STARS EU

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Smart specialization strategies

Current involvement of STARS EU partners and opportunities for interregional cooperation

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Work package 2 – Regional transition accelerator

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Executive summary

The partners of STARS EU – STrategic Alliance for Regional Transition - work together since 2019. The partner HEIs teachers' and researchers' communities focus at this point on seven common priority areas, through joint research and educational activities. Each partner HEI is located in a non-capital European region, and contributing to implementation of the regional smart specialization strategy (S3). The European union co-funded alliance's project has started in November 2023. Amongst the first activities being implemented, Work package 2 – Regional transition accelerator starts with an in-depth assessment of the S3, in order to confirm synergies and complementarities within the STARS EU priority areas.

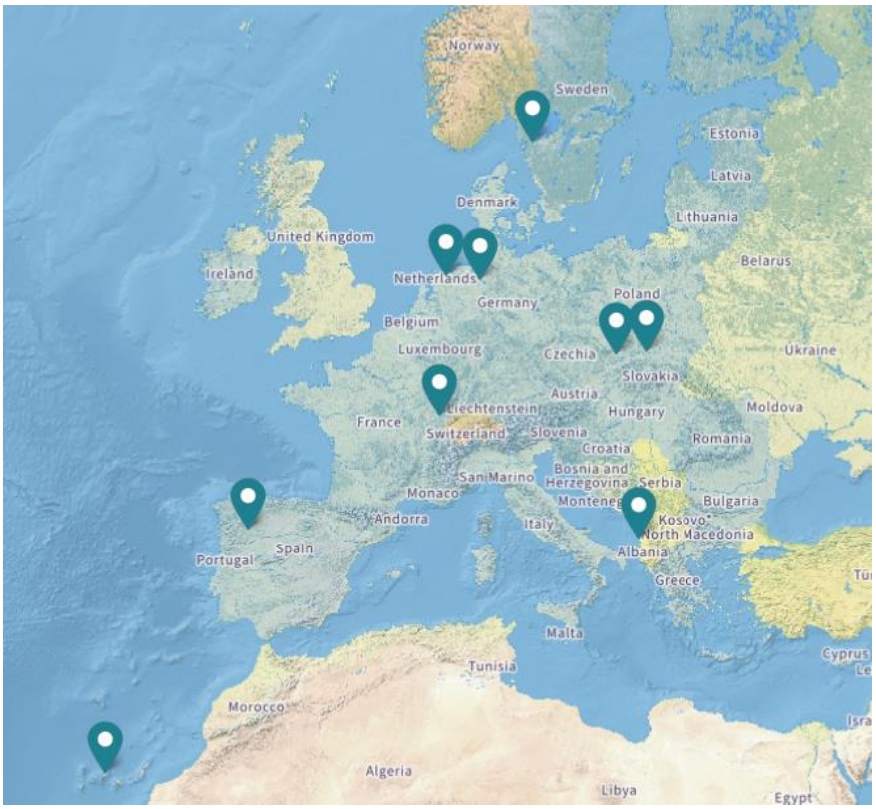


Figure 1 - Full partners of STARS EU. https://education.ec.europa.eu/education-levels/higher-education/european-universities-initiative/map

The STARS EU project aims to capitalize on the partner regional strengths, but also to identify needs for academic support to skills and knowledge development, as well as opportunities for innovation regarding regional transitions, through a cross-sectoral interregional approach, building on the partner HEIs' strengths.

Starting from the S3 as place-based approaches, the STARS EU partners build on the assets and resources available in each partner region and on their specific socio-economic challenges, in order to focus on the opportunities for cross-sectoral and interregional approaches to address the STARS EU Priority Areas and efficiently connect.

This in-depth assessment of the S3 of the partners' hosting regions provides some valuable new insights regarding the involvement of STARS EU partners and other R&I structures in the implementation of the regional specialization priorities through knowledge development and involvement in innovation and entrepreneurial strategies.

Firstly, it confirms the matching of the STARS EU Priority areas with the regional specialization priorities. Thus, healthy ageing, digital transformation, living spaces, arts and

creative industries, entrepreneurship and innovation, energy transition and circular economy are relatively well connecting to the regional priorities for innovation.

Furthermore, the analysis highlights complementary fields of research and innovation in the STARS EU Priority Areas and beyond. It also brings to light some partner specific focuses and regional challenges, thus identifying needs for joint knowledge development and innovation as well as additional accents in the STARS EU Priority areas.

Thirdly, it appears that some of the STARS EU Priority areas should be more specifically addressed from a cross-sectoral perspective. Indeed, Entrepreneurship & innovation, as well as Digital transformation, are considered in most of the S3 as supporting sectors to the regional priorities. The STARS EU Priority area Living spaces does not occur at all as such in most regional strategies. However, it must be underlined that all of the regional priorities somehow contribute to this objective. This cross-sectoral perspective might need a stronger emphasis in the STARS EU approach.

Finally, an interesting insight of the S3 assessment is that almost all the regions identify the production industry, notwithstanding regional variations, as a specific priority, with a particular emphasize on sustainability. So far, this priority has not been addressed as such as a STARS EU priority area, and might be considered as a necessary additional thematic approach. In addition, a social and societal approach of sectoral challenges, such as for example equal access to health services, might be of high added value.

This report presents these findings, the regional ambitions and needs, as well as the partners' actual involvement in the regional priorities, more in detail. The outcomes will feed the activities in the fields of research and innovation as foreseen in the STARS EU project through cross-sectoral and interregional collaboration, thus empowering regional transitions.

Partners regional identities compared

All the partner HEIs are located in non-capital regions. Besides this common geographical characteristic, important disparities appear when observing the regional sizes, the population density, the GDP per capita and – for some regions – the employment rates.

For the purpose of consistency with the NUTS-level used for the regional smart specialization strategies, the data presented in the table below refer to this same level. However, there is no European data base available on S3-level. Therefore, different sources with different years of reference had to be combined.

REGION	Area km2	Population	Population per km2	GDP (million EUR)	GDP per capita (EUR)	Employment rate (%) age group 15-64
Västra Götaland N3	28 778	1 744 859	60,6	50 214	28 778	69***
Terras de Trás-os-Montes N3	5 543	107 020	19,3	1 332	15 810	75,9
Alto Tâmega	2 921,91	83 801	28,7	1 115	13 309	70,6
Portugal Norte N2	21 286	3 609 978	170,6	65 578	18 166	79,1
Groningen N2	2 960	596 000	201,3	25 636	37 500	80,0
Noord Nederland N1	9 082	1 741 932	191,8	64 656	63 200	80,0
Bremen N1 *(according to S3 CoP Observatory)*	420	676 463	1 610,6	34 369	46 469	70,2
Malopolska N2	15 108	3 430 370	227,0	47 231	23 000	68,8
Canary Islands N2	7 447	2 252 237	302,4	42 656	20 100	59,1
Moravia Silesia N2	5 427*	1 189 674*	219,2	21 184	23 600	72,9
Franche-Comté N2	16 202	1 179 601	72,8	32 524	25 300	70,6
Bourgogne-Franche-Comté N1	48 062	2 800 000	58,2	81 711	29 258	73
Albania**	28 748	2 761 785	96,1	17 500	4 023	67,1

Figure 2 - Regional data compared

General sources: Eurostat or S3 CoP Observatory + regional statistic services or input from partners

In blue: level of report into the S3 CoP Observatory

*source: Wikipedia **source: UAMD + Instat Albania ***age group 15-74

Method

The regional specialization strategies

The analysis has been based on the S3 related to the 2021-2027 period in regions where the partner HEIs operate, with one exception and some specificities. Firstly, in this analysis, UAMD refers to a national strategy for Albania since there is no smart specialization strategy available on regional level. It should furthermore be noted that the other S3 analyzed have been based on different NUTS levels. Of the smart specialization strategies in this analysis, four of them are produced at NUTS2-level, three at NUTS1-level and one at NUTS3-level. This has been particularly challenging, especially with regards to common understanding and to comparison of the partners' regions. Numberings seem to differ from one country to another.

There is a difference in the level of interconnection between the partner institutions and the regions at the chosen level. For some higher education institutions in the alliance, this is the natural level of cooperation, and the connections are clear, while for other partner universities, the regional cooperations appear almost exclusively at a more sub-regional level and connections to NUTS- level chosen for the S3 are not always easy to identify. However, in the case of HSB, the zone of influence appears to be bigger than the size of the Land Bremen, and cooperation appears to be transregional, with neighboring Länder. The involvement of universities in the development of the strategies therefore also varies. Some partner HEIs implemented the regional priorities in the organization of their research activities, whereas in the case of other partner HEIs this connection was established in the opposite sense; thus, some S3 have been elaborated based amongst others on the HEI strengths in research and innovation.

Data collection and analysis

For the purpose of this report, data collection was conducted using a qualitative method to gain insights into the research and innovation strategies for smart specialization (S3) of each region of the HEI of the alliance, as well as into the partners' involvement in these. The partner HEIs thoroughly read the S3 (or equivalent in some cases)[1] and answered a comprehensive questionnaire[2], which was developed based on relevant elements for smart specialization strategies.

The questionnaire data was collected over a period of two months. Due to the limited time available, as well as to the fact that not all the strategies were available in English or at the NUTS level of the region concerned, the findings presented in this report are principally based on the responses to the questionnaires completed by the partners. However, there are some differences in the completeness and/or in the availability of the information. Some shortcomings in the available information might subsist.

[1] See References
[2] See Annex 1

The questionnaire is structured around twelve questions and was to be answered once for each regional priority mentioned in the S3.

Q1 informs on the scope of the regional priority and what it thematically implies for the HEI's region

Q2 pinpoints which type of quintuple helix actors are implicated in the HEI's regional ecosystem

Q3 lists the main regional stakeholders implicated in the regional priority – useful for subsequent tasks in other tasks of Work package 2

Q4 informs about funding options available in each HEI's region in a given priority

Q5 informs about support structures available in each HEI's region in the context of innovation and entrepreneurship

Q6 lists public policies concerned with a given regional priority – useful for subsequent tasks in work package 2

Q7 informs whether HEI regions partake in the same international/European cooperation structures or in cooperation structures sharing the same objectives

Q8 lists assets and strengths of HEIs region surrounding a given regional priority

Q9 lists areas of focus and strengths of each HEI in each regional priority to pinpoint convergences

Q10 lists needs and ambitions of HEI and its region in each regional priority to pinpoint (using Q8 and Q9) where partner HEIs and their regions can help

Q11 brainstorms how STARS EU Common Research Agenda could help with needs and ambitions listed in Q10

Q12 links regional priorities to STARS EU Priority Areas

Part of the input from the partners will be further investigated outside the scope of this report. Thus, the main regional stakeholders identified could take place in the STARS EU Living labs, which will be established in the framework of the STARS EU project, WP 2. Available funding opportunities (Q4) have particular relevance for the STARS EU Joint Research Agenda (WP4) as well as for the Thematic interest groups. This information is not extensively listed in this report, but will be handed over to the corresponding task teams.

Choices and constraints

For relevance purposes, the questionnaire and comparative analyses include information related – closely or loosely – to the region and ecosystem surrounding the geographic areas of involvement of the partner HEIs in each S3 priorities. This choice was made to prevent the inclusion of copious amounts of data unrelated to the partner HEIs, which are central to the analysis and to the STARS EU project.

The HEIs' regional priorities were grouped together into the following broad themes: Health, Digitalization, Mobility, Agrofood and Biobased materials, Production industry, Energy, and Tourism, leisure & creative industries. The collected data were analyzed by cross comparing the results of the same question answered by partner HEIs in each grouped theme.

A sector-based approach is not the optimal approach for a comparison, seeing as in some S3, one sector can be stand-alone, or can be part of another priority, or could be a transversal priority, thus englobing many regional priorities at once. However, this approach was preferred to a STARS EU Priority Areas-based approach as it prevented discarding some regional priorities of interest to the HEIs and their region.

Moreover, this approach does not eclipse the importance of the STARS EU Priority Areas, as the broad themes chosen to englobe the regional priorities are directly related to them. Some of the STARS EU Priority areas are eponymously associated with certain themes, such as Healthy Ageing with Health, Digital Transformation with Digitalization, Energy transition with Energy, and Arts and creative industries with Leisure, tourism & creative industries. Some STARS EU Priority Areas, such as Entrepreneurship & Innovation, Circular Economy, Living Spaces and Digital Transformation, appear as transversal and englobe many of the broad regional thematic priorities. These cross-sectoral relations are discussed in the thematic chapters hereafter.

General findings

Thematic priority areas covered

The partners' regional smart specialization strategies cover each between four and seven priority areas, not taking into account the priorities some regions qualified as crosscutting. The most occurring priorities for smart specialization are:

- Digitalization, Production industry (9 S3)
- Health, Energy (8 S3)
- Leisure, tourism and Creative industries (7 S3)

The other priority areas reflected as such in the partners' S3 are: Agrofood & Biobased materials (6), Mobility (5).

Interpretation of this classification should be done prudently, for at least two reasons. First of all, the scope of a priority is not always defined in the same way, and priorities are considered in some S3 as sub-sectors (digitalization or food supporting health for example). Secondly, sectors are often interconnected. This is for example the case for energy, presenting clear challenges related to mobility and production industry.

Analysis through the perspective of STARS EU Priority areas

As mentioned in Method, the STARS EU thematic Priority areas are generally well reflected in the S3, especially Energy transition, Digital transformation and Healthy ageing. Other Priority areas, however, appear less clearly, since their scope is very cross-cutting. This is for example the case of Living spaces, Circular economy and Entrepreneurship & Innovation.

STARS EU Priority Area/ HEI and region	Digital transformation	Energy transition	Circular economy	Healthy Ageing	Entrepreneurship and Innovation	Arts and Creative Industries	Living Spaces
CUT/Malopolska	Information and Communication Technologies	Sustainable Energy		Life Science		Creative and leisure industries	
HSB/Bremen	Digital Transformation	Hydrogen and wind energy	Sustainable Economy and Resource Efficiency	Healthcare		Cultural industries	Tourism management
HUAS/Noord-Nederland	Transition from analog to digital	Transition from fossil to sustainable energy	Transition from a linear to circular economy	Transition from care to (positive) health		Cultural and Creative Industries	
HV/Västra Götaland	Digitalization	Renewable energy		Health and Life Science		Culture and Creative Industries	
IPB/Portugal Norte	Digital transition	Sustainable Mobility and Energy Transition	Technologies, State, Economy and Society	Health and Life Sciences		Creativity, Fashion and Habitats	Tourism Services and Territorial Assets
SUO/Moravian-Silesian	Digitalization	New Energy		Health and a Healthy Lifestyle			
UAMD/Albania	ICT Sector	Energy sector and Renewable Energy		Healthcare and medicine			Tourism
UFC/Bourgogne-Franche-Comté	Digital transformation	Hydrogen for energy and economy transitions		Individualized and integrated healthcare			
ULL/Canarias	Digitalization			Health and wellness	Emerging industries		Digital and sustainable tourism

Figure 3 - Regional S3 focuses as they correspond to the STARS EU Priority areas

Analysis through the perspective of the thematic regional smart specialization priorities

Firstly, it is interesting to observe that all the STARS EU Priority areas are well covered in the S3. Turning the comparison the other way around, the production industry sector appears very strongly, although with different accents, in almost every S3, without being a STARS EU Priority area at this stage.

Theme/ HEI and region	Health	Digitalization	Mobility	Agrofood and Biobased materials	Production industry			Energy	Creative, tourism and leisure industries	
CUT/Malopolska	Life Science	Information and Communication Technologies			Production of Metals, metal products and non-metallic mineral products	Electrical engineering and machine industry	Chemistry	Sustainable energy	Creative and leisure industries	
HSB/Bremen	Healthcare	Digital Transformation	Future Mobility	Food and beverage trading and production	Connective and Adaptive Industry			Hydrogen and wind energy	Cultural industries and tourism management	
HUAS/Noord-Nederland	Transition from care to (positive) health	Transition from analog to digital	Sustainable mobility and transport	Agro, biobased/ circular economy (CE), water technology etc	Circular economy and Smart Manufacturing Systems			Transition from fossil to sustainable energy	Cultural and Creative Industries	
HV/Västra Götaland	Health and life science	Digitalization	Sustainable Mobility for the Future	Food and Bio-based Materials	Sustainable industry			Renewable energy	Culture and creative industries	
IPB/Portugal Norte	Health and life sciences	Digital transformation	Sustainable Mobility	Agro-Environmental and Food Systems	Industrialization and Advanced Manufac-turing Systems	Technologies, State, Economy and Society		Energy Transition	Creativity, Fashion and Habitats	Tourism services and territorial assets
SUO/Moravian-Silesian	Health and a healthy lifestyle	Digitalization			Automation and Robotics			New energy		
UAMD/Albania		ICT sector		Agriculture, forestry and fishing	Manufacturing			Energy sector and renewable energy	Tourism	
UFC/Bourgogne-Franche-Comté	Individualized and integrated healthcare	Digital transition	Smart, sustainable and innovative mobility	Sustainable food	Microtechniques and smart systems		Advanced materials and processes	Hydrogen for energy and economy transitions		
ULL/Canarias	Health and wellness	Digitalization			Emerging industries	Blue economy industry	Astrophysics, space and aeronautics industry		Digital and sustainable tourism	

Figure 4 - Regional focuses grouped in thematic priorities

Within these large S3 priorities, interesting accents appear between the regional strategies. Regarding health for example, the main characteristics are either healthcare, life sciences/engineering, or smart and digital services. This will be addressed in more detail in the thematic comparison herafter.

Partners' institutional involvement in S3 priorities

Based only the answers in the partners' questionnaires, it is very difficult to draw up comprehensive conclusions on partner specific strengths, even by S3 priority. This will need to be addressed in more detail by the Thematic interest groups (TIGs) bringing together researchers and teachers of the HEI partner institutions related to the STARS EU Priority areas. Institutional awareness of the existing connections between the partner institutions and their S3 can be improved in many cases.

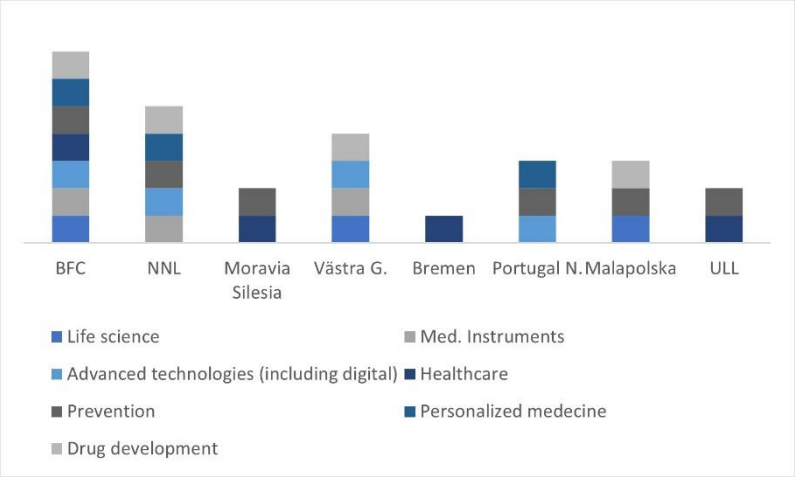
Thematic comparison

Health

Regional accents and interregional similarities

Health is one of the sectors being of high priority in most of the regions, being addressed by eight S3. The ageing of populations is a common reality, which is addressed in different ways.

Figure 5 - Region-specific focuses regarding smart specialization in Health



Some regions are highly scientifically or technologically specialized, whereas others have a strong ecosystem focusing on prevention.

Bourgogne-Franche-Comté has the most comprehensive approach. The region is highly specialized in individualized therapies and medical precision instruments, due to its specialization in microtechnologies and micromechanics. Precision health is also highly developed in Västra Götaland. Life science is an important focus of Bourgogne-Franche-Comté, Västra Götaland and Malopolska. Technology driven and supported healthcare is a high priority for Portugal Norte. Bourgogne-Franche-Comté, Västra Götaland, Malopolska and Noord Nederland are specialized in (personalized) drug development. Prevention is the main priority in Noord Nederland and Malopolska, as well as in Moravia Silesia, where community care is also highly supported and promoted, and in the Canary Islands who target infectious diseases due to the proximity of Africa, and diabetes. Sustainability and resilience of the healthcare system are an import concern in Portugal Norte.

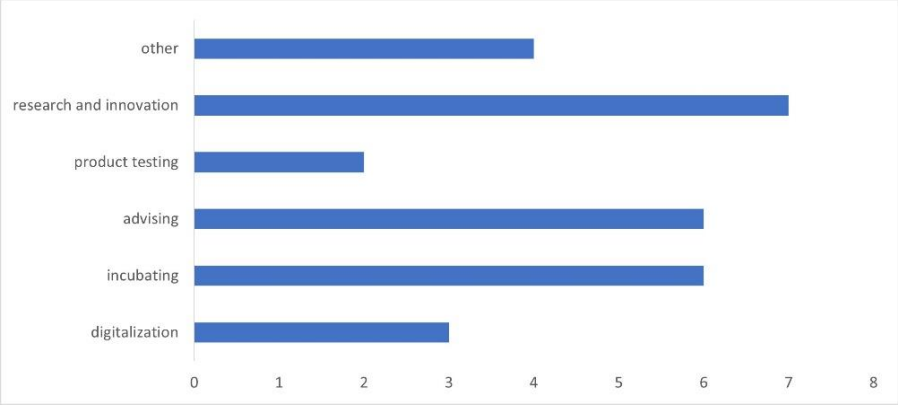
Regional ecosystems

Health benefits from important public support in all the eight regions concerned by this priority. All of them, except for Moravia Silesia, demonstrate strong involvement by companies and academia as well. Environment is included in the quintuple helix of Noord Nederland and Portugal Norte, whereas civil society is involved in this priority in Noord Nederland and Moravia Silesia, in accordance with the focus of these regions on prevention and community care.

Available non-financial support to the priority

Research and innovation in health are supported in most of the regions concerned: Västra Götaland, Malopolska, Bourgogne-Franche-Comté, Bremen, Portugal Norte, the Canary Islands and Noord Nederland. Digitalization of health systems is supported in Bourgogne-Franche-Comté, Noord Nederland and Portugal Norte. The ecosystems of Noord Nederland and Bourgogne-Franche-Comté also provide support to product testing. Advising and incubating services are available in Noord Nederland, Malopolska, Portugal Norte, Västra Götaland, the Canary Islands and Bourgogne-Franche-Comté. Other region-specific services

Figure 6 - Available non-financial support services



are operational in Moravia Silesia (intergenerational cooperation and active ageing), Noord Nederland (prevention networks), Västa Götaland (business development) and Bourgogne-Franche-Comté (lifelong learning programs).

Related public policies at regional level

In addition to the classical strategic development plans and funding, some regions implement health specific policies, such as Moravia Silesia community planning, that integrates health services, active ageing programs, and environmental protection initiatives for the benefit of public health. Portugal Norte provides public support to foster technology transfer initiatives and promote sustainable and resilient health systems.

Existing European and international cooperation

Besides European funded projects, such as Fallwatch involving SMEs, significant international networks involving the regions' ecosystems are the Alliance for healthy ageing (Noord Nederland), Hacking Health (Bourgogne-Franche-Comté) and Medtech Europe, in which Västra Götaland is involved. Strong (trans)regional and national cooperation structures exist as well, mainly aiming to support SME development.

Regional strengths

Five regions stand out for their comprehensive range of strengths: Malopolska, Bourgogne-Franche-Comté, Noord Nederland, Portugal Norte and Västra Götaland. Many region-specific driving forces within the ecosystems occur as well, thus demonstrating the importance of the priority – with some regional accents – as such. The main regional strengths mentioned by the partners are the high priority level in public policies (all regions), strong involvement of academia (all except Moravia Silesia), human capital (all except Bremen and Moravia Silesia), and important support to innovation (all except Moravia Silesia). Västra Götaland, Noord Nederland and Bourgogne-Franche-Comté host a university hospital. Strong involvement of the private sector in R&D and innovation is reported for five regions: Noord Nederland, Portugal Norte, Malopolska, Västra Götaland and Bourgogne-Franche-Comté. The three latter mention the drug industry as a regional strength as well. Finally, the comprehensive approach of environmental health, active ageing and community well-being is considered as a strength in Moravia Silesia, Portugal Norte and Noord Nederland.

Partner HEIs' involvement in the priority

The seven partner institutions concerned are all involved in applied research, and three of the (UFC, ULL and IPB) carry out fundamental research in health. Regarding education, all partners, also the ones of which health is not a smart specialization priority, offer educational programs, except for Silesian university in Opava. HUAS, HV, and UFC are involved in cocreation projects. Spin offs and startups are mentioned by HUAS, IPB, UFC and CUT, the two latter having a strong experience in technology transfer.

Healthcare, health prevention and promotion, as well as healthy ageing, are the most mentioned expertises. In addition to these, UFC is highly specialized in Medical and biomedical technologies, Telehealth and telesurveillance predictive platforms for health purposes, Catastrophe simulation in health and medicine with focus on university hospitals for risk management, Use of technology in accurate, non-invasive and cost-effective screening tests for cancer, as well as in Pharmacy and radio pharmacy. ULL hosts two internationally recognized research institutes: the Institute of Biomedical Technology (ITB) and the Institute of Neuroscience. Their research lines include the development of tools for the early diagnostic of neurological diseases such as Parkinson's and Alzheimer's, the cellular mechanism of channelopathies, asthma and its genetic basis, and the study of renal function, obesity, and diabetes, to name but a few. The ITB recently got a very important project on these later topics (DOKI) within the framework of the twinning call (Widening program of the Horizon Europe).

Regional ambitions and needs

Digitalization (telemedicine and telehealth), the shortage of skilled workers and medical desertification are the main challenges mentioned. Another frequently mentioned ambition is the development of preventive care and facilities for fostering active and healthy lifestyles.

Expected added value of the STARS EU common research agenda in strengthening the priority

The different aspects of health and the main regional challenges are partially addressed in the STARS EU Priority area Healthy ageing, focusing on prevention and healthcare. Interdisciplinary and cross-sectoral cooperation with other STARS EU Priority areas, mainly Digital transformation and Living spaces, could be of high added value. Partner HEIs' regions in the priority of Health benefit from the presence of non-financial support structures on their territory, providing services of advising, incubating, digitalizing, product-testing, innovating and research in the field. Some other non-financial support structures involve missions of business development, of networking support and of training. European funding opportunities are numerous, and could include the Widening program.

Regarding the lack of skilled workers in the regions, partner HEIs should consider addressing the need for upskilling and reskilling through the development of joint educational programs if possible. Such programs could also be interdisciplinary, including telehealth and telemedicine.

Digitalization

Regional accents and interregional similarities

All partners' S3 include digitalization as a regional priority for research and innovation. Information and communication technologies are the most frequent regional focus (Västra Götaland, Bremen, Malopolska, Noord Nederland, Albania and Moravia Silesia), followed by digital transition (Västra Gôtaland, Bremen, Bourgogne-Franche-Comté, Noord Nederland, Portugal Norte) and artificial intelligence (Västra Götaland, Bremen, Canary Islands, Bourgogne-Franche-Comté and Portugal Norte), digital infrastructure (Västra Götaland, Bremen and Moravia Silesia), data analysis and industry (Canary Islands and Bourgogne-Franche-Comté). Surprisingly, Cybersecurity occurs specifically in one S3 only, for the Canary Islands.

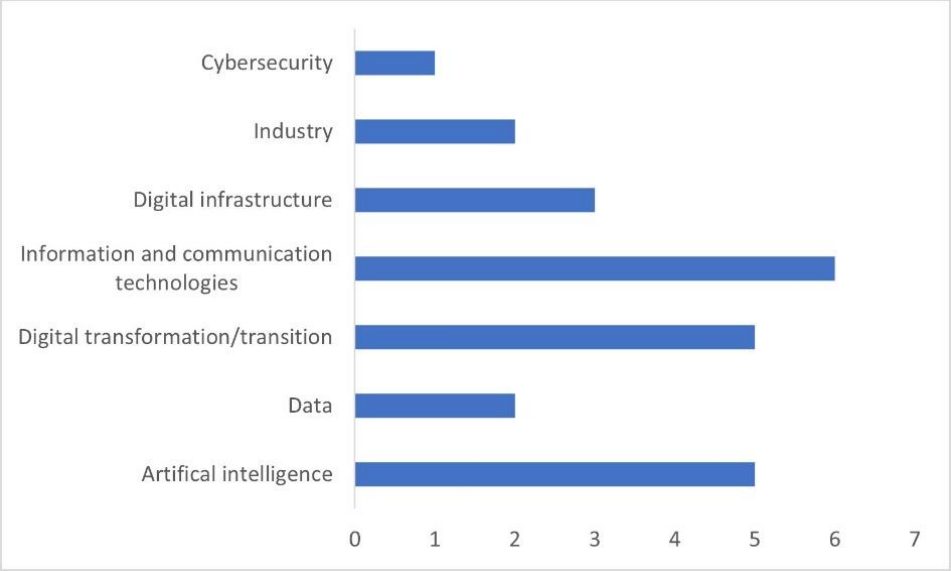


Figure 7 - Region-specific focuses in Digitalization

Wordings might slightly differ from one region to another. Other specific regional focuses mentioned in the S3 are digital games (further addressed in Leisure, tourism & creative industries) and intelligent transport and logistics (Mobility).

Regional ecosystems

In most of the S3, three of the quintuple helix actors are well involved in this priority. Only in Albania there is no sector-specific public policy for digitalization. Industries are less present within this sector in the Canary Islands. Civil society is involved in this priority in Portugal Norte.

Available non-financial support to the priority

All partners' regions benefit from non-financial support to innovation and entrepreneurship in this priority. Incubators are present in every region, whereas advising services are available in six of them (except for Albania, Västra Götaland and the Canary Islands. Support services for upskilling are provided in Bourgogne-Franche-Comté, Noord Nederland, Portugal Norte and Bremen.

Related public policies at regional level

Four partners mention dedicated regional policies specifically addressing digitalization, for the following regions: Noord Nederland, Canary Islands, Västra Götaland and Bourgogne-Franche-Comté.

Existing European and international cooperation

Three regions host a European Digital Innovation Hub: Bourgogne-Franche-Comté, Canary Islands and Noord Nederland. They are part of the European Digital Hubs (EDIH) Network, the driving force behind Europe's digitalization. With the support of the European Commission, it brings together EDIHs, small and medium-sized enterprises (SMEs), and public sector organizations (PSOs) to make the EU's Digital Decade 2030 targets a reality. The EDIH Network is a community of tech experts dedicated to guiding Europe's businesses on their path to digital transformation. EDIHs serve as one-stop shops throughout EU regions, equipping companies with the essential digital tools to improve their competitiveness, upgrade their infrastructure, and boost their overall success.

Besides these European hubs, academic involvement in the Intelligent Information Systems Group is mentioned for both Bourgogne-Franche-Comté and Malopolska regions. Portugal Nortes ecosystem is involved in the European Consortium for Mathematics in Industry. It is also involved in an international academic network called WIN (Wireless Information Networking). Other regional and interregional networks exist in many partner regions.

Regional strengths

The sector is strongly supported by the regional ecosystems. Six partners mention strong involvement by companies in this area. In only three regions this priority seems to represent a substantial source of employment (Portugal Norte, Malopolska and Bourgogne-Franche-Comté). Five partners mention strong public policies regarding digitalization, whereas six partners consider that their region promotes and facilitates digitalization. Scientific production is esteemed at a high level by Hanze university of applied sciences, Instituto politecnico Bragança and Université de Franche-Comté. These three partners, as well as Alexandër Moisiu University Durrës, consider that their regional ecosystem is highly competitive.

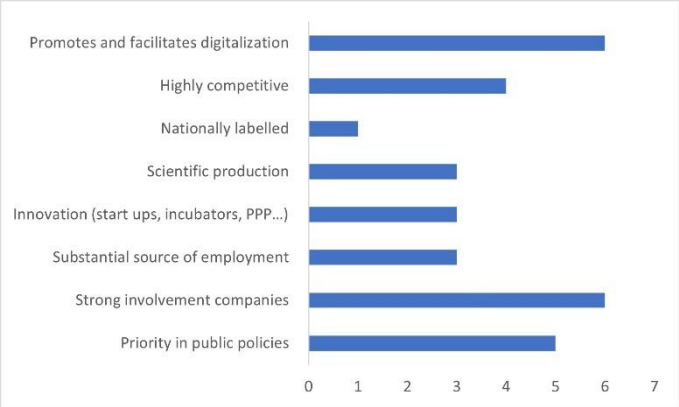


Figure 8 - Regional strengths

Partner HEIs' involvement in the priority

Most partner institutions provide educational programs related to digitalization. These will be further assessed and compared with the needs for future skills and competences during the project. The main research areas mentioned by the partners are cybersecurity and artificial intelligence. Remote and digital solutions for healthcare, health promotion and healthy ageing are also mentioned several times. Another evident sectoral application of research projects

involving the partners is industrial digitalization. Four partner HEIs mention technology transfer activities in the field of digitalization: UFC, IPB, HSB and CUT.

Regional ambitions and needs

According to the partner questionnaires, the most important needs expressed in the S3 regarding digitalization are digitalization of services (government, health…) and support for adoption of Industry 4.0. In terms of skills development, digital literacy and upgrading digital curricula appear as evident needs the partner HEIs can address within other activities foreseen in the project.

Expected added value of the STARS EU common research agenda in strengthening the priority

From the perspective of strategic alliance development, cybersecurity, artificial intelligence, data management and smart systems seem to be the areas with the most potential for common development applied to sectors such as production industries, mobility and health, as well as to all STARS EU Priority areas. This of course has to be further discussed in the Thematic interest groups as well as with regional stakeholders.

Energy transition

Regional accents and interregional similarities

All S3 include energy as a priority for research and innovation, except for the Canary Islands. Transition to renewable energy production, energy efficiency and decarbonization are the main keywords in every region. Most of these regions define Energy as a priority sector: Noord Nederland, Bourgogne-Franche-Comté, Malopolska, Portugal Norte, Västra Götaland, Moravia Silesia and Albania. However, some of the regions chose to combine it with other priorities, such as Västra Götaland where energy is combined with food and biobased materials. Portugal Norte, Malopolska, Noord Nederland and Bourgogne-Franche-Comté explicitly connect the Energy transition to sustainable mobility and thus put strong emphasis on expertise, services and infrastructure for transport decarbonization. Other regions put high priority to clean industry production, as in Västra Götaland and Moravia Silesia. In Bremen, energy transition is not a priority on itself, but it is considered as a supporting, crosscutting priority, supporting sustainable economy, future mobility and adaptive industry. Two regions stand out for their focus on energy production, transportation and storage related to Hydrogen: Noord Nederland and Bourgogne-Franche-Comté. Wind and solar energy are the dominant sources of renewables mentioned in the S3 of Västra Götaland, Albania, Bremen and Malopolska, whereas the latter also mentions biofuels.

Regional ecosystems

Academia and Industries are involved in all the regions. A strong interaction with the environment is mentioned in all of them as well. Public authorities support energy transition in five regions: Moravia Silesia, Portugal Norte, Albania, Noord Nederland and Bourgogne-Franche-Comté.

Available non-financial support to the priority

Non-financial support to energy transition is mainly provided through advising and incubating services. Product testing structures are mentioned for Noord Nederland, Bremen, Västra Götaland and Bourgogne-Franche-Comté.

Related public policies at regional level

All partners mention public policies related to this R&I priority in the questionnaire. However, only very few of them seem to address the energy transition specifically in a dedicated policy. This is the case of Noord Nederland, the Canary Islands and Bourgogne-Franche-Comté.

Existing European and international cooperation

Three out of the nine regions address energy transition in a European perspective. Malopolska region hosts an innovation hub which is part of the Knowledge and Innovation Community called InnoEnergy. EIT InnoEnergy is one of the first three KICs established in 2010 - alongside EIT Digital and EIT Climate-KIC. This KIC relies on a large community of more than 500 partners in 18 countries in Europe and in the United States.

Regarding Hydrogen, both Noord Nederland and Bourgogne-Franche-Comté are a European Hydrogen Valley. In the latter, regional stakeholders take part in the Hydrogen Council,

international association for the promotion of the role of H2 in the energy transition. Bourgogne-Franche-Comté also aims to contribute to Hy-Corridor and to support IPCEI (Important Projects of Common European Interest) Hy2Tech and Hy2Use for the acceleration of hydrogen development.

Regional strengths

Strong involvement of companies and industries is clearly the common strength of all the regions in this priority. UFC and HUAS consider their regions as powerful in many fields, ranging from public policy support to innovation services, and the energy sector is considered as a provider of employment. Scientific production in this field is considered high in Noord Nederland, Portugal Norte, Bremen and Bourgogne-Franche-Comté.

Partner HEIs' involvement in the priority

All the partner HEIs (except for ULL) address Energy efficiency and Renewable energy in their research activity. Clear partner-specific accents appear. Three partners report a focus on hydrogen production, storage, distribution and use: HUAS, HSB and UFC. Fossil-free electricity production represents a scientific focus for five partners: HUAS, IPB, HSB, SUO and HV. Electricity distribution and consumption are mentioned as a field of expertise by HV and UFC. CUT and HUAS have developed academic expertise in the field of sustainable gases and biofuels.

Regional ambitions and needs

Regional ambitions are high regarding decarbonization in all S3. Bourgogne-Franche-Comté and Noord Nederland express the ambition to develop stationary and micro-grid usages of hydrogen for different actors. Fostering startups and supporting innovation is a priority in Noord Nederland, Moravia Silesia, Bremen and Bourgogne-Franche-Comté. The need for upskilling workforces is expressed in five S3: Noord Nederland, Portugal Norte, Moravia Silesia, Bremen and Albania. Energy efficiency of buildings are mentioned as an ambition in the S3 of Malopolska and Noord Nederland.

Expected added value of the STARS EU common research agenda in strengthening the priority

This priority clearly highlights a strong common ground for interregional cooperation in shared regional ambitions and needs, as well some region-specific strengths regarding renewable energy resources and partner specific expertise. Whilst some regions can be considered as "leading" within the alliance, some others are clearly more situated on the demand side. Collaboration between academics and companies in this priority is high. Involvement of the regions in European innovation networks is already strong in the field of Hydrogen, and should be further investigated regarding energy transition as such. All regions express needs and ambitions for further development of the energy transition and decarbonation of the economy. The most evident connections to other STARS EU Priority areas seem to be Digitalization, Circular economy, Entrepreneurship & Innovation, as well as Living spaces.

The need for the development of skills and competences in this R&I priority is clearly expressed and will have to be further addressed, as foreseen, in various activities in STARS EU project

through the development of a joint offer for education, challenge-based learning and work-based learning, both for initial and lifelong learners. Another frequently mentioned ambition is to develop stronger or more support for startups and innovation. This could be addressed by STARS EU through the fostering of research careers and by fostering entrepreneurial mindsets.

Production industry

Regional accents and interregional similarities

All the regions include the production industry in their S3, through different headings: advanced materials and processes in BFC, Emerging industries in the Canary Islands, Connective and adaptive industry in Bremen, Automation and robotics in Moravia Silesia, Sustainable industry in Västra Götaland, Chemical industry in Malopolska, Industrialization and Advanced Manufacturing Systems in Portugal Norte, and Manufacturing in Albania. Only the S3 of Noord Nederland mentions this priority more implicitly (From linear to circular economy), Most of the S3 put a focus on smart manufacturing, automation and the use of digital technologies (only Albania and Malopolska do not specifically mention this).

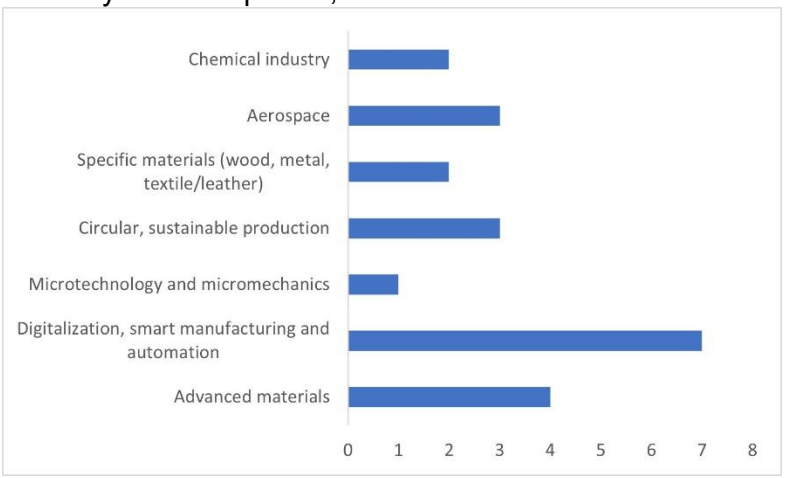


Figure 9 - Region-specific focuses in Production industry

Very region-specific accents mentioned in the S3 are: microtechnologies and micromechanics (Bourgogne-Franche-Comté), optics (Malopolska and the Canary Islands), satellite construction (Canarian Islands), chemical industry (Noord Nederland and Malopolska). Some material specific industries occur: wood, textile and leather in Albania, metal industry in Malopolska. Four regions are specialized in advanced materials and additive manufacturing: Portugal Norte, Bremen, Malopolska and Bourgogne-Franche-Comté.

Regional ecosystems

All S3 without exception mention strong involvement of academia in this priority. Except for Albania, government and industry involvement are mentioned as well. The natural environment is cited as a particularly important factor in the S3 of the Canary Islands, whereas sustainability of industry is an ambition most regions have in common.

Available non-financial support to the priority

Advisory support and product testing structures are available in the partners' regions, except for Albania. Incubators are mentioned by all partners except for IPB and UAMD. Five partners mention existing support structures for digitalization of industry: HUAS, HSB, ULL, HV and UFC.

Related public policies at regional level

The public policies mentioned by the partners in addition to the smart specialization strategies show a great variety in typology and focus. Some of the partners mention funding policies, others refer to cluster specific strategies or to regional strategies for development and

internationalization. There seems to be no dedicated public policy regarding production industry as such.

Existing European and international cooperation

Västra Götaland and Bremen are members of S3P Space. This Smart Specialization partnership was starting to form in 2021 with the aim to build regional coalitions to strengthen the value chain "Access to space". The S3P Space partnership will work to create involvement, interaction, and collaboration among different actors within the regions (such as academia, large corporations, SMEs, start-ups, and clusters). The partnership will facilitate the collaborative efforts by providing this digital B2Match tool for space actors to interact, bringing space actors together to exchange knowledge and identify collaboration projects and boosting innovation through sharing experience.

Other European innovation networks mentioned regarding industrial activity are the EIT Manufacturing Knowledge and Innovation Community (Västra Götaland), EPOSS European cluster (European technology Platform On Smart Systems integration) and Eureka EURIPIDES (European Smart Electronic Systems), in which Bourgogne-Franche-Comté is represented, and the International consortium for ownership of telescopes in which partake the Canary Islands.

Regional strengths

All partners, except HUAS, indicate that industrial production benefits from a high priority level in public policies. Industrial activity strongly leverages employment in the regions of Västra Götaland, Bourgogne-Franche-Comté, Bremen and Malopolska. Incubators in this field are reported by all the partners, except for IPB and UAMD. Scientific production in the regions is considered high by all partners except SUO and UAMD.

Partner HEIs' involvement in the priority

Many different fields of activity are reported by the partner HEIs. Items are not sufficiently documented at this stage to identify synergies and complementarities with certainty, except for engineering, mentioned by six partners (HUAS, HSB, ULL, HV, UFC and UAMD), additive manufacturing, reported by three partners (HV, HSB and UFC) and automation and robotics technologies, which are mentioned by four partners (HUAS, HSB, SUO and ULL). Some partner-related specificities occur, such as Industrial work integrated learning (I-WIL) at University West and Astrophysical research and instrumentation at University La Laguna.

Regional ambitions and needs

Similarly to the great variety of academic activity in the field of production industry, regions express a wide range of needs and challenges in the S3, from electrification to the establishment of a legal framework and from signal and data analysis to expertise in the field of materials. However, some shared needs and ambitions seem to occur regarding automation, robotics and smart industry (Noord Nederland, Portugal Norte and Canary Islands), as well as natural resources, waste management and circular business models (Noord Nederland, Portugal Norte, Västra Götaland and Malopolska).

Expected added value of the STARS EU common research agenda in strengthening the priority

All the partner HEIs present regional priorities within the theme of the Production Industry. This contributes to quite developed regional ecosystems and non-financial support. Through the comparison analysis, both similarities and differences between the regions' priorities and the universities' areas of strength are shown. Sustainability, automation, engineering, and digitalization are some general areas of the production industry that are important to many regions and partner HEIs. Finally, there also appear to be some opportunities for connections in more specific sector-related areas, such as advanced materials, biotechnologies and aerospace, for some of the partner HEIs and their regions. Within STARS EU, this field is so far not addressed as priority as such. Whereas there are possible connections with existing STARS EU Priority areas, such as Digital transformation and Circular economy, the STARS EU partner HEIs should further investigate if the establishment of a new Thematic interest group makes sense, in order to address production industry related challenges through joint research and education programs.

Mobility

Regional accents and interregional similarities

Mobility is developed as a priority in five S3: Västra Götaland, Bremen, Bourgogne-Franche-Comté, Noord Nederland and Portugal Norte. Three main focuses appear clearly:

- Noord Nederland and Bourgogne-Franche-Comté relate this priority to energy storage and electrification of transport systems, the latter being also included in the scope of Västra Götaland.
- Automation, connectivity, digitalization and intelligent vehicles are addressed in four S3: Portugal Norte, Västra Götaland, Bremen and Bourgogne-Franche-Comté.
- Maritime logistics are included in the scope of mobility by Västra Götaland and Bremen.

Regional ecosystems

Industries and public policy actors are involved in this priority in all the five regions concerned. Academia are involved in Portugal Norte, Bremen, Bourgogne-Franche-Comté and Västra Götaland. Partner HEIs mention the involvement of Civil society in Noord Nederland and Portugal Norte, whereas Noord Nederland extends its quadruple helix to the environment.

Available non-financial support to the priority

UFC, HUAS, IPB and HV mention existing support structures related to this priority in the field of advising and incubating, whereas digitalization support services are mentioned for Bremen and Noord Nederland.

Related public policies at regional level

All the five partners concerned mention regional policies or strategies applying to mobility, with great disparities amongst these (funding schemes, regional development strategies, spatial planning documents). Based on the available information in the questionnaires, it is impossible to detect synergies or similarities. It should be further investigated if common guiding principles exist in this field. However, it is likely that green and smart mobility are recurrent priorities in public policies.

Existing European and international cooperation

The regions concerned by this priority do not have common belonging to European cooperation structures. Regional membership of the European Automotive Cluster Network is mentioned by Bourgogne-Franche-Comté. This Cluster Network is leading in the fields of automotive, transport and mobility in Europe. It has been initiated in 2017 by eight clusters and grew to reach today 24 clusters from 11 European countries, representing over 3.000 companies, R&D institutions, public authorities, and other institutions. Its current President is Bruno Grandjean, Director General of Pôle Véhicule du Futur (Bourgogne-Franche-Comté). EACN collaborates in five working groups: Industry 4.0/Industrial modernisation; Supply Chain, Mobility, Skills & Competences, and Clean, connected, and autonomous vehicles (CCAV).

Regional strengths

The five partner HEIs concerned all mention strong support from public authorities. Four of them (University West excepted) report a fertile ground for innovation. HSB, IPB and UFC

indicate high scientific production in their regions. Companies are strongly involved in Bourgogne-Franche-Comté, Noord Nederland and Bremen, and represent a substantial source of employment in these regions.

Partner HEIs' involvement in the priority

Smart, green and integrated transports are addressed by all the five partner HEIs concerned. Three of them are active in the field of Electrification /hybridization of vehicles, as well as in Human and societal aspects of future mobilities: UFC, HV and HUAS. Digital services around mobilities are addressed by HUAS and UFC, whereas UFC and HSB develop expertise in the field of Air transport systems and Aerospace propulsion.

Regional ambitions and needs

The five regions concerned aim to further support innovation for the development of sustainable, smart and connected mobilities. Västra Götaland and Bourgogne-Franche-Comté express the need to accompany sector transition from combustion engine vehicles to electric/hybrid vehicles. The ambition to increase the number of start-ups as well as the number of skilled workers is emphasized in the S3s of Bremen and Noord Nederland.

Expected added value of the STARS EU common research agenda in strengthening the priority

The partner HEIs concerned are all involved in this regional priority, which is very closely linked to the automobile industry in most cases. All the partner HEIs involved in this priority are specialized in smart, green and integrated transports. Subsequently, there is also an interest in the hybridization and electrification of vehicles, as well as in the human and societal aspects of future mobilities. Another area of interest for some of the partner HEIs is air transport systems. Only one European cooperation structure is mentioned. It could be worth considering involvement in this cluster network by the four other regions including mobility in their smart specialization strategies. Mobility is not specifically addressed as a STARS EU priority area. However, it seems closely related to several STARS EU Priority areas. It could be included in a cross-sectoral cross-disciplinary approach, linked to Living spaces, Energy transition and Digital transformation.

Agrofood and biobased materials

Regional accents and interregional similarities

Agrofood is addressed in the smart specialization strategies of Noord Nederland, Västra Götaland, Bourgogne-Franche-Comté, Portugal Norte, Albania and Bremen, with many different accents.

In Noord Nederland, this sector is included in the priority named From a linear to a circular economy. Agriculture is an important economic sector that has a large impact on the land. The region is fully committed to tackling the societal and environmental challenges related to agriculture. Greening of chemistry and circular projects are closely twinned. A strong emphasizes is put on biobased products and activities, based on flows of raw materials from agriculture and chemistry.

The regional priority related to this sector in Portugal Norte is called Agro-Environmental and Food Systems. It addresses articulation of regional agricultural potential, namely in products with high added value, with scientific and technological capacities and businesses, capable of promoting agrofood and forestry sectors with greater added value, in a way that is compatible with the preservation and management of natural resources, and of contributing to a greater valorization of endogenous resources as an opportunity to increase territorial competitiveness. Circular economy and health are identified as key elements in this regional approach.

In Bremen, the food and beverage sector is addressed by three smart specialization priorities: Connective and adaptive industry, Digital transformation and Smart services. Bremen has a long-standing tradition of food and beverage trading and production. The federal state has established itself as a significant hub for deep-sea fishing, an entry point for exotic foods, and a renowned location for brewing well-known beers. The focus is put on the integration of robots into corresponding production processes for the purpose of energy efficiency. In addition, more and more sustainable and climate-friendly products are being manufactured, such as in the area of alternative protein sources, which are transforming the food and animal feed industries.

In Albania, the sector covers agriculture, forestry and fishing, with focus on sustainable organic farming, food processing, sustainable fisheries and aquaculture, as well as on medicinal aromatic plants, oils and extracts production.

Västra Götaland includes the Agrofood sector in the priority named Food, Bio-based Materials & Renewable Energy. Agriculture and fishing are strong economic sectors in the region, with high economic values and providing a substantial source of employment.

The focus given by Bourgogne-Franche-Comté to this priority is Sustainable food/nutrition value chains. It covers environmental protection, health, as well as a full range of activities needed for the conception, production, delivery and disposal of a product/service.

Regional ecosystems

Governments, companies and industries are well involved in all the regions concerned. Environment is not mentioned by HV/Västra Götaland and Bremen. Civil society is mentioned in the S3 of Portugal Norte only.

Available non-financial support to the priority

According to the partner HEIs, four regions are well endowed with advisory and innovation services: Noord Nederland, Bremen, Portugal Norte and Västra Götaland. Digitalization of the food sector is supported by Noord Nederland and Bourgogne-Franche-Comté, whereas product testing is supported in Noord Nederland, Västra Götaland and Bourgogne-Franche-Comté.

Related public policies at regional level

In most cases, sector-specific policies are operational, aiming to support agriculture and/or to protect and valorize its economic potential.

Existing European and international cooperation

Territorial (trans)regional cooperation fostering research and innovation is mentioned in Noord Nederland (Bio-based Industries Consortium) as well as in Portugal Norte (Iberian Research and Innovation Food Lab, European Grouping of Territorial Cooperation Galicia-Northern Portugal and Territorial Cooperation Castilla y León -Northern Portugal). None of the partners mention regional ecosystems' belonging to European or International innovation networks in this priority.

Regional strengths

Agricultural production, strong involvement of companies and public policy priorities are all mentioned for five regions. Noord Nederland, Portugal Norte and Bourgogne-Franche-Comté host food labs. Bremen, Portugal Norte and Bourgogne-Franche-Comté report strong scientific production (in the latter, the sector represents the third largest research areas in terms of number of public researchers in the region). For three out of six regions (Portugal Norte, Bremen and Bourgogne-Franche-Comté) the partner HEIs mention substantial employment in this sector. Portugal Norte and Bourgogne-Franche-Comté are the best endowed regions in this sector, with all of these strengths occurring.

Partner HEIs' involvement in the priority

In its Biobased Economy Knowledge Center, HUAS addresses new biobased products, sustainable production processes and improved business models, in cooperation with companies and other knowledge institutions.

Various research units of UFC are involved in this priority and address research and innovation in the field of food from an environmental, technological and spatial perspective. UFC furthermore hosts part of the regional DIMACELL platform for cellular imaging applied to biobased materials.

University Wests area of strength regarding Production Technology directly and indirectly contributes to new knowledge for bio-based materials. University West is for example partner in the project Manufacture in wood with demonstration environments for digital technology and research to develop the processes for manufacturing prefabricated wooden houses.

IPB has important R&D activities as well as dedicated degree programs in this area. The Institute implements several national and international projects in this regional priority. Its entrepreneurship office supported the creation of several companies.

UAMD is involved in this sector through educational programs and capacity building projects, such as Capacity building for Blue Growth and curriculum development of Marine Fishery in Albania (2020-2022), as well as measurement of microplastic transport.

Regional ambitions and needs

The S3 assessed report the need to support ecological transitions in agriculture, as well as the ambition to foster healthy and sustainable food supply. Optimization of the value chain, reinforcement of food labs and precision agriculture are other regional ambitions expressed.

Expected added value of the STARS EU common research agenda in strengthening the priority

Most of the S3 that include the Agrofood sector as a priority concern agricultural regions (in terms of % of land, GDP and/or employment). Moreover, most of these regions present the ambition to be more involved in the ecological transition of their agricultural sector. Some of the partner HEIs' interest in terms of research lies in the production of healthy food and in the enhancement of sustainable agricultural practices. It also appears that some other partner HEIs are interested in optimizing these very areas. Finally, it appears that some partners share common research interests in the depollution of water bodies, and in the societal impacts of land management, for example. The most evident connections to existing STARS EU Priority areas are Entrepreneurship & Innovation, Circular economy, Healthy ageing and Living spaces (depending of the scope they will be given).

Leisure, tourism and creative industries

Regional accents and interregional similarities

Leisure, tourism and creative industries are addressed as a priority in seven regional smart specialization strategies: Malopolska, Noord Nederland, Portugal Norte, Västra Götaland, Bremen, the Canary Islands and Albania. Under this general heading, two main currents appear. The one, focusing in tourism and leisure, based on major cultural and natural assets in the regions. The other on design and digital arts, often stemming from local traditions.

Five regions are specialized in media and game design: Västra Götaland, Malopolska, Noord Nederland, Portugal Norte and Bremen. Creative industries are present in Västra Götaland, Bremen, Malopolska and Noord Nederland. Tourism, included in six S3, is the best represented subsector. Natural resources are inherent to this in the Canary Islands, where blue tourism is a high priority, Albania, Malopolska and Portugal Norte. In Västra Götaland, the focus is on experience tourism, mainly in the coastal communities. Bremen, Portugal Norte, Malopolska and Albania have a strong specialization in cultural tourism. Sustainability of the tourism sector is a concern in most of these regions, especially regarding mobility, resource preservation and community involvement.

Regional ecosystems

Public authorities and academia are well involved in all the regions. Regarding the involvement of companies, it is strong in all regions except for Albania. Unsurprisingly, natural and cultural resources are the main assets on which leisure and tourism activities flourish. Civil society is contributing to the tourism sector in the regions of Portugal Norte and Noord Nederland.

Available non-financial support to the priority

In all the regions, except for Albania, incubating and innovation support services are available. Product testing is fostered in five regions: Noord Nederland, Portugal Norte, Canary Islands, Malopolska and Västra Götaland. Digitalization is supported in the regions of Canary Islands, Noord Nederland and Malopolska.

Related public policies at regional level

Sector-specific policies are only mentioned for Portugal Norte and the Canary Islands. In Portugal Norte, policies aim to valorize cultural, natural, creative, and endogenous resources, taking advantage of scientific and technological capabilities whilst fostering better integration of tourism in different cultural contexts, modern and traditional, as a way of expanding the territorial base to promote regional competitiveness. In the Canary Islands, tourism is supported by the Canary Islands' plan for tourism.

Existing European and international cooperation

Västra Götaland and Portugal Norte are participating regions in the European partnership for Smart Regional Investments in Textile Innovation. This partnership, established in 2016, aims to develop and implement strategies and projects meant to facilitate and accelerate the emerging industrial renewal in traditional manufacturing regions across Europe. The Canary Islands are part of the World tourism organization.

Regional strengths

All regions, except for Noord Nederland, give high priority in public policies to this sector, which is procuring a significant source of employment in the Canary Islands and in Västra Götaland, and arouses a strong involvement of companies in Portugal Norte, the Canary Islands, Västra Götaland and Malopolska. The sector generates innovation in Noord Nederland, the Canary Islands, Malopolska, Västra Götaland and Portugal Norte. Scientific production related to Leisure, tourism and creative industries is considered high in the regions of Portugal Norte, Albania, Malopolska, Västra Götaland and the Canary Islands.

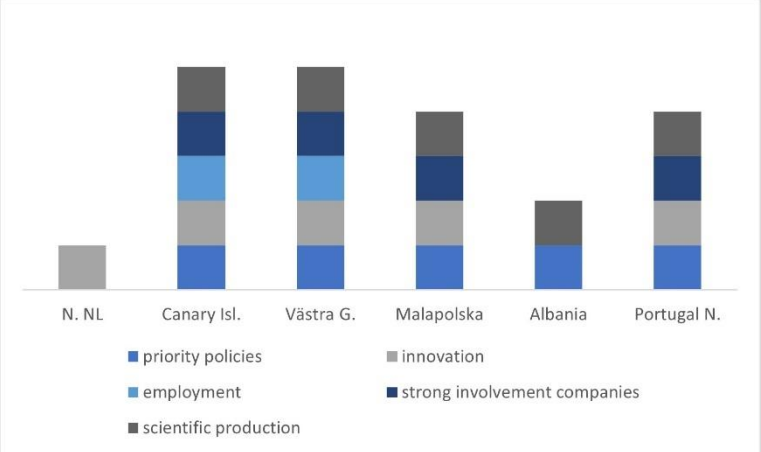


Figure 10 - Regional strengths in the field of Leisure, Tourism and Creative industries

Partner HEIs' involvement in the priority

Partner-specific focuses in this field are very heterogenous. Some similarities and possible complementarities occur.

ULL, IPB and UAMD conduct research and offer educational programs in the field of sustainable tourism. Community engagement and social aspects of tourism are addressed by UAMD, ULL and IPB. Marketing and tourism management are part of the educational scope of HSB and HUAS, as well as ULL. Cultural heritage preservation benefits from a strong focus at UAMD. Place innovation combined with spatial planning and sustainability is an important field of research and education at HV. ULL mentions important collaboration with tourism companies and clusters, which is strongly supported by the Interreg-MAC program.

Regarding game design, the focus is user-centered at HUAS, whereas CUT puts the emphasize on technology development and transfer. HV's research and education in this field are centered on 3D and visualization, and hosts OpenLab, a platform for exploring emerging interaction technologies such as Virtual Reality (VR), Augmented Reality (AR), and Artificial Intelligence (AI) together with partners.

It can be noted that several partner HEIs, without the theme as a specific regional priority, appear to have an educational offering and R&D activities in the field of leisure and tourism.

Regional ambitions and needs

Sustainability and circular business models are clearly the main concern of the regions regarding tourism, together with digitalization. Västra Götaland and Malopolska aim to further support development of film production technologies. Shortage of skilled workers is an issue mentioned in the S3 of Portugal Norte and Bremen.

Expected added value of the STARS EU common research agenda in strengthening the priority

The creative industries fit well in the STARS EU Priority area Arts & Creative industries. Textile innovation could possibly be a common field to be further investigated jointly by HV and IPB, possibly within the existing European partnership, with potential connections to the STARS EU Priority areas Circular economy, Entrepreneurship & Innovation.

Other common strengths and complementarities could be further explored in the field of tourism (UAMD/Albania, ULL/Canary Islands, IPB/Portugal Norte, HV/Västra Götaland, HSB/Bremen), as well as in the field of creative industries and supporting technologies (HV/Västra Götaland, HSB/Bremen, HUAS/Noord Nederland, CUT/Malopolska and IPB/Portugal Norte), with evident possible links to the STARS EU Priority areas Digital transformation, Living spaces and Entrepreneurship & Innovation.

STARS EU partners could explore the relevance of addressing the sectors of Leisure and Tourism separately from Creative industries. However, the place-based approach of Textile innovation for example could be of high added value from a tourism perspective as well.

Discussion of the final outcome

General observations

Many opportunities for cross-sectoral and interdisciplinary approaches of the regional innovation challenges appear through this analysis. Moreover, the STARS EU Priority areas generally correspond quite well to the regional priorities for innovation as they are presented in the S3. The assessment clearly highlights the need for a more cross-cutting approach. The main opportunities for STARS EU contributions based on the existing Priority areas to the regional priorities for innovation are represented in the figure below.

Figure 11 - Thematic regional priorities as they correspond to the STARS EU Priority areas

Theme/ STARS EU Priority Area	Health	Digitalization	Mobility	Agrofood and Biobased materials	Production industry	Energy	Creative, tourism and leisure industries
Healthy Ageing	X	X		X			
Energy Transition		X	X			X	
Digital Transformation	X	X	X	X	X	X	X
Circular Economy		X		X	X	X	X
Entrepreneurship and Innovation	X	X	X	X	X	X	X
Living Spaces	X	X	X	X		X	X
Arts and Creative Industries		X					X

It should be emphasized here that this analysis, as it is focusing on smart specialization, research and innovation, may have left the economic importance of some of the sectors addressed, in terms of employment or contribution to GDP, partially out of scope. The focus on smart specialization is due to the very nature of the STARS EU partners, being Higher education and Research institutions, and does not express any underestimation of the economic realities in the regions where they are located.

Links between regional needs and ambitions and partner involvement in knowledge development and innovation

This report allows the highlight of partner HEIs' capacities for research and innovation per thematic field, while underlining the needs and ambitions partners' regions in these same fields. Strengths, needs and ambitions were detailed in themes of Health, Digitalization, Mobility, Agrofood and Biobased materials, Production industry, Energy, and Leisure, Tourism and Creative Industries.

Cooperation in the context of research and innovation is not limited to the finding of complementary fields of research in two or more partner HEIs' specific areas of focus. Cooperation can also be the result of a regional need being addressed by (complementary) expertise and skills available in other regions.

It appears that partner HEIs have various synergies, and can be complementary to one another, in the context of their involvement in S3 regional priorities. In the undertaken thematic

comparisons, some partner HEIs demonstrate knowledge, competences and expertise in certain areas that could correspond to regional needs or ambitions expressed elsewhere. Opportunities for cooperation arise when these capacities and these needs are crossed. They can be facilitated by various levers identified in this report, such as the strengths of regional ecosystems and funding opportunities that are sometimes specific to certain regions. Furthermore, in all sectors, regional ecosystems are part of European innovation networks. This opportunity should be seized by the STARS EU partners in order to optimize their impact on regional transitions.

Contribution to the STARS EU project and to regional transitions

The data contained in this report will be handed – as foreseen in the work plan - to the STARS EU Thematic Interest Groups as well as to the Challenge Lab (WP4) in particular.

The STARS EU Thematic Interest Groups can build on the assets and resources available in each partner region and on their specific challenges regarding innovation, which were identified in this report, to establish opportunities for cross-sectoral and interregional approaches in their field, thus supporting regional transitions. Partners could explore the opportunity to extend the existing STARS EU Priority areas (for example to social and societal aspects of regional transitions), or even to create new ones to address the thematic smart specialization priorities discussed in this report. In particular, it could be worth exploring the interest of establishing a Thematic interest group with regard to the Production industry sector, if the need for expertise non available in the existing TIGs is confirmed.

The identification of synergies and complementary fields of research and innovation as well as the identification of opportunities for common knowledge development and innovation provide valuable input for the STARS EU Joint Research Agenda, which will be defined and implemented through the Challenge Lab (WP4). Despite these common interests and the available support in the regions, developing joint research activities may be challenging.

This report mainly focused on the assets and resources present in each region and on the research focuses of each partner HEI per theme. The next step of this Task 2.1 will be to identify the fields of competences and skills needed by the regional ecosystems. The STARS EU contributions to the New European Innovation Agenda will be specifically addressed later on during the implementation of this first task of WP 2, Regional transition accelerator, in order to define common actions feeding WP3 Curriculum Lab and T4.3 STARS EU technology transfer office.

The Curriculum Lab (WP3) will capitalize on the identification of complementary fields of skills in partner HEIs' already existing degree programs and on the identification of needs in terms of future competencies and upskilling.

On the long term, the best way to achieve sustainable impact through the STARS EU common research agenda in relation to the smart specialization strategies would be to establish joint research programs based on partner HEIs' complementary strengths and fields of expertise, as well as on the common regional needs and challenges as they occur in the S3, whilst involving regional authorities and other relevant stakeholders in this common approach. The sustainable involvement of these public and private actors is in particular foreseen in other

tasks of Work package 2 (tasks 2, 3, 4, 5 and 6). This Work package doesn't stand on itself, but will continuously interact with the other main work packages 3 (Curriculum lab), 4 (Challenge lab mentioned above), 5 (Cocreation Campus) and 6 (Mobility). Combining and transferring regional strengths to address common and region-specific challenges and needs for knowledge development and innovation will not only empower the STARS EU strategic alliance for regional transition as such. Moreover, it will effectively support regional transitions and thus contribute to a more resilient, independent and future ready Europe.

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Table of illustrations

Annex

Questionnaire for a comprehensive analysis of S3

Regional priority #1: [enter title here]
Q1 – Define the thematic keywords in this regional priority as they are used in the RIS3.
• ….
Q2 – Describe the regional ecosystem surrounding this regional priority. Is it well structured? Are all the links of the chain implicated?
• ….
Q3 – Cite the strong stakeholders in this regional priority and describe their mission in a sentence or two. Please indicate whether they are academic or corporate (or other).
• …
Q4 – What are the available funding options in your region for this regional priority?
• …
Q5 – What are the available (non-financial) regional support structures to innovation and entrepreneurship in this regional priority?
• …
Q6 – Are there local/regional public policies supporting this regional priority in your region? If so, cite them and describe them in a sentence or two.
• …
Q7 – Which European/international R&D cooperation structures pertaining to this regional priority exist in your region?
• …
Q8 – What makes your region stand out in this regional priority?
• …
Q9 – How is your institution involved in this regional priority? Cite the concrete actions undertaken by your institution to further the development of the regional priority.
•
Q10 – What are the areas of this regional priority in which your region would like to be more involved/more active/more efficient?
• …
Q11 – How could the STARS EU Common Research Agenda help you strengthen this regional priority?
• …
Q12 – Does this regional priority relate to the actual scope of one or many of the STARS EU Priority Areas? If so, why and how do they overlap?
• …