# BLUEAIR PROJECT

## BLUE GROWTH SMART ADRIATIC IONIAN S3

# D.T.2.3.3.

# INNOVATION STRATEGY OF THE MACRO REGIONAL S3 ON BLUE GROWTH

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# 1. Purpose and vision

**Marine and maritime research and innovation hold the key to achieving the EU's goal of becoming climate-neutral by 2050[1].** By protecting and restoring marine ecosystems and fostering sustainable innovation, the blue economy can become a hub of ideas and action. Innovative technologies such as big data, artificial intelligence, advanced modelling, robotics, sophisticated sensors, and autonomous systems are poised to revolutionize the blue economy, driving progress and sustainability across sectors.

**Research and innovation play a crucial role in the transformation needed to achieve the Green Deal.** Investment in research and innovation will pave the way for sustainable blue economy value chains and facilitate the green and digital transitions. Smart specialization strategies further boost innovation through various funding opportunities, developing European value chains. Additionally, support for low-carbon technology demonstration projects in the marine environment is available.

**It's time to embrace the call for innovation in the sustainable blue economy.** By working together in a purposefully networked innovation community, we can seize this opportunity and shape a future where innovation and sustainability thrive hand in hand to promote innovation and cooperation and a sustainable use of the blue resources. Through the development of an Innovation Strategy, the BLUEAIR project contributes to improve administrative capacities, innovativeness, and blue economy development for participating territories as well as for the whole Adriatic-Ionian area.

**The purpose of strategy is to provide direction, coherence, and resource optimization, ensuring that stakeholders thrive in competitive environments while preserving the sustainability of the environment and natural habitats.** By setting clear goals, developing action plans, and mobilizing resources, organizations (within innovation ecosystems) can ensure their survival, sustainability, and growth. Strategic objectives serve as a compass, guiding desired outcomes and impacts. Translating strategic goals into practical steps through action plans ensures progress towards the vision of the desired future. By mobilizing and focusing resources, efficiency is optimized, distractions are minimized, and success is maximized. The vision of the Innovation strategy is as follows:

**Built vibrant Adriatic-Ionian Innovation Community composed by all Q-Helix actors that pursues macro regional transformative activities toward Smart and Sustainable Blue Economy making the most of opportunities provided by its seas, lakes and rivers!**

**Simply put, a vision is a summary of the desired future that we believe will be possible through the implementation of the strategy.** The vision of the Innovation strategy is a concise, understandable, and clear description of the ambitious, inspirational, and achievable desired impact over time in the field of Sustainable Blue Economy at the macro-regional level. Aligned with the strategic framework, it contributes concretely to the development of the Blue Economy (Blue Growth), ensuring success and progress towards a vibrant and sustainable future. The vision of the Innovation strategy will be realized through the key elements – long-term goals, short-term objectives, initiatives (activities), inputs (tools and resources), and expected results, outcomes and impacts.

[1] Communication COM(2021) 240: A new approach for a sustainable blue economy in the EU - Transforming the EU's Blue Economy for a Sustainable Future

## 2. Concept and framework

**In the second decade of the 21st century, the concept of the Blue Economy has emerged as exceedingly important, with significant effects on wealth, the labour market, and the organization of coastal regions.** It emphasizes the need for sustainable economic growth, social inclusion, and environmental preservation to meet the growing demands on ocean resources.

**In the Adriatic-Ionian regions Sustainable Blue Economy Innovation policies are characterized by a fragmented situation, with pioneering and lagging regions searching for a joint knowledge-based approach to their innovation strategies to enhance the Blue Economy sectors in their territories.** Moreover, regions and countries overlooking the same seas and rivers need harmonized Blue Economy policies to plan future innovation initiatives on topics such as sea (and waterborne) transport, water pollution, energy connectivity, marine environment protection, as well as promotion of sustainable tourism.

**The innovation strategy concept in a fragmented macroregional context unleashes collaboration, creativity, and boundary-breaking ideas among diverse stakeholders.** The innovation strategy concept in macroregional fragmented context should acknowledge and embrace the diversity of stakeholders' capabilities and strives to create an enabling environment that encourages experimentation and learning, even risk-taking. It promotes the development of mechanisms such as value chain approaches over the traditional and emerging sectors that connect stakeholders and community through thematic innovation hubs, innovation challenges, or collaborative projects, that facilitate interaction, knowledge exchange, and the exploration of new ideas across stakeholder boundaries.

**The innovation strategy concept seeks to create a collaborative and inclusive environment where stakeholders can contribute their expertise, ideas, and resources towards a common goals of driving innovation.** In a fragmented context of innovation policies and stakeholders' capabilities, an innovation strategy concept refers to a deliberate and systematic plan that aims to bridge the gaps and harness the diverse capabilities of different stakeholders to foster innovation. It recognizes that stakeholders, such as individuals, organizations, communities, or regions, possess unique knowledge, expertise, resources, and perspectives.

**By aligning the innovation strategy in the Blue Economy of the Macro-Regional with resources and targets outlined in regional and national Smart Specialization Strategies (S3), the BLUEAIR project aims to enhance the institutional capabilities of ADRION territories.** It aims to achieve this by establishing a dedicated Innovation Community and enhancing the coordination of local initiatives both with the EUSAIR strategy and regional or national S3 resources. The project's objective is to promote the synergies between macroregional S3 policies in the development of the Blue Economy emphasizing the significance of the future relationship between innovation strategy and Smart Specialization Strategies in driving regional progress.

For this purpose, Roadmap for Innovation Strategy and accompanying Action plan were developed, for the period until 2027.

**Roadmap is a holistic innovation strategy – a method for strategic long-term planning and a link between strategy (diagnostics, vision and goals) and action plan.** It describes and clearly communicates (and visualizes) the key outcomes or prerequisites that must be achieved within a certain time frame in order to successfully achieve the strategic vision. This document defines the tools and activities that are necessary for the effective activation of macroregional innovation potentials through the cooperation of stakeholders of the Quadruple Helix (Q-Helix). The roadmap indicates how to realize the goals in terms of achieving the desired transformations and innovations to increase the competitiveness and resilience of the targeted industries of the blue economy in relation to global changes caused by (re)globalization, decarbonization and technological changes, and in order to transform the targeted traditional industries into sustainable blue economy.

**Figure 1. Strategic roadmap: the link between strategy and execution.**


Roadmap includes the concept of Theory of Change, and elaboration in which way and why the desired change of the observed industries is expected through research, development and innovation (R&D&I). It includes also the policy mix concept and is based on the methodology of strategic planning.

Action plan is a sort of an extension of the Innovation strategy and Roadmap – it contain proposals of potential initiatives (activities) in the innovation ecosystem of the Adriatic-Ionian macro-region to fill the gaps in the identified regional value chains in the Blue Growth areas of the Adriatic-Ionian macro-region and activities to achieve the goals set by the Innovation Strategy, Roadmap and frameworks of future activities of the EUSAIR macro-regional strategy and the Interreg ADRION program 2021-2027.

Roadmap and Action plan are in line with the relevant strategic framework and all strategic documents related to the scope of the BLUEAIR project, like the following:

- *The EU Blue Economy Report*
- *EU Strategy for the Adriatic and Ionian Region (EUSAIR) (EU macro-regional strategy)*
- *The European Green Deal (2019)*
- *Agenda 2030 and Sustainable Development Goals*
- *A new approach for a sustainable blue economy in the EU Transforming the EU's Blue Economy for a Sustainable Future (2021)*
- *EU Biodiversity Strategy for 2030 (2021)*
- *A New Industrial Strategy for Europe (2020) and updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe's recovery (2021)*

- *Proposal on the use of renewable and low-carbon fuels in maritime transport and amending Directive 2009/16/EC (2021)*
- *Fostering a European approach to Artificial Intelligence (2021)*
- *European Union Strategy for the Adriatic and Ionian Region (EUSAIR) Flagships 2021-2027 (2020)*
- *A European Strategy for Data (2020)*
- *Making the most of the EU's innovative potential, An intellectual property action plan to support the EU's recovery and resilience (2020)*
- *European Data Strategy*
- *EU's digital strategy*
- *Council conclusions on the implementation of EU macro-regional strategies (2019) and Corrigendum (2019)*
- *Study on macro-regional strategies and their links with Cohesion Policy (2017)*
- *MedFish4Ever Declaration (2017)*
- *Report on the implementation of EU macro-regional strategies (2016)*
- *Action Plan concerning the European Union Strategy for the Adriatic and Ionian Region (2014)*
- *Communication concerning the European Union Strategy for the Adriatic and Ionian Region (2014).*

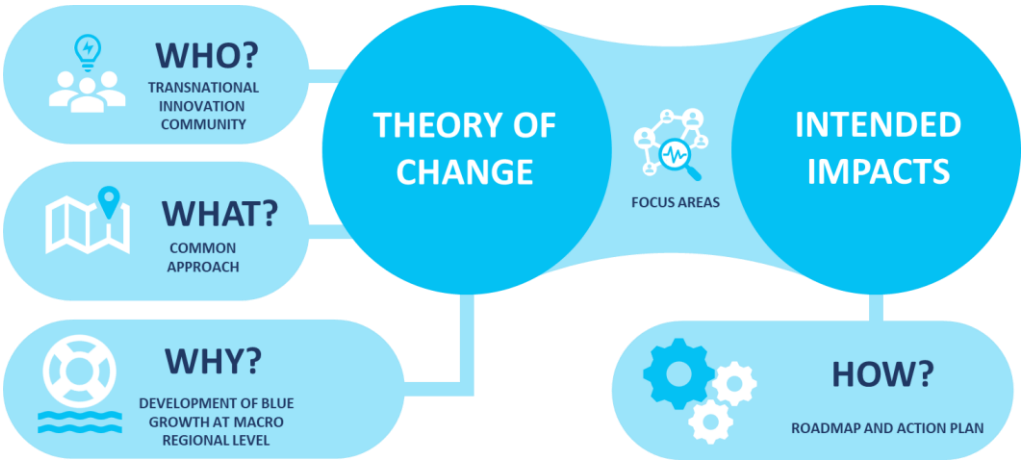
Document consists of six (6) parts, as follows. After first two parts on purpose, vision, concept and framework, in third part follows overview of the methodology used for the preparation of the Roadmap for Innovation strategy and accompanying Action plan for innovation activities. The fourth part presents focus areas identified through research, analysis and diagnostic of relevant analytical documents (project deliverables). The fifth part presents long-term goals and short-term objectives are presented in sixth part.

Separate document elaborates the Action plan for innovation activities, as well with assumptions and preconditions and inputs as in tools and resources needed for the implementation of the strategy (separate deliverable D.T.2.3.4.).

# 3. Methodology

The methodological approach for "bridging the gap" between Innovation strategy visions and diagnostics and accompanying Action plan is to use method of strategy road-mapping that is rooted in the Theory of Change. This means that the baseline for the development of the roadmap was establishing the answers to primary questions "why", "what", "who" and "how" behind the motivation and purpose.

**Figure 2. Methodological approach to the preparation of the Roadmap for innovation strategy**




Theory of Change is an innovative approach to strategic planning, and a complex strategic planning method, which can be used in different ways to be optimally adjusted to the needs and focus of each specific situation. Theory of Change is not the same thing as a logic model in the context of strategic planning. Essentially, Theory of Change is complex, showing the big picture with all possible pathways and interconnections, while the logical model is neat, showing just the pathway that the strategy fundamentally needs to deal with.

The key benefit of "Theory of Change" method in strategic planning is a specific measurable nature of change that forms the basis for strategic planning, ongoing decision-making and evaluation - it requires participants to be clear on long-term goals, identification of measurable indicators of success, and formulation of actions to achieve goals. It differs from any other method of describing initiatives in a few ways:

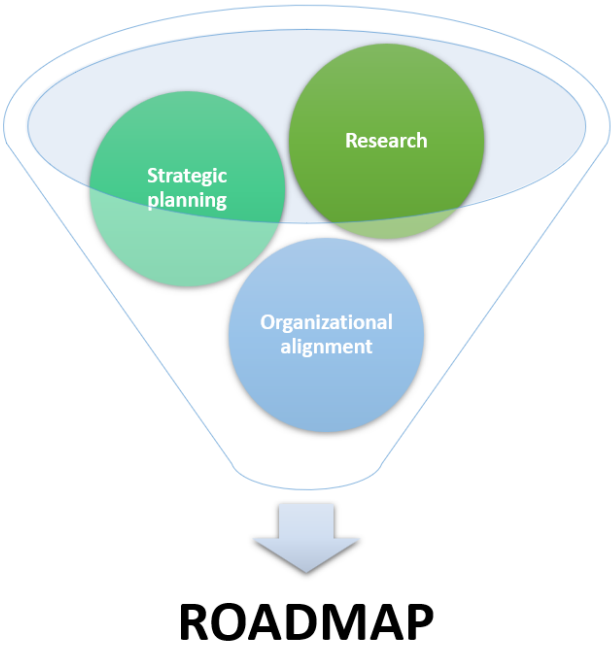
- *it shows a causal pathway from the current point of standing to where the desire is to go, by specifying what is needed for goals to be achieved*
- *it requires articulation of underlying assumptions which can be tested and measured*
- *it changes the way of thinking about initiatives from what is currently done to what is the desired achieved result.*

For example, one of the directions that Theory of Change can lead through is focusing on what is that needs to be changed, identifying what the change is needed for, reflecting on assumptions and

preconditions, and identifying partners and key stakeholders in the process of turning a branch of a problem tree into a solution tree[2].

However, whatever direction is taken with Theory of Change, key elements of each theory are research, strategic planning, and organisational alignment. With this approach, ultimately, Theory of Change provides a roadmap to get from "here" to "there", enabling the best possible chance of making the intended change. A roadmap is exactly that – a practical link between a strategy and action plan, and a practical tool that helps visualize how to turn a vision into strategy, and strategy into action plan.

**Figure 3. Key elements of Theory of Change**




As mentioned, the method included research, strategic planning, and organisational alignment. Research was the first phase of the methodological approach which included contextual research of relevant documents, as well as research, analysis, review and evaluation of the following eight (8) analytical documents (project deliverables) that served as a diagnostic part of the innovation strategy:

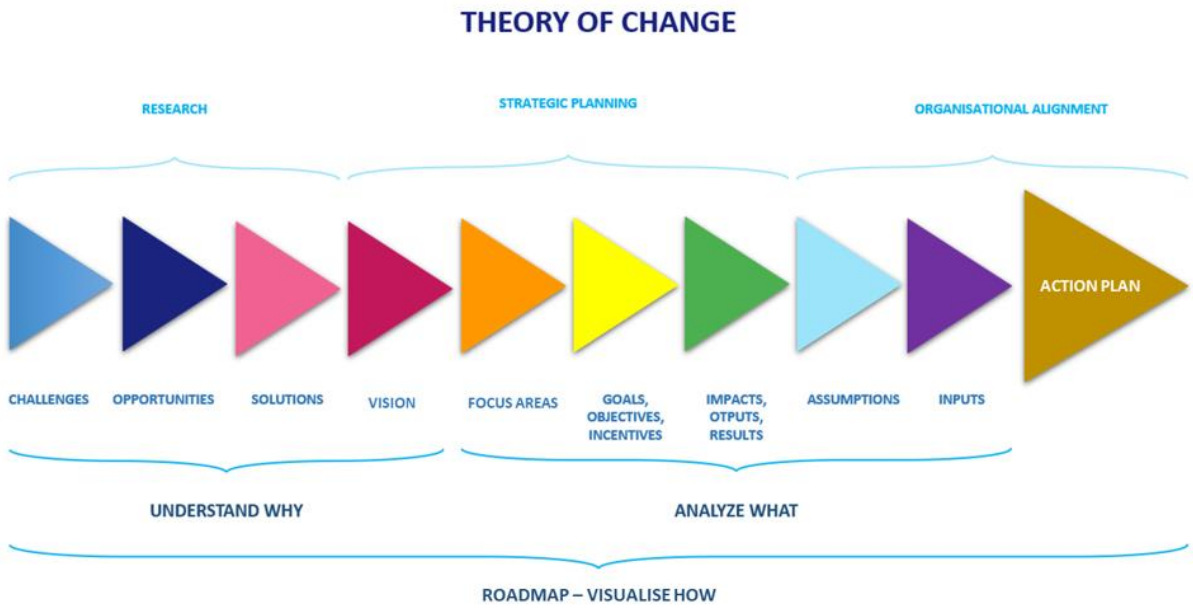
1. *Identification of Blue Growth areas (D.T.2.1.1.)*
2. *Macro-regional S3 analysis on Blue Growth (D.T.2.1.3.)*
3. *Benchmark report (D.T.1.1.2.)*
4. *Evaluation Framework Tool (D.T.2.2.1.)*
5. *Position paper on key common technologies (D.T.2.1.4.)*
6. *White paper on regional and cross-regional challenges and opportunities (D.T.1.2.5.)*
7. *Entrepreneurial Discovery Process – EDP Tool and Pilot (D.T.2.2.2. and D.T.2.3.2.)*
8. *Technology foresight (D.T.2.3.1.)*

[2] United Nations Development Group. (2017). *Theory of Change*. Accessed: 03.04.2023 from https://unsdg.un.org/sites/default/files/UNDG-UNDAF-Companion-Pieces-7-Theory-of-Change.pdf

From the research, analysis and diagnostic also resulted the identification of seven key focus areas of the Roadmap, as well as challenges, opportunities and solutions matrix which served as a tool from White paper deliverable for identifying strategic elements of the Roadmap.

The second phase that followed was strategic planning on the basis of established diagnostic from the first phase, and defining the cornerstones of the pathway that will lead from the current position to the desired impact. Using the Theory of Change as the fundamental basis for the Development plan (Roadmap) for innovation strategy, the Roadmap addresses the following elements of strategic planning and its concrete steps for organisational alignment: focus areas, vision, goals/objectives/incentives, impacts/outputs/results, indicators, assumptions and preconditions, initiatives (activities), and inputs (tools and resources).

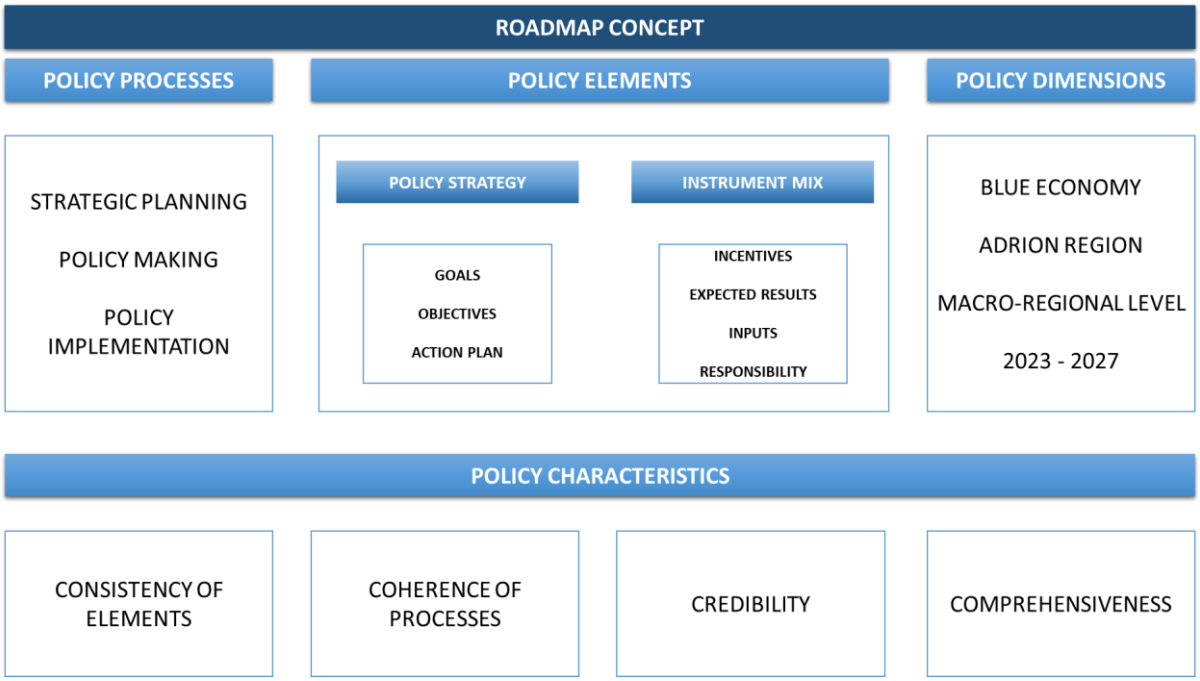
**Figure 4. Theory of Change concept applied in the Roadmap**




The theory of change provides a valuable framework for incorporating a deep understanding of the underlying drivers of change and the pathways to achieve desired outcomes into the development of a strategy roadmap. By integrating the theory of change into the strategy roadmap, organizations or communities ("who") can ensure that their goals, interventions, and milestones are grounded in a comprehensive understanding of the context, stakeholders, and the cause-and-effect relationships at play. This enables strategic decision-making that is not only informed by evidence and analysis but also guided by a clear understanding of how actions and interventions will contribute to the desired change. By leveraging the theory of change in the strategy roadmap, organizations can create a more robust and impactful approach that bridges the gap between vision and action, leading to meaningful and sustainable outcomes.

Roadmap is also built on the concept of policy mix, aimed primarily at the policy makers in ADRION region, and combining different policy instruments, as well as policy processes[3]. The implementation of the concept was based on the already mentioned diagnostic, which also encompassed an assessment of policies regarding Blow Growth in the ADRION region. The policy mix concept that was taken into consideration within the development of the Roadmap consists on the following three (3) blocks: (1) elements; (2) policy processes; (3) characteristics.

**Figure 5. Policy mix concept of the Roadmap**




Policy elements are consisted of policy strategy and instrument mix (with complementarity of instruments for their optimal efficiency), while the processes imply policy planning, making or formulation and implementation with a strategy concept that includes problem-solving processes among constrained and focused areas and actors in search of solutions for growth or particular social challenges.

The last block are characteristics of the policy mix, in terms of consistency of elements (how well the elements of the policy mix are aligned with each over, thereby contributing to the achievement of policy objectives), coherence of processes (synergistic and systematic policy making and implementation processes contributing to the achievement of policy objectives, as well as integration and coordination), credibility, and comprehensiveness (extensive and exhaustive scope of elements), as well as dimensions (policy field, governance level, geographical area, and time).

[3] Rogge, K., Reichardt, K. (2016). *Policy mixes for sustainability transitions: An extended concept and framework for analysis.* Accessed: 03.04.2023 from https://www.sciencedirect.com/science/article/pii/S0048733316300506

The long-term goals of the Roadmap were defined by applying the SMART methodology for determining goals, taking care that they are specific and concrete, measurable, achievable, relevant and time-bound. For the implementation of the Roadmap, each long-term goal has been divided in short-term objectives, while each short-term objective has been divided into incentives, in order to ensure maximum focus within the implementation of each objective and each goal. Each initiative was planned through the complementary SMARTER methodology (Specific; Measurable; Achievable; Relevant; Time-bound; Evaluated; Recognized/Rewarded or Revised/Readjusted). Result indicators for each initiative should be chosen using this same methodology.

# 4. Focus areas that shape the innovation strategy

To effectively drive the smart development of the blue economy in the Adriatic-Ionian macroregion and bring about desired changes and directions, a comprehensive analysis and diagnosis are essential components in preparing a clear strategy. The BLUEAIR project undertook various activities and reports aimed at establishing a strategy that enhances situational awareness within the macroregion, focusing on several key areas. These focus areas are succinctly outlined, highlighting the associated challenges, opportunities, and potential solutions. Each sub-chapter pertaining to these individual focuses includes a detailed analysis document along with a list of utilized sources and references.

## 4.1. The cross-sectoral ripple effect[4] of Blue Technologies on the Blue Economy

To identify Blue Growth sectors of macro regional interest and promote transnational cooperation in line with BLUEAIR objectives, it is necessary to consider the European Commission's support for marine-related economic and innovation activities. In 2019, the Blue Economy Report presented by DG MARE and the JRC emphasized the importance of entrepreneurship, investment, and research and innovation for boosting the blue economy and sustainable use of ocean resources. The Adriatic-Ionian Sea basin, specifically, focuses on blue economy development through the EUSAIR macro-regional strategy, which includes the Blue Growth Pillar as one of its thematic priorities.

The primary focus areas within the Adriatic-Ionian Sea basin encompass established sectors like marine living resources, maritime transport, port activities, shipbuilding and repair, and coastal tourism. Emerging sectors such as desalination, maritime defence, submarine cables and robots, and blue bioeconomy and biotechnology show promise for future socio-economic impacts in the region. These primary focus areas align with the EUSAIR strategy and action plan and serve as the foundation for identifying common thematic, economic, and technological areas within the BLUEAIR project.

The secondary focus area includes other relevant established or emerging sectors that are indirectly connected to the primary focus areas. These sectors align with the remaining pillars of the EUSAIR strategy, namely connecting the region, environmental quality, and sustainable tourism. Although they are indirectly related, these sectors still have a significant impact on the Adriatic-Ionian region through technologies, interactions, research and development, and other common factors.

Certain sectors, such as marine renewable energy (offshore, waves, tides) and marine minerals, fall under the non-focus area as they either lack present activity or have lower future potential for macroregional innovation and smart specialisation. However, sectors like shipbuilding and repair, maritime defence, and research and education are analysed for their technological contributions and spill-over effects on other sectors and activities.

To harmonize the scope of the Blue Growth areas and facilitate the search for common interests in development and innovation, a functional division of the area is proposed. The functional framework

[4] In economics, the ripple effect refers to the spreading impact of an event or change in one sector or industry that gradually affects other sectors or industries, creating a chain reaction throughout the economy.

follows the logic of the EUSAIR Blue Growth pillar and includes three main technology groups: marine technologies, clean technologies (CleanTech), and information and communication technologies (ICT).

Marine technologies encompass various technologies associated with different marine sectors, while CleanTech focuses on reducing negative environmental impacts and resource efficiency. ICT plays a crucial role in digitalization and innovation within the blue economy, including fields like machine learning, cyber-physical systems, and big data analytics.

The framework also includes fields of activities referred to as "Blue sectors" from the Blue Economy report, which align with the primary focus areas. Blue solutions, on the other hand, represent overarching topics that deliver marine and maritime services beyond public interest. These solutions are categorized into maritime surveillance, public services and governance, and management of marine ecosystem services.

**Figure 6. Functional framework of "BLUE" technology**


The framework is designed to accommodate future changes by allowing the addition of new technologies, emerging sectors, or novel solutions. It is closely related to the EUSAIR Blue Growth pillar and expands the scope to include various maritime activities in the AIR region and recent EU initiatives.

Overall, the functional framework establishes a technology-based ecosystem within the BLUEAIR project scope, emphasizing knowledge generation through R&D activities, including both fundamental research in scientific organizations and applied research for business activities.

This chapter is based on document (deliverable) **D.T.2.1.1. Identification of Blue growth areas**. For more details on this particular focus of the innovation strategy and the related challenges, opportunities and solutions arising from the researched topic, please consult the mentioned document created as part of the BLUEAIR project.

The overview of summary of challenges, opportunities and solutions identified within this focus area is shown in the table below.

**Table 1. BLUE Technology – challenges, opportunities and solutions matrix**

| CHALLENGES | OPPORTUNITIES | SOLUTIONS |
|---|---|---|
| • ***Challenging identification of Blue Growth sectors/areas of the macro regional interest within the framework of the Blue Economy to support the further analysis of innovation policies, exploit potential for transnational cooperation according to BLUEAIR specific objectives, and to establish a common understanding among project partners and the adoption of common Blue Growth Areas themes.*** | • *European Commissions' intention of supporting the development of marine-related economic and innovation activities through several initiatives on EU and regional level covering the "Blue" tag.*<br>• *Considering a wider Blue Economy domain on EU level enhanced with recently identified emerging novel sectors (together with data-backed established sectors), a scope of BLUEAIR project sectors may be enriched to provide more focused and updated project framework.*<br>• *There are several promising established Blue Economy sectors within Adriatic-Ionian Sea basin: Marine living resources, Maritime transport, Port activities, Shipbuilding & repair and Coastal tourism. Several emerging sectors have a good starting point to mature and develop as promising sectors in Adriatic-Ionian Sea basin and produce positive socio-economic impacts to the region in near future: Desalination, Maritime defence, Submarine cables and robots, and Blue bioeconomy and biotechnology. According to the analysis there are two priority focus areas important to ADRION region: Primary focus area, and Secondary focus area.* | • *Focus should be on the work under „BLUE" technology scope and consider technologies and relevant focused or supportive resources identified in regional S3's as enablers for solutions and value chains within sectors. That framework takes into consideration all marine related technologies that are directly or indirectly related to the "BLUE" projects priority focus areas – primary or secondary and would affect innovation and growth within the sectors and/or solutions to be observed through the project scope, dialogues and interaction with quadruple helix actors, divided in several main groups: Marine technologies, Clean technologies (Information and Communication Technologies - ICT (Blue Growth related).* |

## 4.2. Enhancing policy focus and strategic importance of Blue Economy

To support the development of the pilot macro-regional RIS3 document on Blue Growth in the Adriatic-Ionian macro-region (ADRION), it is important to explore common denominators among national/regional Smart specialization strategies (RIS3) in ADRION.

The European Union's regional innovation policy has been based on the Smart specialization approach since 2014. This approach focuses on selecting technological fields or sectors for concentrated investment to optimize economic benefits. The Smart specialization process aims to facilitate the emergence of strategic regional sectors based on market and technological trends, driving cross-doctoral cooperation and positioning the territory in emerging industrial value chains.

Macro-regions, which include territories from different countries or regions with common features, have been developed by the EU since the 2004 enlargement. These areas of cooperation and synergy development rely on better alignment of funding, coordination, and new ideas, rather than new legislation, institutions, or money.

The macro-regional strategies launched in the 2007-2013 programming period aim to enhance synergies among neighbouring countries/regions and align with the EU's goals of inclusive and sustainable development. These strategies seek to boost complementarities and synergies among regions, providing opportunities for cross-fertilization across countries and domains of interventions.

The intention is to identify common denominators in terms of economic activity, scientific domains, and policy objectives in the ADRION region by exploring national/regional RIS3 documents to determine the supported Blue Growth sectors. The identified complementarities will be related to the topics of the EU Strategy for the Adriatic and Ionian Region (EUSAIR).

Smart specialization strategy is unique in its approach to selecting key development priorities based on existing potential, creating diversity among regions rather than imitation. It is an integrated, place-based economic transformation agenda that focuses on key national/regional priorities, strengths, and competitive advantages, while supporting innovation, private sector investment, stakeholder involvement, and evidence-based decision-making.

The formulation and adoption of RIS3 are necessary for receiving funding from the European Structural and Investment Funds (ESIF), a primary tool of the European Commission's Cohesion Policy. Cohesion policy is integral to the smart specialization process, aiming to maximize the impact of funding through RIS3 implementation.

Smart specialization strategy stands out due to its structured six-step process, which includes analyzing innovation potential, setting out the RIS3 process and governance, developing a shared vision, identifying priorities, defining an action plan, and monitoring and evaluating progress.

Under the policy objective of "More competitive and smarter Europe," the European Commission has established seven enabling conditions to support the smart specialization process, such as up-to-date analysis of innovation bottlenecks and effective functioning of the entrepreneurial discovery process.

Network visualization and the classification of thematic priorities were used to identify commonalities regarding the Blue Growth agenda in the ADRION macro-region. Blue Growth is the third most common policy objective, mainly focused on traditional sectors of the Blue economy, including aquaculture, fisheries, food production, shipbuilding, and maritime transport. Coastal tourism, although significant, is less represented in RIS3 documents due to its reliance on non-R&D innovations.

These findings partially align with the EUSAIR strategy's Blue Growth pillar but are more focused on established sectors of the Blue economy. RIS3 documents primarily serve as place-based R&D policies to boost innovation potential, while macro-regional strategies provide a framework for cooperation and synergy development aligned with EU goals.

Overall, the exploration of national/regional RIS3 documents in the ADRION region aims to identify commonalities and inform the development of the pilot macro-regional RIS3 document on Blue Growth.

This chapter is based on document (deliverable) **D.T.2.1.3. Macro-regional S3 analysis on Blue Growth**. For more details on this particular focus of the innovation strategy and the related challenges, opportunities and solutions arising from the researched topic, please consult the mentioned document created as part of the BLUEAIR project.

The overview of summary of challenges, opportunities and solutions identified within this focus area is shown in the table below.

**Table 2. Enhancing policy focus and strategic importance of Blue Growth – challenges, opportunities and solutions matrix**

| CHALLENGES | OPPORTUNITIES | SOLUTIONS |
|---|---|---|
| • ***Establishing commonalities regarding Blue Growth agenda in ADRION macro-region within national/regional RIS3 documents.***<br>• ***Not full endorsement of EUSAIR strategy Blue Growth topics, but are rather alignment with other pillars of EUSAIR strategy.***<br>• ***While EUSAIR strategy through its Blue Growth pillar enables emerging sectors (Blue biotechnologies and marine minerals) and established sectors (fisheries and*** | • *Blue Growth is the third most common policy objective in ADRION macro-region, given that horizontal policy objective such as Digital transformation or KETs, are excluded due to fact of their cross-sectoral nature.*<br>• *Blue Growth agenda is supported in 13 RIS3 documents (1 country and 12 regions) out of total of 34 RIS3 documents in ADRION macro-region.*<br>• *Blue Growth agenda in ADRION macro-region is heavily focused on* | • *Use the potential of the established framework for cooperation and synergy development for enhancing policy focus and strategic importance of Blue Growth*<br>• *Exploit potentials for transnational cooperation in innovation and Smart specialisation strategies (S3) development on Blue Growth in the Adriatic-Ionian sea area, through new the R&D&I projects within the framework of national/regional RIS3 documents* |

| | | |
|---|---|---|
| ***aquaculture) as defined in Blue Economy report, national/regional RIS3 documents are more focused on established sectors of Blue economy (Maritime transport, aquaculture and fisheries).***<br>• ***The difference in approach to Blue Growth, which is probably the result of different processes of strategy making - national/regional RIS3 documents are basis for funding of R&D activities, while macro-regional strategies represent a framework for cooperation and synergy development.*** | *traditional sectors of Blue economy, such as Aquaculture, fisheries, food production, shipbuilding and maritime transport.*<br>• *Coastal tourism, although being the largest and most important sector of Blue economy in ADRION Macro-region, is not represented proportionally, mostly due to fact that RIS3 documents, in their essence are R&D policy documents, and tourism, as a sector relies mostly on non-R&D innovations.* | • *Exploit potentials for transnational cooperation in Blue Growth in the Adriatic- Ionian sea area, by implementing the specifics of macro-regional strategies that represent the framework for cooperation and synergy development.* |

## 4.3. Closing the gaps in performance and implementation of Blue Economy Innovation Policies

In the fragmented Adriatic-Ionian region, blue growth innovation policies are characterized by a search for a joint knowledge-based approach to enhance the blue growth sectors. Harmonized blue growth policies are needed for regions and countries overlooking the same seas and rivers. The self-assessment approach compared the transnational Blue Growth innovation policy governance, framework, instruments, process, and implementation. Findings aimed to identify differences as learning examples for the Adriatic-Ionian Basin.

Although the Adriatic-Ionian basin has experienced significant growth, differences in innovation performance have increased between EU and non-EU regions. The proportion of regions/countries with blue growth in their priorities is low, but there is potential for improvement in widening the range of sectors included. Cooperation among Adriatic-Ionian regions in S3 Thematic Partnerships is limited, presenting a research and exploitation opportunity.

The Adriatic-Ionian and Black Sea basins were less resilient to the 2008 crisis, remaining below 2009 levels in GVA and employment in 2018. Overfishing is a concern in the Mediterranean, but the Adriatic-Ionian basin has potential for economic growth with the recovery of fish stocks. Aquaculture production and maritime transport are growing sectors with innovation potential.

The shipbuilding and repair sector in the Adriatic-Ionian Basin can benefit from the growth of the maritime transport sector by adopting technology developments and fostering cooperation. Ports in the basin should focus on decreasing energy consumption, improving organization and logistics, and adopting ICT. The future of ports lies in their role as energy hubs, circular economy contributors, communication facilitators, and industrial clusters.

Interregional cooperation is important for Smart Specialisation Strategy (S3) and EU Cohesion Policy. Less developed regions can benefit from collaboration with more developed regions to enhance knowledge transfer and entrepreneurship. However, less developed regions face challenges in accessing interregional/international networks and tend to have lower participation in competitive programs. To seize opportunities and contribute to growth, projects and initiatives should include the private sector, SMEs, and start-ups. Partnerships should focus on Horizon Europe projects and foster networking within the private sector. The challenges, opportunities, and solutions identified in this focus area are summarized in the table below.

This chapter is based on document (deliverable) **D.T.1.1.2. Benchmark report**. For more details on this particular focus of the innovation strategy and the related challenges, opportunities and solutions arising from the researched topic, please consult the mentioned document created as part of the BLUEAIR project.

The overview of summary of challenges, opportunities and solutions identified within this focus area is shown in the table below.

**Table 3. Closing the gaps in performance and implementation of Blue Growth Innovation Policies – challenges, opportunities and solutions matrix**

| CHALLENGES | OPPORTUNITIES | SOLUTIONS |
|---|---|---|
| • ***In the Adriatic-Ionian region Blue Growth innovation policies are fragmented, with pioneering and lagging regions searching for a joint knowledge-based approach to their innovation strategies to enhance the blue growth sectors in their territories.***<br>• ***Challenging identification of differences as regards Blue Growth Innovation policy and performance that could serve as learning examples for Adriatic-Ionian Basin.***<br>• ***Over time, innovation performance differences (as measured by Regional Innovation Index) increased between EU and non-EU regions in the Adriatic Ionian basin.***<br>• ***The Adriatic-Ionian basin is the basin with the second-lowest proportion of regions/countries with Blue Growth in their S3 priorities. All non-EU countries are considered by the Eye@RIS3, however none of them opted for Blue Growth policy objectives. Out of Italian regions only two and none of Croatian regions have blue growth objectives in their S3 priorities.***<br>• ***All sea basins experienced effects of the 2008 crisis, but the least crisis resilient were the Black Sea and the Adriatic Ionian basins, which are the only ones that in*** | • *Even though Adriatic-Ionian basin is on a similar level as the Atlantic Ocean and the Western Mediterranean as regards the Regional Innovation Index average, the Adriatic-Ionian basin is by far the fastest growing among all six (6) basins. From 2014 the Regional Innovation Index average increased for almost 10% points (non-EU countries excluded) or 8% points (non-EU countries included).*<br>• *Over time, innovation performance differences (as measured by Regional Innovation Index) between regions in the Adriatic-Ionian basin have decreased for EU regions.*<br>• *The Adriatic-Ionian regions/countries stand out in terms of including Aquaculture and Fisheries most often in their S3 priorities, which are not among the most innovation driven sectors - there is potential for improvement in terms of widening the range of blue growth sectors included in S3, that could be addressed by the BLUEAIR project.*<br>• *Except for northern Italian regions, the Adriatic-Ionian regions do not tend to cooperate in S3 Thematic Partnerships. This is a potential that could be further researched and exploited by the basin.* | • *Regions and countries overlooking the same seas and rivers need harmonized blue growth policies to plan future innovation initiatives.*<br>• *Enhancing institutional capacities of Adriatic-Ionian regions in the definition of a common S3 policy on Blue Growth and guaranteeing the alignment of local initiatives with the EU Strategy for Adriatic-Ionian Region (EUSAIR).*<br>• *There is a necessity for interregional S3 cooperation in EUSAIR - interregional collaboration is one of the seven (7) enabling conditions for Smart Specialisation Strategy (S3) and thus will be central in the next programming period 2021-2027 for EU Cohesion Policy. S3 implies building on cross-regional cooperation to strengthen regional competitiveness while minimising duplication and fragmentation of publicly funded activities across the* |

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| ***2018 remained under 2009 levels both in terms of Gross Value Added (GVA) and employment. In terms of the current crisis related to the pandemics this could be a worrying reference.***<br>• ***Seasonality of Coastal tourism is most expressed in Adriatic-Ionian and Black Sea basins. It exposes the sector to strong economic dependence upon a limited period of time to gain economic profits and severe losses in case of lack of visits over such time period. Knowing that in 2018 77% of all blue economy jobs in the Adriatic-Ionian basin were linked to the Coastal tourism sector, creating 57% of the total blue economy GVA, highlights the intensity of seasonality effects on local communities in the basin.***<br>• ***Access to interregional/international networks can be a significant challenge for less developed regions, and they tend to be under-represented in interregional collaboration activities. Whilst they have relatively strong levels of participation in collaborative programmes such as Interreg, their level of participation in competitive programmes such as Horizon 2020 tends to be lower than that of more advanced territories.*** | • *There are 33 clusters cooperating on S3 blue growth priority area in Europe and 67 in blue growth industries, however there are not many located in the Adriatic-Ionian basin.*<br>• *If climate friendly, sustainable travel experiences have been on the rise among travellers' expectations in recent years, the COVID crisis has further boosted the demand for "slow tourism" and outdoor, nature-based destinations.*<br>• *High overfishing is characteristic for Mediterranean and for Adriatic and Aegean Seas in particular. As experiences from other sea basins demonstrate, the economic performance of the primary fishery production increases as fish stocks recover in that regard and with growing market prices, the Adriatic-Ionian basin has potential.*<br>• *Aquaculture production remains highly concentrated in terms of both EU Member States and species farmed, hence the high potential for diversification.*<br>• *Innovative solutions are needed to support transition to sustainable and low-carbon fishing, protection of marine biodiversity and ecosystems, the development of a sustainable and competitive aquaculture contributing to food security, the supply of quality and healthy seafood to European consumers.*<br>• *The Maritime transport sector is on the rise in all basins,* | *European Union (EU). As a result, regional policymakers must aim to find complementarities and synergies with other regions to integrate their regions in the (European) Value Chain while addressing missing links in their innovation value chain and maximising their regions' innovative potential. EUSAIR should use these EU driven trends to encourage interest of regional Managing Authorities for transnational cooperation and alignment.*<br>• *Building international links and strengthening interregional collaboration between regional ecosystems can be particularly beneficial for lagging regions. Collaboration with more developed regions can improve and facilitate knowledge transfer, technological upgrading and entrepreneurship.*<br>• *In order to better seize the opportunities and contribute to growth and jobs, the projects and initiatives should include the private sector, SMEs and start-* |

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| | *however, the Adriatic-Ionian basin is among the fastest growing.*<br>• *In terms of innovation potential, greening the Maritime transport sector will be supported by both policies and funding in the following years. Decarbonising Maritime transport (and fishing operations) will abate not only greenhouse gas emissions, but also air and water pollution and underwater noise, while opening up new innovation and economic opportunities.*<br>• *Even though the Shipbuilding and repair sector experienced difficulties in the Adriatic-Ionian Basin in the past decade, the fact that the Maritime transport sector is growing fast presents an opportunity also for the Shipbuilding and repair. This potential could be seized by keeping up with technology developments and innovations in the sector.*<br>• *The improvement of cooperation between green shipbuilding stakeholders is considered essential, as well as the adoption of green shipbuilding technologies (e.g. LNG fuel for propulsion, Advanced Propeller System, Sulphur Scrubber System, Fuel and Solar Cell Propulsion, etc.) in current macro-regional shipping industry.*<br>• *The six most disruptive technologies to implement in the industry 4.0 revolution in the shipyard sector in the Adriatic-Ionian are: the* | *ups. Apart from building transnational Interreg projects, eligible partnerships should strive to focus on big Horizon Europe projects, both on calls like Horizon Ocean Mission and other Horizon Europe opportunities.*<br>• *As a starting point for these public-private R&D partnerships in the EUSAIR, there should be more focus on networking in and with the private sector, via Chambers of commerce or within specific thematic platforms that could allow to have partners also from the Adriatic Ionian Sea basin, working together on new technologies or applications with partners from the Western Mediterranean or Northern Europe* |

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| | *Additive manufacturing, the Advanced Manufacturing Solutions, Big Data and Analytics, Augmented Reality, Cloud technologies and Cyber Security.*<br>• *Being the fastest growing basin in terms of GVA in 2018, similarly to Maritime transport, also the Port activities sector has prospect in the Adriatic Ionian basin.*<br>• *In ports Bari, Brčko, Durres, Igoumenitsa, Ravenna and Rijeka, there is a need to decrease energy consumption, improve organization and logistics and introduce ICT.*<br>• *The Commission considers that, beyond transhipment and logistics, the future of ports lies in developing their key role as energy hubs (for integrated electricity, hydrogen and other renewable and low-carbon fuels systems), for the circular economy (for collecting, transhipping and disposing of waste from ships and other port industries, and for decommissioning ships), for communication (for submarine cables), and for industry (as industrial clusters).* | |

## 4.4. Strengthening regional value chains in Sustainable Blue Economy

One of the preconditions for the development of BLUEAIR Innovations strategy and accompanying Action plan was the adaptation of known evaluation frameworks and developing analytical tools, especially for complementarity analysis of national/regional S3s overlapping of priority areas and development of regional Blue Growth related value chains analysis and identifying gaps within the value chains. This was conducted by a structured survey for carrying out complementarity analysis of national/regional S3 strategies regarding the overlap of priority areas, along with the methods of performing value chain analysis and benchmarking.

Mapping the value chain is about understanding beyond the traditional areas of focus on supply chain partners, taking a more comprehensive look at the entire product or service chain by creating a map of the structure of the value chain and all entities within it and identifying their linkages and interaction. In order to understand the process of benchmarking and value chain analysis, an example case scenario was designed with conclusions.

Whereas self-assessment report provides guidelines for better embedding of EUSAIR targets and goals in national/regional RIS3 documents and finding new potential funding for EUSAIR determined goals and targets, value chain analysis provides a potential thematic platform for potential international collaboration in ADRION macro-region regarding blue economy. As already mentioned, enabling conditions for Smart specialization strategies in new financial framework 2021-2027 propose international collaboration. EUSAIR macro-regional strategy itself is based on international/interregional collaboration. Mapping potential value chains in sectors of blue economy has the purpose to provide a thematic platform for improved joint international effort by members of ADRION macro-region in tackling EUSAIR proposed goals and targets.

Based on presented case scenario and relevant value chain benchmarking, several conclusions from the analysis were be drawn. Firstly, initial upstream activities, although present in the market, are identified to be insufficient by knowledge or capital, resulting in creating significant VC gaps (e.g. R&D related vessel design & engineering, infrastructure design). Majority of downstream activities in the VC are present but lacking various factors and represent investment possibility for VC upgrade, whereas central VC activities grouped around manufacturing and assembly are present and in good status with some insufficient factors.

Supporting bodies and activities are present in the market but some supporting activities are identified to be lacking with suboptimal links to the core VC activities (e.g. engineering & crafts schools). This market gap, if not addressed properly may present bigger disruption in the long run for the entire VC. Moreover, some VC activities are not present in the specific market. It is normal that those activities are not part of regional GVCs and are operated geographically somewhere away. In this case scenario this is the most obvious for electronic systems production.

Benchmark analysis in general clearly showed gaps in the initial downstream value chain activities (R&D activities) as well as in final upstream activities. Only central VC core activities are in relatively good position with some detected insufficient links. This reveals that country's (or region's) industry central production activities in the value chain are very well organised. It is clearly visible that industry has specialised as low value-added input supplier based on the availability of natural resources and that it does good in relation to manufacturing and assembly activities due to cheap labour.

In order to upgrade more effort and measures have to be put into lacking upstream and final downstream value chain activities, especially higher value-added activities such as R&D and sales and marketing, financial services and aftersales services and into upgrading insufficient important supporting activities in the long run.

This chapter is based on document (deliverable) **D.T.2.2.1. Evaluation Framework Tool**. For more details on this particular focus of the innovation strategy and the related challenges, opportunities and solutions arising from the researched topic, please consult the mentioned document created as part of the BLUEAIR project.

The overview of summary of challenges, opportunities and solutions identified within this focus area is shown in the table below.

**Table 4. Strengthening regional value chains in Blue Growth – challenges, opportunities and solutions matrix**

| CHALLENGES | OPPORTUNITIES | SOLUTIONS |
|---|---|---|
| • ***Challenging adaptation of known evaluation frameworks and developing analytical tools especially for complementarity analysis of national/ regional S3s overlapping of priority areas and development of regional Blue Growth related value chains analysis and identifying gaps within the value chains.***<br>• ***Initial upstream activities, although present in the market, are identified to be insufficient by knowledge or capital, resulting in creating significant VC gaps (e.g. R&D related vessel design & engineering, infrastructure design).***<br>• ***Majority of downstream activities in the VC are present but lacking various factors and represent investment*** | • *Better embedding of EUSAIR targets and goals in national/regional RIS3 documents and finding new potential funding for EUSAIR determined goals and targets, through self-assessment report guidelines*<br>• *Potential thematic platform for improved joint international collaboration in ADRION macro-region regarding Blue economy and joint effort by members of ADRION macro-region in tackling EUSAIR proposed goals and targets, due to value chain analysis and mapping in sectors of blue economy*<br>• *Enabling conditions for S3 strategies in new financial framework 2021-2027 propose international collaboration. EUSAIR macro-regional strategy itself is based on international/interregional collaboration.*<br>• *Joining policy and strategic efforts in strengthening regional value chains and their links, such as initial upstream activities insufficient by knowledge or capital, resulting in creating significant VC gaps (e.g. R&D related vessel design & | • *Joining policy and strategic efforts in strengthening regional value chains and their links, such as initial upstream activities insufficient by knowledge or capital, resulting in creating significant VC gaps (e.g. R&D related vessel design & engineering, infrastructure design), downstream activities in the VC lacking various factors, but represent investment possibility for VC upgrade, supporting bodies and activities lacking with suboptimal links to* |

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| ***possibility for VC upgrade.***<br>• ***Supporting bodies and activities are present in the market but some supporting activities are lacking with suboptimal links to the core VC activities (e.g. engineering & crafts schools). This market gap, if not addressed properly may present bigger disruption in the long run for the entire VC.*** | *engineering, infrastructure design), downstream activities in the VC lacking various factors, but represent investment possibility for VC upgrade, supporting bodies and activities lacking with suboptimal links to the core VC activities*<br>• *The industry has specialised as low value-added input supplier based on the availability of natural resources and it does good in relation to manufacturing and assembly activities due to cheap labour, which is the fundamental basis for further improvement.* | *the core VC activities*<br>• *In order to upgrade more effort and measures have to be put into lacking upstream and final downstream value chain activities, especially higher value-added activities such as R&D and sales and marketing, financial services and aftersales services and into upgrading insufficient important supporting activities in the long run.* |

## 4.5. Potential of key common technologies in function of Blue Economy development

The emerging Blue Economy paradigm aims to utilize ocean/sea resources for sustainable development. The ADRION macro region has witnessed the development of a multi-clustered knowledge space, with information and communication technologies playing a crucial role.

Initially, the knowledge production in the ADRION macro region was dominated by Medical and Veterinary science, along with closely related technological areas like Organic chemistry and Biochemistry. Over time, various clusters emerged, encompassing different technology areas. These clusters include handling, packaging, and transportation of materials, plastics technology, automotive industry, and ICT. The ICT cluster, which includes Computing and Electric communication technique, has a significant influence on shaping the knowledge space of the ADRION macro region. In later stages, it connects with clusters related to Basic electric elements and Generation, Distribution, or Conversion of electric power.

Smart specialisation is an important process that involves identifying priority areas for research, development, and innovation. It aims to promote regional innovation and address challenges. The spatial concentration of innovation activity is crucial, and regional capabilities play a significant role in knowledge creation and specialization. However, the implementation of smart specialisation has faced challenges, including broadly defined priority areas and the need for better alignment of policy instruments. Collaboration among key stakeholders is essential for the success of smart specialization strategies.

Innovation capacity is concentrated in certain countries globally, but it changes over time and between countries. The private sector and national policies influence innovation capacity. Macro-regions, like ADRION, present unique challenges in determining and implementing innovation strategies. To strengthen innovation in the ADRION region, clustering and cooperation between research and public/private sectors need improvement. Developing the innovation value chain and fostering innovation networks can encourage research and development activities. Addressing the lack of cooperation, connectivity, and absorption capacity of companies is crucial for an efficient innovation system.

While there are differences within the ADRION region, an inclusive approach should be fostered to support Blue Growth and inclusive growth. The ADRION knowledge space consists of multiple clusters, including Medical and Veterinary, Automotive, ICT, Environmental technology, and Combustion engine clusters.

This chapter is based on document (deliverable) **D.T.2.1.4. Position paper on key common technologies**. For more details on this particular focus of the innovation strategy and the related challenges, opportunities and solutions arising from the researched topic, please consult the mentioned document created as part of the BLUEAIR project.

The overview of summary of challenges, opportunities and solutions identified within this focus area is shown in the table below.

**Table 5. Potential of key common technologies in function of Blue Growth development – challenges, opportunities and solutions matrix**

| CHALLENGES | OPPORTUNITIES | SOLUTIONS |
|---|---|---|
| • ***Creating a correct framework to develop Blue Economy and to boost potentialities for their activities. Realizing the full potential of the Blue Economy also requires the effective inclusion and active participation of all societal groups.***<br>• ***Proposing and implementing a methodological approach to detect key common technologies in ADRION macro region and detecting key common technologies in in order to support development of the common innovation strategy in the ADRION region.***<br>• ***Due to data scarcity, it is still not possible to compare the results of policy actions taken thus far or still ongoing in the EU countries.***<br>• ***As stated in the EUSAIR, ADRION lacks on clustering and strong cooperation between research and public and private sectors.***<br>• ***high level of innovation activities on the north of the ADRION, and low level of innovation activities on the south of the ADRION. Lack of cooperation and connectivity between stakeholders, inconsistency of basic research in public sector and applied research in industry, improper functioning of institutions in*** | • *Most of the regions/countries of the EU have identified similar S3 priority areas to focus on (agri-food, key enabling technologies, health, energy, digital agenda, etc.). One of the key factors which will contribute largely to the achievement of the desired results of the implementation of S3 strategies is the ability of key stakeholders (quadruple helix) to collaborate in all phases of smart specialisation, from identifying the priority areas to implementing policy actions.*<br>• *The fast-emerging paradigm of Blue Economy primarily seeks to harness the ocean/sea resources for sustainable development.*<br>• *Despite the differences within the ADRION, on the macro-region level, inclusive approach should be fostered. Blue Growth, as one of the pillars of EUSAIR strongly supports inclusive growth, as defined by EUSAIR.*<br>• *Adopting a holistic innovation strategy which is anchored in the results of the BLUEAIR project.* | • *In order to successfully develop and implement common innovation strategy, lack of clustering and strong cooperation between research and public and private sectors weaknesses should be addressed.*<br>*Development of the innovation value chain as a platform for interconnecting stakeholders in the processes of innovation and commercialisation of innovation is of great importance. Innovation value chain is considered to be a fundamental instrument of growth strategies.*<br>• *Strengthening cooperation and connectivity between stakeholders, consistency of basic research in public sector and applied research in industry, proper functioning of institutions in charge of technology and information cohesion and absorption capacity of companies, to contribute to efficient innovation system and* |

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| ***charge of technology and information diffusion and lack of absorption capacity of companies can contribute to inefficient innovation system and consequently low innovation rate.***<br>• ***Globally, innovation capacity is concentrated in several countries around the world, although that number is growing. However, innovation capacity changes over time and between countries. Countries that once dominated in the field of innovation will not necessarily dominate in the future. On the one hand, businesses and the private sector are the main sources of innovation. On the other hand, the innovation capacity of companies within a country is determined by national policy and the structure and efficiency of public institutions. Innovation intensity depends on the interaction of the private and public sectors. Having all this in mind, it can be acknowledged that macro-regions represent specific challenge in terms of determining and implementing innovation strategies.*** | *This should be designed to accelerate growth, while at the same time ensuring sustainable development.*<br>• *ADRION region knowledge space in last decade has developed towards rather multi-clustered knowledge space with many interconnected technology domains that are producing majority of knew knowledge. Those technology domains or "clusters" are: Medical and Veterinary "cluster", Automotive "cluster", ICT "cluster", Environmental technology "cluster, Combustion engine "cluster". The private sector can and must play a key role in the Blue Economy.* | *improvement of innovation rate.*<br>• *Despite the differences within the ADRION, on the macro-region level, inclusive approach should be fostered. Blue Growth, as one of the pillars of EUSAIR strongly supports inclusive growth, as defined by EUSAIR.*<br>• *Adopting a holistic innovation strategy which is anchored in the results of the BLUEAIR project, to accelerate growth, while at the same time ensuring sustainable development.* |

## 4.6. Entrepreneurial Discovery process - EDP

The entrepreneurial discovery process (EDP) is an interactive and inclusive bottom-up approach involving quadruple helix participants from different sectors. It aims to identify potential new activities and attractive innovations through collaboration, with policymakers facilitating the realization of these opportunities. Traditional EDP surveys cover a wide range of thematic areas, while the macro-regional Blue Growth EDP survey focuses specifically on BG domains in the ADRION macro-regional area.

The EDP has a trans-regional dimension and is a key policy concept for innovation within the Europe 2020 strategy and smart specialization strategy. It promotes multi-level governance involving European institutions, member states, regions, and local stakeholders. EU funds play a significant role in strengthening the trans-regional dimension by facilitating cooperation based on shared priorities and complementary interests.

Entrepreneurial agents, including companies, R&D experts, and education institutions, are crucial in the EDP. Their engagement and knowledge in technological, economic, and scientific domains help in identifying specialization areas and driving economic transformation.

The BG-EDP tool aims to develop a structured modular survey for conducting pilot EDP exercises in the Blue Growth (BG) areas. It supports projects' implementing partners, facilitators, policymakers, and the development of the BG Innovation strategy.

The BG-EDP survey focuses on exploring innovation drivers, barriers, growth restraints, capacities, and skills specific to the Blue Growth sector. The survey targets primarily SMEs involved in or connected to the Blue economy value chain activities, along with research communities, education institutions, and relevant public administration representatives.

Total of 2013 participants have entered the survey fallowing provided links from the respective invitation letters received from implementing and supporting partners. 228 valid surveys were collected across all 9 regions/countries giving the response rate of 11%. Most valid inputs have been collected from the industry entities (60%, 136 entities), followed by higher education institutions & research institutions (23%, 91 entities).

The survey results indicate the following key points:

Innovation Drivers and Support:

- *ADRION countries/regions share similar innovation drivers, emphasizing the importance of horizontal support policies.*
- *ADRION entities recognize the available macro-regional public innovation support programs, but improvements can be made.*

Financial Barriers and Access to Finance:

- *Access to finance remains the most significant barrier to innovation and growth in ADRION organizations.*

Collaboration and Networking:

- *Collaboration is prevalent among ADRION entities, fostering cooperation within SMEs/enterprises and with scientific institutions.*

- *Trust and cooperation with the public sector and BSIs need improvement to further support innovation.*

Blue Growth Activities and Diversification:

- *Blue Growth activities in the ADRION region primarily focus on traditional sectors, indicating a need to explore and support innovation in emerging sectors.*
- *Complementarity exists among ADRION countries/regions in Blue Growth technologies, with potential for further development in marine biotechnology & bioprocessing.*

Digital Transformation:

- *ADRION countries increasingly recognize the importance of digital transformation, with the main challenge being the alignment of strategy and execution.*

This chapter is based on documents (deliverables) **D.T.2.2.2. Blue growth EDP tool and D.T.2.3.2. Pilot EDP for Blue Growth**. For more details on this particular focus of the innovation strategy and the related challenges, opportunities and solutions arising from the researched topic, please consult the mentioned document created as part of the BLUEAIR project.

The overview of summary of challenges, opportunities and solutions identified within this focus area is shown in the table below.

**Table 6. Pilot EDP for Blue Growth in ADRION region – challenges, opportunities and solutions matrix**

| CHALLENGES | OPPORTUNITIES | SOLUTIONS |
|---|---|---|
| • ***ADRION countries/regions are diverse and multifaceted, with significant disparities in terms of socio-economic conditions and development.***<br>• ***There is a need for increased technology transfer and public-private partnerships between non-industry and industry entities in ADRION region***<br>• ***Access to finance is the most limiting innovativeness and growth barrier for ADRION organizations.***<br>• ***Availability of macro-regional public innovation support programs.***<br>• ***During the innovation processes there is a noticeable gap in feasibility and business case validations, and the launch/commercialization*** | • *ADRION countries/regions share similar innovation drivers such as customers' needs and expectations, product quality, new market opportunities, management mindset and market trends.*<br>• *ADRION countries/regions are moderately aware of the available macro-regional public innovation support programs.*<br>• *The technical information and business intelligence generated by the patenting process can spark new ideas and* | • *Creation of dedicated Blue Growth tools for national policymakers responsible for S3 implementations,*<br>• *Implementation of a structured modular survey to support innovation strategies,*<br>• *Leveraging the region's unique strengths and addressing its challenges through collaborative efforts,*<br>• *Establishment of a macro-regional innovation community for strengthening cooperation,*<br>• *Improving awareness of available macro-regional public* |

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| ***stages which are the least utilized.***<br>• ***Intellectual Property Rights (IPR) are only moderately used in ADRION***<br>• ***The lack of trust and poor cooperation with the public sector and BSIs among ADRION entities may hinder innovation and growth.***<br>• ***The affiliation with Blue Growth activities in the ADRION region is primarily focused on traditional sectors.***<br>• ***Most countries in the ADRION region are gradually recognizing the importance of digital transformation, with expectations increasing over the years.***<br>• ***The most important barrier to digital transformation in the Blue Growth areas across the ADRION region is the alignment of strategy and execution.*** | *promote new inventions. Other IP rights can also be used to protect a new technology, product or service.*<br>• *More proactive approaches from public sector stakeholders are needed to build trust, share information, and create networks that can support innovation.*<br>• *Focusing on traditional BG sectors suggests that there is a need to explore and support innovation in emerging Blue Growth sectors to diversify the region's economic potential and promote sustainable growth.*<br>• *ADRION region shows a good level of complementarity among countries/regions in the newly created Blue Growth technologies, with the most dominant technology being creation of sensors and ICT solutions related to Blue Growth.*<br>• *Across the ADRION region level, waterborne transport and port activities are expected to benefit the most by gradual digital transformation followed by maritime surveillance, blue bioeconomy & biotechnology, public services and* | *innovation support programs,*<br>• *Boosting skills in market internationalization and creating specialized IPR skills and education courses.* |

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| | *governance and coastal tourism closely behind.*<br>• *Removal of barriers to digital transformation may instigate faster digital transformation in the Blue Growth areas across the ADRION region.* | |

## 4.7. Technology foresight

The foresight exercise developed in the framework of the BLUEAIR Project is addressed to innovation players active in blue economy sectors and is intended to broaden technological horizons and help develop shared perceptions of challenges and opportunities. By gathering intelligence insights from several sources, foresight aims at both providing a better understanding of the forces that may shape the mid- to long-term future and at producing a shared comprehension in policy formulation, planning, and decision-making processes. Within the scope of the BLUEAIR project, a technological foresight (TF), intended as a probabilistic prediction of technological changes that may be affecting machines, systems, or procedures, was carried out with studies and interaction with technical experts. In the framework of BLUEAIR TF activities quadruple helix actors are then offered insights into future scenarios within the blue economy sectors. Specifically, the TF aims at endowing policymakers and stakeholders with a methodological approach, a tool and studies on a selection of foresight focus areas defined both during framework scanning activities and as emerged from the analysis of trends and priority areas. The focus of the technology foresight exercise is on marine and maritime technologies and fields of activities which are clean and ICT-supported and, in other words, technologies or application fields which share decarbonisation and sustainability as common objectives. The technology foresight followed the methodology implemented in the Technology foresight tool (DT2.2.3) consisting of designing the foresight exercise, collecting the inputs and analysing the results.

During the designing phase the framework activities needed to implement the fundamental steps of a foresight process are outlined, which implies the definition of the target users, the setting of the objectives, the focus identification, the approach definition and the scope framing within a timeframe and a time horizon. The designing of the foresight exercise sets the scene for the studies and analyses that will follow by providing the borders of intervention.

The inputs collecting phase focuses on a review of the state-of-the-art in technology and product development in the five selected blue economy areas: alternative fuels, robotics, ICT, waterborne transport and aquaculture.

The review describes the available technologies and products, analyses their relevance to sustainability goals, assesses the current market and industry status, and explores potential, advantages and drawbacks as well as critical areas which may need further research and development.

The analysis phase comprehensively examines profiles for each sector related to blue economy. It covers prospects and key areas for future research and development, potential applications, and expected advancements and commercialization outlook from 2018 to 2030. Overall, 3 detailed technological and products profiles are provided, which explore advantages compared to the current state of the art, their fields of application, the enabling factors or barriers, the leading players involved and the technological status. This section incorporates expert interviews and interactions to gather opinions and insights on prospects. The list of the technological and product profiles analysed for each sector explored in the technological foresight exercise are listed below:

- ***Alternative fuels**: Hydrogen, Ammonia, Methanol*

- ***Robotics:*** *Port and near-shore surveillance and maintenance, Offshore inspection and maintenance, Autonomous vessels and ships.*
- ***ICT:*** *IOT Security, Predictive maintenance, 5G communication*
- ***Aquaculture:*** *Insect protein, Single cell protein, Aquaponics*
- ***Waterborne transport:*** *Low carbon vessel, Multimodal transport, Waterborne traffic management*

The summarized overview of challenges, opportunities and solutions identified within the selected focus areas is shown in the table below.

This chapter is based on document (deliverable) **D.T.2.3.1. Technology foresight on key common technologies**. For more details on this particular focus of the innovation strategy and the related challenges, opportunities and solutions arising from the researched topic, please consult the mentioned document created as part of the BLUEAIR project.

**Table 7. Technology foresight for Blue Growth in ADRION region – challenges, opportunities and solutions matrix**

| CHALLENGES | OPPORTUNITIES | SOLUTIONS |
|---|---|---|
| • ***Shipping is the backbone of the global economy. It is by far the most efficient mode of freight transport and moves approximately 80-90% of world trade volumes. The shipping sector contributes only 11% of global transportation emissions but remains the "dirtiest" emitter due to its use of high-sulfur content heavy fuel oils. Combined with growing demand over the next three decades due to the expansion of global trade, booming demand in commerce, and emergence of new manufacturing hubs, CO2 emissions are expected to consequently rise as well. Maritime decarbonization as the process of reducing greenhouse gas (GHG)*** | • *As the maritime sector continues to expand its adherence to the International Maritime Organization (IMO)'s goals to reduce emissions, diverse choices of energy carriers including methanol, biofuels, synthetic fuels, LNG, batteries, hydrogen, ammonia, and even solar-, wind-, and nuclear-powered vessels have emerged. While some of them are applicable for a variety of use cases, the jury is still out on several others. It is quite likely that most, if not all, of the technologies will find a place in the fuel mix for marine transportation.*<br>• *Maritime ICT is not just an essential function but is rapidly evolving to keep up with the need for fast and* | • *Boosting decarbonisation in the maritime sector through the implementation of new fuels or energy carriers such as hydrogen, ammonia and methanol.*<br>• *Improving ICT technology such as IoT security, predictive maintenance and 5G communications.*<br>• *Improving robotic applications for different applications such as port and near-shore surveillance and maintenance, offshore inspection and maintenance and* |

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| ***emissions from the global maritime sector has thus become an urgent and crucial issue and strict environmental regulations around***<br>• ***Improving competitiveness, safety, and security of European shipping is a major objective of the EU Maritime Transport Strategy, which in turn shapes the requirements for upgraded maritime transport information management. In recent years, advances in information and communication technologies have created a demand for new forms of surveillance and information management systems; these are increasingly driven by policy and governance addressing safety, security, and sustainability.***<br>• ***Substituting manual labor with an automated force, while guiding and controlling it remotely to perform regular tasks such as lifting, cleanup and transport has been happening for decades, if not centuries. Better sensors and control, enhanced capacity to gather and analyze data and make intelligent decisions to alter the course of action have dramatically improved the utility and reach of robots today. Modern robotics, thanks to the digital revolution, promises to address most of the challenges faced by the maritime industry. It is, therefore, unsurprisingly*** | *accurate transfer and processing of enormous volumes of data generated and acquired at sea. As the whole system is increasingly being connected through the technology enabling the flow of information, instructions and operations, ensuring the security, usability and ease of communication becomes paramount. The vital technological levers that need to be watched out for, improved upon and developed to form a robust maritime ICT are founded on three pillars of safety, speed and proactiveness.*<br>• *Initially confined to scientific investigations for monitoring and understanding the sea-bed and aquatic life at unprecedented temporal and spatial extremes, robotics, being a swift enabler in virtually everything humans do concerning oceans, is now a helpful companion across the entire blue economy. Whether remotely operated through a joystick or autonomous in nature, robotics manifests in the achievement of challenging scientific, commercial, and societal goals across all domains.*<br>• *Waterborne transport is going through an evolutionary change as it races to keep up with advances in robotics and communication in and around the ocean while safeguarding itself against the new age threats and, at the same time,* | *autonomous vessels and ships.*<br>• *Transforming waterborne transport by improving the development of low-carbon vessels, multimodal transportation and advanced waterborne traffic management.*<br>• *Developing new sustainable cultivation systems and alternative feeds in the aquaculture sector.* |

| | | |
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| ***spreading across almost all walks of life, including the maritime industry allowing safe, consistent, and efficient operations in hard-to-access spaces and in challenging environmental conditions.***<br>• ***Waterborne transport is one of the oldest, cheapest and most widely used modes of transport throughout the history of civilizations. Although aviation has taken over as the preferred mode for passenger transportation, waterborne transportation continues to touch lives by supporting fishing and leisure, and accounts for about 80% of international trade.***<br>• ***According to Food and Agriculture Organization (FAO), in 2030, total production of fishery and aquaculture is expected to increase further and reach 202 million tons. Most of the increase will come from aquaculture production which is expected to increase to 106 million tons in 2030 with an overall growth of 22% (FAO, 2022). The rapid expansion of the aquaculture sector is currently facing new and updated challenges to assure its sustainability.*** | *complying with the pledge to reduce emissions.*<br>• *Fish meal and fish oil have historically been the most desirable ingredients for feeding farmed fish. However, overfished and depleted wild fish stocks pose a threat to fish meal and fish oil supply. Meanwhile, aquaculture production is on a significant rise and driving demand in feed ingredients. Even with significant research efforts ongoing to reduce the dependence on fish meal for aquaculture diets, the impact of rising fish meal prices on production costs for major farmed species is outpacing the impact of those research efforts. As aquaculture feed ingredients will continue to get more expensive, producers will be driven to seek lower-cost comparable alternatives. Moreover, innovators are beginning to explore opportunities for multi-species co-culture approaches, often referred to as aquaponics. Paired with growing consumer demands for low environmental impact food, national programs to make food systems more resilient, and the creation of improved accessibility to high-quality foods with shorter supply chains interest in aquaponics is growing.* | |

# 5. Long-term goals

Long-term goals of the Innovation strategy and Roadmap entail five (5) goals for the long-term period until 2027, with which it is intended to realize the vision of the Innovation strategy, and the Innovation strategy itself:

1. ***Transformation and transition:*** *Enhancing AIR's Sustainable Blue Economy in the long-term through the sustainable exploitation of marine resources, green technologies, and green operations.*
2. ***Aligned framework(s):*** *Alignment of institutional framework with current needs of the Q-Helix related to macro-regional cooperation and blue innovation.*
3. ***Innovation Community:*** *Establishment of a macro-regional innovation community for strengthening cooperation among all Q-Helix actors in the AIR.*
4. ***Skills and capacities:*** *Capacity building on blue skills and technologies with multi-use applications.*
5. ***Pooled funds:*** *Pooling relevant funding opportunities.*

These five (5) goals represent the building blocks of the Innovation strategy and establishing an integrated common approach towards the development of Blue Growth at the macro-regional level, as well as building a capable and agile transnational innovation community with a strong international collaboration that engages all Q-Helix actors.

**Figure 7. Long-term goals – building blocks of Innovation strategy**


All long-term goals and all their short-term goals, in their more related aspects, contribute to the following sustainable development goals: SDG 8. Decent work and economic growth; SDG 9. Industry, innovation and infrastructure; SDG 10. Reduce inequalities; SDG 11. Sustainable cities and communities; SDG 12. Responsible consumption and production; SDG 13. Climate action; SDG 14. Life below water; SDG 17. Partnerships.

In a broader sense, the implementation of each goal can also be addressed to SDG 1. No poverty; SDG 2. Zero hunger; SDG 3. Good health and wellbeing; SDG 6. Clean water and sanitation; SDG 7. Affordable and clean energy; SDG 16. Peace, justice and strong institutions. In the further content of the chapter, the elaboration of long-term goals follows.

## LONG-TERM GOAL 1: Enhancing AIR's Sustainable Blue Economy in the long-term through the sustainable exploitation of marine resources, green technologies, and green operations

Considering the increasing demand for green technologies and the current challenges towards the alignment of blue technologies with the requirements for the marine environment (i.e., conservation of the marine biodiversity, elimination of the pollution of the marine environment, climate change, etc.), the exploitation of the existing marine resources of the AIR and its relevant competitive advantages can facilitate the green transition of its blue economy sectors (i.e., waterborne transport) and the competitiveness of its regions. Digital solutions (i.e., Artificial Intelligence, Internet of Things, etc.) may play a viable role, while their integration into activities towards conservation of the marine environment can enhance blue economy sectors' sustainability. Their use should focus on the investigation and in timely addressing climate change impacts on marine and coastal areas (i.e., data collection, monitoring).

**Table 8. Challenges, opportunities and impact matrix for long-term goal 1**

| LONG-TERM GOAL 1 | ENHANCING AIR'S SUSTAINABLE BLUE ECONOMY IN THE LONG-TERM THROUGH THE SUSTAINABLE EXPLOITATION OF MARINE RESOURCES, GREEN TECHNOLOGIES, AND GREEN OPERATIONS |
|---|---|
| ***Challenges*** | • *Conservation of the marine environment*<br>• *Maritime decarbonisation by transition of waterborne transport towards sustainable and low-carbon design through new fuels, robust marine ICT and renewable powering*<br>• *Rapid expansion of the aquaculture sector is currently facing new and updated challenges to assure its sustainability.*<br>• *Deployment of safe and efficient operations in marine hard-to-access spaces and in challenging environmental conditions*<br>• *Lack of cross-border monitoring and reporting of the effect of climate change* |
| ***Opportunities*** | Increasing demand for blue and green technologies |
| • ***Expected impact – proposal of potential indicator for monitoring (on the regional level)*** | By long-term improvement of AIR's sustainable blue economy through sustainable exploitation of marine resources, green technologies and green business will contribute to the following impacts:<br><br>• *Increased economic growth and job creation in the blue economy sector.*<br>• *Reduced environmental impact and improved resource efficiency.*<br>• *Enhanced competitiveness and innovation in the region.*<br>• *Improved social well-being and quality of life in coastal communities.*<br><br>*Potential indicators:*<br><br>- *number of innovative solutions developed for sustainable exploitation of marine resources, green and blue technologies, and green operations.*<br>- *number of new technology-based businesses in the blue economy sector.* |

## LONG-TERM GOAL 2: Alignment of institutional framework with current needs of the Q-Helix related to macro-regional cooperation and blue innovation

The integration of appropriate actions, measures and solutions into relevant institutional frameworks (i.e., Smart Specialization Strategy platforms) is necessary for addressing the common challenges of the AIR. The integration of common guidelines and tools for facilitating and accelerating green and digital transition, for adopting circular economy, for enhancing macro-regional cooperation and for better allocation of financial resources towards macro-regional cooperation and blue innovation are indicative specific recommendations that can effectively address those challenges (i.e., the need for adapting blue technologies thus protecting the marine environment, the alleviation of high costs for the development of blue technologies, the adoption of innovative processes and methods in blue economy sectors, etc.). It can also reduce regulatory uncertainties related to blue innovation.

**Table 9. Challenges, opportunities and impact matrix for long-term goal 2**

| LONG-TERM GOAL 2 | ALIGNMENT OF INSTITUTIONAL FRAMEWORK WITH CURRENT NEEDS OF THE Q-HELIX RELATED TO MACRO-REGIONAL COOPERATION AND BLUE INNOVATION |
|---|---|
| ***Challenges*** | • *Conservation of the marine environment*<br>• *High costs of blue technology development*<br>• *Regulatory uncertainty related to blue innovation*<br>• *Limited innovation entrepreneurship*<br>• *Uncoordinated maritime and marine governance and services across borders*<br>• *Lack of cross-border monitoring and reporting of the effect of climate change* |
| ***Opportunities*** | • *Increasing demand for green technologies*<br>• *Circular economy initiatives could be extended*<br>• *Funding opportunities from EU programmes* |
| **Expected impact – *proposal of potential indicator for monitoring (on the regional level)*** | Increasing the alignment of the institutional framework with the current needs of Q-Helix regarding macro-regional cooperation and blue innovation will contribute to the following impacts:<br><br>• *Streamlined decision-making processes and policies.*<br>• *Increased collaboration and knowledge sharing among quadruple helix actors (government, industry, academia, civil society).*<br>• *Improved policy responsiveness to the needs of the blue economy sector.*<br>• *Enhanced innovation capacity in the region.*<br><br>*Potential indicator – number of national and macro-regional action plans and policy/strategy frameworks developed for aligning with current needs of the Q-Helix related to macro-regional cooperation and blue innovation.* |

## LONG-TERM GOAL 3: Establishment of a macro-regional innovation community for strengthening cooperation among all Q-Helix actors in the AIR

A Macro-Regional innovation community should involve and engage all Q-Helix actors related to blue innovation and facilitate the identification and addressing of related common challenges and opportunities. Its establishment can be based on existing relevant efforts and on existing cooperation between industry and academia. It can also motivate actors involved in joint blue projects that aim at the development of products and services adapted to macro-regional challenges and needs or the creation of partnerships for the use of shared infrastructures (i.e., ports) improving Q-Helix actors environmental and economic performance. Its establishment will stimulate cooperation for the development of solutions that can address the specific needs of the AIR related to blue innovation and will facilitate knowledge transfer among all Q-Helix actors and all the AIR countries and regions (i.e., dissemination of products, services, and best practices), thus exploiting the current opportunities for capacity building in the macro-region. This recommendation is fundamental as it supports the implementation of all others.

**Table 10. Challenges, opportunities and impact matrix for long-term goal 3**

| LONG-TERM GOAL 3 | ESTABLISHMENT OF A MACRO-REGIONAL INNOVATION COMMUNITY FOR STRENGTHENING COOPERATION AMONG ALL Q-HELIX ACTORS IN THE AIR |
|---|---|
| ***Challenges*** | • *Lack of development of blue technologies subsectors*<br>• *Lack of cooperation among all Q-Helix actors*<br>• *Low knowledge capacity on blue technologies*<br>• *Lack of technology and knowledge transfer* |
| ***Opportunities*** | • *Increasing demand for blue and green technologies*<br>• *Cooperation and networking among industry, and between industry and academia in the AIR*<br>• *Collaboration projects for tailor-made results in the AIR*<br>• *Fostering of sustainable blue economy innovation communities of the Q-Helix actors in the AIR*<br>• *Increased possibilities for capacity building in sustainable blue economy sectors* |
| **Expected impact – *proposal of potential indicator for monitoring (on the regional level)*** | The establishment of a macro-regional innovation community to strengthen cooperation among all Q-Helix actors in AIR will contribute to the following impacts:<br><br>• *Increased cross-sector collaboration and knowledge exchange.*<br>• *Accelerated innovation and technology transfer.*<br>• *Enhanced capacity for joint problem-solving and shared learning.*<br>• *Strengthened regional identity and sense of belonging among quadruple helix actors.*<br><br>*Potential indicators:*<br><br>- *number of members of macro-regional innovation community for strengthening cooperation among all Q-Helix actors in the AIR.*<br>- *number of cross-sector collaborations and partnerships.* |

## LONG-TERM GOAL 4: Capacity building on blue skills and technologies with multi-use applications

The increasing demand for green technologies as well as the existing opportunities for capacity building in the blue economy can support the integration of blue technologies and new, innovative methods in relevant value chains and the enhancement of capacity building in the entire blue economy. The appropriate use of those blue technologies can accelerate the green transition of the blue economy sectors and support the investigation of the impact of climate change at the macro-regional scale with emphasis on how to monitor them. Emphasis is recommended to be placed on the promotion and integration of such technologies to "traditional" blue economy sectors, which need to modernize their operations and approaches. It is also suggested that research activities should focus on blue innovation, further development and improvement of blue technologies, and current Q-Helix actors' needs in alignment with the requirements for the conservation of the marine environment (i.e., social innovation, development of an open monitoring system for the investigation and identification of climate change impacts on marine and coastal areas, enabling the sharing of and access to knowledge, information, data, and technologies). The establishment of a macro-regional blue career network for connecting relevant centres would enhance capacity building and especially the competences and blue skills of the relevant human capital, while it would also enable knowledge transfer between the AIR countries and regions. Capacity building can be enhanced through appointing innovation experts that can provide consultation on blue innovation, on how to exploit the increasing demand for blue technologies, and how to align those technologies' capabilities with the requirements for conserving the marine environment and its resources.

**Table 11. Challenges, opportunities and impact matrix for long-term goal 4**

| LONG-TERM GOAL 4 | CAPACITY BUILDING ON BLUE SKILLS AND TECHNOLOGIES WITH MULTI-USE APPLICATIONS |
|---|---|
| ***Challenges*** | • *Transition of waterborne transport towards sustainable energy*<br>• *Low knowledge capacity on blue technologies*<br>• *Lack of technology and knowledge transfer*<br>• *Lack of integration of innovative processes/approaches in (global) value chains*<br>• *Lack of cross-border monitoring and reporting of the effect of climate change* |
| ***Opportunities*** | • *Increasing demand for green technologies*<br>• *Increased possibilities for capacity building in sustainable blue economy sectors* |
| **Expected impact – *proposal of potential indicator for monitoring (on the regional level)*** | By building capacities in the field of blue skills and technologies with multipurpose applications, it will contribute to the following impacts:<br>• *Enhanced human capital development and skills training.*<br>• *Increased adoption of innovative technologies and practices.*<br>• *Diversified skill sets for the workforce in the blue economy sector.*<br>• *Improved competitiveness and adaptability to emerging trends.*<br>*Potential indicator – number of R&D&I projects resulting with blue skills and technologies with multi-use applications* |

## LONG-TERM GOAL 5: Pooling relevant funding opportunities

Relevant funding opportunities for blue innovation projects to implement the recommendations already exist to a large extent. Resources may also become available through other initiatives and funding instruments (i.e., Circular Economy initiatives, Blue Sustainable Ocean Strategy by the European Investment Bank, regional programmes, etc.). Their exploitation can address the limited development of blue technologies and the high costs that accompany them as well as the limited blue innovation entrepreneurship in the AIR. To improve access of all Q-Helix actors to these funds, their compilation into a single point and the provision of support on how to apply to relevant calls for projects is recommended.

**Table 12. Challenges, opportunities and impact matrix for long-term goal 5**

| LONG-TERM GOAL 5 | POOLING RELEVANT FUNDING OPPORTUNITIES |
|---|---|
| ***Challenges*** | • *Conservation of the marine environment*<br>• *High costs of blue technology development*<br>• *Lack of development of blue technologies subsectors*<br>• *Limited innovation entrepreneurship* |
| ***Opportunities*** | • *Circular economy' initiatives could be extended*<br>• *New financing opportunities are available for sustainable blue projects*<br>• *Cooperation and networking among industry, and between industry and academia in the AIR*<br>• *Funding opportunities from EU programmes*<br>• *Cooperation in academia in sustainable blue economy*<br>• *Collaboration projects for tailor-made results in the AIR* |
| **Expected impact – *proposal of potential indicator for monitoring (on the regional level)*** | Increased pooling of relevant funding opportunities will contribute to the following impacts:<br><br>• *Increased availability of funding for blue economy projects.*<br>• *Reduced fragmentation of funding sources.*<br>• *Improved access to financing for innovation and research initiatives.*<br>• *Stimulated investment in the blue economy sector.*<br><br>*Potential indicators:*<br><br>- *number of collaborative R&D&I sustainable blue projects in the field of blue economy*<br>- *New investment inflow in the blue economy sector* |

# 6. Short-term objectives

For the implementation of the Roadmap, each long-term goal has been divided in short-term objectives, in order to ensure maximum focus within the implementation of each objective and each goal. Short-term objectives have been divided into incentives and planned through the complementary SMARTER methodology (Specific; Measurable; Achievable; Relevant; Time-bound; Evaluated; Recognized/Rewarded or Revised/Readjusted). Result indicators for each incentive should be chosen using this same methodology.

Short-term objectives for the implementation of each long-term goal are shown below, with corresponding indicators, responsibilities, inputs and due dates. The incentives and activities for the implementation of each short-term objective is shown in the Action plan for innovation activities.

**Long-term goal 1 "Enhancing AIR's Sustainable Blue Economy in the long-term through the sustainable exploitation of marine resources, green technologies, and green operations"** encompasses the following short-term objectives:

1. *Exploitation of the available marine resources, blue technologies and clean operations for sustaining and enhancing in the long-term the competitive advantages of the Adriatic – Ionian Region's sustainable blue economy*
2. *Exploitation of digital solutions (i.e., Artificial Intelligence, Internet of Things, etc.) for conservation of the marine environment and enhancing blue economy sectors' sustainability.*

**Table 13. Short-term objectives for the implementation of long-term goal 1**

| **LONG-TERM GOAL 1** | **ENHANCING AIR'S SUSTAINABLE BLUE ECONOMY IN THE LONG-TERM THROUGH THE SUSTAINABLE EXPLOITATION OF MARINE RESOURCES, GREEN TECHNOLOGIES, AND GREEN OPERATIONS** | | | |
|---|---|---|---|---|
| **Short-term objectives** | **Expected outcome - *proposal of potential indicator for monitoring (on the regional level)*** | **Responsibility** | **Inputs** | **Due date** |
| **Exploitation of the available marine resources, blue technologies and clean operations for sustaining and enhancing in the long-term the competitive advantages of the Adriatic – Ionian** | Increased level of sustainability in exploiting available marine resources, blue technologies and clean operations through R&D&I projects – *Collaborative R&D&I projects for* | All partners | • *National, regional, and EU current and future funding opportunities*<br>• *Q-Helix collaboration*<br>• *Human, material, operative,* | 2027 (recurring: frequency biennially, 2023 – 2024; 2025 – 2026) |



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| **Region's sustainable blue economy** | *exploitation of the available marine resources, blue technologies and clean operations (number)* | | • *financial capacities and resources*<br>• *Competences and know-how* | |
| **Exploitation of digital solutions (i.e., Artificial Intelligence, Internet of Things, etc.) for conservation of the marine environment and enhancing blue economy sectors' sustainability** | Increased level of exploited digital solutions for conservation of the marine environment and enhancing blue economy sectors' sustainability - *Collaborative R&D&I projects for the development and integration of digital solutions into activities towards conservation of the marine environment for enhancing enhance blue economy sectors' sustainability (number); Digital solutions developed and integrated into activities towards conservation of the marine environment for enhancing enhance blue economy sectors' sustainability (number)* | All partners | • *National, regional, and EU current and future funding opportunities*<br>• *Q-Helix collaboration*<br>• *Human, material, operative, financial capacities and resources*<br>• *Competences and know-how* | 2027 (recurring: frequency biennially, 2023 – 2024; 2025 – 2026) |



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**Long-term goal 2 "Alignment of institutional framework with current needs of the Q-Helix related to macro-regional cooperation and blue innovation"** entails the following short-term objectives:

1. *Development of an open cross-border monitoring system for the investigation and identification of climate change impacts on marine and coastal areas, enabling the sharing of and access to knowledge, information, data, and technologies*
2. *Adoption of circular economy into national and macro-regional action plans and policy/strategy frameworks of the blue economy*
3. *Development of common guidelines and tools for adaptation to climate change in blue economy.*

**Table 14. Short-term objectives for the implementation of long-term goal 2**

| LONG-TERM GOAL 2 | ALIGNMENT OF INSTITUTIONAL FRAMEWORK WITH CURRENT NEEDS OF THE Q-HELIX RELATED TO MACRO-REGIONAL COOPERATION AND BLUE INNOVATION | | | |
|---|---|---|---|---|
| **ROADMAP TO ACHIEVING THE LONG-TERM GOAL (solutions and key steps)** | | | | |
| **Short-term objectives** | **Expected outcome - *proposal of potential indicator for monitoring (on the regional level)*** | **Responsibility** | **Inputs** | **Due date** |
| **Development of an open cross-border monitoring system for the investigation and identification of climate change impacts on marine and coastal areas, enabling the sharing of and access to knowledge, information, data, and technologies** | Developed open cross-border monitoring system for the investigation and identification of climate change impacts on marine and coastal areas, enabling the sharing of and access to knowledge, information, data, and technologies - *Collaborative R&D&I projects for the development of an open monitoring system for the investigation and identification of climate change impacts on marine and coastal areas, enabling the sharing* | All partners | • *National, regional, and EU current and future funding opportunities*<br>• *Q-Helix collaboration*<br>• *Human, material, operative, financial capacities and resources*<br>• *Competences and know-how* | 2027 (recurring: frequency biennially, 2023 – 2024; 2025 – 2026) |



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| | *of and access to knowledge, information, data, and technologies (number); Open monitoring system developed for the investigation and identification of climate change impacts on marine and coastal areas, enabling the sharing of and access to knowledge, information, data, and technologies (number)* | | | |
| **Adoption of circular economy into national and macro-regional action plans and policy/strategy frameworks of the blue economy** | Adopted circular economy into national and macro-regional action plans and policy/strategy frameworks of the blue economy - *Collaborative projects for development of national and macro-regional action plans and policy/strategy frameworks for circular economy, or with circular economy included (number);*<br><br>*National action plans and policy/strategy frameworks for circular economy, or with circular economy included (number);*<br><br>*Macro-regional action plans and policy/strategy* | All partners | • *National, regional, and EU current and future funding opportunities*<br>• *Q-Helix collaboration*<br>• *Human, material, operative, financial capacities and resources*<br>• *Competences and know-how* | 2027 (recurring: frequency biennially, 2023 – 2024; 2025 – 2026) |



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| | *frameworks for circular economy, or with circular economy included (number)* | | | |
| **Development of common guidelines and tools for adaptation to climate change in blue economy** | Developed common guidelines and tools for adaptation to climate change in blue economy - *Collaborative projects for development of common guidelines and tools for adaptation to climate change (number);*<br><br>*Common guidelines and tools developed for adaptation to climate change in blue economy (number)* | All partners | • *National, regional, and EU current and future funding opportunities*<br>• *Q-Helix collaboration*<br>• *Human, material, operative, financial capacities and resources*<br>• *Competences and know-how* | 2027 (recurring: frequency biennially, 2023 – 2024; 2025 – 2026) |

**Long-term goal 3 "Establishment of a macro-regional innovation community for strengthening cooperation among all Q-Helix actors in the AIR"** is consisted of the following short-term objectives:

1. *Shared infrastructure on land or in maritime ports through partnerships between cross-cutting blue sectors for increasing efficiency through reduced costs and/or environmental impacts*
2. *Setting up transnational cooperations between S3 regions/countries on common S3 priorities in blue economy for finding joint solutions that can address macro-regional challenges and opportunities*
3. *Setting up transnational "Blue Economy Innovation Communities".*

**Table 15. Short-term objectives for the implementation of long-term goal 3**

| **LONG-TERM GOAL 3** | **ESTABLISHMENT OF A MACRO-REGIONAL INNOVATION COMMUNITY FOR STRENGTHENING COOPERATION AMONG ALL Q-HELIX ACTORS IN THE AIR** | | | |
|---|---|---|---|---|
| **Short-term objectives** | **Expected outcome - *proposal of potential indicator for monitoring (on the regional level)*** | **Responsibility** | **Inputs** | **Due date** |
| **Shared infrastructure on land or in maritime ports through** | Increase of shared infrastructure on land or in maritime ports | All partners | • *National, regional, and EU current* | 2027 (recurring: frequency |



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| **partnerships between cross-cutting blue sectors for increasing efficiency through reduced costs and/or environmental impacts** | through partnerships between cross-cutting blue sectors for increasing efficiency through reduced costs and/or environmental impacts –<br><br>*Collaborative projects for sharing infrastructure on land or in maritime ports through partnerships between cross-cutting blue sectors for increasing efficiency through reduced costs and/or environmental impacts*<br><br>*(number);*<br><br>*Partnerships between cross-cutting blue sectors for sharing infrastructure on land or in maritime ports, and increasing efficiency through reduced costs and/or environmental impacts*<br><br>*(number)*<br><br>*Infrastructure shared on land or in maritime ports for increasing efficiency through reduced costs and/or environmental impacts (number)* | | *and future funding opportunities*<br>• *Q-Helix collaboration*<br>• *Human, material, operative, financial capacities and resources*<br>• *Competences and know-how* | biennially, 2023 – 2024; 2025 – 2026) |
| **Setting up transnational cooperations between S3** | Increase of transnational cooperations set up between S3 | All partners | • *National, regional, and EU current and future* | 2027 (recurring: frequency biennially, |



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| **regions/countries on common S3 priorities in blue economy for finding joint solutions that can address macro-regional challenges and opportunities** | regions/countries on common S3 priorities in blue economy for finding joint solutions that can address macro-regional challenges and opportunities - *Collaborative projects for setting up transnational cooperations between S3 regions/countries on common S3 priorities in blue economy for finding joint solutions that can address macro-regional challenges and opportunities (number);*<br><br>*Joint solutions developed by transnational cooperations between S3 regions/countries on common S3 priorities in blue economy that can address macro-regional challenges and opportunities (number)* | | *funding opportunities*<br>• *Q-Helix collaboration*<br>• *Human, material, operative, financial capacities and resources*<br>• *Competences and know-how* | 2023 – 2024; 2025 – 2026) |
| **Setting up and strengthening transnational "Blue Economy Innovation Community"** | Transnational "Blue Economy Innovation Community" set up - *Collaborative projects for setting up and strengthening transnational "Blue Economy Innovation Communities" (number);* | All partners | • *National, regional, and EU current and future funding opportunities*<br>• *Q-Helix collaboration*<br>• *Human, material, operative, financial* | 2027 (recurring: frequency biennially, 2023 – 2024; 2025 – 2026) |



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| | *Transnational "Blue Economy Innovation Communities" set up (number)* | | *capacities and resources*<br>• *Competences and know-how* | |

**Long-term goal 4 "Capacity building on blue skills and technologies with multi-use applications"** entails the following short-term objectives:

1. *Skills and technologies with multi-use applications for sustainable blue economy value chains exploiting the potential for applying new methods (e.g. big data applications), land-sea technology and economic "cross-overs" and renewing the skills base of the blue economy*
2. *Designation of innovation experts for consulting on innovation and support its implementation in blue economy sectors*
3. *Establishment of a blue career network communities' for connecting relevant centers*
4. *Integration of modern blue technologies to "traditional" blue economy sectors*
5. *Building capacities of all Q-Helix actors for developing strong international collaboration and value chain links for strengthening Blue Growth and enhancing sustainable Blue Economy at the macro-regional level.*

**Table 16. Short-term objectives for the implementation of long-term goal 4**

| **LONG-TERM GOAL 4** | **CAPACITY BUILDING ON BLUE SKILLS AND TECHNOLOGIES WITH MULTI-USE APPLICATIONS** | | | |
|---|---|---|---|---|
| **Short-term objectives** | **Expected outcome - *proposal of potential indicator for monitoring (on the regional level)*** | **Responsibility** | **Inputs** | **Due date** |
| **Skills and technologies with multi-use applications for sustainable blue economy value chains exploiting the potential for applying new methods (e.g. big data applications), land-sea technology and economic "cross-overs" and renewing the skills base of the blue economy** | Increase in development of skills and technologies with multi-use applications for sustainable blue economy value chains exploiting the potential for applying new methods (e.g. big data applications), land-sea technology and economic "cross-overs" and | All partners | • *National, regional, and EU current and future funding opportunities*<br>• *Q-Helix collaboration*<br>• *Human, material, operative, financial capacities and resources* | 2027 (recurring: frequency biennially, 2023 – 2024; 2025 – 2026) |



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|---|---|---|---|---|
| | renewing the skills base of the blue economy - *Collaborative projects for developing skills and technologies with multi-use applications for sustainable blue economy value chains exploiting the potential for applying new methods (e.g. big data applications), land-sea technology and economic "cross-overs" and renewing the skills base of the blue economy (number);*<br><br>*Skills and technologies developed with multi-use applications for sustainable blue economy value chains exploiting the potential for applying new methods (e.g. big data applications), land-sea technology and economic "cross-overs" (number)* | | • *Competences and know-how* | |
| **Designation of innovation experts for consulting on innovation and support** | Increase in designation of innovation experts for consulting on innovation and | All partners | • *National, regional, and EU current and future* | 2027 (recurring: frequency biennially, 2023 – |



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| **its implementation in blue economy sectors** | support its implementation in blue economy sectors - *Collaborative projects for development of virtual innovation hub/platform for development and implementation of innovation in blue economy sectors, with provided designation of innovation experts for consulting on innovation and support to its implementation (number);*<br><br>*Virtual innovation hub/platform developed for development and implementation of innovation in blue economy sectors, with provided designation of innovation experts for consulting on innovation and support to its implementation (number);*<br><br>*Designated innovation experts for consulting on innovation in blue economy sectors and support to its* | | *funding opportunities*<br>• *Q-Helix collaboration*<br>• *Human, material, operative, financial capacities and resources*<br>• *Competences and know-how* | 2024; 2025 – 2026) |



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| | *implementation (number)* | | | |
| **Establishment of a blue career network communities' for connecting relevant centers** | Established blue career network communities' for connecting relevant centers - *Development and implementation of collaborative projects for establishment of virtual innovation hub/platform „Blue Career Network Communities" for connecting relevant centers (number);*<br><br>*Virtual innovation hub/platform „Blue Career Network Communities" established for connecting relevant centers (number)* | All partners | • *National, regional, and EU current and future funding opportunities*<br>• *Q-Helix collaboration*<br>• *Human, material, operative, financial capacities and resources*<br>• *Competences and know-how* | 2027 (recurring: frequency biennially, 2023 – 2024; 2025 – 2026) |
| **Integration of modern blue technologies to "traditional" blue economy sectors** | Increase in modern blue technologies integrated to "traditional" blue economy sectors - *Collaborative projects for the integration of modern blue technologies to "traditional" blue economy sectors (number)* | All partners | • *National, regional, and EU current and future funding opportunities*<br>• *Q-Helix collaboration*<br>• *Human, material, operative, financial capacities and resources*<br>• *Competences and know-how* | 2027 (recurring: frequency biennially, 2023 – 2024; 2025 – 2026) |



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| **Building capacities of all Q-Helix actors for developing strong international collaboration and value chain links for strengthening Blue Growth and enhancing sustainable Blue Economy at the macro-regional level** | Increase in capacities built of all Q-Helix actors for developing strong international collaboration and value chain links for strengthening Blue Growth and enhancing sustainable Blue Economy at the macro-regional level –<br><br>*Activities (workshops, trainings, educations, educational materials) for building capacities of all Q-Helix actors for developing strong international collaboration and value chain links for strengthening Blue Growth and enhancing sustainable Blue Economy at the macro-regional level*<br><br>*(number);*<br><br>*Activities for raising awareness (conferences, roundtables, panels, promotion campaigns) for developing strong international* | All partners | • *National, regional, and EU current and future funding opportunities*<br>• *Q-Helix collaboration*<br>• *Human, material, operative, financial capacities and resources*<br>• *Competences and know-how* | 2027 (recurring: frequency biennially, 2023 – 2024; 2025 – 2026) |



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| | *collaboration and value chain links for strengthening Blue Growth and enhancing sustainable Blue Economy at the macro-regional level (number)* | | | |

**Long-term goal 5 "Pooling relevant funding opportunities"** consists of the following short-term objectives:

1. *Current and future financing opportunities for sustainable blue projects*
2. *Pooling funding from regional programming instruments.*

**Table 17. Short-term objectives for the implementation of long-term goal 5**

| **LONG-TERM GOAL 5** | **POOLING RELEVANT FUNDING OPPORTUNITIES** | | | |
|---|---|---|---|---|
| **Short-term objectives** | **Expected outcome - *proposal of potential indicator for monitoring (on the regional level)*** | **Responsibility** | **Inputs** | **Due date** |
| **Current and future financing opportunities for sustainable blue projects** | Increase in absorption of current and future financing opportunities for sustainable blue projects –<br><br>*Collaborative projects in the field of blue economy through current and future financing opportunities for sustainable blue* | All partners | • *National, regional, and EU current and future funding opportunities*<br>• *Q-Helix collaboration*<br>• *Human, material, operative, financial capacities and resources*<br>• *Competences and know-how* | 2027 (recurring: frequency biennially, 2023 – 2024; 2025 – 2026) |



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| | *projects (number);*<br><br>*Total value of collaborative projects in the field of blue economy financed through current and future financing opportunities for sustainable blue projects (EUR);*<br><br>*Total value of funding awarded to sustainable blue projects (EUR)* | | | |
| **Pooling funding from regional programming instruments** | Increase in funding pooled from regional programming instruments - *Virtual hub/platform developed for pooling and compiling in one place (1) all available current financing opportunities for sustainable blue projects, (2) all future financing opportunities for sustainable blue projects, and (3) provision of support on how to apply to relevant calls for* | All partners | • *National, regional, and EU current and future funding opportunities*<br>• *Q-Helix collaboration*<br>• *Human, material, operative, financial capacities and resources*<br>• *Competences and know-how* | 2027 (recurring: frequency biennially, 2023 – 2024; 2025 – 2026) |



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| | *projects, to improve access of all Q-Helix actors to these funds and efficient absorption of the funds (number);*<br><br>*Collaborative R&D& partnerships and projects in the field of blue economy through pooling opportunities from regional programming instruments, (number)* | | | |



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