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**This report was written by
Susanna Fontana, Fabio Bisogni (Fondazione FORMIT),
Robin Renwick (Trilateral Research Limited).**

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List of acronyms

ADR BI	Bucharest-Ilfov region Regional Development Agency
ADRSV	Agency for Regional Development Southwest Oltenia
BWI	Broad Welfare Indicator
CCDRN	Commission of Coordination and Development of the Norte Region
CEIS	Centro Europeo de Empresas e Innovación de Navarra
CHOIRS	Challenge-Oriented Innovation Partnerships
CoR	European Committee of the Regions
COVID-19	Coronavirus Disease 2019
CRI	Regional Innovation Consortium
DG	Directorate-General
DISs	Domains of Strategic Innovation
EASME	Erasmus for Young Entrepreneurs
EBNN	Economic Board of Northern Netherlands
EC	European Commission
EDGAR	E- missions Database for Global Atmospheric Research
EDiH	European Digital Innovation Hub
EDP	Entrepreneurial Discovery Process
EIS	European Innovation Scoreboard
ERDF	European Regional Development Fund
ESF+	European Social Fund Plus
EU	European Union
EU27	European Union 27 Member States
4G/5G/6G	Fourth Generation / Fifth Generation / Sixth Generation
GDP	Gross Domestic Product
GVA	Gross Value Added
H 2020	Horizon 2020
HRST	Human Resources in Science and Technology
ICTs	Information and Communication Technologies
IPTS	Institute of Prospective and Technological Studies
IRP BK	Regional Policy of the Bratislava Region
ISCED	International Standard Classification of Education
ITM	Hungarian Ministry of Innovation and Technology
JRC	Joint Research Centre
LRAs	Local and Regional Authorities
MIPE	Romanian Ministry of European Investments and Projects

NACE	Statistical Classification of Economic Activities in the European Community
NKFI	Office Hungarian National Research, Development and Innovation
NUTS 1	Nomenclature of Territorial Units for Statistics - major socio-economic regions
NUTS 2	Nomenclature of Territorial Units for Statistics - basic regions
NUTS 3	Nomenclature of Territorial Units for Statistics - small regions
OECD	Organization for Economic Cooperation and Development
OIA	Oulu Innovation Alliance
POR FESR	Programma Operativo regionale - Fondo europeo di sviluppo regionale
PPS	Purchasing Power Standards
PRIs	Partnerships for Regional Innovation
QR	Quadruple Helix
R&D	Research and Development
R&I	Research and Innovation
RII	Regional Innovation Index
RIS	Regional Innovation Scoreboard
RIS3	Research and Innovation Strategies for Smart Specialisation
RIVs	Regional Innovation Valleys
RSES	Regional Spatial and Economic Strategy
RSI WM 2030	Regional Innovation Strategy of the Małopolska Region 2030
RUFS 2050	Regional Development plan for the Stockholm Region 2050
S2	Smart Strategies
S3	Smart Specialisation Strategy
S4 +	Smart Specialisation Strategies for Sustainable and Inclusive Growth
SBS	Structural Business Statistics
SETU	South East Technical University
SME	Small and Medium-sized Enterprise
SRDEII	Schéma régional de développement économique d'innovation et d'internationalisation
SRA	Southern Regional Assembly
TIPs	Territorial Innovation Platforms
UN SDGs	United Nations Sustainable Development Goals

Introduction

The Smart Specialisation Strategy (S3) concept was introduced by Foray *et al.* (2009), as part of the Knowledge for Growth Expert Group composed of growth and innovation economists, appointed in 2005 by Janez Potocnik, former European Commissioner for Science and Research. It also builds on the initiative of DG Regio that started in 1995 on developing Regional Technology Plans and later on Regional Innovation Strategies. The aim was to lend greater impetus to the Lisbon Strategy (2000). The approach emphasises the need for decision and policymakers to recognise innovation fostering technologies and sectors at the local level, focusing on areas of comparative strength while avoiding duplication and fragmentation of efforts (Foray *et al.*, 2009).

Smart Specialisation is interlinked with the EU Cohesion Policy, the main investment instrument at European level. The overarching intention is to narrow disparities between Member States and their regions. The economic and financial crisis in 2008 was responsible for an increase in unemployment, poverty and social exclusion, and the Cohesion Policy was conceived as a tool to implement the ‘EU 2020 Strategy’, which was aimed at supporting the transition towards smart, sustainable and inclusive growth across Europe.

As a policy approach, the S3 promotes efficient, effective and synergistic use of public resources in support of the innovation capacity of the European territories; to co-create a regional programme together with the local stakeholders.

The S3 in the 2014-2020 programming period

The General Regulation establishing common provisions on European Structural and Investment Funds (Reg. 1303/2013) identified the implementation of the Smart Specialisation Strategy as an “ex-ante” conditionality to access funding under the European Regional Development Fund (ERDF).

This first application of the S3 across Europe encountered a diverse innovation landscape. Some regions had pre-existing regional policies for research and innovation, while others did not have any provision in place for developing a regional focused innovation ecosystem.

Drawing from predominant EU challenges, specific goals were identified for 2014-2020: reduction of economic and social disparities promoting growth and jobs; investments in innovation and research; digitalisation; support to small and medium-sized businesses (SMEs); and a transition to a low-carbon economy (McCann & Ortega-Argilés, 2013).

The Smart Specialisation Strategy is based on several building blocks: a policy integration between innovation and other policies; a systemic approach within the framework of cohesion policies based on collaboration and support between

stakeholders entities, to achieve a consistent development across EU territories; a bottom-up approach with the actors of the quadruple helix for identifying promising sectors of regional specialisation along with the main challenges and obstacles to innovation; multi-level governance encouraging collaboration across regional and national boundaries and opening up new opportunities while avoiding fragmentation and overlapping.

One of the key elements of the S3 is the participatory process for the identification of specialisation areas and development of priorities to support local innovation. This process is called the Entrepreneurial Discovery Process (EDP). The idea behind Smart Specialisation Strategies is that territories collaboratively prioritise research and innovation investments for transforming their economies, through a process of “entrepreneurial discovery”, which is based on an evidence-based and co-creational approach. The process includes knowledge creators such as businesses, universities, government bodies, and other territorial actors. Within the years of its application, the EDP concept has been extended to become a continuous process, open to the largest possible range of stakeholders, and for this reason sometimes it is called the Open Discovery Process (ODP).

The S3 in the 2021-2027 programming period

The Smart Specialisation approach continues to play a major role for regional development, because of its potential to respond to global challenges in line with the United Nations Sustainable Development Goals (UN SDGs) and, as recognised by the European Committee of the Region (CoR), for its inherent purpose to build effective partnerships that deliver inclusive innovation as an essential part of the EU’s cohesion policy (European Committee of the Region, 2021).

In the current EU programming period 2021-2027, and due to an evolving socio-economic landscape, specific emerging aspects are requested to be addressed:

- **Sustainability**, with reference to the twin (digital and green) transition.
- **Resilience**, focusing on the main challenges generated by the megatrends such as climate change and associated environmental issues, technological transformation, the crisis of the democratic values, and demographic decline, with reference mainly to the UN SDGs.
- **Inclusiveness** of all societal actors through the promotion of partnerships and collaboration among public sector, industry, academia and, most importantly, civil society for designing a shared vision for the regional programming (e.g., EDP).

The Partnerships for Regional Innovation

The 2014-2020 S3 design and implementation processes provided valuable and relevant lessons to the current programming period. Specifically, it highlighted the

need to align priorities and intervention areas with global challenges and demonstrated the need to tackle existing fragmentation in the EU innovation ecosystem, especially concerning both funding instruments and specific territorial policies.

As part of the Joint Action Plan of the Commission services under the responsibility of Commissioner Mariya Gabriel and the European Committee of the Region¹ the Joint Research Centre (JRC) and the CoR launched in 2022 the Partnerships for Regional Innovation (PRIs) initiative to develop a strategic framework for innovation-driven territorial transformation. The PRIs Pilot Action is framed in the strategy for promoting the generation of deep tech innovation, especially in support of the twin transition, as stated in the [EC Communication on the New European Innovation Agenda](#), with the aim of taking forward flagship projects, as the PRIs, to strengthen the innovation ecosystem at local level and reduce the digital divide between the European territories. In this perspective, the Pilot Action is expected to become a fully-fledged project in summer 2023.

The PRIs aim to connect EU priorities with national plans, create linkages across domains and funding instruments, exploit synergies and address challenges to deliver economic, environmental, and social benefits. It aims to strengthen regional impact, with a particular focus on the green and digital transitions, by fostering synergies with other EU policies including the European Green Deal, Horizon Europe, the Cohesion policy, and Next Generation EU (Pontikakis *et al.*, 2022).

Within the PRIs framework, the Entrepreneurial Discovery Process becomes a mission-oriented mechanism entitled Challenge-Oriented Innovation Partnerships (CHOIRs). Its aim is to tackle specific challenges (missions) that require the collaboration of all societal groups (Laranja, Perianez-Forte & Reimeris, 2022).

The goal is to concentrate Smart Specialisation Strategies onto specific priorities related to the digital and environmental transition. It does this through a systemic and multi-level approach that considers local, regional, and national needs that require alignment of financial instruments and policies.

The PRIs Pilot Action, launched in April 2022, includes 74 territories: four Member States, seven cities, 63 regions and six regional networks that are involved in thematic workshops, exchanges of good practices, policy reviews and analytical insight. These activities are tailored to the areas of interest, whilst national, regional and local policy makers, stakeholders and experts are invited to co-create and test innovative tools and governance mechanisms to integrate projects and investment in the selected strategic areas that link territorial opportunities and challenges to EU priorities.

¹ https://cor.europa.eu/en/events/Documents/SEDEC/Action_Plan_EC_CoR_November_2020.pdf

The PRIs implementation is regularly evaluated during plenary meetings that bring together participants to discuss key concepts, experiences, insights and analyses from the working groups. A PRIs monitoring and evaluation approach is also developed to support capacity building in territories.

The PRIs represent an ambitious policy strategy, aimed at both solving the issues encountered in the previous S3 and to meet new challenges that go beyond traditional strategies. In this regard, the PRIs pilot, as a flagship project within the new strategy conveyed through the [EC Communication on the New European Innovation Agenda](#), is intertwined with other flagship initiatives such as the Regional Innovation Valleys (RIVs), managed by the CoR and directed towards the identification of regions willing to commit for a better coordination of their research and innovation investments and policies and to take part in inter-regional innovation projects. It is hoped that this strategy could foster a breakthrough in the transformation of the EU innovation landscape.

In light of these development the current study focusses on the following research questions:

- How regional Smart Specialisation Strategies (S3) have been adopted and put into practice locally.
- The extent to which Local and Regional Authorities (LRAs) are satisfied with the S3 process and periodic monitoring via existing tools at national and European level (the S3 platform, RIS scoreboard, JRC/DG REGIO analyses, etc.).
- How the "Entrepreneurial Discovery Process", the green and digital transition and the resilience building to upcoming future crises and challenges are implemented at local level and how they are linked together.
- How the concept of regional S3 should evolve in the near future, what can be improved and whether new elements should be taken into consideration in order to capture new challenges, policy developments and social trends.
- Whether the process of regional S3 design and evaluation should include some new steps and be carried out more frequently, while involving new players beyond the city or region – i.e., from the European and national level.
- Whether the EU and Member States should provide funding and expertise for creating more permanent structures (e.g., at NUTS2 level) to facilitate this process locally.

- Which policy actions can strengthen the regional innovation ecosystem by building capacity, enhancing inclusiveness, growing resilience and ensuring the effective and synergetic use of EU (and other) funds following an improved S3 process.

Part 1 An inventory of S3 priorities in the last programming periods

To provide a robust overview of S3 implementation at regional level, a solid methodological approach is required. The heterogeneity of available data concerning the S3 at regional level for the period 2014-2020 are emblematic of different approaches adopted across Europe. To analyse all the available data, the present study considers various European platforms such as the Kohesio database², the Cohesion Open Data platform³, the official portal for European data⁴ and the S3 platform⁵. However, data are often partial or not up-to-date and need to be integrated with additional national sources, for instance, on the S3 platform there are 259 NUTS2 regions out of 266 in total at European level.

First, it is crucial to define a method for scoping the study at geographical level. In this view, a solid clustering approach is presented in the Regional Innovation Scoreboard (RIS) 2021, an expansion of the 2021 European Innovation Scoreboard (EIS). The European Innovation Scoreboard proposes a composite indicator – the Summary Innovation Index – which is based on the innovation performance measured through 32 indicators that describes four factors summarising 12 innovation dimensions, i.e., framework conditions, investments, innovation activities, and impacts. The Regional Innovation Scoreboard, on the other hand, uses a composite indicator – the Regional Innovation Index (RII) – which is based on a revised version of the European Innovation Scoreboard framework.

A comparison between the European and Regional Innovation Scoreboards approaches is presented below.

Table 1. A comparison of the indicators included in the European Innovation Scoreboard and the Regional Innovation Scoreboard

	EIS 2021	RIS 2021
FRAMEWORK CONDITIONS		
Human resources	Doctorate graduates per 1,000 population aged 25-34	<i>No regional data</i>
	Percentage of population aged 25-34 having completed tertiary education	Same as EIS
	Lifelong learning, the share of population aged 25-64 enrolled in education or training aimed at improving knowledge, skills and competences	Same as EIS
Attractive research systems	International scientific co-publications per million population	Same as EIS
	Scientific publications among the top-10% most cited publications worldwide as percentage of total scientific publications of the country	Same as EIS

² <https://kohesio.ec.europa.eu/>

³ <https://cohesiondata.ec.europa.eu/projects>

⁴ <https://data.europa.eu/>

⁵ <https://s3platform.jrc.ec.europa.eu/>

	Foreign doctorate students as percentage of all doctorate students	<i>No regional data</i>
Digitalisation	Broadband penetration (Share of enterprises with a maximum contracted download speed of the fastest fixed internet connection of at least 100 Mb/s)	<i>No regional data</i>
	Individuals who have above basic overall digital skills	Own estimates using Households with broadband access
INVESTMENTS		
Finance and support	R&D expenditure in the public sector as percentage of CDP	Same as EIS
	Venture capital expenditure as percentage of GDP	<i>No regional data</i>
	Direct government funding and government tax support for business R&D	<i>No regional data</i>
Firm investments	R&D expenditure in the business sector as percentage of CDP	Same as EIS
	Non-R&D innovation expenditures as percentage of total turnover	Data for SMEs
	Innovation expenditures per person employed in innovation-active enterprises	Data for SMEs
Use of information technologies	Enterprises providing training to develop or upgrade ICT skills of their personnel	<i>No regional data</i>
	Employed ICT specialists	Estimates using Employment in information and communication
INNOVATION ACTIVITIES		
Innovators	SMEs introducing product innovations as percentage of SMEs	Same as EIS
	SMEs introducing business process innovations as percentage of SMEs	Same as EIS
Linkages	Innovative SMEs collaborating with others as percentage of SMEs	Same as EIS
	Public-private co-publications per million population	Same as EIS
	Job-to-job mobility of Human Resources in Science & Technology	<i>No regional data</i>
Intellectual assets	PCT patent applications per billion CDP (in Purchasing Power standards)	Same as EIS
	Trademark applications per billion CDP (in Purchasing Power standards)	Same as EIS
	Individual design applications per billion CDP (in Purchasing Power standards)	Design applications
IMPACTS		
Employment impacts	Employment in knowledge-intensive activities as percentage of total employment	Employment in medium-high and high-tech manufacturing and knowledge-intensive services
	Employment in innovative enterprises	Data for SMEs
Sales impacts	Medium and high-tech products exports as percentage of total product exports	<i>No regional data</i>
	Knowledge-intensive services exports as percentage of total service exports	<i>No regional data</i>
	Sales of new-to-market and new-to-enterprise innovations as percentage of total turnover	Data for SMEs
Environmental sustainability	Resource productivity	<i>No regional data</i>
	Air emissions in fine particulates (PM2.E) in Industry	Exposure to fine particulates (PM2.E)
	Development of environment-related technologies	<i>No regional data</i>

Source: Regional Innovation Scoreboard 2021

The Summary Innovation Index divides the European Member States and regions into four groups reported here in order of increasing innovation potential: emerging innovators, moderate innovators, strong innovators, and innovation leaders.

Following this categorisation, the present study proposes to analyse the local S3 implementation considering a sample of two regions for each Member State and using the RIS approach, including both NUTS1 and NUTS2 nomenclatures⁶. To provide a representative overview of the different levels of incremental innovation among the European territories, within each Member State it is selected a region belonging to the same category assigned by the EIS at national level and either the best or the least performing region within the same Member State⁷, as showed in the following example.

For Czech Republic, considered a Moderate Innovator by the EIS, the regions analysed are Central Bohemian Region, categorised by the RIS as Moderate Innovator (i.e., same category of the national level) and Prague Region, grouped as Strong Innovator (i.e., the best performing region in Czech Republic).

This approach allows for an analysis that encompasses the array of differences between the regions in terms of S3 implementation, while, at the same time highlighting the original elements related to the local specialisation strategies in each territory.

The ensuing Table summarises the regions selected for the analysis.

Table 2. Overview of the EU 27 Member States and their regions categorised according to RII

Country	National performance according to EIS 2021	Regions considered	Regional performance according to RIS 2021
Austria	Strong Innovator	Eastern Austria Region	Strong Innovator
		Western Austria Region	Strong Innovator
Belgium	Innovation Leader	Brussels Capital Region	Innovation Leader
		Walloon Region	Strong Innovator
Bulgaria	Emerging Innovator	South-Central Region	Emerging Innovator
		Northwest Region	Emerging Innovator
Croatia	Emerging Innovator	<i>No regions at NUTS2 level</i>	
Cyprus	Moderate Innovator	<i>No regions at NUTS2 level</i>	
Czech Republic	Moderate Innovator	Central Bohemian Region	Moderate Innovator
		Prague Region	Strong Innovator

⁶ According to Eurostat, the NUTS classification (Nomenclature of territorial units for statistics) is a hierarchical system for dividing up the economic territory in three levels: NUTS1: major socio-economic regions; NUTS2: basic regions for the application of regional policies; NUTS3: small regions for specific diagnoses. Definition taken from Eurostat. More information at <https://ec.europa.eu/eurostat/web/nuts/background>.

⁷ It is to be noted that Luxembourg, Croatia, Estonia, Latvia, Lithuania, Slovenia, Cyprus and Malta have only one region at NUTS2 level.

Denmark	Innovation Leader	Capital Region	Innovation Leader
		Zealand Region	Moderate Innovator
Estonia	Strong Innovator	<i>No regions at NUTS2 level</i>	
Finland	Innovation Leader	Helsinki-Uusimaa Region	Innovation Leader
		Åland Islands Region	Strong Innovator
France	Strong Innovator	Brittany Region	Strong Innovator
		Île-de-France Region	Innovation Leader
Germany	Strong Innovator	Thuringia Region	Strong Innovator
		Hamburg Region	Innovation Leader
Greece	Moderate Innovator	Attica Region	Moderate Innovator
		South Aegean Region	Emerging Innovator
Hungary	Emerging Innovator	South Transdanubia Region	Emerging Innovator
		Budapest Region	Moderate Innovator
Ireland	Strong Innovator	Eastern and Midland Region	Strong Innovator
		Northern and Western Region	Moderate Innovator
Italy	Moderate Innovator	Abruzzo Region	Moderate Innovator
		Calabria Region	Emerging Innovator
Latvia	Emerging Innovator	<i>No regions at NUTS2 level</i>	
Lithuania	Moderate Innovator	<i>No regions at NUTS2 level</i>	
Luxembourg	Strong Innovator	<i>No regions at NUTS2 level</i>	
Malta	Moderate Innovator	<i>No regions at NUTS2 level</i>	
Netherlands	Strong Innovator	Limburg Region	Strong Innovator
		Friesland Region	Moderate Innovator
Poland	Emerging Innovator	Mazovia Region	Emerging Innovator
		Małopolska Region	Moderate Innovator
Portugal	Moderate Innovator	North Region	Moderate Innovator
		Azores Region	Emerging Innovator
Romania	Emerging Innovator	Bucharest-Ilfov Region	Emerging Innovator
		South-West Oltenia Region	Emerging Innovator
Slovakia	Emerging Innovator	Eastern Slovakia Region	Emerging Innovator
		Bratislava Region	Moderate Innovator
Slovenia	Moderate Innovator	<i>No regions at NUTS2 level</i>	
Spain	Moderate Innovator	Rioja Region	Moderate Innovator
		Basque Country	Strong Innovator
Sweden	Innovation Leader	Stockholm County	Innovation Leader
		North Middle Sweden Region	Strong Innovator

Data source: Regional Innovation Scoreboard 2021; elaboration by FORMIT.

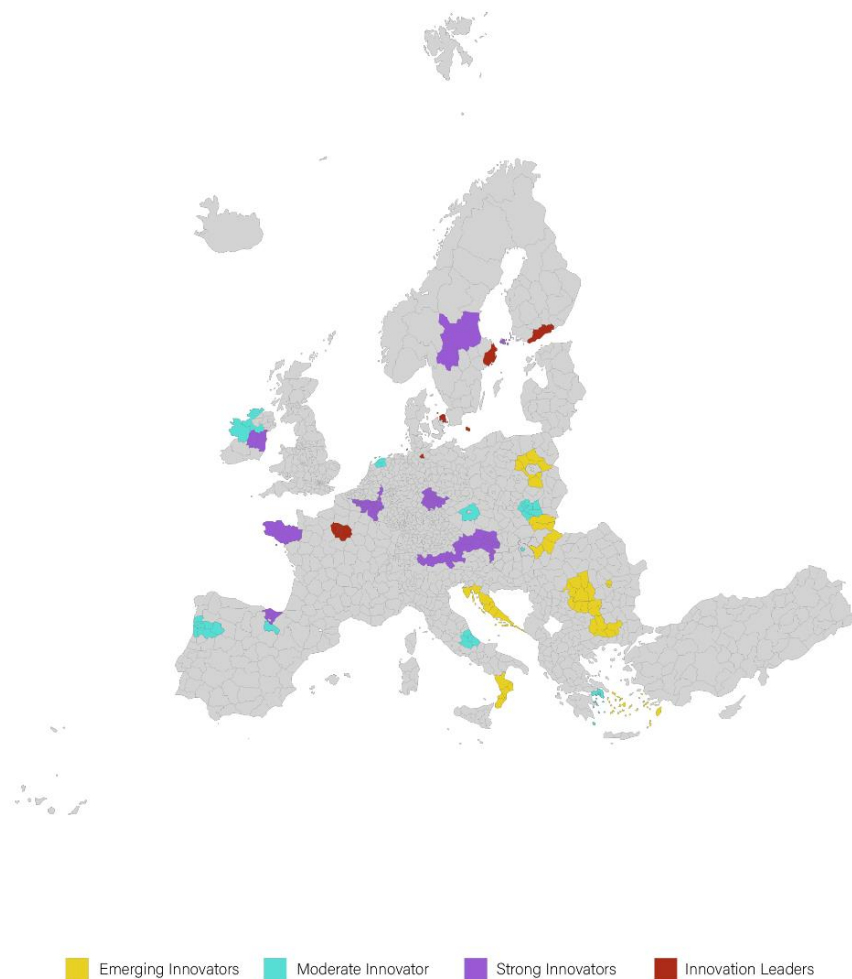
The overarching method of the present study aims at providing an overview of the S3 implementation by considering a representative sample of regions among the 27 EU Member States. After presenting potential similarities and differences among the

regions belonging to each of the four innovation categories (Part 1), the study reports a series of regional case studies based on interviews with LRAs representatives (Part 2). The final goal of this exercise is to build a broad evidence base on which to provide informed and relevant recommendations to the EU institutions and to the LRAs (Part 3).

Figure 3. Methodology for study



Figure 4. Inventory regions



Moreover, in view of the review process of the S3, it is crucial to assess the current implementation by the European regions of the new dimensions of the S3, namely Green Transition, Digital Transition, alignment with the UN SDGs and degree of development of the entrepreneurial ecosystem.

These dimensions are of paramount importance to respond to the new socio-political challenges at local level and are strictly interrelated. The twin transition is the basis to achieve competitive advantages in the market and boost the innovation of the entrepreneurial ecosystem, while the alignment with the UN SDGs ensures a fair, inclusive and sustainable growth, enhancing the resilience of the whole society against crises and disrupting events.

For this purpose, it is necessary to develop dedicated indicators able to capture these dimensions. Starting from the dataset available at regional level the following **data sources** have been identified:

Table 3. Dataset considered for building regional indicators

Source	Title and Code	Type of data collected	Variables considered
Eurostat	SBS data by NUTS2 regions and NACE Rev. 2 (from 2008 onwards) SBS_R_NUTS06_R2	Structural business statistics (SBS) describes the structure, conduct and performance of economic activities, down to the most detailed activity level. SBS are transmitted annually by the EU Member States on the basis of a legal obligation from 1995 onwards. Main characteristics (variables) of the SBS data category: <ul style="list-style-type: none"> • Business Demographic variables (e.g., Number of enterprises) • "Output related" variables (e.g., Turnover, Value added) • "Input related" variables: labour input; goods and services input; capital input. 	Number of enterprises and Number of people employed in the sectors "energy and water" and "information and communication" in 2016, 2019 and in 2020 at regional level and at EU27 level.
European Commission - Directorate-General for Research and Innovation	H2020 Dashboard (FP8)	The Horizon dashboard contains the data on Horizon 2020 proposals, projects, participants with filter options by theme, geography, organisation profile and more.	Number of projects' grants signed in the H2020 Programme, both at regional, national, and EU27 level, with the following thematic priorities: <ul style="list-style-type: none"> • Global Change, climate and biodiversity. • Environment and Health. • Climate action, environment, resources efficiency and raw materials. • Environment (including Climate Change). • Environment and Climate. • Food, Bioeconomy Natural Resources, Agriculture and Environment. • Digital, Industry and Space. • Information and communication technologies.
Eurostat	Gross value added at basic prices by NUTS3 regions NAMA_10R_3GVA	Regional accounts are a regional specification of the national accounts and therefore based on the same concepts and definitions as national accounts (see domain nama10). Gross domestic product (GDP) at market prices is the final result of the production activity of resident producer units. In regional accounts it can be calculated from: <ol style="list-style-type: none"> 1. Output approach GDP is the sum of gross value added of the various institutional sectors or the various industries plus taxes and less subsidies on products (which are not allocated to sectors and industries). It is also the balancing item in the total economy production account. 2. Income approach GDP is the sum of uses in the total economy generation of income 	Gross value added at basic prices in information and communication sectors 2016 and in 2019 at regional national and EU27 level.

		account: compensation of employees plus gross operating surplus and mixed income plus taxes on products less subsidies plus consumption of fixed capital. The different measures for the regional GDP are absolute figures in € and Purchasing Power Standards (PPS), figures per inhabitant and relative data compared to the EU Member States average.	
The European Cluster Observatory	European Cluster Collaboration platform	Clusters are defined as groups of firms, related economic actors, and institutions that are located near each other and have reached a sufficient scale to develop specialised expertise, services, resources, suppliers and skills.	N. of clusters in total, clusters, N. of clusters working on Digital thematic, N. clusters working in Green thematic, both at regional, national and EU27 level.
Eurostat	HRST by category and NUTS2 regions HRST_ST_RCAT	The Human Resources in Science and Technology (HRST) domain provides data on stocks and flows (where flows in turn are divided into job-to-job mobility and education inflows).	N. of people with tertiary education (ISCED) and/or employed in science and technology.
European Environment Agency	Air Quality Health Risk Assessments	This data set presents assessment of health risk due to exposure to three main pollutants (PM2.5, NO2 and O3-SOMO35) at NUTS3 and Country levels. In addition, average and population weighted average concentration values are available in the data set for PM10, PM2.5, NO2 and O3 (SOMO35). The calculations are made for years 2005 to 2020.	Air Pollution Average [ug/m3].
Eurostat	Number and capacity of recovery and disposal facilities by NUTS2 regions ENV_WASFAC	On the basis of the Regulation on waste statistics (EC) No. 2150/2002, amended by Commission Regulation (EU) No. 849/2010, data on the generation and treatment of waste is collected from the Member States.	N. of Waste facilities for recovery-recycling.
OECD calculations based on the Emissions Database for Global Atmospheric Research (EDGAR)	Total production-based GHG emissions per capita estimates (t CO2-eq/capita), 2018; emission growth estimates (%) 1990-2018, OECD large regions (TL2)	EDGAR v6.0 provides emissions of the three main greenhouse gases (CO2, CH4, N2O) and fluorinated gases per sector and country.	Emission growth 1990-2018.

For all identified sources, a timespan of **4 years minimum** has been analysed, to capture potential effects of the S3 in boosting these new dimensions.

For the **Digital Transition**, the figures show:

- [D1] The growth in number of employees in information and communication sector from 2016 to 2019, expressed in percentage and compared with national and EU27 values.
- [D2] The growth in gross added at basic prices in information and communication sector from 2016 to 2019, expressed in percentage and compared with national and EU27 values.
- [D3] The growth in number of people with tertiary education and/or employed in science and technology, expressed in percentage and compared with national and EU27 values.

- [D4] The comparison at regional, national and EU27 of the share of H2020 European projects for the thematic ‘Digital, Industry and Space’ and ‘Information and communication technologies’ per ICT company, expressed in percentage.

For the **Green Transition**, the figures show:

- [G1] The growth in Waste facilities for recovery-recycling from 2016 to 2020, expressed in percentage and compared with national and EU27 values.
- [G2] The decrease in Air Pollution from 2016 to 2020, expressed in percentage and compared with national and EU27 values.
- [G3] The alignment between the regional S3 for the period 2021-2027 with the UN SDGs related with the Green Transition, i.e., Goal 6: Clean Water and Sanitation; Goal 7: Affordable and Clean Energy; Goal 11: Sustainable Cities and Communities; Goal 12: Responsible Consumption and Production; Goal 13: Climate Action.
- [G4] The comparison at regional, national and EU27 of the share of H2020 European projects for the thematic ‘Global Change, climate and biodiversity’, ‘Environment and Health’, ‘Climate action, environment, resources efficiency and raw materials’, ‘Environment (including Climate Change)’, ‘Environment and Climate’, ‘Food, Bioeconomy Natural Resources, Agriculture and Environment’ per energy and water company, expressed in percentage.

Box 1. The alignment with the UN SDGs

To compare the alignment of the regional S3 with the UN SDGs, the analysis considers the S3 priority areas and the strategic domains for the period 2021-2027, for instance of Brussels Capital Region, and cross-checks them with the Green UN SDGs. The resulting share of Goals covered by the S3 is the following:

	Goal 6	Goal 7	Goal 11	Goal 12	Goal 13
<u>Priority areas</u>					
Climate and energy					x
Mobility					
Inclusive and participatory society					
Health and well-being					
Resource efficiency				x	
Healthy eating for all					
<u>Strategic domains</u>					
Advanced digital technologies and services					
Climate resilient buildings and infrastructures			x		
Energy efficiency		x			

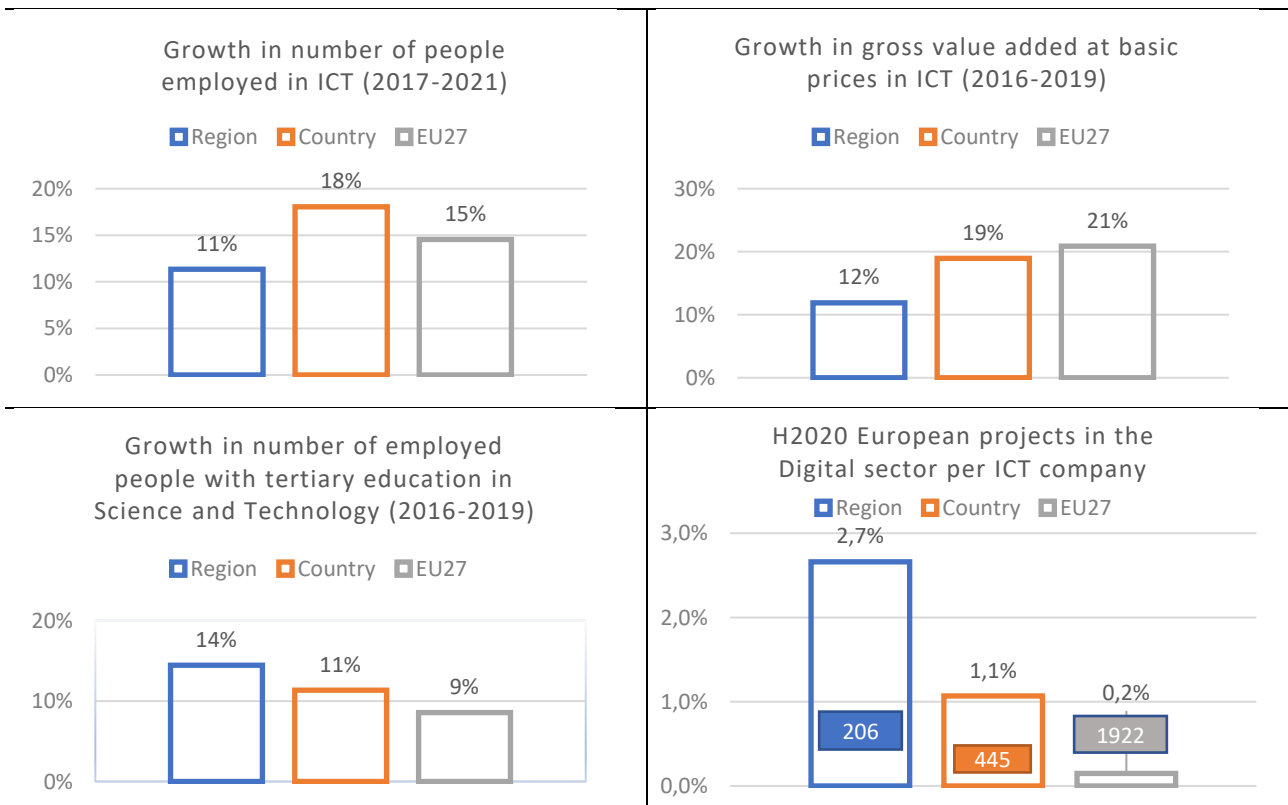
Sustainable and effective urban space management			x		
Health and personalised and integrated care					
Social innovation, public innovation and social inclusion					

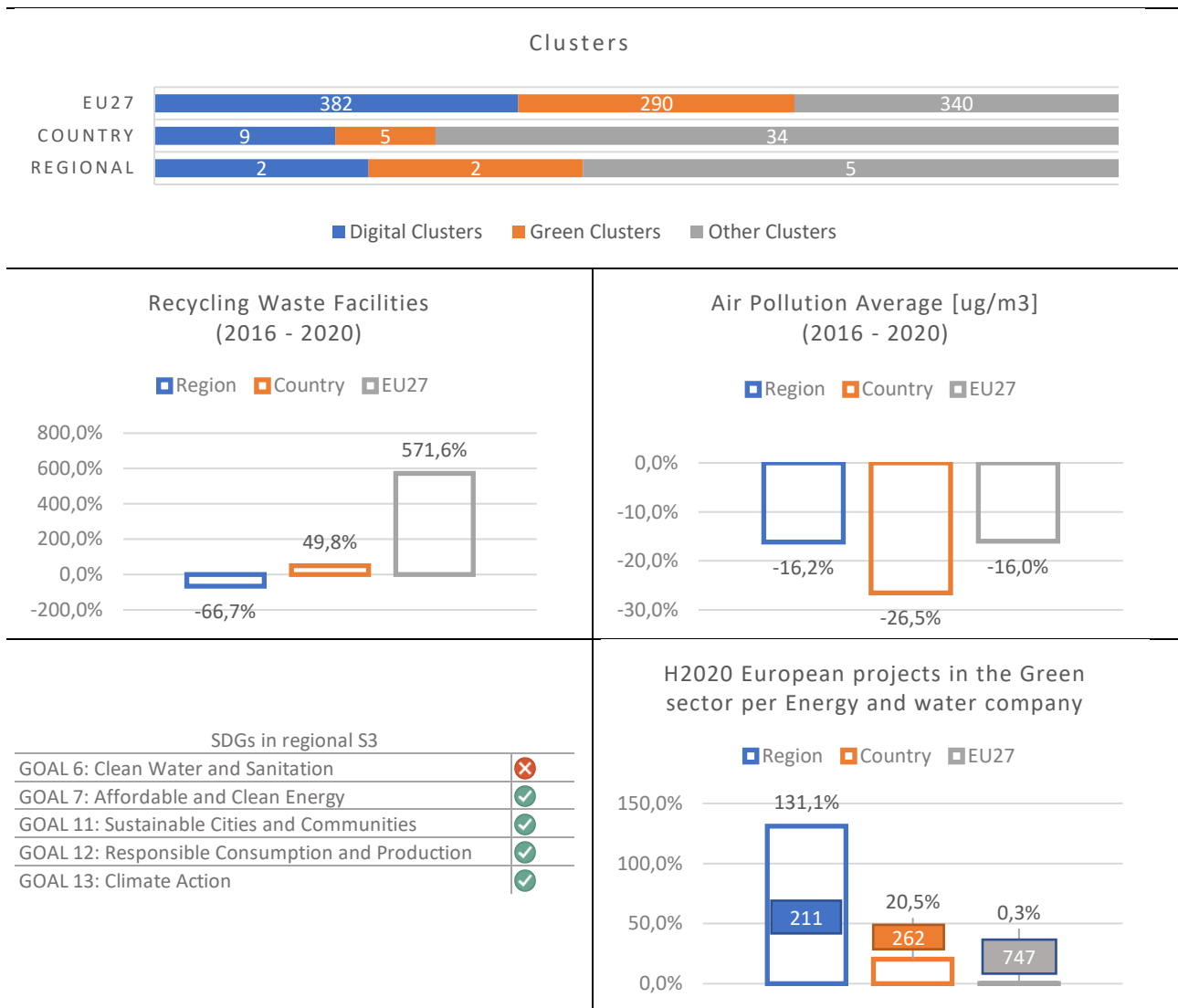
The strength of the **Entrepreneurial Ecosystem** is calculated through the European Cluster Collaboration Platform, which maps and ranks clusters in Europe, including thematic specialisation and type of membership:

- [E1] The comparison at regional, national and EU27 of the share of total clusters, expressed in absolute values.
- [E2] The comparison at regional, national and EU27 of the share of Digital clusters, expressed in absolute values.
- [E3] The comparison at regional, national and EU27 of the share of Green clusters, expressed in absolute values.

As an example, the methodology is applied to the Brussels Capital Region. Figure 1 illustrates each indicator by comparing regional, national and EU27 data and provides a consolidated view through **regional convergence towards the new S3 dimensions** (radar graph).

Figure 1. Example of indicators to measure the new dimensions of the S3





Based on the illustrated datasets, analysis allows presentation of indicators in a consolidated manner, relevant for measuring twin transition regional performance:

D1 – Human Capital: Growth in number of people employed in ICT (2017-2021).

D2 – Value Added: Growth in Gross Value Added at basic prices in ICT (2016-2019).

D3 – Education: Growth in number of employed people with tertiary education in Science and Technology (2016-2019).

D4 – Research: Share of H2020 European projects in the Digital sector.

G1 – Waste: Growth in Waste facilities (2016-2020).

G2 – Air: Decrease in Air Pollution (2016-2020).

G3 – SDG: S3 2021-2027 alignment with Green SDGs.

G4 – Research: Share of H2020 European projects in the Environmental sector.

The unique characteristics of this approach allow for the creation of an index, composed on the above-mentioned indicators. The index brings together the three dimensions investigated for the future of the S3, i.e., twin transition, resilience and

maturity of the entrepreneurial ecosystem. Therefore, in this perspective, the index represents a novel contribution based on data already collected at regional level in EU.

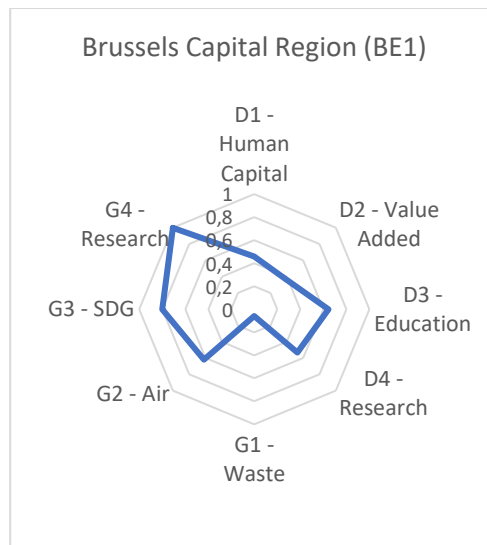
Box 2. The S3 acceleration index

The S3 Acceleration Index (S3AI) can be computed for each of the 242 NUTS2 regions (population) considered ([NUTS 2021 nomenclature](#)). Data gaps at NUTS2 level have been filled as far as possible by considering corresponding averages at NUTS3 level. To identify each of the eight indicators, it is performed a ‘Min-max Normalisation’ of values of the population, removing outliers before standardisation. As a result, the value of each indicator ranges from 0 to 1.

Finally, the S3AI is computed as the average value of the eight indicators. The S3AI is calculated as the arithmetic mean because the weight of each area in contributing to the convergence is assumed to be the same. The S3AI is a synthetic index which provides essential information on the level of the S3 convergence in each region and allows regions to be classified.

The following consolidated chart represents the **S3 acceleration index**:

Figure 2 - S3 acceleration index



The creation of the **S3 acceleration index** aims at bridging the current lack of instruments to measure the twin transition and the development of the entrepreneurial fabric in relation with the S3 at local level. In this perspective, the present study allowed for the conception of this innovative index for keeping track in an aggregated manner of the impact generated by the S3 on these emerging dimensions, responsible for the enhancement of the innovation at territorial level.

In addition, for each of the four RIS categories (i.e., Emerging Innovators, Moderate Innovators, Strong Innovators, and Innovation Leaders), the specialisation areas included in the study are analysed through word clouds, which display selected

keywords in different sizes based on their frequency. For building the word clouds, the specialisation areas of the regions have been retrieved from the S3 documents (see Annex IV), and their taxonomy has been standardised with the following keywords: agri-food, blue economy, chemical industry, circular economy, cultural and creative industries, cutting-edge technologies, data science, digital economy, digitalisation, electrical engineering, e-government, green transition, healthcare, industry competitiveness, infrastructure, jobs creation, life science, luxury goods, metal industry, Public Administration simplification (PA simplification), reduction of inequalities, renewable energy, resources efficiency, rural areas development, security, smart industry, social services, sport, sustainable construction, sustainable development, sustainable mobility, sustainable tourism, technological transfer, training and education.

1.1 Emerging Innovators: S3 Priorities in the last programming periods

Following the selection criteria to analyse the regional S3 in Europe mentioned above, the regions that form the Emerging Innovators group are: South-Central Region (BG42), Northwest Region (BG31), South Aegean Region (EL42), South Transdanubia Region (HU23), Calabria Region (ITF6), Mazovia Region (PL92), Azores Region (PT2), Bucharest-Ilfov Region (RO32), South-West Oltenia Region (RO41), Eastern Slovakia Region (SK04), and Jadranska Hrvatska (HR).

Among the regions considered in the Emerging Innovators group, it is possible to identify similar approaches and challenges emerging from the evaluation of the S3 for the 2014-2020 programming period.

One of the most evident shared characteristics is the methodology used to design the S3. They vary depending on the region, and ranges from an integrated top-down and bottom-up approach, to sole top-down. It is to be noted that regions that were historically part of highly centralised national governments are more used to adopting a top-down approach. These regions have also dedicated considerable effort to move to more local and co-creational approaches (Mieszkowski & Kardas, 2015). This is the case of the Bulgarian regions of South-Central Region and Northwest Region that adopted an integrated methodology combining top-down and bottom-up approaches. In their approach, an initial study of the territory was first conducted to outline the main strategic trajectories and, subsequently, following a bottom-up perspective, consultations were held to build consensus among the stakeholders, to increase commitment and the interest of participants, reduce the risk of scarce communication with the interested parties, give value to the effective use of knowledge of the local participants and, finally, increase S3 awareness.

Another region that chose a hybrid approach is the Mazovia Region, which has undergone three updates of the approach for the regional S3 design, each time increasing stakeholders' engagement through more effective initiatives at the territorial level. In the making of the regional S3 for 2021-2027, the Mazovia Region organised extensive local consultations: nine strategic advisory workshops for the creation of the overall strategy also taking into consideration available studies on the socio-economic situation of the region; nine local workshops for the review of the previous S3; several online consultations on specific smart specialisation projects and three meetings of the Regional Stakeholders Groups under selected Interreg projects.

A more bottom-up approach was taken by the South-West Oltenia Region, which took as premises the UN SDGs, following the guidance of the JRC Institute of Prospective and Technological Studies (IPTS), in their [Guide to Research and Innovation Strategies for Smart Specialisations](#) (Foray *et al.*, 2012) and the [RIS3 implementation manual](#) (EC, 2016). First, an analysis of the sectors with potential for smart specialisation was conducted to lay to foundations for the strategy design, and afterwards, in line with the

EDP, working groups were established and consultations held to confirm or change priorities that were identified in the first stages. The S3 process was guided by the Agency for Regional Development South-West Oltenia (ADR SV) and supervised by the Regional Innovation Consortium (CRI), which was composed of representatives of the private sector, public authorities, academia and civil society, and those responsible for the approval and monitoring of the S3. This participatory CRI is an interesting application of a broader and continuous EDP process, which is also part of S3 governance process.

Other regions in this group employed a bottom-up EDP but encountered difficulties in involving the triple helix of stakeholders, either because they could not reach out to a particular group, or because the industrial ecosystem is not developed or connected. This last case applies to Eastern Slovakia Region that faced shortcomings in the EDP (Cvijanović *et al.*, 2020), mainly since the majority of R&D activities are located in the Bratislava Region (Schulz, 2020). This is evidence of the advantage represented by a pre-existing strong innovation network (Perianez-Forte & Wilson 2021).

In the case of South Aegean Region, the composition of the private sector, mainly constituted by micro enterprises, and the territory's geography, represented significant obstacles to effective EDP implementation. Nevertheless, the region organised consultations with local agencies and representatives of civil society, selected in line with [The European code of conduct on partnership](#), to identify areas of strengths and improvements, whilst also seeking alignment with the national strategy. The geography of the region, which is an archipelago, increased the difficulty of connecting and bringing together the private sector, especially when the current entrepreneurial collaboration paradigm was based on proximity, agglomeration and clusterisation (Burnett & Danson, 2013).

A similar geographical context can be found in the Azores Region, where the administration actively worked towards the reinforcement of the EDP and the review of the regional S3 for the 2021-2027 period by organising three distinct participatory spaces: the working groups, the public sessions and the "Azores Science" roadmap. The strategy aimed at gathering different audiences and promoted a deep reflection on the main programmatic priorities for 2021-2027. However, there is an endogenous structural weakness of the entrepreneurial ecosystem due to the economic disintegration of the archipelagic region, where each of the nine islands presents a specific economic dynamic (Paramio *et al.*, 2013).

In other regions, the EDP presented a major challenge for regional administrations, lacking resources and competences to implement a functioning engagement strategy targeting the private sector. For instance, the approach adopted by the South Transdanubia Region follows the governance created at national level where the National Research, Development and Innovation Office (NKFI Office), with the support of the Ministry of Innovation and Technology (ITM) has created local hubs

called [Territorial Innovation Platforms](#) (TIPs). Each one is guided by a local university, with the aim of reinforcing the EDP by involving the widest possible range of actors in the design of the S3.

It should be noted that the preparatory activities for the S3 design for the period 2021-2027 were held in the context of the COVID-19 pandemic. This context stimulated the ability of the regions to find alternative solutions for carrying out consultations. In the case of Bucharest-Ilfov Region, the Regional Development Agency (ADR BI), responsible for the development of the S3 under the coordination of the Ministry of European Investments and Projects (MIPE) started organising the consultation process through five thematic working groups established by the MIPE. They included private sector, civil society, local authorities and academia. In the context of the COVID-19 outbreak, the ADR BI shifted the consultation format to written consultations coupled with bilateral meetings and broad consultations through teleconferencing platforms. This allowed ongoing participation, fostered exchange of ideas and ultimately the timely completion of the S3 for the programming period 2021-2027.

Furthermore, there are countries that did not have regional programming, nor divisioning of regions. For example, in Croatia the issuing of the regional S3 2021-2027 stemmed from the creation of the NUTS2 regions in 2019, as part of a national programme for fostering the industrial transition of the regions and optimising and targeting the European funding at local level. In the Jadranska Hrvatska Region, the S3 2021-2027 was conveyed in the [Industrial Transition Plan](#), coordinated by the Ministry of Regional Development and Funds of the European Union. It focused mainly on establishing a strategic framework for industrial growth and clusters to support the creation of an innovation ecosystem.

The Calabria Region reviewed its S3 for the period 2021-2027, concentrating on reviewing the governance structure to establish an integrated three-level mechanism that was responsible for the entire process of designing, managing, and monitoring the S3. The region is also well positioned towards an improved and continuous Entrepreneurial Discovery Process. However, as per many of the regions of this group, there is a gap in the visibility and external communication of the S3, which risks leaving behind crucial groups of S3 stakeholders, such as SMEs and civil society.

To conclude, it is not accidental that the regions that form part of the Emerging Innovators group have less knowledge-intensive areas. The pillar of innovation policies has its foundations in the potential underlying knowledge complexity, today understood as linked to technological complexity. However, it does not seem the best strategy for these regions to concentrate all their resources in the attempt to reverse territorial specificities and align themselves towards current global trends. Rather, it can be argued that the new global trends are now coupling technological development with social sustainability aspects which, in the future, will likely become the main innovation driver (Morrison *et al.*, 2020).

In the figure below, it is presented a visual representation of the specialisation areas frequency level for the regions part of this group. At first glance, the most frequent specialisation areas are linked with the twin transition, i.e., “green transition” (13 times), “digital economy” (7), “smart industry” (7), “sustainable mobility” (7), “digitalisation” (6), “e-government” (6), “renewable energy” (6). It can be argued that these regions, for the preparation of the current S3, placed the twin transition at the very centre of their strategies, considering the green and digital dimensions as priority transversal enablers for the other areas. It is also interesting to note that other dimensions are recurring in the Emerging innovators S3 such as the focus on the manufacturing sector indicated by the frequency of “smart industry” (7) and “agri-food” (9) and on the valorisation of the local natural and cultural resources, represented by the keywords “cultural and creative industries” (6), “sustainable tourism” (5) and “blue economy” (4). This consideration, together with the low frequency of words related to knowledge-intensive activities, such as “industry competitiveness” (3), “cutting-edge technologies” (2), “data science” (1), “life science” (1), indicates a traditional economic system based on traditional income-generating activities. Another element in support of this is the strong focus on the enhancement of the social dimension, probably as a result of the recent economic crises, as shown by the frequency of the keywords “reduction of inequalities” (8), “healthcare” (5), “sustainable development” (4), “training and education” (4).

Figure 5. Representation of the specialisation areas for the S3 in the Emerging Innovators group

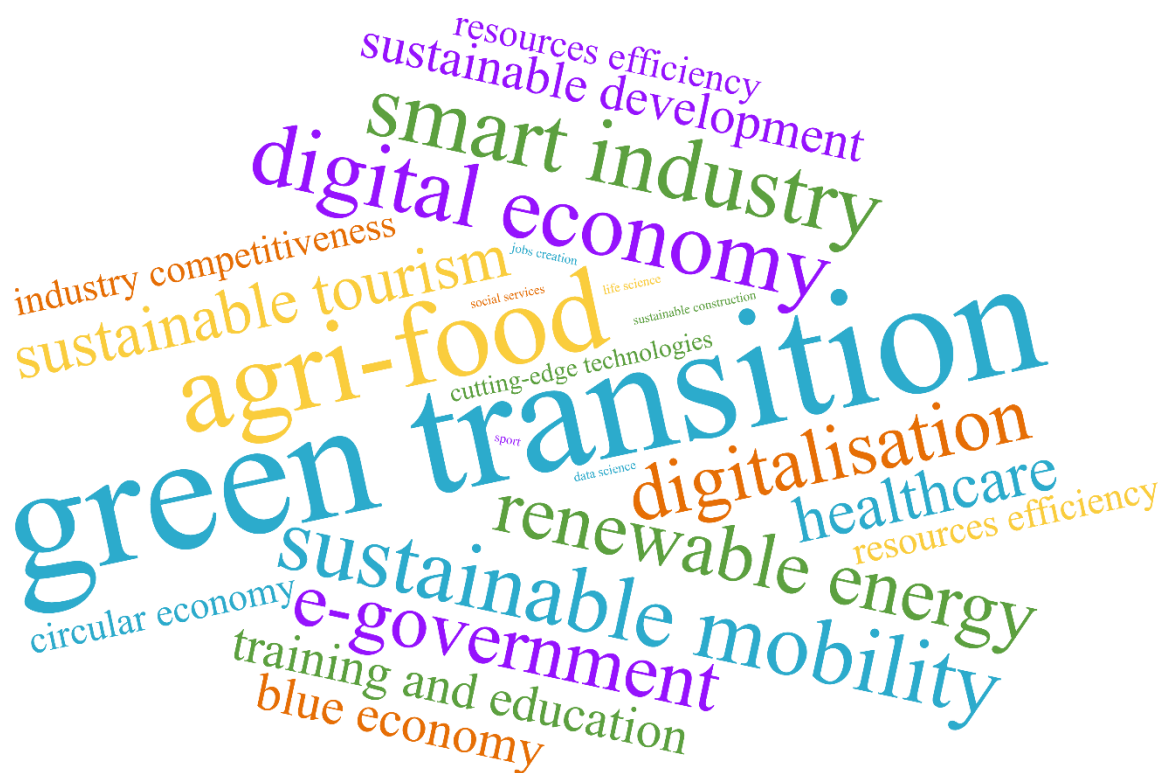
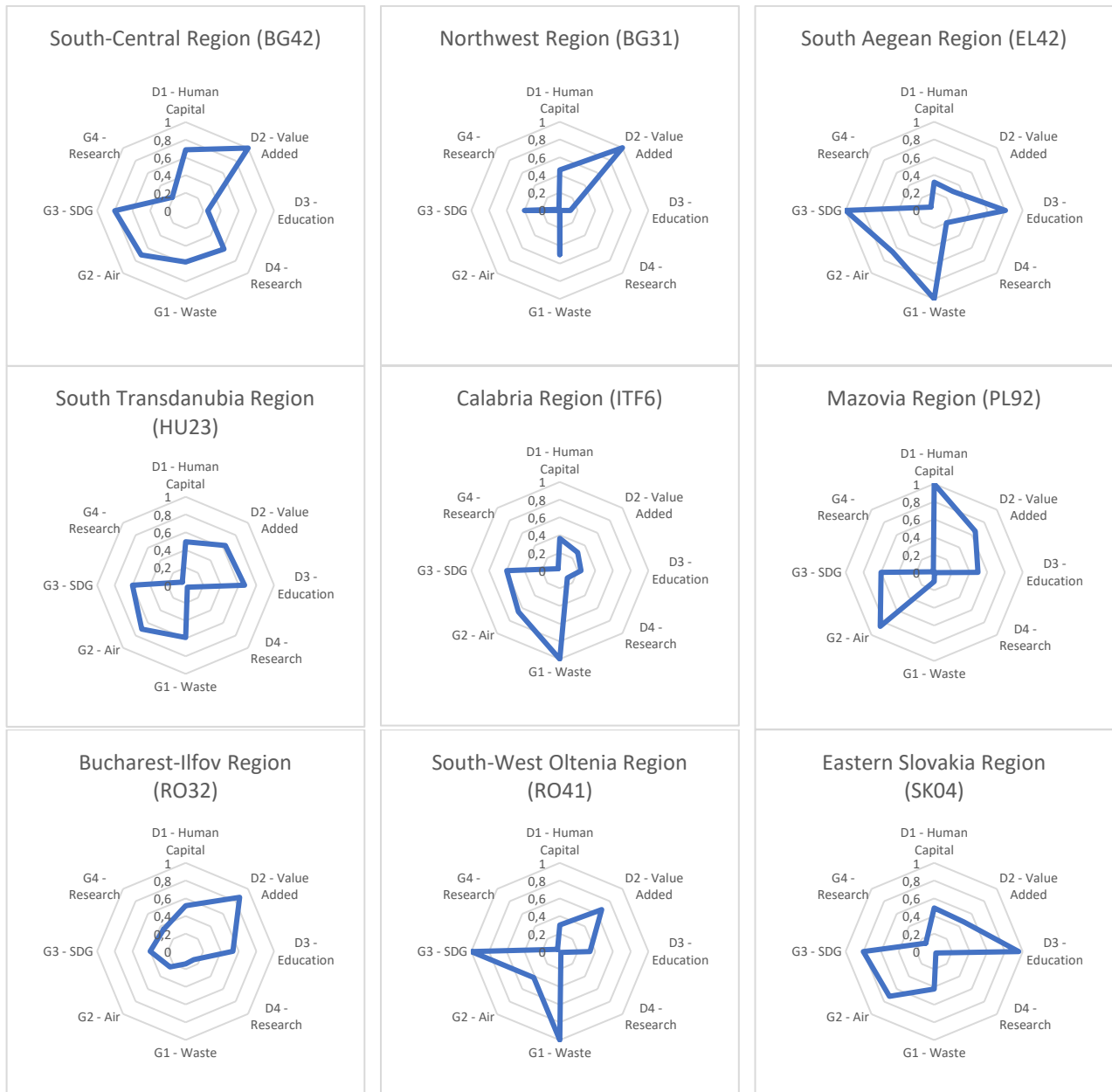


Figure 6. S3 acceleration index – Emerging Innovators group



Within this group of regions, research indicators related to digital and green sectors show low values, with the sole exception of South-Central Region in Bulgaria. In both the regions considered, Bulgaria has the highest growth in the number of ICT companies rate in the group, followed by the Romanian regions.

Eastern Slovakia Region and South Aegean Region, and to a lesser extent the Romanian regions together with South Transdanubia Region and Mazovia Region, have increased the number of people with tertiary degrees in ICT.

All the regions, excluding Northwest Region and Calabria Region, are sufficiently aligned with the green goals of the SDGs.

Finally, there are regions that did not improve air quality nor waste management in the last years. Some regions significantly invested in waste management, i.e., South-West Region, Calabria Region, and South Aegean Region.

1.2 Moderate Innovators: S3 Priorities in the last programming periods

For the group of Moderate Innovators, the regions selected are Central Bohemian Region (CZ02), Zealand Region (DK02), Attica Region (EL3), Budapest Region (HU11), Northern and Western Region (IE04), Abruzzo Region (ITF1), Friesland Region (NL12), Małopolska Region (PL21), North Region (PT11), Bratislava Region (SK01), and Rioja Region (ES23).

Within this group, part of the regions did not develop an S3 in the strict sense, but rather issued a regional development strategy to meet a national statutory requirement. For this reason, even if the strategy approaches are very similar to S3, they present interesting peculiarities and more wide-ranging approaches. Other regions in the group adopted different and reinforced EDP, aiming at overcoming the problems that emerged in the 2014-2020 programming period, which did not always lead to successful results.

Among these regions, there is the region of Zealand (*Sjælland* in Danish) which published its 2020-2024 regional strategy starting from the UN SDGs, seeking an alignment with them. It is important to note that since the SDGs, for their own nature, encompass a wide range of social aspects, the strategy is much more holistic and mission-oriented than a “traditional” S3. A similar overarching approach to regional development is adopted by the Irish regions. In Ireland, innovation policy measures, including the S3, are designed and coordinated at national level, while at regional level the Government approach is to balance regional development through their Regional Spatial and Economic Strategies, which today have become long-term, statutory, programmatic investment frameworks managed by the Regional Assemblies (Săftescu *et al.*, 2016). In the case of Northern and Western Region, the S3 is seen as one of the components of the [Regional Spatial and Economic Strategy 2020-2032](#).

Also centralised, but with a different approach, is the case of Hungary, which has a national S3 that establishes the same priorities for all regions. Nevertheless, since 2019, regions have overseen the EDP through the mechanism of Territorial Innovation Platforms (TIP). This setting is aimed at the enhancement of a regional specialisation mechanism, considering shortcomings identified in the 2014-2020 period, when chosen priorities were too broad and caused scarce participation from the private sector (Birkner *et al.*, 2021). In the case of Budapest Region, the TIP brings together 11 universities. It provides services for enhancing the innovation potential of the private sector. However, it should be noted that the Hungarian S3 priorities have not changed since 2014. Changed sectoral and technological conditions, in respect with the period of 2014–2020, are not reflected in the current strategy and this is negatively affecting the relevance of research and innovation actions (Laranja *et al.*, 2020).

In the previous programming period, Slovakia, which has centralised management of research and innovation policies such as the S3, experienced malfunctioning EDP.

Scarce cooperation of the public research institutions with the business sector has been the explanation (Schultz, 2020). At a local level, the region of Bratislava issued the [Economic and Social Development Programme of the Bratislava Region for the years 2021-2027](#). The development of the strategy was guided by the Institute of Regional Policy of the Bratislava Region (IRP BK), It was created in 2020 with the aim of coordinating local development activities and to manage strategy design and implementation. In the Czech Republic the S3 is also nationally implemented, with the regional dimension addressed in the annexes of the national document. However, some regional S3-related activities have been conducted in Central Bohemian Region. The preliminary phase of the S3 has been directed by the Central Bohemian Innovation Centre and the Central Bohemian Government, which formulated the main conclusions before the start of the EDP. The resulting three pillars of the innovation have been identified: human capital, entrepreneurship, and research. These were presented and discussed in the context of the EDP through the implementation of thematic working groups, with final approval coming from the National RIS3 Coordination Council.

Similar shortcomings are found in the case of the Małopolska Region of Poland, which developed its S3 within the [Regional Innovation Strategy of the Małopolska Region 2030](#) (RSI WM 2030). The document builds on lessons learnt from the previous S3, which resulted in too many priorities and lacked a specialisation element. Nevertheless, the current S3 maintains the same strategic areas as the previous one. Another aspect that has been strengthened for the 2021-2027 period is linked to interregional and international cooperation and value chains, which in the previous S3 were not fully considered. This contrasts with the fact that the region established the new EDP mechanism of the ‘Smart Lab’, developed with technical support from the World Bank. Its aim was to create small, more manageable and diversely composed working groups (World Bank, 2015).

A different case is the Attica Region, which is the most developed region in Greece. The region also hosts some of the best performing universities in the country, according to international rankings. However, a major problem related to the previous S3 was unclear governance, which led to lack of defined ownership, and weak links between these universities and the private sector. This was also due to the previous S3 being predominantly implemented at the national level, lacking a defined role for the regions (OECD, 2020). In response to this, the planning of the 2021-2027 S3 for Attica Region has been developed in cooperation with broad, multi-level partnerships, built in line with the European Code of Ethics for Partnership. The design phase began with the establishment of the Program Planning Group, composed of members of the Regional Authority, the regional Special Management Service, the Special Action Coordination & Monitoring Service of the Ministry of Development and Investments, as well as the Regional Research and Innovation Council of Attica. After the revision of the S3 2014-2020, a concept paper was issued, subject to a public consultation in March and October, 2021. This process then led to the final version of the S3.

In this group, it is also possible to find good practices concerning the organisation of the EDP. The Italian region of Abruzzo, for example, promoted a formal agreement between the region and private sector for adopting sustainable practices. For the current programming, the regional [2021-2027 S3](#) started from development trajectories identified by the Steering Committee, which brought together all the regional institutional levels. Afterwards a regional context analysis was performed, and further integrated with the results of the consultations, held since 2019, and involving a broad composition of stakeholders in line with the regional code for the partnership composition (*Codice Abruzzese di Condotta del Partenariato*). The consultations were held through five thematic working groups (*Atelier strategici*), corresponding to the five strategic areas identified in the S3. The working groups, built on the 2014-2020 good practice of the [Carta di Pescara](#), in support of the EDP, and will once again be involved in a formal pact to carry out the S3 core activities as a consultation group throughout the current programming period. Similarly, the Rioja Region carried out an effective EDP. While the region already had a quite mature innovation ecosystem (Acs, 2015), driven by the clusters established on the territory, the cross-fertilisation between different specialisation fostered innovative solutions in both the agri-food cluster and the health sector, with new business opportunities emerging in the fields of health and nutrition⁸.

Another effective EDP initiative is found in the joint S3 that the North Region built with the bordering region of Galicia (Spain). The strategy is the outcome of a collaborative initiative, involving agents from the innovation systems of both regions, and strongly focused on transregional potential and scale. The [joint S3 strategy](#) developed a vision outlining shared research and innovation goals and priorities and identified common actions that could be conducted and funded across the two regions (Rissola & Sörvik, 2018).

Finally, it is worth mentioning the experience of the [S3 for Noord-Nederland](#) (NUTS1), that includes the Friesland Region (NUTS2). The region's EDP was derived from stakeholders' consultations, carried out as a continuous process and based on the already well-established dialogue between research organisations and the private sector. The specific focus on continuity was encouraged by the JRC conclusions on the 2014-2020 S3 of the region, which highlighted a lack of flexibility and dynamism in the previous process (Bennewortj & Arregui Pabollet, 2021). The current S3 developed around four 'transitions', identified as crucial for the region in the coming years: from a linear to a circular economy; from fossil to sustainable energy; from care to (positive) health; from analogue to digital.

The regions mentioned are clearly dedicating efforts, and in some cases also receiving additional guidance, to overcome challenges identified in the previous S3 programming period. The problems within this group are attributable to two main

⁸ More information at <https://www.interregeurope.eu/good-practices/healthy-rioja-strategy-promotion-of-healthy-food-and-cooperative-ri-in-la-rioja-region>

causes, which are intertwined, i.e., a weak pre-existing innovation ecosystem and inadequate implementation of the EDP.

For the Moderate Innovators group, specialisation areas are highlighted in the word cloud below (Fig. 7). Considering that for this group the variety of keywords is higher and therefore the frequency is lower compared to the previous group, the figure suggests, also in this case, a strong focus on the twin transition, as shown by the keywords “green transition” (6), “digitalisation” (5), “e-government” (4), “sustainable mobility” (4), “circular economy” (3), “renewable energy” (3), “resources efficiency” (3), “digital economy” (2) and “smart industry” (2). In addition, when looking at words such as “electrical engineering” (3), “chemical industry” (2), “industry competitiveness” (2) and “metal industry” (2), it is possible to see a clear reference to a more industrialised ecosystem for the processing of raw materials. However, there is also a significative representation of areas related to the social dimensions, such as “healthcare” (6), “reduction of inequalities” (5), “training and education” (4), “sustainable development” (2), which can be explained by considering that the local economy of the regions is still facing social issues, possibly as consequence of the recent economic crises, which can constitute potential obstacles in the improvement of the innovation system.

Figure 7. Representation of the specialisation areas for the S3 in the Moderate Innovators group

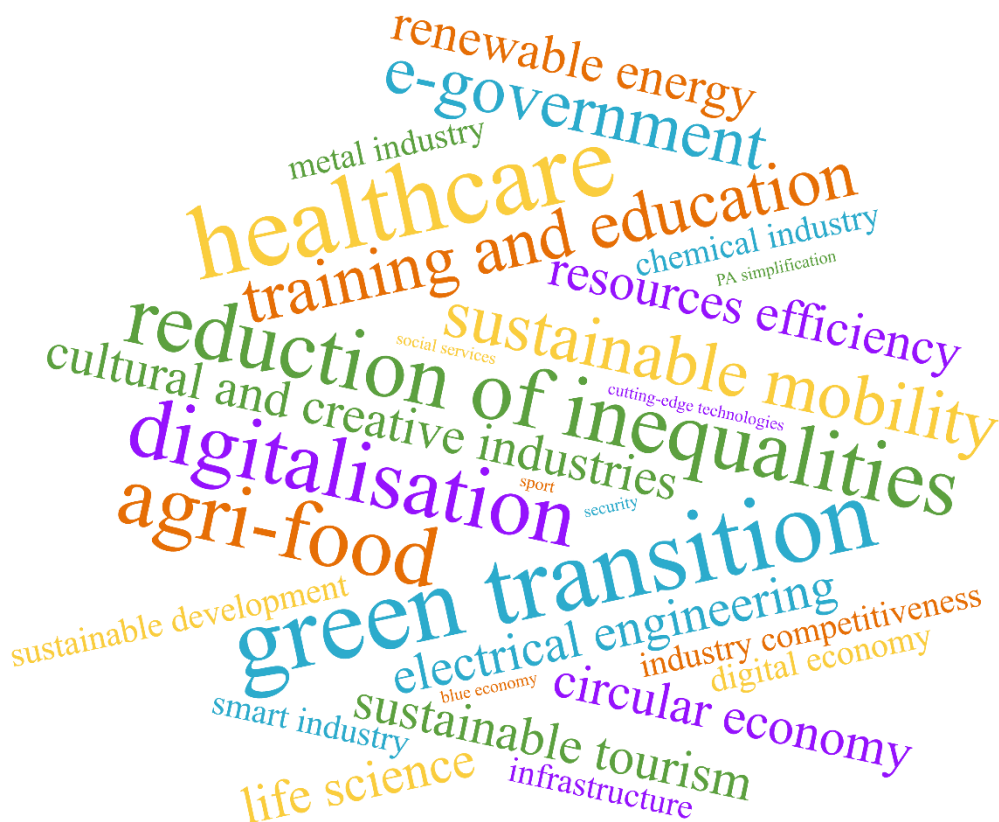
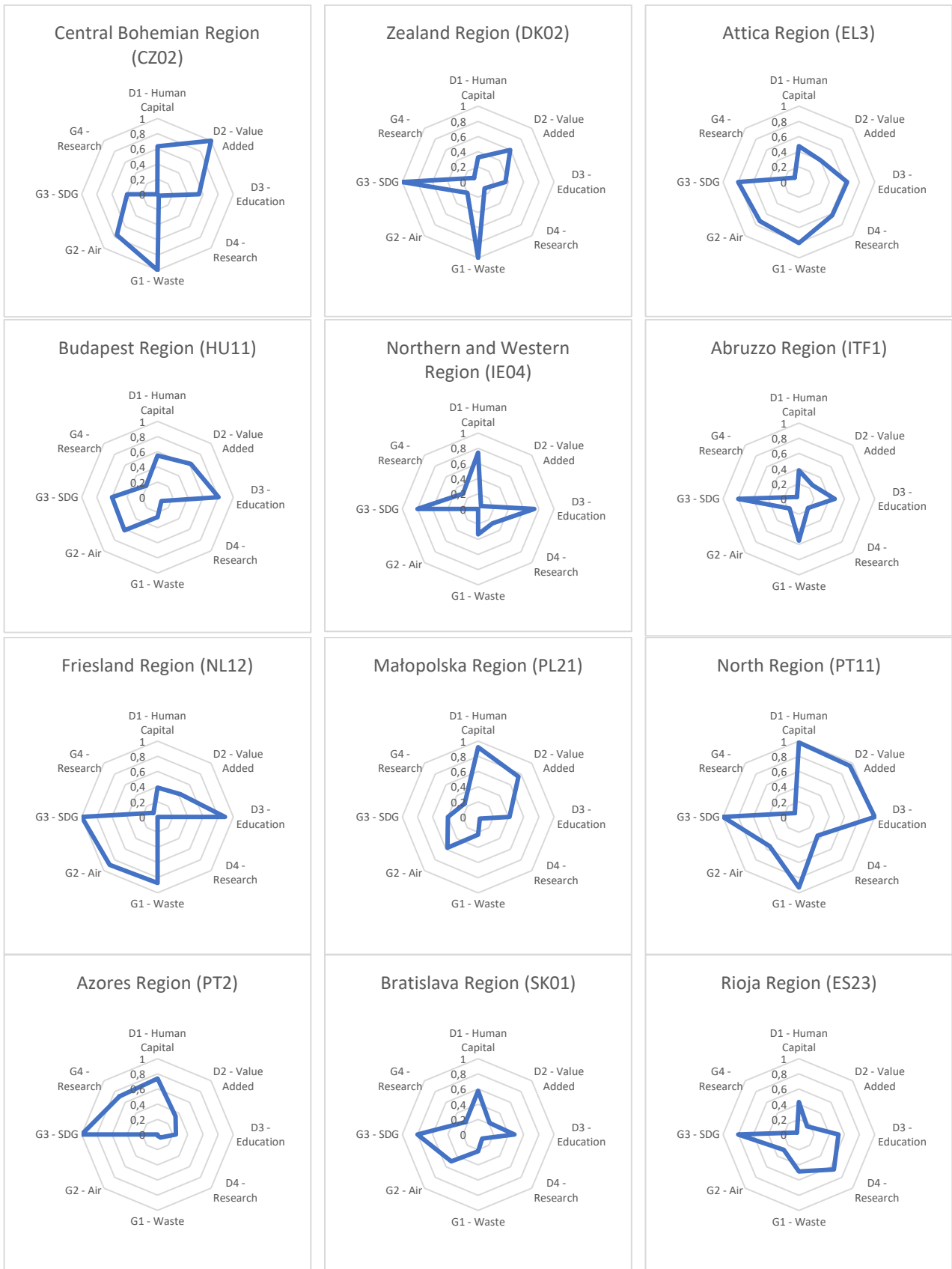


Figure 8. S3 acceleration index - Moderate Innovators group



Interestingly, when analysing the research indicators, the sole region that has a significant value is Attica. This is also the territory with more universities than any other in this group.

Concerning digital transition, the North Region shows a strong growth rate in the number of ICT companies, in the people with tertiary education in ICT, and in the number of people employed in the sector.

Speaking generally, regions where ICT companies' creation is stagnating, there have been investments in the tertiary education in ICT. This should prevent potential misalignment of skills and should help sustain a strong S3 in the medium-long term.

1.3 Strong Innovators: S3 Priorities in the last programming periods

For the group of the Strong Innovators, the selected regions are Eastern Austria Region (AT1), Western Austria Region (AT3), Walloon Region (BE3), Prague Region (CZ01), Åland Islands Region (FI2), Brittany Region (FRH), Thuringia Region (DEG), Eastern and Midland Region (IE06), Limburg Region (NL42), Basque Country (ES21) and North Middle Sweden Region (SE31).

In this group, several regions have implemented a mission-oriented innovation model, aimed at contributing to addressing social challenges and exploiting the new markets resulting emerging from the exploration of innovative solutions. Moreover, other regions in the group have an S3-resemblant strategy which existed prior to the introduction of the smart specialisation concept in Europe. These regions often have already mature innovation ecosystems and perform well in terms of generated impact.

The RIS considers Austria at NUTS1 level while in the Country the regional specialisation strategies are designed and implemented at NUTS2 level. However, all the NUTS1 regions in Austria, i.e., Eastern Austria Region, Southern Austria Region, Western Austria Region, are categorised as Strong Innovators. Austria has a national S3, but the regions issue a distinct regional programme. These are not called S3 but fulfil a similar purpose. In view of the new programming period 2021-2027 and encouraged by the EU focus on development of regional strategies, the Länder (regions) have conceptualised regional economic and innovation and research policies. They integrate overarching EU and national policies, and couple them with the specific strengths of their inner regions (NUTS3). The federal government encourages the regional science and research institutions to actively support the development of the S3. The regional strategies' design takes place in accordance with the federal autonomy, in terms of time and process. This asynchronous planning creates opportunity for exchanges and learning between the regions but, at the same time, makes monitoring more difficult (Kelchtermans, Kardas & Klinecicz, 2021). Particularly interesting is the choice of Wien (which part of Eastern Austria Region at NUTS1) to disregard specialisation areas and instead define strategic transversal objectives. This approach regards the S3 as an umbrella strategy to encompass pre-existing programmes related to technopoles and industrial clusters, designed to maintain a sufficient degree of flexibility that allows it to respond to ecosystem changes (Benner, 2019).

A similar mission-oriented approach is carried out by Walloon Region's [Smart Specialisation Strategy](#) 2021-2027, which was approved in March 2021. The strategy is the result of an open and co-creational participatory process started in December 2019. It involved stakeholders of the quadruple helix: industry, institutions, researchers, civil society. The identification of the strategic domains followed six criteria: links to societal challenges, market potential, distinctive forces in development and innovation (RDI), industrial forces and potentials, positioning in national and

international value chains, and complementarity with other EU regions and European programmes. The choice of these criteria balanced the process and the stakeholders' inputs, while focusing on societal challenges identified by the region.

This trend is observable in the Smart Specialisation Strategy of the region of Limburg, which is contained in the S3 for Southern Netherlands entitled '[Innovating and Achieving with Impact RIS3 South Netherlands 2021-2027 Regional Innovation Strategy for Smart Specialisation for European Fund Programmes](#)'. The document builds on the successful approach of the past period and adds three new elements: a mission-driven approach, the ambition to achieve impact, and a broader concept of innovation.

The focus on transversal challenges represents a clear and increasing tendency in regional programming. The [Smart Specialisation Strategy for 2021-2027](#) of the Basque Country identifies three overarching missions, i.e., internationalisation, skills, new business models and entrepreneurship (Aranguren *et al.*, 2022). Based on analysis of strengths and weaknesses of the territorial context, the strategy foresees the diversification of the regional economy based on three enabling technologies, five market sectors, and three priority areas. Furthermore, the region also maintains best practice for its approach to the green transition, expressed in the [Circular Economy Strategy of the Basque Country 2030](#) (Nauwelaers *et al.*, 2022).

Finally, the same approach was employed by the region of Prague. It is important to note that the Czech Republic issues S3 at the national level. The strategy for the regions is placed within the annexes, but the regional visions have not been updated since 2018. Possibly for this reason, the Prague Region published the strategic document [Smart Prague 2030](#), which is mission oriented. However, as observed in many European Eastern countries, the process for outlining the overall framework was conducted through a top-down approach, and the bottom-up component is identified in the stakeholders participating to the calls for projects. This is a common problem in the Czech Republic, except for the South Moravia Region, which is the only region that maintains a regional innovation agency (Cvijanović *et al.*, 2020).

For the development of their S3 2021-2027, the regions of Brittany and Thuringia shaped the EDP with the addition of some interesting practices. The Brittany Region [S3 2021-2027](#) places a strong emphasis on the potential of social innovation as an economic driver for the region and a powerful tool of resilience towards future challenges. Building on the lessons learnt from the previous programming, the region strengthened the participatory approach of the S3 by putting in place a comprehensive EDP. An interesting feature of the EDP is that at the end of the S3 definition, a survey was conducted targeting the private sector. Its goal was to understand whether the outcome of the EDP was in line with the expectations of the industrial stakeholders. Also noteworthy is the case of Thuringia Region, which concentrated its S3 activities around the twin transition. In its approach to the EDP, a crucial role is played by the

Thuringian Cluster Management organisations which are, in turn, closely aligned to priority areas and serve as a dedicated structure that maintains communication with stakeholders and continuously monitors S3 implementation (Prognos, 2020; Kroll *et al.*, 2016).

In this group, there are also regions which do not implement the S3 but issue regional development programmes. This is the case for Eastern and Midland Region, which issued the [Regional Spatial & Economic Strategy 2019-2031](#), developed through a reinforced EDP. The process foresees a better governance for the strategy and an improved monitoring and evaluation system. Similarly, the North Middle Sweden Region (NUTS1) does not have a specialisation strategy, but each of its NUTS2 regions, [Gävleborg](#), [Dalarna](#) and [Värmland](#), issued an S3 for the 2021-2027 period. As for all the Swedish regions, S3 is considered as part of the regional programming required by the national government. The process is more holistic and includes a strong social dimension. Lastly, Åland, an autonomous region of Finland with its own government and parliament, does not issue the S3 but, through its agency for the competitiveness called Ålands Näringsliv, published a [strategic plan](#) for the period 2012-2024. It attempts to align priority areas encompassing the twin transition, social challenges, and the strengthening of the entrepreneurial ecosystem. Before being introduced as ex ante conditionality for the ESIF funds, the smart specialisation approach was already guiding the regional programming process in the Åland Region (Wøien *et al.*, 2019). Moreover, the region relies also on the Nordic Cooperation Programme, which is a regional cooperation mechanism including Denmark, Finland, Iceland, Norway, Sweden, the Faroe Islands, Greenland and Åland Islands. The Nordic Cooperation Programme established an [Action Plan for the period 2021-2024](#) which has a focus on sustainability, competitiveness and inclusion. Finally, Åland Islands Region has also an [agenda](#) for aligning with the UN SDGs at the territorial level.

In addition to the presence of previously existing regional innovation strategies, the regions part of this group demonstrates a high level of clusterisation, which facilitates interaction within the private sector, and continued collaboration on mission-oriented projects.

In the word cloud presented below, the specialisation areas more frequently selected represent how the twin transition is permeating various industries and creating new business opportunities, i.e., “renewable energy” (11), “sustainable construction” (11), “sustainable mobility” (10), “digitalisation” (9), “resources efficiency” (7), “smart industry” (7), “sustainable tourism” (6), “circular economy” (2), “green transition” (2). This can be viewed as emblematic of a mature innovation ecosystem. If the high frequency of the word “healthcare” is connected to the pandemics – as the S3 design happened in conjunction with the 2021 pandemics for most regions – the keywords “industry competitiveness” (7), “cutting-edge technologies” (5), “life science” (4), “technological transfer” (2) seem to point towards the investment in knowledge-intensive

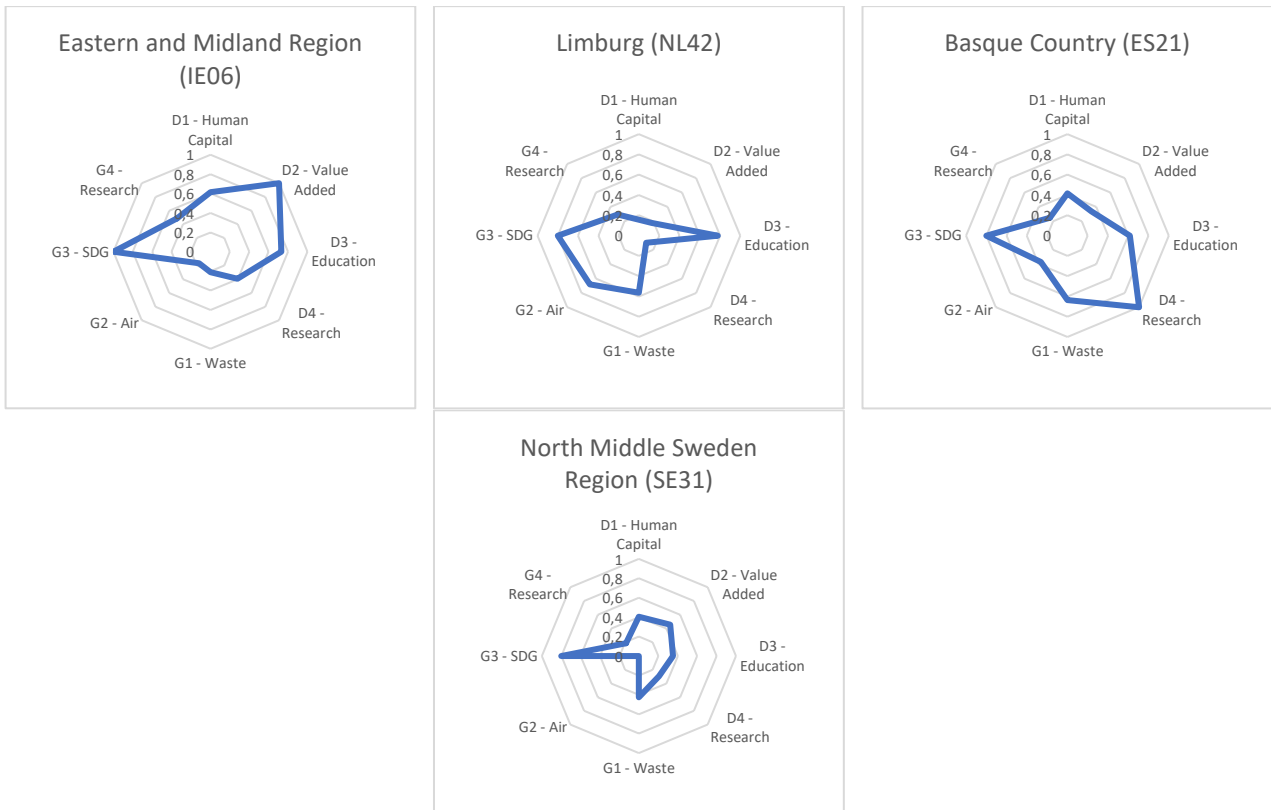
activities and possibly indicating that the Strong Innovators in this group present a more market-oriented economy.

Figure 9. Representation of the specialisation areas for the S3 in the Strong Innovators group



Figure 10. S3 acceleration index- Strong Innovators group





All the regions in the group have their S3 aligned with the green UN SDGs. Furthermore, regions such as the North Middle Sweden Region and Basque Country, are improving their waste management systems, while others, such as Brittany Region, Thuringia Region and the Belgian provinces, with the exception of Hainaut province, have raised air quality. Finally, concerning the research indicators, Basque Country and Thuringia have the highest values which reflect the strong commitment of these regions towards the green transition.

On the other hand, digital transition indicators show that these regions are slowing down, possibly because a degree of maturity has been reached. This is true for all, except the Eastern and Midland Region, which has the highest increase in the rate of ICT companies. However, Thuringia and Brittany have increased their skilled workforce in ICT, and Limburg is the region investing most in ICT tertiary education.

1.4 Innovation Leaders: S3 Priorities in the last programming periods

The regions included in the Innovation Leaders group are Brussels Capital Region (BE1), Capital Region (DK01), Helsinki-Uusimaa Region (FI1B), Île-de-France Region (FR1), Hamburg Region (DE6), and Stockholm County (SE11).

It is significant that most of the regions in the Innovation leaders' group present alternative approaches to S3. All the regional S3 strategies draw on previous regional development programming experiences, which often leaves some discrepancies in research and innovation governance, but also makes them more knowledgeable concerning the smart specialisation underlying mechanisms, such as the EDP.

This is the case of Belgium, where it has been found that Belgian federalism has created obstacles in the achievement of a cohesive and multi-scalar approach to S3. The region oversees economic development, but it does not have the competence of fundamental research and universities, and instead falls on the competences of the Linguistic Community (Dotti *et al.*, 2018). However, the S3 of Brussels Capital Region for 2021-2027 is a mature, mission-oriented strategy based on the assumption that research and innovation must contribute to social, environmental, and economic progress.

Differently from the regional particularism fostered by the S3 model, the Danish government is dedicating efforts to simplifying and centralising services available to the private sector. As for many regions in Denmark, the Capital Region did not implement the S3. Instead it had a [Regional Development Strategy](#) in place for 2020-2023, which seeks alignment with the UN SDGs and uses principles and priorities that are very similar to a S3 strategy (Polverari, 2016). At the national level, the innovation system underwent through a major restructuring in 2018, with amendment of the [Business Promotion Act](#). Denmark's Growth Council and the Regional Growth Forums have been replaced with Denmark's Business Promotion Board ([Danmarks Erhvervsfremmebestyrelse](#)).

Likewise, Stockholm County did not develop a S3 (Polverari, 2016), since the national government requires a different kind of regional programming, outlined in the [Regional Development plan for the Stockholm Region 2050](#) (RUFS 2050). This is a long-term planning document that addresses a host of societal challenges, including the development of an innovation strategy similar to the S3. However, the strategy remains generic and is vulnerable to potential systemic shocks (Wøien *et al.*, 2019). There is a weak connection between the public authorities in charge of the programming and the private sector, and so the region often relies on universities for engagement of the private sector. With the aim of addressing this challenge and for stimulating innovation collaboration between public authorities, business and academia in Stockholm County implemented the [Innovation Stockholm](#) platform. There is also a problem of establishing effective S3 ownership, because even though the Swedish Agency for

Economic and Regional Growth (Tillväxtverket) coordinates the S3 activities in the regions, the Swedish Government's agency innovation, Vinnova, is not involved.

A different approach, particularly for EDP, is adopted by the Île-de-France Region. In October 2022, in line with other strategies such as the [Schéma régional de développement économique d'innovation et d'internationalisation](#) (SRDEII), and the [Stratégie #Leader 2017-2021](#), the Île-de-France Region presented its new economic strategy [Impact 2028](#) for the period 2022-2028. This document combining all the innovation and development strategies into a single cohesive piece. It is interesting to note that the region does not use the phrase 'entrepreneurial discovery process', which has been employed with different approaches in all the French regions. In some cases, the process goes beyond the concept of EDP by including a larger variety of actors, such as public stakeholders (Kustos, 2017).

Finally, good practice for the inclusion of the green transition in the S3 design and for the enlargement of the stakeholders' base is the case of the regions of Helsinki-Uusimaa, and Hamburg. The Smart Specialisation Strategy for the region of Helsinki-Uusimaa is coordinated by the Regional Council's smart specialisation team, together with Aalto University. The region has a particular link with the university, tasked with the mobilisation of the private sector. In view of the new programming period 2021-2027, an assessment has been conducted to identify areas for improvement, which revealed international cooperation as a dimension to be further strengthened. The new strategy 2021-2027 incorporates the priorities of the twin transition and seeks alignment with the UN SDGs, inspired by a vision for Helsinki Smart Region 2030. The mission-oriented strategy is one of the rare cases of co-design that includes the participation of civil society. Furthermore, the Hamburg Region approved its [Smart Specialisation Strategy](#) for 2021-2027 in June 2022. It is strongly anchored around the green transition, and the S3 design counted on contributions gathered through an open and broad consultation process, involving more than 300 stakeholders. Starting from the idea that new technologies only develop their full potential when embedded in social change processes, the strategy outlines five priority areas of excellence with transfer potential around which economic innovation ecosystems are built. The actors composing the EDP present peculiarities: the universities of the region have strong links at international level but do not have a consolidated history of collaboration with the private sector, while the NGOs play a crucial role in the green transition, making them well integrated into the innovation ecosystem (Mariussen *et al.*, 2019).

It is not casual that the regions in this group are mainly capital regions, where the industrial ecosystem and its internal linkages have a long history. There is an important correlation between pre-existing innovation strategies and the achievement of good results through the implementation of S3-resemblant approaches. Furthermore, a high level of innovation potential is strongly correlated with highly skilled human capital, which is more likely to be found in large urban agglomerates, rather than in rural contexts (Caragliu & Del Bo 2018).

This group of regions is the less numerous, counting just six regions compared to the other groups having 11 regions, and this accounts for the general low frequency of the words. As mentioned earlier, and differently from other groups, the vast majority of regions included in the Innovation Leaders category did not adopt the S3 format but produced similar regional programmatic documents. Beside the predominance of the keyword “healthcare” (6) related to the pandemics, these regional strategies are strongly anchored to the UN SDGs and to the concept of sustainability, applied to various industrial sectors, i.e., “resources efficiency” (4), “sustainable construction” (3), “sustainable development” (3), “sustainable mobility” (3), “renewable energy” (2). These areas are also coherent with the green transition, where, on the other hand, the digital transition is reflected in the frequency of the word “digitalisation” (3), included in three out of six regions.

Figure 11. Representation of the specialisation areas for the S3 in the Innovation Leaders group

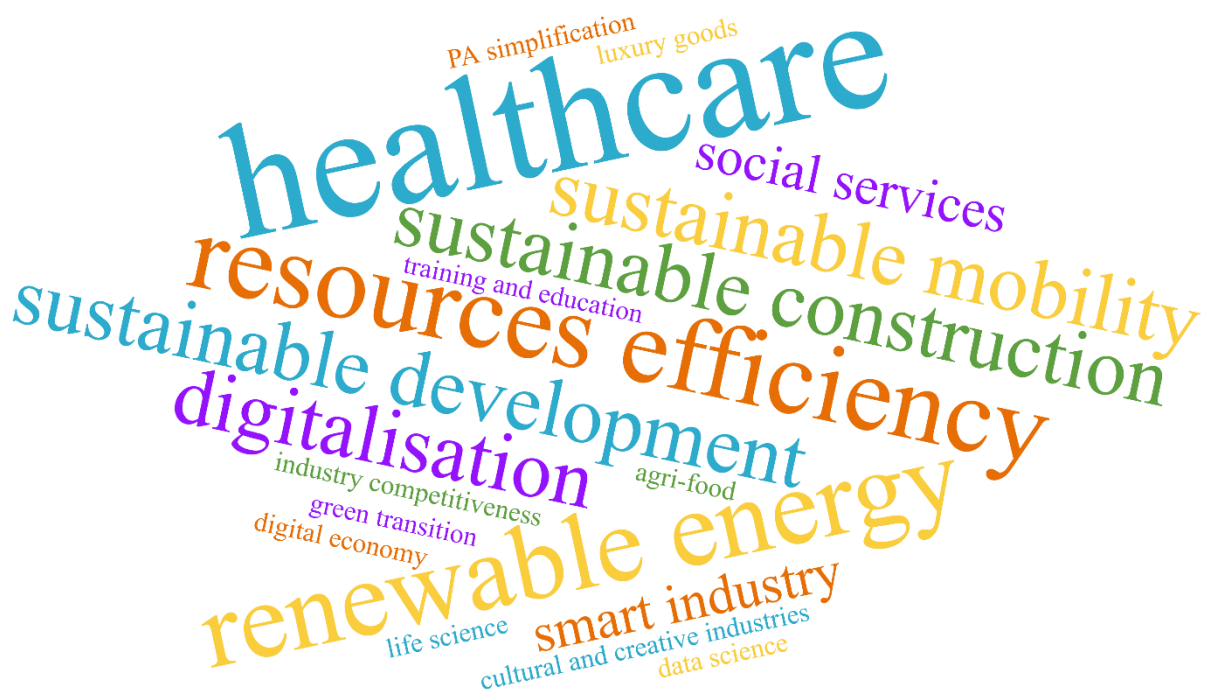
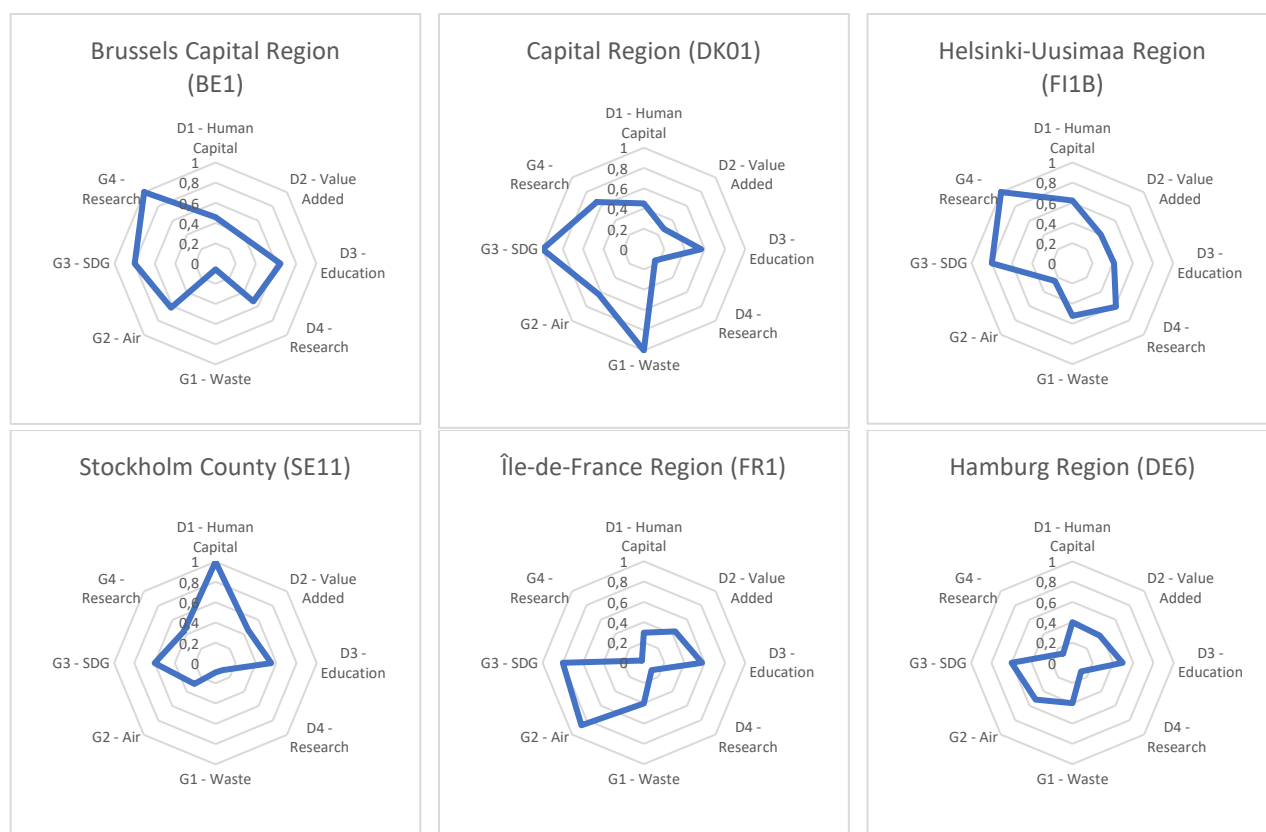


Figure 12. S3 acceleration index - Innovation Leaders group



Within this group, Stockholm County, Île-de-France Region and the Hamburg Region research indicators show low values, while the rest of the regions have the highest success rate in H2020, considering the number of companies in the region.

Also in this group, all regions are aligned with the green UN SDGs. Only Île-de-France Region, and to a lesser extent Brussels Capital Region, have a positive air quality indicator, and only Capital Region shows a positive value related to waste management.

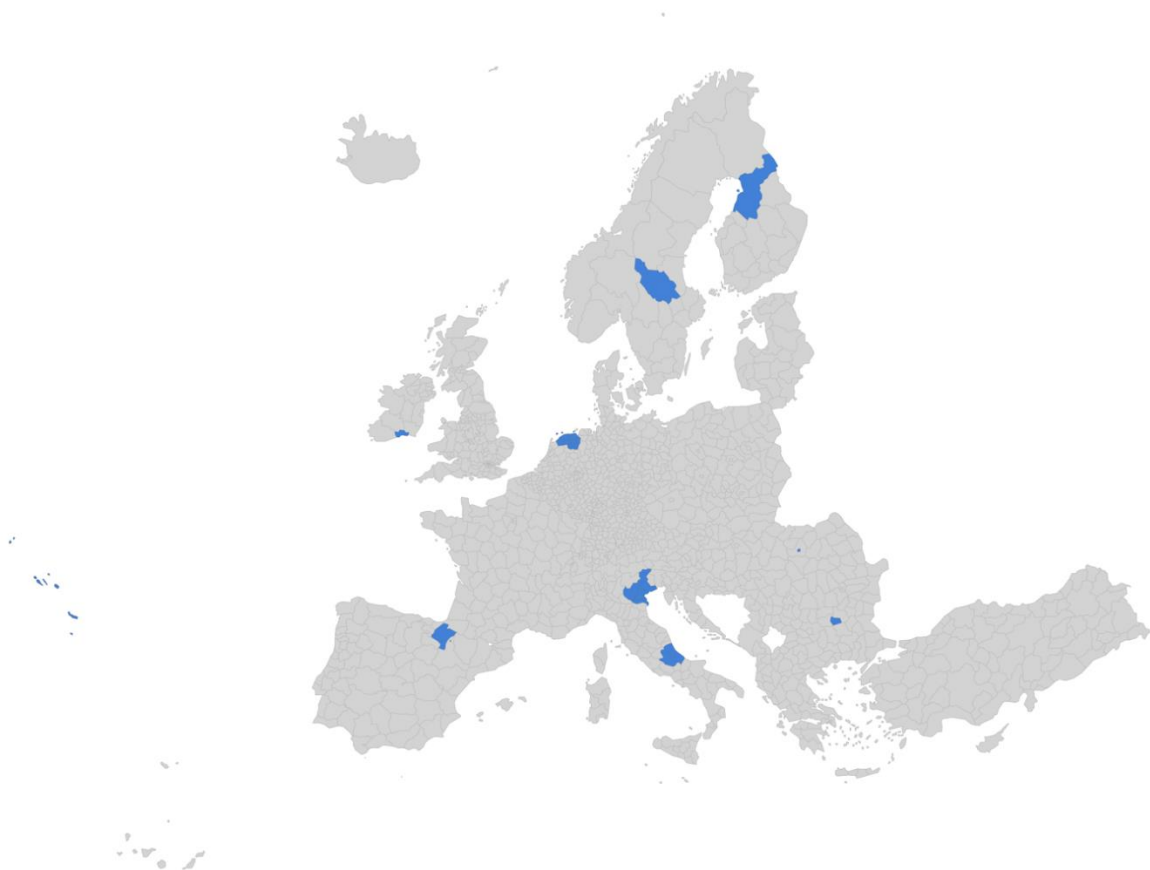
Finally, concerning the digital sector, Stockholm County has the highest increase of people employed in the ICT sector, while the other regions are growing in terms of people with ICT related tertiary education.

Part 2 Case Studies

The following ten case studies presented hereinafter are all based on interviews conducted with representatives of the selected regions, carried out following the questionnaire reported in Annex III. The interviews have been instrumental to analyse more in-depth the local implementation of the S3, the best practices and challenges emerging when addressing the regional programming for research and innovation, as well as collect feedback on the participation to the PRIs, as a criterion for the selection of the regions was the participation in the PRIs Pilot Action.

The information is also complemented by desk research in order to offer a comprehensive overview of the regional approach to the S3 in each ecosystem. The selection of the regions has been performed in order to guarantee a balance between the geographical scope and the RIS categories.

Figure 13. Case-study regions



2.1 Dalarna County (SE312), Sweden



Photo credit: [Yevgen Pogoryelov](#).

Surface area: 30,223 km².

Population: 287,676.

PRIs participant: Yes, together with other regions part of NUTS2.

GDP per capita: 44,600 EUR.

NUTS2: North Middle Sweden Region (SE31).

Specialisation areas: Smart energy systems; Sustainable creative experiences; Sustainable and health-promoting construction and housing; Innovative and sustainable bioeconomy; Green and circular industry and manufacturing.

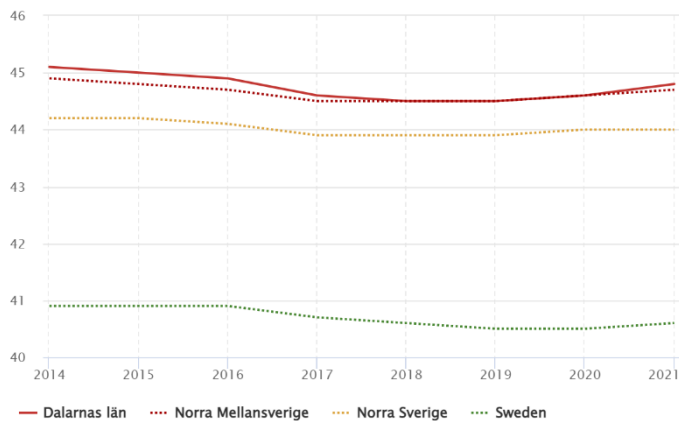
RIS category: Strong Innovator

1. Description

Dalarna County (*Dalarnas län* in Swedish) consists of 15 municipalities and its surface area is Sweden's fourth largest. It is comparable to the surface area of Belgium and is characterised by a sparsely populated rural area. The county's most important cities are Falun and Borlänge, which are the main economic centres of the County, with Falun also being the location of Dalarna University. Its location, in the middle of Sweden and neighbouring Norway, makes the territory a crucial hub for national and international markets and with several important transit routes (Nauwelaers *et al.*, 2013). Dalarna County's economy contributes positively to national growth through export trade, and its most important industries, i.e., construction, trade, and services. The County has a variety of natural and cultural landscapes, which make the territory a world-leading producer of steel, wood, and electricity as well as a predominant national tourist destination.

Demographic change is one of the main current and future challenges of Dalarna County, with 24% of the population over 65 years. It has a significantly higher proportion of elderly people compared to the rest of Sweden.

Median age (years)



This data is reflected by the so-called livelihood ratio. Dalarna is the region with the lowest proportion of working people in relation to the rest of the population. This has negative impact on the labour workforce, tax revenue, and welfare burden.

Data source: European Commission - Urban Data Platform Plus.

However, the population has increased in recent years, attributable to immigration dynamics. However, this immigration dynamic is decreasing, and brings challenges in terms of upskilling and inclusion.

The digitalisation process has facilitated employment in the region, while at the same time it has brought with it complex societal implications. For example, in the manufacturing industry, digitalisation and automation led to a reduction in job posts and contributed to the decrease in large commercial banks' territorial presence. This represents an obstacle for small businesses' access to credit, thus inhibiting industrial development in the county.

The economic ecosystem relies largely on small and medium-sized enterprises, but large enterprises are also present. Its industrial activity is derived from the primary sector, where 18% of the workforce is employed. As a general trend, all the sectors are facing competitiveness challenges due to relatively high wage levels.

In terms of innovation potential, Dalarna region is below the national rate for tertiary education attainment, having its innovation potential in less knowledge-intensive activities related more strongly to rural industries. However, in the County there is a university, specialised in the tourism sector. The university also carries out research in the fields of energy, forestry management, construction, health and welfare, steel and engineering.

2. Smart specialisation strategy 2021-2027

Interestingly, in Sweden some regions have presented the S3 at NUTS2 level, such as the East Middle Sweden (*Östra Mellansverige*), while others, such as Dalarna County, implemented it at NUTS3 level. In the case of East Middle Sweden, each of its NUTS3 regions designed its own S3 thematic roadmaps, mostly because of the extent of the

territory considered at NUTS2 level, which cannot encompass all the local specificities that need to be taken into consideration when designing the S3.

The [Smart Specialisation Strategy for Dalarna County](#) was issued at the beginning of 2022, after almost three years of work. The S3 design took place during the pandemic emergency, which slowed down the process. The process was anchored around the stakeholders' participation, but because of the restrictions during the pandemic, the weekly meetings were held online, and a dedicated platform was implemented. Moreover, each priority area developed a roadmap during three widely participated workshops, held in 2022.

The process has been guided by the regional government which established a dedicated team of two people, with the perspective to overcome the major challenge of limited financial resources and with the goal of enlarging the S3 team in the next years.

Concerning the new elements to be included in the future S3 concept, sustainability has been fully embedded in the current strategy, also because it is already part of the approach employed in the regional programming requested by the national authorities. Moreover, the Dalarna region plans to include better the dimension of inclusiveness, deemed crucial to address the migration dynamics within the region. However, an effective approach is still to be defined.

In addition to the S3, the Swedish government requires regions to issue a regional programme for sustainable development. The current strategy, called [Dalarna 2030](#), was published in June 2021. The team working on this strategy is not the same as the one managing the S3, in fact the regional strategy has dedicated financial resources that allows for a larger management team. With the S3 considered as part of the regional programme for sustainable development, this double track approach has been confusing for local stakeholders. Moreover, the two strategies are not fully aligned, and the region is trying to improve the alignment mechanism by shifting towards a mission-oriented approach in view of the next programming period 2028-2035.

3. The entrepreneurial discovery process

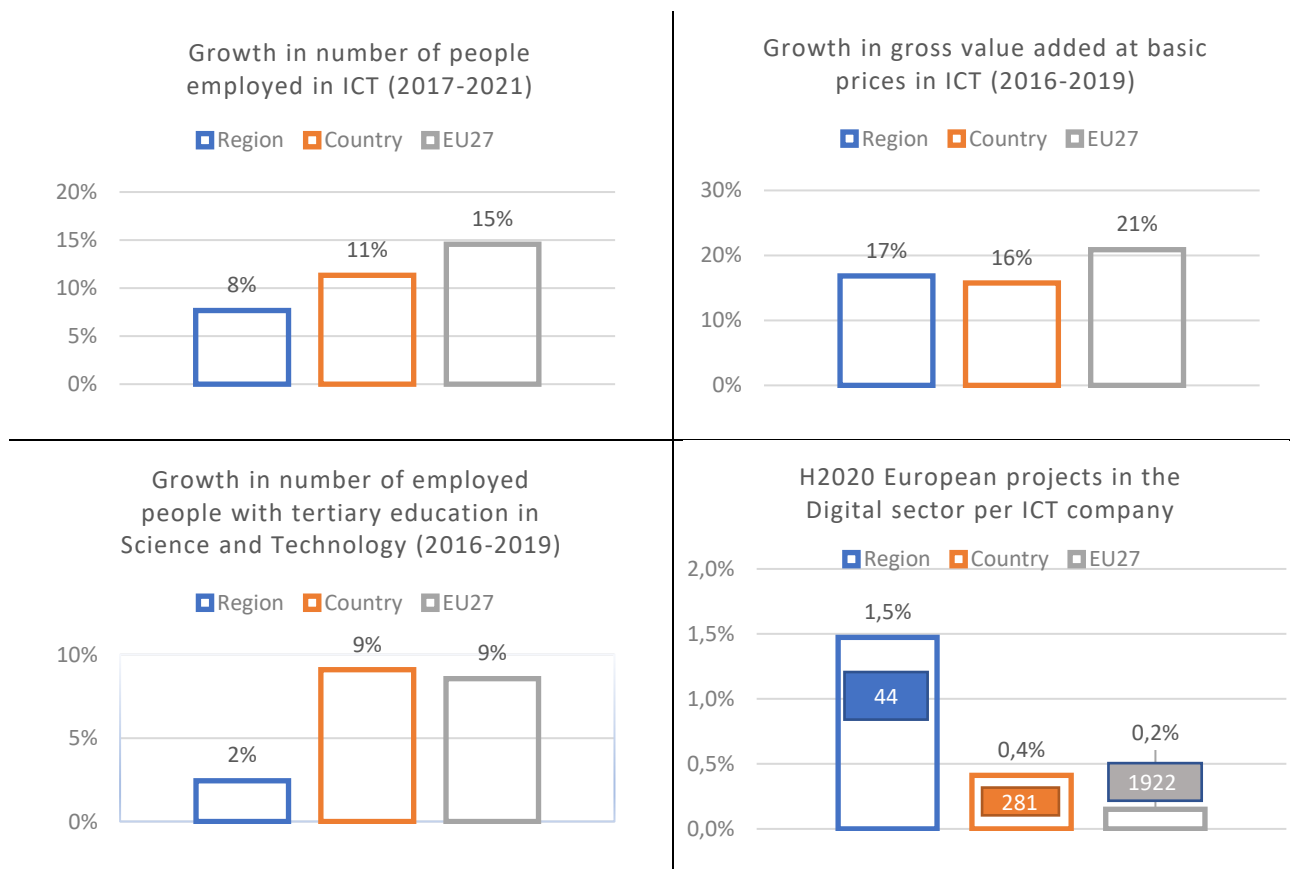
The local priority for stakeholder engagement has been to reinforce their ability to connect within the region, and with other regions at both national and international levels. For this reason, in 2023 important flagship projects are planned that aim at reinforcing the clustering capacity of the stakeholders. In this regard, the coordination role of the region is crucial, as many companies are either not keen to, or cannot, allocate resources for developing better cooperation. This problem is rooted in the Swedish innovation ecosystem, which for a long time relied on public financing that preventing natural evolution in the private sector.

The primary value of the S3 is to guide a process of discovering possible markets by intersecting different industrial sectors. For instance, the health-tech and construction sectors can develop interesting synergies if working towards a common objective of achieving healthy and sustainable living conditions. Particularly regarding the opportunities provided by the green transition, there is a need to support innovation in the more traditional industries, which can be beneficial for other regions in terms of best practice transfer.

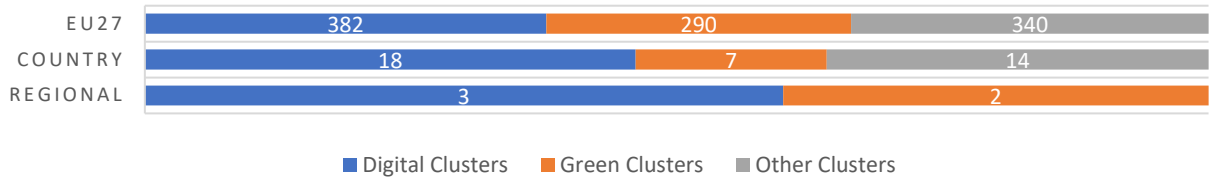
4. Participation in the PRIs pilot

Dalarna County participated in the PRIs pilot as part of the NUTS2 region, i.e., North Middle Sweden Region (*Norra Mellansverige* in Swedish), together with Vinova, the national authority for innovation. The initiative is perceived as less oriented towards achieving innovation itself, but more focused on how to employ innovation for addressing sustainability and social aspects. In the case of Sweden, this new approach is seen as similar to the holistic model adopted for the regional programme for sustainable development, requested by the national government. Finally, it is important to note that in May 2023 Dalarna County will host a high-level conference on the PRIs, organised together with the Swedish Presidency of the EU.

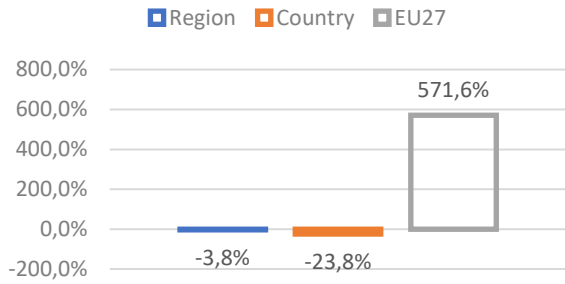
5. S3 acceleration indicators for North Middle Sweden Region (SE3)



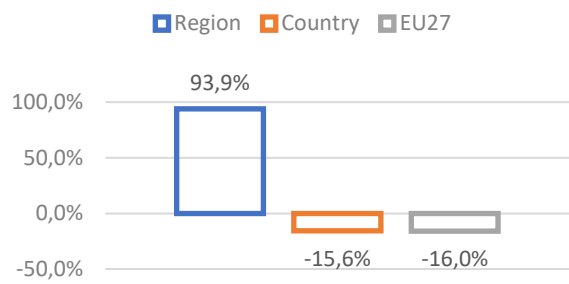
Clusters



Recycling Waste Facilities (2016 - 2020)



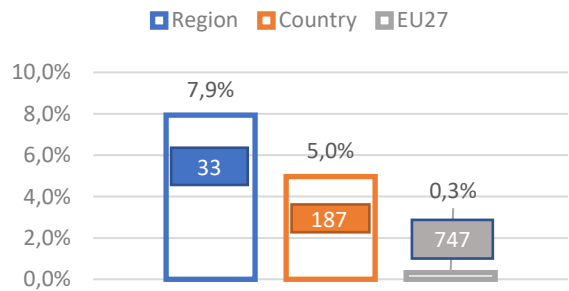
Air Pollution Average [ug/m3] (2016 - 2020)



SDGs in regional S3

GOAL 6: Clean Water and Sanitation	✘
GOAL 7: Affordable and Clean Energy	✔
GOAL 11: Sustainable Cities and Communities	✔
GOAL 12: Responsible Consumption and Production	✔
GOAL 13: Climate Action	✔

H2020 European projects in the Green sector per Energy and water company



2.2 Navarre Region (ES22), Spain



Photo credit: [Joan](#).

Surface area: 10,391 km².

Population: 664,6220.

PRIs participant: Yes.

GDP per capita: 33,620 EUR.

NUTS2: Comunidad Foral de Navarra (ES22).

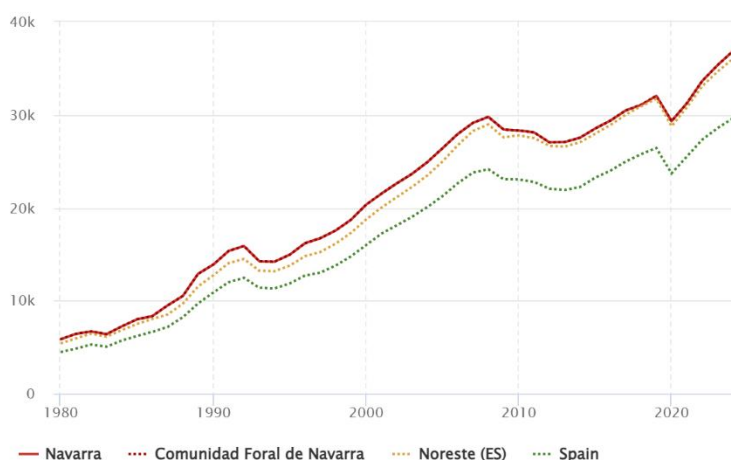
Specialisation areas: Automotive and mechatronics, Food chain, Renewable energy and resources, Health, Comprehensive Tourism, Creative and Digital Industries.

RIS category: Moderate Innovator

1. Description

The Navarre Region (*Comunidad Foral de Navarra* in Spanish) includes 272 municipalities, which, beside the capital Pamplona, each have less than 35,000 inhabitants. Navarre territory, despite its limited extension, presents diverse kinds of landscapes from the Pyrenees Mountain in the north to the plains of the Ebro River valley in the south. Even though the region has been one of the Spanish territories with the greatest increase of population, it is affected by a trend towards population ageing. The population is also unevenly distributed within the territory, concentrated predominantly in the urban areas, and with a lower density compared to the national average. A significant investment in road infrastructure has been made in the last decade, which increased the connection both with the other Spanish regions and with the neighbouring French territory.

GDP per capita at current prices (EUR)



Navarre Region's per capita GDP is higher than the national average and, despite the slowdown observed in recent years, in 2016 the GDP growth rate returned to the pre-crisis level.

From the point of view of the economic structure, the region is characterised, as with comparable developed economies, by a strong

Data source: European Commission - Urban Data Platform Plus.

presence of the tertiary sector, but still lower than the national average.

On the other hand, the manufacturing industry has a higher impact when compared to the national level, accounting for 27% of the Gross Value Added (GVA). In addition, the regional commercial relationship with the exterior is more intense than the Spanish average, supported by the automotive industry. Moreover, other branches of the tertiary sector such as real estate activities, professional, scientific and technical activities, agriculture, livestock and fishing and artistic, recreational and entertainment activities are gaining prominence in the Navarrese economy. At the same time, other sectors are losing importance, such as public services, construction, education, health, and information technology.

Historically, the labour market in Navarre Region has shown a dynamic similar, or higher, than national performance, with the region having an employment rate, of population between 20 and 60 years of 72.5%. This employment demographic supported the regional economy during the economic crisis, but there exist significant variations for the population of specific groups, such as young people and women.

In the region, small and medium-sized companies and companies without employees represent almost the entire business fabric. In terms of specialisation, automotive manufacturing and electricity supply, particularly renewable sources, are very much at the cutting edge. According to the data of the [Global Entrepreneurship Monitor](#), Navarrese companies tend to innovate to a lesser extent than their counterparts in the country. However, there are several public and private collaboration initiatives, such as [Centro Europeo de Empresas e Innovación de Navarra](#) (CEIS), that encourage investment in R&D, with particular emphasis on Industry 4.0 and the digitalisation of SMEs.

Although employability and productivity in the region have improved in recent years, the improvement of competitiveness will require the creation of more stable and qualified employment, meeting the skills demands of the job market as well as providing a boost to the digital transition of the entrepreneurial ecosystem.

2. Smart Specialisation Strategy 2021-2027

The Navarre Region currently has an S3 team composed of five people and has been involved in the European Commission framework for Smart Specialisation Strategy since 2011, when the strategy was called S2. Already at the time, the region was considered as engaging in best practice, because the specialisation approach was already in place starting from 2008, advised by the Monitor Group, the consultancy firm of Michael Porter. Since 2008, the Smart Specialisation Strategy has gone through three update processes, in 2010, 2015 and 2021, which is [the S3 for the 2021-2027 period](#). The region also created a [document](#) for establishing indicators linked to milestones for a five-year period. The next review of the S3 will probably take place

in 2025, corresponding to the mid-term of the programming period. However yearly meetings and qualitative assessment of the stakeholders' performance will be conducted, resulting in a report to be disseminated concerning the governance of S3.

Concerning new elements to be included in the future S3 concept, many companies are already undertaking a path towards the twin transition. The green transition within the S3 framework is embedded in an approach aiming to explore new market niches to identify business opportunities within the green economy, for instance, analysing the sectors of energy, paper, precision agriculture, and alternative proteins.

3. The entrepreneurial discovery process

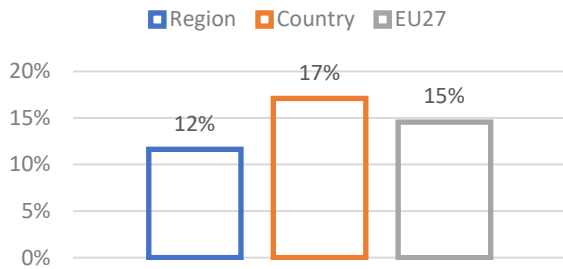
As a first step in the S3 design process, an analysis of the territorial context has been conducted, comparing regional performance with other European regions. Moreover, the results of the research were presented to the stakeholders, relevant to each of the thematic areas identified, and discussed in different sessions, guided by SWOT analysis. The stakeholders involved were public bodies and intermediate business organisations such as business clusters, and they were asked to produce a strategic plan considering transversal priorities, i.e., digital and green transition, and foresight elements such as identification of megatrends. This process is held approximately every four years, unless there are unexpected events such as the emergence of new start-ups. The entrepreneurial discovery process is also used to explore the innovation potential within the green economy, researching possible market niches that exist because of sectoral intersections. The process is highly complex, not always fruitful, and requires the occurrence of different factors at the same time, such as the right skills, a favourable market, and the willingness of the entrepreneurs to invest in innovation and business development. For instance, having automotive companies and renewable energy firms in the same territory is not enough to open a new market segment for green vehicles. The sectoral matching between market demand and the capability of the local companies is a complex process. In the strategic view of the region, it is more effective to foster innovation within the industry environment than to have the research institutions connect with specific companies.

4. Participation in the PRIs pilot

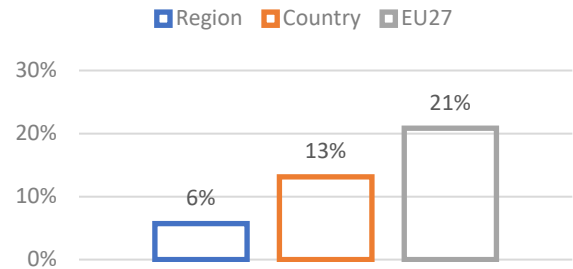
Navarre Region is part of the PRIs initiative and appreciated its methodological building blocks, perceived as less static and more inclusive when compared to the S3. The PRIs playbook has also been welcomed as a useful tool for practitioners.

5. S3 acceleration indicators for Navarre Region (ES22)

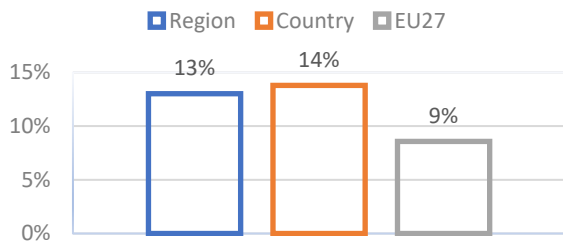
Growth in number of people employed in ICT (2017-2021)



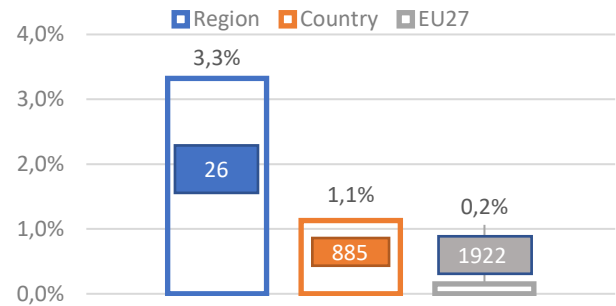
Growth in gross value added at basic prices in ICT (2016-2019)



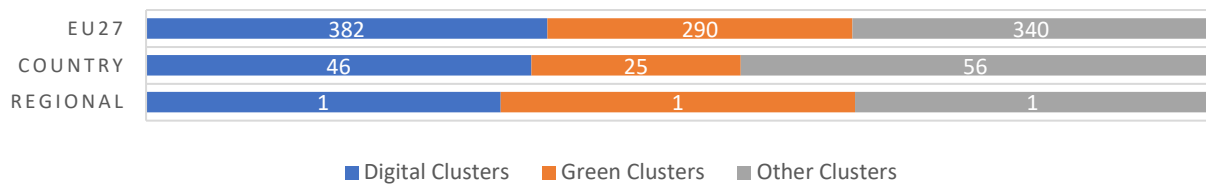
Growth in number of employed people with tertiary education in Science and Technology (2016-2019)



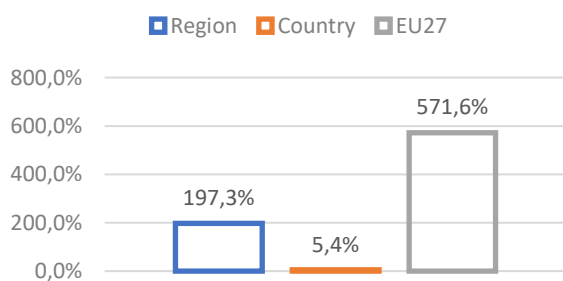
H2020 European projects in the Digital sector per ICT company



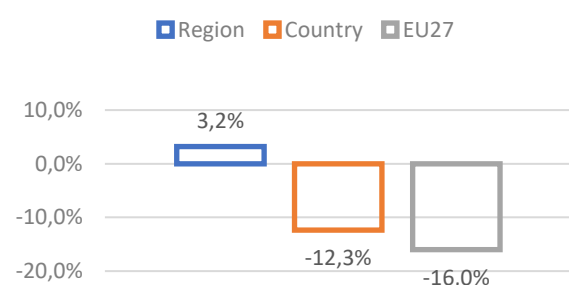
Clusters



Recycling Waste Facilities (2016 - 2020)

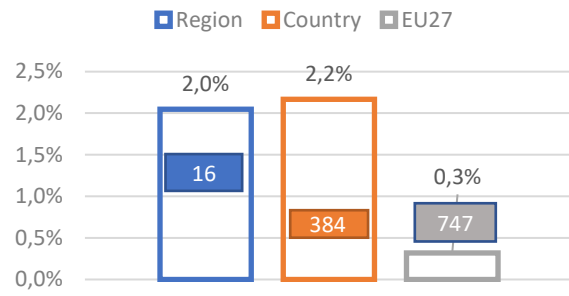


Air Pollution Average [ug/m3] (2016 - 2020)



SDGs in regional S3	
GOAL 6: Clean Water and Sanitation	✘
GOAL 7: Affordable and Clean Energy	✔
GOAL 11: Sustainable Cities and Communities	✘
GOAL 12: Responsible Consumption and Production	✘
GOAL 13: Climate Action	✔

H2020 European projects in the Green sector per Energy and water company



2.3 Northern Ostrobothnia Region (FI1D9), Finland



Photo credit: [Harri P](#) on [Unsplash](#).

Surface area: 37,415.4 km².

Population: 418,510.

PRIs participant: Yes.

GDP per capita: 42,160 EUR.

NUTS2: Northern and Eastern Finland (FI1D).

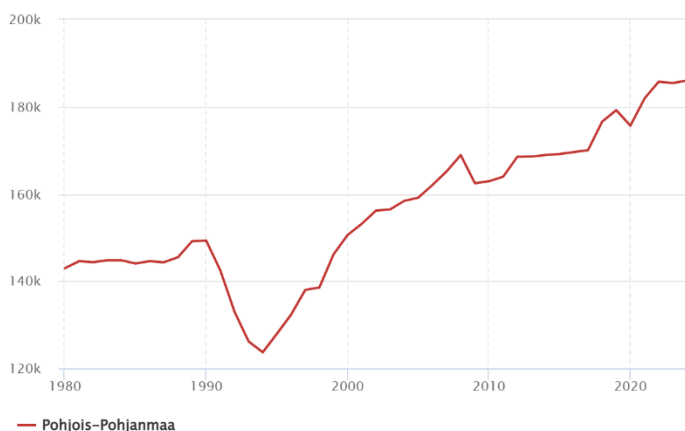
Specialisation areas: Digital Services and Products, Health and Well-Being, Renewable and Low-Emission Industries, Sustainable Construction and Mobility, Innovative Bio and Circular Economy, Smart Food Production.

RIS category: Strong Innovator

1. Description

The Northern Ostrobothnia Region (*Pohjois-Pohjanmaa* in Finnish and *Norra Österbotten* in Swedish) is a region of Finland that borders Lapland, Kainuu, North Savo, Central Finland and Central Ostrobothnia, as well as the Russian Republic of Karelia. The region is made up of 30 municipalities, of which 11 have city status. The region is known for its strong expertise in ICT and for the actors established in the region (e.g., Nokia although with a reduced presence during the last ten years). The most relevant industrial sectors are also the metal manufacturing and processing of wood, including biorefining and mechanical processing. Further emerging industries include health and well-being application and equipment production, as well as various hi-tech components, for example, printed electronics⁹. Finally, other important sectors are agriculture and forestry¹⁰.

Employed persons



Data source: European Commission - Urban Data Platform Plus

The population is annually increasing in the region, although a slowing down in the trend has been registered in the years compared to 2010 and thereafter. By contrast, international migration has driven a population increase, with the highest rate of population growth seen in the Oulu region.

⁹ See <https://www.pohjois-pohjanmaa.fi/en/development/oulu-regions-smart-specialisation-2021-2024/>

¹⁰ Northern Ostrobothnia Climate Roadmap 2021–2030

The total number of employed persons aged 20-64, including both residents as well as non-residents working for resident producer units, shows mostly a constant increase since 1994, with brief decreases in the periods between 2008-2009 and 2019-2020.

The success of Northern Ostrobothnia is in RDI activities in ICT, which triggered the emergence of a concentration of ICT companies, led by the University of Oulu. The Oulu district is particularly competitive due to its concentration of business and R&D and is comparable to the Helsinki-Uusimaa Region. This industrial ecosystem allows the region to achieve better results in employment rates, when compared to the Finland national aggregate, preventing a yearly loss of 140 industry jobs¹¹.

In the Oulu district there are also industry clusters fostered by the [Oulu Innovation Alliance \(OIA\)](#), such as the Centre for Internet Excellence, the Centre for Health Technology and the Centre for Energy and the Environment, in order to boost R&D and prompt the emergence of innovation ecosystems. The [OuluHealth23](#) Hub also has a prominent role in implementing healthcare and wellness technology-driven activities in the area. The goals and activities of OuluHealth23 are aligned with and financed through a wide range of different funding sources (Miörner *et al.*, 2019).

2. Smart Specialisation Strategy 2021-2027

The [Northern Ostrobothnia S3 for 2021-2024](#) period has already been updated to take into consideration the most recent emerging challenges at European level, such as the pandemic emergency, the energy crisis, and migration dynamics. For the revision process, the region organises a yearly meeting with S3 stakeholders to discuss the strategy and review process. The region counts on a team made of three people.

Similar to Sweden, Finland requires regions to issue a [regional development plan](#), which, in the case of Northern Ostrobothnia runs from 2022 to 2025. The plan guides the allocation of the European structural funds. The team leading the regional development strategy is different from the S3 one, but they work together on alignment aspects.

The dimensions linked with the social aspects, such as inclusion, resilience and sustainability have been included in the regional development programme, and specific roadmaps, for instance the climate roadmap, have been set. There are also projects aiming at improving social cohesion and capacity of human capital. An example is provided by the Talent Hub project, led by the University of Oulu, for attracting skilled professionals and enhancing the local workforce.

¹¹ Business Index North, Socio-Economic Resilience in the Barents Arctic, February 2022

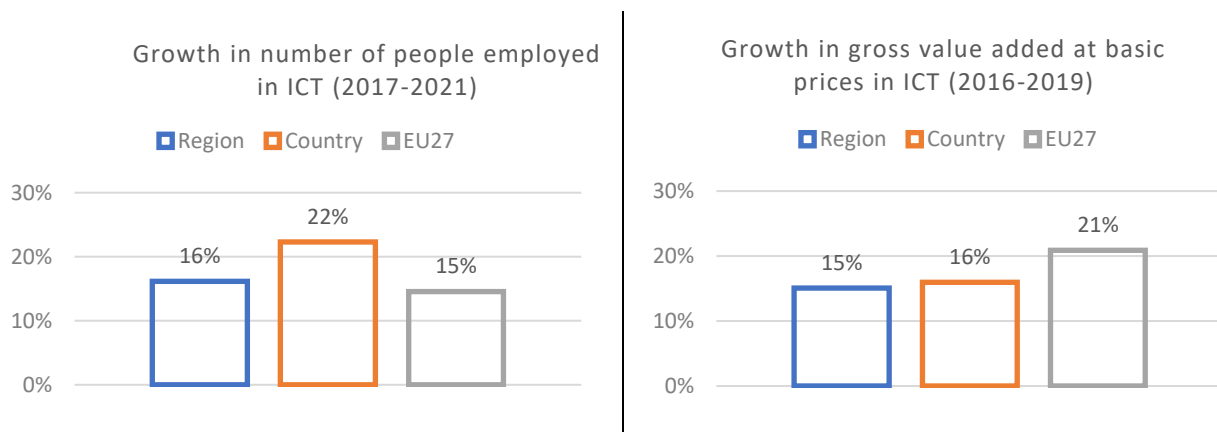
3. The entrepreneurial discovery process

Since the late 2000s the region has been one of the growth centres in Finland, due primarily to the presence of Nokia and the rapid growth of the ICT-sector (Kaivo-oja *et al.*, 2017). Currently, the region is leading an ICT partnership focusing on 5G Advanced and 6G technologies for sustainable industries and societies. The partnership builds on high-level research in the field, carried out by the two universities of the region and with strong connections with the private sector. This is the most common regional approach, where innovation is led by public organisations and research institutions who are tasked with reaching out to private stakeholders. This is a known limit of the entrepreneurial discovery process in Finland (Roman & Nyberg, 2017), where there exists difficulty in connecting with the private sector, due to the impact of the top-down process (Foray, 2017). In fact, in the framework of the triple helix approach, the region, as per all the Finnish territory, organised information exchange and feedback on the strategy, but truly collaborative co-creation is rare (Roman *et al.*, 2018).

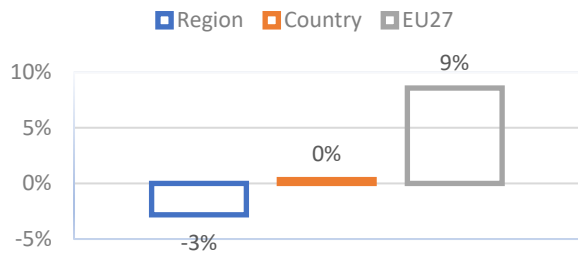
4. Participation in the PRIs pilot

The region took part in the PRIs pilot in consortium with mid-Sweden regions. The PRIs initiative is considered to have novel and significant elements that can improve the overall innovation approach. Moreover, an aspect of interest for the region concerning the PRIs has been the involvement of civil society in the strategy's design, as well as the employment of the backcasting technique. The PRIs approach is currently perceived to be in an early stage, but the region will follow with attention its developments and scoping of its application.

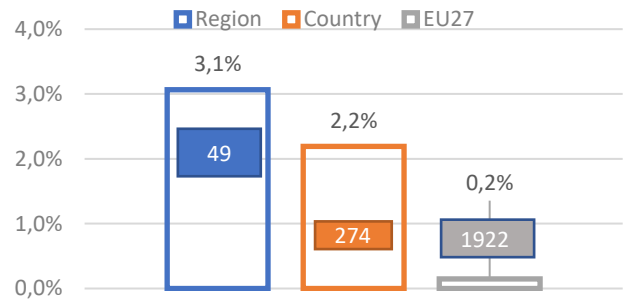
5. S3 acceleration indicators for Northern Ostrobothnia Region (FI1D9)



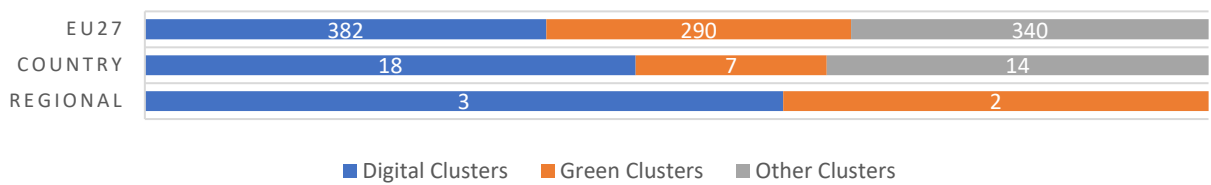
Growth in number of employed people with tertiary education in Science and Technology (2016-2019)



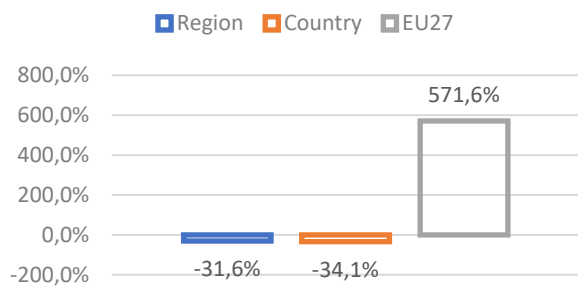
H2020 European projects in the Digital sector per ICT company



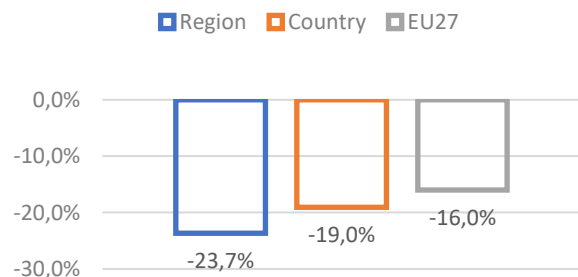
Clusters



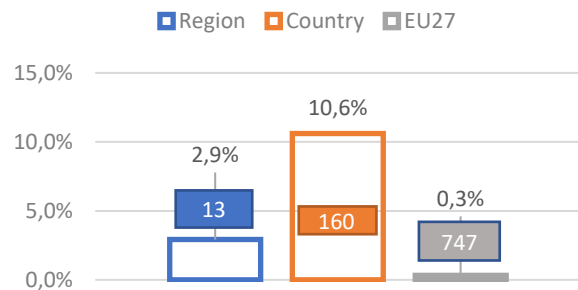
Recycling Waste Facilities (2016 - 2020)



Air Pollution Average [ug/m3] (2016 - 2020)



H2020 European projects in the Green sector per Energy and water company



SDGs in regional S3

GOAL 6: Clean Water and Sanitation	✘
GOAL 7: Affordable and Clean Energy	✔
GOAL 11: Sustainable Cities and Communities	✔
GOAL 12: Responsible Consumption and Production	✔
GOAL 13: Climate Action	✔

2.4 Gabrovo Province (BG322), Bulgaria



Photo credit: [gordontour](#).

Surface area: 2,023 km².

Population: 103,943.

PRIs participant: Yes.

GDP per capita: 11,490 EUR.

NUTS2: North Central region (BG32).

Specialisation areas: Mechatronics, Clean Technologies and Information and Communication Technologies.

RIS category: Emerging Innovator

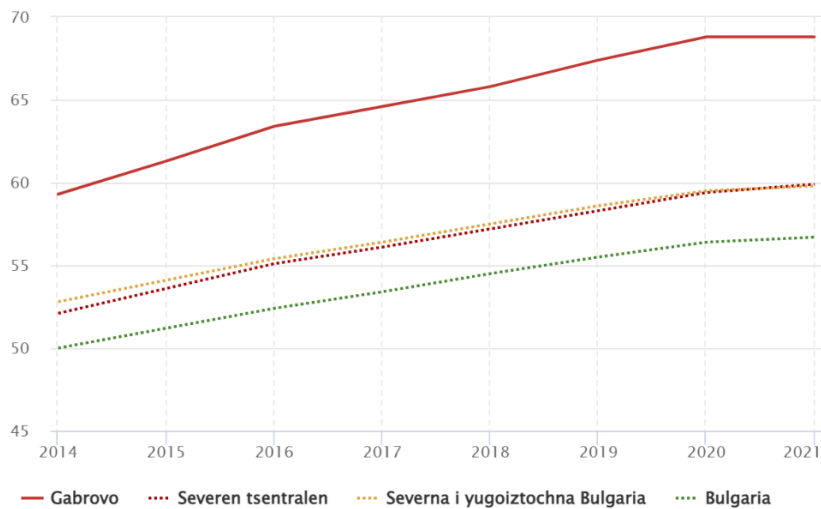
1. Description

The Gabrovo Province (*Oblast Gabrovo* in Bulgarian) is a small area located in the centre of Bulgaria. It is composed of four municipalities, while one of them, Gabrovo, gives the name to the province. The main contribution to the local economy is the manufacturing sector, which provides over half of the net sales revenues in the district. The leading economic activities in the industry are traditional: machine building, production of tools, lifting machines, sanitary fittings; textile, clothing, and the knitwear industry. Gabrovo Province's territory is not suitable for intensive agriculture since the geographical position of the district includes areas with mountains and hills, with mainly small and fragmented cultivated areas (Tsonkov, 2021).

Gabrovo Province has been facing a constant decline in population over the past ten years. The phenomenon is due to the very low birth rate and the large proportionate ageing population. The demographic decline has caused depopulation in the mountainous areas, causing substantial areas of arable land to be abandoned overgrown¹².

¹² See: https://circabc.europa.eu/webdav/CircaBC/ESTAT/regportraits/Information/bg024_geo.htm

Age dependency ratio (%)



Data source: European Commission - Urban Data Platform Plus

The population under 15 years old and over 65 years old is considered as dependent on the working population aged between 15 and 65 years old. This ratio is called age dependency ratio. It is higher in the province than in larger regions such as North and Southeast Bulgaria (*Severna i yugoiztochna Bulgaria* BG3, NUTS1)

and North Central region (*Severen tsentralen* BG32, NUTS2).

The structure of the local economy has significantly changed in the last decades, with many heavy and light industries closing or reducing operations. Nevertheless, Gabrovo Province is among the strongest industrial areas in Bulgaria. The industry contributed to 45% of the GVA of the district in 2019 compared to 25% on average for the country. Its strength is rooted in its industrial legacy, infrastructure, technical competencies of the workforce, as well as the presence of the Technical University in the municipality of Gabrovo. Industry is concentrated in Gabrovo and Sevlievo, with the two municipalities representing over 90% of the region's economy. After the end of the 2007-2013 programming period, the financial instruments made available by the European Union become a key factor for the municipal financial policy implementation, with a multiplicity of effects on growth, employment, wages, and competitiveness depending on the expected outcomes of the funding instruments.

It is important to note that the municipality of Gabrovo was selected as an 'Entrepreneurial European Region' during 2021-2022, predominantly for its entrepreneurial ecosystem and its ambition and commitment to become greener, smarter, and more innovative.

2. Smart Specialisation Strategy 2021-2027

In Bulgaria, the Smart Specialisation Strategy is implemented at a national level, therefore, the local level was not equipped for fostering innovation and engaging with key stakeholders. When the Gabrovo Province started its S3 design for the current programming period, it was assisted by the JRC through the 'RIS3 Support to Lagging Regions' project. It was clear that it was necessary to work on the establishment of

regional innovation structures, to be able to bridge the distance with industrial partners and engage them better in the EDP. The gap was bridged in 2019 with a Interreg Europe project, where the province established a regional innovation centre called “[Ambitious Gabrovo](#)”, which aims at providing research and support for increasing the innovation capacity and competitiveness of regional industry. This experience generated a positive impact on the [S3 for 2021-2027](#), as the province integrated the S3 team with new profiles linked with innovation, market research and internationalisation expertise. Moreover, it is planned to allocate funding to the innovation centre to implement a European Digital Innovation Hub in support of the digital transition.

From a sustainable and long-term perspective, the province is investing consistently in the enhancement of the education system and in its alignment with labour market requirements, with reference to STEM education. This provision is meant to ultimately improve the overall technological transfer capacity of the territory. In 2020 a Technopark was established by the Technical University of Gabrovo, with a focus on mechatronics and clean technologies.

One of Gabrovo Province most interesting experiences related to the S3 has been the collaboration established with the Navarre Region in Spain. The collaboration was developed in 2022 through an Erasmus+ project, entitled ARIES4. The project’s objective is to reinforce the integration of environmental sustainability within the S3, towards the concept of S4+, while also generating tools to measure the green transition.

3. The entrepreneurial discovery process

From the start of the S3 design process, priority areas were identified with a focus group conducted through the Technopark of the Technology University of Gabrovo. The province adopted a bottom-up approach, involving local companies and providing guidance in the domains of circular economy and low carbon emissions. The cooperation with the entrepreneurial ecosystem proved to be a key factor in making the S3 effective.

According to data gathered before and after the pandemic, companies in the Gabrovo Province did not have significant differences in terms of revenue, but the ongoing energy crisis is having a strong negative impact on the private sector. For this reason, the S3 team is working with industrial stakeholders to support them in adapting their business plans towards a green transition and coupled energy efficiency.

The key elements for a better engagement of the private sector lies in capacity building, information exchange, and visibility of European funding and project opportunities. The region is working to reinforce those elements, identified as crucial for the overall success of the S3. To address this gap, the province has set up a platform for the exchange of information regarding the entrepreneurial ecosystem and its participation in innovation projects.

The twin transition, which is a priority in the Gabrovo Province S3, encompasses both the concept of smart cities, industry 4.0, and carbon neutrality and energy efficiency. The S3 will foster the twin transition in all societal domains: from the digitalisation of public administration services, digitalisation of industrial processes, the implementation of smart solutions for the urban environment, and to the automation and digitalisation of housing. The innovative approach for this has been the inclusion and involvement of citizens in the development of the strategy, viewed as especially important for becoming a carbon-neutral territory.

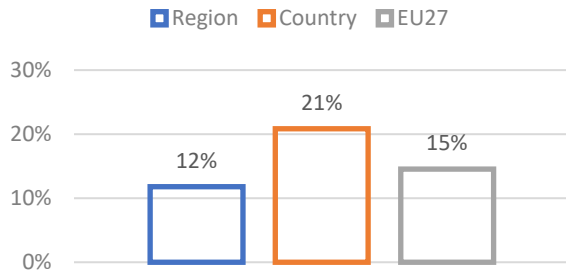
The main funding instruments are the Resilience and Recovery Plan together with the regional programme for innovation and competitiveness. They will be employed to foster technological modernisation of the industry, while at the same time improving human resource capabilities, by promoting STEM education through Erasmus+ projects. The key is to advocate for industrial strategies which put innovation and the twin transition at the centre of planning and to continue to be open to collaboration with other companies. Moreover, having carried out the climate and energy roadmaps in conjunction with the S3, the strategies are aligned well, with the S3 becoming the industrial innovation component of the overall approach.

4. Participation in the PRIs pilot

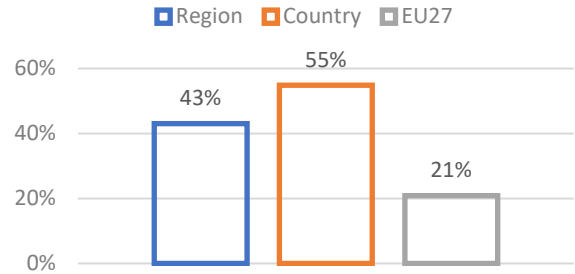
At the beginning of 2023, a regional business forum was held in Gabrovo, organised by the municipality of Gabrovo together with the regional innovation centre “Ambitious Gabrovo”, the Technical University of Gabrovo, Gabrovo Chamber of Commerce and Industry, the Regional Information Centre and the Provincial Administration of Gabrovo. On this occasion, the newly created Gabrovo ICT innovation and cooperation team was presented. The team will facilitate the provision of experts to support capacity building to implement the PRIs initiative, with the aim of supporting cooperation within the private sector. The province is particularly interested in the PRIs methodology and in the indicators for measuring the twin transition. The focus of the PRIs is on stakeholders’ engagement, and how stakeholders can design a systemic approach to innovation which exploits the opportunities offered by the twin transition.

5. S3 acceleration indicators for North Central Region (BG32)

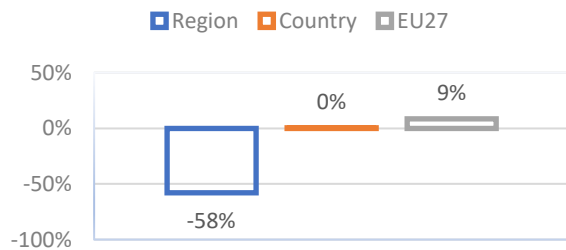
Growth in number of people employed in ICT (2017-2021)



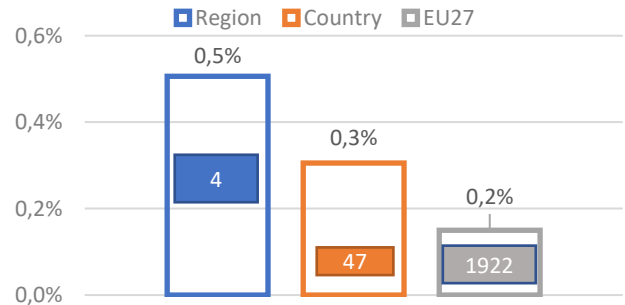
Growth in gross value added at basic prices in ICT (2016-2019)



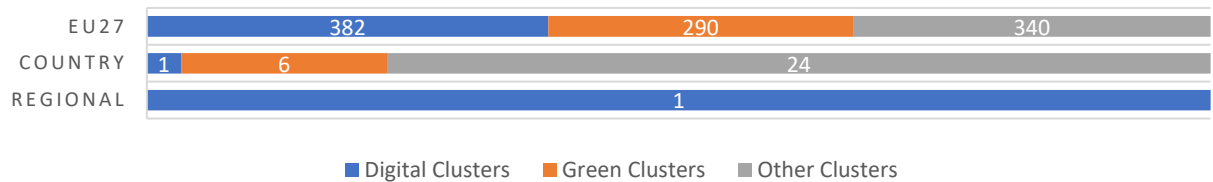
Growth in number of employed people with tertiary education in Science and Technology (2016-2019)



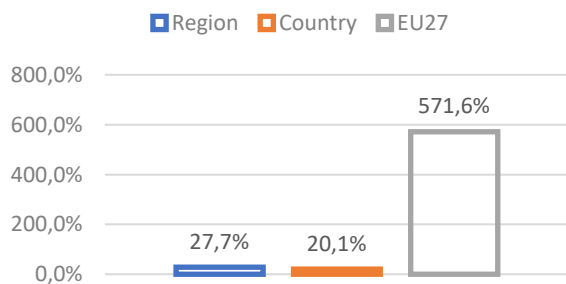
H2020 European projects in the Digital sector per ICT company



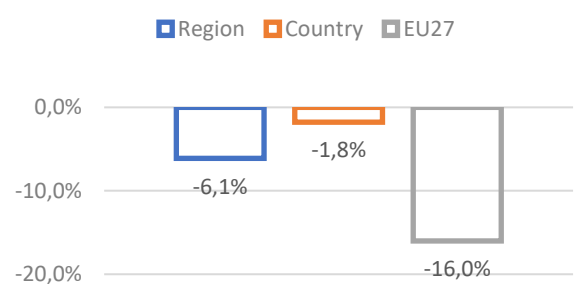
Clusters



Recycling Waste Facilities (2016 - 2020)

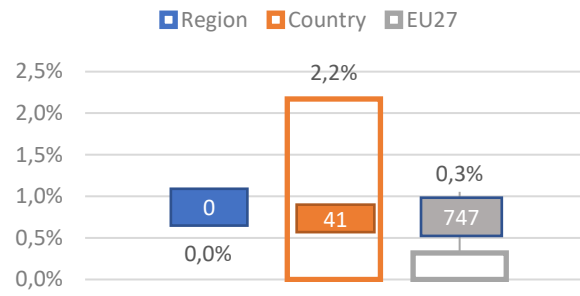


Air Pollution Average [ug/m3] (2016 - 2020)



SDGs in regional S3	
GOAL 6: Clean Water and Sanitation	✘
GOAL 7: Affordable and Clean Energy	✔
GOAL 11: Sustainable Cities and Communities	✔
GOAL 12: Responsible Consumption and Production	✔
GOAL 13: Climate Action	✔

H2020 European projects in the Green sector per Energy and water company



2.5 Azores Region (PT2), Portugal



Photo credit: [Martin Munk](#) on [Unsplash](#).

Surface area: 2.322 km².

Population: 242,201.

PRIs participant: Yes.

GDP per capita: 18,400 EUR.

NUTS2: Região Autónoma dos Açores (PT2).

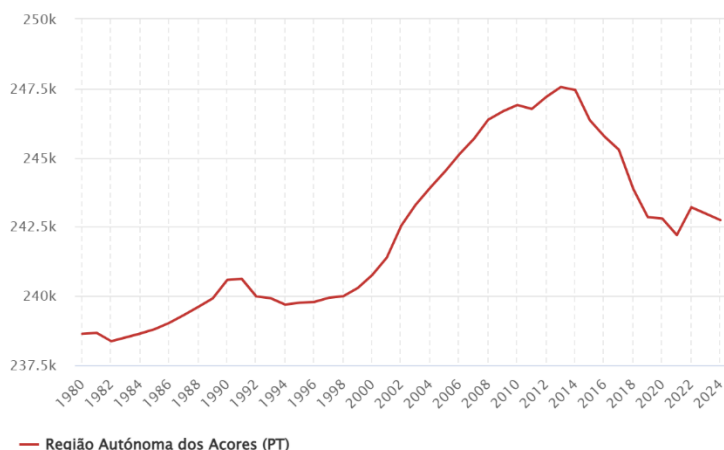
Specialisation areas: Fishing and the sea; Tourism; Agriculture.

RIS category: Emerging Innovator

1. Description

The Autonomous Region of the Azores (*Região Autónoma dos Açores* in Portuguese) is one of the two autonomous regions of Portugal, along with Autonomous Region of Madeira. The Azores Region is an archipelago composed of nine volcanic islands in the Macaronesia region of the North Atlantic Ocean. The islands are divided into three geographic groups: Flores and Corvo (i.e., Western Group); Graciosa, Terceira, São Jorge, Pico, and Faial (i.e., Central Group); and São Miguel, Santa Maria, and the Formigas islets (i.e., Eastern Group). The economy of the region relies mostly on services. An important role for the overall employment is also played by the public sector. Other relevant sectors are wholesale and retail, transport, accommodation and food-related service activities. The sectors of agriculture, with a strong focus on dairy farming, and fisheries are also highly relevant for the economy of the region. Industry is mainly of the agri-food type, e.g., cheese, milk, butter, wine, and forestry processing, but plays a less important role in the economy of the archipelago. Thanks to the Azores Region' natural landscapes, ecosystems and biodiversity, tourism has been progressively gaining prominence: this applies to the tourism sector itself and to a wide range of activities related to it (Azevedo, 2017).

Total population (Inhabitants)



Data source: European Commission - Urban Data Platform Plus

The main demographic trend is towards a decrease in the inhabitants' population. In the last decade there has been a decrease of around 10,400 individuals, however, the number of households, buildings and residential accommodation has increased. The population started decreasing in 2013, with a stabilisation and slight increase between 2019 and 2022.

The Azores Region has received several international awards and distinctions in recognition for their approach to sustainable development and tourism. In addition, some natural areas have received unique classifications and labels (i.e., Biosphere Reserve, OSPAR Convention, RAMSAR Convention, Natura 2000 Network, and World Heritage). Labelling has been accomplished in line with the focus on the sustainable development, envisioned in the programming documents of the regional administration¹³ (Castanho *et al.*, 2021).

To contribute to more sustainable tourism through the use of Artificial Intelligence, High Performance Computing, and Cybersecurity, the [Azores Digital Innovation Hub](#) was established as a non-profit Public Private Partnership (PPP). Its goal is to serve as a one-stop-shop for digital transformation, carrying out activities for development and support for Advanced Digital Skills, contributing to the goal of Sustainable Tourism 4.0. Since 2006, the [Azores Tourism Observatory \(OTA\)](#), has been operating as a private non-profit association, with founding members being the Government of the Azores Region, the Azores Tourism Association. The University of the Azores has provided analysis, dissemination, and monitoring of independent and responsible tourism, contributing to the promotion of sustainable tourism integrated into the region's broader development strategies.

2. Smart Specialisation Strategy 2021-2027

The Azores Region was one of the first regions to implement S3, in 2014. In 2018 it started the revision process which led, in 2022, to the issuing of the [S3 for 2021-2027](#).

¹³ i.e., [Sustainability of the Azores Destination Action Plan 2019-2030](#), [Tourism Master Plan for the Azores Region](#), [the Research and Innovation Strategies for Smart Specialization in the Azores](#) and [the Strategic and Marketing Plan for Tourism in the Azores](#)

The process followed the “standard” steps for the S3 development, involving stakeholders through the triple helix, with a strong role for academia and of the public sector, which play a more important role in the territory compared to the private sector. The region established four thematic working groups corresponding to the priority areas identified in the S3. They also created a ‘Council for Smart Specialisation’ which brings together all S3 stakeholders, the S3 Executive Commission, as a S3 management authority. The S3 team, organised within the Directorate General for Science and Technology, is composed of five people with administrative, technical and financial competences. The team is tasked with the management of policies related to research and innovation at regional level, including the ERDF and the ESF+.

During the S3 design process, monthly meetings were held with different bodies and stakeholders. Since the S3 has been approved, the region has increased the frequency of the meetings to three-four times per month, to support and align with the [Azores 2030](#) strategy, to be launched later in 2023.

To include the twin transition, the region relied on the model developed in the Galicia Region in Spain, which foresees vertical and horizontal priorities including the digital and green transition, which are aspects recognised as crucial at the local level. Finally, the regional S3 has been fully aligned with the SDGs, which reinforces aspects linked to the resilience capacity of the territory. In relation to the inclusiveness, some aspects need to be improved within the S3, and this will be the focus for the first review of the S3 in the coming years.

3. The entrepreneurial discovery process

The S3 is the only initiative in the region concerning open innovation and open discovery process.

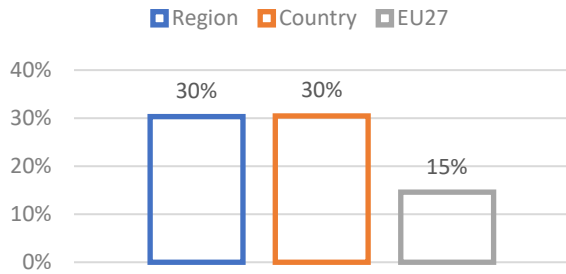
The S3 design started as a bottom-up approach, but since the private sector in the region is not highly developed the process has been enriched with inputs coming from the S3 team. The S3 team guided the stakeholders in the analysis of the previous S3 priority areas, i.e., agriculture, tourism, and the blue economy. These are still relevant for the current S3 2021-2027, and, in addition, two areas were also included, i.e., health and space. These two additional priority areas stemmed from the EDP and from the political interest of the Azores Region’s government.

4. Participation in the PRIs pilot

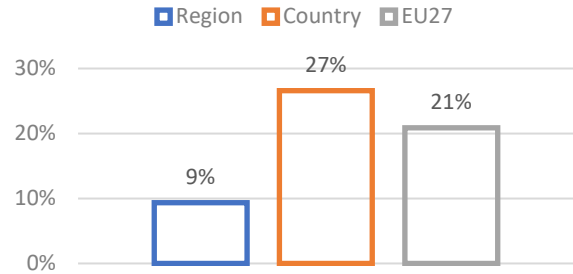
The Azores Region participated in the PRIs and appreciated the experience. It is seen as a frontier exploration of the S3 concept and its evolution. Moreover, the region is interested in exploring the practical implications of the PRI, to test the theoretical framework and the tools for implementation.

5. S3 acceleration indicators for Azores Region (PT2)

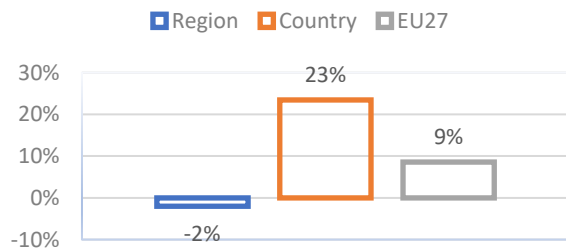
Growth in number of people employed in ICT (2017-2021)



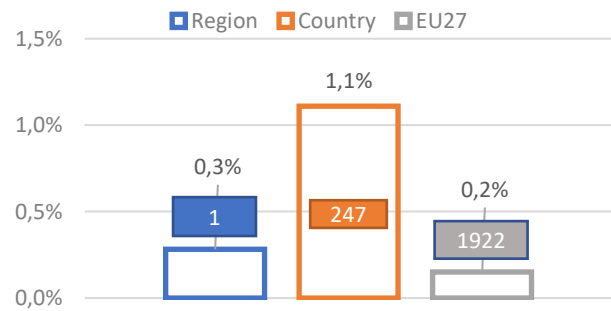
Growth in gross value added at basic prices in ICT (2016-2019)



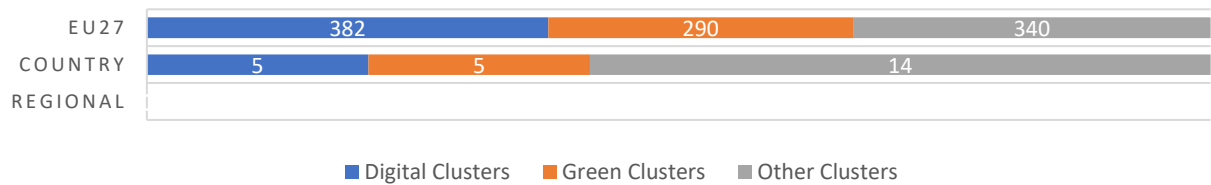
Growth in number of employed people with tertiary education in Science and Technology (2016-2019)



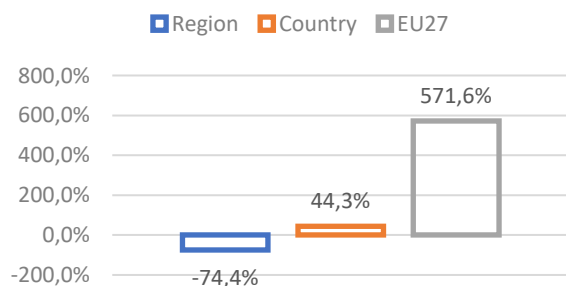
H2020 European projects in the Digital sector per ICT company



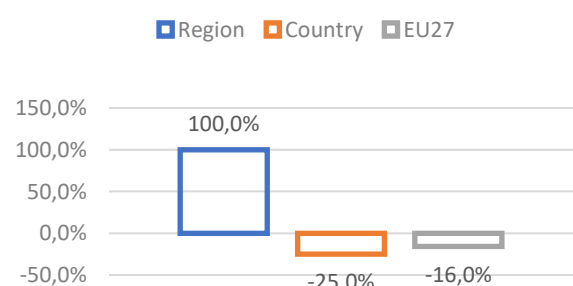
Clusters



Recycling Waste Facilities (2016 - 2020)

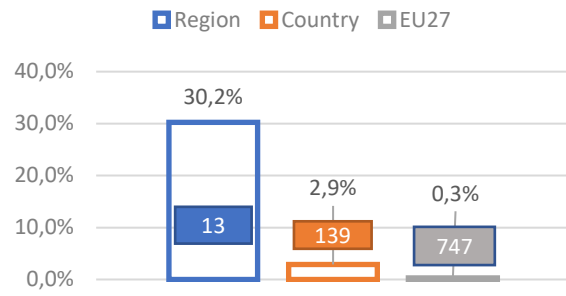


Air Pollution Average [ug/m3] (2016 - 2020)



SDGs in regional S3	
GOAL 6: Clean Water and Sanitation	✘
GOAL 7: Affordable and Clean Energy	✘
GOAL 11: Sustainable Cities and Communities	✘
GOAL 12: Responsible Consumption and Production	✔
GOAL 13: Climate Action	✔

H2020 European projects in the Green sector per Energy and water company



2.6 Abruzzo Region (ITF1), Italy



Photo credit: [Paolo Fefe'](#).

Surface area: 10.833 km².

Population: 1.281.012.

PRIs participant: Yes.

GDP per capita: 29.590 EUR.

NUTS2: Abruzzo (ITF1).

Specialisation areas: New technologies and solutions for the aerospace industry; Advanced technologies for health and living care services (life science); Design driven innovation for fashion industries; Healthy and innovative agri-food sector; Automotive 4.0.

RIS category: Moderate Innovator

1. Description

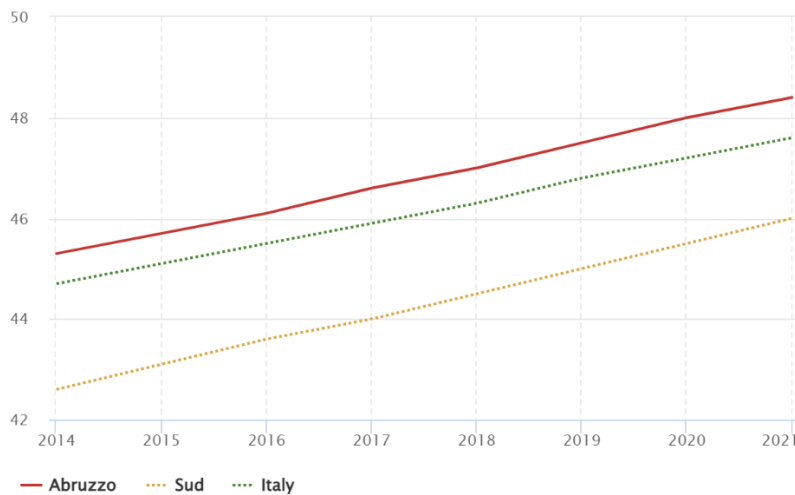
Abruzzo is a region of central southern Italy whose territory extends from the Apennines mountains in the west to the coastal area of the Adriatic Sea in the east. The region is composed by the four provinces - L'Aquila, Teramo, Pescara and Chieti. Most of the territory is composed of rural areas, with the remaining 0.9% being urban and semi-urban areas. The Abruzzo Region has been, for most of its history, an agricultural region. After World War II, local industry became the leading sector of the economy in terms of GDP. The industry rapidly developed, in particular the fields of metal mechanics, agri-food, transport and ICT, as well as chemical, furniture, handicrafts and textiles¹⁴.

From 2014 until 2021 the region has seen a constant decrease in population. The population in the region amounts to approximately a million inhabitants, located mostly in intermediate rural areas (54.4%), followed by residents of areas of under-performing development (26.8%), inhabitants located in urban and semi-urban areas (12.9%) and residually in rural areas with specialised agriculture (5.9%). The depopulation, especially of the internal mountainous areas, has been characterised by high mortality rates and low natality rates¹⁵.

¹⁴ See Regional State of Affairs report, Abruzzo, Italy, INTRA project, November 2017

¹⁵ See https://www.istat.it/it/files/2022/03/Censimento-della-popolazione-in-Abruzzo_focus.pdf

Median age (Years)



Data source: European Commission - Urban Data Platform Plus

The median age of the region is much higher compared to respective figures for the South of Italy (*Sud* - NUTS1 ITF), and at the national level. The emigration of rural population is a historical dynamic of the region. This emigration has increased in the last decade, due to the severe seismic events in 2009. This phenomenon is negatively affecting the socio-economic texture of

the rural areas in terms of production for the enterprises and services for citizens¹⁶.

In comparison, the coastal area presents widespread industrialisation, hosting most of the economic activities as well as several productive clusters (Veraldi *et al.*, 2022).

From this perspective, the establishment of Innovation Poles has assumed a significant role in the Abruzzo Region's R&D policy. The creation of the Innovation Poles, sustained with the ERDF funding, aims to support the regional business ecosystem, and especially SMEs, since there are no large enterprises in the region (Casolani *et al.*, 2019).

2. Smart Specialisation Strategy 2021-2027

In respect to the previous programming period, which for the first time introduced the S3, the development of the current strategy has been more straightforward and allowed better preparation, including benchmarking at European level, conducted through the tools available such as the RIS, the S3 platform and the publications related to the S3.

Moreover, in the S3 design a major role was played by the Italian Territorial Cohesion Agency, which supported the region in the preparation of the programme.

The region approved the S3 at the end of 2022, together with an evaluation of the S3 by the Italian Territorial Cohesion Agency. In the first half of 2023, the first Monitoring Committee meeting will be held, and afterwards meetings for each of the thematic

¹⁶ See also <https://www.openpolis.it/sullo-spopolamento-dellabruzzo-interno-servono-politiche-urgenti/#lattivita-accademica-puo-essere-di-sostegno-alle-politiche-pubbliche-per-il-contrasto-allo-spopolamento>

working groups will be organised to share guidelines. The stakeholders' participation will ultimately allow the region to understand if the strategy has been correctly translated.

The vision for the Abruzzo Region is to strengthen its role in the context of the Adriatic corridor. For instance, the region has a strong focus on the automotive industry, hosting the largest factory in Italy. This generates economic exchanges with the north of Europe, both in terms of inflows for the raw materials and of outflows of finished products. In addition, the region also has a position in an Interreg programme with Croatia.

Another element which is at the core of the S3 is the improvement of the region's two port infrastructures, i.e., Ortona and Vasto. Finally, an element which could be a strong tourist attractor is the Adriatic cycle path, which is currently under construction.

Concerning S3 governance, the Managing Authority has primary responsibility for the proper execution of the S3, supported by the service of Research and Innovation of the region. The S3 team is composed of five people.

In the previous programming period 2014-2020, the approach adopted by the region was to bring together academia and private sector, but it did not produce the expected results in the creation of employment. This has been a major challenge, and a lesson learnt. In this regard, the key element has been identified in the scarce participation of the small enterprises compared to the medium sized ones, which is understood as being due to the three-year duration of projects. In the current S3, the region devised a different approach, aimed at fostering projects with different Technological Readiness Level and different budget sizes.

Another important lesson learnt for the region is that not all the domains selected as being strategic within the S3 have the same growth rate. For instance, the technological sector includes a fast pace of development, while the touristic sector suffers from a degree of fragmentation because it is composed of small, micro and individual enterprises which are not connected with each other. Some additional guidance or best practice exchange for engagement of the private sector in such contexts would be useful. Moreover, the region is willing to seek better integration of the financial resources available for the S3.

3. The entrepreneurial discovery process

For the preparation of the current S3, called [*Abruzzo prossimo*](#), the region conducted a bottom-up EDP. The discussion with stakeholders started from the analysis of the previous S3, developed by the S3 team. The EDP centred the private sector, because it is based on the premise that entrepreneurs have a clear understanding of the priorities for the business ecosystem.

Six meetings were held for the S3 design, one for each of thematic priorities, and one as a plenary.

The relation between the private sector and the academia is changing. In the Abruzzo region there are four technical universities, the *Laboratori Nazionali del Gran Sasso*¹⁷, Telespazio, which is the network of geo-referential satellites for the south of Europe, and several other research institutions. Prior to the S3, these organisations did not interact with the entrepreneurial ecosystem. Thanks to the S3 strategy, the support of the European Commission, and to allocated incentives, stakeholders are now much more connected and actively participating in innovation projects.

The S3 team does not have the expertise to carry out foresight analysis, but the region considered elements in relation to the twin transition. The green transition is a crucial theme, even if it has a highly industrialised territory. The region has a higher ratio of green spaces when compared to the national average. This supports the ambition of the region to become a living laboratory to experiment with the opportunities offered by the green transition, supported by resources received from the ERDF and from the ESF+.

Finally, the region has a European Digital Innovation Hub, awarded with the seal of excellence, funded with national resources, and a Resilience and Recovery plan project on innovation ecosystems, led by the University of L'Aquila.

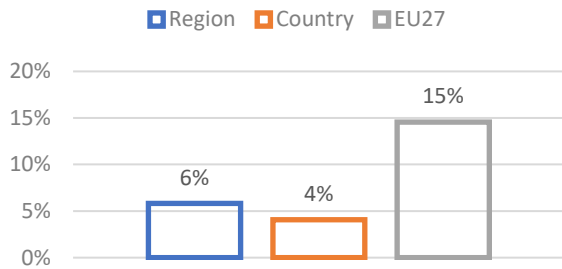
4. Participation in the PRIs pilot

The Abruzzo Region joined the PRIs initiative to explore different approaches to integrate non-entrepreneurial aspects of innovation, i.e., the societal aspects to which innovation can contribute, and to enhance transnational exchanges which, in the previous programming, were overlooked. Transnational exchanges between European regions should be directed towards the identification of a narrow scope for collaboration because initiatives are considered less effective. From this perspective, the region is carrying out transnational activities with the Automotive Regional Alliance, a CoR initiative, which brings together regions specialising in the automotive sector. The goal is to present a joint document to the European Commission concerning the development of an electric transition. This experience was found extremely interesting and relevant.

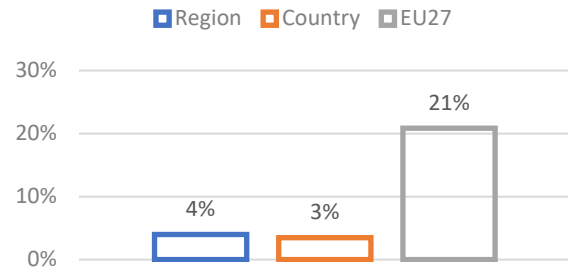
¹⁷ It is the largest underground research centre in the world. Situated below Gran Sasso Mountain in Italy, it is well known for particle physics research by the Italian Institute of Nuclear Physics.

5. S3 acceleration indicators for Abruzzo Region (ITF1)

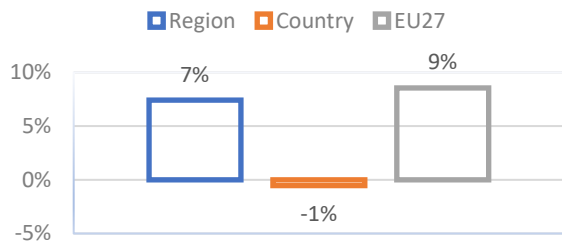
Growth in number of people employed in ICT (2017-2021)



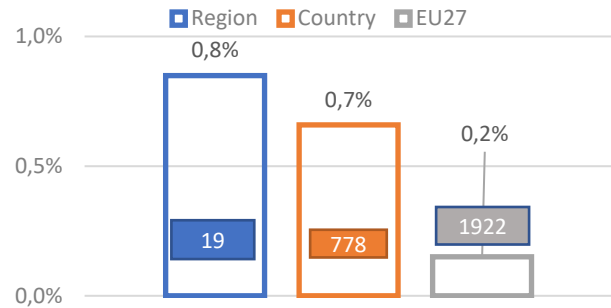
Growth in gross value added at basic prices in ICT (2016-2019)



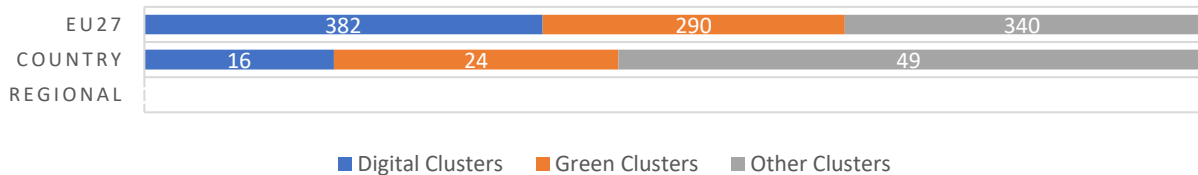
Growth in number of employed people with tertiary education in Science and Technology (2016-2019)



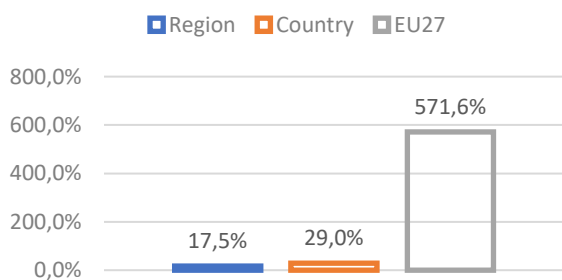
H2020 European projects in the Digital sector per ICT company



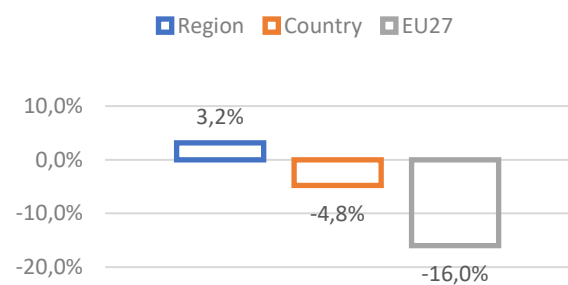
Clusters



Recycling Waste Facilities (2016 - 2020)

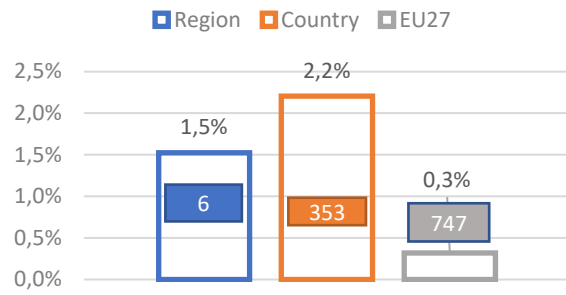


Air Pollution Average [$\mu\text{g}/\text{m}^3$] (2016 - 2020)



SDGs in regional S3	
GOAL 6: Clean Water and Sanitation	✘
GOAL 7: Affordable and Clean Energy	✘
GOAL 11: Sustainable Cities and Communities	✔
GOAL 12: Responsible Consumption and Production	✘
GOAL 13: Climate Action	✔

H2020 European projects in the Green sector per Energy and water company



2.7 Northern Netherlands Region (NL1), Netherlands



Photo credit: [Hannes Maurer](#)

Surface area: 11,389 km².

Population: 1,760,000 (2023)

PRIs participant: Yes.

GDP per capita: 41,450 EUR (2023)

NUTS2: The region participates at NUTS1.

Specialisation areas: agri-food, circular economy, water technology, high-tech systems and materials, digitisation, chemistry, healthcare, and energy.

RIS category: Innovation Leader

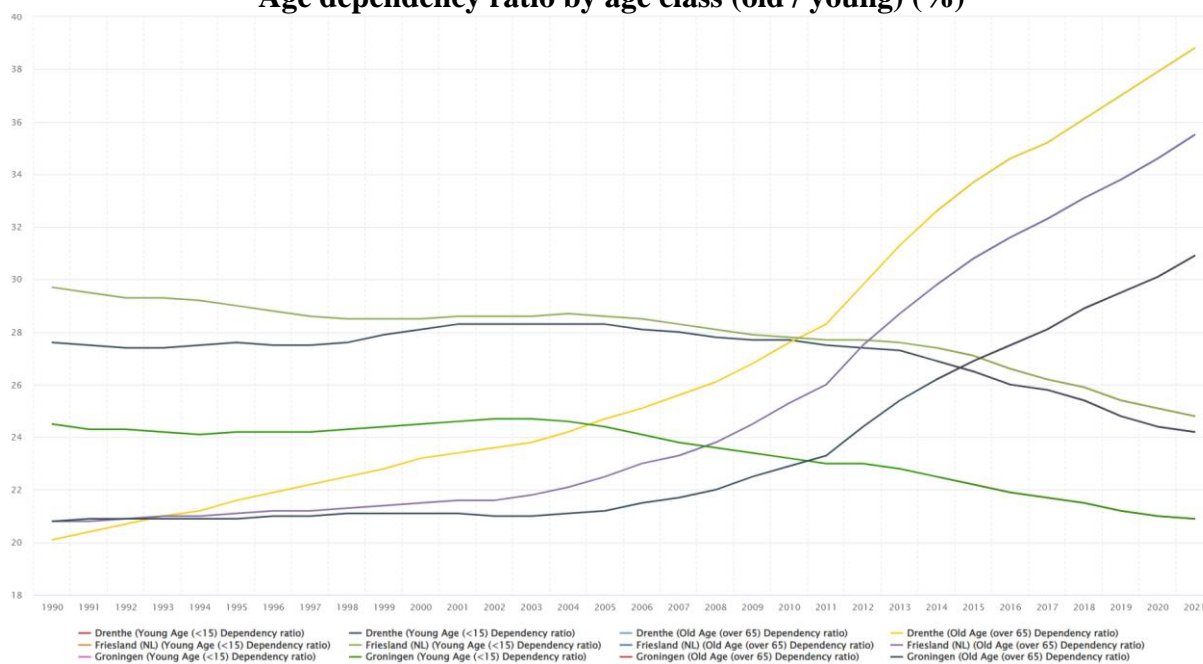
1. Description

Northern Netherlands (*Noord-Nederlands* in Dutch) consists of three provinces located in the northern geographic region of the Netherlands – Drenthe, Friesland, and Groningen. There are currently over 1.7 million people living in the region, and this represents over 10% of the national population. The region is viewed as having core knowledge infrastructure strengths in the fields of energy transition, data science, artificial intelligence (AI), health, circular economy, water technology, and within the agri-food/agriculture/dairy sector.

In 2016, Utrecht University and Rabobank launched a project, entitled the Broad Welfare Indicator (BWI). It attempted to understand the levels of relative prosperity of regions within the Netherlands. The BWI indexes eleven dimensions, including income, environment, health, as well as safety and education. Southwest Friesland and North Drenthe (sub-regions in the North-Netherlands) score particularly well in terms of safety, residential satisfaction, and the environment. However, housing satisfaction, income, subjective well-being, and health lag regions elsewhere. This is particularly noticeable when viewing poverty related statistics, with the region percentage at risk of poverty and social exclusion laying 2% above the national average.

Population in the Netherlands is expected to grow until 2040, but the population in the three northern provinces is expected to fall. In addition to the expected population decline, the composition of the population is also changing. It is expected that the that the number of over-65s will increase by approximately 32% to 2040.

Age dependency ratio by age class (old / young) (%)



Data source: European Commission - Urban Data Platform Plus

The region is also experiencing an increase in regional migration, which is expected to impact on regional demographics and labour market positively, to counteract some of the impact of the ageing population. This migration effect also means that aspects such as social inclusion and societal integration will continue to be a challenge.

2. Smart specialisation strategy 2021-2027

The S3 for the programming period was implemented through the Regional Innovation Strategy at NUTS2 level. The S3 strategy is detailed in the [Research and Innovation Strategy for smart specialisation \(RIS3\) for the Northern Netherlands 2021-2027](#). The S3 was derived through input from a broad stakeholder group, predominantly through two large-scale in person meetings. In addition, the region made use of ongoing initiatives, along with canvassing input from universities such as the University of Applied Sciences, the University of Groningen, the University of the North, and associated development bodies such as the Northern Netherlands Economic Board. There is also an ongoing link with current spatial planning projects such as the Northern Netherlands Environmental Agenda, the Groningen National Programme, the Environmental Vision, and the Nature-Inclusive Agriculture regional deal.

The S3 for 2021-2027 strongly integrated the UN Sustainable Development Goals, including both socio-cultural impact and economic impact, as well as identifying specific regional competences. The smart specialisation team focused on transitions, and formed the strategy as an evolutionary document, through identification of the following challenges:

- From a linear to a circular economy.
- From fossil to renewable energy.
- From care to (positive) health.
- From analogue to digital.

These ‘transition challenges’ prioritise social and technological innovations and challenge the region to seek interrelations and crossovers between the themes, and specific strengths. There is coherent focus on the European agendas of sustainability and inclusion, with efforts being directed at a holistic approach to raise the general level of well-being (both social and economic) in the area. Emphasis is directed strongly towards the idea of social well-being as a key principle.

The process has been guided by a designated unit within the region and was viewed as a cooperative and collaborative process. The strategy was seen as emergent and organic, with direction initiated by a core planning group that met regularly to discuss key aspects of the planning and implementation process and supplemented through broad stakeholder and specific sector input when required.

Furthermore, specific attention was paid to establishing formal and proper governance and monitoring mechanisms, in an effort to gain trust and accountability.

3. The entrepreneurial discovery process

The region of Northern Netherlands is a strong SME focused economy. The S3 report states that over 95 percent of the companies in the region are SMEs. Focusing on this strong entrepreneurship characteristic is viewed as a key success factor.

The bottom-up nature of the process was identified as being a core contributor to the success of the programme, with members and stakeholders all feeling there was opportunity to shape and direct the programme, as it evolved. There was also a direct focus on social objectives, and this contributed naturally to the perceived inclusiveness of the programme. Social objectives were led by the social innovation and social entrepreneurship stakeholders, with direct links to civil society and public representation.

The S3 report states that a key achievement area, is developing an understanding how to integrate the strong entrepreneurship characteristics of the region with the regional challenges. The region has established a strong commitment to new entrepreneurship skills and have also decided to deepen this commitment to nurturing start-ups and the education that supports the start-up process. The knowledge institutions in the region play a critical part in this and will continue to help guide the discovery process as the strategy evolves and develops over the programming period.

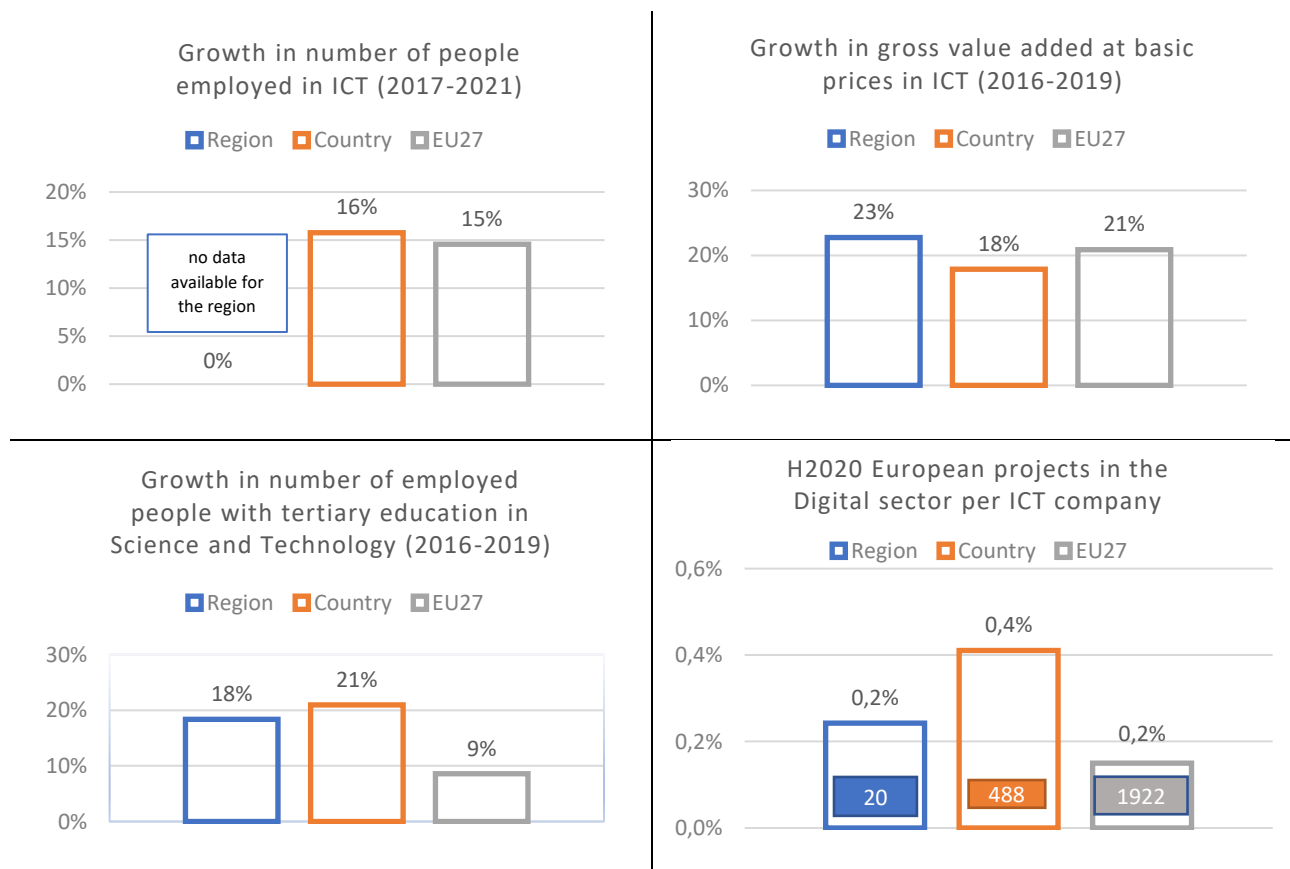
At the regional level, one of the priorities of the EDP has been to reinforce connections, both intra- and inter-regionally. An important component of the process has been trying to understand how the region can both differentiate itself from neighbouring regions, but also how to complement them – guided by the overarching transitions that have been identified.

The region of Northern Netherlands is also committed to being a Region of Smart Factories, in which SMEs, large companies and knowledge institutions work together to create a blueprint of the ‘factory of the future’. The ambitious aim is to reach more companies and accelerate the digitisation of the industry (and the region) to make industry ‘future-proof’.

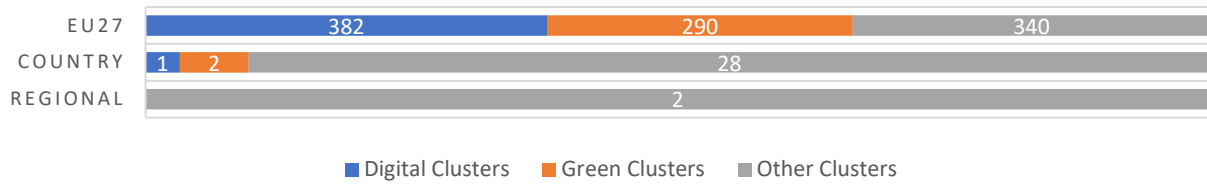
4. Participation in the PRIs pilot

Northern Netherlands is designated as a participant in the PRIs pilot, as a NUTS2 region. The regional focus is viewed as a positive step forward, with the regional innovation unit looking forward to developing a programme for regional specialisation and diversification that is aligned with regional transitions, and the overarching Sustainable Development Goals (SDGs).

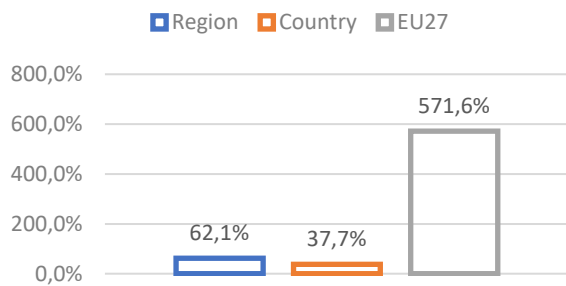
5. S3 acceleration indicators for Northern Netherlands Region (NL1)



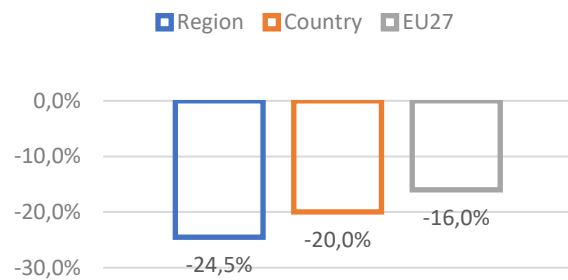
Clusters



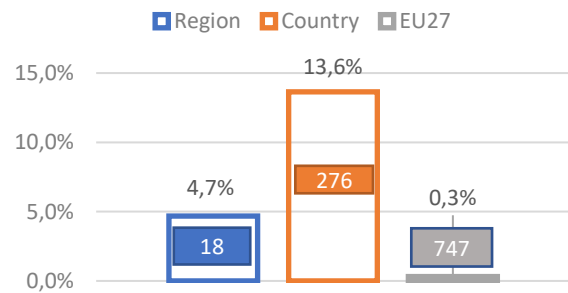
**Recycling Waste Facilities
(2016 - 2020)**



**Air Pollution Average [ug/m3]
(2016 - 2020)**



**H2020 European projects in the Green
sector per Energy and water company**



SDGs in regional S3

GOAL 6: Clean Water and Sanitation	✘
GOAL 7: Affordable and Clean Energy	✔
GOAL 11: Sustainable Cities and Communities	✔
GOAL 12: Responsible Consumption and Production	✔
GOAL 13: Climate Action	✔

2.8 Veneto Region (ITH3), Italy



Photo credit: [Henrique Ferreira](#) on [Unsplash](#).

Surface area: 18,407 km².

Population: 4,869,830.

PRIs participant: Yes.

GDP per capita: 36,050 EUR.

NUTS2: Veneto (ITH3).

Specialisation areas: Providing healthy and safe food (agri-food); Advanced technologies for manufacturing; New technologies for the creative industries; New technologies for sustainable living.

RIS category: Strong Innovator

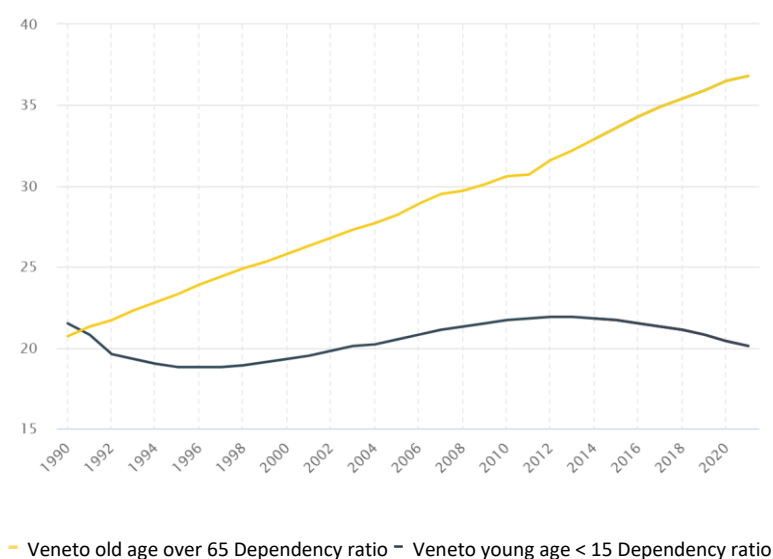
1. Description

The Veneto Region is located in the north-east of Italy, bordering with Austria in the northern corner of the country. The region is composed by the provinces of Belluno, Padua, Rovigo, Treviso, Venice, Verona and Vicenza. The Veneto Region has one of the highest GDPs in Italy, as well as a high statistic for the number of firms per inhabitant. The region's rapid transition in the post-war period developed an agriculture-based economy to a region with a more developed manufacturing sector.

In 2018, the regional economy contributed to 9.3% of the national GDP. The GDP per capita is 14% higher than the Italian national average and 9% higher than the European average (Sacco, 2021). Veneto Region's industry sector is structured in local clusters or districts ("*distretti*"), grouping enterprises with similar specialisations in the same product or service. Mainly composed of SMEs, these local clusters are oriented towards the production of goods and services traditionally associated with the region: apparel, leather/textile, agri-food, design furniture, designer jewellery and fashion accessories, as well as industries of chemicals, electronics, and steel¹⁸.

¹⁸ See <https://www.thebusinessyear.com/article/industrial-clusters-in-northern-italy-veneto/>

Age dependency ratio (%)



Data source: European Commission - Urban Data Platform Plus

Population growth has stabilised, after a sustained increase until 2014. However, almost 20% of the inhabitants are over 65 years, well represented by the statistic for age dependency. While the old age dependency ratio, concerning people over 65 years old is constantly increasing, the young age dependency ratio, concerning people under 15 years old, is decreasing.

The employment rate in the region performs better than the national average. Despite the decrease recorded in 2020, due to the impact of the pandemic on the labour market, the regional employment rates are not far from the pre-crisis values and are recognised as being strongly above the national average.

2. Smart Specialisation Strategy 2021-2027

The S3 design started with a context analysis, led by the four universities of the region. Similar regions in terms of industrial ecosystem and territory have been studied to grasp good practices. Subsequently, the EDP started with the organisation of meetings with the territorial stakeholders, first focussing on broad topics and then with the establishment of thematic working groups. The S3 governance was reviewed with the purpose of reinforcing internal coordination and cooperation. The overall process resulted in a matrix-based approach, including three criteria for prioritising strategic trajectories: innovative development, potential growth, and resilience capacity. The criteria, associated with a ranking system and submitted to the stakeholders, has guided the definition of the strategic trajectories.

The S3 team has been strengthened compared to the previous programming period, and it is currently composed of five people divided into three groups: monitoring and evaluation, EDP, and communication. This last group stems from a lesson learned which found a gap in the visibility of the strategy and of the opportunities offered by it.

The Veneto Region depends on the expertise of an in-house consultancy team of eight people, called Veneto Innovazione, which supported the region in the initial technical analysis.

The four horizontal innovation drivers identified in the regional S3, covers the new aspects for the future of the smart specialisation: the digital and green transition, the upskilling of the human capital, and the innovation of the business models of the industrial stakeholders.

The twin transition is considered as a natural evolution of the territory, as the private sector already considers it as a mean to achieve competitive advantage. Concerning the human capital, which is a crucial topic in the medium-long term, the region is working with the Venetian universities to implement ad-hoc courses to support upskilling and sector specialisation.

Moreover, the resilience aspect has been used as a criterion for the initial shaping of the strategy. Finally, additional elements related to inclusiveness, have focused on elderly and people with disabilities. This is the only concept which is not considered as a driver on the territory, but rather as a social aspect for overall societal well-being.

3. The entrepreneurial discovery process

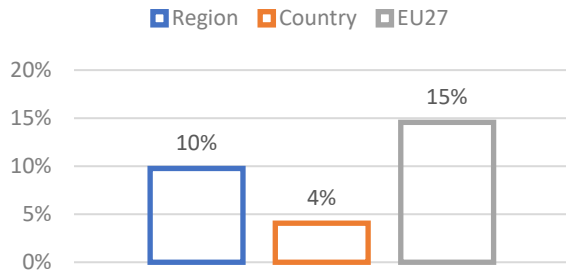
The EDP is organised into three levels: the inter-directorate working group, the stakeholders' observatory, and the technical unit with an advisory function. The stakeholders' observatory is composed of open consultation meetings and thematic roundtables for each of the priority areas and one for the strategic trajectories. The S3 design was conducted through approximately twelve meetings. For the management of the S3, once it has been approved, the region adopts a Continuous Entrepreneurial Discovery Process, which foresees quarterly meetings in conjunction with territorial thematic events. Examples include the National Day for Aerospace, which provided the occasion to organise a thematic conference with the local stakeholders in the aerospace sector. Moreover, the monitoring and evaluation mechanism is also in place and the region is currently working on the approach to collect data, which will be used in the S3 review process, held every three years.

4. Participation in the PRIs pilot

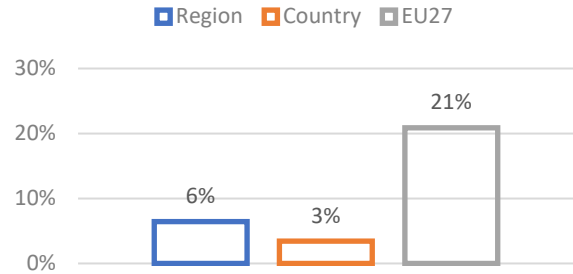
Veneto Region is following the PRIs initiative with interest because it is considered as part of the transformative path of the S3 towards the sustainability (sometimes called S4), and inclusiveness (S4+). However, as for all the initiatives at their early stages, there is a need to better define the PRIs scope and to integrate the participants with the aim to achieve a closer and more efficient cooperation.

5. S3 acceleration indicators for Veneto Region (ITH3)

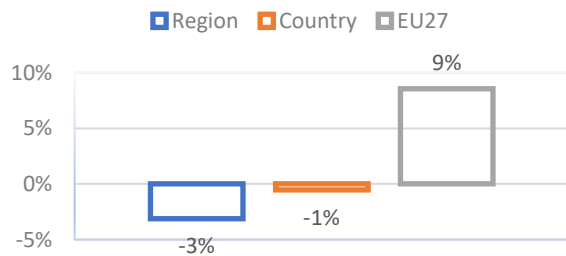
Growth in number of people employed in ICT (2017-2021)



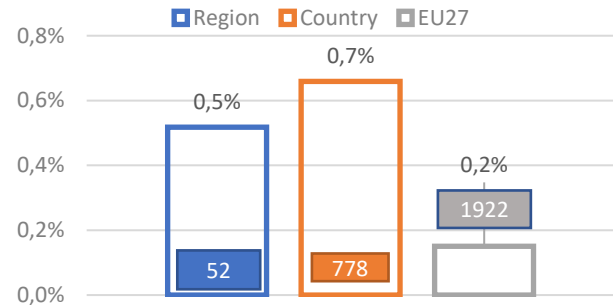
Growth in gross value added at basic prices in ICT (2016-2019)



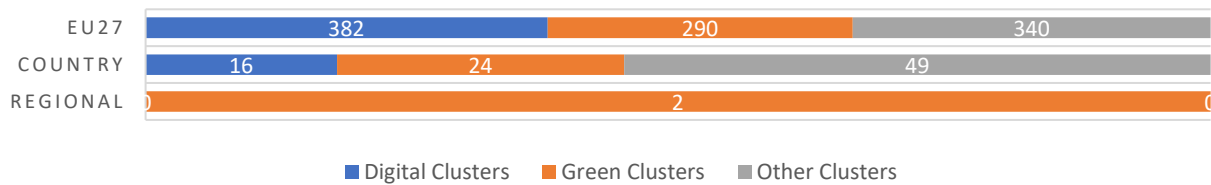
Growth in number of employed people with tertiary education in Science and Technology (2016-2019)



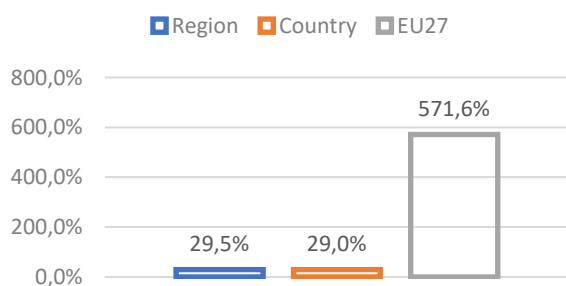
H2020 European projects in the Digital sector per ICT company



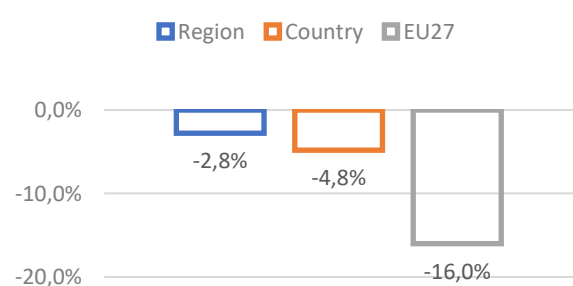
Clusters



Recycling Waste Facilities (2016 - 2020)

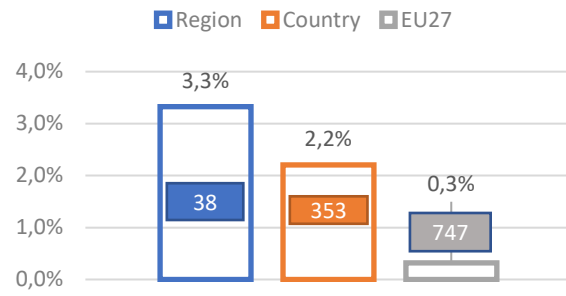


Air Pollution Average [$\mu\text{g}/\text{m}^3$] (2016 - 2020)



SDGs in regional S3	
GOAL 6: Clean Water and Sanitation	✗
GOAL 7: Affordable and Clean Energy	✓
GOAL 11: Sustainable Cities and Communities	✓
GOAL 12: Responsible Consumption and Production	✓
GOAL 13: Climate Action	✗

H2020 European projects in the Green sector per Energy and water company



2.9 Cluj-Napoca City, Romania



Photo credit: [Nută Lucian](#)

Surface area: 34,160 km².

Population 499,210 (Cluj)

PRIs participant: Yes.

GDP per capita: 26,902.12 EUR

NUTS2: North-West (RO11)

Specialisation areas: Agri-food, cosmetics and food supplements, health, new materials and advanced production technologies, information and communication technology (RO11)

RIS category: Emerging Innovator

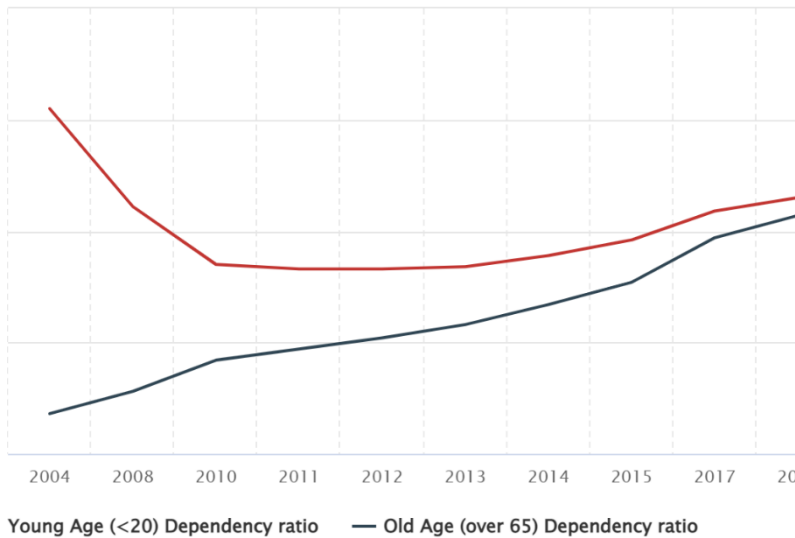
1. Description

Cluj-Napoca (Cluj) is the third most populous city in Romania, and the largest city within the North-West (RO11) region. Geographically, it is located similar distance from the three largest neighbouring European cities, Bucharest, Budapest, and Belgrade. The city's government is headed by a Mayor and is organised into 15 districts. It is intended that each of the districts will have local administration branches.

The city of Cluj has been identified as one of the least developed within the EU. Aspects related to its low classification have been identified as the quality of infrastructure and the overall low level of innovation. Cluj County (RO113 – NUTS3) contributes 41% to the regional GDP, and attracts most of the foreign, direct investment, and labour resources. However, the city of Cluj is viewed as one of the countries benchmarks with respect to the development of digital public services, governance, and the inclusion of citizens in within the local development process. However, even given this the region suffers from rural and urban development disparities, which have been identified as a primary area required for improvement. For example, of the 15 municipalities within the North-West region, only three (Cluj-Napoca, Oradea, Baia-Mare) have developed public transport infrastructure that meets requirements.

Demographic change in Cluj-Napoca is also a predominant challenge, as the city is facing a consistent pressure with population decline. This population decline mirrors the population decline at the national level. This demographic evolution will cause primary and secondary impacts as the region develops, as well as bringing with it challenges related to aspects such as education, health, inclusion, and digitalisation as the age dependency ratio in the city increases.

Age dependency ratio by age class (old / young) (%)



Data source: European Commission - Urban Data Platform Plus

In addition to the population decline in the region, there is a significant upward trend in the age dependency ratio statistics. This pressure will create specific social problems related to overall well-being, as well as impacts for health, education and well-being. This trend will need to be monitored as the city develops, to understand what policy changes might be required to mitigate potential negative impacts.

2. Smart specialisation strategy 2021-2027

The S3 strategy of the region was integrated with the NUTS2 regional development strategy, coordinated by the [Agency for Regional Development of the North-West](#). It is entitled the [Smart Specialisation Strategy for North-West Development Region 2021-2027](#). It was developed in conjunction with the countries [North-West Regional Program](#).

The city of Cluj-Napoca was an integral stakeholder in the development of the process, maintaining a role in several regional and national planning activities such as those concerning the development of Education, and the development of the AI Strategy. The city of Cluj was also an early implementor of the "smart city" concept, with the city being one of only two in the region that have attempted to develop the concept. The city has also been involved in scaling up the smart city efforts, supporting neighbouring towns and municipalities in their efforts, with a general increase in the number of localities that are testing solutions of this type.

For the 2021-2027 programming period, the North-West Region is attempting to ensure there is a flexible, decentralised approach applied to accessing and implementing the development funds. There is an aim to adopt separate funding mechanisms for the different categories of urban areas. This will be supported by several initiatives such that approach issues related to rural-urban inequalities, where development rich urban centres will support rural areas in mobilising innovation and development opportunities.

Practically, the implementation of the S3 strategy has been supported in the region with a designated innovation and development officer and associated support staff, whose

role is to integrate and coordinate access and involvement with several complementary development and innovation policy initiatives.

3. The entrepreneurial discovery process

With the designated innovation contact within the city of Cluj maintaining a role to coordinate and integrate stakeholder involvement, the development and implementation of the strategy for the programming period 2021-2027 should be viewed as an inclusive process. Several workshops were held in the period between November, 2019 and March, 2020:

- Three workshops in the fields of "Advanced production technologies", "Information and communication technology" and "Health and Cosmetics and food supplements".
- Two workshops, in the fields of "Agri-food" and "Health".
- Two other workshops in the fields of "Advanced production technologies" and "Health and Cosmetics and food supplements".
- Two workshops in the fields of "Advanced production technologies" and "Information technology and a communication".

The role of the development officer has also been to support and guide rural areas to access and implement available funding, through education and support, holding several workshops to help them understand the role and accessibility of these regional development funds.

A core component of the regional strategy for the period is the development of the SME ecosystem – with specific attention being given to encourage the development of specific forms of entrepreneurship and intermediation in entrepreneurship and providing support structures for SMEs in the form of incubators, accelerators, industrial parks, and clusters. To foster this involvement, SME grants will be awarded to facilitate integration into broader regional development objectives and priorities.

Several interventions for SMEs have been identified as support for accessing the following EU programs:

- Erasmus for Young Entrepreneurs (EASME).
- InvestEU.
- The Digital Innovation and Scale-up Initiative.

Moreover, at the municipal level, the city of Cluj-Napoca incorporated an innovation centre that could traverse the classic departments of the cities administration (roads, waste, education, etc). This allowed the S3 team to monitor activities across departments, such as resource requirements, and allowed them to be able to innovate

strongly in an inclusive manner, mobilising ideas and resources for specific projects when required.

Finally, social innovation was placed front and centre of the development and innovation strategy of the region, with distinct success stories in projects focused on decreasing the inequality found between the rural and urban environment. Distinct modes of communication between urban and rural centres were created, which allowed for villages on the outskirts of the city to learn more about the development and innovation process. It also allowed them to communicate into the urban centres about specific requirements and provided an avenue to help shape priorities. These rural-urban initiatives proved popular with all stakeholders and helped to provide a roadmap of how these collaborations can continue in the future.

4. Participation in the PRIs pilot

Cluj-Napoca is a participant in the PRIs pilot, involving itself as a case-study city. Its involvement is in primary stages, but it has been received well to date – with the city looking forward to an innovative and inclusive process through which priorities, strategies, and processes will be developed. The holistic model is viewed as providing more potential for the city, especially considering the city's attempt to include surrounding rural areas. The Initiative is seen as a route for guidance, support, and opportunities for development and innovation prototypes that can be tested at the regional/city level, followed by a wider regional up-scaling.

2.10 Waterford City, Ireland



Photo credit: Matthew Reilly

Surface area: 48.30 km².

Population: 53,504 (2016).

PRIs participant: Yes.

GDP per capita: 127,930 EUR (IE05)

NUTS2: Southern (IE05)

Specialisation areas: Additive Manufacturing, Advanced Transport & Mobility Systems, Applied IoT, Bio-based economy, Biopharmaceuticals and Pharmaceuticals 4.0, Blue Bioeconomy, Blue Energy, Creative Industries, Cybersecurity, Digital service sectors for smart regions, Efficient and Sustainable Manufacturing, FilmTech, Fintech, Future Sustainability & Food Tourism, Marine Technology, Nutritional food & high value ingredients, Precision Agriculture and Smart Farming, SportsTech, Sustainable Finance, Sustainable livestock management, Tech for Tourism Regeneration (IE05)

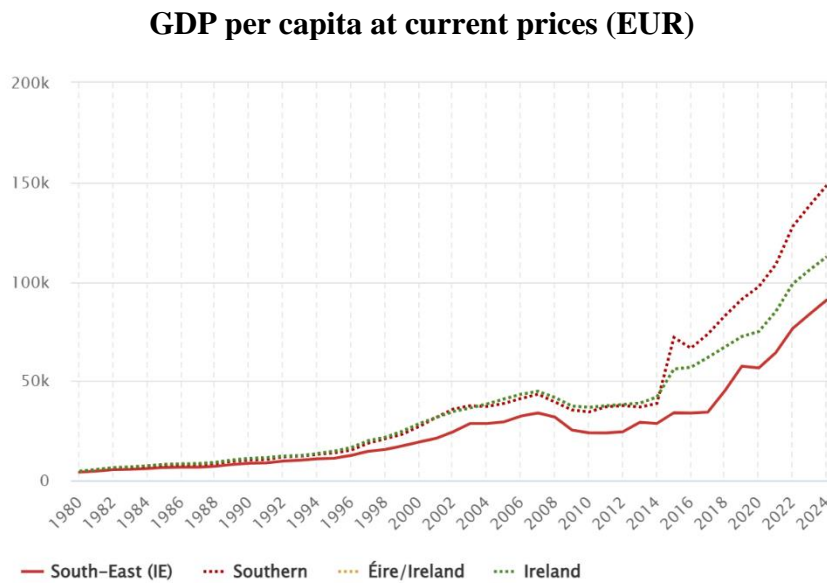
RIS category: Strong Innovator (IE05)

1. Description

Waterford City is the third largest city in the Southern (IE05) Region of Ireland. The Southern Region comprises three NUTS3 category sub-regions: South-East, South-West, and Mid-West. Waterford city is the capital of Waterford County and is the largest city and primary economic area in the South-East (IE052) sub-region. The city is strong in several sectors and is viewed as an investment and innovation hub. Waterford boasts a strong educational and knowledge creation component, being home to the main South East Technical University (SETU) campus. The city has strong representation of multi-national companies, especially within sectors such as Bioeconomy and Biomaterials, Electronics and medical technology, Pharmaceuticals, and Financial Services.

At the sub-region level, the South-East statistics show a rising population, contributing to the overall development potential of Waterford City. The city also has a strong tourism sector, with the South-East region situating itself above the EU27 average in tourism intensity. This is due to the rich natural environment and strong historical tourism heritage of the region, as represented through the national 'Ireland's Ancient East' tourism initiative. The sector boasts a strong economy, with continual progression with regards to employment percentage and GDP per capita growth, spurred on by the attractive region and the city's commitment to entrepreneurship and attracting foreign and direct investment. The region does boast a rising age dependency, though this percentage is slowing due primarily to the influx of both national and international migrants, given the healthy labour market, and relatively good supply of affordable housing stock.

The GDP data reflects the fact that the region is developing economically.



However, the sub-region (South-East) does lag the national average and the NUT2 region of Southern. This can be explained by the concentration of economic investment in the East-Midland region, which incorporates the capital city of Dublin, and the strong multinational component of neighbouring counties

Data source: European Commission - Urban Data Platform Plus

Cork and Limerick. which have historically always been a very strong performing economic areas, when compared nationally.

Despite strong economic performance, the Southern Region faces challenges related to unemployment. Even though the unemployment rate has, since 2012, steadily declined, it remains a considerable concern, exacerbated by the pandemic given the region's strong reliance on the tourism and hospitality sectors. It is viewed that the regions tourism sector is still recovering from the macro-shock of the pandemic. More specifically, the South-East has one the highest rates of unemployment nationally. However, the region's employment rate has shown steady increases over recent years, demonstrating the regions strong opportunity for continued economic and social development.

Waterford City can be described as maintaining strong innovation potential, with several potential initiatives at the sub-regional and urban-area level. The involvement of the city as a pilot in the PRIs provides the city potential to align regional, national, and European priorities, as well as providing the avenue to improve connectivity, digitisation, and inclusion across the city, while fostering a strong focus on achieving designated UN SDGs according to the 2030 Agenda.

2. Smart specialisation strategy 2021-2027

The Smart Specialisation Strategy 2021-2027 for Waterford City was developed at the NUTS2 level, by the [Southern Assembly](#), published as their [Regional Approach for development of a Smart Specialisation Strategy in the Southern Region](#). Waterford City council was integrated as a principal stakeholder in the process, as the region pursued

its intended goal of becoming a resilient, inclusive, sustainable and competitive economy. The process involved a combination of quantitative and qualitative methods and was developed using an evidence-based and participatory approach.

In addition to the S3, the Irish government initiates development of a Regional Spatial and Economic Strategy (RSES), developed also by the Southern Regional Assembly (SRA). The RSES is viewed as a regional implementation of the National Development Plan. To achieve the vision of being a resilient, inclusive, sustainable, and competitive economy, the SRA identifies five principles: Smart Specialisation, Clustering, Placemaking for Enterprise Development, Knowledge Diffusion and Capacity Building. During the development of the region's S3, several methods were used to identify priority areas, including stakeholder interviews, workshops, regional profiling and benchmarking, patent analysis and detailed SWOT analysis at the sub-regional level.

The sub-region (South-East) has been relatively slow at establishing Digital Innovation Hubs (DIH), and this is viewed as an area of improvement. These DIHs are viewed as potentially being to unmask the entrepreneurial and innovation capabilities of the region, especially as they tie in with the knowledge and educational capacity in the South-East.

The regional assembly also communicated a general difficulty with obtaining sub-regional (especially city level) develop statistics and data, due to privacy and GDPR concerns. This sharing of data had to be mobilised at the national level and led to the creation of a specific project entitled EIRO which was led by a knowledge institution, and mandated the task of creating a sub-regional and city level data sharing platform.

3. The entrepreneurial discovery process

The Entrepreneurial Discovery Process is described within the S3 as still evolving but is designated a priority as the process seeks to be both inclusive, participatory, and evidence based. A combination of approaches was utilised to define priority areas and included both sectoral analysis and stakeholder input. The SRA define the EDP as beyond the scope of the S3 report, but also recognises that the participatory process was undertaken to ensure the level of granularity needed to identify potential specialisation areas. Sub-regional SWOT analysis was also a core component and is viewed as an important part of the ongoing monitoring and evaluation processes. The methodological approach to form the analysis included three main dimensions – regional assets, international benchmarking, and entrepreneurial dynamics.

4. Participation in the PRIs pilot

Waterford City is designated as a participant in the PRIs pilot but has not formally begun. The city does not currently have a designated representative that has been

provided the concrete responsibility at the city council level. As it stands, at the regional level (i.e., the SRA) it is not clear who will be responsible for coordinating the cities involvement in the process.

The PRIs concept is viewed as being a potential vehicle for empowerment and ownership at the sub-regional level. The possible existence of a series of pilots that Waterford City could attempt to implement, with continued guidance from both Europe and the regional assembly is viewed a potential net positive. If coupled with direct funding and oversight processes and capabilities, the City could benefit tremendously from the initiative.

Part 3 Conclusions and recommendations for the future of Regional Smart Specialisation Strategies

The present study investigates S3 approaches adopted by regions across Europe, with a particular focus on the pivotal elements established in the current European strategy, such as the full integration of **sustainability, resilience and inclusiveness dimensions**. The study also highlights noteworthy practices for the design, implementation, monitoring and evaluation of S3. Such analysis can stimulate discussion around the extent to which S3 needs to be adapted to local contexts and how LRAs address territorial specificities to be taken into consideration when defining a regional strategy.

The conclusions presented in this report aim to support the evolution of the smart specialisation concept, considering emerging elements brought by the valuable experience of the PRIs initiative organised by the CoR together with the JRC.

In line with the conclusions, recommendations directed towards the EU institutions and the LRAs are formulated. They seek to provide actionable items to strengthen the regional innovation ecosystem in Europe.

3.1 The effectiveness of the S3 model

The achievement of economic and territorial cohesion in Europe is strongly linked with the implementation of effective strategies at a local level. The present study shows that at regional and local levels there is a profound conviction that the future of Europe lies in regional specialisation. Protecting and valuing diversity is one of the main proponents of the European Union and one of the most difficult challenges that S3 needs to address is to make Europe cohesive and competitive at an international level.

In general terms, the current S3 model is deemed efficient, and, for many regions, the current programming period represents the first implementation of the S3 model with all its components. It is possible to identify three macro-groups of regions in relation to their perspective on S3.

A group of regions is characterised by a deep understanding of the S3, mostly derived from previous regional programming approaches, already in place when S3 was introduced. These regions are strongly convinced of the effectiveness of S3 and are interested in following the concept's evolution, while also contributing from a theoretical point of view (e.g., **Navarre Region** and **Azores Region**).

Another group is composed of regions which, in the previous programming, experienced significant shortcomings in adopting the S3 model, either due to obstacles present in their socio-economic contexts, or due to lack of familiarity with regional

programming. However, these regions worked diligently to bridge gaps and paid great attention to the development of S3 for the 2021-2027 period (e.g., **Abruzzo Region** and **Gabrovo Province**).

Finally, there is a group of regions that, in addition to the S3, have also national funded programmes for the regional development. Given the double approach in place, where the funded national one prevails, these regions perceive the S3 added value mostly related to the enabled access to European structural funds (e.g., **Dalarna County** and **Northern Ostrobothnia Region**), and less to the approach itself.

One of the most decisive factors for S3 success undoubtedly lies in the EDP. Furthermore, the process naturally evolves towards an enlargement of the stakeholder base and acts as a continuous mechanism to engage each sub-group of stakeholders. It is important to note that regions which could rely on previously established networks, such as industrial clusters or associations, tend to perform better in the EDP. Better performance is also observed in the regions that carry out the EDP with continuity (Perianez-Forte *et al.*, 2016; Perianez-Forte & Wilson 2021) and that participate in interregional innovation projects, together with the successful transfer of best practices from other regions. Moreover, compared to the previous programming period, the regions are much more aware of the necessity to involve the quadruple helix actors. However, the most prevalent approach involves the triple helix, as it is extremely rare to find regions that include civil society in the EDP. This is mainly due to the difficulty in identifying the right channel and approach to guide them through the expression of their need. In this regard, more guidance would be beneficial for improving regions' capability to fully engage all territorial actors. In this direction, DG REGIO recently launched the [Interregional Innovation Investments \(I3\) Instrument](#) with the aim of supporting both interregional innovation projects and to increase the capacity at regional level to participate in global value chains and enhance their innovation ecosystems.

Recommendation 1. The European Commission shall convey efforts to provide regions, through an appropriate body, with more guidance on effective models to engage civil society in the S3 EDP, accompanied by EU investments and policy guidance, to broaden the stakeholders base and achieve full involvement of the quadruple helix into regional programming.

A pivotal aspect which requires more attention concerns the principle of smart specialisation itself. As discussed, there are different interpretations of the term specialisation. In some cases, it is correctly understood as diversified specialisation and transformation towards higher added value activities. In other cases, it is implemented as a Porter-like strategy, where companies vertically specialise in certain goods or services (Balland *et al.*, 2019; Grillitsch & Asheim, 2018). It is crucial to clarify that the choice regions are called to make concerns the identification of areas where they can specialise in a different way, especially when compared to other regions (Asheim

& Grillitsch, 2017). This aspect also represents a challenge from a political perspective, as selecting the most promising areas in terms of specialisation implies political capacity and willingness (Guzzo & Gianelle, 2021; EC, 2021a). From this perspective, the increasing use of transversal areas may also be interpreted as being used to avoid the politically difficult selection of thematic prioritisation (Foray, 2019; Querejeta, Morgan & Wilson, 2022).

Finally, the PRIs Pilot Action has been largely appreciated by the participating regional and local entities, perceived as a useful expansion of the theoretical framework for sustainable territorial growth with the perspective of exploring new approaches towards the set-up of transformative innovation programmes at both regional and local level.

Recommendation 2. The European Commission, together with the CoR, shall build on the momentum towards the Partnerships for Regional Innovation Initiative to cooperate with LRAs for the integration of the sustainable, resilient and inclusive dimensions in the S3 implementation by promoting a practical framework that leverages best practices and knowledge transfer particularly in view of the ambition of the Commission to develop Regional Innovation Valleys.

3.2 The tools supporting S3 implementation

All tools provided at European level to support the implementation of the S3, were found useful: the Regional Innovation Scoreboard represents a powerful tool to compare and benchmark regional performance, the S3 platform to identify a common taxonomy for the specialisation areas, and the publications, even if in some cases considered too technical, are employed as a method to follow the evolution of the S3 concept.

However, various approaches to smart specialisation at local level highlighted some additional tools that could be useful for strengthening elements.

Stakeholder engagement, crucial for the EDP, still represents a significant challenge in some regions. In particular, the main problem seems to relate to an effective communication implementation that can convey opportunities offered by S3 and the causal chain linking S3 and positive impact on the innovation ecosystem. For this purpose, a repository gathering all regional S3 programmes would allow for a deeper understanding of best practices concerning stakeholder engagement within the associated EDP.

Recommendation 3. The European Commission, together with the CoR, and building on the positive role of the Joint Research Centre, shall implement a common repository for exchanging LRA S3 best practice related to the EDP across European regions.

Moreover, the systemic shocks recently occurring at a global level, such as the COVID-19 pandemic and unfolding energy crisis, made LRAs aware of the importance of reinforcing preparedness and resilience of the regions. Considering this, the performance of foresight analysis to support regional programming is considered crucial. However, according to the findings of the present study, none of the regional S3 teams have this expertise in-house. Therefore, there is an emerging request for training, which could be an occasion to outline a shared European model for regional foresight.

Recommendation 4. The European Commission shall devote specific resources to the provision of foresight analysis training, possibly including it in existing initiatives such as the [Innovation Camps](#). This will be directed towards the LRAs in charge of the S3 design and implementation, to ensure that all the European territories can consider future regional scenarios when addressing their regional programming. LRAs shall create specific roles for such activity.

Furthermore, another important theme is the requirement for a data collection and processing system for the monitoring and evaluation of the S3, both at regional and European level.

Firstly, there exists difficulties in retrieving data at NUTS2 and NUTS3 levels that is useful for S3 development and monitoring. In this regard, closer collaboration with Eurostat and the S3 Platform to outline relevant datasets related to the Smart Specialisation Strategy monitoring and evaluation would be valuable. Furthermore, regions often struggle to implement a suitable monitoring and evaluation system, either because it is perceived as a technical matter, or because they do not have the resources or capacity to develop an efficient technological tool to support data collection and processing.

Recommendation 5. The European Commission shall, with the support of the JRC, seek closer collaboration with Eurostat and Member States' statistics services to strengthen collection of relevant data at the regional level. This will enable better measurement and monitoring of the impact of S3.

At regional level, there are examples of best practices, such as the case of **Catalonia** or **Emilia-Romagna** (here described in Box 3), which implemented a publicly available AI-based dashboard able to automatically categorise projects and present data in a structured manner. At the European level, there is a shared perception of fragmentation of S3 data across different platforms, which seems to prevent a clear representation of S3 implementation. There is also non-negligible risks concerning data duplication. A simple common entry point for regional level data, with the ability to cascade updated information on all S3-related European platforms would simplify and reinforce the monitoring and evaluation process.

Box 3. Best practice: the monitoring platform of Emilia-Romagna

The Emilia-Romagna region together with ARTER, a non-profit consortium of exclusively public undertakings in support of the development of sustainable innovation for Emilia-Romagna region, are to launch a new AI-based monitoring system for the regional S3. Starting from the already [innovative monitoring system](#), the new system is conceived to serve a multi-faceted purpose: the platform gives visibility to the S3, increasing territorial awareness of the regional programme, while capitalising on the value of the information assets in support of the policymaking. Based on the example of the [Catalonia region platform](#) for S3, the platform implements a powerful algorithm to conduct a semantic analysis. It is able to automatically map and categorise all publicly funded R&I activities, enriched by dynamic data visualisation and contextual narratives. This is possible through a machine learning mechanism, which processed hundreds of projects' documents and generalised semantic domains and causal links between concepts. The new platform will be available from March 2023.

3.3 The integration of the S3 new dimensions: Green, Digital and Resilience

The future of the S3 is strictly intertwined with emerging dimensions deemed crucial at the European level to achieve sustainable growth.

The twin transition has been fully integrated by most of the regional strategies. In many cases, the regions found the private sector already convinced to undertake the path towards the digital and green transition. It was viewed as crucial for establishing competitive advantage in the market, and considering lessons learnt from the pandemic.

On the contrary, the dimensions of resilience and inclusiveness are understood differently across Europe. Resilience is often associated with the UN SDGs, while in other cases, it has been applied to a selection of specialisation areas with the ability to increase resilience of the economic system. Many regions, particularly Scandinavian ones, developed their S3 around the UN SDGs, with a special focus on environmental goals. In some regions, alignment with the goals has been challenging because the UN framework encompasses many societal aspects, falling within a broader scope than the S3.

While resilience is perceived as instrumental to the reinforcement of the regional economy, inclusiveness is perceived as merely a social aspect, not in line with the innovation purpose of the S3, and strongly linked with political will. Therefore, depending on the territorial political context, inclusiveness could be translated into policies dedicated to supporting vulnerable or marginable groups, such as the elderly, disabled, or LLGBT+ communities. This could also result in mechanisms for integrating migrants fully into society, especially those that have been forced into irregular migration. Moreover, regions did not find an effective approach to foster inclusiveness within an innovation framework.

Recommendation 6. CoR shall promote the clarification of the concepts of resilience and inclusiveness in the context of the S3 to support the LRAs and to further align with the European strategy and with the international framework of the UN SDGs.

Lastly, some regions also considered another transversal dimension closely related to smart specialisation, which is the upskilling of the human capital in specific specialisation areas S3. This is considered as necessary to implement the strategy within the 7-year programming period. This is interesting reasoning to support the sustainability of S3, while at the same time it is a measure aimed at mitigating the phenomenon of ‘brain drain’, which is widely experienced.

Recommendation 7. In addressing the regional S3 programming, the LRAs shall consider initiatives aiming at training and upskilling the workforce, necessary to implement the research and innovation actions foreseen and to achieve twin transition and sustainable growth in Europe.

3.4 The support of the S3 from the European and national levels

From the findings of the present study, the regions normally organise an S3 team composed of a maximum five people. They are not exclusively dedicated to S3, but usually also carry out other tasks.

In general, a stronger commitment and support to the S3 from the national government, especially in terms of human and financial resources, is widely requested to support the enhancing of the S3 governance and communication among its structures. This is particularly the case for the EDP, as it is viewed as a challenging and time-consuming activity. Opportunities to foster dialogue between regions of the same country would support the improvement of the less-performing regions, spreading good practices at national level. In this regard, there is a marked difference between regions with more economic resources, which in many cases, established an in-house technical consultancy agency. This is contrasted with regions that can only rely on their S3 team. In addition to all the efforts done to reinforce the S3 structure at local level, it can be noted that fostering the establishment of a national technical structure able to provide technical support it would be of great importance for the regions and valuable to balance regional performances concerning S3.

Recommendation 8. In order to achieve cohesion in the research and innovation programming among the regions, the national governments shall consider the creation of dedicated bodies (e.g., agencies) for innovation, aiming at supporting the LRAs in planning and implementing the S3 at the territorial level, making available tailored resources, models and approaches.

On the other hand, the exchange of experiences and practices between European regions resulted were effective when focused on specific aims, such as the peer-to-peer collaboration of **Gabrovo Province** and **Navarre Region** on the green transition in the context of the [Science meets Regions](#) project.

Lastly, almost all the regions found the potential involvement in the EDP of the other European structures present on the territory interesting, such as the ERA Hubs or the EDiHs. In fact, these structures are seen as valuable stakeholders, both for involving the private sector and for the provision of sectoral expertise, particularly for the digital and green transition.

However, in the view of the LRAs, these structures are not seen as suitable for providing support on the S3, because of their specific missions compared to the broadness of the S3. Moreover, there is the firm belief that the added value for the S3 is deeply rooted in the knowledge of the territorial dynamics, which is a unique prerogative of the LRAs.

<p>Recommendation 9. The LRAs shall pursue involvement in the EDP of the European structures and initiatives present at local level. This is viewed as crucial for a synergic and aligned use of European resources and expertise.</p>

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Annex II. S3 Acceleration Index values

	D1 Human Capital	D2 Value Added	D3 Education	D4 Research	G1 Waste	G2 Air	G3 SDGs	G4 Research	S3A Index
Lower Austria Region (AT12)	51,2%	52,7%	47,2%	27,1%	81,4%	51,3%	80,0%	28,0%	52,3%
Wien (AT13)	46,5%	35,2%	50,4%	8,3%	89,2%	72,4%	100,0%	17,5%	52,4%
Burgenland Region (AT11)	52,2%	54,9%	43,9%	38,0%	63,4%	69,4%	40,0%	65,0%	53,3%
Oberösterreich (AT31)	43,3%	27,4%	54,3%	31,8%	43,2%	70,0%	60,0%	1,8%	41,5%
Salzburg (AT32)	52,9%	51,4%	46,6%	27,6%	70,9%	0,0%	60,0%	3,0%	39,1%
Vorarlberg (AT34)	54,4%	55,0%	50,3%	43,1%	75,1%	64,2%	40,0%	2,3%	48,0%
Tirol (AT33)	53,9%	47,0%	42,7%	15,7%	58,9%	58,1%	40,0%	2,5%	39,9%
Brussels Capital Region (BE1)	47,0%	48,6%	40,1%	13,1%	64,8%	73,3%	20,0%	4,4%	38,9%
Walloon Region (BE3)	50,8%	47,9%	46,0%	24,4%	70,8%	73,0%	60,0%	4,7%	47,2%
Prov. Brabant Wallon (BE31)	45,9%	37,7%	64,4%	53,1%	6,0%	62,0%	80,0%	100,0%	56,1%
Prov. Luxembourg (BE34)	58,3%	53,0%	54,7%	11,8%	100,0%	89,9%	80,0%	18,9%	58,3%
Prov. Hainaut (BE32)	90,5%	53,7%	48,8%	13,0%	100,0%	92,7%	60,0%	40,9%	62,4%
Prov. Liège (BE33)	31,5%	3,6%	84,5%	11,6%	100,0%	100,0%	60,0%	0,0%	48,9%
Prov. Namur (BE35)	23,3%	62,4%	38,5%	7,9%	100,0%	0,0%	60,0%	20,3%	39,1%
South-Central Region (BG42)	54,1%	51,9%	71,0%	21,0%	100,0%	99,0%	60,0%	22,6%	59,9%
Northwest Region (BG31)	71,7%	41,8%	48,1%	6,4%	100,0%	100,0%	60,0%	5,0%	54,1%
Central Bohemian Region (CZ02)	68,7%	100,0%	24,9%	61,3%	58,0%	70,7%	80,0%	21,3%	60,6%
Prague Region (CZ01)	45,6%	100,0%	11,8%	0,0%	50,0%	0,0%	40,0%	1,6%	31,1%
Capital Region (DK01)	63,3%	100,0%	54,6%	2,5%	100,0%	75,8%	40,0%	0,2%	54,6%
Zealand Region (DK02)	56,6%	97,4%	66,2%	7,8%	100,0%	53,5%	60,0%	5,3%	55,8%
Helsinki-Uusimaa Region (FI1B)	45,0%	28,1%	56,6%	15,6%	100,0%	63,1%	100,0%	65,7%	59,3%
Åland Islands Region (FI2)	32,4%	59,7%	36,0%	11,8%	100,0%	20,0%	100,0%	7,5%	45,9%
Northern Ostrobothnia Region (FI1D9)	62,4%	40,1%	41,2%	61,0%	52,1%	24,8%	80,0%	100,0%	57,7%
Brittany Region (FRH)	46,6%	32,1%	39,9%	0,0%	6,7%	0,0%	60,0%	0,0%	23,2%
Île-De-France Region (FR1)	53,0%	42,7%	0,0%	61,1%	44,7%	79,2%	60,0%	6,3%	43,4%
Thuringia Region (DEG)	100,0%	20,0%	53,0%	16,0%	49,0%	66,8%	80,0%	1,1%	48,2%

Hamburg Region (DE6)	29,6%	43,6%	57,3%	10,4%	40,3%	87,3%	80,0%	2,9%	43,9%
Attica Region (EL3)	55,3%	1,2%	36,1%	50,0%	45,7%	77,8%	100,0%	1,9%	46,0%
South Aegean Region (EL42)	40,0%	37,9%	49,5%	12,2%	39,8%	51,5%	60,0%	13,1%	38,0%
South Transdanubia Region (HU23)	47,3%	40,4%	63,6%	62,0%	80,4%	72,8%	80,0%	8,2%	56,8%
Budapest Region (HU11)	31,8%	30,0%	80,5%	19,7%	100,0%	66,4%	100,0%	5,3%	54,2%
Eastern And Midland Region (IE06)	49,2%	63,7%	66,7%	2,9%	59,0%	69,8%	60,0%	5,2%	47,1%
Northern And Western Region (IE04)	55,0%	62,3%	80,5%	7,3%	26,1%	61,7%	60,0%	21,4%	46,8%
Abruzzo Region (ITF1)	61,5%	100,0%	73,1%	39,3%	21,0%	16,8%	100,0%	48,8%	57,6%
Calabria Region (ITF6)	74,2%	5,4%	73,9%	26,6%	33,5%	0,0%	80,0%	28,4%	40,2%
Veneto Region (ITH3),	37,7%	25,4%	47,3%	16,9%	54,9%	17,6%	80,0%	3,6%	35,4%
Limburg Region (NL42)	36,3%	28,6%	23,9%	12,0%	100,0%	66,0%	60,0%	2,7%	41,2%
Friesland Region (NL12)	43,6%	29,3%	0,0%	10,3%	61,9%	31,2%	60,0%	7,8%	30,5%
Northern Netherlands Region (NL1)	15,8%	17,8%	77,8%	10,1%	56,4%	68,3%	80,0%	29,4%	44,4%
Mazovia Region (PL92)	38,7%	42,6%	89,0%	0,0%	87,0%	89,2%	100,0%	7,6%	56,8%
Malopolska Region (PL21)	No data	40,9%	84,1%	4,8%	80,8%	81,1%	0,0%	13,1%	No data
North Region (PT11)	100,0%	65,6%	49,4%	0,4%	10,4%	86,1%	60,0%	1,1%	46,6%
Azores Region (PT2)	91,9%	75,1%	41,2%	3,0%	23,3%	57,3%	40,0%	25,3%	44,6%
Bucharest-Ilfov Region (RO32)	98,1%	95,2%	100,0%	34,9%	92,9%	54,3%	100,0%	7,4%	72,9%
South-West Oltenia Region (RO41)	73,8%	33,8%	24,3%	5,6%	1,5%	0,0%	100,0%	71,0%	38,8%
Eastern Slovakia Region (SK04)	51,6%	86,4%	53,5%	13,2%	14,1%	24,8%	40,0%	35,1%	39,9%
Bratislava Region (SK01)	29,8%	66,8%	34,1%	1,6%	100,0%	41,6%	100,0%	3,6%	47,2%
Rioja Region (ES23)	49,1%	47,3%	95,5%	2,6%	42,4%	71,6%	80,0%	13,4%	50,2%
Basque Country (ES21)	57,6%	21,5%	47,8%	7,5%	22,0%	50,0%	80,0%	23,1%	38,7%
Navarre Region (ES22)	42,9%	15,3%	52,2%	65,1%	48,6%	28,2%	80,0%	3,5%	42,0%
Stockholm County (SE11)	41,6%	33,7%	61,6%	100,0%	63,5%	36,9%	80,0%	24,7%	55,3%
North Middle Sweden Region (SE31)	46,3%	28,2%	0,0%	66,2%	100,0%	17,4%	0,0%	4,8%	32,9%

Annex III. Questionnaire for the case studies

Topic: overall satisfaction with the S3 process and periodic monitoring via existing tools at national and European level (the S3 platform, RIS scoreboard, JRC/DG REGIO analyses, etc.).

- For the S3 planning, which tools did you take into consideration at national and European levels? (ex. S3 platform, RIS scoreboard, JRC/DG REGIO analyses etc.)
- Are you satisfied with these instruments?
- Which instruments are missing and would be beneficial for the S3 process?
- How often the preparatory meetings for the S3 design take place before its adoption? And how often the meetings related to the S3 implementation take place during the 7-year programming period?

Topic: new elements to be included in the future S3 concept (sustainability, inclusiveness, resilience, and in particular also foresight aspects).

- Are you familiar with the new S3 dimensions (e.g., sustainability, inclusiveness, resilience, and in particular also foresight aspects)?
- Did you include any of the above for the S3 2021-2027?
- If not, do you plan to include them and in which way?
- If yes, how did you include them in the S3?
- Can you give us an example of how inclusiveness is pursued in the S3 of your region/city?

Topic: to work out whether the process of regional S3 design and evaluation should include some new steps and be carried out more frequently, while involving new players beyond the city or region – i.e., from the European and national level to support them.

- How is the regional S3 design and evaluation in your region currently shaped?
- Would you say that the twin transition has been fully embedded by the current S3 in your region/city?
- If yes, how?
- If not, why?

- Should the process of regional S3 design and evaluation include (i) other elements/steps, (ii) carried out more frequently (iii) involving new players beyond the city or region (European/national levels)?
- If yes, which elements/steps/frequency/players?
- If not, why?
- Which is the added value that would be lost if the S3 were abolished?

For regions and cities part of the PRIs pilot:

- Among the new elements of the PRI, which one is the most interesting in your opinion?
- In your opinion, what elements could be improved in the PRIs process?

Topic: whether the EU and Member States should provide funding and expertise for creating more permanent structures (e.g., at NUTS2 level) to facilitate this process locally. These latter could, for instance, be the ERA Hubs or similar structures, driving the "entrepreneurial discovery process" on a permanent basis and providing continuous information to national and European authorities about S3 implementation.

- Is there a dedicated team for the S3 in your region/city? If yes, how many people and which expertise they have?
- Do you think EU and Member States should provide funding and expertise for creating more permanent structures (e.g., at NUTS2 level) to facilitate this process locally?
- How do you think would fit the European Digital Innovation Hubs in driving the "entrepreneurial discovery process" on a permanent basis?
- In alternative, in your opinion is there another local European initiative that could carry out this task on a permanent basis?

Annex IV. Smart Specialisation Strategies

[Burgenland Region](#) (AT11)
[Lower Austria Region](#) (AT12)
[Wien](#) (AT13)
[Oberösterreich](#) (AT31)
[Salzburg](#) (AT32)
[Tirol](#) (AT33)
[Vorarlberg](#) (AT34)
[Brussels Capital Region](#) (BE1)
[Walloon Region](#) (BE3)
[South-Central Region](#) (BG42)
[Northwest Region](#) (BG31)
[Central Bohemian Region](#) (CZ02)
[Prague Region](#) (CZ01)
[Capital Region](#) (DK01)
[Zealand Region](#) (DK02)
[Helsinki-Uusimaa Region](#) (FI1B)
[Åland Islands Region](#) (FI2)
[Northern Ostrobothnia Region](#) (FI1D9)
[Brittany Region](#) (FRH)
[Île-de-France Region](#) (FR1)
[Thuringia Region](#) (DEG)
[Hamburg Region](#) (DE6)
[Attica Region](#) (EL3)
[South Aegean Region](#) (EL42)
[Hungaria](#) (HU)
[Eastern and Midland Region](#) (IE06)
[Northern and Western Region](#) (IE04)
[Abruzzo Region](#) (ITF1)
[Calabria Region](#) (ITF6)
[Veneto Region](#) (ITH3),
[South Netherlands](#) (NL4)
[Northern Netherlands Region](#) (NL1)
[Mazovia Region](#) (PL92)
[Małopolska Region](#) (PL21)
[North Region](#) (PT11)
[Azores Region](#) (PT2)
[Bucharest-Ilfov Region](#) (RO32)
[South-West Oltenia Region](#) (RO41)
[North-West Region](#) (RO11)
[Eastern Slovakia Region](#) (SK04)
[Bratislava Region](#) (SK01)
[Rioja Region](#) (ES23)
[Basque Country](#) (ES21)
[Navarre Region](#) (ES22)
[Stockholm County](#) (SE11)
[Dalarna County](#) (SE312)
[Gävleborg](#) (SE313)
[Värmland](#) (SE311)
[Gabrovo Province](#) (BG322)

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