

## Interreg Alpine Space 2019-2022



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## 1 Introduction

*“The blueprint is a strategic document that will define an approach for the Alpine Region for the creation of a shared research and innovation agenda, through prioritisation of R&I topics for the activation of a transnational synergic and complementary collaboration.”<sup>1</sup>*

A Blueprint serves the function of providing a process model or design for a transnational Strategic Research and Innovation Agenda (SRIA). It provides guidance on both process and content for achieving the SRIA. In terms of content, the Blueprint provides indications on the main components or building blocks of the SRIA document and how these can be structured effectively to build on each other. In terms of process, the Blueprint provides guidance on the appropriate structures for steering these efforts and providing strategic oversight, engaging all relevant stakeholders, building consensus and ownership and for generating the required content. The Blueprint paves the way for the SRIA, by instilling a systematic, iterative, and learning approach and the guiding principles of openness and inclusiveness in the SRIA co-design. The effectiveness of the Blueprint depends on the extent to which it is fine-tuned to the type of SRIA which is envisaged, required and feasible for the setup in question. This will be guided by the steering team, the specific context, and the stakeholder community.

To date SRIAs have been developed at European level to address a specific societal challenge(s) or to address a specific research topic/s. The design of a SRIA blueprint for a macro-region will entail a fresh approach which can build on the experiences of successful SRIAs such as the JPI URBAN EUROPE but would require fine-tuning. The ERA-LEARN Guide for the SRIA Development process indicates that *“each SRIA development process must be designed to fit its relevant R&I and stakeholder contexts, therefore, there is no universally ‘right’ or ‘typical’ SRIA process applicable to all partnerships. While we cannot provide a blueprint or a step-by-step guide for the design of the SRIA process, some elements are necessary in all SRIA processes”<sup>2</sup>.*

Our goal is to develop such a blueprint together with a systemic approach for the SRIA co-design process, based on a robust evidence base and extensive stakeholder consultation and engagement. By initiating strategic discussions on the vision and level of ambition of the SRIA, its rationale and key orientation, the Blueprint development phase provides insights on the key questions to be addressed and the different options available based on stakeholder interests, needs and expectations. The Blueprint phase paves the way for more forward-looking reflections on the role of transnational R&I in the current and future development of the Alpine Region. It helps to build the transnational stakeholder community that will contribute and benefit from this. The Blueprint in no way aims to replace the SRIA - rather it anticipates and supports key reflections, decisions and actions which need to be addressed in the SRIA co-design phase and aims to provide the facilitating tools and mechanisms to ensure success.

The development of the Blueprint was based on a review of relevant documents including

<sup>1</sup> A-Ring Deliverable AT1.3 “Transnational R&I Focus Report”

<sup>2</sup> <https://www.era-learn.eu/support-for-partnerships/additional-activities/strategic-research-and-innovation-agendas/guide-for-the-sria-development-process>

- the EUSALP and its publications (AGs)
- the A-Ring and other relevant publications (from ARDIA-NET, S3-4AlpClusters, AlpGov, GaYA, the Vanguard Initiative)
- existing JRC/EC manuals and other relevant guides (from ERA-LEARN, BiodivERSa, etc.)
- foresight studies and results (especially those linked to thematic SRIAs and JPIs)

The document is structured along two main parts, A and B. Part A draws upon the international state-of-the-art and addresses the elaboration approach followed in the development of the Blueprint and consequently the SRIA that can eventually be developed. Part A is complemented by the underlying megatrends and specific trends in the key areas of common interest that were identified in the A-Ring project. Part B includes a repository of tested methods and routes in trans-national inter-regional collaboration that are structured along sever collaboration routes. Part B finishes with specific guidelines and good practices for additional elements of a SRIA development process such as engaging stakeholders, communicating and raising awareness, championing and overseeing the process, vision setting and prioritisation.

The document finishes with a list of Annexes including the Interest, obstacles and needs for cooperation as documented by the A-Ring project (Annex I), a Glossary of terms of digital technologies that is useful to grasp the emerging trends in the area (Annex II) and the typical contents and structure of a SRIA document (Annex III).

A last but important point to make is that several terms are used interchangeably to refer to collaboration among countries/regions in the reports and projects reviewed including for instance, cross-regional, inter-regional or trans-regional/national. Different projects have referred to different terminology which we have just reproduced here. The use of all these terms in the present document is common i.e. to refer to transregional collaboration in view of addressing common transnational challenges.

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# PART A

Part A includes three main sections. Section 2 presents the key features in SRIA development based on the state-of-the-art, mainly benefiting from the long experience within R&I partnerships. Section 3 then presents an overview of the main trends and development in the identified themes of common interest. Going well into the future, the SRIA needs to consider any identifiable trends in the medium- and long-term future. Section 3 also serves as an example of a more detailed analysis of the common areas of interest that needs to take place to identify specific areas of collaboration through e.g., research projects and other related research activities. Section 4, then, presents two approaches in the SRIA development, i.e., a fast-track one and a more detailed and systemic one (that we have called deep-dive). The SRIA development approach is influenced by the decisions of those involved (the regional/national authorities, EUSALP Executive Board) concerning the level of ambition and the overall aim of the transnational collaboration. We present two different approaches but combinations among the two are also possible.

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## 2 Background on the A-Ring SRIA development

### 2.1 Context

The wider ‘macro-region’ policy context where the SRIA is to be located should be clearly delineated as the backdrop to the exercise. This allows the full set of transnational R&I opportunities, to be identified and appropriately explored. It is understood that the wider policy context is the European Strategy for the Alpine Region (EUSALP). The overall goal of EUSALP is to ensure that the Alpine macro-region remains one of the most attractive areas in Europe, taking better advantage of its assets and seizing its opportunities for sustainable and innovative development in a European context.<sup>3</sup> The EUSALP’s mission statement is “*to balance development and protection through innovative approaches that strengthen the Alpine Region*”. The involved regions and counties are quite diverse in terms of culture and socio-economic conditions and economic structures and, thus, present different national and regional/local S3 strategies. Defining shared macro-regional objectives and identifying common areas of interest is crucial to leverage more and more coordinated efforts and resources.<sup>4</sup>

The EUSALP’s Action Plan<sup>5</sup> identifies areas of specific relevance to the Alpine Region based on the national/regional smart specialisation strategies, such as:

- (1) agriculture and sustainable forestry sector-based products and services throughout the complete value chain (including the pharmaceutical and wood-construction sector),
- (2) tourism sector (e.g., agro-tourism or health tourism, sustainable year-round tourism),
- (3) energy sector for applying potential clean renewable energy production (i.e., with low or no emissions of air pollutants such as PM, renewable energy sources: wind and solar power; biomass and geothermal sources for heating, energy-storage building, increasing energy efficiency of hydropower),
- (4) health sector in relation to: agriculture, with regards to the production of pharmaceutical products, tourism, focusing on therapeutic and recreational activities, and health services (including e-Health) in order to improve efficiency of healthcare.
- (5) high-tech sector: further developments in the sector, e.g., linked to specific computer software (e.g. destination management systems, GPS-based 3D navigation and information systems or mobile apps to support visitors); high-end products based on specific Alpine Region raw material (e.g. pharmaceuticals); or high-end products linked to typical activities in the Alpine Region (e.g. ropeways, ski and boot manufacturers, climbing equipment or artificial snow-making installations).

Yet, it is also acknowledged that there is limited development of overall R&I strategies regarding specific Alpine topics of interest (e.g., Digital Divide, Climate Change, Biodiversity conservation, Advanced Manufacturing) that are supported in the Joint declaration on the EUSALP, 2019<sup>6</sup> and the Report on implementation of MRS, 2019<sup>7, 8</sup>.

<sup>3</sup> <https://www.alpine-region.eu/mission-statement>

<sup>4</sup> A-Ring deliverable AT1.2 “SE RIS Policy Report”

<sup>5</sup> Available at [https://ec.europa.eu/regional\\_policy/sources/cooperate/alpine/eusalp\\_action\\_plan.pdf](https://ec.europa.eu/regional_policy/sources/cooperate/alpine/eusalp_action_plan.pdf).

<sup>6</sup> Available at [https://www.alpine-region.eu/sites/default/files/uploads/page/24/attachments/eusalp\\_2019\\_joint\\_declaration\\_final\\_191121.pdf](https://www.alpine-region.eu/sites/default/files/uploads/page/24/attachments/eusalp_2019_joint_declaration_final_191121.pdf)

<sup>7</sup> Available at [https://www.alpine-region.eu/sites/default/files/uploads/page/24/attachments/report\\_from\\_the\\_commission.pdf](https://www.alpine-region.eu/sites/default/files/uploads/page/24/attachments/report_from_the_commission.pdf)

<sup>8</sup> The A-Ring deliverable AT 1.3 has recorded certain obstacles to collaboration besides needs and interests. (See Annex I)

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The design of a macro-region SRIA opens a range of opportunities and this calls for deep reflection on key questions that need to be given due consideration. These questions may not be resolved at the outset as options may initially be kept open for discussion and experimentation.

- What is the level of ambition of this exercise? The SRIA may well benefit from the already identified areas of common interests, i.e., building on the overlaps across the existing strategies at national and regional level. Alternatively, the SRIA may pursue a more ambitious set of goals, i.e., to start with a transnational approach and identify R&I challenges from this perspective leading to a gradual alignment of relevant national and regional policies. Whereas the first approach offers a rather quick start based on cross-border or shared exchanges and partnerships with consequent benefits, albeit the obstacles to collaboration<sup>9</sup>, the second approach offers a more holistic and strategic consideration and take-up of transnational collaboration needs and opportunities.<sup>10</sup>
- How to dovetail with broader EU goals: digital, green, and fair transitions? Transnational collaboration in the AR needs to be seen within the wider context of the EU and related policies, especially as the identified areas of common interest are directly linked to EU goals (such as the twin transition).
- How will the relevant national and regional R&I strategies already in place be aligned with the SRIA? What will be the role of these strategies? How can the SRIA build on these effectively? Experience from R&I partnerships shows that a two-way dialogue is usually built between the SRIA and national/regional policies allowing mutually reinforcing and largely beneficial influences. For this dialogue to be built there needs to be a structure linking the people involved in the SRIA development with those responsible for policy design at the respective regional/national level.
- What would the level of granularity be of the SRIA in relation to the identified themes of common interest? Usually, thematic priorities in SRIAs are rather broadly defined to allow buy-in from as many different countries/regions as possible. However, call topics supporting research proposals need to be specific so that actual research consortia can be built based on individual interests of researchers and the specific thematic priorities in national/regional programmes and initiatives. In addition, very broadly defined themes cannot support any specific strategic orientation of the joint efforts. The right balance needs to be found between generality and focus.

When the SRIA is co-designed and enters a level of maturity, the implementation of the SRIA should also be positioned vis-à-vis existing policy implementation tools (such as Interreg Alpine Space Programme, national and regional R&I programmes and activities, other EU relevant project and activities)

## 2.2 Rationale and overall goals

Relevant A-Ring documents note that the rationale for developing a common SRIA for the Alpine Region is based on three factors:

- The EUSALP regions are running at different speeds.

<sup>9</sup> See for instance Annex I

<sup>10</sup> These two approaches are analyzed in Section 4.

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- There is limited focus on a transnational approach on strategic topics of interest for the Alpine Region in order to better exploit economic opportunities.
- There is no strategic transnational cooperation framework for topics of specific Alpine importance.

From this perspective, the SRIA takes on strategic importance, potentially playing an instrumental role in aligning national and regional research and innovation policies and building a common transnational cooperation framework.

The SRIA can be as effective as the extent of commitment and engagement achieved among key players and stakeholders to building this common transnational cooperation framework. The SRIA needs thus to be supported by jointly agreed goal(s) and objectives. For instance, following the above rationale the goal of developing a SRIA for the Alpine Region should reflect three aspects:

- To contribute to inter-regional convergence in terms of R&I performance and capacity
- To integrate the transnational collaboration dimension in addressing topics of interest for the Alpine Region
- To help build an overarching strategic transnational cooperation framework for topics of specific Alpine interest.

The above are only an indication. The SRIA goals and objectives need to be clearly articulated within the framework of the EUSALP objectives<sup>11</sup>:

- To balance development and protection through innovative approaches
- To enhance attractiveness and competitiveness of the Alpine Region
- To ensure mutually beneficial interaction between the mountain regions and the surrounding lowlands and urban areas
- To promote the Alpine Region in its function as an EU laboratory for effective cross-sectorial and multi-level governance, strengthening cohesion within the Union

<sup>11</sup> <https://www.alpine-region.eu/mission-statement>

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Following these, more specific objectives need to be set for the SRIA that would later guide the development of specific actions/measures/activities in the SRIA's implementation plan.<sup>12</sup>

The development of the goals and objectives entails a process of testing and agreeing on common values as the basis for moving towards shared vision and common implementation frameworks.

### 2.3 Timeframe

The timeframe of the SRIA needs to be defined corresponding to the time needed to work on the objectives set to achieve the expected results (next 10 years or more). Naturally, the level of political support and commitment is crucial, although not easily secured for such long periods.

### 2.4 Guiding principles

The SRIA will need to be based on a commonly agreed set of guiding principles. These may already be prescribed through EUSALP and EU principles but there may be specific additional aspects for consideration.

Examples:

- Support for R&I capacity-building in lower R&I intensity regions, tech/knowledge transfer
- R&I for achieving the Sustainable Development Goals<sup>13</sup>; R&I for sustainability
- Resilience to crises such as the Covid pandemic
- RRI (responsible research and innovation), social responsibility/innovation, open and fair science, open innovation.

### 2.5 Scope & targets

The scope of the SRIA reflects the level of ambition. For a macro-region the scope is ideally not focused on a specific theme; but rather kept broad covering several themes – i.e., the four main areas identified by A-Ring (see section 3). The Orientation of the exercise and the way these areas will be addressed (cf. Section 4) has implications for the choice of methods and the stakeholders to engage. Put very simply, if the areas are to be addressed from a strictly research, scientific and/or technological approach, the primary actors leading the exercise would be the academic and research community and the methods would be primarily based on expertise<sup>14</sup>. The priorities identified will reflect purely R&I niches.

By addressing the transnational R&I agenda in a more systemic way, seen as themes cutting across multiple areas of economy and society, a variety of actors need to be consulted and engaged, reflecting not only scientific and technological prospects but also business/economic opportunities as well as concerns and

<sup>12</sup> Examples: enhance capacities/knowledge, reduced fragmentation, enhanced scientific profiles of AR (taken from JPI Urban Europe), launching sectoral partnerships, and/or business – research – education partnerships

<sup>13</sup> <https://sdgs.un.org/goals>

<sup>14</sup> Based on Rafael Popper's Foresight Diamond, foresight methods can be grouped according to their focus on expertise or evidence, or facilitating interaction and creativity: <https://rafaelpopper.wordpress.com/foresight-diamond/>

potential of activating society as contributors apart from end users. This approach would need a combination of methods enabling interaction and creativity apart from drawing on evidence and expertise.

Based on the objectives, the applied approach, the scope, and the guiding principles, the SRIA can lead to certain SMART<sup>15</sup> targets that may be:

- Research-related
- Innovation-related
- Market-related
- Environment-related
- Public services including Policy
- Societal
- A combination of the above

An important question is whether there are certain types of targets that need to be prioritized, how and why. As noted in the SRIA of BiodivERsA (a public R&I partnership under Horizon 2020), *“implementation of these targets will require action to change current ways of supporting R&I (e.g., deep changes in the way we perform research, with reinforced relationships between scientists and research stakeholders, deeper collaborations between disciplines, enhanced international collaborations, and better policy relevance of research. Profound changes in the way research programmers and funders design, implement and evaluate their research programmes, and increased support for cross-sectoral and cross-border research, are also vital.”*<sup>16</sup>

15 specific, measurable, achievable, (sometimes agreed), realistic (or relevant) and time-bound, (or timely).

<sup>16</sup> Biodiversa SRIA, <https://www.biodiversa.org/>

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### 3 Inputs to the A-Ring SRIA development

This part of the report focuses on the future, aiming to identify how the identified common themes of interest may evolve in the future. This can be done by contextualising these potential trajectories within anticipated global megatrends and sectoral trends, as well as any drivers and “black swans” that may occur in the next ten years.<sup>17</sup>

#### 3.1 Identified themes of common interest

This chapter builds on the Research and Innovation (R&I) topics of interest across five of the seven Alpine region nations (Austria, Germany, France, Italy, Slovenia) reported in several A-Ring reports<sup>18</sup>, which captivated the current and future individual priorities of these regions as well as the thematic cooperation potentials beyond regional and national borders, as well as the extensive consultations on R&I topics among S3 policy/ decision makers and implementation bodies, including public authorities (PAs) from all 7 countries and 48 regions of the Alpine macro-region<sup>19</sup>.

The common areas of interest across the Alpine regions, based on consultations with the policy community (AT 1.2) and the business and academic communities (AT1.3) were:

- **Digital transformation / digitalisation** that concerns both the transformation of production and Industry 4.0 as well as the use of digital technologies such as Artificial Intelligence, Internet of Things, data mining, ICT-Security, data science, smart materials, digital training, and internet infrastructures, for public and private matters.
- **Sustainability** that involves topics related primarily to energy as well as the circular economy.
- **(Smart) Mobility** viewed both as a topic of its own as well as part of the previous two areas.
- **Social innovation** going beyond the point of sustainability i.e., raising the potential for innovation through greater involvement of citizens and users.

#### 3.2 Megatrends

Understanding megatrends helps the contextualization of the potential future trajectories the themes of common interest may take and the implications these trajectories may bring. Megatrends are “*macro-level phenomena which include various (sometimes conflicting) sub-phenomena (e.g., globalisation, climate change)*”<sup>20</sup> and involve “*large, transformative global forces that define the future by having a far-reaching impact on business, economies, industries, societies and individuals*”<sup>21</sup>. This section builds on relevant and

<sup>18</sup> A-RING Deliverable AT1.3 “Transnational R&I Focus Report” and D.T1.2.1 S3/RIS Policy report, Transnational report with focus on current and foreseen transnational activities within each regional S3/RIS strategy and on transnational R&I topics, integrated with results from available RIS3 Comparative analysis, focused on AR area.

<sup>19</sup> Relevant work has been done under WP T3 Activity 3.1: Alpine R&I Seed Lab and A.T2.2 Co-design and knowledge capitalisation and reported in DT1.4.2 A-RING Blueprint Workshop – Implementation Paper, D.T2.2.1 – Alpine Transnational Live Learning, D.T2.2.2 – Policy Report Live Scenario, D.T2.2.3 – Successful S3 implementation webinar.

<sup>20</sup> Georghiou, L. (Ed.). (2008). *The handbook of technology foresight: concepts and practice*. Edward Elgar Publishing.

<sup>21</sup> EY (2015). Megatrends 2015: Making sense of a world in motion. Retrieved from [https://www.ey.com/Publication/vwLUAssets/ey-megatrends-report-2015/\\$FILE/ey-megatrends-report-2015.pdf](https://www.ey.com/Publication/vwLUAssets/ey-megatrends-report-2015/$FILE/ey-megatrends-report-2015.pdf)

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recent research and policy reports, scientific articles, and other publications elaborated by international public and private institutions regarding a time-horizon spanning between 10 and 30 years.

### 3.2.1 Demographic Shifts

Changes in the size and synthesis of the population are among the most cited megatrends in the literature. According to the United Nations (UN), the global population is projected to keep increasing from 7.7 billion in 2019 to 8.5 billion in 2030 and 9.7 billion in 2050. Nevertheless, the recorded population growth will not be equally distributed among continents and nations, as growth is anticipated to take place primarily in developing countries<sup>22</sup>. The European population is projected to *decrease* from 747 million in 2019 to 741 million in 2030 (-0.8%) and 710 million in 2050 (-4.9%).<sup>23</sup> Within Europe, significant discrepancies in population growth are expected: Southern and Eastern Europe populations are projected to decrease by almost 3% by 2030, while Northern Europe is anticipated to increase by 4% (

<sup>22</sup> Roland Berger Trend Compendium 2050: Population and Society, Retrieved from

<https://www.rolandberger.com/en/insights/Publications/Roland-Berger-Trend-Compendium-2050-Population-and-Society.html>

<sup>23</sup> United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019: Volume I: Comprehensive Tables. Retrieved from [https://population.un.org/wpp/Publications/Files/WPP2019\\_Volume-I\\_Comprehensive-Tables.pdf](https://population.un.org/wpp/Publications/Files/WPP2019_Volume-I_Comprehensive-Tables.pdf)

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Table 1). The primary reason behind decreasing population growth rate is the low fertility rates<sup>24</sup>.

<sup>24</sup> Roland Berger Trend Compendium 2050: Population and Society

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Table 1: European population per geographic region

Regions	2019	2030*		2050	
	in thousands	in thousands	% of change	in thousands	% of change
Europe	747,183	741,303	-0.8%	710,486	-4.9%
Southern Europe	152,447	148,460	-2.6%	136,648	-10.4%
Northern Europe	105,769	109,990	4.0%	114,960	8.7%
Eastern Europe	293,445	284,535	-3.0%	261,977	-10.7%
Western Europe	195,522	198,318	1.4%	196,902	0.7%

Source: UN (2019). *World Population Prospects 2019: Volume I: Comprehensive Tables*.

The average age of the population is also expected to increase, mainly due to higher life expectancies and lower fertility rates.<sup>25</sup> According to the UN, life expectancy on a global level is forecasted to grow from 72.6 years in 2019 to 74.0 years in 2030. At the same time, the global fertility rate is projected to decline from 2.5 in 2019 to 2.38 births per woman in 2030. Hence, people over age 65 are currently the fastest-growing age group: in 2019 there were 703 million people aged 65 years or over globally (accounting for 9% of the total global population), and the number is expected to increase to 997 million in 2030 (accounting for 12% of the total global population). Furthermore, between 2019 and 2050, the number of people aged 80 years or over in the worldwide population is expected to triple from 143 to 426 million.<sup>26,27</sup>

In Europe, the megatrend of population ageing is even more evident. By 2030, the population aged more than 65 years will account for 23% of the total European population. The phenomenon will be more intense in Southern Europe, where the share of 65+ is anticipated to reach 35% by 2050 (Table 2).

<sup>25</sup> OXFAM (2020). *Global Megatrends: Mapping the forces that affect us all*. OXFAM Discussion Papers. Retrieved from <https://oxfamlibrary.openrepository.com/bitstream/handle/10546/620942/dp-global-megatrends-mapping-forces-affect-us-all-310120-en.pdf?sequence=1&isAllowed=y>

<sup>26</sup> United Nations, Department of Economic and Social Affairs, *Population Division (2020). World Population Ageing 2019 (ST/ESA/SER.A/444)*. Retrieved from:

<https://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2019-Report.pdf>

<sup>27</sup> United Nations, Department of Economic and Social Affairs, *Population Division (2019). World Population Prospects 2019: Volume I: Comprehensive Tables*. Retrieved from [https://population.un.org/wpp/Publications/Files/WPP2019\\_Volume-I\\_Comprehensive-Tables.pdf](https://population.un.org/wpp/Publications/Files/WPP2019_Volume-I_Comprehensive-Tables.pdf)

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Table 2: Proportion of people aged 65+ in Europe

Regions	2019	2030*	2050
Europe	18.8%	23.0%	28.1%
Southern Europe	21.1%	26.0%	35.0%
Northern Europe	18.8%	21.8%	25.4%
Eastern Europe	16.4%	20.5%	25.2%
Western Europe	20.6%	24.9%	28.8%

Source: UN (2019). World Population Prospects 2019: Volume I: Comprehensive Tables.

### 3.2.1.1 Demographic developments in the Alpine area

The Alps are a dynamic living space, with the alpine population playing a central role in these dynamics, be it through its traditions and innovations, its cultural and linguistic richness, its economic activities, and its intensive interactions with the surrounding regions. Some 150 years ago, the population in the Alps was about half the current size. Today, overall population growth and depopulation of certain areas co-exist next to each other, and population density varies dramatically within the overall region. Moreover, novel phenomena like the so-called “new highlanders” are becoming increasingly visible.<sup>28</sup>

The demographic development in the Alpine region is anticipated to be diverse. According to projections for 2050 for the area<sup>29</sup>, urban and metropolitan regions will tend to show more positive trends, but many rural areas also will show a positive demographic balance.

The demographic development within the Alps perimeter is anticipated to follow the diversity observed above for the European territory with the north and the south showing a varying picture as observed in the Figure 1 below which showcases the change of population between 2010-2015 in the Alpine region taking into consideration the agglomeration of population in rural and urban areas. It is anticipated that the demographic changes will be influenced by urbanisation: metropolises and larger cities will be at the centre of growth trends, whereas the patterns in the rural areas will be more diverse. For example, the South Tyrol area is anticipated demographically to develop more positively than the Belluno province. Moreover, differences in trends will be observed between the different Alpine countries, e.g., along the French-Italian and the German-Swiss borders. This is an important parameter that should be taken into consideration during the design of future policies.<sup>30</sup>

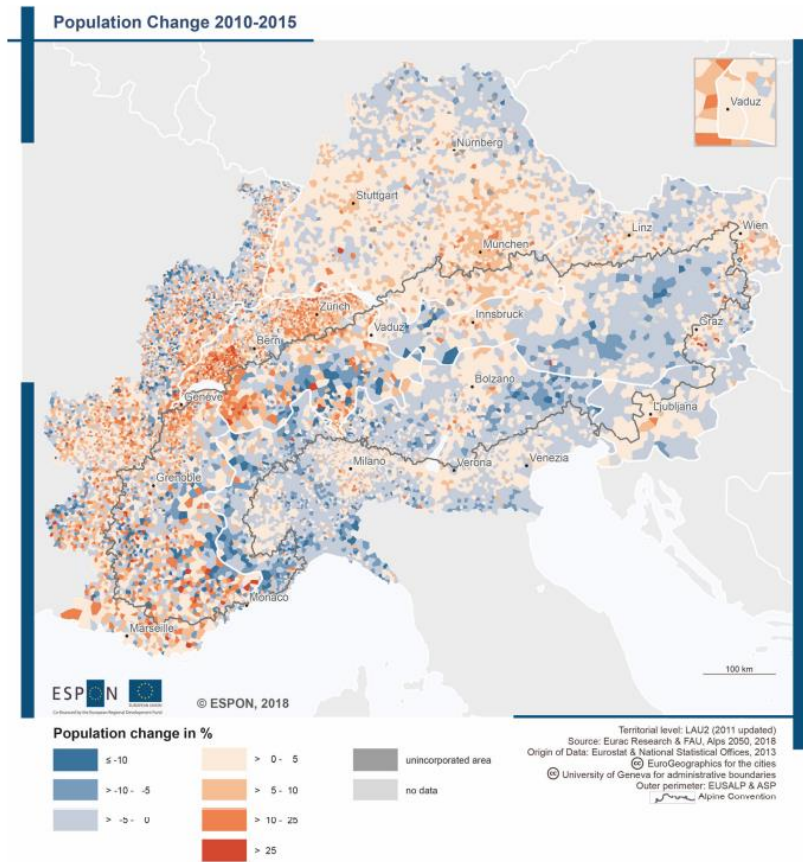
<sup>28</sup> Demographic changes in the Alps: Report on the state of the Alps, ALPINE CONVENTION 2015 Retrieved from: [https://www.alpconv.org/fileadmin/user\\_upload/Publications/RSA/RSA5\\_EN.pdf](https://www.alpconv.org/fileadmin/user_upload/Publications/RSA/RSA5_EN.pdf)

<sup>29</sup> ESPON (2018), Alps2050: Common spatial perspectives for the Alpine area. Towards a common vision, Retrieved from: [https://www.espon.eu/sites/default/files/attachments/01\\_alps\\_2050\\_FR\\_main\\_report.pdf](https://www.espon.eu/sites/default/files/attachments/01_alps_2050_FR_main_report.pdf)

<sup>30</sup> ibid

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Figure 1: Population change on municipal level



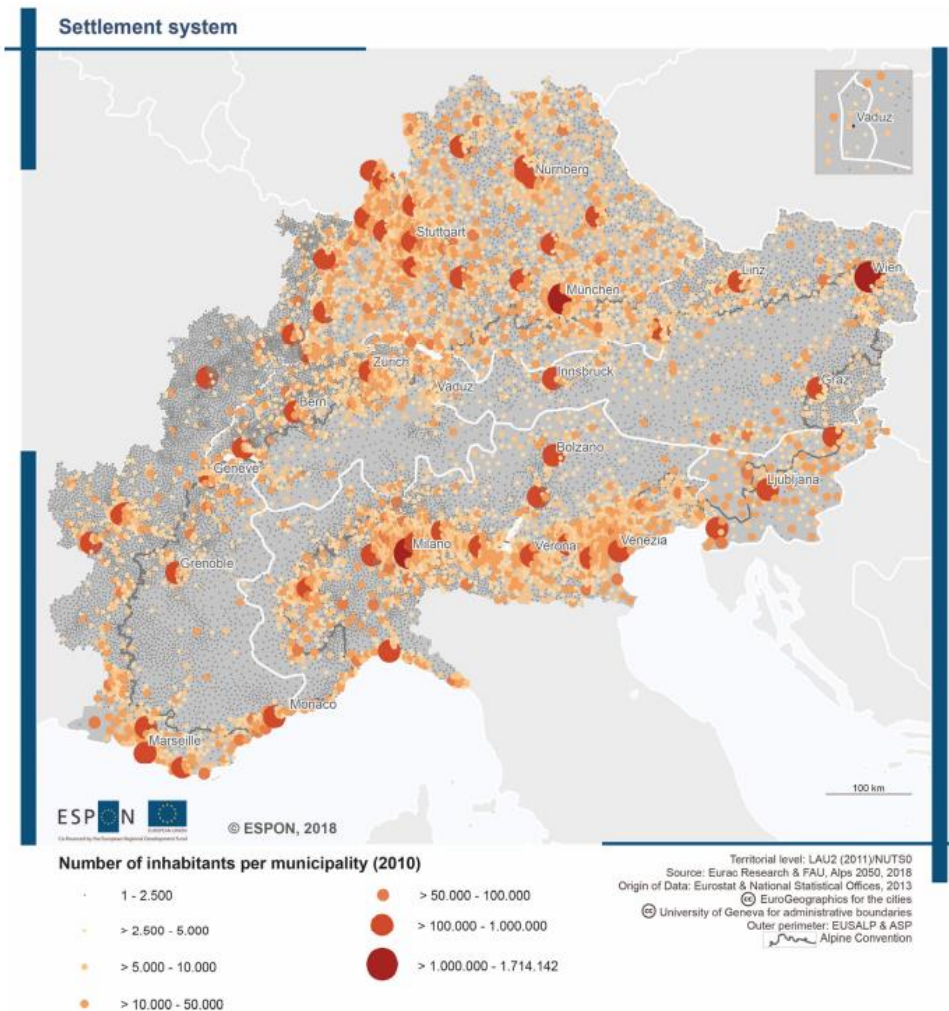
Source: Alps2050: Common spatial perspectives for the Alpine area. Towards a common vision

The abovementioned information should be seen within the context of the overall Alpine settlement. Overall, the spatial structures are morphological influenced as illustrated in the map below, which depicts the size of the municipalities. Some observations recorded in the Alps 2050 concern the relevance of the different political and administrative contexts, as for example the average size of municipalities is larger in Slovenia than in France, as well as that the higher the mountains and narrower the valleys, the smaller the settlements.

Despite all the differences between national and regional contexts, there are obvious parallels in the settlement system – the relevance of the morphological structure in the Inner Alpine area, and the agglomeration ring all around the mountainous area. As macro-regional strategies are about common challenges and opportunities, the settlement system could be an obvious issue. It might be meaningful to debate transnational instruments for the development of settlement systems that support synergies across borders.

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Figure 2 : Size of the municipalities (2010) as an important facet of the settlement system



Source: Alps2050: Common spatial perspectives for the Alpine area. Towards a common vision

### 3.2.2 Urbanisation<sup>31</sup>

According to the UN, during the past two decades the global urbanisation level increased from 43% in 1990 to 56.2% in 2020. Projections show that urbanisation, combined with the overall growth of the world population,

<sup>31</sup> The rate at which the percentage urban grows, or declines is called the urbanization rate. Definition sourced from: United Nations, Department of Economic and Social Affairs, *Population Division (2019). World Urbanization Prospects: The 2018 Revision (ST/ESA/SER.A/420)*. New York: United Nations

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will add another 1 billion people to the urban population by 2030, leading to a global urbanisation level of 60.4%.<sup>32</sup>

Africa and Asia will undergo urbanisation at higher growth rates than the rest of the world. In contrast, Europe, currently with a high urbanisation level already at approximately 75%, will show slower urbanisation rates and it is expected to reach an urbanisation level of 77.5% in 2030 and 83.7% in 2050 (Table 3).<sup>33,34</sup>

Table 3: Urbanisation levels in Europe

Regions	2019	2030	2050
Europe	74.7%	77.5%	83.6%
Southern Europe	71.8%	75.4%	82.0%
Northern Europe	82.4%	85.0%	89.2%
Eastern Europe	69.8%	72.3%	79.4%
Western Europe	80.1%	82.2%	86.9%

Source: UN, *World Urbanisation Prospects (2018)*.

### 3.2.2.1 Urbanisation and the Alpine Region

The demographic trends described in the previous section (Section 3.2.2 Demographic developments in the Alpine region) may not reproduce the differences currently existing between mountainous and non-mountainous regions in the Alp region. Instead, the diversity of rural development parts and the large-scale influence of metropolitan ‘*growth poles*’ may lead to a much more complex picture, further increased by the combination of diverse and overlapping in- and out-flows of migrants which produce a highly diversified situation for all parts of the Alpine space<sup>35</sup>. Many demographic indicators refer to these patterns, highlighting the increase of bi-directional (and circuit) migratory flows, negative natural trends, significance of specific age groups and gender differences in migration movements, length and frequency of movements etc. Still, metropolitan areas will continue showing positive values in terms of demographic changes, whereas rural patterns will have a more diverse picture.

In particular with respect to migration, there is a trend recorded for second homes and for amenity migration, even if quantitative data is not available in a standardised form. The megatrends in migration dynamics are anticipated to influence the Alpine region and consequently will affect its spatial development. The ongoing

<sup>32</sup> United Nations, Department of Economic and Social Affairs, *World Urbanisation Prospects (2018)*. File 1: Population of Urban and Rural Areas at Mid-Year (thousands) and Percentage Urban. Retrieved from <https://population.un.org/wup/Download/>

<sup>33</sup> *ibid*

<sup>34</sup> United Nations, Department of Economic and Social Affairs, *World Urbanisation Prospects (2018)*. File 9: Average Annual Rate of Change of the Percentage Urban by region, subregion, and country, 1950-2050 (per cent). Retrieved from <https://population.un.org/wup/Download/>

<sup>35</sup> Gretter, A., Machold, I., Membretti, A., & Dax, T. (2017). Pathways of immigration in the Alps and Carpathians: Social innovation and the creation of a welcoming culture. *Mountain Research and Development*, 37(4), 396-405.

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societal differentiation and the diversification of lifestyles change migration patterns. Residential mobility is supposed to grow, focussing on places of dynamic labour markets and those of a high quality of living. From the Alpine perspective, this is a chance for economic development and can, at the same time, be a challenge for rural cultures that have to adapt to new dynamics. Beyond this predominantly domestic and the European dynamics, the international migration dynamic post-2015 is a European wide challenge. It remains to be seen how persisting global migration pressures will bring new challenges in particular to the rural spaces. In parallel, demographic change is a challenge for Europe and for the Alpine region. As shown in the territorial analyses, in some regions outmigration and ageing are an increasing challenge that is actually very difficult to mitigate. However, large-scale migration movements and international migration have already affected rural mountain areas and will contribute to future demographic trends as well. Adaptation strategies on how to deal with societal and cultural implications are of major importance.

Overall, the implications that may be induced by these demographic changes are:

- In the long run, the trend of metropolisation can lead to polarisation. At the same time, positive development trends in some mountainous, rural regions show that there can be opposite trends. Political action addressing the territorial potentials (of all types of spaces) can make a difference – place based approaches for tourism and economic innovation are just prominent key issues in this context.
- If demographic growth and loss trends would continue like they have developed in recent years, the settlement system would change fundamentally, blurring the differences between inner- and pre-Alpine areas.
- Demographic growth as well as loss can mean challenges for the maintenance of public services, financial systems, and cultural dynamics. Moreover, settlement growth is coming along with increasing environmental pressure.

### 3.2.3 Environmental, Ecological and Climate Changes

Despite continued efforts, the world's emissions continue to increase, the average temperature of Earth is growing, and the sea level is rising. Annually human activities generate approximately 42 billion tons of carbon dioxide (CO<sub>2</sub>) emissions, accelerating global warming.<sup>36</sup> According to the Energy Information Administration (EIA), global energy-related CO<sub>2</sub> emissions are expected to grow from 35 billion metric tonnes in 2018 to almost 43 billion in 2050 (0.6% increase per year). Yet, this growth in energy-related CO<sub>2</sub> emissions is not evenly distributed across countries. As non-OECD countries continue to grow, so does their energy consumption and consequently their energy-related CO<sub>2</sub> emissions. More specifically, the energy-related CO<sub>2</sub> emissions in non-OECD countries are expected to rise by 1.0% per year, while in OECD countries to decrease

<sup>36</sup> United Nations, Department of Economic and Social Affairs (2019). *Sustainable Development Outlook 2019: Gathering storms and silver linings - An overview of SDG challenges*.

by 0.2%.<sup>37</sup> Nevertheless, currently the average per-capita emissions in high-income countries are 43 times higher than emissions per-capita in low-income countries.<sup>38</sup>

According to the Intergovernmental Panel on Climate Change (IPCC), global warming is expected to reach 1.5°C between 2030 and 2052, while the scenario of a 2°C increase is also possible. Global sea-level rise associated with climate change is likely to be in the range of 0.26 to 0.77m by 2100 for 1.5°C of global warming, plus 0.1m in the case of global warming of 2°C.<sup>39</sup> Developing countries are more vulnerable to climate risks, as they will be confronted with higher human cost and economic damages.<sup>40</sup>

### 3.2.3.1 Environmental, ecological and climate change in the Alpine area

Climate change is already evident in the Alpine region and involves not only rising temperatures, but also changes in the seasonal cycle of precipitation, global radiation, and humidity, as well as changes in temperature and precipitation extremes, that will bring impacts like floods, droughts, snow cover, and natural hazards (Figure 3).

Under the relevant scenarios described in the Alps 2050 report, about 0.25 °C warming per decade is projected until the mid of the 21st century and accelerated 0.36 °C warming per decade in the second half of the century. It has to be noted, that the expected rates of change in the 21st century are clearly below the observed rates in the past few decades (about 0.5 °C per decade). The reasons for this include natural variability, but also systematic underestimated trends in historical simulations. *“This can be interpreted as a warning that the possibility of even stronger warming than presented here cannot be excluded”*<sup>41</sup>.

The annual cycle of precipitation is also expected to change considerably until the end of the 21st century with decreases in summer, particularly in the southern regions, and increases in winter.

Climate projections also suggest changes in extremes, such as a reduction of return periods of extreme precipitation events.

Projected changes of the (air) temperature show the following patterns and characteristics:

- There will be higher increases in annual mean temperature in the inner-Alpine areas than in the area of the spaces beyond the mountain topography, which means that there will be a strong correlation of temperature with the morphological picture of the Alps: the higher the mountains, the stronger the

<sup>37</sup> U.S. Energy Information Administration (2019). International Energy Outlook 2019: with projections to 2050. Retrieved from <https://www.eia.gov/outlooks/ieo/pdf/ieo2019.pdf>

<sup>38</sup> United Nations, Department of Economic and Social Affairs (2019). Sustainable Development Outlook 2019: Gathering storms and silver linings - An overview of SDG challenges. Retrieved from [https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/publication/SDO2019\\_Preview\\_Booklet\\_Web.pdf](https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/publication/SDO2019_Preview_Booklet_Web.pdf)

<sup>39</sup> Masson-Delmotte, V., et al. (2018). Summary for Policymakers. In: *Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. IPCC. World Meteorological Organization. Geneva. Switzerland. 32 pp.

<sup>40</sup> United Nations, Department of Economic and Social Affairs (2019). *Sustainable Development Outlook 2019: Gathering storms and silver linings - An overview of SDG challenges*.

<sup>41</sup> Alps2050: Common spatial perspectives for the Alpine area. Towards a common vision

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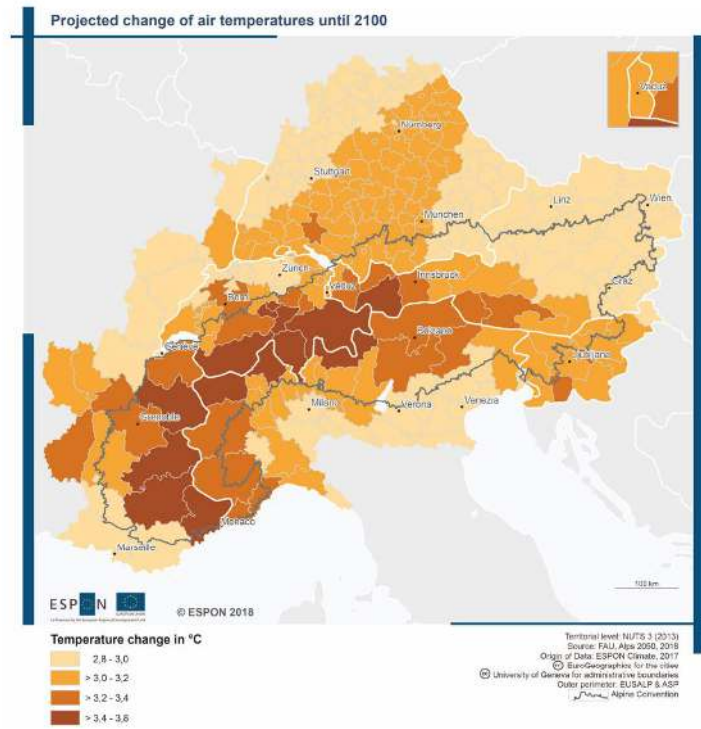
increase of temperature (even if the relatively lower temperature rise in the pre-Alpine areas means already considerable adaptation challenges).

- The Southern side of the Alpine area – and in particular the Western Alps – is anticipated to face the highest changes in annual mean temperature.

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Figure 3. Projected change of air temperature



Source: Alps2050: Common spatial perspectives for the Alpine area. Towards a common vision

Changes in the temperature and precipitation are very likely to have a range of secondary effects on floods, droughts, snowpack, and the occurrence of natural hazards. For instance, the intensification of precipitation is likely to cause more frequent severe flooding in the Alps. Increased temperatures are expected to lead to more severe drought regimes and large decreases in alpine snow amount and duration below about 1500–2000 m elevation. Also natural hazards, which are often related to downwasting of glaciers and melting of permafrost,

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are expected to respond to climate change by more frequent rockfalls and landslides and more intense debris flows.<sup>42</sup>

The implications of this situation on regional level may involve<sup>43</sup>:

- If the projections are correct, the Inner-Alpine parts will be more concerned by climate change and soil sealing along the valleys. Ecological fragmentation will be a key concern and moderating the demands of protection and development will be a key political challenge on cross-national level.
- The more urbanised areas may play an important role by demanding and using ecosystem services, in particular with regard to water, leisure supply (including second homes), tourism demand, but also clean air, ecological benefits etc.
- These changes will also incur impacts on a range of socio-economic sectors such as tourism, agriculture, or hydropower as well as cause serious damage to life and infrastructure. Detailed investigations on cross-national, cross-border level with respect to disaster risk management, touristic adaptation strategies, new energy concepts will be needed to elaborate effective and flexible adaptation strategies well in advance, in order to alleviate the most negative impacts of climate change in the Alpine region.
- Biodiversity changes have to be addressed via cross-border planning approaches with a long-term place-based perspective.

### 3.2.4 Economic Megatrends

Before the COVID-19 pandemic outbreak, the International Monetary Fund (IMF) estimated that the global gross domestic product (GDP) would increase between 2020 and 2024 by 3.5% per year on average.<sup>44</sup> At the same time, the Organisation for Economic Co-operation and Development (OECD) projected that the world economy would grow in the long term, yet in a constantly slower pace, ranging from 3.5% in 2018 to almost 2.7% in 2030.<sup>45</sup> However, since then, the lockdown and widespread closure measures taken by governments all around the world to slow the spread of the coronavirus and protect human lives, had a severe impact on economic activity that is not yet fully mapped as the pandemic is still affecting nations across the globe. The lack of historical precedent of comparable size and nature to this crisis, makes economic forecasts subject to higher uncertainty than usual<sup>46</sup>, hence all projections mentioned hereunder need to be viewed with a level of caution.

Certain trends are more reliable including the yearly growth of GDP in BRICS until 2060 to be higher than the respective growth of GDP in OECD countries. In 2030, China is expected to become the world's largest economy

<sup>42</sup> Gobiet, A., Kotlarski, S., Beniston, M., Heinrich, G., Rajczak, J., & Stoffel, M. (2014). 21st century climate change in the European Alps—A review. *Science of the Total Environment*, 493, 1138-1151.

<sup>43</sup> Ibid

Alps2050: Common spatial perspectives for the Alpine area. Towards a common vision

<sup>44</sup> IMF (2020). World Economic Outlook Database. *World Economic and Financial Surveys*. Retrieved from <https://www.imf.org/external/pubs/ft/weo/2020/01/weodata/index.aspx>

<sup>45</sup> Guillemette, Y. and Turner, D. (2018). The Long View: Scenarios for The World Economy To 2060. *OECD Economic Policy Paper No. 22*. OECD. OECD Publishing.

<sup>46</sup> IMF (2020). *World Economic Outlook, April 2020: The Great Lockdown*. World Economic Outlook Reports.

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(with a 27% share of the world output), surpassing the United States.<sup>47,48,49</sup> Due to this rising importance of emerging markets, notably those of China and India, it is believed that the centre of economic gravity will continue shifting from North America and Europe towards Asia.<sup>50,51</sup>

In addition, the rise of the middle class<sup>52</sup> and wealth concentration by the wealthy are two notable and contrasting trends identified on global level. By 2030, the number of people classified as middle class will increase to 5.2 billion, up from 3.2 billion in 2017. In other words, by 2030, most of the world will be middle class.<sup>53</sup> A large chunk of these people will be situated in emerging economies, especially in China.<sup>54</sup> Moreover, in 2030 the wealthiest 1% of the world's population is projected to own two-thirds of the world's wealth.<sup>55</sup>

#### 3.2.4.1 Economic projections in the Alpine area

Overall, the economic performance of the Alpine region is rather strong with spatial patterns and trends for different economic sectors as depicted in the Figure 4 below.

- there is a North-South divide: the trends in employment and in GDP (economic strength) are anticipated to be more positive on the Northern side of the Alps space than on the Southern side.
- There is a 'central-peripheral pattern' when it comes to tourism: the gradient goes from the (inner-Alpine) centre to the (pre-Alpine) 'periphery' of the Alps space.
- There is also an East-West gradient that concerns the share of labour in the agricultural sector: it is higher in the Eastern Austrian and Slovenian regions than in the east side of the Alpine region.

<sup>47</sup> PWC (2017). The Long View How will the global economic order change by 2050? The World in 2050. Retrieved from <https://www.pwc.com/gx/en/world-2050/assets/pwc-the-world-in-2050-full-report-feb-2017.pdf>

<sup>48</sup> JP Morgan (2020). Long-Term Capital Market Assumptions. Time-tested projections to build stronger portfolios. 24th Annual Edition. Portfolio Insights. Retrieved from <https://am.jpmorgan.com/blobcontent/1383647197004/83456/JPM52180%20LTCMA%202020%20A4.pdf>

<sup>49</sup> Guillemette, Y. and Turner, D. (2018). The Long View: Scenarios for The World Economy To 2060. *OECD Economic Policy Paper*. Economic Policy Paper No. 22. OECD. OECD Publishing.

<sup>50</sup> *ibid*

<sup>51</sup> European Commission (2020). Strategic Foresight Report – Charting the course towards a more resilient Europe.

<sup>52</sup> Middle class: individuals falling anywhere between 67-200% of the median income in a country. Source: Homi Kharas (2017). *The Unprecedented Expansion of the Global Middle Class*. Brookings. Cited in: ESPAS (2019). *Global Trends to 2030: The future of urbanization and Megacities*. Ideas Paper Series. European Union.

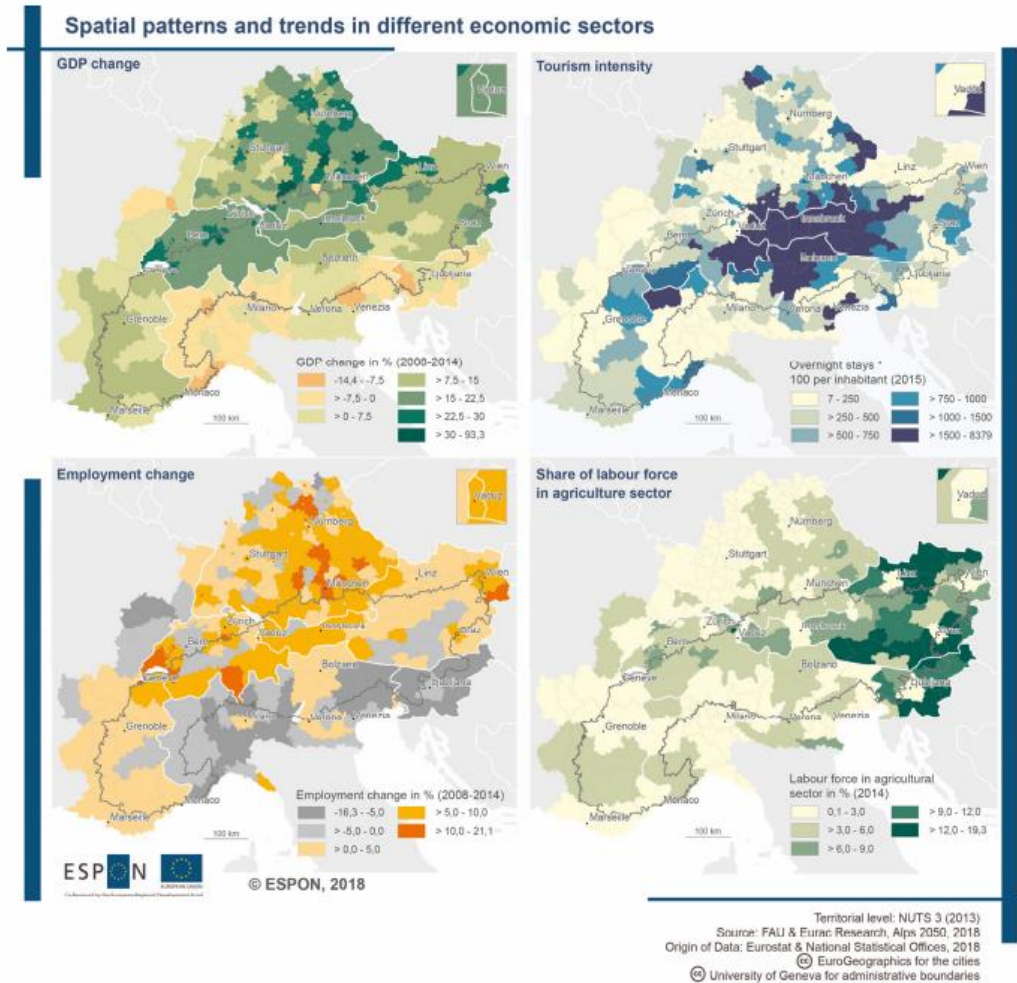
<sup>53</sup> *ibid*

<sup>54</sup> World Bank (2016). *Poverty and Shared Prosperity 2016: Taking on Inequality*. Washington. Cited in: ESPAS (2019). *Global Trends to 2030: The future of urbanization and Megacities*. Ideas Paper Series. European Union.

<sup>55</sup> Branko Milanovic (2016). *Global Inequality: A New Approach for the Age of Globalization*. Cambridge: Belknap Press of Harvard University Press. Cited in: ESPAS (2019). *Global Trends to 2030: The future of urbanization and Megacities*. Ideas Paper Series. European Union.

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Figure 4. Spatial patterns and trends in different economic sectors in the Alpine region



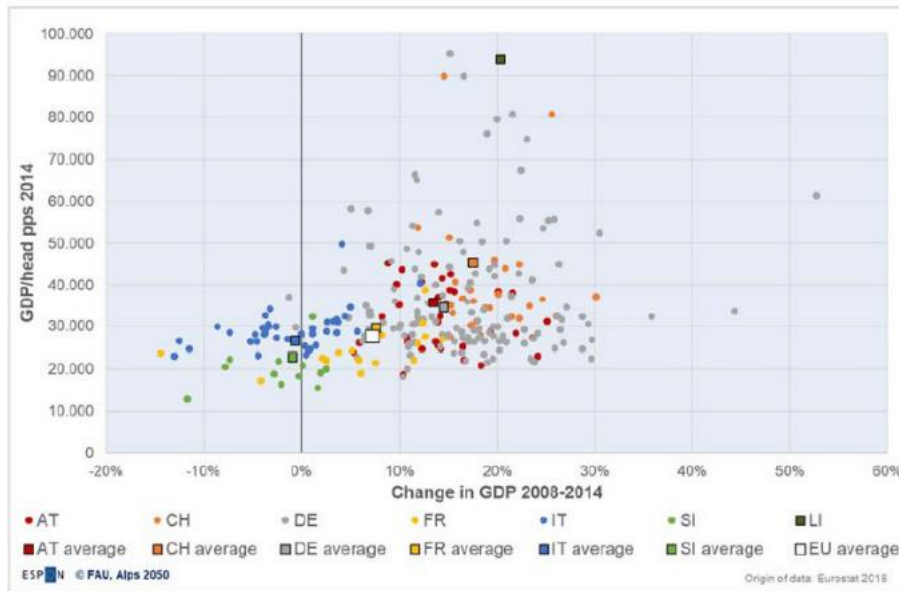
Source: Alps2050: Common spatial perspectives for the Alpine area. Towards a common vision

Moreover, according to the authors of the Alps2050 report, belonging to a specific nation-state determines more decisively the economic level of a region rather than if it is situated in the inner-Alpine or pre-Alpine area (i.e. AC or EUSALP) (Figure 5). Moreover, they identified that regional development is not determined by the Alpine region's morphology, and also that the projections do not highlight an urban-rural antagonism, i.e., that metropolitan regions will perform better as there will continue to be very successful rural regions, too.

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Figure 5. National differences in economic performance



Source: Alps2050: Common spatial perspectives for the Alpine area. Towards a common vision

Against this background, one can conclude that the Alpine regional development in the years to come will not be necessarily ‘handicapped’ by its specific territorial structure. Of course, spatial development will be influenced by morphological differences and by the urbanisation intensity. However, political decisions will be able to make a difference should they aim to exploit specific cross-regional potentials (on tourism, agriculture, traditional handcraft, energy production) and overcome challenges (transport policy). Within this context, it will be important for policy makers in the Alpine region to collectively consider:

- how can the current economic performance be maintained and ensured, in light of digitalisation trends and globalisation paradigm?
- how the accomplishment of UN’s sustainable development goals for all regions be ensured, while aiming for economic development simultaneously<sup>56</sup>?
- What kind of economic performance should be preferred, i.e., which sectors should be supported, what kind of growth should be aimed, how can endogenous potentials be used?
- what should economic cohesion mean for all alpine regions, i.e. how far should harmonization of regional performance go, and which scale should be used as reference base?<sup>57</sup>
- how can regions overcome the economic implications and negative impacts caused by the COVID-19 pandemic? How to best prepare for the future?

<sup>56</sup> e.g. improvement of touristic inflows will have a negative impact on the environment, quality of life of locals, etc.

<sup>57</sup> Alps2050: Common spatial perspectives for the Alpine area. Towards a common vision

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Overall, an integrated spatial perspective for the Alpine economy seems an urgent necessity for the economic development of the Alpine area.

### 3.3 Future trends for themes of common interest

#### 3.3.1 Digitalisation

As discussed above, digital transformation and digitalisation is a topic of interest for all the participating countries of the Alpine macro-region. Following the discussions made among the participating regions, digitalisation concerns the transformation of production and the progress of industry towards Industry 4.0 as well as the progress in Artificial Intelligence (AI), Internet of Things (IoT), data mining, ICT-Security, data science, smart materials, and internet infrastructures<sup>58</sup>. These trends are also reported in the relevant literature, amongst others such as Distributed Ledger Technologies (DLT) including blockchain; autonomous vehicles; 5G data networks; Virtual and Augmented reality (VR/AR); and 3D printing<sup>59,60,61</sup>

But it's not only technologies themselves that are anticipated to bring about disruptions; it is also the convergence of technologies that may yield solutions that will be greater than the sum of their parts. For instance, DLT, IoT and AI combined can provide solutions that ensure the authenticity of data, verifying identities enabling novel, secure multi-party transactions. Automation, robotics, and intelligent systems united can support industries in developing and integrating autonomous systems into the value chain.<sup>62</sup> The diffusion of these technological advancements into people's daily life, influencing almost every part of their living, ranging from work, travel and energy to food production and environment, is known as the process of Digital Transformation of our society. This transformation is central in shaping the direction of many other trends, such as improvements in healthcare and revolutionising the nature of work and education.<sup>63</sup>

Regarding the impacts of digitalisation on manufacturing, Industry 4.0 and the related Factory of the Future (FoF)<sup>64,65</sup> paradigm envision a future of creating smart products through smart processes and procedures, strongly rooted on the Internet of Things and Services and Cyber-Physical Systems-enabled manufacturing<sup>66</sup>, with applications in the area of energy, logistics, sustainable mobility, etc. The widespread adoption of Cyber-Physical Systems and Big Data analytics technologies by manufacturing companies will lead to the 4th Industrial

<sup>58</sup> A-Ring Deliverable AT1.3 "Transnational R&I Report"

<sup>59</sup> PWC (2020). The Essential Eight: Your guide to the emerging technologies revolutionizing business now.

<sup>60</sup> Marr, B. (2019). The 7 Biggest Technology Trends In 2020 Everyone Must Get Ready for Now. Forbes. Retrieved from <https://www.forbes.com/sites/bernardmarr/2019/09/30/the-7-biggest-technology-trends-in-2020-everyone-must-get-ready-for-now/#297577db2261>

<sup>61</sup> OXFAM (2020). Global Megatrends: Mapping the forces that affect us all. OXFAM Discussion Papers.

<sup>62</sup> PWC (2020). The Essential Eight: Your guide to the emerging technologies revolutionizing business now.

<sup>63</sup> European Commission. (2018). Hyperconnectivity & IoT. Competence Centre on Foresight - Megatrends Hub. Retrieved from [https://ec.europa.eu/knowledge4policy/foresight/topic/accelerating-technological-change-hyperconnectivity/hyperconnectivity-iot-digitalisation\\_en](https://ec.europa.eu/knowledge4policy/foresight/topic/accelerating-technological-change-hyperconnectivity/hyperconnectivity-iot-digitalisation_en)

<sup>64</sup> A.W. Colombo, S. Karnouskos and J.M. Mendes, Factory of the future: A service-oriented system of modular, dynamic reconfigurable and collaborative systems, in: *Artificial Intelligence Techniques for Networked Manufacturing Enterprises Management*, L. Benyoucef and B. Grabot, eds, Springer, 2010. ISBN 978-1-84996-118-9

<sup>65</sup> S. Karnouskos, A.W. Colombo, T. Bangemann, K. Manninen, R. Camp, M. Tilly, P. Stluka, F. Jammes, J. Delsing and J. Eliasson, A SOA-based architecture for empowering future collaborative cloud-based industrial automation, in: *IECON 2012 – 38th Annual Conference on IEEE Industrial Electronics Society*, 2012, pp. 5766–5772. doi:10.1109/IECON.2012.6389042

<sup>66</sup> L. Monostori, B. Kádár, T. Bauernhansl, S. Kondoh, S. Kumara, G. Reinhart, O. Sauer, G. Schuh, W. Sihn and K. Ueda, Cyber-physical systems in manufacturing, *CIRP Annals – Manufacturing Technology* 65(2) (2016), 621–641. doi:10.1016/j.cirp.2016.06.005



Revolution where CyberPhysical Production Systems (CPPS)<sup>67</sup> are blurring the boundaries between the real world and the virtual world. Smart products will plan, control, and optimize their own production process with minimal human intervention. Digital transformation will enhance the transparency of the production process, even across the organisational boundaries of the manufacturing enterprise. As such, similarly to the classical intelligent environments (smart homes, smart offices, smart cities), there is a trend of transforming production and logistics processes into smart factory environments where big data capabilities and smart predictive decision support tools are used to increase productivity and efficiency.<sup>68</sup>

At the centre of industrial transformation is IoT, accounting for more than \$178 billion<sup>69</sup> in 2016 and proving critical to providing companies with a competitive edge. The manufacturing industry is leading in IoT because of the revolutionary ways this connected technology has streamlined and simplified various manufacturing processes. For instance, IoT can provide real-time feedback and alerts companies of defects or damaged goods. These simple yet critical implementations of IoT reduce cost and waste. Further incorporation of IoT, Industry 4.0 “represents the vision of the interconnected factory where equipment is online, and in some way is also intelligent and capable of making its own decisions”<sup>70</sup>. Responsible for the rise of smart machinery, Industry 4.0 also introduced a hybrid approach of virtual and actual content warehouses that has freed up manpower on the production and collaboration side of the industry. The trend of mass customization has allowed manufacturers to react to consumer demand more efficiently. As customers expect the products, they use to be intuitive and easy to interact with, mobilization and connectedness continue to drive manufacturers to innovate faster and create software-enabled products. IoT and Industry 4.0 capabilities are also changing how post-sale service is provided, offering immediate and consistent online support.<sup>71</sup>

<sup>67</sup> L. Monostori, Cyber-physical production systems: Roots, expectations and R&D challenges, *Procedia CIRP* 17 (2014), 9– 13

<sup>68</sup> E. Ilie-Zudor, A. Ekárt, Z. Kemeny, C. Buckingham, P. Welch, and L. Monostori, Advanced predictive-analysis-based decision support for collaborative logistics networks, *Supply Chain Management: An International Journal* 20(4) (2015), 369– 388.

<sup>69</sup> <https://www.i-scoop.eu/internet-of-things-guide/internet-of-things-in-manufacturing/>

<sup>70</sup> <http://www.digitalistmag.com/iot/2017/04/25/industry-4-0-digital-transformation-in-manufacturing-05041191>

<sup>71</sup> <https://www.forbes.com/sites/danielnewman/2017/08/08/top-5-digital-transformation-trends-in-manufacturing/>

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Figure 6: Top digital transformation trends in manufacturing



Source: <https://www.forbes.com/sites/danielnewman/2017/08/08/top-5-digital-transformation-trends-in-manufacturing/>

Moreover, smart factories and Industry 4.0 have the potential to spark labour productivity. Smart factories will be a game changer for the manufacturing industry.<sup>72</sup> They could potentially ignite stalled labour productivity and unlock the key to productivity.

Hence, digital transformation is more than just implementing new technology, investing in tools, or upgrading existing systems. Digital transformation may help leaders answer the questions for their business such as the current digitalisation level, future vision, and how to get there.

### 3.3.1.1 Digitalisation in the Alpine area

Digital technologies are developing very fast, and they have a big potential for rural areas in the alpine arch as they can help to overcome the natural handicaps of mountain and rural areas and strengthen the resilience of the mountain and rural villages.<sup>73</sup>

This aspect has been highlighted even more during the COVID-19-crisis, where the tourism sector - one of the main pillars of the Alpine mountainous economy - was completely shut down from one day to the next, the education system had to switch to home schooling and workers and employees stayed at home for home

<sup>72</sup> Deloitte (2020), Manufacturing goes digital: Smart factories have the potential to spark labour productivity. Retrieved from: <https://www2.deloitte.com/global/en/insights/industry/manufacturing/driving-value-smart-factory-technologies.html>

<sup>73</sup> Smart villages: using the potential of digitization in Alpine villages. Interreg Alpine Space – EUSALP. Available at: <https://www.alpine-region.eu/publications/smart-villages-using-potential-digitization-alpine-villages>

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office. All these changes would not have been possible without the provisions of digitalisation, which nevertheless are significantly less advanced and available in mountains. Still 25% of rural areas do not have Internet access<sup>74</sup>. The current digital divide between connected (urban) and non (or badly) connected (mountainous) areas imposes an additional burden on the remote and mountainous areas as has been demonstrated in these lockdown times.

As observed by OECD, the key drivers of rural change are, according to OECD, i) additive and distributive manufacturing; ii) digital connectivity; iii) cloud computing and the internet of things; iv) drones; v) driverless cars; vi) the future of education; vii) the future of health; viii) shifting values and preferences; ix) decentralised energy systems; and x) the future of food. Technologies that create more deconcentrated and network-based distributive production systems have the potential to reshape the geography of economic activity in favour of rural areas. Innovation will be critical for rural areas to benefit from these key drivers of change as will key infrastructures (transport, connectivity etc.). OECD also posits that “rural areas will play a central role in meeting the major global opportunities and challenges of the 21st century around climate change, new energy sources, circular and bioeconomy, food and nutrition security for a growing global population, reducing poverty and ensuring the sustainable provision of natural resources that will support the next production revolution”<sup>75</sup>.

Strong efforts and future policy decisions should aim to support and extend the digital infrastructures especially in the mountainous areas of the Alpine region. But, infrastructures should be supported by relevant trainings and educational activities that will equip locals with the necessary digital skills so as to build resilience and further encourage regional value chains.<sup>76</sup>

Two particular aspect of digitalisation that could be further supported in the Alpine area – given the economic context of the region as described above – concern smart farming and amenity deliveries. Peripheral alpine region areas can profit from supply via drones, while education may be delivered via online tools.

Overall, the digitalisation trend in the Alpine region means an opportunity for new markets and innovative paths. However, uptake of new technological tools requires social adaption and an appraisal of ecological and social threats and benefits as well.<sup>77</sup>

### 3.3.2 Sustainability

Sustainability in the context of A-Ring involves topics such as green and renewable energies, alternative energy sources, smart resourcing, clean production, sustainable innovations, and circular economy.

One of the key points of the stakeholder discussions across the macro-region concerns how the transformation of the energy sector, commonly known as Energy Transition, may affect the Alpine area. According to the

<sup>74</sup> Euromontana. May 2020. Towards a long-term vision of rural areas. Retrieved from: [https://www.euromontana.org/wp-content/uploads/2020/05/2020-05-Note-Euromontana-VP-Suica\\_FINAL\\_EN.pdf](https://www.euromontana.org/wp-content/uploads/2020/05/2020-05-Note-Euromontana-VP-Suica_FINAL_EN.pdf)

<sup>75</sup> OECD, Edinburgh Policy Statement on Enhancing Rural Innovation, OECD, 2018. <https://www.oecd.org/regional/Edinburgh-Policy-Statement-On-Enhancing-Rural-Innovation.pdf>

<sup>76</sup> A long-term Vision for the EU's Rural Areas - Towards stronger, connected, resilient and prosperous rural areas by 2040, COM(2021) 345 final

<sup>77</sup> Alps2050: Common spatial perspectives for the Alpine area. Towards a common vision

literature, the Energy Transition entails two main aspects, the Decarbonisation and Decentralisation of energy systems:

- Decarbonisation refers to “reducing or eliminating of carbon dioxide from energy sources to achieve zero net emissions of carbon dioxide (CO<sub>2</sub>), as well as the stabilising of emissions of short-lived greenhouse gases (GHGs)”<sup>78</sup>
- Decentralisation refers to the shift away from the traditional highly centralised model (in which monopolist power companies distribute their energy from large power plants to end-users) to a model that is relying on more distributed generation, energy storage and a more active involvement of consumers (prosumers)<sup>79,80</sup>.

Overall, by 2050, electricity is projected to become the central energy carrier, while the electricity grid will triple in size.<sup>81,82</sup> Besides, there are several technologies which – partly empowered by digitalisation – are evolving as crucial trends in the energy sector. In a nutshell, these are the (i) energy storage technologies; (ii) improved connections between neighbouring grids; (iii) generators with the ability to start quickly and vary their output rapidly and (iv) Demand Side Response (DSR) measures.

Within this context prosumers – i.e., people who both consume and produce electricity – are anticipated to highly disrupt the long-living sector of energy. Prosumers may act alone or jointly; in which case they form Energy Communities.<sup>83</sup> Such communities can range from physical ones to virtual communities.<sup>84</sup> Prosumers and Energy Communities are anticipated to play an increasingly important role in decarbonising the energy sector for two reasons:

- Prosumers can manage their own energy portfolio and will require cleaner and more favourable environmental solutions to be manufactured in relation to batteries or fuel cells among others.
- In contrast to the centralised model, where more power must be generated when demand peaks, grid stability in a decentralised system can be achieved through Demand Response. Demand Response

78 Deloitte. (2020). Extracting value from Decarbonisation. Retrieved from

<https://www2.deloitte.com/content/dam/Deloitte/au/Documents/risk/deloitte-au-risk-decarbonisation-extracting-value-from-decarbonisation-05032020.pdf>

79 Fukuizumi, Y. (2020). 3 trends that will transform the energy industry. World Economic Forum. Retrieved from

<https://www.weforum.org/agenda/2020/09/3-trends-transform-energy-industry/>

80 Altmann, M. et al. (2010). Decentralized Energy Systems. European Parliament. Directorate General for Internal Policies. Policy Department A: Economic and Scientific Policy. Retrieved from

<https://www.europarl.europa.eu/document/activities/cont/201106/20110629ATT22897/20110629ATT22897EN.pdf>

81 Arifin, Z. (2019). Energy Transition and Digitalization in Power system. Research Gate. Retrieved from

[https://www.researchgate.net/publication/338147271\\_Energy\\_Transition\\_and\\_Digitalization\\_in\\_Power\\_system](https://www.researchgate.net/publication/338147271_Energy_Transition_and_Digitalization_in_Power_system)

82 Hübner, C. (2020). Sustainable Energy and Digitalisation: Practices and Perspectives in Asia-Pacific. Regional Project Energy Security and Climate Change Asia-Pacific (RECAP) of the Konrad-Adenauer-Stiftung (KAS). Retrieved from

<https://www.kas.de/documents/265079/265128/Sustainable+Energy+and+Digitalisation+Practices+and+Perspectives+in+Asia+Pacific.pdf/a1a26d16-fa77-ac3f-c688-92d91bca6834?version=1.0&t=1581407991474>

83 European Parliament. Will distributed energy resources (DERs) change how we get our energy? At a glance. Thinking about tomorrow. Retrieved from

[https://www.europarl.europa.eu/RegData/etudes/ATAG/2020/651944/EPRS\\_ATA\(2020\)651944\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/ATAG/2020/651944/EPRS_ATA(2020)651944_EN.pdf)

84 WNS Global Services. Top 7 Trends Powering the Energy & Utilities Industry. Retrieved from

<https://www.wns.com/insights/articles/articledetail/591/top-7-trends-powering-the-energy--utilities-industry>

programmes “allow electricity consumers to reduce their electricity demand for a period of time in exchange for a payment”. In doing so, they encourage reduced power consumption at peak times.<sup>85,86</sup>

In total, the Energy Transition is believed to be feasible only with the assistance of new technologies, such as the Internet of Things, Data Analytics, Artificial Intelligence, Blockchain and Digital Platforms. Thus, digitalisation may offer new solutions for decentralised approaches and the use of renewable resources, and consequently contribute into the alleviation of the negative impacts of the energy sector on climate change.<sup>87</sup> Concluding from the above, energy transition (incorporating the aspects of Decarbonisation and Decentralisation) and digitalisation are two strongly interlinked trends that cannot be looked at in isolation.<sup>88</sup>

Digital technologies applied in Energy, Transport, Agriculture, and Manufacturing have the potential to reduce the global CO<sub>2</sub> emissions by 12.08 Gt by 2030 (which is equal to a 20% reduction). Particularly in the energy sector, Digitalisation enables “intelligent” electricity networks, commonly known as Smart Grids<sup>89</sup>. Better data quality, greater connectivity, and automation can make energy grids cheaper and more efficient, leading to a reduction of 1.8 Gt of CO<sub>2</sub> emissions by 2030.<sup>90,91</sup>

Also, with respect to energy demand, DNV GL<sup>92</sup> forecasts that it will peak in 2033, growing from 420 exajoules per year (EJ/yr) in 2018 to 462 EJ/yr in 2033. If energy efficiency practices – already discussed and in many

85 Transpower. How demand response works. Keeping you connected. Retrieved from <https://www.transpower.co.nz/keeping-you-connected/demand-response/how-demand-response-works>

86 Business Wire. (2020). Growth Opportunities in the Global Distributed Energy Market to 2030 - ResearchAndMarkets.com. Retrieved from <https://www.businesswire.com/news/home/20200519005649/en/Growth-Opportunities-in-the-Global-Distributed-Energy-Market-to-2030---ResearchAndMarkets.com>

87 Digitalisation is defined as “the use of digital technologies to change a business process and enhance efficiency and revenue; it is the process of moving to a digital business”. Source: Santamaria J. et al. (2019). Digitalization and the Future of Energy. Beyond the hype — how to create value by combining digital technology, people and business strategy. DNV-GL. Retrieved from <https://download.dnvgl.com/digitalization-the-future-of-energy>

88 Hübner, C. (2020). Sustainable Energy and Digitalisation: Practices and Perspectives in Asia-Pacific. Regional Project Energy Security and Climate Change Asia-Pacific (RECAP) of the Konrad-Adenauer-Stiftung (KAS). Retrieved from <https://www.kas.de/documents/265079/265128/Sustainable+Energy+and+Digitalisation+Practices+and+Perspectives+in+Asia+Pacifi.c.pdf/a1a26d16-fa77-ac3f-c688-92d91bca6834?version=1.0&t=1581407991474>

89 Smart Grid is “an electricity network based on digital technology that is used to supply electricity to consumers via two-way digital communication”. Source: Technopedia. (2017). Smart Grid. Retrieved from <https://www.techopedia.com/definition/692/smart-grid>

90 Digital Europe. Digitalisation as Key for a Sustainable Europe our Call to Action for the EU’s Strategic Agenda 2019-2024. Retrieved from [https://www.digitaleurope.org/wp/wp-content/uploads/2019/06/Narrative\\_Sustainability\\_0620\\_WEB.pdf](https://www.digitaleurope.org/wp/wp-content/uploads/2019/06/Narrative_Sustainability_0620_WEB.pdf)

91 Hübner, C. (2020). Sustainable Energy and Digitalisation: Practices and Perspectives in Asia-Pacific. Regional Project Energy Security and Climate Change Asia-Pacific (RECAP) of the Konrad-Adenauer-Stiftung (KAS). Retrieved from <https://www.kas.de/documents/265079/265128/Sustainable+Energy+and+Digitalisation+Practices+and+Perspectives+in+Asia+Pacifi.c.pdf/a1a26d16-fa77-ac3f-c688-92d91bca6834?version=1.0&t=1581407991474>

92 Created in 2013 as a result of a merger between Det Norske Veritas (Norway) and Germanischer Lloyd (Germany).

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cases in place – are implemented in transport, manufacturing and buildings, the energy demand is projected to decline to 446 EJ/yr by 2050.

The mixture of energy supply is also anticipated to alter in the years to come. The share of fossil fuels is projected to decline to 56% at mid-century from the current 80%. At the same time, the solar PV and wind energy will dominate the electricity mix by 2050, when they have a 33% and 30% share respectively.<sup>93</sup>

Energy storage is emerging as one of the key solutions to increase the share of renewable energy sources used. Although wind and solar power are dependent on weather, batteries can allow electricity generated to be stored and fed into the grid at another time, when energy demand peaks. In doing so, batteries provide flexibility for rapid response and contribute to the balance of the electric grid. By 2030, the cost of battery storage is expected to diminish by nearly 50%, and thus, battery storage to become the fastest-growing source of power system flexibility.<sup>94, 95</sup>

### 3.3.2.1 Sustainability in the Alpine area

The topic of sustainable innovation is considered a perfect match between a policy driven initiative at local, national and EU level (sustainability) and a bottom-up, business driven initiative of innovation. Therefore, it is not surprising that the topic of sustainable innovation is the one most commonly identified as a priority among both Academia and Business sector stakeholders of the A-RING stakeholder pool<sup>96</sup>. This wide area includes the following sub-topics: green and renewable energies, alternative energy sources, smart resourcing, clean production, sustainable innovations and circular economy.

According to the Green Economy Progress report, green and renewable energies are an important element of the Alpine region. However, progress in the green economy in the Alpine region has been uneven and rather slow. Thus, stepping up of efforts to achieve a climate-neutral, climate-resilient, resource efficient Alpine region by 2050 is needed so as to preserve biodiversity and ecosystem services and ensure public well-being and equity<sup>97</sup>. From a thematic point of view, the following recommendations were articulated in the “Green Economy in the Alpine Region” report<sup>98</sup>, which is based on the findings of the Sixth Report on the State of the

93 DNV GL (2019). Energy Transition Outlook 2019: Power Supply and Use. A global and regional forecast to 2050. Retrieved from [https://www.euractiv.com/wp-content/uploads/sites/2/2019/09/DNV-GL-ETO-2019-%E2%80%93-Power-Supply-and-Use\\_single\\_LR\\_under-embargo.pdf](https://www.euractiv.com/wp-content/uploads/sites/2/2019/09/DNV-GL-ETO-2019-%E2%80%93-Power-Supply-and-Use_single_LR_under-embargo.pdf)

94 Birch, S. Top 10 energy trends. Energy. 6. Distributed Energy Resources. Retrieved from <https://www.energydigital.com/top10/top-10-energy-trends/distributed-energy-resources>

95 Berahab, R. (2020). Global trends in the energy sector and their implication on energy security in NATO’s southern neighbourhood. Elcano Royal Institute. Retrieved from [http://www.realinstitutoelcano.org/wps/portal/riecano\\_en/contenido?WCM\\_GLOBAL\\_CONTEXT=/elcano/elcano\\_in/zonas\\_in/ari103-2020-berahab-global-trends-energy-sector-and-implication-on-energy-security-in-natos-southern-neighbourhood](http://www.realinstitutoelcano.org/wps/portal/riecano_en/contenido?WCM_GLOBAL_CONTEXT=/elcano/elcano_in/zonas_in/ari103-2020-berahab-global-trends-energy-sector-and-implication-on-energy-security-in-natos-southern-neighbourhood)

96 A-Ring Deliberable AT1.3 “Transnational R&I Report”

97 [Green Economy in the Alpine Region 2020 \(alpconv.org\)](https://www.alpconv.org/)

98 Available online at [https://www.alpconv.org/fileadmin/user\\_upload/Topics/Green\\_Economy\\_progress\\_report\\_2020.pdf](https://www.alpconv.org/fileadmin/user_upload/Topics/Green_Economy_progress_report_2020.pdf)

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Alps (RSA6) in which a green economy is defined as “one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities”<sup>99</sup>.

- Energy efficiency and low carbon economy: the Alpine region needs the implementation of energy efficiency and sufficiency policies at local level, as defined in the Innsbruck Declaration<sup>100</sup>. Municipalities could define energy standards and support innovative energy consumption patterns.
- Resource efficiency: Efficient land use practices including inner-urban development should be supported and recommended as good practices to Alpine municipalities. The application of different, already existing approaches at local level should be fostered. Examples of such approaches are the reuse of brownfields, performance of cost benefit and environmental impact assessments and reassuring that there is an actual demand before developing the land.

Economics can provide significant operational instruments to induce better land use patterns and management that are still rarely adopted in the region. The launch of pilot projects at local level for applying these approaches will evaluate their usefulness and provide the basis for exploration of future implementation on larger scale. Regional responsibility and co-operation across the boundaries of local communities for resource-conserving land management should be strengthened.

- Ecosystem services and natural capital: One concrete way to support the recognition of ecosystem services and their economic relevance is to develop a pathway for the introduction of Natural Capital Assessments (NCA) at local level. Municipalities should be encouraged to arrange for NCA in their area and to consider the results in their local decision-making processes. Demonstration projects on the potential benefits provided by green infrastructures and natural capital to local and regional economies and well-being can be encouraged. The set-up of pilot NCA municipalities can be supported by relevant project calls in the upcoming Alpine Space Programme.
- Quality of life and well-being: Sustainable procurement is a powerful instrument for the practical implementation of a green economy at local, regional and national levels. Procurement efforts should be based on EU-wide criteria and future developments so as to fully harness their transformative potential. It is useful for there to be an exchange of experiences, including the legal/technical point of view, taking into account the feasibility of setting up a platform for sustainable public procurement across the Alps. Such a platform could support governmental authorities as well as municipalities in taking over sustainable procurement procedures in their day-to-day businesses and connect suppliers to procurers from the Alpine region. A second approach is to study and use existing Alpine-specific indicators of well-being instead of the conventional economic indicators. If necessary, existing indicators could be adapted to Alpine conditions or new ones could be developed.

On alternative energy sources, a recent study sees untapped solar and wind energy potential in the Alps. According to the researchers, the Alps get a lot of sunshine in the winter, and the hydropower infrastructure that’s already in place could be used to transmit solar energy to the main grid. That’s also true for wind energy,

<sup>99</sup> Alpine Convention (2017): Report on the state of the Alps 6 – Greening the economy in the Alpine region. Online: <https://www.alpconv.org/en/home/news-publications/publications-multimedia/detail/rsa6-greening-the-economy-in-the-alpine-region/>

<sup>100</sup> Available at: <https://rm.coe.int/innsbruck-declaration-en/16809ce941>

whose considerable potential in the Alps is still largely untapped, and partially unknown due to the mountains' complex topography<sup>101</sup>.

### 3.3.3 (Smart) Mobility

Mobility in the context of the A-RING project is considered both a stand-alone issue as well as in association with digitalisation and sustainability, as abovementioned.

To date, several technological breakthroughs are contributing towards acceleration of the transition towards intelligent transport systems. A fully developed smart mobility system requires that digital technologies and online databases pre-exist, upon which it will build the necessary logistics and transport activities<sup>102</sup>. Hence, digitalization – especially in the fields of IoT, communication networks, wireless technologies, global positioning system (GPS) and sensing technologies – will be needed in order for intelligent transportation to further in the coming years.

A key example highlighting the connection between digitalization and mobility is the ambitious restructuring of San Diego's region transportation system that involves:

- (i) promotion of integrated travel: Mobility-as-a-Service (MaaS), multimodal transportation, travel without tickets, micro-mobility innovations.
- (ii) digital travellers' identity, including digital driving licenses and facial recognition at airports.
- (iii) improved travellers experience, which puts forward a customer-centre approach, the promotion of user-friendly digital tools and infrastructures of better quality for pedestrians and travellers.
- (iv) innovation accelerators for mobilisation of private sector and creation of public-private partnerships with a focus on innovation; and
- (v) AI-augmented mobility, aiming to minimise travel time, manage traffic and congestion problems, and improve regulatory compliance<sup>103</sup>.

Multimodal transport systems (such as integrated travel planners or interconnectivity) and the advent of intelligent and efficient logistics (such as intelligent cargoes and weigh-in-motion technology) have become integral elements of the latest developments in intelligent transport. The evolving traffic management and intelligent infrastructure approaches have made vehicles more "open" concerning transport infrastructures and have enabled the centralisation of data processing.<sup>104</sup> Hyper-connectivity will connect different transport

<sup>101</sup> Dujardin, J., Kahl, A., & Lehning, M. (2021). Synergistic optimization of renewable energy installations through evolution strategy. *Environmental Research Letters*, 16(6), 064016.

<sup>102</sup> Tomaszewska, E. J. and Florea, A. (2018). Urban smart mobility in the scientific literature — bibliometric analysis, *Engineering Management in Production and Services*, Volume 10, Issue 2, pp. 41-56.

<sup>103</sup> Fishamn, T., Kelkar, M., Schwartz, A. (2020). What are the most transformational trends in mobility today? Deloitte Insights, Retrieved from: <https://www2.deloitte.com/us/en/insights/industry/public-sector/transportation-trends.html>

<sup>104</sup> EC (2010). Intelligent transport systems, Directorate-General for Research Transport. Retrieved from: [https://ec.europa.eu/transport/themes/its\\_en](https://ec.europa.eu/transport/themes/its_en)

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modes with mobile applications and will lead to faster passengers' flow, combined with smartphones that function as mobility sensors<sup>105</sup>.

With respect to vehicles, by 2032 half of the global vehicle sales are estimated to be electric cars.<sup>106,107</sup> It is expected that by 2024, almost 90% of the total manufactured cars which are sold internationally will have embedded technologies (transforming the car into a mobile sensor, capable of gathering real-time information about the urban mobility state)<sup>108</sup> that will improve its driving performance as well as – and most importantly – the health and safety of travellers within the vehicles or outside of them. The so-called Internet of Vehicles (IoV), which falls under the broader category of Internet of Things, aims to facilitate: the uptake of green transportation (for instance, manufacturing of eco-friendly vehicles) and the introduction of autonomous vehicles<sup>109</sup>. Also, the incorporation of Artificial Intelligence in vehicles gains impetus: between 2015 and 2025, the number of vehicles that contain AI systems will rise from 7 million to 22 million. Nevertheless, the ethical concerns associated with the use of big data and digital technologies in mobility are anticipated to have counter forces upon the trends abovementioned.

Micro-mobility is another theme that has gained popularity among citizens, policymakers, and companies in recent years. This refers to the means of single-rider, open-air transit solutions, such as e-scooters and shared bikes. Their rise can be attributed to the solutions they offer to traffic congestions, their relevant lower price than private vehicles and moreover in the context of the Covid-19 pandemic, the lockdowns and suspension of use of public transport have showcased the benefits of micro mobility solutions. The adoption of micro-mobile solutions is evident across Europe, and government and industry initiatives seek to address citizens' new choices<sup>110</sup>.

Finally, it should be mentioned that apart from technological developments that will support the elaboration of sustainable/smart services, governance will play a key role in the transition towards intelligent transport systems. The consolidation of a functioning governance system, with robust formal and informal institutional arrangements and inter-stakeholders' cooperation, may pave the way for smart transport to take place. Hence, large-scale investments through the collaboration of public and private sector are considered another means to promote sustainable smart transport solutions further in the future.

### 3.3.3.1 *Transport in the Alpine region*

With regard to transport services, the contrast between mountainous and pre-Alpine areas still plays a substantial role – with the determining topic of transit traffic and its unequal consequences: corridors of pan-

105 Chavan, R. (2018). Smart Transportation: Mobility Trends in a Digital Age. Retrieved from: <https://smartclasses.co/knowledge-base/smart-transportation-mobility-trends-in-a-digital-age/>

106 Kane, M. (2020). Global EV Sales For 2019 Now In: Tesla Model 3 Totally Dominated. InsideEvs. Retrieved from <https://insideevs.com/news/396177/global-ev-sales-december-2019/>

107 DNV GL (2019). Energy Transition Outlook 2019: Power Supply and Use. A global and regional forecast to 2050.

108 Soriano García, F. R., Martínez-Durá, J. J., Samper Zapater, J. J., Cirilo Gimeno, R. V. (2018). Smart Mobility Trends: Open Data and Other Tools, IEEE Intelligent Transportation Systems Magazine, doi: 10.1109/MITS.2017.2743203

109 Balasubramaniam, A., Paul, A., Hong, W., Seo, H., Kim, J. (2017). Comparative Analysis of Intelligent Transportation Systems for Sustainable Environment in Smart Cities. *Sustainability*, 9, 1120.

110 CBINSIGHTS (2020). The Micromobility Revolution: How Bikes and Scooters Are Shaking Up Urban Transport Worldwide. Retrieved from: <https://www.cbinsights.com/research/report/micromobility-revolution/>

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European importance play a major role on all political levels whilst environmental damage is mainly experienced in the transit areas.

The map in

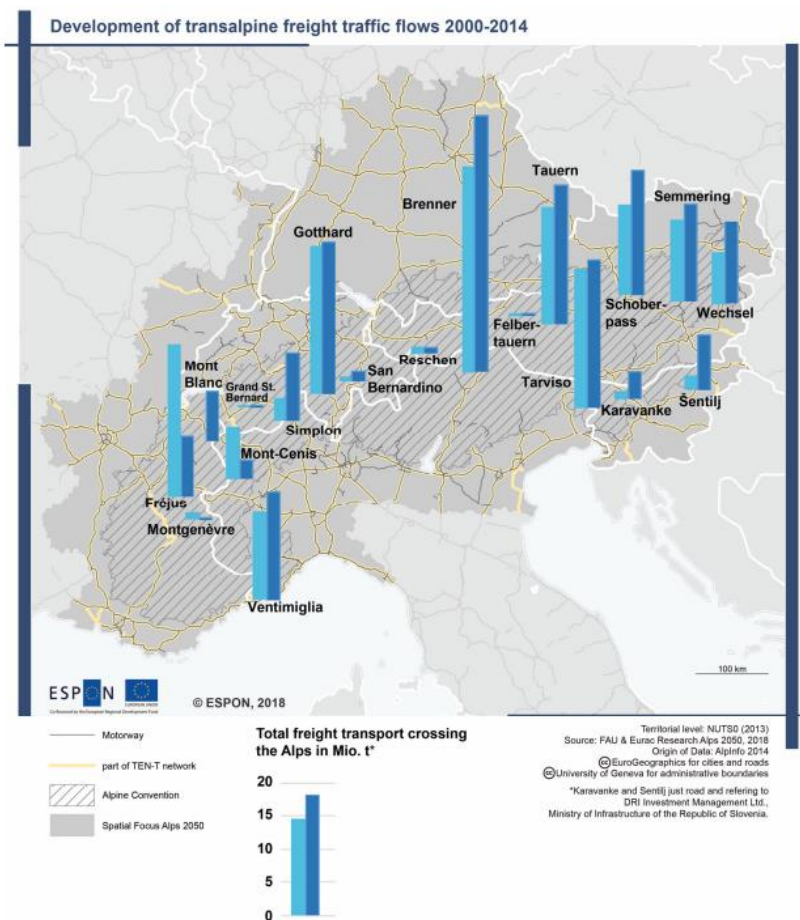
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Figure 7 hereunder provides a visualisation of the uneven increase of transalpine freight traffic. The amount of transported net tons per year has grown at almost all transit corridors, but to a different degree. This simple indicator introduces to more complex political debates like the call for the 'multimodal' use of transport infrastructure, the task of balancing extra- and intraregional accessibility needs, the alignment of toll systems, and potential limits to mobility growth.

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Figure 7 : Development of transalpine freight traffic flows 2000-2014



Source: Chilla, T., & Heugel, A. (2018). Alps2050. Common spatial perspectives for the Alpine area. Towards a common vision.

In parallel to freight transport, passenger transport is a challenge for sustainable management: (intra)regional accessibility and transit flows demand for smart strategies, including in particular multi-modal regimes.

With respect to accessibility to services of general interests (SGI), e.g., doctors, primary schools and train stations, the ESPON project PROFECY (cf. ESPON PROFECY 2017<sup>111</sup>) has elaborated an indicator representing both the density of the services and at the same time the accessibility of the services through road network. The overall picture shows that the morphology matters: the inner-Alpine perimeter shows clearly lower values of accessibility than the pre-Alpine and more urbanized areas. The difference is not marginal – the average time needed can differ by a factor of 10 between pre- and inner- Alpine regions. The picture is similar for the accessibility to all three selected service types, but there are differences: The accessibility to primary schools

<sup>111</sup> For further information please visit: [PROFECY - Inner Peripheries: National territories facing challenges of access to basic services of general interest | ESPON](#)

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is polarized between inner- and pre- Alpine areas. The train stations are – for good reasons – orientated along the valleys. The accessibility to doctors is worse than that for the other services.

From a normative side, the following arguments have to be considered:

- On the one hand, the accessibility of SGI is the basis for a good quality of life, and in the long run, a poor accessibility to these services will lead to demographic problems due to outmigration and low levels of immigration.
- On the other hand, it is a characteristic of rural and mountainous places that accessibility and services density is lower than in urban contexts. An identical supply level of services cannot be the objective, but at least a reasonable or acceptable level has to be achieved. This is closely linked to the development of the settlement system. For scattered settlements it is more difficult to provide SGI in an appropriate time.
- Moreover, the technological development (digitalisation) offers new options of SGI provision – medical care via internet, online courses for learning, online communication tools and many more economic, social and cultural applications. The most relevant questions are how much a society is willing to invest in these services, what the benefits of these technological changes are, and to what extent shifts in infrastructure installations and use are accepted.

Therefore, smart mobility solutions will need to be identified and implemented. In a scenario produced by the ESPON project Alps 2050<sup>112</sup>, its objective was to balance transnational mobility and accessibility on the one hand, and ecological quality and good local quality of life on the other. This scenario, the authors stated it can only be achieved by considerable efforts on the domestic level, as well as increased attention at the transnational level. New infrastructure and new modes of mobility may lead to new geographies due to new accessibility patterns that fundamentally change regional development paths. To this end, the following policy recommendations were formulated:

- **Sectoral level:** The TEN-T has to be completed, including connecting routes, completing a transnational accessibility regime. Moreover, enhancing multi-modality, combining in particular road and rail, is of high priority. A transnational toll policy might be an important element in this respect. In parallel, internal accessibility (passenger transport) has to be developed in a sustainable way.
- **Integrated spatial development:** Transport policy has to be closely interwoven with general spatial planning processes. There has to be a clear differentiation of transit flows of high quantities that have to be organised along few corridors that are capable to handle large flows in a way that does not harm environmental quality. On the other hand, accessibility on the regional and local level have to be closely linked to questions of the settlement system including services of general interest and to economic dynamics.<sup>113</sup>

### 3.3.4 Social innovation

Social innovations are increasingly considered a key driver of societal and economic change and its potential for supporting green and digital transitions has still to be explored and realised. Social innovation is key for raising the potential for innovation through greater involvement of citizens and users. Like in the case of mobility, social innovation needs to be considered also in relation to the first two themes – digitalisation and sustainability – as it may affect or be affected by their course.

<sup>112</sup> Chilla, T., & Heugel, A. (2018). Alps2050. Common spatial perspectives for the Alpine area. Towards a common vision. Targeted Analysis, Interim Report, 23, 2018

<sup>113</sup> ibid

Overall, the spur for Social Innovation at EU level has been associated with the urge to respond to the social damages of the 2008 crisis, when public budget deficits and pressing social needs acted as accelerators for the development of initiatives to prevent social exclusion and maintain the provision of services. But Social Innovation is not as simple an idea as replacing public spending by the voluntary work of charities or business dynamism. A decade of experimentation and research has brought evidence that “Social Innovation can be a transformative process towards a new paradigm of growth. It has the potential to provide answers to address social and ecological challenges as well as political disenchantment and lack of trust.”<sup>114</sup>

A recent study<sup>115</sup> analysed literature, projects, and expert interviews, and following Juncker’s White Paper grand challenges, identified seven macro trends of significance to social innovation as transformation of systems:

1. Institutional Capacity and Wellbeing
2. Democracy and Trust
3. Skills and the future of work
4. Internet Technologies and On-line/Off-line interactions
5. New Financial instruments
6. Urban Renewal
7. Global Interdependencies

According to their analyses, in different contexts and areas and to different degrees and at different stages on the “wave of change”<sup>116</sup> (Goldstein, Hazy, & Silberstang, 2010), stakeholders and people tend to reorganize around a shared mission to tackle entrenched societal issues following a multistakeholder approach and leveraging on different assets, skillsets and networks. What was also noted was that multi-stakeholder partnerships for public good has been a shared trait of all trends.

In total, the tremendous social and economic challenges Europe is facing – especially in the context of the post-Covid era, the lack of adequate public sector resources to address them simultaneously with the possibilities offered by digital technologies (as discussed above), are galvanizing efforts of multiple stakeholders and individuals to drive positive socio-economic change. The rise of impact investing, the growth of social entrepreneurship across Europe together with the professionalization of social economy actors, the spread of peer-to-peer networks and a growing community of new and traditional businesses which, often under the pressure of consumers, are committed to making a positive difference in the context where they operate, has led to the creation of a complex ecosystem of actors committed to using their different resources, skills and networks to overcome a broad range of social issues.<sup>117</sup> However, further research and experimentation in

114 Howaldt, J., Kaletka, C., Schröder, A., & Zimgiebl, M. (Eds.). (2018). *Atlas of social innovation: New practices for a better future*. Dortmund: Technische Universität Dortmund, ZWE Sozialforschungsstelle.

115 Addarii, F & Lipparini F. (2017). *Vision and Trends of Social Innovation for Europe* (published by European Commission). 10.13140/RG.2.2.30629.60640.

116 Goldstein, J., Hazy, J. K., & Silberstang, J. (2010). A complexity science model of social innovation in social enterprise. *Journal of social entrepreneurship*, 1(1), 101-125.

117 ibid





social innovation is needed to understand the requirements associated with its evolution and integration within the social and economic context of Europe on national and regional levels.

Acceleration of social innovation is dependent upon multi-stakeholder partnerships for public good. There the role of individuals and private organizations in designing, implementing, and funding public goods and services is at its strongest. Moreover, the rise of digital technologies – both as enablers of social innovation and as a cause of disruption requiring innovative intervention – is another pervasive trend. Similarly, technological advancements, are transforming the way that value is created and by extension, the workforce needs. New kinds of jobs will be created, while others will be eliminated. Indicatively, it is projected that between 2019 and 2030 “the world will need to create 600 million new jobs”<sup>118</sup>. To retain a job, employees and workers will require an increased level of specialisation and creativity. Hence, this trend is driving the transformation of education as well (see next section Changing the Education).<sup>119</sup>

The nature of work and labour market are anticipated also to be affected by the phenomena of platform work<sup>120,121</sup> and the influx of new generations into the workforce.<sup>122</sup> By 2025, it is believed that the platform economy will add \$2.7 trillion (2%) to the global Gross Domestic Product (GDP) and create 72 million full-time-equivalent job positions.<sup>123</sup> Nevertheless, digital platforms may be used for circumventing labour regulations and ultimately, lowering the quality of employment.<sup>124</sup>

Overall, the twin green and digital transitions are changing the way we live, work, and interact. The EU’s aim to become more resource-efficient, circular, digitalised and climate neutral economy and the wide deployment of artificial intelligence and robotics are expected to create new jobs<sup>125</sup> while other jobs will change or even

118 United Nations, Economic and Social Affairs, Economic Analysis (2019). Sustainable Development Outlook 2019: Gathering storms and silver linings. An overview of SDG challenges. Retrieved from <https://www.un.org/development/desa/dpad/publication/sustainable-development-outlook-2019-gathering-storms-and-silver-linings/>

119 OXFAM (2020). Global Megatrends: Mapping the forces that affect us all. OXFAM Discussion Papers. Retrieved from <https://oxfamlibrary.openrepository.com/bitstream/handle/10546/620942/dp-global-megatrends-mapping-forces-affect-us-all-310120-en.pdf?sequence=1&isAllowed=y>

120 Gagliardi D., Psarra F., Wintjes R., Trendafil K., Pineda Mendoza J., Haaland K., Turkeli S., Giotitsas C., Pazaitis A., Niglia F., (2020), *New Technologies and Digitisation: Opportunities and Challenges for the Social Economy and Social Enterprises*. European Commission, Executive Agency for SMEs, DOI: 10.2826/667682

121 Platform workers are the people who have gained income from providing services via online platforms. Examples of such platforms include Amazon, Airbnb, Uber, and Baidu. Source: Brancati, U., et al. (2020). New evidence on platform workers in Europe. Results from the second COLLEEM survey. Joint Research Centre (JRC).

122 European Commission. (2018). Platformisation of work. Competence Centre on Foresight - Megatrends Hub. Retrieved from [https://ec.europa.eu/knowledge4policy/foresight/topic/changing-nature-work/platformisation-of-work\\_en](https://ec.europa.eu/knowledge4policy/foresight/topic/changing-nature-work/platformisation-of-work_en)

123 McKinsey Global Institute (2015). A Labor Market that Works: Connecting Talent with Opportunity in the Digital Age. Executive Summary.

124 Brancati, U., et al. (2020). New evidence on platform workers, U in Europe. Results from the second COLLEEM survey. Joint Research Centre (JRC). |

Gagliardi D., Psarra F., Wintjes R., Trendafil K., Pineda Mendoza J., Haaland K., Turkeli S., Giotitsas C., Pazaitis A., Niglia F., (2020), *New Technologies and Digitisation: Opportunities and Challenges for the Social Economy and Social Enterprises*. European Commission, Executive Agency for SMEs, DOI: 10.2826/667682

125 Before the outbreak of the COVID-19 pandemic, it was estimated that 1 million jobs would be created by 2030. Employment and Social Developments in Europe (ESDE), 2019. Similarly, it was estimated that these technologies would create almost 60 million new jobs worldwide in the next 5 years. Source: European Commission (2020), European skills agenda for sustainable competitiveness, social fairness, and resilience.

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disappear. Demographic change will require Europe to draw on all its talents and diversity. At the same time, it will also generate new job opportunities in the silver and care economies. These transitions amplify the urgent need for an unparalleled shift in skill sets to reap their full potential.

Moreover, the acceleration of digital transition caused by the COVID-19 pandemic has impacted teleworking and distance learning that have become a reality for millions of people in the EU – and probably will continue to be so in the near future. But this shift has revealed altogether the limitations of our current level of digital preparedness. The pandemic has accentuated the digital skills gap that already existed and new inequalities are emerging as many people do not have the required level of digital skills or are in workplaces or schools lagging behind in digitalisation.<sup>126</sup> 40% of European employers are already facing difficulties in finding employees with the proper skills to help them grow and innovate.<sup>127</sup> In 2019 44% of the working adults (aged 16-74) in Europe lacked even basic digital skills<sup>128</sup>; however, the demand for digitally skilled employees increases by around 4% a year.<sup>129</sup>

Apart from digital, soft skills are becoming important<sup>130,131,132</sup> and gradually the significance of non-formal and informal learning (gained at work, through social activities, volunteering etc.) as well as of life-long learning, is increasing.<sup>133,134</sup> The so-called *meta-skills* that support adaption to rapid change and navigation in volatile employment markets and changing environments, are becoming important as professions are becoming all the more subject to rapid changes.

Most importantly, the existing system of education and further training do not seem to be able to cope with the changes that are now being introduced and even now cannot keep pace with the speed of change. Experts in a recent foresight study asserted that major educational institutions need to catch up with technological trends, otherwise they could see a looming threat of a growing asymmetric (and in particular technological) education that will only serve to exacerbate the present social divide.<sup>135</sup>

126 European Commission (2020), European skills agenda for sustainable competitiveness, social fairness and resilience.

127 European Social Fund Transnational platform (2018). Being digitally competent in 2020 and beyond: A Skills Deal for Europe!. ESF Learning & Skills Thematic Network policy paper. Retrieved from <https://ec.europa.eu/esf/transnationality/content/being-digitally-competent-2020-and-beyond-skills-deal-europe>

128 <https://ec.europa.eu/social/main.jsp?catId=1223> (last accessed June 2021)

129 European Social Fund Transnational platform, (2018). Being digitally competent in 2020 and beyond: A Skills Deal for Europe!. ESF Learning & Skills Thematic Network policy paper.

130 European Commission. (2018). Diversification of education and learning. Competence Centre on Foresight - Megatrends Hub.

131 Government Office for Science (2017). Future of Skills & Lifelong Learning. Foresight. London. Retrieved from <https://espas.secure.europarl.europa.eu/orbis/sites/default/files/generated/document/en/foresight-future-of-skills-lifelong-learning.pdf>

132 Soft skills are character traits and interpersonal skills that characterize relationships with other people and complement hard skills in the workplace. Source: <https://www.investopedia.com/terms/s/soft-skills.asp>

133 European Commission. (2018). Diversification of education and learning. Competence Centre on Foresight - Megatrends Hub.

134 Informal education is the type of knowledge that one gains through several life experiences. Non-formal education is one that is framed according to the requirement of a particular job. Source: Globale, E. (2020). *Types of Education: Formal, Informal and Non-Formal*. Medium.

135 Daheim, C., Wintermann, O., Glenn, J., Korn, J., & Schoon, C. (2019). *Work 2050: three scenarios: new findings of an international Delphi study by the Millennium Project*. Bertelsmann Stiftung.

## 4 Approach and methodology to SRIA development

The development of a SRIA is usually a lengthy approach if based on a wide structured set of consultations and iterations with a variety of stakeholders. When this needs to be done at the trans-national level, as in this case, this is even more challenging (cf. Section 1 of the Blueprint).

The A-Ring project has already completed a comprehensive set of consultations with the public authorities (AT. 1.2.) and the business and academic communities (AT.1.3) across the regions of the Alpine macro-region aiming at identifying common thematic priorities. These include, in particular, digitalization (AI, production transformation, industry 4.0), sustainability (renewable energy sources, clean production), mobility and social innovation<sup>136</sup> (cf. Section 3).

Having already identified certain themes of common interest, a fast-track SRIA development approach could be an option that is

- firmly focused on the identified thematic areas of interest that are shared in already existing strategic documents and regional policies (RIS3, S3),
- urging to benefit from the joint capacities and resources in supporting collaborative research and innovation through jointly funded projects
- oriented towards economic/business opportunities to strengthen regional competitiveness of local businesses by benefiting from the joint resources enabled through trans-national cooperation, (e.g., industry-business R&I partnerships, cross-border public-private partnerships addressing societal challenges, etc.)

At the same time, the work that has already been done can form the basis for a deep dive, more systemic approach in SRIA development that

- moves the level of reference from across the regional / national to the actual transnational level,
- shifts from building upon the overlaps in priorities to identifying the challenges facing the macro-region and agreeing on jointly identified priorities at the transnational level,
- takes a step back to explore possible futures and jointly agrees upon a vision for the macro-region.
- incorporates societal challenges by engaging citizens and communities in R&I policy design,
- addresses both supply side and demand side R&I policy approaches.

These two approaches are presented in detail below.

As ERA-LEARN notes in its guide for SRIA development “Each SRIA development process must be designed to fit its relevant R&I and stakeholder contexts, therefore, there is no universally ‘right’ or ‘typical’ SRIA process applicable to all partnerships. While we cannot provide a blueprint or a step-by-step guide for the design of the SRIA process, some elements are necessary in all SRIA processes”<sup>137</sup>. The methodologies suggested below

<sup>136</sup> See Section 3 for a more detailed discussion on the common thematic areas of interests.

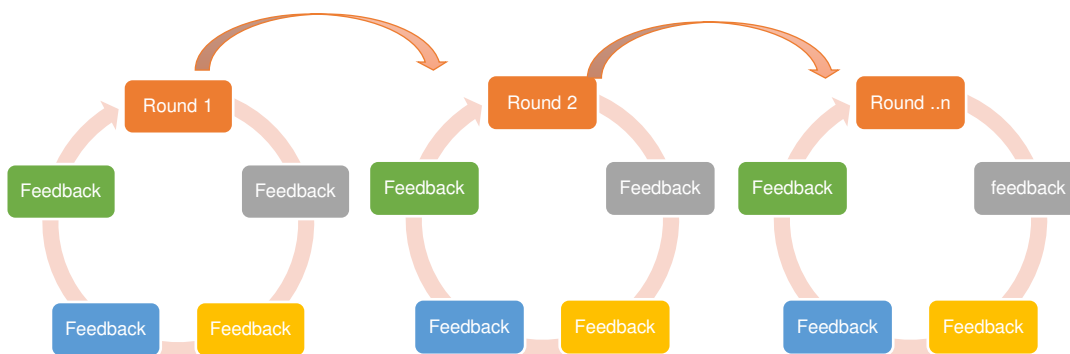
<sup>137</sup> <https://www.era-learn.eu/support-for-partnerships/additional-activities/strategic-research-and-innovation-agendas/guide-for-the-sria-development-process>

build on the ERA-LEARN guide as well as the specificities of the case as documented in EUSALP and A-Ring and the discussions held with A-Ring partners and AG2 members.

Regarding the timeframe of the two approaches, the fast track approach can aim to launch joint activities, e.g. calls for research proposals for instance within a year. Yet, this also depends on the interoperability (i.e. compatibility of participation rules, evaluation procedures, etc.) of the relevant national/regional programmes and the synchronisation of the programme life cycles that can be achieved. The deep-dive approach, on the other hand, will need to add at the start at least six months, as it needs to revisit the common areas of interest and prioritisation from a transnational approach.

Needless to say, variations of these two approaches are also possible, one borrowing certain elements from the other. However, no matter which approach is applied the process of the SRIA development needs to be inclusive and transparent. Communication and engagement activities all through the process of development is an effective way of ensuring this. This aspect should be given proper attention as a process of development behind closed doors would certainly lead to failure as it would fail to ensure buy-in from important stakeholders.

In a co-design process, it is important to achieve several feedback loops among stakeholders so that all key elements of the SRIA are discussed and agreed by all. By the same token several feedback loops need to be accommodated across the implementation cycles of the SRIA leading to the SRIA's update and improvement/enrichment.



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## 4.1 Fast track SRIA development methodology

### 1. Creation of a SRIA development task force

**Brief description:** the SRIA development is a long process engaging multiple organisations and bodies across different countries/regions. Whereas it is important that all the key stakeholders are engaged in the process, it is also important to determine who will lead and drive the process. A key requirement is the setting up of a small task force, ideally made up of high profile, influential individuals who command sufficient power and interest. The designation of the members of the task force should also reflect a balanced territorial representation of the involved regions/countries. The remit of such a task force is to oversee the whole process, taking action when necessary. The task force will be steering the SRIA process, including methodology and process design and implementation, timeframe and drafting and elaborating the SRIA document. During the SRIA process, the task force may also serve as a temporary decision-making body regarding SRIA development in close consultation with the established management and decision-making structures.

**Actors:** this task force – ideally not more than 5-7 individuals – should include officers from regional/national/transnational authorities with capacity and resources to organise and coordinate participatory consultation processes as well as to synthesise the results in brief policy reports.

### 2. Further mapping and prioritisation of shared themes of interest

**Brief description:** Besides the identification of the common thematic areas of interest that have taken place within the A-Ring project, other sources need to be analysed referring to existing interregional collaboration across the Alpine Space and EUSALP Regions. An important source to analyse is the Thematic S3 platforms that contribute to building an increasing number of interregional partnerships across the EU with the ultimate goal of establishing European ecosystems for transnational and interregional collaboration in regions and countries with similar or complementary S3 priorities. An initial analysis of such cross-regional collaboration has been done within the A-Ring project. This can be reviewed and further elaborated to form a detailed picture of the existing interregional collaboration in the Alpine Region on R&I.

Following this, the common thematic areas of current and future collaboration need to be prioritised across the involved countries and regions. Besides the specified areas, the prioritisation process needs to consider

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the future trends in these areas<sup>138</sup>, as well as the national/regional strengths and prospects in R&I identified in each region/country in the specific areas<sup>139</sup>.

**Actors:** this process needs to involve the highest level of regional/national authorities and at the transnational level, the EUSALP Executive Board and Action Groups members.

**Methods/techniques:** there are several prioritisation techniques<sup>140</sup> that can be deployed in the prioritisation process. It is important to allow for adequate time for consultations that would prepare the ground for the prioritisation exercise, which might include several dedicated events (such as prioritisation workshops).

### 3. Validation and adoption of the SRIA

**Brief description and actors:** the resulting meta-priorities form the SRIA of the AR. As a key strategy document of the macro-region, it must be formally approved and adopted by the Executive Board. It may also involve additional internal and/or external feedback and consultations for broader validation and finalization. Thus, adequate time should be devoted to this step.

### 4. Communication and awareness-raising

**Brief description** This aspect of the process is a very important activity throughout the SRIA development, ensuring the transparency and openness of the process at every step. This helps to reinforce the open participatory approach and enables outsiders to engage from within and outside the macro-region. This helps to support the buy-in so important for effective implementation.

**Actors:** all involved regional/national/transnational authorities should be engaged in the wide dissemination of the SRIA

**Methods:** different outreach tools including social media can be used together with hybrid events (online and in person) to launch the SRIA to a wider public.

### 5. SRIA implementation action plan / roadmap

The SRIA is the policy document that will set the basis and the limits of the transnational collaboration. It thus needs to be accompanied by an implementation action plan or roadmap defining, the specific thematic topics to be addressed, the actions/activities they would be addressed by, the procedures to be applied and the monitoring and evaluation procedures to inform the SRIA updates and possible improvement of the SRIA development process. The following steps are relevant.

#### 5.1 Requirements in capacity, infrastructure, competencies, skills, education, training, legislation, funding opportunities, and any other enabling setups

<sup>138</sup> Section 3 includes an example of the type of analysis that should be carried out

<sup>139</sup> These are normally analysed in the S3 and RIS documents of each country/region.

<sup>140</sup> See prioritisation techniques in <https://www.businessanalystlearnings.com/blog/2016/8/18/a-list-of-requirements-prioritization-techniques-you-should-know-about>

**Brief description:** once the SRIA priorities are identified, each region/country should review their situation in terms of the requirements that these priorities imply. These may refer to

- research and innovation capacities and infrastructures – certain regions/countries will be more advanced in certain priorities than others both in relation to performance in research as well as research infrastructure. Experience has shown that there can be win-win situations in the collaboration among more and less advanced regions and there are already good examples of inter-regional cooperation across different countries;<sup>141</sup>
- skills and resources in R&I collaboration but also in managing transnational projects – one of the most common issues that national authorities face when participating in R&I partnerships is the lack of resources in managing transnational projects, which comes on top of managing projects supported with national funds; yet, it also holds true that the mutual learning enabled in partnerships help improve national skills in monitoring and managing collaborative projects;
- any legislative barriers that may need to be considered to allow multi-lateral collaboration – the incompatibilities of the different programmes’ features that need to be aligned can be a serious obstacle (e.g., different timing of starting of projects across the countries, different funding and participation rules, different policy cycles in programme design, etc.); adding to these, there are also national laws that do not allow programmes to open up to funding foreign researchers or that do not allow certain funding agencies to fund certain types of beneficiaries (private or public sector).
- combination of funds: national/regional programmes might be one source of funding for the transnational activities. Other relevant sources include for instance the European Territorial Cooperation (Interreg) but also the EU Framework Programmes for R&I. Combining different sources of funds e.g., ESIF, Horizon Europe, etc. although very important is not a straightforward task, although several steps have been taken in view of Horizon Europe encouraging the so-called synergies of funds.<sup>142</sup>

**Actors:** officials from the respective regional/national authorities are to be involved in this task.

**Methods/techniques:** it is mainly through the internal knowledge of regional/national officials and desk research that the above features can be reviewed and analysed for each interested region/country.

## 5.2 Mapping of national/regional programmes, initiatives and supporting schemes

**Brief description:** the resulting shared priorities would then guide the analysis of existing programmes and other supporting schemes and initiatives that could provide the funds for supporting joint research projects. Relevant programmes and initiatives are usually mapped in terms of thematic areas addressed, call topics, type of research (e.g., fundamental, applied, demonstration, etc.) as well as the procedures and timings of the various steps in the programme cycle (e.g., application procedures, evaluation of proposals, contract signing,

<sup>141</sup> Woolford, J., Amanatidou, E., Gerussi, E. and Boden, J.M., Interregional Cooperation and Smart Specialisation: a Lagging Regions Perspective, EUR 30691 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-37539-5 (online), doi:10.2760/25586 (online), JRC124118

<sup>142</sup> For a discussion on the obstacles in creating synergies among various sources see <https://www.era-learn.eu/support-for-partnerships/additional-activities/synergies>. An updated ERA-LEARN policy brief on this issue is coming up shortly including more good practices in synergies between different EU funding sources.

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reporting procedures, financial management, participation rules, periodicity of calls, etc.). Unsurprisingly, there is usually large variety in the features of these elements across different programmes. Yet, certain procedures, such as the call launch and evaluation of proposals, needs to be aligned across the various programmes for the joint call and projects to be realised.<sup>143</sup>

**Actors:** officials from the respective regional/national authorities are involved in this task.

**Methods/techniques<sup>144</sup>:** it usually entails desk-based research, surveys and interviews that are applied for the mapping exercise.

### 5.3 Identification of topics for calls for research proposals

**Brief description:** the shared meta-priorities included in the SRIA are rather generically described at this stage. The formulation of topics that can be addressed through calls for proposals needs to achieve the right balance between specificity/focus and flexibility to bring all on board the SRIA but also allow reflection of the individual national/regional interests and strengths. The call topics should be defined considering the overlaps across the regional/national priorities as well as the relevant priorities and areas of foci of the national/regional programmes and initiatives (current and future ones). Besides specifying the call topics, it is also relevant to specify how these topics would be addressed, i.e. with what type of projects or activities (e.g., fundamental or applied research, etc.; research projects, demonstration projects, capacity building actions, etc.)

**Actors:** officials from the respective regional/national authorities (programming units) are involved in this task as well as the main research funding organisations and major research performing organisations depending on the R&I governance systems in each country.

**Methods/techniques:** this needs to be an iterative process with several types of consultation methods (e.g., interviews, workshops, focus groups) depending on the features of the R&I system in the country/region in question with the main aim of achieving the necessary balance between focus and flexibility. Several iterations are usually needed for all relevant parts to agree on the call topics and types of activities (collaborative projects or otherwise) to support.

### 5.4 Identification of other transnational activities to support

<sup>143</sup> There is experience in terms of making different programmes interoperable (i.e. achieving operational alignment) across countries/regions although the situation is not ideal yet. The latest joint report of ERA-LEARN with GPC addressing this issue is coming out shortly also identifying what kind of obstacles (legal, organizational, etc.) the different countries face in such endeavors. Several reports have recorded such obstacles in the past – see for instance [file:///C:/Users/user/Downloads/D3.2\\_Final\\_3Nov2015.pdf](file:///C:/Users/user/Downloads/D3.2_Final_3Nov2015.pdf)

<sup>144</sup> For more details on methods usually applied in SRIA development, see <https://www.era-learn.eu/support-for-partnerships/additional-activities/strategic-research-and-innovation-agendas/guide-for-the-sria-development-process/methods>

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**Brief description:** based on the findings of 4.1 and other activities than collaborative research projects might also become necessary to cover identified needs. These may include capacity building activities, networking and partner search activities, policy alignment workshops, etc.<sup>145</sup>

**Actors:** officials from the respective regional/national authorities (programming units) are involved in this task, each region/country trying to cover their own identified gaps (task 4.1) benefiting from the collective capacities and sources of the AR.

**Methods/techniques:** capacity building events, networking, events, workshops, etc.

### 5.5 Monitoring and evaluation

**Brief description:** the SRIA leads to a jointly agreed programme of activities. As any policy implementation tool, it needs to be accompanied by specific key performance indicators reflecting the agreed goals and objectives and the anticipated outputs and impacts. In keeping track of the level of achievement of the objectives set, a monitoring system needs to be established at the transnational level and evaluation tasks need to be performed at regular intervals.<sup>146</sup>

**Actors:** officials from the transnational authorities (i.e. EUSALP AG) should be in charge of coordinating the monitoring and evaluation of the transnational activities. The individual regional/national monitoring systems should be feeding the transnational system with data and information.

**Methods/techniques:** monitoring and evaluation techniques, e.g. the RIPE toolkit.

## 4.2 Deep dive transnational SRIA co-design approach

While the fast-track SRIA development scenario outlines a quick route to aligning R&I activities within a narrow set of areas of shared interest and priority among the countries and regions, the deep dive approach entails a significant upscaling of transnational ambition and effort. In this case, there is a clear shift from the regional/national to the transnational level. While taking into account the regional and national level priorities, rather than merely building up from the overlap in priorities, the deep dive approach makes the transnational level the starting point for defining challenges and priorities and the alignment and co-evolution of regional and national strategies the route to achieve this.<sup>147</sup>

This will require a more ambitious and open co-design process where stakeholders are able to switch into exploratory mode, escape from the here and now and project more into forward-looking territory. In this transnational context, the emphasis will shift to awareness and identification of the bigger challenges facing the macro-region. There is a marked effort to address more systemic concerns such as gaps and weaknesses in the R&I ecosystem in general and how these impact on particular niche areas. The focus is broader and at

<sup>145</sup> For a sample of additional activities see <https://www.era-learn.eu/support-for-partnerships/additional-activities/other-additional-activities>

<sup>146</sup> For more details on monitoring and evaluation of R&I partnerships see <https://www.era-learn.eu/support-for-partnerships/governance-administration-legal-base/monitoring-and-assessment>

<sup>147</sup> A discussion on the alignment of national/regional strategies in the joint programming process of the EC is available on [https://www.era-learn.eu/support-for-partnerships/additional-activities/copy\\_of\\_alignment](https://www.era-learn.eu/support-for-partnerships/additional-activities/copy_of_alignment) or <https://rio.jrc.ec.europa.eu/policy-support-facility/mle-alignment-and-interopability-national-research-programmes>

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the same time deeper and combines a concern with economic opportunities emerging from the RIS3 entrepreneurial discovery process with the societal and systemic challenges ahead.

The goals and objectives extend from partnerships in focused thematic projects in the fast-track scenario to more long-term joint structuring of R&I programmes and cultivation of related ecosystems at cross-regional and -national level. The end goals of the deep dive approach are ambitious and include influencing the directionality of R&I and related investments and bringing about structural change by aligning R&I goals and programmes to achieve sufficient critical mass at transnational level. The deep dive approach requires a strong competent steering team working hand in hand with a highly motivated and engaged stakeholder community.

The main building blocks for the deep dive scenario are identified below in terms of both process and content.

### 1. *Creation of a SRIA development task force*

(as in the fast-track SRIA development approach)

### 2. *Contextualization of the SRIA*

Brief description: this entails an analysis of R&I trends and drivers, gaps, opportunities and threats, regional, national and European policy goals, and related activities and initiatives. This together with other key inputs from RIS and ongoing projects (A-Ring, Ardia Net...) provide the framework for the macro-region's expected R&I contribution as well as prepare for the definition of its priority areas, needs and rationale for coordinated action among members. Such an analysis provides data for further SRIA development and reflects the principle of evidence-based agenda setting.

Actors: regional/national/transnational authorities should supervise this task that might be outsourced to external experts/consultants.

Methods such as document review, expert interviews, and consultations with scientific experts and stakeholders may be used for such purposes.

### 3. *Vision-setting /Revisiting /updating the Vision and Mission.*

Brief description: vision and mission are essential elements of a SRIA, though their development is typically not part of the SRIA process. The SRIA process tends to focus on update existing vision and mission statements. Yet, in the EUSALP case it is important to jointly build on a common vision for the AR considering existing as well as future trends, strengths, and opportunities. While step 2 will provide the wider context, this

step will set a specific vision for the Alpine macro-region in the next say 15+ years seen from the transnational level, rather than from the individual region's perspective.

Actors: regional/national/transnational authorities

Methods: vision building techniques<sup>148</sup> that may be part of a wider foresight-exercise concerning the future of the Alpine Region<sup>149</sup>

4. *Identification and elaboration of transnational R&I challenges, the related R&I agenda and priority areas for coordinated action.*

Brief description: these are the main activities in the SRIA co-design process. In this phase a wide set of stakeholders going beyond the usual groups and individuals consulted, reflect on current and emerging challenges facing the macro-region and agree on the R&I agenda. This process is typically highly interactive and iterative, with multiple consultation rounds with different stakeholders. The SRIA evolves as a live document through multiple drafts as key elements are elaborated and refined. The implementation of stakeholder engagement and co-creation activities covering a range of domains (scientific, policy, national/regional, European) entails the main focus of effort in SRIA development.

Actors: wide range of stakeholders representing the quadruple helix at the regional/national and transnational levels

Methods: the co-design process, methodology and tools, are adapted to fit with and support the broad orientation, the challenges, overall R&I agenda, and topics selected and the range of stakeholders that need to be engaged accordingly.

5. *Validation and adoption of the SRIA*

Brief description and actors: the SRIA, as a key strategy document of the macro-region must be formally approved and adopted by the EUSALP Executive Board. It may also involve additional internal and/or external feedback and consultations for broader validation and finalization.<sup>150</sup>

6. *Communication and awareness-raising*

Brief description: This aspect of the process is a very important activity throughout the SRIA development, ensuring the transparency and openness of the process at every step. This helps to reinforce the open

<sup>148</sup> Some techniques are mentioned in <https://www.onlines3.eu/phase-3-strategy-formulation/3-1-collaborative-vision-building/>

<sup>149</sup> An example of vision-building as part of a foresight exercise is available on <http://www.foresight-platform.eu/tag/vision-building/>; A foresight guide is available on <http://www.foresight-platform.eu/community/forlearn/>

<sup>150</sup> For European Partnerships, the SRIA must be agreed with the Commission prior to the launch of the initiative

participatory approach and enables outsiders to engage from within and outside the macro-region. This helps to support the buy-in so important for effective implementation.

**Actors:** all involved and interested regional/national/transnational authorities should be engaged in the wide dissemination of the SRIA

**Methods:** different outreach tools including social media can be used together with hybrid events (online and in person) to launch the SRIA to a wider public.

### 7. *Communication and awareness-raising*

(as in the fast-track SRIA development approach)

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# PART B

Part B of document includes a list of tested methodologies along seven main routes:

- Route 1: The S3-Innovation Model for interregional collaboration
- Route 2: Building Thematic Interregional Partnerships for Smart Specialisation
- Route 3: Close to market inter-regional collaboration (Vanguard Initiative)
- Route 4: Alignment of regional RDI funding programmes
- Route 5: Multi-level governance structures for implementing cross-regional funding options
- Route 6: Interregional innovation investments (I3) - cross-regional funding of innovation
- Route 7: Review of other funding opportunities

Following these, there are sections addressing additional important steps in the process of SRIA development. These include: engaging stakeholders, communicating and raising awareness, championing and overseeing the process, vision setting and prioritisation as well as setting up a monitoring and evaluation process. Guidelines and good practice advice based on international practice are provided for those steps.

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## 5 Methodologies for cross-regional collaboration

Cross-regional collaboration should address all regional stakeholders starting from the policy community that needs to prepare the ground and create the necessary framework and opportunities, and tools to promote cross-regional collaboration among R&I stakeholders (academia, businesses, societal organisations, etc.). National authorities should also be engaged to the degree national policies affect and are affected by the regional context and to formulate the links in a multi-level governance approach.

There is a history of this type of collaboration in the alpine region but not organised from a transnational perspective and through a targeted strategy. Work on designing an optimal approach for the macro region started with several projects like S3-4Alpclusters, A-Ring, Ardia-Net, etc. so this Blueprint builds on previous and ongoing efforts to design appropriate and customised methodologies for such collaboration. Some of them have also led to practical guidance and tools. Below are noteworthy examples of such efforts that have been carried out within the Interreg Alpine Space programme or other existing schemes that are worth exploring.

### 5.1 Route 1: [The S3-Innovation Model](#) for interregional collaboration

The S3-4AlpClusters project examined a systematic approach to identify, develop and implement transformative activities with cluster initiatives. The final publication of the project highlights, it is not enough for the implementation of S3 to define broad priority areas. The identification and development of transformative activities are also needed. Transformative Activities are defined as *“a collection of innovation capacities and actions of a group of actors derived from an innovative combination of existing structures, targeting related areas and having the potential to significantly transform existing industries.”*<sup>151</sup>

Transformative activities can be generated through *“new combinations of innovation capacities and actions targeting related areas (or cross-sectoral intersections) and having the potential to significantly transform existing industries”*. This should draw upon the examination of existing capacities and resources and the opportunities that lie ahead.

The objectives of the S3-Innovation Model are to:

- Focus on the identification and development of Transformative Activities
- Facilitation of need-based cross-regional cooperation
- Involvement of clusters along the entire process

The process includes five steps: the generation of a base of evidence, the identification, the development and the implementation of transformative activities, and finally the evaluation of the process (

<sup>151</sup> <https://www.alpine-space.org/projects/s3-4alpclusters/project-results/publication/s3-4alpclusters-final-publication----interactive.pdf>

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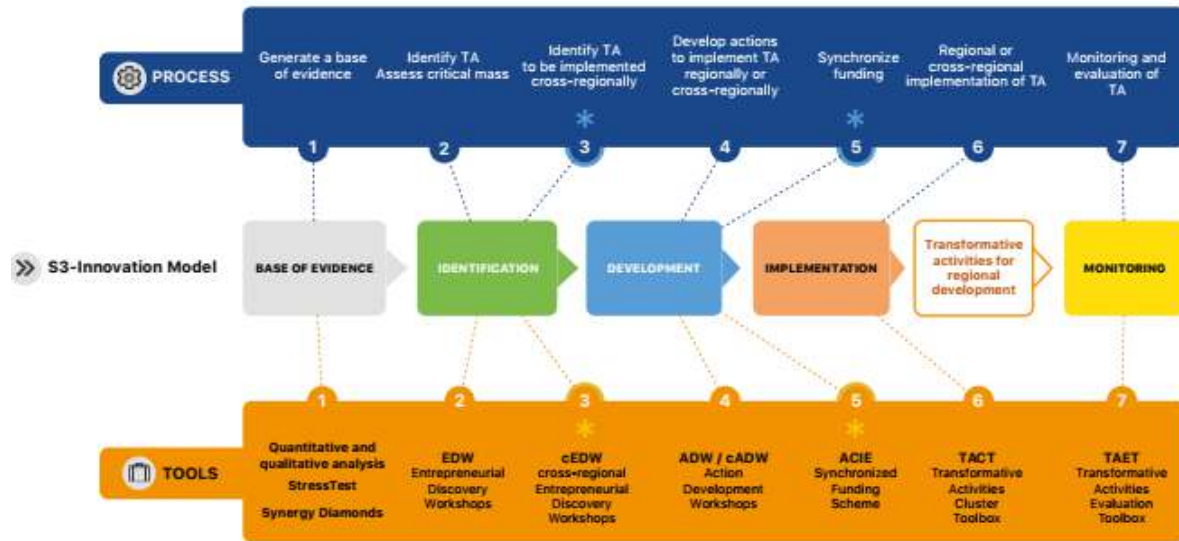


Figure 8).

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Figure 8: The S3-Innovation Model and its action lines



Source: S3-4AlpClusters

The **first step of generating evidence** draws on qualitative and quantitative information on existing capacities, clusters, entrepreneurial resources and opportunities for transformation. The S3-Innovation Model promotes two main tools for this step:

- the [S3-Synergy Diamonds](#), which is a methodology representing existing priority areas and capacities in a way that facilitates the identification of transformative activities and captures opportunities for need-based interregional cooperation, and
- the [StressTest methodology](#), that helps to analyse the role of clusters in the current implementation of regional strategies

The generated evidence informs the **second step, the identification**, which identifies the set of innovation capacities necessary to achieve the aspired structural transformation. This is done through [Entrepreneurial Discovery Workshops \(EDW\)](#) that assess the existing critical mass and detect the needs for cross-regional cooperation. In lack of critical mass within the region, cross-regional Entrepreneurial Discovery Workshops (cEDP) are proposed to identify complementary competences and needs from multiple regions.

The **third step, the development**, aims at turning the ideas for transformative activities into concrete actions, e.g. R&D projects, networking activities, cooperation schemes or actions for developing critical skills. This step includes [Action Development Workshops \(ADW\)](#) that engage stakeholders in this process. In the case multiple regions are involved then the process needs to be continued [cross-regionally \(cADW\)](#).

The S3-Innovation Model also introduced a proposal for an [Alpine Cluster Innovation Express \(ACIE\)](#), that was later tested under the AlpGov project. The **fourth step, implementation**, refers to the execution of the developed actions. As relevant methods in this step, a generic [Transformative Activity Cluster Toolbox \(TACT\)](#)

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is suggested consisting of a broad set of best practises of different kinds of potential implementation actions in several fields such as education, technology, growth, research or collaboration.

In its **final step, monitoring**, the S3-Innovation Model includes a methodology contributing to the evaluation and monitoring of the whole process. The [Transformative Activity Evaluation Toolbox \(TAET\)](#), is suggested here providing a general framework that supports a formative evaluation during the implementation of the S3-Innovation Model.

The S3-Innovation Model was developed under the [S3-4ApIClusters](#) project which ended in 2019. Within the two years of the project duration it was tested within 11 regions and 30 pilot clusters across the Alpine Space.

## 5.2 Route 2: Building Thematic Interregional Partnerships for Smart Specialisation

Through the current Cohesion Policy, the EU has been encouraging regions and Member States to collaborate in view of supporting the creation of new European value chains. To enable the building of such collaborations, the EC launched three thematic smart specialisation (S3) platforms in 2015, in the areas of Agri-Food, Energy and Industrial Modernisation. These platforms have served as the interactive and participatory environment for building interregional partnerships that help regions improve their regional knowledge base and take new paths of development towards better positioning in global value chains and following a transnational joint strategy of innovation.

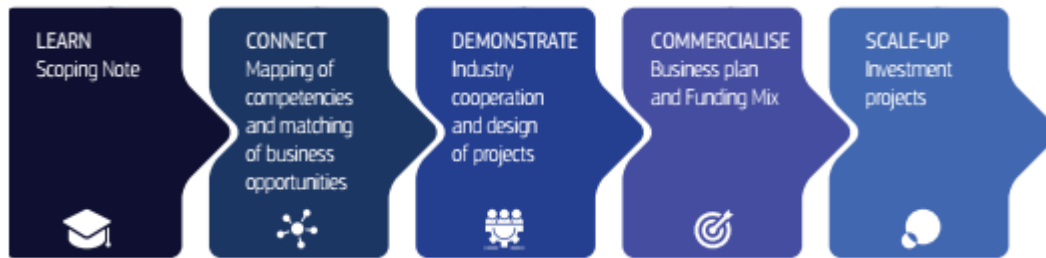
Several partnerships have been created since then. In the area of agri-food there are five [S3 Agri-food Partnerships](#), addressing consumer involvement, high-tech farming, nutritional ingredients, smart sensors for agri-food, and traceability and big data. In the area of energy, six [interregional S3PEnergy partnerships](#) have been created bringing regions together to implement their energy-related innovation strategies, develop joint demonstration solutions in energy, and looking for strategic alignment. The area of industrial modernisation is more populated with 24 interregional [S3 Industrial Modernisation partnerships](#) involving around 150 regions and countries. The total of the regions and countries involved in the Thematic Interregional Partnerships are shown in the Thematic Platforms iNteractive Map, <https://s3platform.jrc.ec.europa.eu/thematic-platforms-map>.

The EC methodological manual for building thematic S3 partnerships

The EC has prepared a [methodological manual](#) to assist regions and counties develop a thematic S3 interregional partnerships. In particular the manual guides interested entities to build a partnership through a work-flow including 5 phases. These are the four phases elaborated by the Vanguard initiative (presented below) plus a phase about scale-up.

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Figure 9 : The five phases for building thematic S3 partnerships



Source: <https://s3platform.jrc.ec.europa.eu/en/w/methodological-manual-developing-thematic-interregional-partnerships-for-smart-specialisation>

The guide specifies that the process is iterative and non-linear, which can be understood as a dynamic flow of activities that result in living documents and outcomes that require continuous monitoring and review. The underlying belief is that Smart Specialisation as a drive to building new value chains across borders.<sup>152</sup>

*“The Value Chain concept describes the full range of activities that firms engage in to bring a product from its conception to its end use and beyond. This includes design, production, marketing, distribution and support to the final consumer. The activities that comprise a value chain can be contained within a single firm or divided among different firms. Value chain activities can produce goods (services) and can be contained within a single geographical location or spread over wider areas. Global Value Chains are value chains that can be divided among multiple firms and dispersed across wide swaths of geographic space, hence the term ‘global value chain’.”<sup>153</sup>*

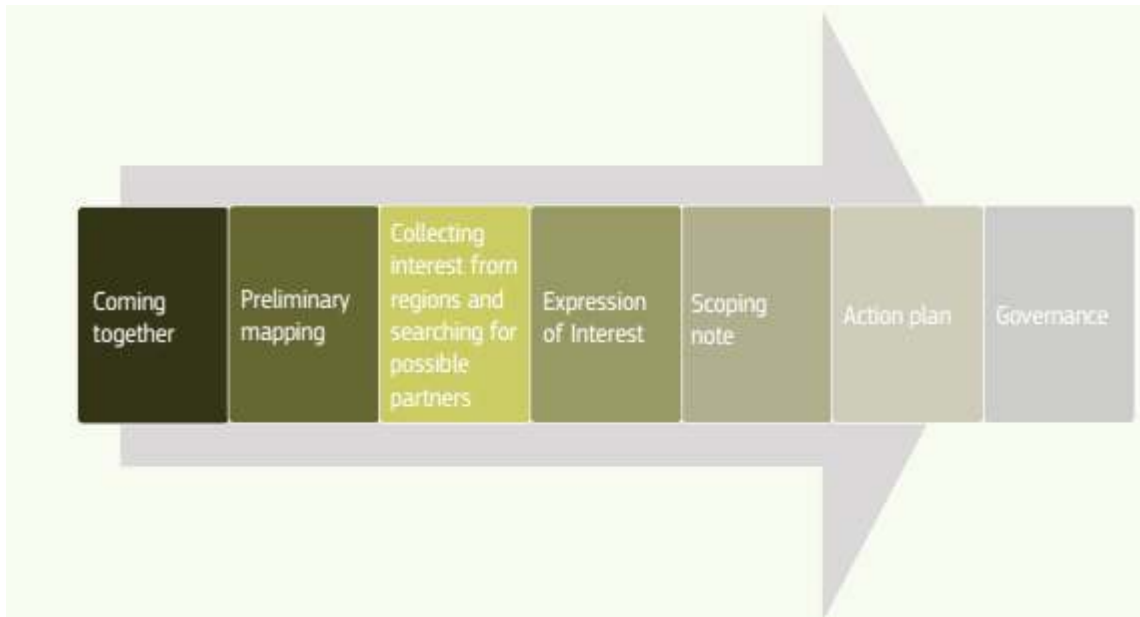
While showing the whole process, the manual covers only the first two phases, i.e. learn and connect, in detail with the aim of assisting public authorities responsible for designing and delivering interregional investment projects ensure that these joint projects attract sufficient private sector interest to ensure their sustainability.

The first phase is structured as follows.

<sup>152</sup> Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions Strengthening Innovation in Europe’s Regions: Strategies for resilient, inclusive, and sustainable growth.

<sup>153</sup> EC / JRC Methodological manual, p. 23

Figure 10 : The structure of the phase 'Learn'



Source: <https://s3platform.irc.ec.europa.eu/en/w/methodological-manual-developing-thematic-interregional-partnerships-for-smart-specialisation> p. 29

The manual includes a detailed description of the above steps, enriched with useful tips and examples from the Vanguard pilot cases, where this methodology has been tested.

Existing tools are also cited that help implement the steps, such as the [Eye@RIS3](#) that is increasingly popular in identifying potential partners for interregional S3 partnerships based on their S3 priorities.

The governance of the future partnership is also addressed at length, with examples of the pilots, and including guiding questions that need to be answered in choosing the best organisational model and the corresponding

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governance structure. The manual concludes that certain key elements need to be highlighted regarding the first phase (p. 66):

- “1. Linking concrete domains and RIS3 priorities can help develop a collaborative framework and identify relevant peer regions with similar interests.*
- 2. An explicit political and financial commitment is an essential and indispensable factor to ensuring success of most thematic S3 partnerships.*
- 3. Good knowledge of the existing policy instruments provided by the European Commission can help accelerate various partnership activities.*
- 4. As soon as possible partner regions should reflect on how to combine available EU instruments and funding with national and sub-national provisions derived from the RIS3 frameworks of partner regions.*
- 5. Partner regions can improve the impact of their partnership by capitalising on any relevant previous or parallel collaborative exercises and initiatives.*
- 6. Partner regions should explore, measure, and anticipate what resources and administrative procedures are required and should be available to implement partnership activities.”*

The second phase, Connect, is structured as follows.

Figure 11 : The structure of the phase ‘Connect’



Source: <https://s3platform.irc.ec.europa.eu/en/w/methodological-manual-developing-thematic-interregional-partnerships-for-smart-specialisation> p. 71

There are two main parts in the second phase. The first one, highly exploratory and analytical, and building on the outcomes of the Learn phase (rationale, vision and objectives of the partnership) helps ascertain whether the partnership can attain sufficient critical mass in terms of economic, scientific, and research potential by reviewing the regions’ capabilities and competencies. The second part refers to matching stakeholders with relevant competences to combine ambitions between actors in order to identify cross-regional synergies and

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matching business ideas based on identified investment areas of common interest that were defined and validated during the earlier mapping steps.

This phase, especially the second part, requires a good level of prior stakeholder engagement. As the manual suggests this can be facilitated by questionnaires, interviews, concept notes, summaries of potential business cases, and specific project fact-sheets. The manual includes valuable examples of matchmaking events (organisation, preparation, structure, review), as well as examples of existing projects in explaining how a project idea can be turned to a project.

Besides the planning tips and numerous examples the manual also pays attention to reviewing each phase and provides a set of checklist questions.

### 5.3 Route 3: Close to market inter-regional collaboration (The Vanguard Initiative)

Given that the above manual does not include the two last phases, demonstrate and commercialise, reference should also be made to methodology developed by Vanguard initiative. As mentioned earlier this methodology has been tested [through specific pilots](#). These pilot projects are close to the market and therefore have a high commercial potential. This means the pilots focus on applications at post-prototyping level (> TRL5), with the potential for full market deployment in a time span of 3 to 5 years. In this regard this methodology is relevant for close-to-market collaboration.

Figure 12 The four steps for interregional collaboration of the Vanguard initiative

Learn	Connect	Demonstrate	Commercialise
<p>Creating a shared vision on the future on a particular industry domain, through mapping of emerging value chains, innovation clusters and industries. The mapping also includes regional ambitions and challenges.</p> <p>Methods/actions</p> <ul style="list-style-type: none"> <li>•Develop a scoping paper</li> <li>•Mapping questionnaire</li> <li>•Identify lead regions and actors</li> </ul>	<p>Matching value chains of partners across regions which seek to cooperate on a common roadmap, based on complementarities in their respective smart specialization strategies.</p> <p>Methods/actions</p> <ul style="list-style-type: none"> <li>•Matching events for partners</li> <li>•Develop Demonstration cases</li> </ul>	<p>Developing networks of pilots and demonstrators for manufacturing, dependent on co-investment commitments by businesses and public authorities.</p> <p>Methods/actions</p> <ul style="list-style-type: none"> <li>•Networked demonstration</li> <li>•Pilot lines for first-of-a-kind factories (TRL 6-8)</li> <li>•Generation 'n', 'n+1' and 'n+2'</li> </ul>	<p>Implementing new innovation and industrial investment projects by business actors.</p> <p>Methods/actions</p> <ul style="list-style-type: none"> <li>•Launch of new ventures and start-ups</li> <li>•New value chains (TRL 9)</li> </ul>

Source: *The ins and outs of the Vanguard Initiative*, [https://www.interregeurope.eu/fileadmin/user\\_upload/plp\\_uploads/policy\\_briefs/2017-10-06-Policy-brief-Vanquard\\_Final\\_N.pdf](https://www.interregeurope.eu/fileadmin/user_upload/plp_uploads/policy_briefs/2017-10-06-Policy-brief-Vanquard_Final_N.pdf) ; ERA-LEARN Alignment at Trans-Regional Level: Case Study No.5 The Vanguard Initiative, ....<https://www.era-learn.eu/documents/eralearn2020t4-4casestudies5vanquard.pdf>

The third step, demonstrate, is the development of a network of pilots and demonstrators (demonstrate) based on a commitment to 'co-invest' by businesses and public authorities by combined funding. The focus lies on cross-regional demonstration for projects which are close to market, i.e. showing a clear added value compared to what already exists at regional level and a scale up potential of impacting international markets.

The final step, commercialise, is the implementation by business actors of new innovation and industrial investment projects in emerging industries. As the Vanguard's Pilot Projects show, the purpose is to bring prototypes to production by testing the transfer and replication potential of applications across the regions. In

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this way the development of specific commercial applications is accelerated within the targeted value chains through the development of industry-led, multi-regional demonstration platforms.<sup>154</sup>

The pilot projects experiences offer a variety of important factors for success, in particular:

- The Vanguard Initiative and their associated pilot projects have been able to secure high-level political commitment through the signing of a high-profile declaration and active EU level lobbying and regular project presentations and events;
- Strong alignment with regional S3 priorities facilitating synergies with innovation ecosystem actors and SMEs, and synergies with structural funding and other EU sources of funding;
- Good fit with societal challenges and key priorities identified for the future of Horizon 2020;
- Engaging with SME intermediaries in projects such as clusters and technology transfer agencies to both help identify key businesses and help modernise regional innovation systems and remove bottlenecks linked to technology diffusion or commercialisation actions;
- Active regions in the various Thematic S3 Platforms;
- New Interreg Europe partnerships can be built up with partners drawn from different Vanguard projects and thus accelerating the learning and knowledge transfer process.<sup>155</sup>

#### 5.4 Route 4: Alignment of regional RDI funding programmes

The AlpsConnect Cross-regional Cooperation Scheme was developed under [the ARDIA-Net project](#) funded under the Interreg Alpine Space programme. The work of ARDIA-Net highlights increased alignment of regional programmes is needed with the macro-regional strategies to strengthen their impact and their capacity to respond to common challenges. This in turn calls for increased cross-regional collaboration (Keller, K., et al. 2020)<sup>156</sup>. Yet, there is a persistent funding gap for cross-regional research, development and innovation (RDI) activities targeting regional priorities of particular relevance for areas like the Alpine Region, one of the main reasons being the lack of multi-regional governance structures for cross-regional cooperation in S3-implementation<sup>157</sup>. In building such a functional multi-level governance scheme, ARDIA-Net points out a set of minimum requirements:

- Commitment of participating Alpine Region partners needed (political and financial) especially for a pilot / discovery period.
- Reasonable efforts for implementation but requiring as less changes as possible in terms of administrative procedures, while funds should not be crossing borders.
- Possibility to select call scopes according to individual S3 priorities.
- Likelihood of short-term implementation
- Aspiring long term impact on both the RDI landscape in the Alpine Region as well as the individual RIS3 implementation.

<sup>154</sup> ERA-LEARN Alignment at Trans-Regional Level: Case Study No.5 The Vanguard Initiative, ....<https://www.era-learn.eu/documents/eralearn2020t4-4casestudies5vanguard.pdf>

<sup>155</sup> The ins and outs of the Vanguard Initiative, [https://www.interreg-europe.eu/fileadmin/user\\_upload/plp\\_uploads/policy\\_briefs/2017-10-06-Policy-brief-Vanguard\\_Final\\_N.pdf.pdf](https://www.interreg-europe.eu/fileadmin/user_upload/plp_uploads/policy_briefs/2017-10-06-Policy-brief-Vanguard_Final_N.pdf.pdf)

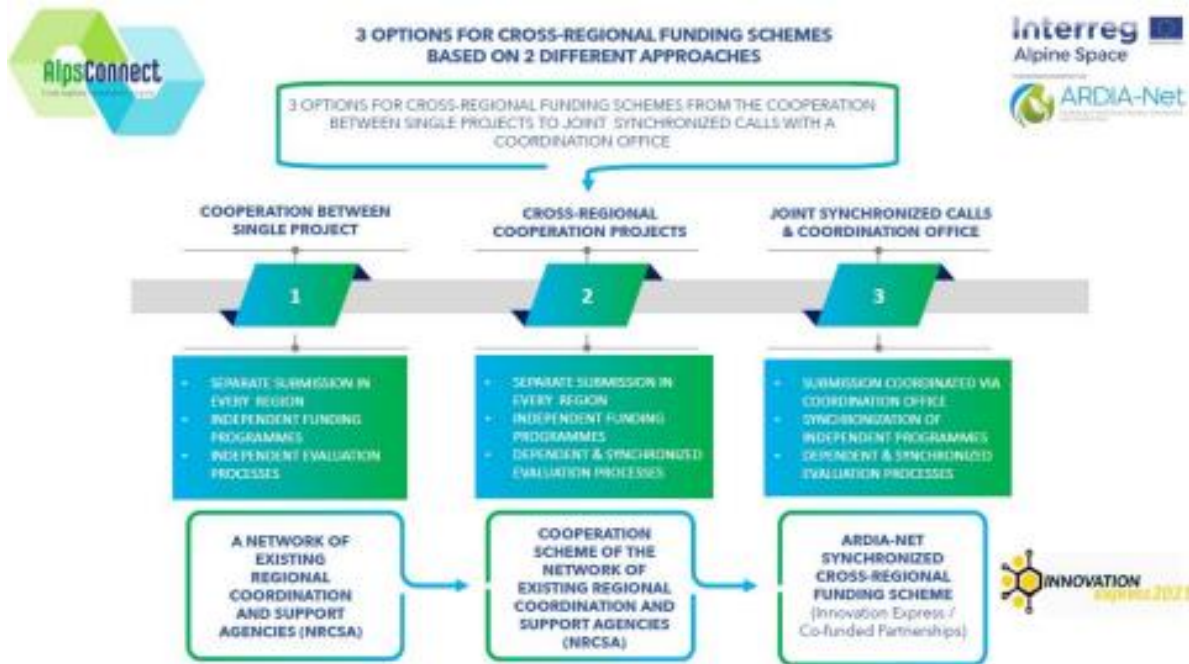
<sup>156</sup> Keller, M., Dermastia, M., Meier zu Köcker, G., Pfaller, Ph., Bersier, J. (2020), New power for the macro-regional innovation motors – A call for a wave of new cross-regional funding schemes in Europe, DOI : 10.13.140/RG.2.2.34535.88488

<sup>157</sup> Dermastia, M. and Osvald, D. (2018), Study to Prepare A Synchronised Funding Scheme For Bioeconomy Development In The Alpine Region. Interreg AlpGov.

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Taking a step further, ARDIA-Net developed a collaboration approach including three options for possible funding schemes: “Cooperation between Single Projects”, “Cross-regional Cooperation Projects” and “Joint Synchronized Calls & Coordination Office”.

Figure 13: AlpsConnect Cross-regional Cooperation Scheme



Source: ARDIA-Net 2021

### Option 1: A Network of Regional Coordination and Support Agencies - NRCSA

The first option is the easiest of all three in terms of implementation as it only requires a certain degree of coordination among the participating regional agencies given that beneficiaries do not directly do common research activities. Yet, such a cooperation scheme helps beneficiaries become aware of counterparts and their activities and interests in other regions, which is important to prepare the ground for more solid cooperation. The first step in this option includes a mapping of the available regional funding programmes. The second step is to identify a network of existing regional coordination and support agencies to support cross-regional cooperation between RDI-actors.<sup>158</sup>

### Option 2: Cross-regional Cooperation Projects

The second option keeps all procedures in terms of submission and funding separate across the regions, while adding a layer of dependent and synchronised evaluation process. Applicants need to submit an application separately to the regional funding agency and a common proposal preparation form to the call secretariat. Whereas, in the first option the NRCSA supports potential applicants to create a quasi-cross-regional project, in the second option the NRCSA supports the funding programme managing authorities and programme owners as well as applicants. The funding programme managing authorities and programme owners are

<sup>158</sup> More details about the particularities and needs for each Option is included in Pfaller, P., Ammerl, T., Keller, M., Reingruber, I. 2021. *Key elements of an S3 based funding scheme including target group needs analysis*. ARDIA-Net Report.

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supported to align their funding programmes in the sense of allowing partners from different regions. The joint projects are cross-regional in content, but regional when it comes to funding regulations. <sup>159</sup>

### Option 3: Joint Synchronised Calls & Coordination Office

The third option increases the level of coordination by synchronising the calls - regions shall issue the same calls for proposals, based on common topics of strategic importance. Secondly, the coordination expands to forming project consortia, submitting and evaluating proposals, and taking funding decisions. This is done through a central coordination office. However, despite the increased level of coordination, participating regions remain completely independent in their funding decisions. They participate with existing programmes, according to existing rules and no funds are crossing borders.

This scheme was tested through the [Innovation Express 2021 call](#) which was funded by existing regional funding programmes and managed by the participating funding agencies in four regions (Salzburg - Austria, Brandenburg and Baden-Württemberg – Germany, and Canton Fribourg in Switzerland). The Innovation Express 2021 call was designed as a quick response to assist the economic recovery after Covid-19 and offered SMEs the possibility to widen their markets and develop new products and services with partners in Europe in two areas, artificial intelligence in healthcare applications and digital solutions in sustainable industry. However, it could have been adapted to any RDI or SME cooperation. <sup>160</sup>

The feedback received proved that this approach is feasible, especially when a macro-strategy is also linked to existing regional programmes and networks of managing authorities. However, there is a lack of an overview of the existing collaboration and regional programmes, running and anticipated. This calls for a macro-region wide network of management authorities to exchange information about potential for synchronisation of existing and upcoming programmes as well as good funding practices and suggestions for improvement in implementing schemes like the Innovation Express. <sup>161</sup>

As documented in the ARDIA-Net Policy Memo 3, the experience of launching the Innovation Express 2021 call concluded that it is worth applying on a broader basis in the Alpine space including other macro-regions for three main reasons: it brings together new actors in a simple way, it is driven by the participating regions and it is SME friendly. Yet, it is not without challenges, which need to be addressed before rolling it out again at a larger scale:

- Bringing people from various organisations and companies from different regions to communicate and find common areas of interest that would actually lead to collaboration takes time. Thus, the call period needs to be long enough to allow partner search and networking events and facilities to be effective; otherwise, it will result to a limited number of applications.
- The number of participating regions also needs to be adequately large not to limit the probability of finding cross-regional cooperation matches, and thus the number of applications.
- A careful examination also needs to be done of the specific requirements of the regional programmes that will be synchronised to minimise the obstacles in formulating cross-regional teams.
- Inevitably, there will need to be an additional layer in the application process, i.e. in addition to applying under the regional programme, a proposal summary in a jointly agreed common template is usually submitted to the call secretariat. This will be an extra burden for the applicants as they need to meet both

<sup>159</sup> More details and instructions about the how to implement each Option is included in Pfaller, P., Ammerl, T., Keller, M., Reingruber, I. 2021. *Key elements of an S3 based funding scheme including target group needs analysis. ARDIA-Net Report.*

<sup>160</sup> ARDIA-Net POLICY MEMO #02: Options for cross-regional funding schemes within the Alpine Region 30/11/2020

<sup>161</sup> ARDIA-Net POLICY MEMO #03: Experiences of the Innovation Express 2021 Call: Lessons Learned and Policy Implications of the First Alpine Region Cross-regional Funding Scheme 06/12/2021

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the requirements of the regional funding programme, and also those of the cross-regional call. Thus, intensive coaching of potential applicants is needed as the Innovation Express 2021 experience has shown.

- A serious challenge is also the different timings in programme funding and the time needed to go through the evaluation process of the proposals at the national/regional level. Where a full-scale evaluation is carried out at the regional level this can take significant amount of time, which may lead to missed opportunities for timely funds' disbursement in some regions, and thus delay that start of the successful projects.
- Wide differences in the amounts of money allocated to the call by the participating regions can also create problems as this may lead to different levels of involvement of the different partners in a project.

These are challenges that are also met in the ERA-NET scheme and other public partnerships (Art 185 initiatives, Joint Programming Initiatives, etc.). As this experience has shown, indeed, it is important to organise raising awareness events in each of the participating state/regions to estimate the potential interest of research actors even before the call is launched. In some countries so-called mirror groups are formed bringing together research actors to determine the level of interest in a call topic or even before that stage, to help define the call topic in detail. This helps estimate the potential number of research groups and proposals to expect as well as the funding that should be earmarked by the regional programmes. At the same time, wide promotion of the call and matchmaking events in all regions are of major importance.<sup>162</sup> Equally valuable is to provide support for the applicants at the proposal writing phase as well as during project implementation.

Wide differences in the budgets earmarked by the participating states in ERA-NET calls is still a reality. However, the most important diversity that is hard to deal with is between the level of interest and success of local research groups (being included in positively evaluated proposals) and the funds earmarked by their funding agencies to cover their participation. It is not unusual that highly ranked proposals do not get funded because the respective budgets of certain countries run out. The mirror-groups and awareness raising events can be used to estimate the possible level of interest and thus earmark adequate funds.

In relation to the evaluation process, in many ERA-NETs a two-stage evaluation process<sup>163</sup> is usually applied, and the national / regional authorities are engaged in an eligibility check at the first stage. Yet, the evaluation process can be centralised or decentralised with either option being relevant for different purposes. As the ERA-LEAN toolbox for implementing co-funded calls prescribes, in a 2-step evaluation procedure the following combinations are possible<sup>164</sup>:

- A) Step 1: centralised; Step2: centralised
- B) Step 1: decentralised; Step2: centralised
- C) Step 1: decentralised; Step2: decentralised

The centralised evaluation system (i.e. run by a central call secretariat) is typical for reaching a joint ranking list of full proposals and it is appropriate to use this system for all real common pot and mixed mode funding models. The decentralised evaluation is carried out by national/regional programmes/funding agencies. This is an option for calls in which project feasibility about the financial stability and/or innovation aspect is an essential criterion, e.g., in applied research. Quite often only national agencies have access to detailed

<sup>162</sup> <https://www.era-learn.eu/support-for-partnerships/implementing-joint-calls/call-planning-preparation/promotion-of-the-call>

<sup>163</sup> <https://www.era-learn.eu/support-for-partnerships/implementing-joint-calls/call-planning-preparation/timing-scope/1-or-2-step-submission-procedures>

<sup>164</sup> <https://www.era-learn.eu/support-for-partnerships/implementing-joint-calls/evaluation/evaluation-procedures/centralised-decentralised>



information related to the applicants. The joint outcome is often a consensus on projects to be funded but without ranking priorities.

Although some of the countries may additionally require the submission of the proposals nationally / regionally in parallel with the central submission system, the common evaluation process by international experts is generally accepted. Even in the countries where no separate proposals need to be submitted locally, it is required that a summary of the proposal together with specific data/information are submitted in the local language in case of approval to form part of the grant agreement. Such procedures, however, require a greater level of collaboration, i.e. that envisaged in more formal partnerships like the ERA-NETs.

Having reviewed the possibilities for cross-regional collaboration under a number of instruments (FP7 Horizon 2020, Interreg, EUREKA, and EUROSTARs, and ERA-NETs) ARDIA-net concluded that, indeed, the ERA-NET scheme may be a possible approach to follow for a more solid cross-regional partnership,<sup>165</sup> allowing financial commitments that can be set on a case-by-case basis, and not requiring separate funds as the ERA-NET is based on synchronisation of existing calls among the partner regions, although this can prove to be a challenge sometimes.

The ERA-NET scheme, however, is no longer available, under Horizon Europe. The ERA-NET Cofund scheme that existed in Horizon 2020 is now replaced by the Co-funded partnerships. These are partnerships involving EU countries, with research funders and other public authorities at the core of the consortium. The partnership is based on grant agreement between the Commission and the consortium of partners, resulting from a call for proposals for a programme co-fund action in the work programme of Horizon Europe.<sup>166</sup> Although regional public authorities can indeed participate, the discussions about the formulation of such partnerships primarily take place at the national level. At the same time, long-term commitment is required underlined by a strategic approach with enhanced coordination at the national/regional level. Forty-nine candidate partnerships have been formulated under Horizon Europe in total including 15 Co-funded partnerships mainly in Cluster 1 (Health) and 6 (Food, bioeconomy, agriculture) and one partnership on Innovative SMEs.

Given that the new version of the Co-funded partnerships may be more demanding than what the regions can commit to in the first instance, another option to consider is the possibility to apply for a Coordinating Support Action (CSA) under Horizon Europe to prepare the ground for a more solid, long-term, cross-regional collaboration. The first call is already open for proposals. As stated in the work-programme, *the actions funded under this topic will coordinate national and regional R&I programmes by pooling national resources and contributing to the alignment of national research and innovation policies. Projects are expected to contribute to the following expected outcomes:*

- *Identification of common research and innovation priorities agreed among the participating national and regional R&I programmes, taking into account international developments where relevant;*
- *Implementation of multiannual joint calls, resulting in the funding of transnational collaborative R&I projects;*
- *Implementation of other joint activities supporting the market, regulatory or societal uptake of results;*
- *Contribution to participating states meeting Global Challenges, including relevant contribution to the SDGs.<sup>167</sup>*

<sup>165</sup> Keller, M., Pfaller, P., 2021. Case study: RDI cooperation in the alpine macro-region. ARDIA-Net report.

<sup>166</sup> <https://www.era-learn.eu/partnerships-in-a-nutshell/type-of-networks/co-funded-european-partnerships>

<sup>167</sup> Details on this possibility will become available as Horizon Europe workprogrammes unfold and the respective calls are launched.



The deadline for submitting proposals is April 2022 but the call will open every year aspiring to support 2-3 proposals of around Euros 2.5 m each.

This project is co-financed by the European Regional Development Fund through the Interreg Alpine Space programme



### 5.5 Route 5: Multi-level governance structures

Whatever approach is applied in the SRIA development, the SRIA needs to be supported by a specifically designed governance structure overseeing its implementation, monitoring as well as iteration, revision, and update. The key actors to be involved in the governance structures would be those with authority to act and take the lead at the transnational level. Typically, the bodies to design the SRIA governance framework need to address the strategic and the operational level, i.e., an Executive Board (EUSALP) to steer the strategic development of the transnational cooperation and thus of the SRIA and its updates, the Management Board in charge of revising/defining implementation action plans and overseeing their execution. It is also advisable to create Stakeholder Advisory Boards representing the key stakeholders of the Alpine Region. As a first round of engagement is indeed achieved through the wide consultations carried out for the identification of the common areas of interest, it is vital to build on the momentum and commit the stakeholders in an advisory role all through the SRIA implementation and future revisions. In a similar vein, several R&I partnerships also create Users' Advisory Boards giving emphasis on the engagement of the potential users of the results produced by the joint projects/activities. These would possibly include both the policy and business communities.<sup>168</sup>

ARDIA-Net suggests that to fully benefit from the cooperation options, the existing governance structures need to be enhanced. This can be done by forming the Network of Existing Regional Coordination and Support Agencies (NRCSA) which is essential for the first two options. These agencies can be cluster organisations, private or public regional business support agencies or funding experts, funded by the different regional governments.

The next two options require the support of a Coordination Office of joint synchronised calls. To minimise costs and risks, such an office should draw upon the existing structures and networks in the involved regions. In the third option, where the coordination office has a central role, it needs to be a permanent structure which can be funded, for example, through cooperation with the EU Strategy for the Alpine Region (EUSALP).<sup>169</sup> In the second option where the coordination is limited to the evaluation process, and is thus temporary, the role of the coordination office can be mandated to one of the regional bodies.

The call secretariat in ERA-NETs is organised in similar ways. Each of the participating funding agencies can take this role in turn. Alternatively, the secretariat is a team of individuals, each mandated and funded by one of the participating funding agencies. Another option, although more difficult to apply as funding agencies may not be allowed to fund external bodies other than beneficiaries, is to set up an external organisation that will be funded by the participating agencies in the form of a membership fee.

Besides the importance of the call secretariat, that needs to be adequately resourced, the ERA-NET experience has shown that ensuring the funds needed is not an easy task. The FP7 ERA-NET scheme used to consider management costs as eligible to be covered under the scheme. In Horizon 2020, however, this was replaced by the so-called unit costs in the ERA-NET Cofund scheme, which can cover many activities including management, but are inadequate to do so.

Besides the coordination office, the Innovation Express 2021 experience has shown that the involvement of multi-level experts is instrumental in turning the idea into implementation and promoting its outreach within

<sup>168</sup> For more details on how to identify and engage stakeholders see <https://www.era-learn.eu/support-for-partnerships/additional-activities/stakeholder-involvement>

<sup>169</sup> Pfaller, P., Ammerl, T., Keller, M., Reingruber, I. 2021. *Key elements of an S3 based funding scheme including target group needs analysis. ARDIA-Net Report*

the macro-regional strategies. Thus, the set up of a multi-level expert group is suggested. Accordingly, ARDIA-Net established a formal Counselling Board supporting the development of networks and coordination offices through pilot actions, promotion and involvement of relevant stakeholders at EC, national and regional levels.<sup>170</sup>

### 5.6 Route 6: Interregional innovation investments (I3) - cross-regional funding of innovation

Another option that can be explored for cross-regional funding is the Interregional Innovation Investments (I3) instrument, a funding instrument under the European Regional Development Fund (ERDF) regulation. I3 is implemented by the European Innovation Council and SMEs executive agency (EISMEA) based on a biannual work programme. The scheme provides funding for mature joint innovation projects by focusing on existing interregional partnerships that emerged around concrete smart specialisation strategies (see i.e. partnerships on the [S3 Thematic Smart Specialisation Platform](#)). The objective is to support the demonstration, commercialisation and scale-up phases of interregional innovation investments, aiming at a certain level of maturity (TRL 6-9), by providing the necessary tools to overcome regulatory and/or other barriers. The ambition is to mobilise synergies and complementarities with other EU funding programmes and initiatives such as: Horizon Europe (in particular European Innovation Ecosystems), Digital Europe Programme, Single Market Programme and Interreg Europe.

The design of the instrument was informed by the two pilot actions launched following the Communication on "Strengthening innovation in Europe's regions: towards resilient, inclusive and sustainable territorial growth strategies" and an Interregional pilot project on COVID 19 Response and Recovery that was launched in 2020. As a result, Cohesion policy is supporting 4 new partnerships on coronavirus-related innovative solutions, circular economy in health, sustainable and digital tourism, and hydrogen technologies in carbon-intensive regions. The experience from these pilot actions enriched the design of the new I3 instrument, which was also placed under wide consultation between July and September 2020. ([https://ec.europa.eu/regional\\_policy/en/policy/themes/research-innovation/i3/](https://ec.europa.eu/regional_policy/en/policy/themes/research-innovation/i3/))

The definition of the work programme of the I3 instrument and of the subsequent calls for proposals is facilitated by an expert group set up by the Commission (I3 Expert Group), consisting of representatives from Member States, regional authorities and cities, representatives of business, research and civil society bodies active in the field of smart specialisation. The first call for proposals that was launched in January 2022 focused on topics in the areas of digital transition, green transition and smart manufacturing (Call for proposals: [https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/i3/wp-call/2021/call-fiche\\_i3-2021-inv1\\_en.pdf](https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/i3/wp-call/2021/call-fiche_i3-2021-inv1_en.pdf))

### 5.7 Route 7: Review of other funding opportunities

Besides ARDIA-net other projects have carried out a review of the funding opportunities, some of them in significant detail and with a forward-looking approach. One such case was the [AlpGov project](#), now in its second phase - [AlpGov 2](#) running until June 2022. Based on a review of the funding opportunities in view of

<sup>170</sup> Pfaller, P., Ammerl, T., Keller, M., Reingruber, I. 2021. *Key elements of an S3 based funding scheme including target group needs analysis. ARDIA-Net Report*

the next programming period 2021-2027, the AlpGov partners examined the relevance of existing and future programmes to the foci of the AGs and concluded in the following list of interesting programmes for each AG:

For all AGs: INTERREG and mainstream ERDF programmes plus

- AG 1: Horizon Europe
- AG 2: Horizon Europe, LIFE, COSME, Digital Europe, ESF+ mainstream
- AG 3: ESF+ mainstream, Erasmus
- AG 4: CEF
- AG 5: Horizon Europe, CEF, CAP
- AG 6: Horizon Europe, LIFE, LEADER
- AG 7: LIFE, LEADER, Horizon Europe
- AG 8: Horizon Europe, LIFE
- AG 9: Horizon Europe, CEF

The analysis carried out by the AlpGov partners (Report On Eusalp Action Groups Funding Requirements From Future Eu Funding Programmes Post 2020, 2019) noted the high interest in programmes where the management is shared, i.e. the ERDF co-financed programmes, which can be explained by the fact that the corresponding draft regulations allow a much more precise addressing of the programmes and that AGs are more familiar with this kind of programmes. Within this group, the INTERREG programmes play a dominant role, while European Social Fund (ESF) and the European Agricultural Fund for Rural Development (EAFRD) only play a minor role. The Alpine Space Programme was still considered to be one of the core programmes for the implementation of the EUSALP, although with small financial resources.

The report also highlighted that programmes centrally managed by the European Commission should also be targeted, including for instance Horizon Europe, the Connecting Europe Facility and the LIFE programme, although these were mentioned less. Other centrally managed programmes such as COSME and Digital Europe programmes and the Erasmus programme were considered even less relevant. These are thematically limited and may only thus refer to certain AGs, while AG members are less familiar with them. Another important conclusion of this work was that funding needs extended beyond cooperation to a wide range of measures including basic and applied research, strategy development, skills and capacity building, value chain development, governance models and actual investments on the ground.

Under the same project (AlpGov) the AGs proceeded to a review of the state of play and a gap analysis in relation to funding needs on the basis of their priorities. This resulted in the so-called '[Strategic Implementation Initiatives](#)', i.e. mid-term to long-term activities that can be subject of a proposal for any funding scheme, including the Interreg Alpine Space programme. (AlpGov Final Publication, <https://www.alpine-region.eu/publications/alpgov-final-publication>)

Building on these efforts, [a database of strategic funding programmes](#) was also created under the Interreg Alpine Space programme containing information on funding calls and programmes at EU, national and regional level supporting research and innovation collaboration in the Alpine region. The database is rich and although



it needs regular updates it is a valuable source of information allowing search based on a number of features and profiles (public body, business or university, research institute).

## 6 Good practices for co-design of joint RDI

### 6.1 Stakeholder engagement

There are several guides and good practice tools for engaging stakeholders in research and innovation programmes, in their design and implementation. The A-Ring Relation Tool Model is the most relevant one for the purposes of engaging stakeholders in trans-national collaboration activities in the Alpine Region. This is mentioned as part of the A-Ring Alpine R&I Chart presented in section 6.2 below.

Drawing on the practices in public partnerships in research and innovation, an instrument that seems relevant to operationalise cross-regional collaboration, there are guides, i.e. the [BiodivERsA Guide on Stakeholder Engagement](#) and the [ERA-LEARN Policy Brief on Stakeholder Engagement in Joint Programming Initiatives](#). They are both aligned in terms of what are the basic steps in engaging stakeholders. They are briefly addressed below. In addition, the GoApply project that was supported under the Interreg Alpine Space project has produced [Criteria and Factors for Successful Stakeholder Participation](#) in climate adaptation governance. The

#### 6.1.1 What is a stakeholder?

Based on the Oxford University resources<sup>171</sup> stakeholders are “All those with interests in an organisation; for example, as shareholders, employees, suppliers, customers, or members of the wider community (who could be affected by environmental consequences of an organisation's activities). Stakeholder theory is an approach to business that attempts to incorporate the interests of all stakeholders in a business, as opposed to the view that a firm is responsible only to its owners (see shareholder value). It thus attempts to adopt an inclusive rather than a narrow approach to business responsibility.”

Similarly, the [BiodivERsA<sup>172</sup> Guide on Stakeholder Engagement](#)<sup>173</sup> adopts an inclusive approach and defines as stakeholder “any person or group who influences or is influenced by the research”.

#### 6.1.2 Why engage stakeholders?

Based on a literature review, the GoApply project identifies four main types of benefits of engaging stakeholders:

- to improve knowledge by fostering exchange and co-creation of knowledge;
- to improve the quality of the decision-making and implementation processes by involving different views and creating solutions through “actionable knowledge”;
- to improve legitimacy of decisions through consensus-based decision-making; and
- to improve effectiveness of the adaptation process by fostering ownership and commitment among stakeholders as well as increasing their awareness, resources, and interrelations.

<sup>171</sup> <https://www.oxfordreference.com/view/10.1093/oi/authority.20110810105923834>

<sup>172</sup> [BiodivERsA](#) is an ERA-NET Cofund action, consisting of a network of national and regional funding organisations promoting pan-European research on biodiversity, ecosystem services and nature-based solutions, and offering innovative opportunities for the conservation and sustainable management of biodiversity.

<sup>173</sup> Durham E., Baker H., Smith M., Moore E. & Morgan V. (2014). The BiodivERsA Stakeholder Engagement Handbook. BiodivERsA, Paris (108 pp).



Along similar lines, the BiodivERsA guide highlights that there are several benefits such as promoting links between science and society; gaining access to additional information or resources, and improving the relevance or utility of the research to users and beneficiaries. In addition, the guide classifies the benefits based on the role attributed to stakeholders, i.e. a role of just being informed, or being consulted, or being involved or being actual collaborators on equal footing. (cf. Table 1.1 in the Guide for a summary). The Guide also stresses the importance of ensuring that the process of stakeholder engagement needs to be credible, relevant and legitimate.

### 6.1.3 Why/How to engage the youth?

Engaging the youth has been highlighted during the 2020 Annual Forum of the EUSALP as an area that needs special attention. The fact is that there is *“a clear and growing dissatisfaction among youth with the way politics is conducted and with ‘politicians’ in general”*. (EACEA, 2010). As [the GaYA project](#) notes, young people in the Alpine region lack spaces and opportunities for deliberation and their views and ideas do not find the way to decision-makers. In addition, rurality and the remoteness of many Alpine areas do not make the provision of youth services and youth participation easier, while the brain drain phenomenon is another challenge.

In order to help the Alpine regions, towns and rural communities retain their youth and benefit from their energy and ideas, the GaYA project produced practical recommendations resembling the process with a hiking route. The route involves five steps: starting the hike, getting prepared, during the hike, reaching the summit and coming back. Under each step certain tips, guidelines and questions are posed<sup>174</sup>. In ‘Startin the hike’, decision-makers (including municipalities) are encouraged to have an open-mind about youth participation, learn from others, try to persuade other stakeholders about the importance of engaging with the youth and securing the needed resources. The ‘Getting Prepared’ step refers to analysing the current situation by identifying roles, tasks and responsibilities considering also potential risks; designing realistic goals and clear decision-making procedures, choosing the target group and providing the necessary training to the staff that will run the participatory processes or getting external experts onboard. This step highlights that the participatory processes must be co-designed, involving also young people with experience.

The third step, ‘During the hike’, is instructed to be clear from the beginning regarding what can be influenced and what not and to adjust to the young people’s schedule (places they go, means of communication) to get in touch and mobilise them, rather than expect them to adjust. Efforts are also suggested to work in collaboration with youth organisations, to help create a stable link with young people. The fourth step, ‘Reaching the Summit’ is about implementation. Moving quickly to implementation after decisions are made is recommended as young people need swift results, along with keeping promises and communicating the results among the population and in the media in a clear way. Involving politicians closely with young people is also crucial to ensure that their voice will be heard. The last step, ‘Coming back’, is about evaluating the process. It is important to learn from experiences to create a specific know-how within the administration.

<sup>174</sup> Your Hiking Route To Youth Participation, <https://www.alpine-space.org/projects/gaya/results/policy-recommendations/gaya-practical-recommandations-eng-a3-web.pdf>

This project is co-financed by the European Regional Development Fund through the Interreg Alpine Space programme

Integrating youth participation in the institutional framework of a municipality or a region is key in the continuation of the process and not losing the momentum created.<sup>175</sup>

Besides the practical recommendations, GaYA produced the [Youth Participation Toolbox A Way to Bring Youth and Authorities Together](#) to inspire and guide decision- and policy-makers. The toolbox includes:

- posters to raise awareness among your colleagues;
- case studies to be inspired and learn about good practices;
- cards to find alternative approaches to common obstacles;
- a brochure to learn about designing youth participation processes.

Policy recommendations were also developed addressing the policy-makers in the Alpine area. The ambition is to re-establish trust among young people and reconnect them to their home areas.<sup>176</sup>

#### 6.1.4 How to identify/analyse/prioritise stakeholders?

Another crucial step is to identify who the relevant stakeholders are. The ERA-LEARN Policy Brief on Stakeholder Engagement clarifies that the stakeholders of joint programming initiatives, i.e. Member State-led transnational public partnerships in research and innovation, belong to the following broad categories, which are also relevant for cross-regional collaboration:

- R&I policy makers at EU, national and regional levels
- R&I funding organisations at EU, national and regional levels
- R&I performing organisations from academic and industry
- intermediary organisations representing specific stakeholder groups (e.g. industry associations, researchers associations, etc.)
- public and private user communities including civil society

There are several ways in identifying more specifically who are the relevant stakeholders. Things like information on stakeholders, their interests, and their capacity to contribute, oppose, reform, etc. a programme, project or process need to be taken into consideration. This task should lead to a stakeholder registry or a list among the lines of Table 8 presented under the Vision setting methodology section (section 6.4.3).

The BiodivERsA guide specifies three main stages:

- Stage 1: Identify all potential stakeholders and stakeholder groups.
- Stage 2: Assess and prioritise the stakeholders.
- Stage 3: Develop an understanding of your stakeholder

<sup>175</sup> <https://www.alpine-space.org/projects/gaya/results/policy-recommendations/gaya-practical-recomandations-eng-a3-web.pdf>

<sup>176</sup> <https://www.alpine-space.org/projects/gaya/results/policy-recommendations/gaya-policy-recomandations-eng-a4-web.pdf>

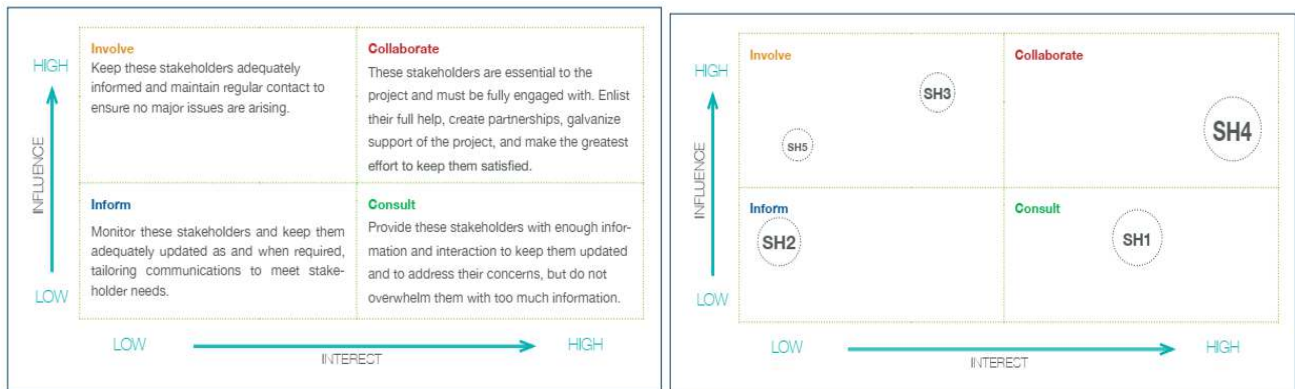
It is important that the process is inclusive and stakeholders are included as early as stage 1. It is important to ensure that groups or individuals that are considered to be potential sources of conflict are not left out of the engagement process.

In stage 1, once broad categories of stakeholders are identified such as those above, then the next step would be to use secondary data sources to analyse in more detail how they can affect or are affected by a programme or project. Other methods may include

- brainstorming with other organisations that have been involved in similar activities,
- consulting with colleagues to share relevant knowledge,
- developing a ‘mind map’ that can be used to identify suitable stakeholders; assessing secondary data (e.g. historical records, media articles)
- Initiating self-selection by promoting the engagement process
- Using ‘snowball sampling’ techniques, whereby one stakeholder identifies further stakeholders
- Utilising existing lists of organisations in order to identify specific groups, networks and agencies who represent relevant elements of society
- Consulting with forums used by government and other organisation (e.g. local authorities, town councils, etc.).

Stage 1 will inform the second stage, where the stakeholders should be classified based on certain dimensions, the most used ones being the level of power or influence and the level of interest. The two diagrams below included in the BiodivERSA Guide show how this is done.

Figure 14 : Stakeholder analysis and management based on level of power/influence and interest



Source: BiodivERSA Guide for Stakeholder Engagement (pp. 42-43)

The idea is that collaboration needs to be the stakeholders with the stakeholders with high influence and interest, while those with low influence and interest just need to be monitoring and informed. Those with high influence but low interest - at least currently - need to be regularly informed and included at some points, while those with high interest but low influence need to be consulted to ensure their concerns are addressed.

Although extensively used, such matrices have been criticised as rather simplistic. There are also suggestions to use more extended tables considering not only the level of interest and influence but also the nature of



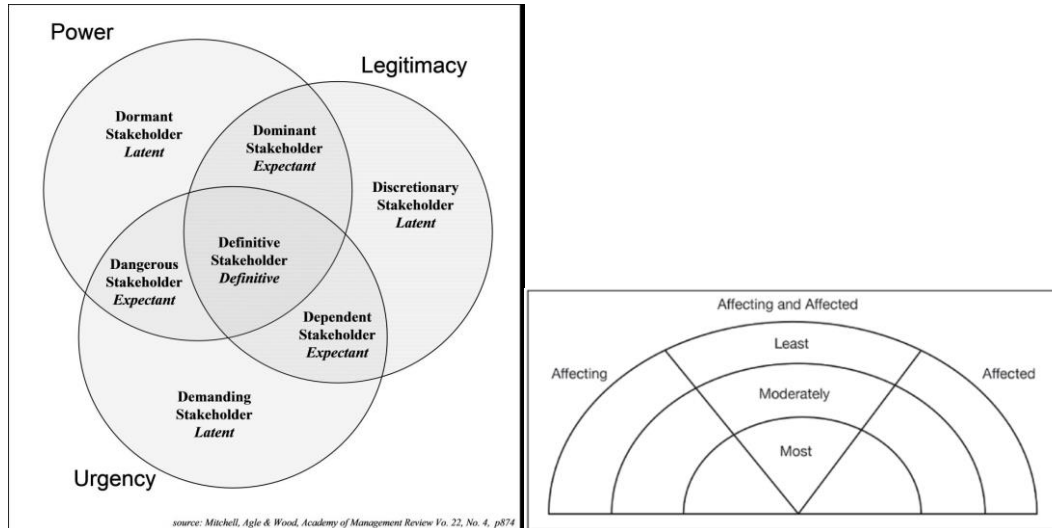
those interests and reasons behind them.<sup>177</sup> Mitchell suggests a classification based on power, legitimacy and urgency, while Chevalier and Buckles<sup>178</sup> suggest the use of a ‘rainbow diagram’ classifying stakeholders based on the level they affect, are affected or both and to what level.

<sup>177</sup> Reed, M.S., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J., Prell, C., Quinn, C.H. And Stringer, L.C. 2009. Who’s in and why? A typology of stakeholder analysis methods for natural resource management. Journal of Environmental Management, 90, 1933–1949. Available from: <http://sustainable-learning.org/wp-content/uploads/2012/01/Who%E2%80%99s-inand-why-A-typology-of-stakeholder-analysis-methods-for-natural-resource-management.pdf>

<sup>178</sup> CHEVALIER, J.M. And BUCKLES, D.J. 2008. SAS2: A Guide to Collaborative Inquiry and Social Engagement. Sage Publications, Available from: [http://omec.uab.cat/Documentos/coop\\_internacional/00110.pdf](http://omec.uab.cat/Documentos/coop_internacional/00110.pdf)

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Figure 15 : Mitchell et al. typology of stakeholders and Chevalier and Buckles' rainbow diagram



source: Mitchell, Agle & Wood, Academy of Management Review Vo. 22, No. 4, p874

Source: Mitchell et al. 1997 p.874 and BiodivERsA Guide for Stakeholder Engagement (p. 45)

The third stage, understand your stakeholders, based on the BiodivERsA guide, aims to gain a greater understanding of their motivations, interests, expertise and capacity to engage when considering how and when to engage with them. Relevant questions to try and answer include for example:

- Is there an existing relationship between the programme/project and the stakeholders? Do relationships already exist between stakeholders?
- What knowledge do the different stakeholders possess that may be relevant to the programme/project?
- What views are the stakeholders likely to hold about the programme/project and its outcomes?
- Is there the potential for any conflict arising amongst stakeholders or between stakeholders and the project?
- What are the appropriate means of communication?
- Is there a willingness to engage; if not, why not, and how could this be overcome?

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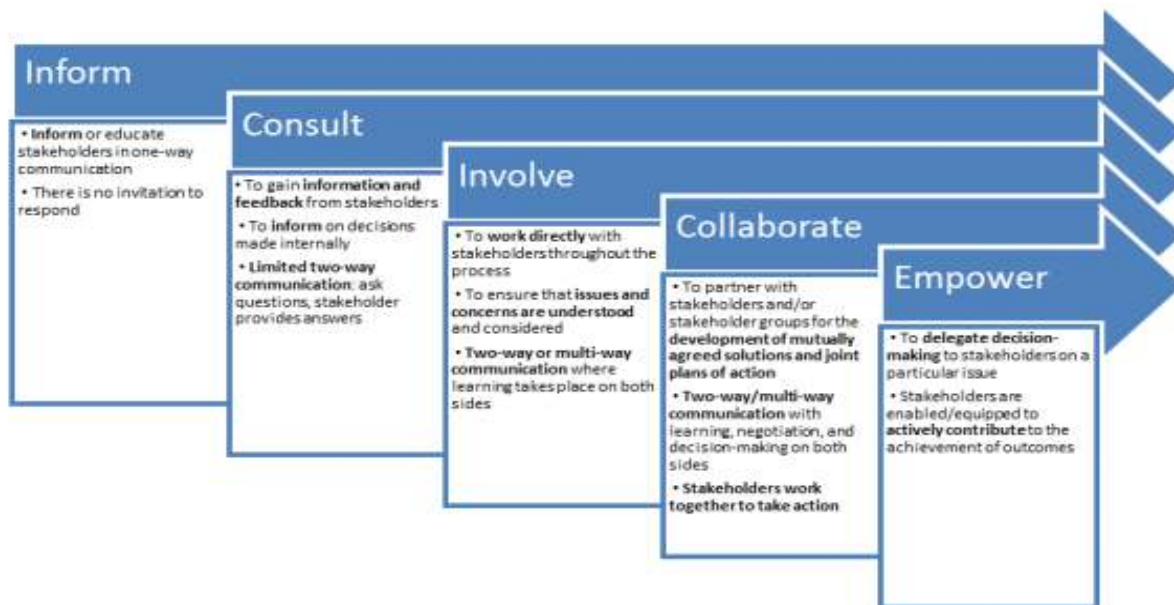
Answering these questions would help define specific ways of engaging stakeholders and/or the timing and role they should have in the process. A nice way of putting all this information together is Table 3.3 of the BiodivERSA Guide p. 48.

The [ERA-LEARN Policy Brief on Stakeholder Engagement in Joint Programming Initiatives](#) provides useful advice on how stakeholders can be engaged in a partnership between national/ regional authorities across different countries in view of supporting transnational collaboration in research and innovation.

### 6.1.5 How can stakeholders be engaged?

Stakeholders can be engaged at different stages of designing and implementing inter-regional or transnational collaboration as well as at different levels. Drawing upon [Arnstein’s Ladder of Participation](#), the levels of engaging stakeholders in a partnership is shown as follows in the ERA-LEARN Policy Brief.

Figure 16 : Different levels and types of stakeholder engagement



Source: ERA-LEARN Policy Brief (p. 8)

Similarly, the GoApply project suggests different types of stakeholder involvement on local and regional level as well as interaction formats depending on the degree of participation.



Figure 17 : Different levels and types of stakeholder engagement

Degree of Participation	Characteristics	Aims	Examples for interaction formats
Stakeholder communication	Mostly one-way flow of information from initiator to stakeholder or vice versa	Access to stakeholder knowledge, awareness raising, dissemination of results	Websites, newsletters, presentations, surveys, etc.
Stakeholder consultation	Two-way flow of information, mainly aimed at gathering opinions and proposals without obligation to integrate stakeholders' views in decision-making	Increase acceptance and / or support for adaptation policies, gather insights on relevance and implementation options, recommendations for development of strategies / measures	Workshops, focus groups, Delphi events, open spaces, interviews, etc.
Stakeholder co-production	Stakeholders have crucial role on generating knowledge, often in a research-led participation process	Integration of different knowledge bases, coping with conflicts, uncertainties, and different risk perceptions; evidence-based policy development	Participatory scenario development, interactive vulnerability analysis, participatory modeling, etc.
Stakeholder co-decision / co-design	Stakeholders are involved in analysis, action-planning, decision-making or the preparation of political decisions Co-Design: stakeholder involvement in identifying and framing societal challenges, participatory development of research agendas, questions, funding schemes	Joint development of strategies, action plans, measures; increased societal relevance of scientific research; establishing common understanding of tolerable / acceptable risk levels (risk governance approach)	Workshops as integrated part of strategy development, stakeholders as members of decision-making boards, etc.

Source: [https://www.alpine-space.org/projects/goapply/results/results\\_revised/goapply\\_d.t3.1.1\\_wp3\\_success\\_criteria\\_review\\_uba-de\\_nov-2018.pdf](https://www.alpine-space.org/projects/goapply/results/results_revised/goapply_d.t3.1.1_wp3_success_criteria_review_uba-de_nov-2018.pdf), p. 6.

#### 6.1.5.1 Matchmaking parleys and seed labs

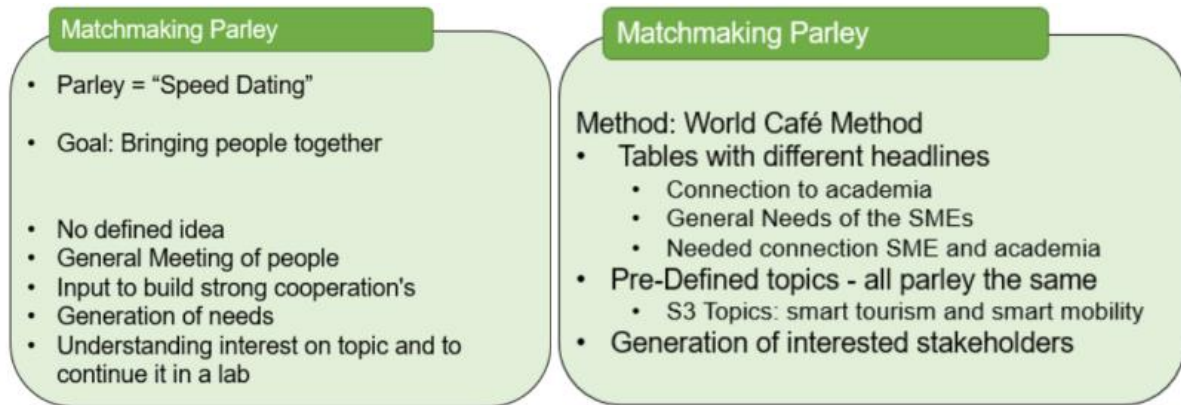
The A-Ring project has also developed and tested a variety of methodologies for engaging stakeholders from academia and the business communities in view of generating ideas for transnational collaboration. In particular, it is suggested to combine matchmaking parleys with seed labs.

A matchmaking parley aims at defining the common areas of interests among different stakeholders (academia, businesses, societal actors) within the frame of the smart specialisation strategies and put forward the most relevant topics for a region that will then be addressed through the seed lab. The methodology for

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organising a matchmaking parley is shown in the following figure.<sup>179</sup> It is suggested to implement interaction methods, particularly those suggested under ‘problem analysis’ or ‘knowledge gathering’ in the [A-Ring Dialogues Interaction Toolbox](#).

Figure 18 : Structure and methodology of a matchmaking parley



Source: A-Ring. 2020 Deliverable D.3.1.1: Alpine R&I Seed Lab, p. 15 16

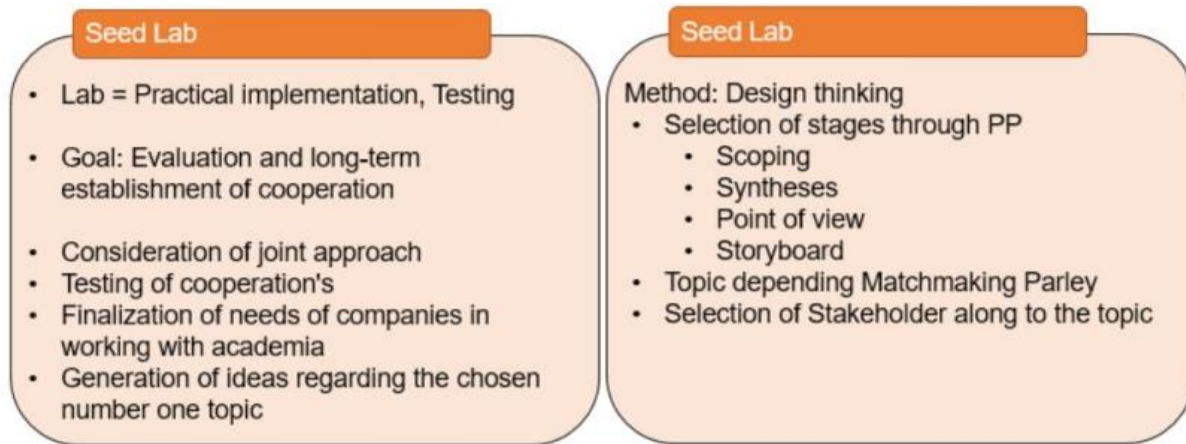
As specified in the A-Ring project, Seed Labs provide spaces to generate ideas without any specific target in mind. A Seed Lab can target

- to support the Alpine Region markets by supporting innovation and research within the region, joining partners with similar interests, facilitating the emergence of start-ups and understanding the needs of local companies
- to generate networks and collaborations by enlarging regional research networks, linking large companies and SMEs as well as companies and research actors (universities or research organisations)
- to enhance learning by establishing synergies with other EU projects on research and innovation, building capacities, skills and knowledge through knowledge transfer, generating insights in interdisciplinary working groups with representatives from the triple helix.

<sup>179</sup> A-Ring. 2020 Deliverable D.3.1.1: Alpine R&I Seed Lab.

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Figure 19 Definition and methodology of a Seed Lab



Source: A-Ring. 2020 Deliverable D.3.1.1: Alpine R&I Seed Lab, p. 17

The Seed Lab will generate ideas for joint projects/activities and help establish long-term collaboration among participants. The method suggested is Design Thinking explained in the following box.

**Design Thinking Phases and methods suggested by the [A-Ring Dialogues Interaction Toolbox](#)**

1. *Empathise - Interviews, shadowing, seek-to-understand, non-judgmental assessment*  
 Layer 1: Research, workshops  
 Layer 2: Surveys, Delphi panel, 6 thinking hats
2. *Define - Create human-centric problem statements, infer insights*  
 Layer 1: Research, workshops, webinars  
 Layer 2: Future scenarios, problem tree, SWOT-analysis
3. *Ideate - Brainstorm (radical) ideas, build on others' ideas*  
 Layer 1: Workshops, hackathons, online platforms  
 Layer 2: Brainstorming session, 6 thinking hats, business model canvas, morphological box
4. *Prototype - Create low-resolution object and experiences, role play to understand context and key features, quickly build (to think and learn)*  
 Layer 1: Hackathons, workshops  
 Layer 2: Prototyping
5. *Test - with customers to refine solution and gather data, gain deeper empathy, embrace failure*  
 Layer 1: Workshops, hackathons, online platforms  
 Layer 2: 6 thinking hats, concept evaluation matrix, survey
6. *Assess - Openly giving and receiving feedback, integrating feedback*  
 Layer 1: Workshops, webinars, online platforms  
 Layer 2: Brainstorming session

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### 6.1.5.2 Transnational matchmaking seed labs

The implementation of these ideas then need to be addressed through living labs. The A-Ring project suggests transnational matchmaking seed labs following the Interreg definition, i.e. *“transnational LL help companies that want to launch a new product or service and make an informed decision about their cross-border/worldwide R&D or commercialization plans by exploring the user and market context and the local ecosystem”*. This requires supporting the generation of networks and collaborations and the living lab approach can very well serve this purpose.

As the A-Ring Dialogues Interaction Toolbox suggests, the so-called innovation labs use experimental methods to foster innovation and engage with different actors in multiple sectors. These methods may include techniques such as user-centred design, design thinking and data analytics to develop solutions with the user or citizen in mind. In particular, workshops and hackathons with increased stakeholder participation that focus on user needs and future demands are actions taken in innovation labs.

The experience of the A-Ring partners in implementing matchmaking parleys and seed labs is valuable. Some lessons learnt include for instance, the importance of the efforts made on multiple levels to engage stakeholders in cooperating towards innovation. Exchanging such experiences is also vital to lead to more effective results. Another lesson was that the administrative costs and costs of bureaucracy seemed to be the most important hindrances for understanding the macro-level strategies and establishing cooperation towards bigger objectives. At the same time, political will is essential in creating a favouring and welcoming ground and ensuring continuity of collaboration efforts among the various stakeholders. Changes in elected positions may disrupt previous administrations’ programmes and create a general feeling of powerlessness and disengagement with the political discourse. In this regard, a third-party, not necessarily a research actor, but a foundation, for instance, with funds secured by, other than public, sources, may be in a good position to work for sustaining and upgrading the political attention and concrete actions towards R&I cross-border collaboration and triple helix cooperation.

The A-Ring report on Activity A.T 3.2 – Activation & Implementation of working groups for Alpine Seed Labs provides a detailed account on how the parleys and seed labs were structured, what methods and techniques were used and how results were used to define the follow-up actions. These processes revealed important lessons such as the need to focus deeper in the sub-topics of the key areas of common interest, the importance of bringing people together to address specific research areas and the appreciation of shorter and less guided matching meetings. The matchmaking process was the most important part of the process for SMEs and academia.

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### 6.1.5.3 The Alpine S3 Lab

The tools and methods above are addressing stakeholders with specific aims such as to design concrete paths for collaboration among stakeholders from the research and business communities based on jointly identified ideas. The A-Ring project has also developed a comprehensive methodology for interregional collaboration at the policy level.

The so-called Alpine S3 Lab addressing public authorities and policy-makers that has been designed and tested in the A-Ring project, is suggested to be adopted by the Eusalp's Action Group 1 and made available as a methodology for all the 48 Alpine Regions. The Alpine S3 Lab is a methodology for involving Public Authorities at different levels (regional and national) and the actors representing the research and innovation ecosystems of the regions interested in interregional collaboration. (A-Ring T2.1. Report)

The Alpine S3 Lab consists of 3 main parts<sup>180</sup>:

- Alpine Transnational Live Learning (“ATLL”) Sessions; these are events where triple (or even better quadruple)-helix stakeholders from Alpine Regions are brought together to gain understanding of the different national and regional research and innovation eco-systems, to better promote the exchange about and engagement on identified topics of smart specialisation strategies that are of common interest. The outcome of the learning sessions should be a report containing knowledge of S3 improvement areas, lessons learnt and transnational actions transferred during the study visits.
- Policy Pilot Live Scenarios; in these scenarios specific policy actions are piloted addressing strategic common R&I topics. These topics should emerge from the ATLL sessions or any other related forward-looking dialogues and RIS3 needs discussions priority organised. As noted by A-Ring, Policy Pilot Actions require significant buy-in and engagement with the targeted stakeholders. Possible examples of policy actions to be piloted include: exchange on detailed good-practices / use-cases on RIS3 management; transfer of regional RIS3 management methodology from one region to another; preparation of common White Paper on RIS3 Priorities; alignment of sub-topic priorities of a regional or national or ESIF supported programme. The outcome should be a report containing regional Factsheets on the results of the Policy Pilot Live Scenario testing
- S3 Implementation Webinars. These webinars should provide input for effective S3 implementation, responding to territorial challenges and the needs of Academia and the Business Sector, with a focus on Public Authority procedures, governance, and methods exchange. Suggested topics for such seminars by the A-Ring project include for instance:
  - “R&I in the Alpine Space – Use-Cases of Alignment in Transnational, AR-Focused Research”
  - “What is S3, and what does it bring for me?” – A guide to the opportunities of Smart Specialisation through the lens of Policy Makers, Academia and Business
  - “S3 in Europe – Use-Cases of Good Practices in S3 Policy Alignment from Across Europe”
  - Potential Topics for Webinar 2:
  - “S3 in the Alpine Space – Use Cases of Good Practice in S3 Policy Alignment from AR”
  - “Building on these Successes – The Future Opportunities for S3 Alignment, and the presentation of the Blueprint for Alpine Region Research and Innovation Agenda “

<sup>180</sup> For more detailed information on the three tools, you can read the A-Ring Deliverables DT2.2.1, DT2.2.2 and DT2.2.3.

As the A-Ring project suggests, the Alpine S3Lab methodology is appropriate for operationalising the first two phases of the „[Vanguard Initiative Methodology](#)“: learn and connect (Section 5.3) by addressing two types of macro aspects:

1. „general issues“ (*governance models, policies, stakeholder engagement, best/good practices*) which are meant to improve mutual knowledge and increase networking primarily among public authorities, and
2. „specific and operative labs sessions“ (*cooperation, position papers, ...*) which expect the participation of public authorities but also the involvement of experts and R&I stakeholders, (companies, universities, research centres, associations, etc), where concrete activities with set goals and expected results should be addressed among all the participants.

As suggested, the process can be initiated by selecting a macro aspect to address and possibly completing a relevant template explaining why, setting the aim and expected results and forward this to the AG1 Leader to share with the rest of the action group members.

Given the reference made to the first two phases of the Vanguard Initiative, it also makes sense to consider the EC [methodological manual](#) for building thematic S3 partnerships that is also addressing the phases of ‘learn’ and ‘connect’ of the Vanguard Initiative.

#### 6.1.5.4 Entrepreneurial Discovery Process

Another process of stakeholder engagement that is well known in European regions, is the [Entrepreneurial Discovery Process](#) (EDP) originally developed by the EC/JRC as a main component of developing S3. EDP is primarily applied within the region(s) of one country. Although experiences in organising cross-regional EDP are limited, this is a method that resembles those suggested above for transnational cooperation purposes. EDP is an interactive and inclusive process in which the relevant actors identify new and potential joint activities of collaboration. The relevant authorities assess this information and empower those actors most capable of realising the potential.

Stakeholder engagement is one of the key enabling conditions of ERDF’s good governance for the period 2021-2027. Yet, despite the years of implementation, experience shows it is still a challenge to bring different stakeholders together (academia, businesses, society under the guidance of the relevant authorities) to jointly reflect on ideas for collaboration and realise the collaboration potential.

A [recent study by JRC](#) suggests four broad sets of findings influencing the success of the entrepreneurial discovery process.

- Continuity; it is difficult to maintain interest in engagement, especially given the significant time and resources implied. Sustained engagement appears easier to achieve when a region already has strong intermediary institutions such as cluster organisations, technology districts or development agencies. Yet, it can also be achieved through the creation of new institutions, such as the [Strategic S3 R&I Partnerships created by Slovenia](#) for the implementation of S3.<sup>181</sup>
- The mechanisms and instruments used: the role of intermediary institutions is important, whether they be multi-stakeholder platforms such as clusters or government-led agencies or forums with a

<sup>181</sup> See for instance <https://s3platform.jrc.ec.europa.eu/en/w/strategic-research-and-innovation-partnership-on-circular-economy#:~:text=The%20SRIP%20D%20Circular%20Economy%20aims,system%20in%20its%20own%20right;https://srp-circular-economy.eu/>



specific remit to facilitate the entrepreneurial discovery processes; the use of thematic groups or workshops is key in allowing depth of discussion and exploration.

- The organisation and coordination of EDP: an efficient organisation requires an important role of the relevant public authorities as well as clear rules to ensure wide access, transparency and equal possibilities to influence the process by all relevant stakeholders.
- Adequate capabilities among both public authorities and other stakeholders; the lack of skills in government, intermediary organisations and other relevant stakeholders constrains the efficient results of EDP. Capacity building measures are important to implement to help stakeholders develop the capacity needed to take part in the smart specialisation process and respectively the cross-regional collaboration processes.<sup>182</sup>

Methods that can be used in the implementation of EDPs include focus groups, working groups, workshops and forums. Online platforms appear less popular in general.<sup>183</sup>

<sup>182</sup> Perianez-Forte I. and Wilson J., Assessing Smart Specialisation: The Entrepreneurial Discovery Process EUR 30709 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-37823-5, doi:10.2760/559139, JRC124405.

<https://s3platform.jrc.ec.europa.eu/w/the-entrepreneurial-discovery-process>

<sup>183</sup> <https://s3platform.jrc.ec.europa.eu/w/entrepreneurial-discovery-process-europe-tools-and-mechanisms>

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### 6.1.6 What are the basic criteria for successful stakeholder participation?

The GoApply project identified certain success factors in stakeholder engagement, which are horizontal and apply in any case of participatory endeavour.

The authors of the respective report rightly highlight, however, that any set of success criteria are heavily context-dependents and while they can promote success, they cannot guarantee it.

*Figure 20 : Basic criteria for stakeholder engagement*

- **1. clarity of definitions:** nature, goals and scope of the format should be clearly defined;
- **2. transparency:** clear and open communication about the process, role of participants and facilitators, modes of decision-making with stakeholder in all phases;
- **3. feasibility:** time and financial resources should be adequate to ensure successful completion of preparation, implementation and post-processing of the format; make sure that all relevant participants can engage in the process and provide opportunities for building of relationships, networks and trust;
- **4. efficiency:** interaction formats can be time-consuming, labor-intensive and costly for stakeholders involved; the process should be conducted efficiently, balancing costs and desired outcome for all participating parties
- **5. flexibility** - formats should be open to incorporate new aspects and inputs from stakeholders;
- **6. representativeness** - formats should include all relevant representatives of stakeholders and make sure they can participate in the decision-making process; attention should be given to marginalized groups and their chances to participate;
- **7. appropriateness** - information, applied tools and instruments should be tailored to capacities and needs of involved target groups;
- **8. objectivity** - participation should be conducted in an unbiased way; information should be presented based on objective, scientific research;
- **9. timely and frequent involvement** - stakeholders should be involved in the format as early as possible and informed on a regular basis throughout the whole process;
- **10. respectfulness and trust:** participants and facilitators should engage on equal footing throughout the process, respect different points of view and engage in respectful dialogue; building trust and enhancing relationships should be facilitated throughout the process
- **11. impact:** The output of the procedure should have a genuine influence on policy; impacts should be evaluated and communicated.

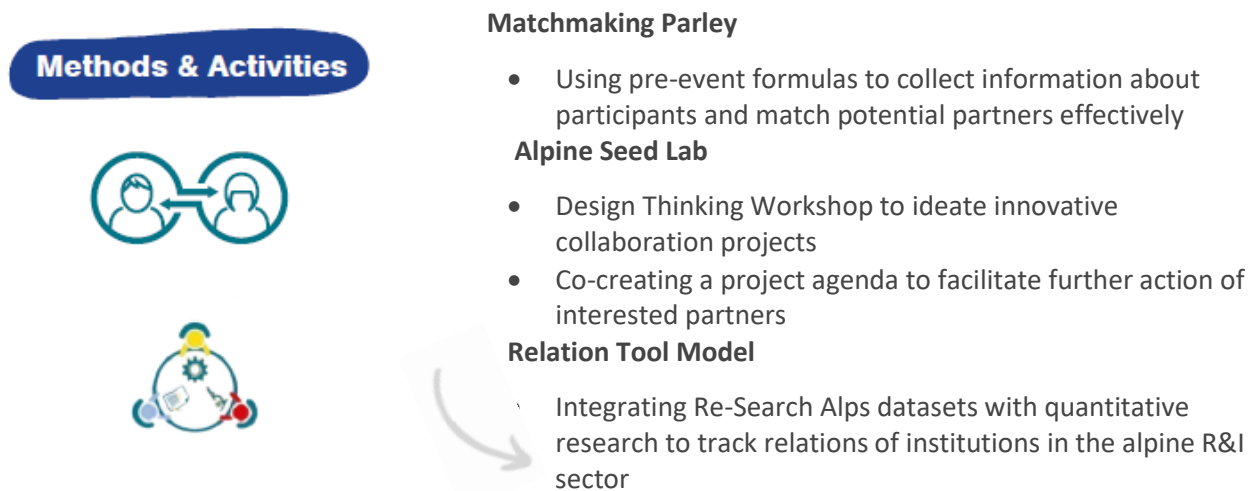
Source:

[https://www.alpine-space.org/projects/goapply/results/results\\_revised/goapply\\_d.t3.1.1\\_wp3\\_success\\_criteria\\_review\\_uba-de\\_nov-2018.pdf](https://www.alpine-space.org/projects/goapply/results/results_revised/goapply_d.t3.1.1_wp3_success_criteria_review_uba-de_nov-2018.pdf), p. 9

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## 6.2 A-Ring Alpine R&I Chart<sup>184</sup>

The A-Ring Alpine R&I Chart presents an action plan to support transnational collaboration and network among academia and business sector representatives. It includes the matchmaking parleys and seed labs as methods, specific structures, functions and connections/relations that need to be established based on the A-Ring Relation Tool Model. The Relation Tool Model tracks relations in the R&I sector among universities, research centres, laboratories & SMEs, integrating Re-Search Alps dataset to support the Public Authorities to develop new public policies and enhance collaboration dynamics.



As also explained in section 6.1.5.1 above, the matchmaking parley mechanism describes an effective method to identify and match potential partnerships through profile analysis and project/collaboration intention. The interactive process of the matchmaking leads to a shared vision as well as to an adaptive goal and target setting. It is a workshop format that brings together stakeholders from across the Alpine Space to align their interests or issues, with the aim to identify areas of agreement and potential for cooperation so that synergies can be exploited.

The Seed Lab Sessions enable, through an integrated design thinking mechanism, to create innovative projects and develop solution approaches for alpine problems to tackle within the new joint partnerships. Without any previous idea in mind, it fosters the generation of a joint ideation.<sup>185</sup>

<sup>184</sup> This section draws on the A-Ring deliverables 2022: “D.T3.2.1 R&I Ecosystem relation tool model” and “Output O.T3.1 Alpine R&I Chart”.

<sup>185</sup> For detailed information on the Matchmaking Parleys and the Seed Lab Methodology cf. *Implementation Guide Matchmaking Parley and Seed Lab* <https://www.alpine-space.org/projects/a-ring/en/project-results/wpt3/d.t3.2.2---matchmaking-parley-d.t3.2.3--seed-lab-innovative-r-i-action>


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## MATCHMAKING PARLEY as mechanism to match cooperation partners

### Phase 1: Profile


Interested participants fill out a short survey presenting:

- Type of organisation
- Search type of organisation
- Focus topics
- Status of project idea



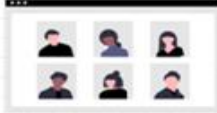
### Phase 2: Match

According to their profile data, participants are pre-matched. Most useful are matches with fitting focus topics.




### Phase 3: Exchange

Within a defined meeting frame (e.g., world cafe or self pitch) participants exchange on their business, targets and preferred project settings.




### Phase 4: Collaboration Interest

Participants form working groups with most fitting partners to work on project ideas in the Seed Lab.



### Transfer to Seed Lab


The Seed Lab will give the participants the chance to define project ideas and get to know other participants more detailed.



## SEED LAB as mechanism to generate project ideas


### Phase 1: Set up

The Seed Lab is a guided workshop to seed project ideas and gain mutual understanding of potential partners about project goals. The Design Thinking methodology is recommended.



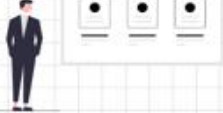
### Phase 2: Group work

The working groups from the Matchmaking Parley are guided through the phases of Emphasise, Define, Ideate, and Prototype with respective methods. The involvement of a trained Design Thinking moderator is recommended.




### Phase 3: Pitch

The working groups present their findings and prototypical project agenda to the other working groups.




### Phase 4: Test and Implement

The last two Design Thinking phases, Test and Implement, should then be pursued after the Seed Lab. Participants are provided with tips for the next steps in project funding.



### Network

After the Seed Lab, participants get the chance to network. The Speed Dating method is recommended.



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The A-Ring Alpine R&I Chart suggest the establishment of an alpine office, which organises matchmaking events, interacts with stakeholders to work on needed funding and presents Smart Specialization Strategy (S3) to the local stakeholders

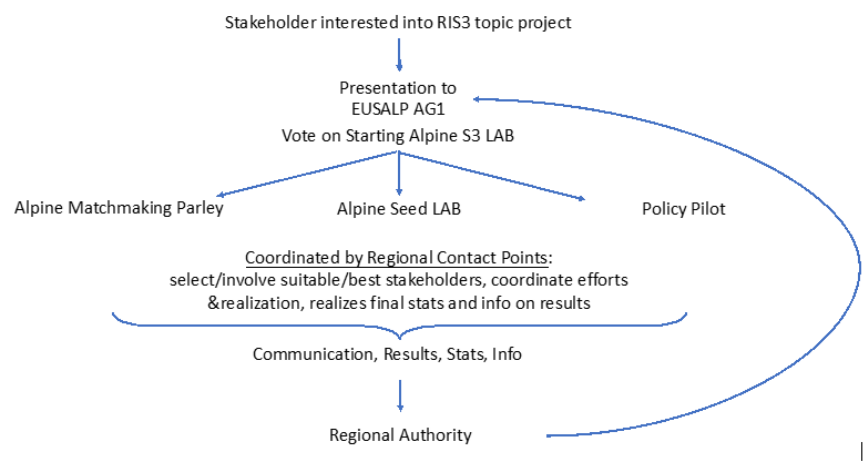
- Establishment of support institutions across the entire alpine area, that provide information on funding opportunities, accompany in the process and create partnerships (in exchange with the Alpine Office)
- Development of ONE platform that brings all desired data to a joint
- Adaptation of existing or development of new funding opportunities to support alpine regional cooperation (smaller consortia, longer timeframe, coordinated for trans-regional collaboration)

**Joint Actions & Services**



**Alpine R&I Relations**

Collaboration can be initiated bottom up by stakeholders interested in the topic in question. It can then follow up the path shown below to materialise through a parley and seed lab coordinated by appointed regional contact points.



Source: A-Ring Output O.T3.1 Alpine R&I Chart

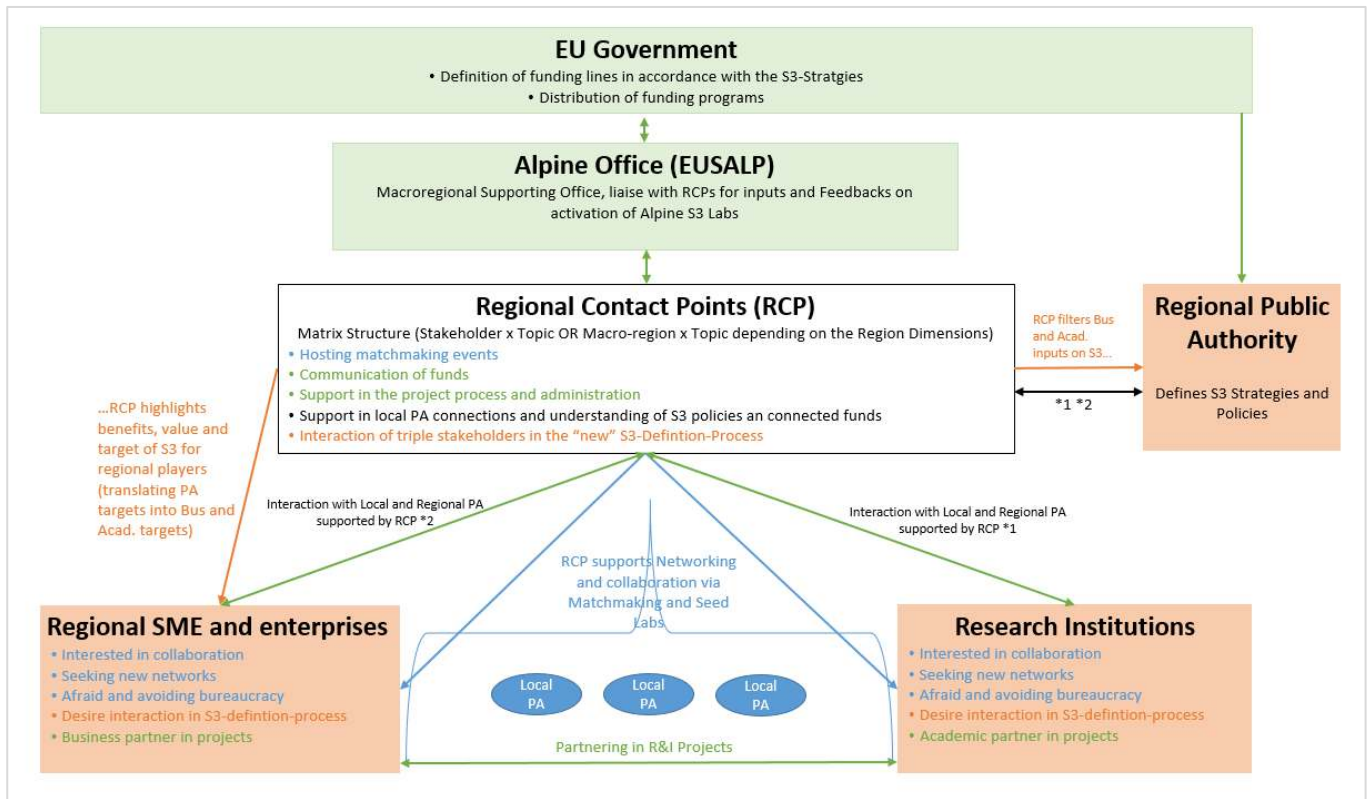
The A-Ring project also presents a specific governance model to foster collaboration between the different triple helix stakeholders of the Alpine Region and build the necessary relations, through the establishment of new joint services and office points

Relations can be fostered on macro-regional level by bottom-up support services (like one-stop website and the Alpine S3 Lab implementation process) and top-down support services (Glossary and Funding Guides).

Relations can be fostered on regional level by addressing the need for information readiness, information clarity, fostering contacts among different stakeholders, and lowering perceived bars for triple helix collaboration (cf.: Joint Actions & Services).

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Figure 21 : Relation Model supporting Collaboration suggested by A-Ring



Source: A-Ring Output O.T3.1 Alpine R&I Chart

### 6.3 Communication activities and raising awareness

The quality of the SRIA process, as with other forward-looking activities, depends on the effective engagement of key stakeholders, namely those who wield influence or have an interest in the undertaking. Of particular interest are those stakeholders which can serve as multipliers, informing others not able to participate and to relay the latter's interests and feedback. This engagement has to last from the start to the end of the process and to generate sufficient ownership to ensure that stakeholders take follow-up implementation action. Effective communications if appropriately targeted can generate multiple benefits for the SRIA process serving as a leverage for generating international profile, building a wider circle of supporters through enhanced and targeted stakeholder engagement, promoting science-society debate and active citizenship. It plays a unique role in terms of wider validation of the process and results and for tackling and resolving divergences and explaining difficult choices.

Communications can thus be effective in providing policy narratives and futures story lines that stakeholders can relate to. Beyond this, it can act as the springboard to enable/support mutual learning processes and communities of practice and generally for marketing the macroregion's R&I potential.

*"The communication strategy, if well-planned and implemented, provides a good reflection of the main thrust of the Foresight exercise. This will be transmitted to those involved or targeted by the exercise using various media over the lifecycle of the project, from start-up to implementation and diffusion. An implicit objective of*

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*a Foresight exercise is the learning and unlearning it generates in terms of policy transfer, formulation and implementation. A well-designed communications strategy moves beyond one-way reporting of the work underway and is more specifically oriented towards generating a high degree of interaction and learning among all those involved in the exercise or in some way addressed by it.” (JRC Forlearn)*

The communication approach thus needs to be planned to work hand in hand with and accompanying the SRIA process, adjusting to its needs. It requires dedicated resources including an experienced team and access to a range of media. Communications covers a range of activities from marketing to expert briefings to citizen dialogues, including:

- targeting key champions and sponsors (high power high interest)
- upscaling the interest/power of key stakeholders through dedicated actions
- providing inspiring and engaging narratives and content as well as user-friendly updates on the SRIA process
- marketing the results and securing ownership

A range of tools and social media are available and the challenge is to direct customised content to the appropriate media. depending on the target audience, different activities can be organised to develop and sustain closer interactions with stakeholders, including briefings, webinars, hearings, and more participatory events.

- *the* [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/674209/futures-toolkit-edition-1.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/674209/futures-toolkit-edition-1.pdf) *futures* *toolkit,*
- *forlearn* [https://knowledge4policy.ec.europa.eu/foresight/topic/forlearn-online-foresight-guide\\_en](https://knowledge4policy.ec.europa.eu/foresight/topic/forlearn-online-foresight-guide_en)

#### 6.4 Vision-setting for R&I where the vision is not yet formulated or needs to be revised/precised;

*“Innovation networks are rarely contained within regional boundaries and often transcend regional, even national borders...An ‘outward looking’ approach to innovation policy, including collaboration in the design and implementation of policy instruments with other regions, may help regions, particularly lagging ones, overcome fragmentation and lack of critical mass and facilitate access to research capacity, production expertise and finance that can be locally scarce.”<sup>186</sup>*

Macro regions are implicitly (if not explicitly) based on a vision of how they could evolve over a medium to long-term time horizon. This generally entails the co-design of an incremental approach to multi-level cooperation and coordination efforts with a strategic macroregion focus. Multilevel collaboration and ordination constitutes a significant challenge for the macroregion since it calls on those driving the

<sup>186</sup> Joint Research Centre, Institute for Prospective Technological Studies, Uyarra, E., Midtkandal, I., Sörvik, J., Inter-regional collaboration in research and innovation strategies for smart specialisation (RIS3), Publications Office, 2014,

macroregion initiative to capitalise, unlock and tap into multiple ongoing R&I development processes already underway in the regions and at national level within the Alpine countries.

The SRIA has the ambition to build on and bring together four levels of strategic actions:

- the regions' individual smart specialisation strategies,
- national R&I strategies
- crossregional/interregional strategies
- macro-region collaborative initiatives already underway.

Thus, the SRIA development process is not undertaken in a vacuum but rather unfolds in a 'live' dynamic policy context (as seen in the previous sections) where many players are undertaking collaborative actions which relate directly and indirectly to research and innovation. The link between smart specialisation (RIS3) strategies and macroregion SRIA is of particular relevance, since RIS3 follows a systematic approach to guide and prioritise R&I investments and inter-regional cooperation is a key dimension to be addressed.

#### 6.4.1 Exploring complementarities between macroregion and smart specialisation strategies

The implementation of the RIS3 strategies calls on regions to engage more actively in outward-looking policies, through orientation to global value chains, cross-border cooperation and cross regional projects and networks. Based on market-based knowledge as well as S&T, the novelty of smart specialisation is its emphasis on place-based economic transformation, by using pre-existing industry and related capabilities to develop new industries. There are opportunities for strong complementarities between RIS3 strategies and macroregion SRIA. "Smart Specialisation can contribute to the integrated approach of macro-regional strategies by stimulating regional related diversification, connecting and aligning the various RIS3 in a macro region, as well as developing critical mass to tackle major common challenges. In turn, macro regional strategies have the potential to facilitate synergies among programmes, regions and member states to improve economic, social and territorial cohesion, including coordination of RIS3s, collaboration in thematic activities (INTERREG B), policy support measures (such as cluster cooperation), joint policy development and preparation for application for Horizon2020 projects".

RIS3 strategies focus resources on a defined set of priorities identified through a process of entrepreneurial discovery in line with the region's economic potential and using a 6 step approach: analysis of innovation potential; RIS3 process and governance; a shared vision; priority setting, a coherent policy mix and monitoring and evaluation. In the vision-setting phase, the emphasis of RIS3 strategies is on societal challenges which extend beyond regional/national borders and whose resolution calls for cross-border collaboration. These complementarities between RIS and macroregion strategies and the potential for inter-regional cooperation in the frame of RIS3 has been tackled by the Baltic Sea Region through a number of activities. Table 4 below outlines the main rationales for such cooperation, the forms it could take, the main actors and the relevance for the RIS3 process. The rationales identified relate primarily to the potential for exploiting innovation opportunities and inter-regional learning potential.

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Table 4 : The Dynamics of RIS3 inter-regional collaboration in BSR

Why?	What?	Who/Where?	How?	Relevance for RIS3 stages
Economies of scale Economies of scope Facilitating an increased outward looking dimension in the analysis	Mapping of potential partners within given fields. Exploring opportunities for complementarities and common R&D specialisations	Actors from other regions in BSR, e.g. regional authorities and statistical agencies	Learning workshops, Data sharing, mapping foresight and other qualitative processes	Step 1 - Analysis
Necessary territorial coordination due to mismatch administrative and functional regions Improved policy learning and multi-level coordination Improved capability and competences in policy making Exploit public goods and club goods	Better and more coherent EU-level implementation, more efficient use of funds.	Actors in a triple or quadruple helix constellation Macro regional collaboration, because there are established relations	Attempt to create an inter-regional and international forum for collaboration Coordination of efforts and resources aiming at different regional, national and EU level programmes	Step 2 Governance
Align actors Support entrepreneurial discovery in the cross border area Improve connectivity	Grand societal challenges Tackling regional inequality and promoting territorial cohesion Realise joint opportunities by accessing and developing bigger markets Inter-regional policy learning	Actors in a triple or quadruple helix constellation Easy start with neighbour countries.	Networking complementary sources Collaboration with strong partners in the BSR. Joint innovation strategy	Step 3 - Vision /Goals/ Objectives
Economies of scale and scope Club goods Improved connectivity and conditions for entrepreneurial discovery Break path dependency – looking beyond regional borders for emerging potential	Policy learning Exploration of joint opportunities Eco-efficiency at a macro-level "Smart rural areas" eHealth solutions to meet societal challenges.	External knowledge sources enabling innovation in enterprises	Support to new products, to SME, application of new technologies in Eco-efficiency a pilot in Smart rural areas a pilot test bed for eHealth solutions	Step 4 - Identification of priorities
Access to specialist and complementary capabilities and assets To promote and allow for cross border collaboration in innovation. A new administrative reality to adapt to Access to EC programmes and funding structures	Realise joint opportunities Concrete, ad hoc, projects, limited in time. Jointly funded programmes or actions addressing common problems	National and regional agencies from other Member states and regions	Research infrastructure and innovation support. Cluster policy Living labs Pilot projects Public procurement Open platforms for collaboration. Joint funding models for innovation projects	Step 5 - Policy mix
Develop intervention logic that better reflect joint activities and allow bench learning	Develop common indicators	Managing authorities	Joint design projects Inter Reg	Step 6 - Monitoring & Evaluation

In terms of vision-setting the main rationales are to support the process of entrepreneurial discovery in the cross-border area and improve connectivity. The common areas of concern are societal challenges, addressing regional inequalities and cohesion and access to larger markets.

**Baltic and North Sea BANOS SRIA: Vision and Priorities**

The Baltic and North Sea SRIA which was eventually developed, sets a vision for the macroregion and more specifically for the implementing programme (BANOS). The vision relates to three key challenges: Healthy Seas and Coasts, Sustainable Blue Economy; Human Wellbeing and sets R&I priorities including overall upgrading of the ecosystem and thematic priorities and attributes for the implementing programme.. The SRIA development process involved dialogues, on-line consultations and thematic experts. The resulting SRIA is anchored in a particular macroregion and reflects the vision and priorities at the time. “Although the BANOS

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“SRIA is complete, it should be considered as an open document that will be updated periodically as new challenges emerge.”

*Table 5 : The BANOS SRIA : Vision and priorities*

	Vision	Priorities	Targeted impacts/outcomes/enablers
<b>1.Focus and rationale</b>	<p>to deliver a decisive and much needed boost to the sustainable marine and maritime economy, by elevating the collective R&amp;I capacity of the Northern European region to the next level through a scientifically, administratively, and financially firmly integrated R&amp;I programme</p> <p>3 overarching Strategic Objectives: Healthy Seas and Coasts, Sustainable Blue Economy; Human Wellbeing. Main precondition: ecosystem-based management</p>	<p>developed preconditions for launching joint Baltic and North Sea Research and Innovation Programme</p> <p>to deliver policy relevant research and innovation in support of sustainable use of ecosystem goods and services while generating strong EU added value /impact.</p>	<p>Identifies a clear path forward while at the same time, through regular review and update, allows sufficient space for agile response to emerging needs for enquiry by scientists and innovators.</p>
<b>2.Contents</b>	Vision to Action: Annual planning and programming cycles.	R&I priorities (addressing strategic objectives) and upgrading of the ecosystem as a whole.	development and implementation of science informed policies.
	European Sustainable Blue Economy Partnership as the Main Implementation Vehicle	R&I thematic priorities and sub-priorities (state of the art, knowledge gaps, rationale, expected outcomes	Impact enablers

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<p><b>3. Process</b></p>	<p>The scoping process defined also three key attributes of the BANOS Programme: ‘close connection to the eco-system’, ‘dependence on climate impact’ and ‘geographic relevance to the Baltic and North Sea’.</p>	<p>Task: to check if existing priorities, status and capacity in relevant fields of research and innovation in the Baltic Sea and the North Sea regions is in line with Banos strategic objectives</p> <p>Dialogue to seek views and define future BANOS region’s research and innovation needs,</p> <p>an open online consultation carried out on the possible SRIA objectives and themes generated further, close to 70 suggestions</p> <p>27 interdisciplinary marine experts forming the drafting team, coordinated and prepared the thematic parts of the SRIA under the three strategic objectives according to their respective spheres of expertise</p>	<p>Impact Monitoring and Assessment</p> <p>Effective Communication of the Results of R&amp;I</p> <p>Knowledge Synthesis as Enabler of Greater Research Impact</p> <p>Collaboration Across Marine and Maritime Funding Streams</p> <p>Sea Basin Cooperation</p> <p>Human Capacity and Skills Development</p> <p>Open Science: Open Access/ Open Data/Marine Citizen Science</p> <p>Stimulating Innovation Diffusion and Open Innovation</p> <p>Cooperation among Europe’s Regional Seas’ R&amp;I Programmes</p>
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**Rationale for vision-setting**

Visions constitute powerful tools for capturing the collective imagination and ambition of countries, regions and stakeholders forming part of the macroregion. They can be used effectively to develop ownership of a

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novel approach, to build consensus and momentum for a required change, for managing a transition and as the basis for setting priorities and mobilising joint action.

Horizon Europe highlights the need for the SRIA development process to be open and inclusive and this effectively means that both the vision-setting and its end result, the vision, need to be:

- Open and exploratory and not pre-determined by a set vision and or top-down steering, thereby providing a space for new ideas and approaches
- Inclusive and participatory by allowing a broad range of stakeholders to have their say; in particular citizens, consumers and users of R&I seeking to comply with these criteria of openness and inclusivity, the challenge of vision-setting becomes more apparent.

Thus, the path towards achieving a common vision is not necessarily easy or straightforward, particularly if stakeholders are highly diverse in their profiles, affiliations, interests, needs and priorities. At the level of the macroregion, vision-setting faces an additional challenge, as transnational and inter-cultural factors come into play. This challenge becomes more complex when the vision entails a transition, for example a green, digital or societal shift, or a geographical shift in focus and organisation from regional and national to macroregion. Transitions may impact on stakeholders' power, interests and assets in potentially positive and/or negative ways. Such transitions may open up opportunities and resources for some stakeholders, while closing the door to others. Managing such transitions as part of a macroregion SRIA is an ambitious, risky goal which needs to be approached with due care and responsibility to ensure equitable outcomes for all.

#### 6.4.2 Scoping the vision for the Alpine Region SRIA

*“A common research agenda able to build an effective ecosystem of research and innovation in the Alpine Macroregional area” Anna Giorgi<sup>187</sup>*

In the area of research and innovation, EUSALP has the vision to reach common agreement and ensure commitment to a forward-looking strategic R&I agenda for the Alpine macro region as a means for developing an effective R&I ecosystem.

The emphasis on the R&I ecosystem delineates the scope of the vision and identifies key elements which need to be addressed. “R&I systems are complex ecosystems which need various elements to perform optimally. These include; strong business participation in innovation activities; fluid and abundant knowledge flows across R&I actors; and good framework conditions that allow business innovation to flourish.”<sup>188</sup> Two additional key elements have been identified from the literature review, as deserving particular attention in moving from national and regional (sub-national) R&I ecosystems to design and build a macroregion R&I ecosystem, namely effective stakeholder engagement and the unlocking of resources including funding. For a Macroregion R&I Ecosystem, the triple helix (emphasis on academia, industry and government) is extended to the quadruple helix, broadening the stakeholder base to include the third sector and citizens. While the supply/accessibility of resources and funding usually form part of the enabling framework conditions, at the macroregion level this element is particularly challenging and calls for dedicated mechanisms. Innovative use

<sup>187</sup> <https://www.alpine-region.eu/publications/alpgov-final-publication>

<sup>188</sup> [https://ec.europa.eu/info/sites/default/files/file\\_import/european-semester\\_thematic-factsheet\\_research-innovation\\_en.pdf](https://ec.europa.eu/info/sites/default/files/file_import/european-semester_thematic-factsheet_research-innovation_en.pdf)

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of existing/new resources and funding mechanisms still entails significant efforts in cross-border alignment of R&I priorities and measures.

The extensive work (studies, consultations, policy design) undertaken to date by a number of EUSALP projects, to develop an evidence base for policy, provide key insights in this context. Each of the six elements of an effective macroregion R&I ecosystem are mapped in Table x below, together with policy insights from relevant EUSALP initiatives. This mapping provides a clearer picture of how the focus of efforts has developed to date in designing and building the Alpine macroregion R&I ecosystem. It highlights gaps in data, knowledge, capacity, implementation and funding frameworks as well as the types of initiatives policy makers would like to see in place. Coherence and alignment between levels of R&I policy making is key and this calls for robust

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methods for bridging these levels effectively, in particular RIS3 strategies and national R&I strategies falling within the macroregion.

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*Table 6 Key Elements of an effective Macroregion R&I Ecosystem*

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Key features	Relevant Project	Policy insights
<p>A robust (sustainable) macro region <b>public science base</b> producing accessible high quality outputs – this would build on the national science base in the Alpine countries and connect them to create critical mass.</p>	<p>The RE-SEARCH ALPS project by providing data about R&amp;I capacity, laboratories and research and innovation centres and the potential for building critical mass.</p>	<p>Highlights a key challenge for improving the macroregion R&amp;I ecosystem: knowledge on what is available and where is crucial.</p> <p>Mapped 126,102 organisations<sup>189</sup>. 257,376 projects, 112,680 websites and 766,599 publications aimed at improving the R&amp;I ecosystem.</p> <p>lack of knowledge on research infrastructures which slows networking between research institutions (private and/or public), SMEs and start-ups.</p> <p>to avoid this knowledge gap a dataset with geo-referenced data is needed in each country.</p>
<p>Dynamic, fluid and targeted macroregion <b>knowledge flows</b> across R&amp;I actors and borders</p>	<p>A-RING<sup>190</sup>: Alpine Region Research and Innovation Capacity, by establishing the basis for an effective, transnational cooperation among different levels and actors, to develop shared R&amp;I policies for the Alpine Regions. Promote transnational collaboration among R&amp;I centres, Uni &amp; BS on uptake of R&amp;I results in Alpine Regions-related main topics</p>	<p>Policy-makers are interested in platforms for networking (32%), scale-up business support schemes (13%), access to funds (25%), webinars and e-learning activities (24%); 27% would like platforms on a macroregion level.</p> <p>S3 process inclusion, allowing multiple organization types (PAs, especially businesses and research) to collaborate to find common priorities.</p> <p>S3Alpine Lab addresses need for a space for working together, mutual learning, active exchange on policy instruments associated to the thematic priority areas (what works in each region/ what is a “work in progress”/ where are the gaps not currently meeting stakeholder’s needs?). Data driven design and stakeholder consultation at the core of the policy lab.</p>

<sup>189</sup> active in the 7 Countries considered (France, Switzerland, Germany, Italy, Liechtenstein, Slovenia, Austria)

<sup>190</sup><sup>190</sup> <https://www.alpine-space.org/projects/a-ring/en/project-results/communication-material/deliverables-download>

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<p>Enabling macroregion <b>framework conditions</b> for business innovation</p>	<p>Interreg-project S3-4AlpClusters</p> <p>ARDIA-NET: Developing an Alpine Space Research, Development and Innovation Area by lowering barriers for cross-regional cooperation</p> <p><i>“There remains a huge discrepancy between the synergy potential across the Alps and the macro-region as a geography for de facto cooperation.”</i></p>	<p>Lack of multi-national governance structures for focused cooperation in S3-implementation</p> <p>persistent funding gap for cross-regional RDI projects targeting S3 opportunities of particular relevance and including actors of new value chains, from research to market.</p> <p>The analysis of funded EU FP projects on bio-economy/biomass indicates AR represented individually, however almost no specifically macro-regional cooperation. No funding instruments suited for macro-region (eranet is close)</p> <p>Operational challenges: translating: identified potentials to action -implementation projects. Eu regions and citizens disinclined to add complex new governance bodies to already complicated structures and approve top-down funding.</p> <p>Technical challenges transforming innovative ideas into social and economic reality, opportunities into jobs, businesses and new value chain; tapping into regional /local innovation.</p>
<p>Strong <b>business participation</b> in innovation activities</p>	<p>A-RING: Alpine Region Research and Innovation Capacity by moving from individual S3 strategies to a transnational triple helix approach on strategic Alpine Region topics</p>	<p>Policy Lab: The process of positioning specific industries and priority areas within the global value chains should be strengthened. The ‘macroregion’ policy lab is ideally positioned to facilitate, where possible, interregional value chains (complete value chains or a significant part of a global value chain.)</p> <p>The quality of EDP during the public discussion is difficult to assess.</p> <p>S3Alpine Lab: A set of criteria to identify and involve industrial parties.</p>
<p><b>Quadruple helix</b> commitment and engagement in (macroregion) R&amp;I</p>	<p>A-RING: Alpine Region Research and Innovation Capacity</p>	<p>how to choose the common cooperation topics and on what scale do the stakeholders want to work. how to specialize within the Alpine to gain in competitiveness while considering individual priorities at more local scale. The creation and implementation of this shared agenda will have to work on ensuring the inclusion of a maximum of different type of shareholders.</p> <p>a definite need to change approach and foster the quadruple-helix inclusion of third-sector and civil society.</p>

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<p><b>Unlocking Resources including Funding</b> Macroregion R&amp;I</p>	<p>ARDIA-NET: Developing an Alpine Space Research, Development and Innovation Area</p> <p>Interreg S3-4AlpClusters implement S3 by means of a cluster-based approach and transformative activity</p>	<p>Need for simple coordination mechanisms, based on bottom-up decision processes, without funds necessarily having to cross borders, allowing regions to control entire process.. The basic principle is to rely on available regional funds and programmes, to use existing region-specific administrative procedures and to work towards joint coordinated calls. Innovation Express call.<sup>191</sup></p> <p>Cross-regional cooperation in the identification, development and implementation of transformative activities should be further supported by cross-regional synchronized funding schemes.</p>
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Table 6 provides the means for encapsulating the current status of the Alpine region R&I macrosystem based on a concise overview of key findings from relevant studies included in this review. Each element of the ecosystem has been addressed through these studies, and it is evident that there is a stronger emphasis on business innovation, funding and stakeholder consultations/engagement. The table is not comprehensive and will need to be updated over time to include missing/additional studies undertaken and to update any new insights generated. It can be used as a tool for overall tracking of progress in advancing the R&I ecosystem and for managing the balance of efforts.

This approach will be used as the framework for the vision-setting process. Each of the 6 elements will be addressed from a forward-looking perspective – e.g. how will the public science base for the macroregion advance by 2030? How will the enabling framework conditions improve by 2030? How will business participation in innovation evolve by 2030 especially in the context of industry 5.0 with its emphasis on worker well being? What policies, initiatives and efforts are needed and how to prioritise? The interactions between the six elements of the R&I ecosystem will also need to be taken into consideration, in order to determine how they can be more mutually reinforcing and not evolve in a counterproductive way.

### 6.4.3 Championing and oversight : Role of the core team

Vision-setting is likely to entail considerable efforts to build trust, bridge differences of perspective, identify common ground and build consensus. This calls for a ‘dream team’, combining leadership, tact, facilitation and diplomatic skills, an appropriate level of domain expertise and policy design experience. The vision-setting process therefore constitutes a critical step in the SRIA process and needs to be planned integrally as part of the overall systemic approach.

The core team leading the SRIA process are responsible for:

- the championing and oversight of the SRIA approach and process, fine-tuning and iteration

<sup>191</sup> The call is funded by existing national/regional funding programmes and managed by participating funding agencies to initiate, develop or enhance transnational exchange activities among applicants and their project proposals to be funded. Call supports economic recovery and addresses complex societal challenges. <https://innovation-express-2021.b2match.io>

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- the direction and content including economy/society driven, R&I ecosystem
- The operational aspects including selected methods, participants, timeframe

The direction and content determine to a large extent the operational approach, in terms of selection of participants to drive the vision-setting and the methods used. A key responsibility for the core team is the way in which the participants' views are interpreted and compiled and how the final results are reconciled. Indeed, the core team's role is crucial throughout the process, as they may need to fine-tune the approach, for example to accommodate stakeholders' needs/preferences on operational aspects; or to revisit and follow through unresolved issues or reach agreement to postpone their discussion to future iterations of the SRIA.

**6.4.4 Vision-setting for R&I in the macroregion context can be explored from two broad dimensions in terms of:**

- Exploring the current and future role of R&I in the Alpine macroregion's economic development including digital, green and social transitions. This includes consideration of the extent to which R&I could be better embedded in the economy and society and the benefits and risks related to this.
- Building the Alpine macroregion R&I ecosystem per se, its current strengths and weaknesses and exploring emerging opportunities and challenges. This includes an emphasis on the key players and their current and emerging role in this ecosystem.

A third approach would entail a combination of the two which would allow for a better grounding of the process for developing the R&I ecosystem.

The vision-setting methodology for this third approach could thus be based on an exploratory exercise where quadruple helix stakeholders (individually or in groups) are invited to reflect on the level of priority currently assigned to each of the 7(+) goals in Table x1. The same stakeholders are then invited to explore the future importance of these goals in light of the desired outlook for 2030 in line with the Macroregion SRIA. In the case that stakeholders identify additional goals which need to be headlined, these can be added to table x1 and addressed as part of the exercise.

This methodology thus starts with a simplified exercise of mapping different visions of and for R&I in the Alpine Region, together with the goal(s) and enabling factors. These are ranked in terms of their current relevance and future importance for achieving the vision. This exercise has the purpose of making stakeholders aware of the fact that there could be different goals driving the Alpine region SRIA and that at the start it is worth giving due consideration to the full range of goals, before focusing on a particular goal(s). It also creates awareness of the fact that different stakeholders have different rankings of goals for macroregion R&I. Thirdly, the exercise helps stakeholders to reconsider their preferred goal(s) from a forward-looking perspective and in terms of the goal(s)' importance for the macroregion 2030 vision.

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*Table 7: Proposed Methodology for Macroregion SRIA goal-setting*

Goals	Current relevance	Future importance	Desired outlook for 2030
1. Enhance the Role of R&I in macroregion economic development	<i>Rank the current relevance of this goal Explain in brief your ranking</i>	<i>Rank its future importance Explain in brief your ranking</i>	<i>Outline how this goal links to the Macroregion R&amp;I vision</i>
2. Invest in R&I for driving transitions - Green, Digital, Social	<i>Rank the current relevance of this goal. Explain in brief the reason(s) for your ranking</i>	<i>Rank its future importance. Explain in brief the reason(s) for your ranking</i>	<i>Outline how this goal links to the Macroregion R&amp;I vision</i>
3. Building the R&I Ecosystem	<i>Rank the current relevance of this goal. Explain in brief the reason(s) for your ranking</i>	<i>Rank its future importance. Explain in brief the reason(s) for your ranking</i>	<i>Outline how this goal links to the Macroregion R&amp;I vision</i>
3a. Build/sustain a robust macroregion public science base			
3b. Increase macroregion knowledge flows among R&I actors across borders			
3c. Ensure enabling conditions for business innovation			
3d. Develop strong business participation in innovation activities			
3e..Ensure Quadruple helix commitment and engagement in (macroregion) R&I			
3f. Secure Macroregion R&I funding/resources			
3g. Additional Goals proposed by stakeholders			

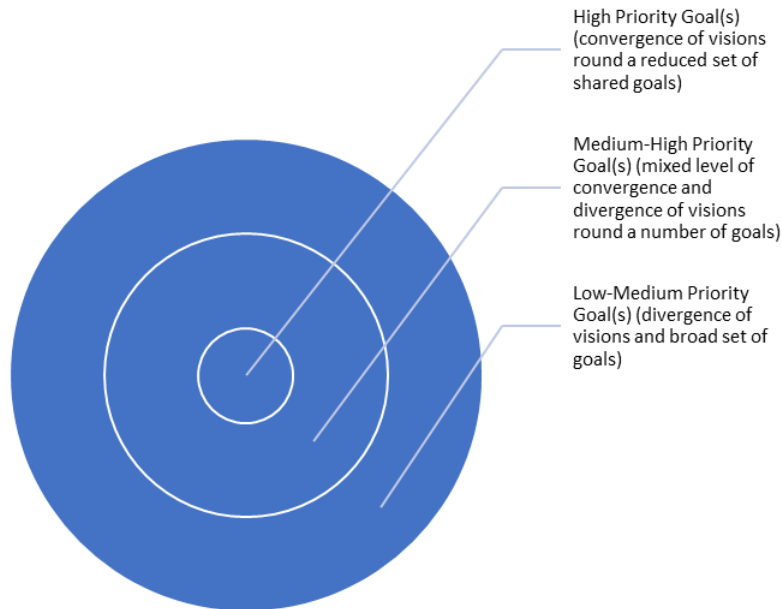
**Convergence and divergence mapping**

The results of the exercise provide the basis for identifying points of convergence and divergence between stakeholders on where the region’s key goals and challenges lie. By mapping the results in a core-periphery diagram, participants may better understand the outcomes of the exercise and the implications for the SRIA

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design. Engaging different profiles of stakeholders in this consultation exercise enriches the discussion and helps in identifying the extent of divergence in forward-looking perspectives.

### Core-Periphery Diagram



The number of stakeholders involved in the vision-setting exercise depends on the level of ambition and targeted scope as well as the resources available. An immediate convergence of views among participants is not necessarily a positive outcome and it may call for further efforts to ensure that a sufficiently wide and representative stakeholder pool is active in the exercise. The selection of participants in the vision-setting process benefits from a more systematic approach, by broadening the range of stakeholder profiles to match the overall purpose of the process and its end result, the SRIA. Stakeholder analysis techniques can be used to determine which stakeholder groups wield high power and have high interest in the exercise as well as those with varying degrees of power and interest. The effectiveness of an exercise depends on the buy-in of all relevant stakeholders and in ensuring that no stakeholder group or its representative take over the process. While it is crucial that high power high interest groups are committed to the process, a key measure of success is the extent to which the exercise moves low power low interest groups /individuals up the chain towards high interest high power. SRIA vision-setting which envisages and entails key transitions of different types, needs to elicit high levels of stakeholder engagement and commitment. The vision-setting process itself is a means of engineering change by leveraging the power and interest of stakeholders, gradually gearing them up to take ownership for the SRIA and become agents of change.

The transitions which are underway will feature in varying degrees in the vision-setting process and will require forward-looking reflection and significant consensus-building efforts. Key questions will relate to how the SRIA can prove effective in advancing all or some of these transitions?

The Stakeholder analysis in Table 8 below roughly groups the key stakeholders in two categories: low power and high power. Within each category, the groups may vary in terms of their level of interest depending on the transition in question. In the low power group, low interest may be due to lack of awareness,

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misinformation (fake news) and/or insufficiently detailed information on the benefits and repercussions of the transition (this is likely to differ during the transition process and when it reaches its end state). In the highpower group, the level of interest may vary depending on the extent to which there is commitment and belief in the transitions, particularly in terms of their viability and achievement. Low or negative interest may be due to a range of factors, including a perception that these transitions threaten their own status quo and assets or those of close allies /supporters; or simply create extra work and require resources which are not available or are beyond their control currently or will become so in the future.

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*Table 8 Stakeholder analysis*

<b>Transitions Underway</b>	<b>Stakeholders: low power low interest to high interest</b>	<b>Stakeholders: high power low interest to high interest</b>
<p><i>Select a transition:</i></p> <ul style="list-style-type: none"> <li>● macroregional economic development</li> <li>● circular economy</li> <li>● economic recovery</li> <li>● industry 4.0 and 5.0</li> <li>● green and digital transitions</li> <li>● demographic/societal transition</li> <li>● fair transition</li> </ul>	<p><i>Map low power stakeholders for this transition</i></p> <ul style="list-style-type: none"> <li>● citizens</li> <li>● third sector</li> <li>● gender/young people</li> <li>● disadvantaged</li> <li>● communities</li> <li>● micro-enterprises</li> <li>● young researchers</li> <li>● young entrepreneurs</li> <li>● SMEs</li> <li>● small communities</li> <li>● professional bodies</li> </ul>	<p><i>Map high power stakeholders for this transition:</i></p> <ul style="list-style-type: none"> <li>● macroregion policymakers EU</li> <li>● national and regional authorities</li> <li>● national and regional policymakers</li> <li>● economic leaders and advisers</li> <li>● University leaders and management</li> <li>● industry leaders and associations</li> <li>● large and medium enterprises</li> <li>● civil servants</li> <li>● regulators</li> <li>● HEIs and RPOs</li> <li>● RFOs</li> <li>● academics/senior researchers</li> <li>● ethics bodies</li> <li>● unions</li> </ul>
	<p>forward look : which stakeholders will belong in this category in 2030?</p>	<p>forward look : which stakeholders will belong in this category in 2030?</p>

The stakeholder analysis approach flags potential barriers as well as key levers for change. It highlights the need for effective communication and transparency during the vision-setting process to address gaps in information and the evidence base. Vision-setting exercises have the potential for stimulating stakeholder interest and for thereby increasing their power, transforming low interest stakeholders into high interest players. In a forward-looking exercise, stakeholder analysis could explore the potential role of stakeholders in future scenarios and the power that they could wield. The approach can also be applied to address each of the goals, by focusing on how power and interest may vary depending on the goal and the level of relevance and importance assigned to it.

### 6.5 Prioritisation /priority-setting

Foresight and vision-setting activity typically focuses on selecting research and innovation priorities and defining them to an appropriate level of granularity. This approach has been refined over time to take into account the fact that R&I priorities do not “exist independently of a consideration of the structures and

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infrastructures that are needed to support that research”<sup>192</sup>. Thus ‘stand-alone’ foresight approaches with a primary focus on broad-based technological priority-setting have given way and are being complemented by more structural foresight linked to R&I ecosystem reform/transition and innovation policies, including cluster policies and public procurement of innovation.

### 6.5.1 Dual track approach: thematic and structural/transformational

Priority-setting is thus tackled from two aspects both in terms of

1. selecting thematic priorities and identifying technology niche areas, and
2. addressing weaknesses and strengths in the R&I ecosystem which sustains them.

Thematic (S&T) priorities are thus contextualised within the R&I ecosystem and the priority-setting process takes both into account. The prioritisation of S&T investments from a forward-looking perspective explores the potential of the R&I ecosystem to deliver over time the enabling conditions including relevant capacities, competencies and resources and to support targeted advances in the thematic priorities.

In focusing on the R&I ecosystem, the aim is to ensure that the enabling framework conditions are in place to support the SRIA. Structural foresight is particularly relevant in the design and implementation of the macro region SRIA, as it seeks to prioritise and address required transitions. In this context, there are three broad types of transformational roles which it can play:

- Corrective role – addressing deficiencies and systemic failures and policy lock-ins.
- Disruptive role – encouraging an emphasis on crisis, tipping points or breakthrough events which can completely change the current status quo.
- Creative role – stimulating the conditions for new networks and structures to evolve.

A combination of these roles could also be foreseen. As outlined earlier, the Alpine macroregion SRIA is faced with a number of transitions which may entail a rethinking of economic policy/approaches towards circular

<sup>192</sup> From priority-setting to articulation of demand: Foresight for research and innovation policy and strategy. Georghiou, Luke; Cassingena Harper, Jennifer. Futures, Vol. 43, No. 3, 04.2011, p. 243-251.

economy and zero growth, driving and managing the disruption of green and digital transitions and the design and launch of macroregion R&I policy including the building of new networks, structures and capacities.

As a preliminary step in priority-setting, these transitions could be addressed through dedicated panels which include policy makers, R&I policy and domain experts and other quadruple helix stakeholders.

Priority-setting in the context of the SRIA is typically undertaken in the context of alignment of resource allocations, including funding and infrastructures. It is possible to distinguish between three types of priorities which are interconnected:

- mission-oriented priorities referring to socio-economic or technological goals;
- thematic priorities referring to fields of science and technology;
- functional priorities referring to features of the R&I ecosystem.

The work undertaken to date by the Alpine region projects and the recent manifesto indicate that the SRIA development process will entail dedicated priority-setting on all three types: namely to define and agree the overall mission-orientation, to set specific S&T thematic priorities as well as addressing the enabling functional priorities.

Table 9 proposes a two-step approach, whereby a panel or dedicated panels address the required transitions and prioritization of the SRIA in terms of the desired impacts. In Step 2, the same panel or dedicated panels then focus on priority-setting in terms of alignment of investments and the desired outputs. This will allow a mapping of mission-oriented, thematic and functional priorities.

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Table 9 : Mapping levels of priorities

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	<i>Step 1: Panel or Dedicated panels focus on required transitions and prioritization of SRIA desired impacts (long-term)</i>		
Step 2: Panel or Dedicated panels set SRIA aligned priorities and desired outputs (medium-term)	Corrective	Disruptive	Creative
	Relevance Emerging challenges Targeted impacts	Relevance Emerging challenges Targeted impacts	Relevance Emerging challenges Targeted impacts
<b>Priority-setting</b>			
Mission-oriented		XX	XX
Thematic			XXX
Functional	XX		XX

This approach may be complemented by wider consultations with quadruple helix stakeholders to help validate:

- the relevance of the transitions and the related challenges,
- the extent to which they are and will remain important in the future; and
- to prioritise their potential role and impact.

This is a good point at which to record any divergence of opinion and to assess their strength and basis for this.

In exploring the emerging challenges for the macroregion, the aim is to shortlist the number of challenges or cluster them, focusing on those with high to medium potential impact. This prioritisation helps to narrow down the focus and dig deeper into each challenge.

Key questions to be addressed in this step relate to the following broad categories:

- Why is this challenge of particular priority for the Alpine Region?
- What is known regarding the relevant trends and drivers and their potential impact?
- What needs to be further researched, explored or discussed?
- Which stakeholders can help with this process? The challenge may be economic, environmental, societal, health, security, ...
- Which R&I thematic areas of particular priority for the Alpine Region? Is it particular niche areas which we need to focus on? What will be the level of granularity when tackling topics related to digital divide, digital tourism, climate change, biodiversity conservation?
- What is known in terms of relevant trends and drivers ? What needs to be further researched, explored or discussed? Which stakeholders can help with this process?

- Examples of challenges and questions to address:

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Types of Challenges	Current	Emerging
		<i>Key questions to address for each challenge:</i> <i>How is this expected to evolve ?</i> <i>What other factor(s) could influence it?</i> <i>What is the desired outcome?</i> <i>What action is needed/ feasible?</i>
Governance and championing	Deciding on the appropriate level of governance reconciling different levels of governance and different priorities Young and/or old champions?	
Agility	The fact that policy makers, Academia and Business Sector are not always jointly valorising elements of S3/RIS, leads them to run at different speeds, holding back benefits for the Alpine Region as a whole	
Alignment	Dovetail Macroregion SRIA with S3 – creating critical mass, critical networks, critical clusters	
Resources	Key decision whether to use own funds /EU funds (S3, ERDF ESF FP) and what latter will entail in terms of criteria for access	
Capitalize on opportunities	Link to transformative activities. Build on existing strengths and future opportunities to develop transformative activities); to seek opportunities for transformation at cross-sectoral intersections	
Values and ethics	Agreeing on the Guiding principles: Cohesion – support for weaker regions social economy and sustainable development Gender-responsive and gender transformative approaches and inclusivity	
Communication and engagement	Keeping stakeholders engaged throughout the process reconciling diverse opinions and priorities	

## 6.6 Setting up a monitoring and evaluation system including Key Performance Indicators (KPIs) for the SRIA<sup>193</sup>

The SRIA is usually followed by an Implementation Plan including the programme of activities and associated sub-objectives, the actors responsible for their execution and the timing. This programme of activities should be accompanied by Key Performance Indicators (KPIs) set to monitor the progress in relation to implementing

<sup>193</sup> This part is largely based on the guidance provided by ERA-LEARN for trans-national partnerships in R&I and particularly the RIPE toolkit, <https://www.era-learn.eu/support-for-partnerships/governance-administration-legal-base/monitoring-and-assessment/r-i-partnership-evaluation-toolkit-ripe>

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the SRIA. In turn, the process of data collection for assessing the progress needs to be supported by a monitoring and evaluation system.<sup>194</sup>

The process of evaluation particularly that of ex post evaluation is greatly enhanced by the availability of robust, systematic and comprehensive information and data relating to the implementation activities of the SRIA. The availability of such data greatly facilitates the task of the evaluators and obviates much of the need to collect retrospective information, some of which may have been forgotten or lost over the years. In addition, the collection of such data ex post necessitates significant time and resources on the part of both the evaluators and those involved in the evaluation.

This underlines the advantages of implementing a process of monitoring since the beginning of drafting the SRIA specifying also the appropriate KPIs to monitor and evaluation its implementation. Through a 'light touch' monitoring process, a significant amount of information may be collated which will greatly assist the evaluation process.

As a case in point, the latest BiodiERsA SRIA has identified a series of indicators to monitor and evaluate progress of the implementation of the SRIA. In particular, the BiodivERsA outputs, as well as short and longer-term impacts, are assessed using a set of indicators divided in two types:

- Type A indicators of the performance of the BiodivERsA partnership, i.e. indicators to assess the BiodivERsA objectives => BiodivERsA Activities => Expected outcomes
- Type B indicators of performance of BiodivERsA-funded research projects, i.e. indicators to assess the Objectives of BiodivERsA-funded projects => Projects' Activities => Expected outcomes of the funded projects.<sup>195</sup>

Type A and type B indicators will be reported to the BiodivERsA partners, the Advisory Board and possibly the European Commission on a regular basis (typically every 2 years) in the form of a balanced scorecard.

At the same time, the previous version of the BiodivERsA SRIA (2017-2020) also included examples of qualitative indicators for both types.

*“An example of type A qualitative indicators could result from the survey of national and European perceptions of the impact of the BiodivERsA collaboration, targeting relevant players (including other European initiatives, BiodivERsA national partners, relevant DGs from the EC) or from the survey of perceptions of national research communities on the type of research promoted by BiodivERsA, linking scientific excellence and inter/trans-disciplinarity and the engagement of societal stakeholders in research projects. An example of type B qualitative indicators could result from the survey perceptions of stakeholders on their involvement in projects or the uptake and use of knowledge and technology developed under BiodivERsA projects. Another type of qualitative indicators to be implemented by BiodivERsA, encompassing type A and type B indicators, would be the production of “impact case-studies” relating successful examples of how BiodivERsA’s activities or funded research project’s outcomes have resulted into wider socio-economic or political impacts and changes.” (Le*

<sup>194</sup> For more information on how to develop a monitoring and evaluation system for trans-national partnerships in R&I see for instance, <https://www.era-learn.eu/support-for-partnerships/governance-administration-legal-base/monitoring-and-assessment/r-i-partnership-evaluation-toolkit-ripe/about-the-r-i-partnership-evaluation-toolkit/setting-up-a-monitoring-and-evaluation-system>

<sup>195</sup> For the extended list see Eggermont H., Le Roux X., Tannerfeldt M. Enfedaque, J., Zaunberger, K. & Biodiversa+ partners (2021). Strategic Research & Innovation Agenda.

Biodiversa+, 108 pp. <https://www.biodiversa.org/1913/download>, Table 2a, pp. 96-99, and Table 2b, pp. 100.

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Roux X., Eggermont H., Lange H. & BiodivERsA partners (2016). (The BiodivERsA strategic research and innovation agenda (2017-2020) - Biodiversity: a natural heritage to conserve, and a fundamental asset for ecosystemservices and Nature-based Solutions tackling pressing societal challenges. BiodivERsA, p. 76)

There is plenty of knowledge and experience already on how to build a monitoring and evaluation system for trans-national partnerships for R&I. this needs to be properly reviewed and adjusted to the particular context, framing conditions and characteristics of the SRIA. Setting up a monitoring system and associated KPIs is an indispensable part of the design and implementation of the SRIA and should be given adequate attention and resources.

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## 7 Annex I- Interest, obstacles and needs for cooperation

<p>Austrian regions surveyed</p>	<ul style="list-style-type: none"> <li>• <b>Interest in cooperation:</b> Experts from both academia and business support organisations agreed in the value of cooperation. The experts from business support organisations highlighted, that while big companies already cooperate often with academia, many SMEs could benefit from more cooperation.</li> <li>• <b>Obstacles:</b> 4 main obstacles were identified: (1) the administrative effort, (2) the willingness of companies to invest money themselves; (3) different requirements between academia and businesses, (4) lack of personal acquaintance between research staff and companies. With international cooperation, the experts highlighted the difficulties of finding public funding opportunities for small, bi-lateral projects with consortiums with only two or three partners. Knowledge about funding possibilities was not seen as a major issue.</li> <li>• <b>Needs:</b> Funding for smaller, bi-lateral projects with 2-3 actors. Networking events and workshops are valuable for creating contact but should be focused on a specific topic and target group.</li> </ul>
<p>German regions surveyed</p>	<ul style="list-style-type: none"> <li>• <b>Interest in cooperation:</b> The experts agreed unanimously that cooperation between academia and the business sector are vital for future projects</li> <li>• <b>Obstacles:</b> The experts identify too much bureaucracy in funding, different interests, and a lack of transparency. Business stakeholders raised the point of academia being too hidden. Different interests (publications vs. patents / company secrets) can be a hurdle.</li> <li>• <b>Needs:</b> The stakeholders suggested that platforms are helpful to connect businesses and academia. Smaller funding programs with the possibility of bilateral cooperation across direct borders</li> </ul>
<p>French regions surveyed</p>	<ul style="list-style-type: none"> <li>• <b>Interest in cooperation:</b> The participants express interested in more cooperation between business and academia and with other organisations in the Alpine Region.</li> <li>• <b>Obstacles:</b> The experts identify the lack of time and resources to create new cooperation as the main hurdle.</li> <li>• <b>Needs:</b> The stakeholders from both sectors feel well informed about funding possibilities or know actors that may guide them to the process. They express the opinion, that workshops, webinars, and matchmaking activities can be opportunities to foster innovation</li> </ul>
<p>Italian regions surveyed</p>	<ul style="list-style-type: none"> <li>• <b>Interest in cooperation:</b> The willingness and the capability to cooperate depend on how the five obstacles are overcome.</li> <li>• <b>Obstacles:</b> Five main obstacles were identified: (1) communication: the cultural attitudes of (small) companies towards innovation; bureaucracy keeping businesses and academia away from participating in tenders and financing opportunities; compartmentalisation in academia preventing interdisciplinary working and effective collaboration. (2) Insufficient investments in education and training reduces the ability to innovate and adapt. (3) Current legislation not supporting cooperative technological and process innovation. (4) Lack of fitting funding schemes. (5) Inappropriate time frames for research and development.</li> <li>• <b>Needs:</b> To tackle these obstacles, there is a need to (1) adopt a more integrated and simplified communication, (2) stimulate cultural change within companies regarding doing innovations, (3) develop legislative innovations helping collaborative initiatives, (4) elaborate new funding possibilities, also coming from the private sector and (5) develop appropriate time frames in funding schemes that better suit the different needs in research.</li> </ul>
<p>Slovenia</p>	<ul style="list-style-type: none"> <li>• <b>Interest in cooperation:</b> The majority of businesses are interested in more cooperation with academia. 20% of experts from the academia sector wish for more cooperation with businesses. Both experts from academia and business highlight the value of cooperation on master and doctoral studies.</li> <li>• <b>Obstacles:</b> Academia respondents stressed that the value of cooperation between business and academia is sometimes not seen by businesses. Academia and especially business experts criticised</li> </ul>

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	<p>the availability of funding possibilities and the lack of consolidated information about funding possibilities.</p> <ul style="list-style-type: none"> <li>• <b>Needs:</b> Especially business stakeholders wish for more support in the funding process and are interested in networking. They showed less interest in workshops and webinars.</li> </ul>
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Table 5: Overview: Interest, obstacles and needs for cooperation (AT1.3)

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## 8 Annex II – Glossary of terms of digital technologies<sup>196</sup>

**Internet of Things (IoT)** is the virtual and physical environment wherein sensors and actuators blend seamlessly with the environment and the information is shared across platforms in order to develop a common operating picture. It is enabled by wireless sensor technologies set out in the environment. These include home equipment (smart homes), smartphones, interactive facilities embedded in cars and public transport lines, public and private services (restaurants, libraries, etc.) and up to the latest fitness or entertainment wearable devices.

IoT has been defined in Recommendation ITU-T Y.2060(2012) as a global infrastructure for the information society, enabling advanced services by interconnecting (physically and virtually) things based on existing and evolving interoperable information and communication technologies<sup>197</sup>. Through the exploitation of identification, data capture, processing, and communication capabilities, the IoT makes full use of physical things (as objects from the physical world) or virtual things (from the information world), which can be identified and integrated into communication networks. IoT offers services to all kinds of applications, whilst ensuring that security and privacy requirements are fulfilled. Aiming to integrate leading technologies, such as technologies related to advanced machine-to-machine communication, autonomic networking, data mining and decision-making, security and privacy protection and cloud computing, with technologies for advanced sensing and actuation, the Internet of Things (IoT) is a potential key driver of the digital transformation that enables to reinvent products, services, internal operations, and business models<sup>198</sup>. From a broader perspective, the IoT can also be perceived as a vision with technological and societal implications<sup>199</sup>. Various kinds of IoT applications, e.g., "intelligent transport systems", "smart grid", "e-health" or "smart home" can be based on proprietary application platforms, yet they can also be built upon common service/application support platform(s) providing generic enabling capabilities, such as authentication, device management, charging and accounting<sup>200</sup>. For the social economy, IoT changes social relationships among people and objects. Applications in this framework are characterised by a social and ethical perspective when retrieving personal data and simulating persons' or communities' behaviours.

**Distributed Ledger Technology (DLT), including Blockchain**, has established itself as an umbrella term to designate multi-party database systems that record, store, and distribute securely transactions data. DLTs operate in an environment with no central operator or authority and has a very high tolerance for parties who may be unreliable or have malicious intentions. Blockchain technology is often considered a specific subset of the broader DLT universe that uses a particular data structure consisting of a chain of hash-linked blocks of

196 Gagliardi D., Psarra F., Wintjes R., Trendafil K., Pineda Mendoza J., Haaland K., Turkeli S., Giotitsas C., Pazaitis A., Niglia F., (2020), *New Technologies and Digitisation: Opportunities and Challenges for the Social Economy and Social Enterprises*. European Commission, Executive Agency for SMEs, DOI: 10.2826/667682

197 Source: <https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=y.2060>

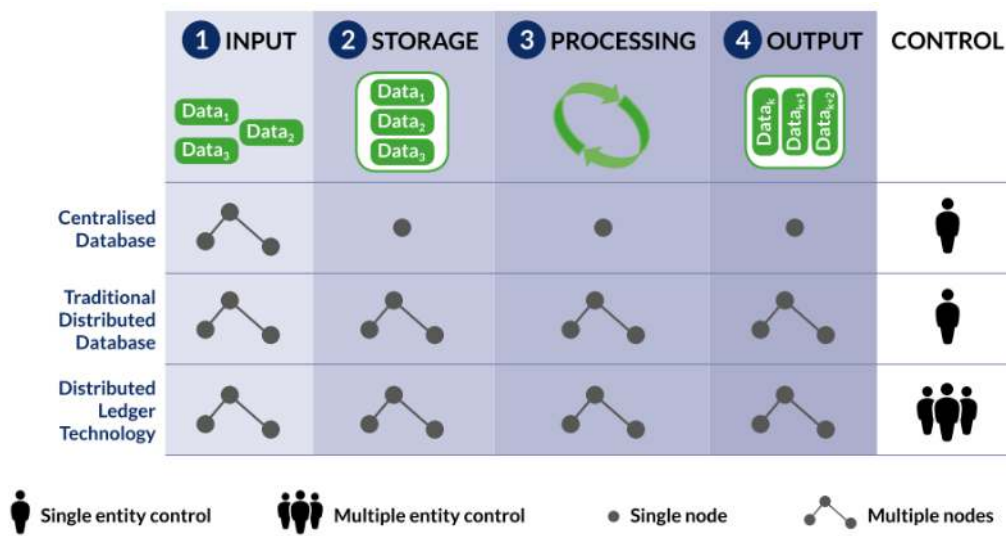
198 Source: <https://eiuperspectives.economist.com/sites/default/files/EIU-ARM-IBM%20IoT%20Business%20Index%202017%20copy.pdf>

199 Source: ibid

200 Source: ibid

data. A traditional distributed database consists of multiple nodes that collectively store and process data. However, the nodes are generally controlled by a single entity as opposed to DLT systems where there are multiple controllers (Figure 21). A DLT system is a system of electronic records that enables independent entities to establish a consensus around a shared 'ledger' - without relying on a central coordinator to provide the authoritative version of the records (Rauchs et al., 2018b). This aspect of distributed - multiple entities - control with DLT fits well with the values of the social economy. The origin and emergence of this technology was actually inspired by one of the founding principles of the social economy and its preference for distributed governance.

Figure: From centralised databases to distributed ledgers



Source:(Rauchs et al., 2018a), p.23

A DLT system can be divided into three interdependent core layers:

1. Protocol: set of software-defined rules that determine how the system operates.
2. Network: interconnected actors and processes that implement the protocol.
3. Data: information flowing through the system that carries specific meanings in relationship to the design and functions the system is intended to play for users.

The application of DLTs is not limited to Bitcoin, finance or smart-contracting; it is spreading towards social and public domains by defining new opportunities for justice, economics, healthcare markets and creative content exploitation. These latter applications include tax collection, identity management, personal health records handling, distribution of benefits, local (or national) digital currencies, property and land registry and





any kind of government record. Blockchain appears to have a better chance to disseminate more quickly and achieve rigorous protocols and standardisation through open-source collaborations.

**Big data** are voluminous amount of structured and unstructured data. The potential value of big data is unlocked only when leveraged to drive decision-making, which is based on data management and analytics. Data management consists in database applications and, in more modern terms, they make use of blockchain or other forms of secure DLTs. Big Data Analytics refers to techniques used to analyse and acquire intelligence from big data. They apply to various high-impact applications such as e-commerce, market intelligence and security. Social perspectives of big data analytics are well known in critical socio-technical systems such as e-government and healthcare, to name a few. Big data analytics in medicine and healthcare, for instance, covers integration and analysis of large amount of complex heterogeneous data such as genomics, biomedical data and electronic health records data (Ristevski & Chen, 2018).

Challenging issues about big data that are often underlined include privacy and security.

**Cloud computing** is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services). Cloud computing can be rapidly provisioned and released with minimal management effort or service provider interaction.

Different service models may be devised. These include the Software as a Service (SaaS) model, the Platform as a Service (PaaS) and the Infrastructure as a Service (IaaS). All these service models support several interesting social-oriented applications through the deployment of 'Community Cloud' and 'Public Cloud' models.

**Artificial Intelligence (AI)** refers to the computational, inferential, and learning ability of digital tools (machines) to process, interpret and act upon data and information in a manner similar to humans. Artificial intelligence can be classified into three different types of systems: *analytical*, *human-inspired*, and *humanised artificial intelligence* (Kaplan & Haenlein, 2019). *Analytical AI* has only characteristics consistent with cognitive intelligence; generating cognitive representation of the world and using learning based on past experience to inform future decisions. *Human-inspired AI* has elements from cognitive and emotional intelligence, understanding human emotions, in addition to cognitive elements, and considering them in their decision making. *Humanised AI* shows characteristics of all types of competencies (i.e., cognitive, emotional, and social intelligence), is able to be self-conscious and is self-aware in interactions with others.

In general terms, AI is a form of biomimicry which seeks solutions to human challenges by emulating natural time-tested patterns and strategies (e.g., the evolution of human brain, its computational skills, and capacities). AI seeks to emulate natural intelligence. It is growing as a broad scientific and technological research and application field. One of the goals is that of creating autonomous, intelligently skilled and learning machines serving at least a function and/or a purpose.

AI has started to affect the ways in which economies operate by shaping many aspects of contemporary businesses operations showing advances especially in genetic diagnostics, industrial automation, sales, and marketing. The AI revolution is therefore building up its potential with significant economic, public, social, and civic implications. In the social economy domain, AI may offer new opportunities to explore patterns,

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regularities, and even rules in data. This will allow to leverage data, text, sounds, images and patterns, regularities, and rules within these objects of analysis. These new opportunities in detecting, measuring, recommending solutions to concrete problems may support better decision-making in tackling social and societal issues, increase efficiency of business operations and effectiveness of governmental policies.

In relation to our conceptual framework with operand and operant use of technology, the very underpinning ‘cognitive’ functions of AI (Russell & Norvig, 2016) implies that the technology can be integrated within the social economy organisations’ operations as critical operant technology. For example, it may be employed to support solving societal problems in new ways via pattern analysis and inference of big data. The intrinsic dynamic nature of the technology, which is becoming applicable to increasingly complex settings, implies that AI is opening new and unforeseen ways and applications. Tasks that in the past were only possible through the application of ‘human intelligence’ such as complex patterns recognition are increasingly becoming undertaken by advanced AI. Less complex tasks (e.g., optical character recognition) have now become routine. These may be performed by off-the-shelf, basic AI technology and are no longer considered to be advanced AI (McCorduck, 2004).

**Digital platforms:** the need for balancing efficient production with increased customer responsiveness has begot the rise of **platforms**. Although the nature of platforms vary depending on their application (Gawer, 2014), a common feature is their ability to permit repeatable solutions and facilitate contact between different actors. Thus, their *raison d’être* is essentially to connect actors, coordinate exchange, and enable strategies that would otherwise be impractical. This necessity combined with the rapid emergence of digital technologies – as enablers as well as “materials” for platform development – have offered platforms the flexibility to disaggregate constituent parts into standardisable physical modules and develop digital modules that can be modified, copied, and disseminated at very low cost (Saarikko, 2015; Yoo, Henfridsson, & Lyytinen, 2010). Thus, they form online knowledge bases of digital content that – depending on their main purpose (collaboration, entrepreneurship, education, business, news and events, search, social community) – are characterised by a different way to collect, retrieve, store, manage, redistribute and provide added value to digital data (European Commission, 2016).

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## 9 Annex III - Typical content and structure of a SRIA document

There is no single pre-defined template for the SRIA document since it can relate to different contexts and challenges. While there is no one-size-fits-all approach, the SRIA needs to incorporate a detailed and distinct level of contents, that allow establishing annual and multi-annual workplans based upon the prioritized lines of actions.<sup>201</sup> The following constitute the essential elements of a SRIA, regardless of the approach (fast-track or deep-dive) followed for its development. The final version may be customized to include additional elements specific to the Alpine region.

1. Vision / mission statement
2. SRIA governance
3. Meta-prioritisation of shared thematic areas of interest
4. Requirements in capacity, infrastructure, competencies, skills, education, training, legislation, funding opportunities, other enabling setups
5. SRIA implementation action plan
  - 5.1. Identified call topics
  - 5.2. Identified additional activities
  - 5.3. Time plan of calls and activities
  - 5.4. Responsibilities of involved regions/countries
6. Monitoring and evaluation
7. Communication and dissemination

<sup>201</sup> Several examples of SRIAs are available on <https://www.era-learn.eu/support-for-partnerships/additional-activities/strategic-research-and-innovation-agendas/guide-for-the-sria-development-process>

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