> <p>M.74 - Other professional, scientific and technical activities</p>	<p><b>2 - Environment</b></p> <p>02.18 - The elimination and prevention of pollution</p> <p><b>5 - Energy</b></p> <p>05.32 - Energy efficiency - consumption</p>
<p><b>3 Aeronautics, space, defence, sustainable and smart mobility</b></p> <p>Aerospace engineering, satellite technology, defence systems, electric vehicles, space exploration, aviation safety, military tech, smart transportation, rocket propulsion, and urban air mobility.</p>	<p><b>C - Manufacturing</b></p> <p>C.26 - Computer, electronic and optical products</p> <p>C.27 - Electrical equipment</p> <p>C.28 - Machinery and equipment n.e.c.</p> <p>C.29 - Motor vehicles, trailers and semi-trailers</p> <p><b>H - Transportation and storage</b></p> <p>H.51 - Air transport</p> <p><b>J - Information and communication technologies</b></p> <p>J.61 - Telecommunications</p> <p>J.62 - Computer programming, consultancy and related activities</p>	<p><b>1 - Exploration and exploitation of the earth</b></p> <p>01.04 - Exploration and exploitation of seabed</p> <p>01.05 - Hydrology</p> <p>01.06 - Mineral, oil and natural gas prospecting</p> <p>01.07 - Sea and oceans</p> <p><b>3 - Exploration and exploitation of space</b></p> <p>03.19 - Applied research programmes for space</p> <p>03.20 - Launch systems for space</p> <p>03.21 - Scientific exploration of space</p> <p>03.22 - Space Laboratories and space travel</p>

	<p><b>M - Professional, scientific and technical activities</b></p> <p>M.72 - Scientific research and development</p> <p>M.74 - Other professional, scientific and technical activities</p>	<p><b>4 - Transport, telecommunication and other infrastructures</b></p> <p>04.27 - Telecommunication systems</p> <p>04.28 - Transport systems</p> <p><b>6 - Industrial production and technology</b></p> <p>06.38 - Increasing economic efficiency and competitiveness</p> <p>06.39 - Improving industrial production and technology</p> <p>06.44 - Manufacture of textiles</p> <p>06.45 - Manufacture of wearing apparel</p>
<p><b>4 Health and care</b></p> <p>Preventative medicine, healthcare technology, patient care, medical research, holistic health, telemedicine, mental well-being, health services, medical devices, and wellness programs.</p>	<p><b>Q - Human health and social work activities</b></p> <p>Q.86 - Human health activities</p> <p>Q.87 - Residential care activities</p> <p>Q.88 - Social work activities without accommodation</p>	<p><b>7 - Health</b></p>
<p><b>5 Luxury and cosmetics</b></p> <p>High-end brands, skincare products, perfumery, designer labels, premium quality, cosmetic trends, luxury experiences, beauty routines, fashion statements, and elite craftsmanship.</p>	<p><b>C - Manufacturing</b></p> <p>C.13 - Textiles</p> <p>C.15 - Leather and related products</p> <p>C.31 - Furniture</p> <p><b>M - Professional, scientific and technical activities</b></p> <p>M.72 - Scientific research and development</p> <p><b>R - Arts, entertainment and recreation</b></p>	<p><b>6 - Industrial production and technology</b></p> <p>06.44 - Manufacture of textiles</p> <p>06.46 - Manufacture of leather and related products</p> <p>06.62 - Manufacture of furniture</p>

	R.90 - Creative, arts and entertainment activities	
<b>6 Agriculture, Agri-Food, and nutrition</b>  Agriculture, Agri-Food, rural space, sustainable, inclusive, solidarity-based, innovative.	<b>A - Agriculture, forestry and fishing</b>  A.01 - Crop and animal production, hunting and related service activities  A.02 - Forestry and logging  A.03 - Fishing and aquaculture	<b>8 - Agriculture</b>  08.72 - Agricultural forestry impact on the environment  08.73 - Agriculture, forestry and fishery  08.75 - Fertilizers, pest control and mechanisation of agriculture  08.76 - Food productivity and technology

Table 2.7 S3 specialisations in the region of "Île de France". (Île de France, 2020)

### 3.8. UNIVERSITY OF PISA, ITALY

Italy has a unified national Smart Specialization strategy, complemented by 19 regional strategies and two additional strategies for the autonomous provinces of Trento and Bolzano. The coordination between the regional and national levels of Smart Specialisation Strategies (S3) in Italy has traditionally focused on two main areas: the development and comprehension of the various S3s across the country through a monitoring system and the leveraging of synergies between regionally managed Operational Programmes and those managed at the national level. Until 2023, the National Agency for Territorial Cohesion was tasked with developing instruments to facilitate the coordination of regional strategies and to foster synergies between national and regional research and innovation strategies for smart specialisation. However, since 2023, the Agency's responsibilities have been transferred to the Department of Cohesion, which operates directly under the Presidency of the Council of Ministers. In the current programming period, the coordination between the national and regional levels is governed by an inter-ministerial protocol that includes MIMIT (the former Ministry for Economic Development) and MUR (Ministry of University and Research), as well as a "Subcommittee for National Smart Specialisation Strategy (SNSI)" that is tasked with monitoring and supporting the implementation of the national strategy.

The University of Pisa is engaged in several ITS projects, including MITA, Made in Italy Tuscany Academy, PRIME Tech Academy, TAB (Tourism, Art and Cultural Heritage), and VITA. Additionally, the university is involved in regional technology districts, namely Fashion, Interior and Design, Railway, and Advanced Manufacturing. Moreover, it represents a significant scientific research landmark in Tuscany, particularly within biotechnology and chemistry (Regione Toscana, 2020).

Table 2.8 illustrates Tuscany's regional priorities.

<b>S3 PRIORITY</b>	<b>ECONOMIC CLASSIFICATION (NACE SECTION &amp; DIVISION)</b>	<b>SCIENTIFIC CLASSIFICATION (NABS DIGIT 1 &amp; 2)</b>
<p><b>1 Information and communication technology</b></p> <p>Technology adoption, software and automation, industrial integration, IoT, big data analytics, cybersecurity.</p>	<p><b>J - Information and communication technologies</b></p> <p>J.60 - Programming and broadcasting activities</p> <p>J.61 - Telecommunications</p>	<p><b>4 - Transport, telecommunication and other infrastructures</b></p> <p>04.27 - Telecommunication systems</p>
<p><b>2 Advanced manufacturing technologies</b></p> <p>The regional Industry 4.0 platform facilitates the relationship between research and industry. It identifies strengths such as the presence of highly innovative companies and excellence centres in robotics and advanced production systems, as well as specific expertise in areas like biorobotics and robotics for medicine.</p>	<p><b>C - Manufacturing</b></p> <p>C.26 - Computer, electronic and optical products</p> <p>C.27 - Electrical equipment</p> <p>C.28 - Machinery and equipment n.e.c.</p>	<p><b>6 - Industrial production and technology</b></p>
<p><b>3 Advanced materials and nanotechnologies</b></p> <p>Composite materials, biomaterials, nanomaterials, smart materials.</p>	<p><b>C - Manufacturing</b></p> <p>C.24 - Basic metals</p>	<p><b>5 - Energy</b></p> <p>05.33 - Energy production and distribution efficiency</p>
<p><b>4 Technologies for life and the environment</b></p> <p>Environmental and life technologies, chemical disciplines, pharmaceutical disciplines, biological disciplines, digital technologies, IoT, big data analytics, and human-machine interactions.</p>	<p><b>Q - Human health and social work activities</b></p> <p>Q.86 - Human health activities</p> <p>Q.87 - Residential care activities</p> <p>Q.88 - Social work activities without accommodation</p>	<p><b>7 - Health</b></p>

Table 2.8 S3 specialisations in Tuscany. (Regione Toscana, 2020)

### 3.9. UNIVERSITY OF VIENNA, AUSTRIA

Austria has a national strategy for smart specialisation, designated as the Austria RTI Strategy 2030. Moreover, each of the nine federal states (Länder) has its own economic and innovation strategy, aligned with the overarching framework of the federal RTI Strategy 2030.

The Austrian RTI Strategy 2030 addresses the fragmentation of high-level research and institutional disciplines by fostering collaboration and reducing the innovation gap. The strategy's governance structure adopts a cross-departmental approach led by the RTI Task Force, which includes representatives from various federal ministries. This task force coordinates policy and oversees the strategy's implementation, drawing on the expertise of a wide range of stakeholders.

Table 2.9 illustrates Austria's regional priorities.

S3 PRIORITY	ECONOMIC CLASSIFICATION (NACE SECTION & DIVISION)	SCIENTIFIC CLASSIFICATION (NABS DIGIT 1 & 2)
<p><b>1 Materials and Intelligent Production</b></p> <p>Advanced materials, production automation, smart manufacturing, digital fabrication, industry 4.0</p>	<p><b>C - Manufacturing</b></p> <p>C.26 - Computer, electronic and optical products</p> <p>C.27 - Electrical equipment</p> <p>C.28 - Machinery and equipment n.e.c.</p>	<p><b>6 - Industrial production and technology</b></p> <p>06.56 - Manufacture of fabricated metal products, except machinery and equipment</p> <p>06.57 - Manufacture of computer, electronic and optical products</p> <p>06.58 - Manufacture of electrical equipment</p> <p>06.59 - Manufacture of machinery and equipment n.e.c.</p>
<p><b>2 Quantum science</b></p> <p>Artificial intelligence, big data and AI-based data analysis technologies, cloud and high-performance computing (HPC and quantum computing).</p>	<p><b>C - Manufacturing</b></p> <p>C.26 - Computer, electronic and optical products</p>	<p><b>12 - General advancement of knowledge</b></p> <p>12.107 - Physical sciences</p>
<p><b>3 Mobility</b></p> <p>Smart transportation, autonomous vehicles, urban mobility solutions, green transportation, mobility-as-a-Service (MaaS).</p>	<p><b>H - Transportation and storage</b></p> <p>H.49 - Land transport and transport via pipelines</p> <p>H.50 - Water transport</p> <p>H.51 - Air transport</p>	<p><b>4 - Transport, telecommunication and other infrastructures</b></p> <p>04.28 - Transport systems</p>

<p><b>4 Life sciences and pharmaceuticals</b></p> <p>Bioinformatics, biomedical technology, precision medicine, human-machine interaction, machine learning models, single health &amp; access to digital services.</p>	<p><b>Q - Human health and social work activities</b></p> <p>Q.86 - Human health activities</p>	<p><b>7 - Health</b></p> <p>07.69 - Public health legislation and regulations</p> <p>07.70 - Public health management</p>
<p><b>5 Information and communication technology and digital transformation</b></p>	<p><b>C - Manufacturing</b></p> <p>C.26 - Computer, electronic and optical products</p>	<p><b>6 - Industrial production and technology</b></p> <p>06.57 - Manufacture of computer, electronic and optical products</p> <p>06.58 - Manufacture of electrical equipment</p> <p>06.59 - Manufacture of machinery and equipment n.e.c.</p>
<p><b>6 Green tech (incl. bio-economy, circular economy, environmental technology)</b></p> <p>Sustainable agriculture, renewable energy, waste management, carbon capture, and clean water technologies.</p>	<p><b>D - Electricity, gas, steam and air conditioning supply</b></p> <p>D.35 - Electricity, gas, steam and air conditioning supply</p>	<p><b>5 - Energy</b></p> <p>05.31 - Energy conservation</p> <p>05.32 - Energy efficiency - consumption</p> <p>05.33 - Energy production and distribution efficiency</p> <p>05.37 - Renewable energy sources</p>
<p><b>7 Creative Industries</b></p> <p>Culture and creative industries, media, arts and entertainment, sports, access to cultural content, heritage and history.</p>	<p><b>R - Arts, entertainment and recreation</b></p> <p>R.90 - Creative, arts and entertainment activities</p>	<p><b>10 - Culture, recreation, religion and mass media</b></p> <p>10.85 - Cultural services</p>

Table 2.9 S3 specialisations in Austria (Federal Government of the Republic of Austria, 2020).

## 4. CHALLENGES AND LEARNING

### 4.1. CHALLENGES

This section lists different difficulties encountered by the research team while conducting the study. This information is reported with the aim of creating a shared understanding of the obstacles that have characterised the research so far, and that could potentially affect the next steps in order to open a dialogue about ways and actions needed to overcome them:

- First, significant challenges to obtain data regarding the projects implemented from S3 priorities. The Smart Regional Specialization documents often lack sufficient detail to accurately indicate the projects arising from such spatial development programs.
- Second, it should be pointed out that the extent of policy intervention varies among the regions considered, ranging from the regional to the national area. In some areas, investment priorities are identified on a circumscribed (regional) territorial basis. In contrast, in other areas (e.g., Norway), priorities are identified at the national level and instead identified as missions. The obstacle faced in this first step of research might make it challenging to compare different cases and envisage intervention in the community on a narrower scale than nationally identified.
- Furthermore, establishing contact with regional contact persons has proven challenging. This initiative aims to obtain specific insights into the various projects, facilitating a more accurate assessment of the real spillovers of smart specialisation projects.
- Finally, Circle U. Partner Universities are essential research and training centres for the economic development of their regions. They are involved in projects funded by Regional Development Funds such as ERDF and ESF+. Monitoring the ongoing projects would be essential to capitalise on them and increase the geographical coverage of their outcomes and impacts.

### 4.2. LEARNINGS

The analysis outlines the Smart Specialization Strategy (S3) priorities across various European regions. Here is a comparison of the regional priorities mentioned in the document, highlighting the most common transversal priorities across regions.

#### 4.2.1. INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

- Aarhus University, Denmark: ICT, digital technologies, including robotics and artificial intelligence.
- Belgrade, Serbia: Computer programming and ICT.
- Humboldt-Universität zu Berlin, Germany: Information and communication technology, digital services, and creative economy.
- King's College London, UK: Information economy.
- Université Paris Cité, France: Digital, data industry, creative industry.
- University of Pisa, Italy: Information and communication technology (software, automation, big data analytics).
- University of Vienna, Austria: Information and communication technology, digital transformation.

**Observation:** ICT-related technologies are a highly transversal priority, particularly digitalisation and automation, with an emphasis on innovation through AI, robotics, big data, and cybersecurity.

#### 4.2.2. HEALTH AND LIFE SCIENCES

- Belgrade, Serbia: R&D and technical consultancy related to healthcare.

- Berlin-Brandenburg, Germany: Healthcare economy, including translational medicine and medical data use.
- Île de France, France: Health and care technologies, preventative medicine, telemedicine.
- Tuscany, Italy: Technologies for life sciences and the environment.
- Vienna, Austria: Life sciences, pharmaceuticals, biomedical technology, precision medicine.

**Observation:** Health and life sciences are consistently prioritised, especially medical technologies and e-health services, showing a focus on improving healthcare systems and biotechnology.

#### 4.2.3. ENERGY TECHNOLOGIES

- Denmark: Energy technologies, including energy-efficient solutions and renewable energy.
- Berlin-Brandenburg, Germany: Energy technology (smart grids, renewable energy).
- Paris, France: Sustainable and smart energy systems, including low-carbon technologies.
- Tuscany, Italy: Advanced energy-efficient production systems.
- Vienna, Austria: Green technologies, renewable energy, and circular economy.

**Observation:** Sustainable energy solutions like renewable energy, energy efficiency, and smart grids are common regional priorities, reflecting a strong focus on addressing climate change and the energy transition.

#### 4.2.4. ADVANCED MANUFACTURING AND PRODUCTION

- Aarhus, Denmark: Advanced production, high-quality industrial products.
- Belgrade, Serbia: Focus on innovation and competitiveness in production sectors.
- Vienna, Austria: Advanced materials and intelligent production.
- Tuscany, Italy: Advanced manufacturing, industry 4.0, biorobotics.

**Observation:** Several regions prioritise advanced manufacturing and production technologies, often focusing on industry 4.0 principles and combining robotics and automation with new materials.

#### 4.2.5. ADDITIONAL TRANSVERSAL PRIORITIES

- Sustainable Development and Green Technologies:
  - o Focus on sustainability is prevalent across multiple regions, especially concerning green technologies, waste management, bio-economy, and circular economy (e.g., Wallonia, France, Vienna).
- Creative Economy and Culture:
  - o Digital and creative industries, including animation, games, film, and cultural sectors (France, Denmark, and Austria), indicate a common interest in fostering the creative economy.

### 4.3. A FOCUS ON AGRICULTURE, AGRIFOOD AND FOOD SECTORS

While they may not be as prominently featured as ICT or health, they play a significant role in certain regions. Here is a breakdown:

#### Regions Prioritizing Food, Agrifood, and Agriculture:

- Aarhus University, Denmark: Food and bioresources: The region emphasises agroecology, biorefining, sustainable fishing, and food ingredients. There is also close cooperation between raw material producers, food companies, and research institutions in Central Jutland, highlighting the importance of the agri-food sector.
- UC Louvain, Belgium (Wallonia): Future Agri-Food chains and innovative environmental management: This includes sustainable farming, ecosystem services, food traceability, and

biodiversity conservation. It reflects a strong focus on agricultural innovation and environmental sustainability.

- Université Paris Cité, France: Agriculture, Agri-Food, and Nutrition: In Île de France, agriculture and rural development are prioritized, focusing on sustainable, inclusive, and innovative farming systems. This covers the entire food chain, from production to food technology.
- University of Pisa, Italy: Tuscany's advanced manufacturing technologies indirectly mention the agrifood sector, with projects related to food innovation and sustainable production systems.

While agrifood and agriculture are not always featured as top priorities across all regions, they are core areas in regions like Denmark, Belgium (Wallonia), and France. These regions emphasise:

- Sustainable agriculture;
- Food innovation;
- Bio-resources management, and
- The integration of food production with environmental sustainability.

In summary, agrifood and agriculture may not be as universally emphasised as the digital or health sectors. However, they are critical regional priorities where agricultural innovation and sustainability are key drivers of local economic development.

## CONCLUSION

This document aimed to outline the theoretical framework, background context, research design and the preliminary results of an investigation on S3 common priorities and activities outlined and implemented by the regions where Circle U. universities are embedded. Further development of this Milestone will be Deliverable 5.3, foreseen at Month 16, extending the primary outcomes of this Desk research with the findings of a current pilot study.

This research can feed into concrete activities in collaboration with other Circle U. WPs, Platforms and Hubs. For instance, understanding the most critical regional priorities for a cluster of regions can help set up valuable and productive challenge-based activities and Master or Intensive Courses with outcomes and results replicable and scalable in other contexts. Furthermore, the collaborative environment we aim to build between regions and universities can help to foster a dialogue on the most fruitful and compelling calls for funding/innovation/entrepreneurial ideas that could be adopted at local and international levels and funded by Structural Investment Funds managed by Regional Authorities. This allows for creating a broader research playground area by fostering new opportunities for both senior and early career researchers to explore these topics through action research approaches to address specific priorities and challenges and to allow a cross-country comparison of cases.

To sum up, the most common transversal priorities include:

- Digital and ICT innovation (AI, robotics, big data);
- Health and life sciences (e-health, biotechnology);
- Energy efficiency and renewable technologies;
- Advanced manufacturing and Industry 4.0.

These priorities indicate a shared focus on innovation, sustainability, and digital transformation across the Circle U. regions, reflecting broader European goals like smart growth and sustainable development.

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# ANNEX

## REGIONAL INVESTMENT PRIORITIES AND RELATED ACTIONS

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### SECTION 1 - INTRODUCTION

Dear officer,

In the [Circle. U - European University Alliance](#) framework, the research group led by [Prof. Alessio Cavicchi](#) (University of Pisa) is currently investigating the investment priorities for regional development in various European areas. Your region's development priorities within the "Smart Specialisation Strategy", the activities undertaken to support them, and the current and future investment calls to support them, are all crucial pieces of this puzzle.

Your participation is crucial in helping us gather accurate and comprehensive data for your region.

The results will be used to customize co-creation activities among the partner universities of the alliance in line with the needs of our communities and regions.

Therefore, we invite you to reflect on the few targeted questions proposed by this questionnaire, which is designed to be completed in approximately 15 minutes.

We thank you in advance for your time and invite you to contact Prof. Cavicchi ([alessio.cavicchi@unipi.it](mailto:alessio.cavicchi@unipi.it)) for further information on the investigation.

Email: \_\_\_\_\_

### SECTION 2 - CONSENSUS TO DATA COLLECTION

By completing this questionnaire, I authorize the processing of my personal data in accordance with Art. 13 of Italian Legislative Decree 196/2003 and Art. 13 of EU Regulation 2016/679. The data will be collected, stored for specific purposes, and deleted when no longer needed. Only the form authors will have access to the data.

\* I give my consent to the treatment of the data provided

### SECTION 3 - INFORMATION ABOUT THE RESPONDENT

Name

Surname

Country

Professional ROLE

### SECTION 4 - REGIONAL INNOVATION PRIORITIES

1. What are the priorities and sub-priorities in your Smart Specialization Strategy?

2. Could you provide us with specific links where to find this information/documents?

3. Could you please provide a list of the activities and projects that have already been funded or implemented in accordance with the regional priorities?

4. Have you already planned any calls to fund the above-mentioned priorities and activities? If so, can you provide details?

5. We are interested in conducting follow-up interviews to gain a deeper understanding of some of the topics investigated in this questionnaire. These interviews will last up to 30 minutes and will take place at a mutually convenient time soon.

Would you be willing to participate in such an interview?

- Yes
- No

6. If you are open to this, please provide your contact information. We assure you that all information shared will be treated with the utmost confidentiality and used solely for research purposes.

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Thanks for your time and availability!