OIS-AIR PROJECT

Establishment of the Open Innovation System of the Adriatic-Ionian Region

DT 1.1 – PILOT OF ADRIATIC-Ionian MACRO-REGIONAL SMART SPECIALISATION STRATEGY

Macro-Regional Smart Specialisation Strategy

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Macro-Regional Smart Specialisation Strategy of Adriatic-Ionian Region

Strategy document

PART I

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OIS-AIR Pilot of Adriatic-Ionian MRS3

### Abbreviations

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<thead>
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<th>Acronym</th>
<th>Definition</th>
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<tr>
<td>ADRION</td>
<td>Interreg Programme of Adriatic-Ionian region</td>
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<tr>
<td>AI</td>
<td>Artificial intelligence</td>
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<tr>
<td>AIR</td>
<td>Adriatic-Ionian region/macro-region</td>
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<td>AR</td>
<td>Augmented reality</td>
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<td>ATMC</td>
<td>Advanced Traffic Management Center</td>
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<td>B2B</td>
<td>Business-to-business</td>
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<td>B2G</td>
<td>Business-to-government</td>
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<td>C-ITS</td>
<td>Cooperative ITS</td>
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<td>DER</td>
<td>Distributed energy resources</td>
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<td>EDs</td>
<td>Economic Domains</td>
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<td>EDP</td>
<td>Entrepreneurial discovery processes</td>
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<tr>
<td>EUSAIR</td>
<td>Macro-Regional Strategy of Adriatic-Ionian Region</td>
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<td>G2G</td>
<td>Government-to-government</td>
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<td>GHG</td>
<td>Greenhouse gases</td>
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<td>GVCs</td>
<td>Global Value Chains</td>
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<td>IoMT</td>
<td>Internet of Medical Things</td>
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<td>IoT</td>
<td>Internet of Things</td>
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<tr>
<td>ITS</td>
<td>Intelligent Transport Systems</td>
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<tr>
<td>KETs</td>
<td>Key enabling technologies</td>
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<td>MRS3 AIR</td>
<td>Macro-Regional Smart Specialisation Strategy of Adriatic-Ionian Region</td>
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<td>MRSTPA</td>
<td>Macro-Regional Sub-Thematic Priority Area</td>
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<td>MRTPA</td>
<td>Macro-Regional Thematic Priority Area</td>
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<tr>
<td>OIS-AIR</td>
<td>Open Innovation System of the Adriatic-Ionian Region</td>
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<tr>
<td>POs</td>
<td>EU Policy Objectives</td>
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<tr>
<td>R&amp;D</td>
<td>Research and development</td>
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<tr>
<td>R&amp;D&amp;I</td>
<td>Research, development and innovation</td>
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<td>RPA</td>
<td>Robotic process automation</td>
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<td>S3</td>
<td>Smart Specialisation Strategy</td>
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<td>SaaS</td>
<td>Software as a service</td>
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<td>SDs</td>
<td>Scientific Domains</td>
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<td>SDGs</td>
<td>Sustainable Development Goals</td>
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<tr>
<td>TEN-T</td>
<td>Trans-European Transport Network</td>
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<tr>
<td>TPA</td>
<td>Thematic priority area</td>
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<td>VR</td>
<td>Virtual reality</td>
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Macro-Regional Smart Specialisation Strategy of Adriatic-Ionian Region (MRS3 AIR) is a pilot document that is envisioned to set a framework for supporting and strengthening innovation system of the Adriatic-Ionian region and is designed within a project of a broader scope Establishment of the Open Innovation System of the Adriatic-Ionian region (OIS-AIR). The Adriatic-Ionian region is a functional area defined primarily by the Adriatic and Ionian Sea basins. It is home to more than 70 million people and crucial for Europe’s geographical continuity. As a region it is a place of considerable differences, from highly competitive regions that are global leaders in research and development and have excellent research facilities, to a large number of territories with poorer economic and innovation performance, limited research capacities and low manufacturing productivity.

The framework of MRS3 AIR is defined by resources of partner countries and regions, outlined in their Smart Specialisation Strategies (S3) and by challenges that are recognised in EU Strategy for the Adriatic and Ionian Region (EUSAIR). By focusing on several thematic priority areas, mapping potential partners within given fields and exploring opportunities for complementarities and common R&D specialisations, this document endeavours to set R&D directions for the Adriatic-Ionian macro-region (AIR).

Adriatic-Ionian macro-region consists of four EU Member States (Croatia, Greece, Italy and Slovenia) and four non-EU countries (Albania, Bosnia and Herzegovina, Montenegro and Serbia), while OIS-AIR project and Pilot MRS3 AIR involve seven project partners from the macro – region: four countries (Albania, Croatia, Slovenia, Serbia) and three regions (Basilicata, Friuli-Venezia Giulia and Kentriki Makedonia).

The strategy framework is focused to five thematic priority areas that have emerged as strategic areas based on S3 documents’ analysis and on the analysis of data available to the OIS-AIR project team. These thematic priority areas were identified as most common and most present in S3 documents and are, furthermore, interrelated with EUSAIR’s pillars and identified challenges. These five proposed Macro-Regional Thematic Priority Areas (MRTPA), along with associated Macro-Regional Sub-Thematic Priority Areas (MRSTPA) are:

1. Agro-Bioeconomy – Healthy and functional food (Blue) – emphasis on seafood (including freshwater food)
2. Energy and Environment – Integration of distributed energy resources (DER)
3. Transport and Mobility – Green coastal & maritime mobility
4. Tourism and Culture – Smart and creative upgrade of cultural tourism

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OISAIr is implemented through the financial support of the ADRION programme
Within each of the MRSTPAs, few subtopics with more specific R&D and innovation opportunities are proposed. These subtopics are outlined in the following chapters.

In order to support reaching the triple objectives of smart, inclusive and sustainable growth in the Adriatic-Ionian region, this strategy aims to explore the possibility of applying a mission-oriented approach to the identified MRSTPAs. Missions might come in a different shapes and sizes, and in some cases represent simply a trigger for action, still they can provide a massive opportunity to increase the impact of European research and innovation activities, to capture the public imagination and to make a real push in addressing complex challenges.\(^5\)

Data from 33 Smart Specialisation Strategies (S3) and more than 200 thematic priority areas in the Adriatic-Ionian region were analysed using a tailor-made methodology. Proposed MRTPAs for MRS3 AIR are based on several factors and it is the frequency of these factors as a R&D resource as well as the ability of these factors to tackle regional challenges of EUSAIR that were considered. These identified “interrelationships” between S3 and EUSAIR, MRTPAs are shown in a Sankey diagram (Figure 1).

Figure 1 Interrelationships between S3 thematic priority areas with EUSAIR, its pillars and topics

Source: Authors

Within the broader project scope, there is also a focus to SMEs’ active involvement through an open innovation platform that is envisaged by the project. It is a web-based platform\(^6\) aimed to become the

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\(^6\) Interreg ADRION/OIS-AIR, https://oisair.net/, retrieved: 27.2.2019
innovation marketplace of the Adriatic-Ionian Region and virtual place for knowledge, innovation, technology, initiatives and opportunities exchange. In this light, proposed MRTPAs which are more solution-based and which can be perceived as platforms that include other thematic priority areas based on key enabling technologies or KETs (e.g. ICT, new materials or advanced manufacturing systems). To enable a clear and consistent communication regarding MRS3 AIR among all stakeholders, a strategic framework that implies purpose, vision, mission and goals is used to strategically align and link all elements of MRS3 AIR. Furthermore, a mission-oriented approach was employed to create efficient linkages across the MRSTPAs, subtopics and the basic strategic elements. Approach to defining the elements of the MRS3 AIR is explained in the following chapters.

Pilot MRS3 AIR is divided into two parts, in order to facilitate understanding of its MRS3 AIR scope, goals and the methodological approach. In the first part, a review and description of the strategic elements and areas of action are given. The second part provides an overview of the overall framework, methodology outline, statistical overview and the results, as well as the selection procedure of MRTPAs, overview of MRSTPAs with subtopics for innovation and research, and the harmonization of all elements into a single strategic framework.

Strategy document is furthermore composed in a way that allows efficient communication among partners, stakeholders, target groups and the public, by formulating purpose, vision and supportive mission of each thematic area in a way that can easily be communicated and understood. The creative approach to the communication of the strategy is visualised in the following figure.

Figure 2 Efficient communication of the strategy

- First, it helps to have a clear purpose and vision of what a strategy should do.

- Without understandable mission, it is easy to become distracted (chase too many goals - not all of which lead to a strategic outcome).

- If „seeing is believing” than „understanding is participating” (in addition to funding)

Source: Authors
1. Introduction

Over the last decade, S3 has become a pivotal policy development in the EU, in that it has integrated the concepts of innovation policy and industrial policy. Although the S3 concept initially emerged in the academic realm, it has extensively been developed through the actions of both policymakers and practitioners. Recently, the concept has been successfully exported beyond the EU borders, showcasing its international and cross-border potential.

On the other hand, a “Macro-Regional Strategy” is an integrated framework endorsed by the European Council for addressing common challenges faced within a defined geographical area, which may be financially supported by the European Structural and Investment Funds, among possible sources of finance. EUSAIR is one of the four adopted EU macro-regional strategies.

Recently, the idea of combining the two policy concepts/keywords (S3 and macro-regional strategy) into a joint new one (Macro-Regional Smart Specialisation Strategy) has been proposed as a “real challenge”, due to the fact that the idea of conceptual synergy is unique and there is no previous practice in formulating this type of strategic document. The validity of the concept was planned to be tested and benchmarked against other similar strategies, however, no document, whether academic paper or policy report, has provided the answers to the issues of feasibility and applicability of the concept, and to the issues of its practical implementation.

Only few available documents have tackled related issues, by referring mostly to the need of a revision of the S3 concept roughly ten years upon the first proposal of S3 and to problems arising from involvement of global value chains within S3. Still, none of these documents approach the topic in a manner that includes both innovation (S3) and macro-regional issues simultaneously.

In a broad sense, drafting a macro-regional S3 implies the identification of strengths and weaknesses of the productive and scientific realms across an area larger than a country. As in the case of drafting a national S3 after several regional S3 have already been implemented, the shift from the country/region level to a macro-regional one, implies beginning the process anew, including mapping actors/technologies across a broader territory. The conceptual paradigm behind overrides a simple additive concept whereby all national system components are added on. Instead, it is a concept wider than the sum of its parts, e.g. actors and system components of a region may surpass a particular country.

While looking into the possible roles of MRS3 AIR, a strategy that is positioned in-between many national/regional S3 strategies and EUSAIR, several options appear viable. All roles should consider

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both regional S3 resources recognised and consolidated through earlier entrepreneurial discovery processes (EDP) and keeping innovation and research as the core element. The main roles of MRS3 AIR might be seen in the following:

1. using S3 resources to meet some of the challenges identified in EUSAIR;
2. building and establishing transnational value chains in the Adriatic-Ionian region;
3. boosting interregional innovation collaboration;
4. improving economic competitiveness regarding transnational cooperation;
5. increasing macro-regional market opportunities by identifying transnational complementarities and synergies;
6. helping to decrease vast regional cross-country heterogeneity that is still very high;
7. supporting cooperation and partnership between Member States and the neighbouring participating countries;
8. framing several priority areas that are suitable for SMEs and placing focus to them.

Such a broad and rather complex set of feasible roles and challenges of the new MRS3 AIR needs a tool to encompass and direct all diversities and differences found across the Adriatic-Ionian region and to help identify clear directions of the regional innovation and research. This tool might be found in problem-solving approach using missions to fuel innovation-led growth, a concept which was recently endorsed by Prof. Mariana Mazzucato. By setting missions that require different sectors to work together (both across regions and transnationally), it is possible to create instruments that reward those businesses that are willing and able to co-invest alongside European and Member State public investments. 10 This Strategy, as a pilot version defined by the parenting OIS-AIR project attempts to implement some aspects of mission-based approach to its sub-thematic priority areas, i.e. MRSTPAs for innovation and research activities.

An important indicator showing the level of interconnectedness of capabilities, specialisation and division of labour amongst firms in the Adriatic-Ionian countries, is country participation in Global Value Chains (GVC). Namely, in terms of sheer gross export, countries of Adriatic-Ionian region cooperate intensely (Table 1), nonetheless, in terms of participation in GVCs, the situation is quite different. Heterogeneous nature of the Adriatic-Ionian region re-emerges and casts light on great disparities in economic and technological development of Adriatic-Ionian region. In principle, participation in GVC is observed through the extent of forward and backward linkages.

Table 1 Gross export to Adriatic-Ionian region and GVC participation per member country

<table>
<thead>
<tr>
<th>Country</th>
<th>GVC participation (% share of gross export)</th>
<th>% share of export to AIR region in total export</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>81</td>
<td>3</td>
</tr>
<tr>
<td>Slovenia</td>
<td>77</td>
<td>26</td>
</tr>
<tr>
<td>Greece</td>
<td>33</td>
<td>15</td>
</tr>
<tr>
<td>Croatia</td>
<td>30</td>
<td>41</td>
</tr>
<tr>
<td>Bosnia and Herzegovina</td>
<td>24</td>
<td>45</td>
</tr>
<tr>
<td>Albania</td>
<td>17</td>
<td>70</td>
</tr>
<tr>
<td>Montenegro</td>
<td>13</td>
<td>43</td>
</tr>
<tr>
<td>Serbia</td>
<td>1</td>
<td>35</td>
</tr>
</tbody>
</table>

Source: COMTRADE database, authors’ calculation

Forward participation is observed domestic value added sent to third economies, i.e. it reveals how much of value added of one country is present in exports of another country. On the other hand, backward participation is observed through foreign value added of (one’s country) exports, i.e. how much of foreign value added is present in one’s country exports. A detailed statistical analysis of GVC participation is given in Part II of the pilot MRS3 AIR, while the main findings are presented in this section.

Italy and Slovenia are leaders of the region in terms of GVC participation, while the rest of the Adriatic-Ionian region’s participation in GVCs is strikingly low and inadequate.

GVC analysis reveals two distinct patterns, as follows:

1. Regional leaders in GVC participation Italy and Slovenia’s backward participation in GVCs in the Adriatic-Ionian region is visibly low. This implies that these countries are not vertically specialized within Adriatic-Ionian region, i.e. they do not have their “resource base” in the Adriatic-Ionian region.

2. All Adriatic-Ionian countries are less connected to GVCs through forward participation in the Adriatic-Ionian region, i.e. the Adriatic-Ionian region does not serve as “export vehicle” for the Adriatic-Ionian countries.

The primary intention of smart specialization strategy framework is to serve as a policy tool for managing R&D development, by bringing together excellence in R&D and entrepreneurial activities, in specific areas of expertise. One of the main tasks of S3s is narrowing or focusing to a regional context, ideally leading to specialization and differentiation that are built on regional advantages and strengths. On the other hand, development of R&D collaboration networks that grew out of participation in Framework programs of European Union (FP7 and H2020), represents “mechanism that modifies knowledge flows in space, and serves as another source of interaction among regional innovation processes”.

This represented a natural argument to include network analysis of R&D collaboration within Adriatic-Ionian region as part of methodology of MRS3 AIR. The results provided additional

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support for selection of proposed MRTPAs. Evolution of R&D networks in Adriatic-Ionian region was assessed by deploying some concepts and insights from Social network analysis (SNA). This type of analysis “focuses on the structure of ties within a set of social actors, e.g., persons, groups, organizations, etc.”, and is suitable for “analysing brokerage and exchange among other things”. Analysis was carried on institutional data on participation in FP7 and Horizon2020 programmes across each proposed MRTPAs. Main proposals according to findings may be brought down as follows:

1. key actors and facilitators of R&D excellence in R&D AIR networks have been identified using SNA;
2. identified R&D organizations should be considered as facilitators of future development, and ones that can serve as bridges for knowledge and technology transfer from more developed to less developed regions of the AIR macro-region.

Designed within the project of a broader scope “Establishment of the Open Innovation System of the Adriatic-Ionian region” (OIS-AIR), this document will be accompanied with the Action Plan that will define tasks, timing and resources needed for supporting the implementation of pilot MRS3 AIR across identified directions, scheduled for later project stages. OIS-AIR is a web platform based on Hub & Spoke model as collaborative knowledge and infrastructure sharing system between one transnational Hub and many local Innovation Centres (IC) that are connected to support transnational innovation within the AIR area. OIS Platform and the Hub with Innovation Centres will act as a collaborative system in unifying R&D&I services and infrastructures pooling the transnational research-driven innovation process.

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13 Ibid.
2. Strategy framework

“The ability of innovation to spur economic growth has long been recognised. Less recognised is the fact that innovation has not only a rate but also a direction.”

Prof. Mariana Mazzucato

2.1 Basic elements used for setting strategy framework

Strategy can be simply described as a diagnosis that defines or explains challenge or opportunity, a set of decisions for dealing with the challenge or opportunity, and a coherent set of actions to deliver on the decisions to create sustainable advantage and superior results.

The initial reason behind the challenge of devising MRS3 AIR within the scope of OIS-AIR project was to find areas of common partner interest and priorities for innovation and R&D activities through open innovation platform that are framed by two conditionalities. On the one hand, MRS3 AIR attempts to meet the challenges identified by the EUSAIR, and on the other hand, it identifies those areas whose resources are mostly focused on similar goals within the Adriatic-Ionian region, and as such represent viable resources for enhancing interregional innovation and building GVCs in those areas or industries.

To narrow down a broad set of opportunities and directions among challenges and opportunities within Adriatic-Ionian region, clearer strategic framework for both researchers and private sector must be articulated beyond “just a policy”. This may imply or point out to a more business-based approach to forge strategy framework and communication since active private sector involvement is needed and desired as one of the most important indicators of success. On the other hand, in the form of the missions, new policy-based approaches enable environment for setting incentive measures and directions for innovation and research activities.

As previously mentioned, mission-oriented policy approach has emerged as a key element of policies focused on inclusive growth and creation of new jobs. Mission should trigger action to speed-up progress in the innovation, research and development of technologies that increase their societal impact. In other areas, the mission should drive a systemic change. Well-known example of a good mission-oriented thinking are global challenges defined as 17 Sustainable Development Goals (SDGs), adopted by 193 countries and initiated by the United Nations. Missions should also take into consideration upcoming global megatrends in the following decades, which are pertinent worldwide and affect all parts of society.

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Report of the independent High Level Group on industrial technologies\textsuperscript{17} embraces mission-based approach to define mission-oriented policies to promote European re-industrialisation within the framework of an innovation system and policy around KETs. KETs have substantial impact in terms of creating high quality jobs, improving people’s lives and creating future prosperity. In 2009, KETs were defined as knowledge intensive and associated with high R&D intensity, rapid innovation cycles, high capital expenditure and high-skilled employment. As a factor of a huge systematic relevance, they enable process, products and services innovation throughout the economy. KETs are multidisciplinary, cutting across technology areas with a trend towards convergence and integration, and can therefore assist technology leaders in other fields that capitalise their research effort.\textsuperscript{18}

2.2 Methodology “in brief”

The context for the development of a Macro-regional smart specialization strategy represents a novelty in the area of R&D and policy developing strategies. Therefore, it requires the development of a dedicated or specific methodology for document creation and the identification of thematic areas for research, development and innovation. This task, at the same time represents an opportunity for compromise, but also a challenge for the AIR region. As a first step of the process, extensive desk research of all available sources (such as Eye@RIS3 tool shown in Figure 3), projects, research papers and works was carried out, focused to the topic of smart specialization in terms of cross-border or regional collaboration. The processes of funnelling and aligning within given context and framework was deployed as the basic methodological tools. The developed approach is depicted in its simplest form in Figure 4.

\textit{Figure 3 Eye@RIS3 tool}


The developed methodology process (Figure 5) for determining the MRTPAs includes the following key steps:

1. collecting data on S3 thematic priority areas (TPAs) from Eye@RIS3 tool (Figure 4);
2. classifying all collected TPAs into 20 predefined, broader and coherent thematic priority areas termed Macro-Regional Thematic Priority Areas (MRTPAs);
3. identifying five MRTPAs common to all AIR countries/regions based either on their highest frequency and/or firm association with pillars and topics of EUSAIR;
4. analysis and comparison of relevant S3 TPAs data based on inputs from three data categories: Economic Domains (EDs), EU Policy Objectives (POs) and Scientific Domains (SDs);
5. for each of five chosen MRTPAs, most appropriate Macro-Regional Sub-Thematic Priority Area (MRSTPA) is defined based on TPA descriptions, composition of ED (NACE Rev. 2), PO and SD data and their frequency and association with EUSAIR pillars and topics;
6. anticipating megatrends and analysing recurring keywords, KETs, R&D networks and data from previous steps to propose MRSTPA subtopics and a set of solutions containing interconnected and interrelated topics for innovation and R&D;
7. aligning all elements into a strategy by stating purpose and vision for the MRS3, missions, and goals for each of the five MRSTPAs.
Methodology and data are explained in detail in the document PART II, including a step-by-step example.

### 2.3 Purpose and Vision

Purpose and Vision of the MRS3 AIR are derived from several sources describing framework of the strategy between OIS-AIR project, EUSAIR, AIR perspectives, S3 context and results from methodological analysis for finding common areas and technology trajectories in innovation and research. Sources are:

1. There are several relevant strategic documents that create a framework for defining purpose and vision of a MRS3 and are used as a common anchor for all MRSTPAs. In the follow-up, important statements and keywords from these documents are pointed to: “...significant untapped opportunities in interregional collaboration for innovation and innovation-driven growth persist...” (Project OIS-AIR Application Form)\(^{19}\)

2. “The EUSAIR focuses on four pillars: 1) Blue Growth; 2) Connecting the Region; 3) Environmental Quality; and 4) Sustainable Tourism. The Action Plan is one of the outputs of the Strategy. Its aim is to go from “words to actions” by identifying the concrete priorities for the macro-region. It is structured to reflect the four pillars, as well as the topics selected

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\(^{19}\) Application Form: Adriatic-Ionian Programme INTERREG V-B Transnational 2014-2020: First Call for Proposal
under each of them, also including an indicative list of eligible actions and project examples...” (Project OIS-AIR Application Form)20

3. “Challenges and opportunities that the Adriatic-Ionian region faces. What we see today are very noticeable socio-economic differences across the countries in the region.” (EUSAIR)21

4. “Increase of key innovation actors’ capacity level to be effectively involved in transnational actions for the development of a regional innovation system.” (Interreg ADRION)22

5. “Promoting business investment in R&I, developing links and synergies between enterprises, R&D centres and academia, especially investment promotion of product and service development, technology transfer, social innovation, eco-innovation, public service applications, demand stimulation, networking, clusters and open innovation through smart specialisation.” (Interreg ADRION)23

6. “The EUSAIR is founded on four thematic priorities/pillars representing key challenges as well as key opportunities in the Adriatic-Ionian region. For each pillar, specific topics and actions have been identified, taking into account the needs, issue urgency and the joint actions value added in order to meet the existing challenges and build the future opportunities.” (EUSAIR)24

7. Regulation (EU) N° 1303/2013: “Smart Specialisation Strategy means the national or regional innovation strategies which set priorities in order to build competitive advantage by developing and matching research and innovation own strengths to business needs in order to address emerging opportunities and market developments in a coherent manner, while avoiding duplication and fragmentation of efforts; a smart specialisation strategy may take the form of, or be included in, a national or regional research and innovation (R&I) strategic policy framework.” (S3)25

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20 Ibid.
Proposed Purpose & Vision for the Macro-Regional Smart Specialisation Strategy (MRS3 AIR):

**PURPOSE**
Reason of existence (never changes)

Strengthen the regional innovation system and spark smart growth through cross-regional collaboration, thereby responding to priorities, challenges and opportunities of the Adriatic and Ionian region (AIR).

**VISION**
A shared picture of mission success (midterm)

Established and competitive transnational value chains in Adriatic and Ionian region created by deploying complementary resources & infrastructure and fostering innovation in S3 areas of common interest.

2.4 Missions and Goals

Missions and goals are developed for each of five proposed MRSTPAs to support Vision and Purpose of the MRS3 AIR containing basic and key elements of chosen areas and subtopics. The illustration in Figure 6 shows the analogy taken from the mission-oriented concept.

*Figure 6 Strategy in mission-oriented concept*

Source: Authors, based on Mazzucato, M. (2018), op. cit.
Five proposed MRTPAs with associated MRSTPAs are as follows:

1. **Agro-Bioeconomy** – Healthy and functional food (Blue) – emphasis on seafood (including freshwater food)
2. **Energy and Environment** – Integration of distributed energy resources (DER)
3. **Transport and Mobility** – Green coastal & maritime mobility
4. **Tourism and Culture** – Smart and creative upgrade of cultural tourism
5. **Health and Medicine** – Sustainable new healthcare models.

Within each of the MRSTPA, few subtopics with more specific fields for research, development and innovation (R&D&I) opportunities are proposed:

1. **Healthy and functional food (Blue)** – emphasis on seafood (including freshwater food)
   a. Advanced processing and packaging solutions
   b. Food safety and traceability
   c. Smart solutions for personalized diet
2. **Integration of distributed energy resources (DER)**
   a. Integration of renewable energy sources, energy storage systems and demand-side management systems
   b. Data-based services and solutions for energy efficiency planning (including for infrastructure upgrading or retrofitting)
   c. Smart grid solutions
3. **Green coastal & maritime mobility**
   a. Hybrid propulsion and vessel energy efficiency systems
   b. Coastal (short-sea) based Intelligent transport systems (ITS)
   c. Smart ports solutions
4. **Smart and creative upgrade of cultural tourism**
   a. Culture destination management (cultural heritage management)
   b. Creative industries
   c. Digital transformation
5. **Sustainable new healthcare models**
   a. Outcome-based healthcare model (Value-based care – VBC)
   b. New technologies and Data Management
   c. Personalized medicine
   d. Health tourism.
Mission and Goals for proposed MRSTPAs:

| MRSTPA 1: Healthy and functional food (Blue) – emphasis on seafood (including freshwater food) |
| MISSION: Fresh and safe Mediterranean diet delivered from its source |
| GOALS: Creating and securing sustainable value chain based on regional fresh seafood marketed for healthier lifestyle. |

| MRSTPA 2: Integration of distributed energy resources (DER) |
| MISSION: Energizing natural diversity with affordable and integrated renewables |
| GOALS: Build regional capacities and expertise for successful and smart integration of renewable and distributed energy sources to assure sustainable future and regional biodiversity. |

| MRSTPA 3: Green coastal & maritime mobility |
| MISSION: Green and smart interface to the hinterland |
| GOALS: Fostering clean, safe, connected, automated and integrated mobility solutions based on interoperability between maritime and hinterland transport. |

| MRSTPA 4: Smart and creative upgrade of cultural tourism |
| MISSION: Enhanced territorial experience through synergies of culture and creative industries |
| GOALS: Increasing solutions for closer integration of cultural heritage and local resources into sustainable tourism through innovation, creativity and smart technologies. |

| MRSTPA 5: Sustainable new healthcare models; |
| MISSION: Encourage transformation of healthcare to improve health and well-being |
| GOALS: Deploy digital transformation in the region to enable preventive, more integrated, value-based and sustainable healthcare systems to ensure quality of life and active and healthy aging. |
3. MRTPA Agro-Bioeconomy

Data collected from Eye@RIS3\(^\text{26}\) tool for all S3 and similar strategic documents of Adriatic-Ionian region are analysed and categorised into 20 broader categories called Macro-Regional Thematic Priority Areas (MRTPAs), through the use of developed methodology\(^\text{27}\). Agro-Bioeconomy is the most frequent thematic area that encompasses 31 regions, covers broader scope of defined areas and differs regarding its innovation knowledge and market features across the macro-region. Figure 7 shows regional distribution of regions that have included Agro-Bioeconomy as one of the priority areas in S3 or similar strategic documents.

*Figure 7 Frequency of Agro-Bioeconomy in Adriatic-Ionian region*

Further methodological analysis of the data sets of 20 thematic priority areas and its chosen Economic Domains, Scientific Domains and EU Policy Objectives, has further pointed to **Healthy and functional food (Blue) – emphasis on seafood (including freshwater food)** as a common trajectory on a sub-thematic level, on the level of Macro-regional Sub-thematic Priority Area (MRSTPA) that further focuses on identified resources and challenges. Furthermore, MRSTPA has three proposed subtopics for innovation and R&D activities (Figure 8). More detailed analysis and explanations are given in the document PART II.

\(^\text{26}\) See document PART II, chapter Eye@RIS3 Tool
\(^\text{27}\) See document PART II, chapter Methodology
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Figure 8 Healthy and functional food (Blue) subtopics and their impact

Source: Authors

Following the idea of using mission-based policies framework, proposed MRSTPA is embedded within strategy-based components such as mission, goals and solutions that define more focused approach to the success of the strategy.

3.1 MRSTPA mission

Fresh and safe Mediterranean diet delivered from its source.

3.2 Goals

Creating and securing sustainable value chain based on regional fresh seafood marketed for healthier lifestyle.

Goals are about:

**Fresh and safe seafood** – requires highly efficient cold chain management within logistic operations of the value chain that is usually connected to high technology (e.g. traceability, block chain, cold chain, processing, packaging, etc.)

**Regional source and specific diet** – long tradition of Mediterranean region and specific healthy seafood diet is recognized in Europe and beyond. Sources are fisheries and aquaponics originating from Adriatic and Ionian Sea resources.

**Healthier lifestyle** – based on healthy, fresh, traceable seafood diet supported by smart innovative solutions for personalized diet to meet citizen’s nutritional and allergenic requirements that relies on healthy Mediterranean food from the source.

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3.3 Impact and Relevance

Given its favourable geostrategic position, Adriatic-Ionian region may economically prosper by creating sustainable new value chain based on specific lucrative marketed segment based on healthy seafood. Innovate solutions and creation which rely on new business models along value chain activities are essential to meet consumers’ increasing demand for transparency, smarter fish farming practices, food ethics, information on origin of produce, together with smart personalised diet solutions as important value added model. Ability to innovate business processes and production, traceability, cold chain logistics, sales, management practices and marketing along the value chain across the Adriatic-Ionian region would steer the whole region towards more competitive position as a resilient provider of safe, healthy and sustainable food.

In this context, the Adriatic-Ionian region has excellent preconditions to develop specific sustainable model in order to preserve sustainability of its natural resources for long-term benefit and raise competitiveness by providing better and healthier lifestyle.

3.4 Solutions

Technological innovations such as life science technologies, precision farming, artificial intelligence, blockchain, security and connectivity along the value chain activities, which would improve production and distribution efficiency while also providing better food quality are crucial for the success. Knowing that major health issues and chronic diseases come from unhealthy or inappropriate diet, having knowledge about food origin and other information stated on food declarations is a massive step towards disease prevention and health. Therefore, increasing food transparency and traceability is a major concern that can be tackled with new digital tools such as sensors, artificial intelligence, security and connectivity, data-driven planning along the cold supply chain, taking into account forecast information on food production and demand, thereby reducing wastes while also meeting personalized demand, all of which could lead to regional competitive advantages. Other technological innovations could be focused on reducing greenhouse gas emissions associated with the food value chain, reducing food and packaging waste along the production and value chain and using new biotechnologically processes that can turn agricultural waste into valuable recyclable products, thereby strengthening the green economy.
4. MRTPA Energy and Environment

Energy and environment is the third most frequent MRTPA that encompasses 20 regions, covers broader scope of defined areas and differs regarding its innovation knowledge and market features across regions. Figure 9 shows distribution of regions that have placed Energy and environment as one of the priority areas in their S3 or similar strategic documents.

*Figure 9 Frequency of Energy and Environment in Adriatic-Ionian region*

Integration of distributed energy resources (DER) was defined as MRSTPA, along with three proposed subtopics for innovation and R&D activities (Figure 10). More detailed analysis and explanations are given in the document PART II.

*Figure 10 Integration of distributed energy resources (DER) subtopics and their impact*
Following the idea of using mission-based policies framework, proposed MRSTPA is embedded within strategy-based components such as mission, goals and solutions that define more focused approach to the success of the strategy.

4.1 MRSTPA mission

Energizing natural diversity with affordable and integrated renewables.

4.2 Goals

Build regional capacities and expertise for successful and smart integration of renewable and distributed energy sources to assure sustainable future and regional biodiversity.

Goals are about:

**Capacities and expertise** – know-how and talent management are needed and represents second key enabler in addition to technology itself.

**Integration of renewables** – integration is the practice of developing efficient ways to deliver variable renewable energy to the existing grid. Secure and proofed methods should be developed and deployed to maximize the cost-effectiveness of incorporating the variety of renewable energy (RE) sources into the power system while maintaining or increasing system stability and reliability.

**Distributed energy** – distributed energy sources situated close to customers or consumers tackling both challenges of higher efficiency and sustainability. Development and deployment of various technologies both “on grid” or on remote locations can meet the criteria of sustainability and efficiency. It resonates heavily with the shift from energy consumer (in traditional energy landscape), to energy prosumer (indicating a bi-directional energy flow).

**Smart and data-based** – smart grids comprise a broad mix of technologies for modernising electricity networks. Improved monitoring, control and automation technologies can help enable new business models while unlocking system-wide benefits including reduced outages, help energy users make better energy choices based on data collection and information, improve response times, deferral of investment in the grids themselves and the integration of distributed energy resources.

4.3 Impact and Relevance

Having availability of clean and affordable energy produced near consumption allows for a more efficient and transparent energy system as one of the key enablers for sustainable development and growth of local societies and communities. Innovation and development of such distributed and renewable energy sources accompanied with new business models would make shift from national incentives, enabling them to operate on market principle. Integration of such distributed energy sources

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sources, developing new services and aggregation models based on data would accelerate the greening of the energy systems.

4.4 Solutions

Affordable renewable technologies for energy independence, better efficiency and improved energy storage technologies and systems require research in new strategies for controlling renewable energy generators, and for the improvement of the existing algorithms for the optimal use of the obtained power; new concepts for generators; development of cross-border connections, power measurement units, predictive analytics, phase-shifting transformer technologies: high and low voltage converters, new Maximum Power Point Tracking algorithms, interfaces for network connection involving new quality and grid management; development of software applications and tools for the observability and the flexibility of the whole power system; as well as new materials and components to improve both energy storage costs and performance.\textsuperscript{30}

\textsuperscript{30} European Commission, Directorate-General for Research and Innovation (2018); op. cit.
5. MRTPA Transport and Mobility

Transport and mobility is the fifth most frequent MRTPA that encompasses 11 regions, covers broader scope of defined areas and differs regarding its innovation knowledge and market features across regions. Figure 11 shows distribution of regions that have placed transport and mobility as one of the priority areas in S3 or similar strategic documents.

*Figure 11 Frequency of Transport and Mobility in Adriatic-Ionian region*

Source: Authors

*Green coastal & maritime mobility* was defined as MRSTPA, along with three proposed subtopics for innovation and R&D activities (Figure 12). More detailed analysis and explanations are given in the document PART II.
Following the idea of using framework of mission-based policies\textsuperscript{31}, proposed MRSTPA is embedded within strategy-based components such as mission, goals and solutions that define more focused approach to the success of the strategy.

5.1 MRSTPA mission

Green and smart interface to the hinterland.

5.2 Goals

Fostering safe, connected, automated, clean and integrated mobility solutions based on interoperability between maritime and hinterland transport modes.

Goals are about:

**Safe and secure** – by aiming for protection from road traffic accidents, by halving the number of serious injuries in the EU by 2030 from the 2020 baseline\textsuperscript{32} and enhancing the resilience of transportation systems to external shocks such as cyberattacks or extreme weather condition. With regard to vessels safety and security\textsuperscript{33}, focus is on early identification of high-risk vessels, earlier precautionary actions, and improved emergency response to incidents or pollution, including search and rescue operations. Regarding passenger vessels, the focus is on further enhancing the level of safety and facilitating the internal market.

**Connected and automated** – infrastructural readiness for new ITS (Intelligent Transport Systems) and C-ITS (Cooperative ITS) critical and indispensable systems and services for imminent rollout of connected, electrical and autonomous vehicles and vessels. For example, the EU has already begun to prepare the ground, with the adoption of strategies on cooperative intelligent transport systems,

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\textsuperscript{31} Mazzucato, M. (2018), op. cit.
as well as on future 5G communications technology.\textsuperscript{34} Regarding waterborne transport, additional aspects of administrative simplification, optimization and cargo flows, and better use of existing infrastructure using digital technologies, will be addressed in the recently established Digital Transport & Logistics Forum.\textsuperscript{35}

Clean and sustainable – by reducing the environmental impact of mobility on greenhouse gases (GHG) and other polluting emissions, material usage and waste and noise, e-mobility solutions are promoted. Regarding waterborne transport, clean and sustainable shipping will be further promoted with the effective implementation of Directive 2014/94/EZ on the deployment of alternative fuels infrastructure. The new TEN-T guidelines and their main financing instrument, The Connecting Europe Facility (CEF), support the promotion of green shipping.

5.3 Impact and Relevance

Fostering joint Adriatic-Ionian region transnational research and implementation of specific regionally mobility products, solutions and values that can boost local and regional economies through better transport networks between ports and hinterland, traffic flows, safer transport and cleaner environment therefore providing well-being and better life of population across the region. Ports of the Ionian seas and especially the Adriatic, with their interfaces towards hinterland are considered to become main maritime transport vessel entry points to the EU from the east, especially China, Central Asia and Middle East (so-called 21\textsuperscript{st} Century Maritime Silk Road)\textsuperscript{36}, therefore providing great opportunity and economic impacts for Adriatic-Ionian states.

5.4 Solutions

Knowledge exchange promotion and information transparency among stakeholders, encouraging cooperative and multi stakeholder relationships including Business-to-Business (B2B), Business-to-government (B2G) and Government-to-Government (G2G). Raising awareness of all public, private, policy makers and other stakeholders about importance and benefits of implementing innovative ITS solutions. Comparing with traditional transport systems, digitalization and IT solutions implemented in a form of ITS solutions can provide safer, faster, cleaner and economically sustainable results without a need for additional costly investments into new road and port infrastructure facilities. Adriatic-Ionian region should be prepared with critical infrastructure readiness regarding upcoming rollout of new emission-free propulsion, connected, autonomous land (road and rail) vehicles and maritime green vessels. That includes implementing sensors, cameras, new communication networks (5G), charging infrastructure, Advanced Traffic Management Centres (ATMC), smart ports facilities, etc.


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integrated with various public services, having disseminating role to public and providing transport data over open data platform as a ground base for new innovative entrepreneurial mobility business models. Synergies with TEN-T policy should be further exploited. Better coordination of maritime and inland waterways operations with ports and hinterland connections can be pursued, through the integration of ICT tools (e.g. Union Maritime Information and Exchange system SafeSeaNet, River Information Service). Technological solutions focusing on: 1) New energy efficient system and architectural concepts; 2) Filling/charging and energy and power management; 3) Smart sensors; 4) Smart actuators and motors in transport systems; 5) Environment recognition; 6) Localization, maps, and positioning; 7) Control strategies; 8) Artificial intelligence in automated mobility and transportation; 9) Communication inside of and outside of vehicle; 10) Testing and dependability; 11) Functional safety and fail operational architecture and functions; 12) Swarm data collection and continuous updating; and 13) Predictive health monitoring for connected and automated mobility.
6. MRTPA Tourism and Culture

Tourism and Culture is the second most frequent MRTPA encompassing 24 regions, covers broader scope of defined areas and differs regarding its innovation knowledge and market features across regions. Figure 13 shows distribution of regions that have placed tourism and culture as one of the priority areas in S3 or similar strategic documents.

*Figure 13 Frequency of Tourism and Culture in Adriatic-Ionian region*

Source: Authors

**Smart and creative upgrade of cultural tourism** was defined as MRSTPA, along with three proposed subtopics for innovation and R&D activities (Figure 12). More detailed analysis and explanations are given in the document PART II.
Following the idea of using mission-based policies framework, proposed MRSTPA is embedded within strategy-based components such as mission, goals and solutions that define more focused approach to the success of the strategy.

6.1 MRSTPA mission

Enhanced territorial experience through synergies of culture and creative industries.

6.2 Goals

Increasing solutions for closer integration of cultural heritage and local resources into sustainable tourism through innovation, creativity and smart technologies.

Goals are about:

- **Local resources** – one of the higher concentrations of the UNESCO World Heritage Sites (approximately 70 sites) and richness of the natural resources and biodiversity (national parks, nature parks, terrestrial and marine protected areas, rural and mountain areas, etc.)

- **Creativity** – experience, promotion and visibility of local cultural and natural resources supported by creative industries.

- **Technology and innovation** – huge impact on future development of cultural heritage management, usage and preservation but also on the creation of new business services and models.

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6.3 Impact and Relevance

Relevance of the tourism on the AIR economy is indisputable: tourism accounts for around 10 % of GDP, of which 66 % comes from foreign contribution of tourism to GDP.\(^{38}\) On the EU level, one in ten enterprises belonged to the tourism industries, employing 12.7 million people (2015)\(^{39}\). Europe as the most frequently visited region in the world accounts for just over half (51 %) of the 1.32 billion international tourist arrivals (2017).\(^{40}\) Therefore, successfully developed solutions in this MRTPA within the AIR region represents a huge potential for transfer of the solutions to other EU regions and beyond. Cultural heritage and the associated cultural tourism as one of the most important selective forms of tourism, contributes to forming an individual and macro-regional identity, supports social and territorial cohesion and has the potential for defining new types of creative industries jobs. Usage, protection and promotion of sustainable cultural heritage on EU level is highly needed. Europe 2020 Strategy denotes potential of culture and cultural heritage in capacity building in four flagship initiatives: the Innovation Union, the Digital Agenda for Europe, An industrial policy for the globalization era and the Agenda for new skills and jobs.

6.4 Solutions

Cultural heritage management, optimization, promotion and preservation should rely more on smart technology opportunities and creative industry solutions. It needs to anticipate upcoming trends (e.g. providing personalized tourism experience, virtual reality cultural heritage sites experience, etc.) and to be very attentive to the expectations regarding tourists’ generation gap (how they consume services and their impact on the destination differ). Different tools are developed and used in order to increase cultural heritage availability on digital platforms, such as database integration, e-culture as a digitally created culture type, promotion of urbanization as a source of new art forms and culture, biometrics or gaming industry. Each activity oriented towards generating value added products and services, competitive and creative jobs, smart and sustainable development should be supported by following technologies: blockchain, Big data, Internet of Things (IoT), artificial intelligence (AI), software as a service (SaaS), mobile technology, augmented reality (AR) and virtual reality (VR).

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7. MRTPA Health and Medicine

Health and Medicine is the fourth most frequent MRTPA encompassing 19 regions, covers broader scope of defined areas and differs regarding its innovation knowledge and market features across regions. Figure 15 shows distribution of regions that have placed health and medicine as one of the priority areas in S3 or similar strategic documents.

*Figure 15 Frequency of Health and Medicine in Adriatic-Ionian region*

Source: Authors

**Sustainable new healthcare models** was defined as MRSTPA, along with four proposed subtopics for innovation and R&D activities (Figure 16). More detailed analysis and explanations are given in the document PART II.
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**Figure 16 Sustainable new healthcare models subtopics and their impact**

![Diagram showing subtopics and their impact]

Source: Authors

Following the idea of using mission-based policies framework, proposed MRSTPA is embedded within strategy-based components such as mission, goals and solutions that define more focused approach to the success of the strategy.

### 7.1 MRSTPA mission

Encourage transformation of healthcare to improve health and well-being.

### 7.2 Goals

To deploy digital transformation that enables preventive, more integrated, value-based sustainable healthcare systems to ensure quality of life and active and healthy aging.

**Goals are about:**

**Digital** – new technologies and innovations are introduced within the industry, based on rapid healthcare changes and development creating big change among medical practitioners, researchers, and patients.

**Integration** – changes in organizational behaviours and enhancement in delivery of patient care while lowering its costs by developing infrastructure for measuring outcome, collecting and processing data, establishing a communication network across the health care industry.

**Value-based** – organization of healthcare industry in the way it is safe, innovative and cost-effective by delivering quality patient care, measuring patient outcomes and quality of life.

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7.3 Impact and Relevance

The future of the healthcare industry will inevitably rely on cutting-edge technology and innovations. With financial sustainability, care delivery, patient centricity (personalized medicine), digital transformation and regulatory compliance healthcare sector leaders need to collaborate with all stakeholders, both within the healthcare ecosystem and within emerging industries, which will shape the future of healthcare and establish a sustainable smart health community.

It is imperative for stakeholders across the healthcare ecosystem to collaborate around a whole-life approach to funding and delivering sustainable healthcare. Investments in technology such as virtual health and telehealth could expand services by shifting focus away from a system of sick care in which patients are treated after they fall ill, to one of healthcare that supports well-being, prevention, and early intervention.

7.4 Solutions

Data management, analysis and sharing are crucial for the future of European healthcare. Digital technologies are supporting health systems’ efforts to the transition to new models of patient-centred care and helping them develop “smart health” approaches to increase access and affordability, improve quality and lower costs. Blockchain, robotic process automation (RPA), cloud, artificial intelligence (AI) and robotics, internet of medical things (IoMT), digital and virtual reality are just some of the ways technology is disrupting health care. These technologies are helping with diagnosis and treatment, as well as with speed, quality and accuracy, and improving the patient experience. Developing new electronic healthcare structure and data sharing with analysis will show the path towards understanding and developing treatments for conditions.
8. Strategic fit

Strategic fit, shown in Figure 17 represents “flawless and seamless” transference of MRS3’s purpose and vision into five MRSTPA missions. Each MRSTPA has set goals and identified subtopics for meeting these goals through collaborative innovation and R&D activities.

*Figure 17 Strategic fit from Purpose and Vision to identified subtopics*
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