

**STRENGTHENING THE
CAPACITY FOR EXCELLENCE
OF SLOVENIAN AND
CROATIAN INNOVATION
ECOSYSTEMS TO SUPPORT
THE DIGITAL AND GREEN
TRANSITIONS OF
MARITIME REGIONS**



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Authors	Nikolina Pomenic (PRIGODA), Irena Đokic (Euro ekspertiza j.d.o.o.)
Reviewers	Hrvoje Marušić (UNIRI), Marko Šimic (UL), Olivier Vasseur (UANTWERP)
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Abstract	This document includes the strategic framework for research and innovation in Western Slovenia and Adriatic Croatia maritime sectors. The strategic framework is developed based on analyses and mapping of maritime innovation ecosystems in Western Slovenia and Adriatic Croatia, it takes into consideration a wider strategic context (supranational, national, and regional) and is built on four strategic objectives. They are further decomposed into priority areas and corresponding measures which implementation should lead to the achievement of a jointly set vision.
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PARTNERS

The list of INNO2MARE partner's:

1. UL, University of Ljubljana, Faculty of Mechanical Engineering, Slovenia
2. ISKRA, Electro and system solutions, d.o.o., Slovenia
3. DIGITEH, Optimization of production processes, d.o.o., Slovenia
4. BSC, Business Support Centre Kranj – Regional Development Agency of Gorenjska, Slovenia
5. ZOTKS, Association for Technical Culture of Slovenia, Slovenia
6. UNIRI, University of Rijeka, Croatia
 - 6.1 PFRI, Faculty of Maritime Studies, Croatia
 - 6.2 RITEH, Faculty of Engineering, Croatia
7. STEP RI, Science and Technology Park of the University of Rijeka, Croatia
8. MS Tech, MS Tech d.o.o., Croatia
9. MCoE, Maritime Center of Excellence d.o.o., Croatia
10. PRIGODA, Regional Development Agency of Primorje-Gorski Kotar County, Croatia
11. CTC Rijeka, Centre of Technical Culture Rijeka, Croatia
12. UANTWERPEN, University of Antwerp, Belgium
13. HZS, Antwerp Maritime Academy, Belgium
14. REA KVARNER, Regional Energy Agency Kvarner, Croatia
15. DBC, Blue Cluster, Belgium
16. URBANEX, Croatia
17. PoAB, Port of Antwerp, Belgium

INNO2MARE partner's LOGOS:



EXECUTIVE SUMMARY

Many activities undertaken in maritime areas of Slovenia and Croatia are intertwined, linked, and bring diverse impacts in both countries. Technological trends, climate changes, unexploited potential for the use of renewables, increasing negative impacts on the Adriatic Sea and the coastal areas from various economic activities, growing environment-related problems and waste generation, lack of coordination in the implementation of various (mainly planning) documents ask for more concerted action of decision makers and stakeholders in maritime innovation ecosystem. As a response to that, one of the deliverables of the project Strengthening the capacity for excellence of Slovenian and Croatian innovation ecosystems to support the digital and green transitions of maritime regions – INNO2MARE is this Joint maritime R&I strategy for Western Slovenia and Adriatic Croatia (R&I Strategy). It is a result of combined and joint actions undertaken by all participating partners and stakeholders and is based on several inputs as follows:

- Analytical assessment, identification, and quantification of the key economic and technical indicators of the Croatian maritime innovation ecosystem
- Report on ecosystem's mapping (for both countries)
- Report on ecosystem's needs (for both countries)
- Findings and conclusions of the workshops with project partners and stakeholders conducted during the project implementation
- Other relevant documents and sources.

The strategic framework developed here reflects the response to the ecosystem's needs striving to bridge the gap identified in both ecosystems and gives strategic directions for future actions that have to be implemented to achieve the vision set. A jointly developed vision is future-oriented and in compliance with all current trends at the EU and global level. The vision is as follows:

Western Slovenia and Adriatic Croatia are innovative, resilient, and sustainably using marine space and resources developed contributing to emission reduction and supporting blue economy growth. The maritime research and innovation ecosystem of the region is globally recognized and adaptive, fostering Adriatic Sea cooperation, knowledge sharing and advances in innovation and technology.

The overarching vision was useful in setting the strategic objectives which are the following:

- I. Digital advancement of the maritime innovation ecosystem
- II. Green transition of the maritime innovation ecosystem
- III. Attractive and in full capacity maritime ecosystem labour market
- IV. Excellence in maritime ecosystems' governance.

For each strategic objective, the priority areas and measures are defined containing a number of projects, activities, and initiatives that contribute to the achievement of strategic objectives. The strategic framework also provides indicators which will serve to measure progress and evaluate implementation, performance and achieved targets and which will be used to give directions for future actions.

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INTRODUCTION

The project *Strengthening the capacity for excellence of Slovenian and Croatian innovation ecosystems to support the digital and green transitions of maritime regions* – INNO2MARE is a joint Horizon Europe project in which 19 organizations from Slovenia, Croatia and Belgium participate. The main goal of INNO2MARE is to strengthen the capacity for excellence of Western Slovenian and Adriatic Croatian innovation ecosystems through a set of jointly designed and implemented actions that will support the digital and green transitions of the maritime and connected industries. Besides Slovenian and Croatian partners, the Belgian partners participate in the project in different project activities to support the development and later implementation of the joint R&I strategy¹. Their support is to a large extent provided through various knowledge exchange activities and presentation of good practices in the Belgian maritime innovation ecosystem, with an aim to apply (what is applicable) and/or adapt solutions and positive examples to Western Slovenia and Adriatic Croatia maritime innovation ecosystem.

INNO2MARE aims to initiate joint actions to boost cross-border cooperation and create scientific and economic synergies, primarily through:

- Formulating a shared R&I strategy and action & investment plan
- Implementing three R&I pilot projects addressing key challenges related to the maritime sector
- Creating opportunities for the effective transfer of innovative technology to the markets
- Improving conditions for talent attraction and retention in accordance with the principles of equal opportunities and gender equality
- Fostering knowledge creation and transfer based on the “Quadruple-Helix” model.

Joint maritime R&I strategy for Western Slovenia and Adriatic Croatia (R&I Strategy) is one of the deliverables of the project. It is closely related to all the other project WPs and deliverables as it represents an “umbrella” for implementation of various complementary, innovative and future oriented activities that will contribute to enhancing of cross-border cooperation and strengthening of maritime innovation ecosystem of Western Slovenia and Adriatic Croatia. R&I Strategy is a result of combined and joint actions undertaken by all participating partners and stakeholders and is based on a number of inputs as follows:

- Analytical assessment, identification, and quantification of the key economic indicators of the Croatian maritime innovation ecosystem
- Report on ecosystem’s mapping (for both countries)

¹ A full list of project and associated partners is presented in Table 4 List of project and associated partners.

- Report on ecosystem's needs (for both countries)
- Findings and conclusions of the workshops with project partners and stakeholders conducted during the project implementation
- Other relevant documents and sources.

We believe that the strategy in which relevant strategic objectives, priorities, and measures have been identified can be used as a high-quality document for steering future projects and actions that will strengthen the capacity for excellence of Slovenian and Croatian innovation ecosystems to support the digital and green transitions of their maritime regions.

PURPOSE AND OBJECTIVES OF DEVELOPMENT OF A JOINT R&I STRATEGY

Many activities undertaken in maritime areas of Slovenia and Croatia are intertwined, linked and bring diverse impacts in both countries. Technological trends, climate changes, unexploited potential for use of renewables, increasing negative impacts on the Adriatic Sea and the coastal areas from various economic activities, lack of coordination in implementation of various (mainly planning) documents ask for more concerted action of decision makers and stakeholders in maritime innovation ecosystem². This project and the R&I strategy as one of its' deliverables is a response to the current state and guidance for future action that address many issues and challenges identified in analyses conducted within the project so far.

None of the actors in our maritime areas should not act in an isolated way. The project has brought actors and stakeholders together and sought for a joint vision, strategic objectives, priority areas and measures that are quite realistic and likely feasible to implement.

This joint exercise of a strategy elaboration proved the need for a joint engagement in identification of critical areas that need improvements and/or setting up of missing organizational/institutional structures, further research and innovation related activities, cooperation, collaboration and networking to create desirable environment and atmosphere for achieving the strategic objectives set in a joint strategy.

Innovation ecosystems are a complex process that span the generation of ideas, their translation into products, and the commercialization of these products to a large scale. The success of this progression depends on multiple factors, such as a business culture that rewards entrepreneurship, risk-taking and a will to embrace change, a set of regulations and administrative norms that incentivize this attitude, a strong knowledge-generation sector (universities, research centres and laboratories), and collaboration between these knowledge centres and commercial businesses. Innovation can be successfully steered towards applications particularly valuable to society (World Economic Forum, 2020).

When we add maritime to innovation ecosystem (the Ecosystem) then it refers to the companies from the coastal region (in our case Western Slovenia and Adriatic Croatia) and those from the

² Note: There are intrinsic strategic competition and even conflicts of interest between Croatia and Slovenia, which affect collaboration in sectors relevant for this project, i.e. energy, maritime and on-shore transport, fisheries, maritime domain management, territorial disputes in the Savudrija Bay etc. Although they are present and acknowledged, they however do not present a significant direct concern for R&I collaboration, but they may have a limiting impact on the implementation of joint strategies.

continental region, but with major business operations carried out in Adriatic region. The Ecosystem comprises of companies that constitute the supply side of innovation (the innovative production firms) and the demand side of innovation (infrastructure, logistics, shipping, public etc.).

Based on these premises, analytical background has been prepared, needs and key challenges identified and through a series of workshops they have been translated in more concrete and operational steps, listing the projects and activities that could be implemented to enhance maritime innovation ecosystems of both countries and create more synergetic developmental effects.

ANALYTICAL BACKGROUND

In this chapter summaries of various analyses undertaken have been provided which present how the ecosystem has been mapped, what are the needs that are recognized in Slovenian and Croatian ecosystems, identification and quantification of key economic and technical indicators for Croatian maritime innovation ecosystem and what are the findings included in SWOT analyses for both countries.

Ecosystems' mapping – summary

Mapping of the ecosystems

The INNO2MARE project aims to map the Western Slovenian and Adriatic Croatian maritime innovation ecosystems to support digital and green transitions in the maritime and connected industries. The Report on Ecosystems' mapping (Deliverable D2.1) represents a comprehensive analysis that examines the Slovenian and Croatian maritime and nautical industry ecosystem, including its innovation ecosystem canvas, SWOT analysis, and a list of all stakeholders.

The main objectives of the mapping are understanding the current state of the industry, identifying strengths and weaknesses, opportunities and threats, developing recommendations for improvement, and supporting informed decision-making. The mapping should be a continued strategic activity for this ecosystem's sustainability and resilience to changes, as well as it should strive to include as many as possible all those companies that may have great potential within the R&I ecosystem. Project-specific objectives include understanding key stakeholders, ongoing processes, past, present, and future activities, and relationships between stakeholders.

The outcome of the ecosystem's mapping is a visual representation of the ecosystem, which can be used to understand the structure and dynamics of the ecosystem, identify areas of opportunity and risk, and develop strategies to enhance the sustainability and competitiveness of the ecosystem. The ecosystem mapping will also help understand better how interconnected Slovenian and Croatian maritime and nautical ecosystems are.

Maritime and nautical innovation ecosystem mapping aims to understand its strengths and weaknesses, identify improvement opportunities, and identify potential partners and collaborators. Stakeholders within the ecosystem are categorized into logistics, production, shipping, software development, service, infrastructure, startups, incubators, VCs, research and academia, and other services related to maritime and nautical industry. The number of identified stakeholders exceeds those included in the ecosystem canvas, mainly due to the difference between private companies that are innovative in their business model and companies that are not innovation drivers due to their core business. Within the mapping, the innovation driver is defined as a factor that promotes the development and adoption of new ideas, technologies, or processes that lead to significant positive change or improvement in the industry.

Slovenian maritime & nautical ecosystem

The Slovenian ecosystem is diversified, with a focus on promoting innovation, addressing niche markets, and the rapid growth of the entrepreneurial ecosystem. The industry includes shipbuilding, transportation, logistics, and ports, with Luka Koper being the only strongly significant company in the maritime sector. However, the industry's small size makes it primarily dependent on the private sector, which can be an advantage or disadvantage. The largest share of stakeholders in Slovenia is represented by companies involved in manufacturing, logistics, start-ups, and software development. The number of start-ups, production companies, and software development companies drives innovation. The Slovenian maritime & nautical ecosystem is presented in Figure 1.

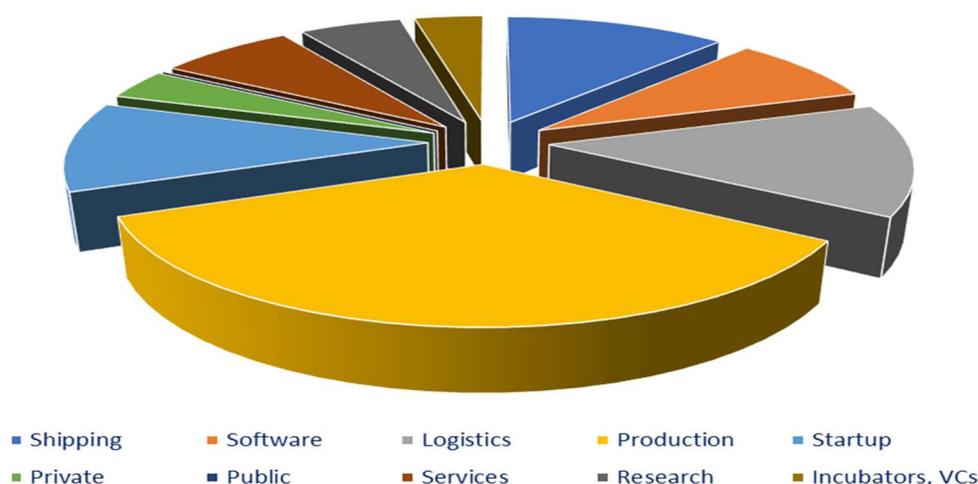


Figure 1 Slovenian maritime & nautical ecosystem (by categories)

Source: *The Report on Ecosystems' mapping (Deliverable D2.1, V1.0) (2023)*

The Slovenian maritime industry offers opportunities for innovation and new technological approaches, with a strong manufacturing and technical knowledge base. Opportunities include large infrastructure projects, emerging technologies, and a growing demand for sustainable and eco-friendly solutions. However, Slovenia faces challenges such as limited access to funding, long administration processes, high taxation, public ownership of the Port of Koper, dependence on public financing, and outdated infrastructure.

Croatian maritime & nautical ecosystem

The Croatian maritime innovation ecosystem is a dynamic environment involving various stakeholders, including universities, research institutions, software companies, start-ups, shipyards, shipping companies, ports, clusters, boatbuilders, and marinas. Design offices play a crucial role in ship design, collaborating with shipyards, marine equipment producers, and suppliers. The main driver of innovative performance in Croatia is the networking of public, private, and scientific research sectors, to strengthen the competitiveness and innovation of the

shipbuilding sector and related industries in Adriatic Croatia. The ecosystem is heterogeneous, with major stakeholders being competitors, collaborators, or not interested in local collaboration due to their global market presence. Production is a crucial aspect of the Croatian maritime innovation ecosystem, with companies like Luerssen, Mayer Group, Royal IHC, Kongsberg Group, Vard, and NAOS Group contributing to the industry.

Croatia is ranked as an Emerging Innovator with a performance gap of 66.50% of the EU average, with performance increasing strongest in research systems, finance and support, innovators, and sales impacts. The number of start-ups, production companies, and software development companies is on the rise, driving innovation through the digitalization of traditional maritime industries like logistics, shipbuilding, shipping, and support services.

The Croatian maritime sector is experiencing significant transformations to tackle climate and environmental challenges while maintaining a competitive position in the global markets. The restructuring process of most Croatian state-owned shipyards presents challenges, but the industry has managed to survive and obtain new contracts with government intervention. State-owned shipyards in Croatia face weaknesses such as technological lagging, lower productivity, inadequate skilled workers, and low financial potential. Croatian maritime & nautical ecosystem is presented in Figure 2.

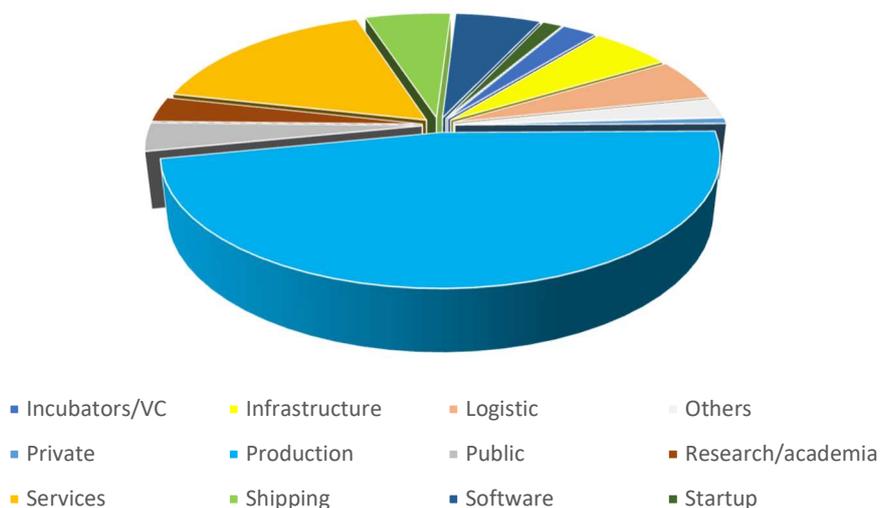


Figure 2 Croatian maritime & nautical ecosystem (by categories)

Source: The Report on Ecosystems' mapping (Deliverable D2.1, V1.0) (2023)

Mapping process

The mapping process was conducted in several phases that are presented in Figure 3:



Figure 3: Mapping process

The first phase was related to the definition of the research methodology. The research methodologies used included desk research, database search, questionnaires, and interviews. The methodology involved designing the questionnaire, pretesting it, administering it, and collecting and analyzing the data. With some stakeholders the interviews were conducted.

The second phase of the ecosystem mapping involved identifying key stakeholders, such as companies, research centers, maritime industry associations, governmental organizations, non-governmental organizations, startup incubators, academic institutions, and cooperatives.

Data collection was the third phase of the mapping, and it involved searching databases and/or addressing stakeholders with a questionnaire. Additional data was collected using other research methodologies, such as the public business registers, which contained data about legal entities and their beneficial owners.

In the data interpretation phase, the collected data was analyzed, extracting meaningful insights and relationships between stakeholders within one ecosystem and between both.

The results of ecosystems mapping were presented in the form of an ecosystem map. The maritime innovation ecosystem representing all 4-helix stakeholders can be presented as presented in Figure 4.

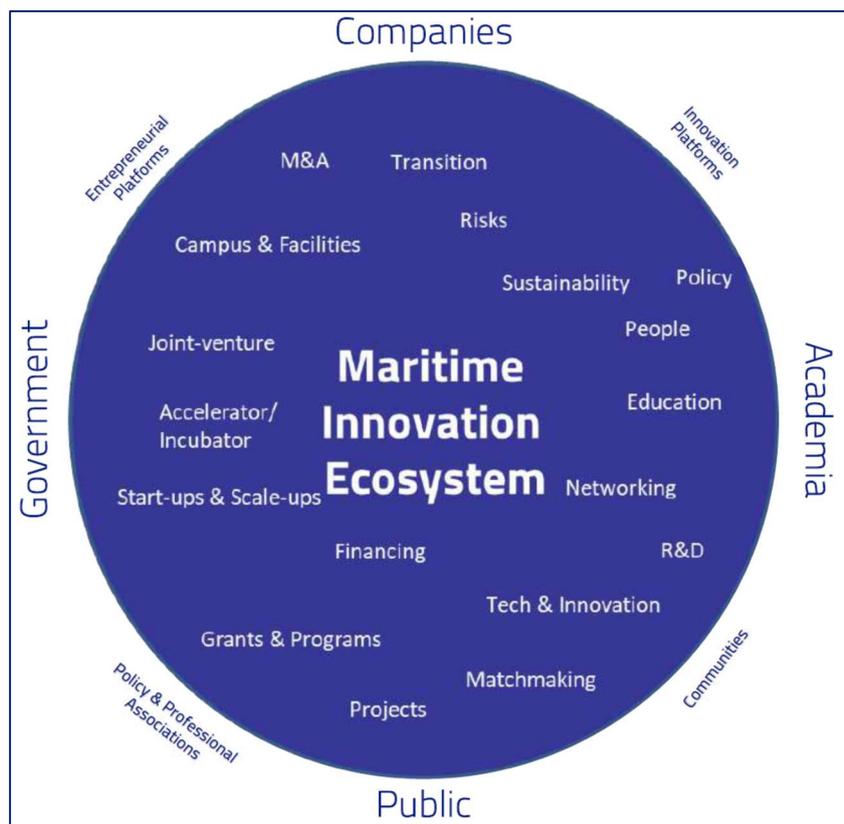


Figure 4 Maritime Innovation Ecosystem

Source: Mehta, D. (2023), *Navigating Innovation*, INNO2MARE Antwerp visit, 13.12.2023. – presentation material

Innovation ecosystems' needs – summary

The Report on ecosystems' needs is the output of Task 2.2 – Gap analysis whose purpose is to collect stakeholders' views regarding common and distinct R&I needs, gaps challenges, and opportunities as well as best practices, unmet needs, and possible solutions. The purpose of the Analysis is to identify gaps and deficiencies in the Croatian and Slovenian maritime innovation ecosystem and determine areas of improvement. Various aspects of the maritime industry have been assessed including production, shipping, regulations, education, financing, and environmental impact considering economic, environmental, and social factors affecting the ecosystem. In that respect, both internal and external factors are taken into account which provides a comprehensive and more complete understanding of the ecosystems' current state and desired future state.

A gap analysis is used to assess the difference between the ecosystem's current state and its desired or ideal state. It helps identify areas where there are disparities or "gaps" between the two, which can then be addressed to achieve better performance and improvements. The importance of the Gap analysis is in providing insight relevant to strategic decision-making for industry stakeholders and policymakers. In bridging the gap and building successful ecosystems with all its' components, an important role plays an academic community. Academic institutions

are in charge of the preparation of new education and training Programmes for future engineers and other experts that gain the knowledge required for the companies and market. Besides this important role, the institutions and the members of the academic community are often involved in the preparation, reviewing, commenting, and advising of strategic documents at national, regional, and local levels as well as in EU projects, identification of relevant research areas, developments and technologies that should be implemented in companies to increase their competence and values of various economic and technical performance indicators. The results of the Gap analysis are based on conducting two workshops with the Croatian stakeholders and two workshops with the Slovenian stakeholders in the maritime innovation ecosystems. The results of the Gap analysis of the Adriatic Croatia and Western Slovenia Maritime Innovation Ecosystems are presented in Tables 1 and 2.

Table 1: Results of the Gap Analysis of the Adriatic Croatian Maritime Innovation Ecosystem

CURRENT STATE	IDENTIFIED GAP	POSSIBLE ACTIONS	DESIRED FUTURE STATE
Communication between stakeholders is not- satisfactory being sporadic, scattered, and practically non-existent	No systemic approach to communication	<ul style="list-style-type: none"> • Creation of a centralized hub/ platform where information can be exchanged between all stakeholders • Establishing a project registry of all ongoing innovation projects • Organizing conferences and workshops on a regular basis • Organizing forums with the purpose of presenting industrial achievements and the needs of businesses to universities and other stakeholders 	Stakeholders share a continuous open communication
<ul style="list-style-type: none"> • Large number of universities with a long tradition present in Adriatic Croatia that offer high-quality programs of maritime studies and engineering • The programs are in some aspects outdated 	<ul style="list-style-type: none"> • Mismatch of study programs with needs of the modern maritime industry • Demand for a high-quality workforce, especially engineers is higher than the supply 	<ul style="list-style-type: none"> • Creation of new study programs aligned with the needs of the maritime industry • Use of new technologies within the educational process like VR etc. • Introducing software that is used in 	<ul style="list-style-type: none"> • Study programs are compatible with the needs of the modern maritime industry • Universities produce sufficient graduates that satisfy the needs of the Croatian maritime industry • The new graduates

CURRENT STATE	IDENTIFIED GAP	POSSIBLE ACTIONS	DESIRED FUTURE STATE
<p>and need to be modernized</p> <ul style="list-style-type: none"> • Decreasing interest among students in enrolling in maritime studies, especially naval engineering 		<p>companies to students within the study programs</p> <ul style="list-style-type: none"> • Creation of alternative courses that match the specific needs of companies within the maritime industry • Promotional campaigns that promote the benefits of engineering and maritime studies 	<p>adapt quickly to companies' requirements and easily enter the workforce</p>
<ul style="list-style-type: none"> • Funds for financing innovation are not sufficient, companies rely mostly on their own resources • Procedures to obtain grants are complicated and take a long time • Most of the funds are directed at universities, not companies • Dependence on EU funding is present • Large shipyards are excluded from obtaining financing due to their size 	<ul style="list-style-type: none"> • The companies struggle to find financing to invest in innovation • Shipyards can't obtain the financing needed for their modernization 	<ul style="list-style-type: none"> • Opening more funds and programs that finance innovation in the maritime sector • Encouraging and forming consortia and clusters between stakeholders within the Croatian maritime innovation ecosystem so that they can apply funds from the Plan of Industrial Transition of Adriatic Croatia 	<ul style="list-style-type: none"> • The process of obtaining financing for innovation is quick and easy • Companies as well as universities, research institutions, and shipyards have equal access to financing
<ul style="list-style-type: none"> • Mindset of the maritime industry is closed and conservative when compared with other industries • Closedness of companies, instead of sharing knowledge, resources, and experience • The reluctance of the key people in the maritime industry in accepting innovations 	<ul style="list-style-type: none"> • The maritime sector is slow to change and adapt to new technologies • Closedness of stakeholders within the ecosystem causes a disconnection between innovators with the users of the innovation • "Service mindset" which signifies the belief there is no need for market research and 	<ul style="list-style-type: none"> • Change the mindset to be more open and risk-embracing by emphasizing the need and benefits of innovation • Acceptance of mistakes as a normal part of research and innovation • Changing the "Service mindset" to a mindset of production which includes market research and 	<ul style="list-style-type: none"> • The open mindset of the maritime ecosystem that embraces change and encourages the environment in which innovations are quickly accepted • Innovations are more easily introduced to the market and monetized

CURRENT STATE	IDENTIFIED GAP	POSSIBLE ACTIONS	DESIRED FUTURE STATE
<p>The problem of the “big ship paradigm” existing in our history and maritime tradition</p>	<p>development</p> <ul style="list-style-type: none"> The pilot projects remain in the pilot phase; the focus is mainly on big ship production 	<p>development</p> <ul style="list-style-type: none"> Education of the key people in the maritime industry to accept innovative solutions 	
<ul style="list-style-type: none"> Croatian maritime industry is, except international regulators (IMO), also regulated by Croatian laws which include both maritime and land regulation The governance of various sectors within the maritime ecosystem (i.e., ports shipyards, etc) falls under different Ministries <p>The complex and long-term procedure of certification of equipment and products</p>	<ul style="list-style-type: none"> There are problems with respecting maritime and land regulations because in many cases they contradict each other The authorities in different counties of Adriatic Croatia interpret the same laws in a different manner The companies must contact different Ministries in order to conduct business which is very demanding and time-consuming The companies are exhausted by requirements and give up on innovations due to the complexity and duration of the process of certification 	<ul style="list-style-type: none"> Action is needed from the Government to adjust the maritime and land regulations in the greatest way possible to be coherent with one another Providing a clear and concise interpretation by the Ministries of the laws that have to be used in all Counties of Adriatic Croatia in the same way Companies from the same sectors within the maritime industry should jointly approach Ministries by demanding open communication Changing the laws and requirements to be faster and easier to implement to encourage innovative business activities 	<ul style="list-style-type: none"> The Croatian maritime industry is completely in line with all regulatory requirements Local regulations are clear, and stakeholders can easily respect them The process of certification is quick and easy for companies The Croatian maritime industry is sustainable and respects the environment (IMO requires decarbonization of the industry by 2050)
<ul style="list-style-type: none"> A long tradition of shipbuilding Shipyards are partially state-owned, and their future depends on Government’s decisions Regional naval design hub concentrated in Rijeka Presence of subsidiaries and branches of foreign companies and groups 	<ul style="list-style-type: none"> Shipyards are mostly devastated and need state support Shipyards need modernization and transition from Industry 2.0 to Industry 4.0 Non-involvement of Croatian companies owned by foreign groups in innovation and development The lack of action 	<ul style="list-style-type: none"> The synergy between engineers who carry out processes in Croatian shipyards and have domain knowledge with IT experts to digitalize and improve processes Persist with bringing the innovation from the owner company headquarters to Croatia, work together with teams from headquarters and 	<p>The maritime sector of Adriatic Croatia is a highly specialized export-oriented sector that produces innovative products and represents a force in the Croatian economy and is recognized on international markets</p>

CURRENT STATE	IDENTIFIED GAP	POSSIBLE ACTIONS	DESIRED FUTURE STATE
<ul style="list-style-type: none"> • Non-existence of value chains in the maritime sector • Non-existence of specialization strategy 	<p>plans due to the absence of a strategy for the maritime sector</p> <ul style="list-style-type: none"> • Trying to follow all trends and “buzzwords” within the maritime industry without concentrating strategically on any goal 	<p>teams situated in Croatia</p> <ul style="list-style-type: none"> • Creation and establishment of value chains and reaching a consensus on the values and priorities of the digital, circular economy and Industry 4.0 • Focus on new niches in shipbuilding, yachts, and special vessels • Start with “small wins” that multiply over time, do not get lost in problems that are “too big of a challenge” 	

Source: Report on Innovation Ecosystems’ Needs, Deliverable D2.2 (2023)

Table 2 represents the results of the Gap analysis for the Western Slovenian Maritime Innovation Ecosystem.

Table 2: Results of the Gap Analysis of the Western Slovenian Maritime Innovation Ecosystem

CURRENT STATE	IDENTIFIED GAP	POSSIBLE ACTIONS	DESIRED FUTURE STATE
<p>Communication between stakeholders is not- satisfactory being sporadic, scattered, and practically non-existent</p>	<p>No systemic approach to communication</p>	<p>Organizing any type of collaborative invention events regularly</p> <ul style="list-style-type: none"> • Better digital collaboration between public and private entities • Organizing conferences and workshops on a regular basis • Developing new data sharing platforms • Forming working groups focusing on specific topics and 	<p>Stakeholders share a continuous open communication</p>

CURRENT STATE	IDENTIFIED GAP	POSSIBLE ACTIONS	DESIRED FUTURE STATE
		regularly reporting duties	
<p>Large offer of various programs and studies at various faculties studies, especially naval engineering</p>	<p>Demand for enrolling in maritime studies, especially engineers are decreasing in new generations and is not nearly close to expectations, compared to offered studies</p>	<ul style="list-style-type: none"> • More campaigns and publicity that will encourage young people to study engineering and maritime studies • Use of new technologies within the educational process like VR etc. • Introducing software and future opportunities that is used in companies to students 	<ul style="list-style-type: none"> • Study programs are compatible with the needs of the modern maritime industry • The new graduates adapt quickly to companies' requirements and easily enter the workforce • The study offer is more effective in practice
<ul style="list-style-type: none"> • Lack of resources • Directed financial support mostly to universities and public institutions, instead of entrepreneurs • Dependence on EU funding is present • Lack of pragmatic funding sources for the maritime industry funding sources that are fast and easily obtained • Slow pace of change due to lack of resources, particularly personnel and funding to support innovation efforts 	<ul style="list-style-type: none"> • The companies struggle to find financing to invest in innovation • Shipyards can't obtain the financing needed for their modernization • There is no clear structure of accessibility and form of financing 	<ul style="list-style-type: none"> • Opening more funds and programs that finance innovation in the maritime sector • Create a structured and clear picture of financing • Find new resources • More pragmatic funding • Open more funding to private entities and start-ups 	<ul style="list-style-type: none"> • The process of obtaining financing for innovation is quick and easy • Companies as well as universities, research institutions, and shipyards have equal access to financing • A new clear structure of financing is made
<ul style="list-style-type: none"> • Mindset of the maritime industry is closed and conservative when compared with other industries 	<ul style="list-style-type: none"> • The maritime sector is slow to change and adapt to new technologies • Closedness of 	<ul style="list-style-type: none"> • Change the mindset to be more open and risk-embracing by emphasizing the need and benefits of 	<ul style="list-style-type: none"> • The open mindset of the maritime ecosystem that embraces change and encourages the environment in which

CURRENT STATE	IDENTIFIED GAP	POSSIBLE ACTIONS	DESIRED FUTURE STATE
<ul style="list-style-type: none"> • Closedness of companies, instead of sharing knowledge, resources, and experience • The reluctance of the key people in the maritime industry in accepting innovations • Overload of the companies with regular business activities • Mistrust of the state when allocating funds to lesser-known entrepreneurs due to previous bad experiences of fraud 	<p>stakeholders within the ecosystem causes a disconnection between innovators with the users of the innovation</p> <ul style="list-style-type: none"> • “Service mindset” which signifies the belief there is no need for market research and development • The pilot projects remain in the pilot phase; the focus is mainly on big ship production 	<p>innovation</p> <ul style="list-style-type: none"> • Acceptance of mistakes as a normal part of research and innovation • Changing the “Service mindset” to a mindset of production which includes market research and development • Education of the key people in the maritime industry to accept innovative solutions 	<p>innovations are quickly accepted</p> <ul style="list-style-type: none"> • Innovations are more easily introduced to the market and monetized

Source: Report on Innovation Ecosystems’ Needs, Deliverable D2.2 (2023)

Identification and quantification of key economic indicators for Croatian maritime innovation ecosystem - summary

The Croatian maritime innovation ecosystem (the Ecosystem) consists of 261 companies from the coastal region of Adriatic Croatia and a few from the continental region, but with major business operations carried out in Adriatic Croatia. The Ecosystem comprises companies that constitute the supply side of innovation (the innovative production firms) and the demand side of innovation (infrastructure, logistics, shipping, public, etc.). In 2022, companies within the Ecosystem had 11,315 employees, generated 1,293.4 million euros of sales revenues (67.9% from sales abroad) and 626.2 million euros of value added. The Ecosystem’s distinctive feature is a strong international business orientation, and due to this, exposure to global economic developments and disturbances. The central part of the Ecosystem is production companies that are innovating.

The results of the economic analysis of the Ecosystem’s size and importance are seen in the contribution that it is providing to Adriatic Croatia. In 2022 the Ecosystem employed 4.06% of people in Adriatic Croatia, generated 5.37% of total business revenues, 4.63% of sales revenues, 6.33% of the total newly created value, and 14.1% of exports of the entire entrepreneurial part of the Adriatic Croatian economy. Added value per employee (55,346 euro) of the Ecosystem, is 56.11% higher than the average of Adriatic Croatia, and the monthly gross salary is 41.18 percent

higher, all pointing to above-average productivity. Ecosystem's contribution to the innovation output of the region is also important and is reflected in the following: as much as 10.65% of the value of concessions, patents, licenses, trademarks and service brands, software, and other rights of the entrepreneurial sector of Adriatic Croatia was achieved by the maritime sector.

As mentioned, at the core of the Ecosystem are innovative maritime production companies, namely a number of shipyards (but not all), ship producers and some engineering & design companies, a service company, and also to a smaller degree software firms and start-ups. In total 41 companies can be considered innovative. The group is heterogeneous, with both large, medium, and smaller firms as well as different market niches and product portfolios. The common feature among innovative product manufacturing is the use of an innovative approach in product development through innovative materials, designs, or innovative techniques, also these are private companies, export-driven and sell their products in the international market, as reported by BSC & Lemur Legal, based on input by PRIGODA (D2.1, 2023). In 2022, Innovative maritime companies had 1,441 employees, generated 134.6 million euro of sales revenues (58.6 % being generated from sales abroad) and 51.7 million euro of value added. In terms of sales revenues and similar aggregate business indicators, a major shipyard BRODOSPLIT stands out at the beginning of the period 2018 – 2022, but over time its performance declined and a shift in the structure of the Innovative companies towards a larger share of medium and smaller companies is noted.

SWOT analysis needs and challenges - summary

In order to assess and evaluate the internal strengths and weaknesses, as well as the external opportunities and threats of each of the ecosystems, as part of the ecosystem mapping study SWOT³ analysis was prepared.

The said analysis comprehensively summarizes some of the key aspects of the ecosystems.

The Western Slovenian maritime innovation ecosystem SWOT analysis is presented in Table 3 below:

³ SWOT stands for S-strengths, W-weaknesses, O-opportunities, T-threats.

Table 3 SWOT analysis for the Slovenian ecosystem

Strengths	Weaknesses
<p>Port of Koper is the main driver in the maritime industry;</p> <ul style="list-style-type: none"> • strategic geolocation of Slovenia (Mid Europe with direct access to the sea); • awareness of modernization and digitalization needs in the industry; • strong start-up and scale-up ecosystem; • excellence in design, engineering, and construction; • a large percentage of companies from a traditional industry (e.g., shipbuilding) build their solutions by promoting innovation and new technological approaches; • strong manufacturing and technical knowledge base (sound school system, companies with legacy); • high existing awareness of the importance of the green industry (compliance with ESG standards); • a large number (per capita) of filled patents and models (Slovenian and EU). 	<ul style="list-style-type: none"> • limited access to funding and capital for maritime industry specialized companies (no special public financing Programmes for the nautical/maritime industry); • only one for the nautical/maritime industry specialised incubator • maritime/nautical industry not listed as a priority by existing (or any of the past) government; • long administration processes (obtaining permits, negotiations with bigger companies, etc.); • high taxation; • public ownership of Port of Koper (instability in governance); • dependence on Port of Koper (only one large stakeholder in the Slovenian maritime ecosystem); • existing dependence on public financing for start-ups and scale-ups; • existing infrastructure (railways, roads, capacity in Port of Koper); • no innovation hubs of foreign large companies in Slovenia (mostly only sales departments).
Opportunities	Threats
<ul style="list-style-type: none"> • large infrastructure projects in the process (railways, expansion of Port of Koper capacity); • emerging technologies such as automation, digitalization, and alternative fuels; • growing demand for sustainable and eco-friendly solutions in the maritime sector; • rapidly rising venture capital opportunities for Slovenian start-ups and scale-ups; • EU public funding schemes (e.g. SME instrument); • due to its size, the Slovenian market is ideal for testing new technologies, and products (“proof of concept phase”); • agility in state governance due to the county's size; • bringing back to Slovenia the individuals who are successful in entrepreneurship and in other industries (the government is implementing such Programmes). 	<ul style="list-style-type: none"> • start-up and scale-up “brain drain” due to lack of funding opportunities, unfriendly tax environment and slow changes in the regulatory framework; • economic downturns; • geopolitical instability; • political instability (internal); • regulatory changes (too slow, always waiting for the EU regulation to be adopted); • no government strategy for the future development of maritime/nautical industry; • competition from low-cost producers in Asia and other regions.

Source: D2.1_ Report on Ecosystems' Mapping_V1.0 (2023)

The results of the SWOT analysis of the Adriatic Croatian maritime innovation ecosystem are presented in Table 4:

Table 4 SWOT analysis for Croatian ecosystem

Strengths	Weaknesses
<ul style="list-style-type: none"> • strong maritime heritage and long tradition of high-quality shipbuilding and craftsmanship • strategic geolocation of Croatian ports and their infrastructure • strong maritime ship design engineering companies with state-of-the-art know-how • strong maritime and engineering universities providing excellent education • professional and high skilled labour force (engineers, etc), competitive on global market • region is a traditional Hub for maritime sector workforce due to long tradition and educational facilities • long term presence of Croatian companies on global market • presence of multinational companies branches and subsidiaries in maritime sector • excellence in ship design, engineering, construction, and production • presence of local IT companies that support maritime innovation ecosystem • awareness and implementation of green technologies • presence of research centre for new materials (light materials, advance materials, nanomaterials) 	<ul style="list-style-type: none"> • limited access to funding and capital for R&D projects from the government and venture funds • dependence on EU funding for innovative projects • SME-s lack in-house funding for innovations • Insufficient investment in R&D&I • weak connection between the business and scientific research centres and universities on innovative projects, insufficient partnerships between them • lack of networking in local/regional value chains • lack of broader strategy for shipbuilding industry (local/state level, EU) • reliance on government subsidies for state-owned shipyards • rigid administrative regulations • competition for highly skilled workforce between companies • brain-drain and import of expat workforce in shipyards • lack of investment in zero emission technologies in traditional shipping companies • lack of supportive infrastructure readiness • outdated technology and infrastructure • lack of smart skills for the industrial transition to new technologies • lack of strong high-tech player in the field of maritime technologies that could lead R&D process in the region • smaller companies existing in the ecosystem do not have strong or any R&D departments • only one nautical/maritime industry specialised incubator • no innovation hubs of foreign large companies in Croatia, only a few local subsidies are involved in collaboration on innovation projects • due to size and complex structures, ecosystems resist embracing innovation and change, and when enforced, innovative

	<p>performance is brought slowly and with great difficulty</p> <ul style="list-style-type: none"> • no real effort from governmental sector in sense of legislation change that would be in favour of green transition, for example, shipyards are excluded from any kind of subsidy even for green shipping • outdated infrastructure
Opportunities	Threats
<ul style="list-style-type: none"> • transition towards niches with higher added value (autonomous ships, green ships, luxury yachts and floating hotels, special purpose ships) • possibility of participating in EU founded R&D projects • large infrastructure projects for expansion in the port of Rijeka (railway, highway, new container terminal) and smart marina • establishment of an effective regional ecosystem and an ecosystem for entrepreneurs through establishment of maritime innovation clusters • creation of knowledge transfer centres between universities and industry • development of smart skills through lifelong learning • digital transformation and application of digital technologies in maritime industry • orientation on services with high added value (R&D, Ship design) • willingness of industry experts to adopt new technologies • emerging technologies such as autonomous shipping, AI, VR, and digital twins and their application in maritime industry • transition of vessels to alternative fuels • IT solutions and production technologies, digitization and automatization of business processes, management and planning etc. • development of ecological sustainable propulsion systems, development of intelligent steering systems, production of green energy for production needs, application of robotics • strengthening the capacity of medium and large enterprises • establishing a supportive start-up ecosystem 	<ul style="list-style-type: none"> • climate change and environmental challenges • shifts in global order and demographic • geopolitical instability • political instability • economic cycles/crisis • global competition, namely from East Asian shipyards especially in terms of lower labour cost and financial capacity • existing uncertainties and regulatory challenges/ changes related to green and digital transition in maritime technology (EU regulations to be adopted) • international standards for implementation of advanced ship technology are not in mature stage therefore, a close cooperation and liaising with certifying authorities early in the design phase is needed to enable effective transition • the development and adoption of new technologies is associated with considerable uncertainties, risks, and high costs

- | | |
|---|--|
| <ul style="list-style-type: none">• support of leading maritime companies to public companies in developing modern services and products in maritime sectors• attracting the best talents and involving citizens in the innovation process• clear focus on profit and/or changes in maritime legislation enforcing the application of innovations | |
|---|--|

Source: D2.1_ Report on Ecosystems' Mapping_V1.0 (2023)

The findings presented in SWOT analyses for Slovenia and Croatia have been discussed at the workshops with the project partners and stakeholders and later used in elaboration of a strategic framework.

STRATEGIC FRAMEWORK

A Joint maritime R&I strategy for Western Slovenia and Adriatic Croatia is one of the deliverables within the project Strengthening the capacity for excellence of Slovenian and Croatian innovation ecosystems to support the digital and green transitions of maritime regions (WP2, Deliverable D 2.3). As there is no prescribed form of a strategy as a document, for the purpose of elaboration of this strategic framework, a combination of the Croatian and Slovenian methodology has been used.

Namely, in Croatia, there is a legal framework regulating the elaboration of strategic planning acts⁴, while in Slovenia long-term development documents are adopted based on Public Finance Act^[Obj], four-year state Programmes of development policies (PRP) and mid-term fiscal strategy, that are annually updated. Additionally, a number of national maritime strategies has been consulted to align this strategy with relevant points of departure. During the workshops, the first one was conducted in March (vision development and setting strategic objectives), the second one at the beginning of April (agreeing on strategic objectives, identification of priority areas, elaboration of measures), and the third one later in April 2024 (further elaboration of measures, projects, and activities) it was jointly agreed that the strategic framework should include strategic objectives, for each strategic objective relevant priority areas, and each priority area there should be measures identified which will lead to the achievement of strategic objectives and ultimately of a joint vision. Besides this basic hierarchical structure, the indicators are also determined that will serve to monitor progress of strategy implementation and as a “traffic light” to notify (or in more extreme cases alarm) on negative divergencies or bottlenecks in strategy implementation. For a better understanding of basic terms, the most relevant ones are listed below:

The strategic objective is here determined as a long-term goal whose implementation will lead towards vision achievement. At this level, it is common to set up the impact indicators as quantitative and qualitative measurable data that enable monitoring, reporting and evaluation of success in achieving of determined strategic objective.

Policy priority is an umbrella term for a policy area in which focused interventions, measures, Programmes, projects, and activities will be implemented to address specific issues or problems detected in a particular sector or field of development.

Specific objective is a mid-term objective defined in national plans and plans of regional and local self-government through which strategic objective from strategies and a link to the Programmes

⁴ Law on strategic planning and management system in the Republic of Croatia, Official gazette 123/17, 151/22.

in the state budget or in the budget of regional and local self-government. Outcome indicator is a quantitative and qualitative measurable data that enables monitoring, reporting and evaluating of successfulness in achievement of determined specific objective. In this Joint R&I Strategy, no specific objectives are determined.

Measure is considered as a set of intertwined activities and projects in a specific administrative area that lead to the achievement of specific objectives and indirectly their implementation contributes to the achievement of the strategic objective. *Result indicator* is here considered as quantitative and qualitative measurable data that enables monitoring, reporting, and evaluation of success in the implementation of determined measures, projects, and activities.

Overall strategic context

The Croatian and Slovenian maritime innovation ecosystems are not isolated from other ecosystems across Europe and wider. It is expected that the implementation of a joint R&I strategy will contribute at least to some extent to achievement of both objectives set in this Joint R&I strategy and objectives defined in different maritime and research and innovation strategic documents above the regional or national level.

The majority of the supranational level documents indicated here include objectives, priority areas, measures and/or projects/activities related to digitalisation, green transition, blue economy, challenges in the labour market in the maritime sector, and governance-related issues. In this respect, our Joint R&I strategy takes into consideration these aspects at a higher level of the planning hierarchy and translates them into concrete measures that will be implemented at the national and regional levels in Western Slovenia and Adriatic Croatia. In this way, acting at a lower level of governance is aligned with a wider supranational strategic context and should positively contribute to the overall achievement of targeted values and success in general.

In this section, we provide information on a wider strategic or development context in which this joint strategy should fit. The list includes supranational, national, sectoral/multisectoral, subnational, and regional development documents of relevance to the maritime innovation theme.

Supranational level

The Joint R&I Strategy should take into consideration a wider strategic and development context as its' implementation has wider implications and impacts not only in Western Slovenia and Adriatic Croatia region but also in neighbouring countries and globally. Also, from a methodological point of view and following EU principles, the strategy should be coherent (or in compliance with) in hierarchical terms with the higher-level strategic documents and public policies. This Strategy is coherent with a number of documents and policies at the EU level and they are listed below.

European industrial strategy

On 10 March 2020, the Commission laid the foundations for an industrial strategy that would support the twin transition to a green and digital economy, make EU industry more competitive globally, and enhance Europe's open strategic autonomy. The day after the new industrial strategy was presented, the World Health Organization announced COVID-19 as a pandemic. On 11 May 2021, the Commission updated the EU Industrial Strategy to ensure that its industrial ambition takes full account of the new circumstances following the COVID-19 crisis and helps to drive the transformation to a more sustainable, digital, resilient, and globally competitive economy. As a primary vehicle of innovation in the various ecosystems, small and medium enterprises (SMEs) need to be kept in mind in all actions under this Strategy. This is reflected in a horizontal manner by increased attention to regulatory burdens for SMEs. New actions strongly benefit SMEs and start-ups, whether it be from a strengthened Single Market, reduced supply dependencies or accelerated green and digital transitions. The updated Industrial Strategy is proposing new measures to take into account the lessons learned from the crisis and sustain investment. In particular, it focuses on: Strengthening of the resilience of the Single Market, Supporting Europe's Open Strategic Autonomy through dealing with dependencies and supporting the business case for the twin transitions.

Maritime technology challenges 2030 – New Technologies and Opportunities (European Council for maritime Applied R&D (ECMAR))

ECMAR's vision for 2030 is for more energy-efficient design and operation for shipping and maritime activities, utilizing new technologies and green energy sources. The objective is to achieve a globally connected and competitive European Waterborne Sector, decarbonized and digitalized for a sustainable marine and maritime economy. Digitalization will spur automation and positively impact safety and environmental performance. New cloud technologies will dramatically affect the design, manufacture, and operation of vessels and their components. The Internet of Things will help to deliver smart vessels with shore-based control. Cybersecurity and Human Factors will become important issues with digitalization and automation. The next generation of connectivity between ship and shore will help shipowners reduce costs, avoid expensive repairs, and improve operational efficiency. Automated processes and the introduction of "big data" in maritime operations will lead to advances in engine monitoring, remote maintenance, and real-time weather data and routing. The seas and oceans are drivers for the European Blue Growth economy and have great potential for innovation and growth. Given the new challenges raised by the scarcity of resources, Blue Growth will be important for fulfilling the growing needs for food, energy, water, organic or mineral resources etc. ECMAR's maritime technology outlook for 2030 addresses societal, global, and industrial challenges in order to secure a safer, smarter, and more competitive, and sustainable maritime industry.

Many of the technology areas will need to embrace the application of new disruptive technologies that together with digitalization and connectivity, will be transformative and will make a significant contribution to the competitiveness and sustainability of the European maritime industry. ECMAR's main objective through Research, Development and Innovation is to achieve a globally

connected and competitive European Waterborne Sector, with zero emissions and zero-accident ships, digitalized shipping and autonomy, to ensure a sustainable marine and maritime economy.

The Shipyards' & Maritime Equipment Association of Europe (SEA Europe) and the Federation of Trade Unions Industrial Europe – the social partners for shipbuilding and ship repair – have called on the next European Commission to issue a robust EU maritime industrial strategy' that will enable European shipyards and maritime equipment manufacturers, as well as their employees to maintain Europe's position as a global technology leader while regaining strategic markets and tapping into emerging markets. It is expected the EU will reinforce its industrial production capacity and support the business case for sustainable and digitalized vessels. The key pillars of a future European maritime industrial strategy are four-fold: 1) Reinforce Europe's industrial sovereignty and competitiveness, 2) A supportive regulatory framework, 3) Reinforce Europe's technological leadership and 4) Attract a skilled workforce.⁵

EU Valorization Policy

Industry-academia collaboration is one of the key channels to foster a mutual exchange between knowledge generators and business actors, boost private investments in research, lead to more inventions and patents, facilitate the flow of knowledge and talents into companies, enhance researchers' skills and understanding of the market needs and increase entrepreneurial culture among researchers. This improves not only the competitiveness of European industry and the research and innovation system, but supports the development of green, innovative and digital solutions for society.

Although many policy instruments are in place to promote collaborations between academia and industry in Europe – such as grants for mobility, collaborative research and public-private partnerships – stronger interaction is needed. Citizens expect science to be a driving force that will address societal challenges and deliver solutions for ongoing green and digital transitions. The objective is to increase access, and use of research results, in particular when publicly funded. Making research results working for society is crucial to overcome the current needs and challenges faced by Europe.

Knowledge valorisation is the process of creating social and economic value from knowledge by linking different areas and sectors and transforming data, know-how, and research results into sustainable products, services, solutions, and knowledge-based policies that benefit society. EU knowledge valorisation policy covers both technological and non-technological solutions that can derive benefits to society as a whole. It calls for the participation of all actors in the research and

⁵ <https://www.offshore-energy.biz/shipbuilding-sector-trade-unions-demand-eu-maritime-industrial-strategy/> (accessed 17th June 2024)

innovation ecosystem including users, citizens, and policy-makers. This cross-fertilization of knowledge among different actors and sectors happens through academia-industry collaboration and mobility, the creation of spin-offs and start-ups, intermediaries and knowledge transfer professionals, citizens and local communities engagement, intellectual assets management, standardization, knowledge dissemination, and policy uptake.⁶

In the framework of Horizon Europe (2021-2027), the EC invests in a mission-driven approach to research and innovation to develop solutions to some of the major societal challenges. Hence, this will provide the underpinning for important policy initiatives such as the Green Deal, the Climate Adaptation Strategy, etc. The objective of the Restore our Ocean and Waters Mission (Mission Ocean) is to protect and restore the health of our ocean and waters by 2030 through research and innovation (by means of targeted project calls and tenders), citizen engagement and blue investments. In this way, the Mission will contribute to achieving climate neutrality and restoring nature. The aforementioned objective is supported by cross-cutting enabling actions, in particular broad public mobilisation and engagement and a digital ocean and water knowledge system, known as the European Digital Twin Ocean (DTO). The Sustainable Blue Economy Partnership (SBEP), consists of 60 partner institutes from 25 countries and the EC, to pool investments in marine research and innovation and align national programmes on a pan-European scale. SBEP is co-funded by Horizon Europe and builds on the blue R&I agendas of the sea basins (Mediterranean, Black Sea, Baltic Sea and North Sea) and the Atlantic Ocean. Several European initiatives facilitate collaboration concerning marine research infrastructures to optimise their use. The European Strategy Forum on Research Infrastructure (ESFRI) supports a coherent and strategic approach to the European policy on this infrastructure. Within the ESFRI context, several pan-European infrastructures have already been established, of which some are of particular importance for marine research in Flanders and Belgium.

There are several consortia and networks representing (parts of) the European marine research and innovation community. The European Marine Board (EMB) is the leading think tank for marine science policy and represents an important part of the European marine research institutes and funding organisations. EMB elaborates on different types of publications with recommendations for research priorities and strategies for European marine research.

Blue Economy Report for 2023 (European Commission Directorate General for Maritime Affairs and Fisheries, and the Joint Research Centre (JRC))

The Blue Economy established sectors include Marine living resources, Marine non-living resources, Marine Renewable energy, Port activities, Shipbuilding and repair, Maritime transport

⁶ https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/eu-valorisation-policy_en (accessed 17th June)

and Coastal tourism. The Blue Economy's emerging and innovative sectors include Marine renewable energy (i.e., ocean energy, floating solar energy and offshore hydrogen generation), Blue biotechnology, Desalination, Maritime defence, security and surveillance, Research and Infrastructure (submarine cables, robotics). The Blue biotechnology and Ocean energy sectors offer significant potential for economic growth, sustainability transition, as well as employment creation.

European Maritime, Fisheries and Aquaculture Fund (EMFAF)

The EMFAF runs from 2021 to 2027 and supports the EU common fisheries policy (CFP), the EU maritime policy and the EU agenda for international ocean governance. It provides support for developing innovative projects ensuring that aquatic and maritime resources are used sustainably. As a global ocean actor and a major producer of seafood, the EU has a responsibility to protect and sustainably use the oceans and their resources. It is also in the EU's socio-economic interest to guarantee the availability of food supplies, the competitiveness of the maritime economy and the livelihood of coastal communities. The fund helps achieve sustainable fisheries and conserve marine biological resources, which leads to food security through the supply of seafood products growth of a sustainable blue economy healthy, safe and sustainably managed seas and oceans. It also helps achieve the UN's Sustainable Development Goal 14 ('conserve and sustainably use the oceans, seas and marine resources'), to which the EU is committed. Furthermore, the EMFAF helps fulfil the objectives of the European Green Deal, the roadmap for the EU climate and environmental policies.

The EMFAF supports innovative projects that contribute to the sustainable exploitation and management of aquatic and maritime resources. In particular, it facilitates the transition to sustainable and low-carbon fishing the protection of marine biodiversity and ecosystems the supply of quality and healthy seafood to European consumers the socio-economic attractiveness and the generational renewal of the fishing sector, in particular as regards small-scale coastal fisheries, the development of a sustainable and competitive aquaculture, contributing to food security, the improvement of skills and working conditions in the fishing and aquaculture sectors, the economic and social vitality of coastal communities, innovation in the sustainable blue economy, maritime security towards a safe maritime space, international cooperation towards healthy, safe and sustainably managed oceans.

INTERREG IPA ADRION 2021-2027

The Interreg IPA ADRION Programmes (2021-2027) act as policy drivers and governance innovators fostering European integration among Partner States, taking advantage of the rich natural, cultural and human resources surrounding the Adriatic and Ionian Seas and enhancing economic, social and territorial cohesion in the Programmes area. Through the IPA ADRION, the following impacts are expected:

- Development of a regional innovation system for the Adriatic-Ionian area

- Enhanced capacity to transnationally tackle environmental vulnerability, fragmentation and the safeguarding of ecosystem services in the Adriatic and Ionian areas.
- Enhanced capacity for integrated transport and mobility services and multi-modality in the Adriatic-Ionian area
- Enhanced institutional capacity of public administrations and key stakeholders, and assist the progress of implementation of joint priorities in the framework of the EUSAIR.

INTERREG EURO-MED

Interreg Euro-MED is a European Territorial Cooperation Programme that aims to make the Mediterranean region smarter and greener and improve the governance between its stakeholders. It provides funds for projects developed and managed by public administrations, universities, and private and civil society organizations. The Programme's cooperation area includes 69 regions of 14 countries from the Northern shore of the Mediterranean: 10 EU Member States and 4 countries from the Instrument for Pre-Accession Assistance (IPA). Interreg Euro-MED supports projects, initiatives, and policies related to climate change and the environment in line with the priorities and specific objectives set out by the European Commission for the Cohesion policy. Four missions have been identified: 1) Strengthening an innovative sustainable economy, 2) Protecting, restoring, and valorising the natural environment and heritage, 3) Promoting green living areas and 4) Enhancing sustainable tourism.⁷

Position paper - A European Blue Technology Fund, SEA The Shipyards' & Maritime Equipment Association of Europe

SEA Europe represents the European shipbuilding industry in 16 nations, encompassing the production, maintenance, repair, retrofit, and conversion of all types of ships and floating structures, commercial as well as naval, including the full supply chain with the various producers of maritime systems, equipment material, and services. It is the voice of the maritime civil and naval technology industries in Europe. SEA promotes better management of the European Blue Technology Fund that will overcome fragmented and complex EU funding for the maritime sector.

A European Blue Technology Fund should be supporting innovative projects that will bring a sustainable and digitalized blue economy and waterborne value chain. To remedy this situation, SEA Europe calls upon the European Commission to put in place a European Blue Technology Fund under the Multiannual Financial Framework starting in 2028, with a budget of €10 billion euros. SEA advocates the development of impactful and innovative strategic technologies and flagship

⁷ <https://interreg-euro-med.eu/en/> (accessed 17th June 2024)

projects which should be geared towards the scaling-up of maritime technologies in support of a competitive and sustainable blue economy in Europe, through the Blue Technology Fund.

SEA Europe believes that this new fund should take over the EMFAF, and extend it to the following objectives:

- reinforcing European maritime technological leadership on a global strategic scale,
- contributing to EU maritime sovereignty,
- help businesses investing in carbon-neutral, sustainable, and digital maritime technologies (from low TRL technologies to de-risking projects upfront investments),
- strengthen the resilience of the maritime technology industrial value chain,
- create future-proof jobs in the sustainable blue economy.

NAPA (North Adriatic Port Association) Declaration on joint policies and actions

The five NAPA seaports (Ports of Koper, Rijeka, Trieste, Venice, and Ravenna) are located at the northern tip of the Adriatic Sea, a natural waterway that penetrates deep into the middle of the European continent, thus providing the cheapest naval route from the Far East via Suez to Europe with a distance that is about 2,000 Nm shorter than other North-European ports. More than 100 million tons of water-borne cargo are handled in the NAPA seaports every year. The cargo consists mainly of general cargo, containers, cars, ores and minerals, fossil fuels, chemicals and others types of cargo. Due to the huge variety of logistic services and the extensive traffic network, NAPA forms a perfect multimodal gateway to the key European markets. The nearby fifth Pan-European transport corridor provides a quick link to 500 million European consumers. Large commercial and industrial hubs like Vienna, Munich, and Milan are just a few hours' drive away.

The NAPA seaports combine their strengths to promote the Northern Adriatic route and present themselves as an alternative to the North European ports. In addition, the association anticipates cooperation in the development of maritime and hinterland connections, visits from cruise lines, environmental protection, safety, and information technology. The ports of NAPA will also invest efforts into the coordinated planning of road, rail, and maritime infrastructure, as well as the harmonization of regulations and procedures in the field of port service provision.

The Vision of NAPA: The NAPA will form a European logistics platform, in particular with regard to servicing the markets of the Far East as well as Central and Eastern Europe.

National – Slovenia & Croatia

The overarching strategic development document in Slovenia, which defines further development, is the **Slovenian Development Strategy 2030**⁸. The document lists as a strategic orientation a highly productive economy, which creates added value and requires lifelong learning, cooperation, etc. The Strategy also highlights the importance of technological progress and development, innovation, and harnessing the digital potential enabled by digital technologies.

The Slovenian Smart Specialization Strategy (S5)⁹ is a development document and is the starting point for focusing development investments on areas where Slovenia has a critical mass of knowledge, capacity, and competencies and where it has innovation potential. The Smart Specialization Strategy identifies ten priority areas, which are in a heterogeneous relationship. These include (i) Smart Cities and Communities, (ii) Horizontal ICT Network, and (iii) Factories of the Future. The Government Office for Development and European Cohesion Policy has upgraded Slovenia's Sustainable Smart Specialization Strategy S5 taking into account the suggestions and comments received, however, the previous Smart Specialization Strategy S4 (Digital Slovenia 2020) has still been in force and it served well as a background material for elaboration and upgrade of S5.

The Digital Slovenia 2030 is the overarching strategy for the digital transformation of Slovenia by 2030 and is the response of the Government of the Republic of Slovenia to the development challenges of digitalization. It is intended to provide strategic planning for promoting Slovenia's digital transformation in the development period by the year 2030. The strategy takes into account the ambitions and principles of the European Union (EU) and is the result of coordination between government representatives, institutions, academics, civil society, and the interested public. It addresses the key areas of Slovenia's digital transformation, building on European strategic documents and focusing on the main challenges of digital transformation in Slovenia. The strategy anticipates orientations and targets with indicators to address the biggest development gaps to accelerate the development of digital transformation in all areas, from gigabit infrastructure to the digital transformation of the economy, digital public services, the path to Smart Society 5.0, cybersecurity, digital competences and inclusion, and related content such as enabling environments and the green transition. The Digital Slovenia 2030 Strategy is a strategic document and contains specific measurable indicators in each of the thematic areas. The overarching objective of the strategy is to promote the digital transformation of Slovenia in all segments – society, government, local communities, and the economy. The Ministry responsible for digital transformation is responsible for managing the implementation of the strategy. It links and

⁸ Strategy for the Development of Slovenia. Available at: https://www.gov.si/assets/vladne-sluzbe/SVRK/Strategija-razvoja-Slovenije-2030/Strategija_razvoja_Slovenije_2030.pdf.

⁹ Slovenian smart specialization industry. Available at: <https://evropskasredstva.si/slovenska-strategija-pametne-specializacije/>.

complements the Plan for the Development of Gigabit Infrastructure by 2030, the Strategy of the Digital Transformation of the Economy, the National Programmes to Promote the Development and Use of Artificial Intelligence in the Republic of Slovenia by 2025, and the Digital Public Services Strategy 2030, the strategic focuses of which are described below. Digital Slovenia 2030 is subordinate to and consistent with some of the key objectives of the Slovenian Development Strategy 2030. The following objectives are determined in the Digital Strategy 2030 and this Joint R&I Strategy is highly linked to them:

- To increase the competitiveness of Slovenian companies and value-added per employee
- To support the growth of the ICT sector, which is key to the successful digitalisation of the economy
- To increase the share of investments in research, development, and innovation in advanced digital technologies in companies to 2% of total costs per year by 2030
- To increase grants to support the digital transformation, especially for SMEs
- To support the improvement of digital competencies among employees (regardless of profiles), including opportunities for retraining (micro-credentials)
- To support an enabling environment, which is an important element of the overall enabling environment to support the digitalisation of the economy (including chambers, Digital Innovation Hubs, European Digital Innovation Hubs, Strategic Development, innovation partnerships, etc.), in addition to direct action by ministries.

The Slovenian Industrial Strategy 2021–2030¹⁰ sets out the guidelines for the development of industry and the wider economy under a common denominator: green, creative, and smart development. Smart development emphasizes the strengthening of digitalization and smart solutions, as the modernization of the economy must be focused on the use of the most modern technologies, the highest process safety, increasing the level of automation and robotics, and the use of digital technologies and artificial intelligence. Digitalization must also support the green transition of the economy. Our Joint R&I Strategy is coherent with the Slovenian Industrial Strategy 2021 - 2030.

With the approval of the National Programmes to Promote the Development and Use of Artificial Intelligence in the Republic of Slovenia by 2025 (NpAI)¹¹, Slovenia has joined the ranks of EU Member States that have already prepared national strategic orientations for artificial intelligence and have committed to joint cooperation in this field at the EU level. The NpAI aims to ensure people's confidence in AI, limit its negative impacts on individuals and society, and reap the benefits that AI can provide so that we can all benefit from AI, especially in improving living

¹⁰ *Slovenian industrial strategy. Available at: <https://www.gzs.si/Portals/206/Slovenska%20industrijska%20strategija.pdf>*
¹¹ *National Programme to Promote the Development and Use of Artificial Intelligence in the Republic of Slovenia by 2025. Available at: <https://www.gov.si/teme/digitalizacija-druzbe/>.*

conditions and standards of living. Our Joint R&I Strategy is compliant with the NpAI to a large extent.

At the beginning of 2022, the Slovenian Government adopted the **Strategy of Digital Transformation of the Economy**¹², which was prepared in parallel with the digitalization, informatization, and Digital Single Market processes already underway in the EU. It highlights current advanced digital technologies such as artificial intelligence, the Internet of Things, Big Data technologies, blockchain technologies, high-performance computing, quantum computing, and 5G technologies, which will be drivers of economic growth and competitiveness. It addresses three main or priority areas. The first is advanced digital technologies that enable the digital transformation of the economy in the first place, the second focuses on an efficient ecosystem for a competitive economy, and the third focuses on an open and sustainable society as the basis for the growth of the digital economy. The key areas of this Strategy are: (1) Technology as the enabling tool for the economy's digital transformation; (2) Efficient ecosystem for competitive economy and (3) An open and sustainable society as the basis for the growth of a digital economy. Our Joint R&I Strategy is compliant with this Strategy to a large extent.

National Development Strategy of the Republic of Croatia until 2030 (NDS)¹³ is the national strategic action plan for the period 2018 to 2030. It aims to support the twin digital and green transition of the Croatian society and economy. The NDS establishes a strategic framework for a number of other planning documents and processes in a more detailed manner, including those related to regional and local development. Croatia's development directions have been set taking into account the circumstances of the pandemic and its consequences. The first is a sustainable economy and society, the second is strengthening crisis resilience, the third is a green and digital transition, and the fourth is balanced regional development. The NDS outlines four strategic priority clusters: Sustainable economy and society, Strengthening resilience to crises, Green and digital transition, and Balanced regional development.

The Chapter on the Green and Digital Transition of the Strategy offers further insight into the specific actions, planned with regards to supporting the development of digital skills and jobs for all citizens, the labor force, education sector - including more advanced skills for digital experts. Its first strategic objective is to enhance the digital transition of society and economy, and a key focus under this objective is to reach the EU average Digital Economy and Society Index (DESI) rating by 2030. Croatia ranked on 20th place within the EU according to the 2020 DESI (scoring 47.6). The EU average for 2020 is 52,57. Another focus is the creation of initiatives to develop digital

¹² *Strategy of Digital Transformation of the Economy. Available at: <https://www.gov.si/assets/ministrstva/MGTS/Dokumenti/DIPT/Digitalizacija/Strategy-of-digital-transformation-of-the-economy.pdf>.*

¹³ *National Development Strategy of the Republic of Croatia until 2030. Available at: <https://hrvatska2030.hr/>.*

competencies and promote the availability of digital jobs for all. Activities and actions launched by the NDS aim to support the four pillars of the Digital Skills and Jobs Coalition in Europe through strategic initiatives targeting Croatian society at all levels. Priorities include:

- Digital skills for all citizens, the labour force, and ICT professionals and in education
- Improve and facilitate access to quality adult education programs (for digital competencies) for all
- Raise the level of basic and advanced digital skills of citizens and enable their active participation in the digital society and economy
- Ensure the skills match of employees with appropriate digital competencies and recruitment needs, promote the development of digital jobs, and create the necessary conditions to enhance individuals' career prospects
- Raise the digital competencies of professionals from non-technical professions and industries outside of the information and communication technology (ICT) sector
- Retrain and reskill existing workforce and support the acquisition of digital competencies throughout economy sectors
- Adapt and develop further human resources for traditional industries and occupation so that they respond to the needs of the digital environment, society, and economy.
- Increase the number of competent, highly educated young ICT professionals and support their entry into the job market.
- Upskill existing ICT competences, retaining and attracting digital talent through incentives for employed professionals and opening up research and innovation to foreign students and dedicated professionals from all over the world.
- Encourage an increase in the number of professionals with higher and secondary education and the development of advanced digital competencies from an early age.
- Support initiatives and actions launched by secondary schools and higher education institutions for jobs to raise awareness of digital jobs.

Our Joint R&I Strategy is compliant with this Strategy to a large extent.

Digital Croatia Strategy for the period until 2032 defines the guidelines for a green and digital transformation of our country, as the precondition for future sustainable economic growth and social development. In order to transform Croatia in a comprehensive and structured manner, this Strategy outlines a set of clear digital transition objectives for the following ten years and defines priority public policy implementation areas in all segments of the digital ecosystem: infrastructure, technology, science, and education, and innovation and markets. By creating a regulatory, investment, and tax environment that fosters technological development and innovation, investing in citizens' digital competencies, and increasing the number of ICT specialists in the private and public sectors alike, as well as applying advanced technologies in public and market activities, Croatia wants to become a country with digitally and economically competitive enterprises and digitalized public administration with personalized public services by the year 2032. Our Joint R&I Strategy is coherent with the following strategic objectives and priority public policy implementation areas:

Strategic objective 1: Developed and innovative digital economy

- 4.1.1. Digital transition of the economy - Strategic objective: Developed and innovative digital economy
 - 4.1.1.1. Priority public policy implementation area 1.1: Supporting digitalisation in micro, small, and medium-sized enterprises
 - 4.1.1.2. Priority public policy implementation area 1.2: Digitalising public services for enterprises and securing access to anonymized public data
 - 4.1.1.3. Priority public policy implementation area 1.3: Supporting digital innovation hubs

Strategic objective 4: Developed digital competences for working and living in a digital age

- 4.4.1 Developing digital skills and digital workplaces – Strategic objective: Developed digital competencies for working and living in a digital age
 - 4.4.1.1. Priority public policy implementation area 4.1: Increasing the number of ICT specialists in the labour market
 - 4.4.1.2. Priority public policy implementation area 4.2: Developing citizens' digital competencies for working and living in a digital age, with the help of ICT
 - 4.4.1.3. Priority public policy implementation area 4.3: Digital transition supporting the development of the education and research system

Smart Specialization Strategy until 2029 - Smart Specialization Strategy (S3) for a period 2016-2020 has been primarily used as an absorption tool for ESIF funds invested in Research & Development and Innovation. Measures and the majority of the projects from that Strategy are mostly in implementation and its outcomes and achievements in terms of accomplishments measured with result and outcome indicators are still to be realized and analyzed. Preliminary evidence shows that Croatia is still lagging with regard to competitiveness and innovation. The new S3 2021 - 2027 takes into account acquired experiences, lessons learned and available evidence in order to achieve significant improvements in the current Programmes implementation cycle. S3 by 2029 aims to contribute to the achievement of the cohesion policy objective "Smarter Europe" through innovations and support to economic transformation and modernization, the industrial transition of regional economies, and in that way support the implementation of strategic objectives of the Republic of Croatia as defined in the National Developmental Strategy until 2030. A new approach of Croatia to S3 is aligned with real economic conditions including the effects of the recent COVID-19 pandemic and its social and economic consequences. Priorities and Programmes framework reflect the needs, abilities, and strategies of a business and research sector, while evaluation will serve as a basis for adjustment of policies during their implementation. To address unbalanced regional development, S3 includes measures for industrial transition for three NUTS 2 regions with GDP below 75% of the EU average. To accept the challenge of economic modernization, Croatia must strengthen these regions and help them in creation of new economic values. In these strivings, regions in the industrial transition are facing specific challenges such as a lack of appropriate skill, high costs of work, and deindustrialization, which hamper complete exploitation advantages of globalized markets and technological change. Measures of industrial transition will help regions to take advantage of their territorial capital and

comparative advantages, face challenges of industrial transitions, create higher added value, approach new markets, and join forces with other regions. Key documents to resolve these challenges are plans for industrial transition, which are prepared through a bottom-up approach at NUTS2 level regions in the process of industrial transitions. New S3 will keep so far determined thematic priorities, but it goes one step further to make them perfect and determine their scope, transformation goal, and Programmes framework. The new S3 envisages the redesign of structures and processes for guidance and adaptation Programmes. In the multi-year financial framework 2021 - 2027. smart specialization strategies are treated as conditions that enable the withdrawal of funds for research, development, and innovation from EU funds (e.g., enabling conditions – ENC).

Transport Development Strategy of the Republic of Croatia 2014-2030 - The Strategy sets out the basic guidelines for the development of the transport sector within the Republic of Croatia over a medium and long-term horizon (2014-2030), aiming to define an overall and coherent framework to ensure the linkage of infrastructure and transport policy and enabling decision making. The Strategy is the result of a deep analysis and reflection process but also of participation and debate open to the whole of society for this purpose. As a result, a committed participation of main stakeholders has been registered, getting important contributions in the form of suggestions and proposals to improve and enrich the Strategy. The Transport Development Strategy has considered the concern for sustainable development and by great sensitivity to environmental concerns and criteria. As a result, it constitutes a decisive commitment to the future of the Republic of Croatia, to its economic development and its competitiveness, to its social and territorial cohesion, and to the improvement of the quality of life of its citizens, with a set of measures designed to create a transport system which is more integrated, safer, efficient and respectful of its environment.

Adriatic Croatia Industrial Transition Plan 2021-2027 - The implementation of the industrial transition process is aimed at strengthening regional competitiveness and is directly connected to the National Development Strategy of the Republic of Croatia until 2030 (in further 2030) and strategic objective 13, Strengthening regional competitiveness, through smart specializations activities and strengthening position of the regional economy in global value chains. To effectively implement the process of industrial transition, industrial transition plans are based on available resources and the potential for their use, identification of competitive advantages, and smart specialization as the basis of future growth and development of Croatian regions. The industrial transition plans will drive structural change through vertical logic of interventions aimed at modernization, diversification, transition, or introduction of radical changes in regional economies and will represent an upgrade of horizontal public policies. The purpose of the industrial transition plans is to:

- clarify the unique combination of problems faced by regions in the industrial transition and identify directions of change based on a "place-based" approach to investment;
- support better coordination and complementarity in the planning and implementation of interventions on regional and local level;

- enable the development of regional hubs (economic hubs) and branding and internationalization of regional economies;
- provide a strategic framework for the efficient use of budgetary and EU funds for deployment of structural changes in regional economies in order to strengthen regional competitiveness.

To achieve their goals, the industrial transition plan represents a combination of regional, innovation, and industrial policies, applying a subnational approach to specialization and industrial transition towards niches of more added value and introducing innovative elements.

Regional

At the regional level in Western Slovenia, there is the Regional Development Programme of Primorje-Notranjska region for the period 2021 - 2027, and in Croatia, there are Development plans for the counties in the Adriatic region.

Regional Development Programmes of Primorje-Notranjska region for the period 2021-2027

- The development orientation of the region is green, sustainable development in all areas. In compliance with Sustainable Development Goals, the Primorje-Notranjska region highlights similar development directions and builds on the potential for sustainable development. Among a number of them are the Transformation of the economy in the direction of digitization, advanced technologies, circular economy principles, reduction of the environmental footprint, and creation of new, green jobs increasing energy efficiency and achieving a higher proportion of renewable energy use, a functioning system of development, financing and investments in energy efficiency (energy renovation of buildings in the public and private sector and renovation of public lighting systems, sensors, technological renovation to increase the energy efficiency of companies, infrastructure for energy distribution). Taking into account development guidelines, as key areas of specialization of the region (among others) are the Development of manufacturing activities in the direction of increasing added value, digitization and green transition and the Development of circular economy in all sectors.

County Development Plans of Adriatic Coast Counties - There are seven coastal counties in the Adriatic region of Croatia. As prescribed by the Law on Strategic Planning and Management System in the Republic of Croatia, they prepare and adopt medium-term (up to 10 years) development plans in which they define their specific objectives, public policy priority areas, and measures that will be implemented to achieve the objectives set. The county development plans contain specific objectives and several measures that are linked to our Joint R&I Strategy (the measures are not indicated here, nevertheless each Development Plan addressed at least three or more measures that fully or partially correspond to the measures identified within our Joint R&I Strategy. The Development Plans are shortly described below to demonstrate linkages to the Joint R&I Strategy, based on specific objectives:

The Development Plan of the County of Istria for the period from 2022 to 2027

The Development Plan of the County of Istria is a fundamental medium-term strategic planning act for the development of the County of Istria. It has been prepared in accordance with the provisions of the Act on Regional Development of the Republic of Croatia¹⁴ and the Act on System of Strategic Planning and Managing Development of the Republic of Croatia¹⁵. The vision of development is the following: Green, resilient, connected, and smart region of recognizable identity and high quality of life whose development is based on an innovative and competitive economy. There are 16 specific objectives grouped into four areas of development. Under Green and connected regions, the specific objectives are Energy transition and facing the consequences of climate changes, Sustainable traffic, and communication connecting and Strengthening capacities for risk management. Under the Region of innovative and competitive economy in sustainability function, the specific objectives are Digital and green economy transformation, Entrepreneurship based on research and innovation, and the Development of sustainable and competitive, agriculture, forestry, hunting, fishery, aquaculture, and water management. No explicit measures related to the maritime innovation ecosystem are mentioned, however they are implicitly indicated under identified specific objectives.

The Development Plan of the Primorje-Gorski Kotar County for the period 2022 – 2027

The vision indicated in the Development Plan is the following: *Primorje-Gorski Kotar County is a competitive, smart, sustainable, and socially fair region desirable for living and working.* The vision will come true once the specific objectives are achieved and policies implemented and coordinated through five priorities. Consequently, development priorities and corresponding specific objectives have been set, among others those that could be linked to our Joint R&I Strategy:

Priority 1. Smart region of a competitive economy based on knowledge and advanced technologies

Specific objectives:

- 1.1. A competitive economy based on knowledge and innovation
- 1.2. Economic growth aimed at boosting exports by raising productivity and digital transformation
- 1.3. Attractive business environment for employment, growth and investment

Priority 3. Green transition based on sustainable management and use own resources

Specific objective (of relevance to the Joint R&I Strategy): Green and energy transition towards carbon neutrality.

Development Plan of Lika-Senj County for a period until 2027

¹⁴ Official Gazette no. 147/14, 123/17, 118/18.

¹⁵ Official Gazette no. 123/17.

The vision indicated in the Development Plan of Lika-Senj County is the following: *strengthening the competitiveness and sustainability of agriculture and the economy through investments in green and digital technologies, increasing the efficiency of resource use, developing sustainable and green tourism, developing smart cities and villages, improving the quality of education, demographic recovery and improving the quality of life by investing in health and social infrastructure and security.* In the Development Plan of Lika-Senj County there are three strategic objectives and corresponding measures that could be linked to our Joint R&I Strategy. The specific objectives are as follows:

Specific objective 1: Strengthening the competitiveness of the economy through investment in green and digital technologies

Specific objective 3: Increasing efficiency in use of resources,

Specific objective 5: Smart cities and villages.

Development Plan of Zadar County from 2021 - 2027

The vision of development indicates the following: *Competitive and developed county leading in blue and green economic growth in Adriatic Croatia. County of innovative and sustainable development with safe and stimulating environments for all her citizens.* There are four so-called priority directions, two of them with specific objectives (and measures within each specific objective) related to our Joint R&I Strategy. They are as follows:

Priority direction 1: Competitiveness and innovativeness of economy and society

Specific objective 1: Encouraging the industrial transition towards niches of high-added value

Specific objective 2: Creating strong small and medium-sized enterprises and an enabling business environment

Priority direction 3: Resource efficiency and connectivity

Specific objective 14: Improving energy efficiency and infrastructure with the transition to clean energy and renewable energy sources.

Development plan of Šibenik-Knin County for the period 2021 – 2027

The vision for the development of Šibenik-Knin County is the following: *A region with a high quality of life, attractive, preserved, and valorised natural and cultural-historical heritage, balanced development based on knowledge, and a competitive and innovative economy.* There are four priorities, that include specific objectives with a link to our Joint R&I Strategy, as follows:

Priority 1.: Competitive economy

Specific objective 1: Development of a diversified economy (through digitalisation and innovation among others)

Priority 2.: Inclusive, resilient, and sustainable society

Specific objective 10: Digital transformation of society and economy

Priority 3.: Green and functional county

Specific objective 12: Green and energy transition

Specific objective 13: Development of sustainable mobility, Measure 13.2.: Improving maritime transport

Priority 4: Balanced regional development

Specific objective 15: Development of smart and sustainable cities and villages in the context of strengthening the position of regional economies.

Development Plan of Split-Dalmatia County from 2022-2027

The vision indicated in the Development Plan of Split-Dalmatia County is the following: *County for everyone - a place of quality, safe, and comfortable living for all its inhabitants - which enables a balanced economic and social development respecting the principles of sustainability and social inclusion.* There are a few priorities and corresponding specific objectives (and measures within each specific objective) that are compliant with our Joint R&I Strategy and they are as follows:

Priority 1: Competitive and resilient economy

Specific objective 1.1.: Creation of a Competitive, sustainable, and knowledge-based resource-efficient economy

Specific objective 1.2.: Strengthening of small and medium entrepreneurship and entrepreneurial environment.

Priority 3.: Green and resource-efficient county of sustainable infrastructure

Specific objective 3.1.: Environmental and nature protection and creating resistance to climate change and natural disasters

Specific objective 3.2.: Sustainable development of infrastructure systems

Specific objective 3.3.: Energy transition of the county

Specific objective 3.5.: Development of overall transport system

Under the Horizontal theme and the development priority of Smart and sustainable management of island resources and environment, there are the following Specific objectives:

Specific objective 3.2.: The development and stimulation of building of renewable energy sources system, the use of clean energy, and energy efficiency

Specific objective 3.3.: Environmental and nature protection, risk reduction and mitigation of consequences, and strengthening of resilience to climate change.

Development Plan of Dubrovnik-Neretva County until 2027

By 2027, Dubrovnik-Neretva County will become a European region of high quality of life, a stable and dynamic economy, with a high degree of social solidarity and inclusiveness, preserved environment and cultural history heritage that is managed through a participatory and strategically based approach to the well-being of future generations. The vision defined in this way is a guide for the elaboration of priorities, goals, and measures. Many priorities, strategic objectives (and measures within each specific objective) are compliant with our Joint R&I Strategy and they are as follows:

Priority 1. Strengthening the resilience of the economy and increasing investment in a sustainable and digital economy

Specific objectives 1.1.: Improvement of the business environment

Specific objective 1.2.: Fostering sustainability, digitalization, and innovation in the Economy

Specific objective 3.1.: Preservation of the environment and energy transition to the greatest possible well-being of local communities

Specific objectives 3.2: Improving internal and external connectivity and green mobility.

A route to a strategic framework

Various analyses conducted in the initial stages of the project provided valuable information on the current state of maritime innovation ecosystems in Western Slovenia and Adriatic Croatia. They showed several problems that these regions are facing in the research & innovation sector, what are the needs that should be satisfied to fill the current gap, what are the challenges that stakeholders face working, serving and/or being under the influence of this sector. All these findings are relevant for prediction of future trends and setting adequately Western Slovenia and Adriatic Croatia on the maritime innovation ecosystems map.

The findings, results and conclusions of analyses are discussed at the workshops with the project partners. Based on written and oral inputs we have jointly formulated the vision, determined the strategic objectives that we want to achieve, priority areas in which we want to focus our interventions, and measures which we want to implement through projects, activities, and actions to strengthen the two maritime innovation ecosystems' excellence and make them recognized at the European or even global level (concrete paths and tools to achieve this will be more elaborated in the Action and Investment Plan including monitoring methodology, D4.1 and synergies with other initiatives & new partnerships, D4.2).

The path from analysis to the strategic framework for the Joint R&I strategy of the Western Slovenian and Adriatic Croatian maritime innovation ecosystems is presented in the Figure 5 showing the key inputs for the creation of the strategic framework.

The process described in Figure 5 led to the formulation of a vision. Vision is usually described as the key element of strategy development and it articulates strategic direction for a desired state in the future. It is a summarized statement that describes what we want to achieve in ideal conditions. In forecasting the vision, we have applied commonly used criteria in this exercise:

- Oriented towards the future based on rational hypotheses about the future
- Idealistic, adequate, ambitious, inspirational, purposeful
- It reflects a joint understanding of a problem
- It is based on information collected on relevant and available existing data and facts (trends, alternative futures, political context, potential barriers and risks, experience)
- It has taken into consideration stakeholders' perspectives – although it is significant in all phases of strategy preparation that they are critical in the definition of strategic direction.



Figure 5: From analysis to strategic framework of Joint R&I strategy

Source: Authors

In considering how the vision could be formulated, we also consulted other Maritime and Joint Strategies of the countries with rich experience in the maritime sector which are still valid documents. The maritime (innovation) framework, strategies, and documents consulted are the following:

- Belgian - Belgium, as a country with a rich history of maritime activities has long been recognized for its maritime heritage and its strategic position as a gateway to international markets. Over the years, Belgium has developed a robust maritime landscape that encompasses diverse sectors such as shipping, ports, logistics, offshore energy, and marine technology. In recent times, the importance of fostering innovation within the maritime sector has gained considerable attention worldwide. Innovation has become a key driver for sustainable growth, competitiveness, and resilience in an increasingly

globalized and technologically advanced environment¹⁶. Presentation and other materials provided at the workshops and visit to the Port of Antwerp-Bruges, as ports with best practices in the maritime innovation sector were valuable inputs for developing a strategic framework and in particular the measures that should be implemented within the Joint R&I Strategy.

- Belgian Vision for the North Sea 2050: a Long-Term Vision Document for the Belgian part of the North Sea up to 2050. It guides the development of Maritime Spatial Planning (MSP) in Belgium. Key aspects covered in the vision include 1) Coexistence of uses (e.g., economic, environmental, social aspects), 2) Land-sea interactions, 3) Multi-use approaches, 4) Blue Economy and Blue Growth, and 5) Future perspectives. Unlike the vision, the maritime spatial plan is a concrete, legally binding planning document with a shorter timeline (2020-2026). It focuses on specific spatial arrangements, while the vision sets long-term goals and conditions for sustainable development.
- The Belgian Science Policy Office (BELSPO) supports the science policy of the federal government. BELSPO is responsible for the management of research programmes in support of policies about sustainable development, combating climate change, biodiversity, energy, health, mobility and the information society.
- Department of Economy, Science & Innovation (EWI) In Flanders, is the entity that is responsible for the development and implementation of the science and innovation policy. In addition, other policy domains can also (albeit to a much lesser extent) take initiatives in the field of science and innovation in order to support and underpin their policy.
- Norwegian Maritime Strategy - Maritim21 is a strategy for research, development and innovation for the maritime industry. In this context, maritime industries include the shipping industry, the shipbuilding industry, and service and equipment suppliers for all types of ships and vessels. They also include vessels and maritime technology used in other ocean industries, including aquaculture, fisheries, offshore oil and gas production, and offshore renewable energy, as well as knowledge-building in research groups on topics in technology and social sciences that are significant to the Norwegian maritime industry. The Maritim21 strategy provides an important direction for the development of the Norwegian maritime industry.
- The Dutch Maritime Strategy - 2015 – 2025 - As a trading nation, the Netherlands has succeeded in building up a strong global maritime position, partly as a result of the strategic position at the estuary of the rivers Meuse, Rhine, and Scheldt. This is reflected in the international leading position of the industries from the Dutch maritime cluster, a cluster which is predominantly internationally orientated and regulated. The Netherlands

¹⁶ University of Antwerp – Faculty of Business and Economics (2023) *Belgium Maritime Innovation Ecosystem (Master thesis)*.

has an open economy and is one of the world's ten leading exporters to which the maritime cluster significantly contributes to that position.

- Relevant documents from the Nordic cooperation framework¹⁷ which involves Denmark, Finland, Iceland, Norway, Sweden, the Faroe Islands, Greenland, and Åland. Their vision is to make the Nordic region the most sustainable and integrated region in the world. The partner countries and autonomous areas cooperate in a number of priority areas in which they see and use potential for joint action and synergies. These priority areas are the following: Legislation and justice, Working life, Digitalisation and innovation¹⁸Disability, Healthy and sustainable food systems, The environment and climate, Sustainable development, Children and young people, Energy, Culture, Education and Research, Gender equality and LGBTI.

Nordic countries and autonomous areas cooperate as well in the field of marine spatial planning which is considered a promising tool for the management and protection of the marine environment, offering an integrated, ecosystem-based approach to managing the multiple and potentially conflicting uses of the sea.¹⁹ Spatial planning is applied to different maritime sectors.

Defining the vision

The participants of the workshops based on all mentioned above provided valuable inputs (words, phrases, ideas, hints...) for the formulation of the vision which were plenary discussed. This exercise is followed by joint formulation and agreement on the vision among participants in the following way:

Western Slovenia and Adriatic Croatia are innovative, resilient and sustainably using marine space and resources contributing to emission reduction and supporting blue economy growth. The maritime research and innovation ecosystem of the region is globally recognized and adaptive, fostering Adriatic Sea cooperation, knowledge sharing and advances in innovation and technology.

¹⁷ <https://www.norden.org/en/digitalisation-and-innovation>

¹⁸ *Digitalization and innovation - The aim of the digitization partnership is to strengthen the Nordic and Baltic countries as a coherent and integrated digital region. Joint efforts to promote the green digital transformation will benefit citizens, businesses and public administrations right across the region.*

¹⁹ *Marine spatial Planning in the Nordic region Principles, Perspectives and Opportunities Outcomes from the Nordic Forum on MPAs in Marine Spatial Planning (2009)*

It is common to define values in strategic documents as guiding principles that determine how the institution will behave in the implementation of its mission and strategic vision and promote them through the implementation of its activities and delivery of its own commodities/products/services. Values can be considered as an addition to the vision statement. For preparation and implementation of our Joint R&I Strategy, the following values can be applied:

- Quality of research and innovation work – a continuous tendency to secure high-quality of work and delivery of high-quality deliverables
- Independence and impartiality in research and innovation work – it should ensure that all research and innovation activities and deliverables (including methodology findings, results, and conclusions) will be independently collected and impartially interpreted
- Relevance - focusing on the topics that are most relevant to strengthening excellence in R&I in Western Slovenia and Adriatic Croatia
- Ethically acceptable – all the work should be carried out in line with ethical standards and norms
- Transparency of work – all the work should be carried out in a transparent manner
- Effectiveness and efficiency – implementing the projects, activities and actions should be effective (they will deliver the desirable impacts) and efficient (they should bring value for money).

Strategic objectives

The main objective as set in the project is the following: *Strengthening the innovation ecosystems' excellence*. It helped in formulating the vision, and determining the strategic objectives and priority areas. The number of objectives is in general arbitrary, it can vary but for practical reasons, we have determined four strategic objectives which we have further elaborated into priority areas and derived corresponding measures. The strategic objectives are as follows:

- I. Digital advancement of the maritime innovation ecosystem
- II. Green transition of the maritime innovation ecosystem
- III. Attractive and in full capacity maritime ecosystem labour market
- IV. Excellence in maritime ecosystems' governance

Priority areas and measures

As indicated in the project summary, preliminary priority areas for the R&I investments are taken into consideration when developing the strategic framework. They are listed below:

- Vessel security and safety, automated maritime transport, and energy efficiency
- Sharing infrastructure, access to start-up and growth capital
- Creation of innovation culture/collaboration and communication through open innovation approaches (innovation acceleration and networking)
- Employment, skills, and attracting talents in the innovation sector
- Pathways to commercial exploitation including valorisation and knowledge transfer
- Ecosystems' leadership & governance

- Equality, diversity & inclusion
- Emission reduction
- Blue economy growth
- Sustainable use of marine space and resources
- Exploring synergetic potential between maritime transport and other economic activities in “Blue” sectors

Finetuning of priority areas followed in cooperation with the project partners and stakeholders, through workshops and the results of these participative and interactive processes contributed to the drafting of the Joint R&I Strategy.

A strategic framework consisting of strategic objectives, priority areas (15 in total), and elaborated measures (27 in total), with preliminary lists of potential projects and activities is presented in the table below. The table also includes information on target groups/users at the level of each measure, responsibility (and co-responsibility) for implementation of each measure, indicators that should be monitored, and potential sources of financing implementation of identified projects, activities, and actions. In principle, many projects and activities could be financed through various EU funds/Programmes, state/regional/local budgets, and private capital, where the interest for a private sector engagement is clear).

When discussing the responsibility for implementation of measures, clearly whenever possible, project partners will be engaged and will support implementation. For some measures, the institutions that should be in charge of implementation have not been directly and intensively involved in this project, but they should be involved and implementation expected to be undertaken from their side should be discussed and coordinated.

An agreement made as a result of workshop discussions was that Equality, diversity & inclusion would be addressed as a horizontal theme and should be integrated within each strategic objective, priority area, measure, project, and activity whenever and wherever applicable. This horizontal theme will be considered and elaborated on in each case.

The information about the strategic framework is presented in Table 5 below.

Table 5 Strategic framework

No.	Strategic objective	Priority area/Measure	Users/target groups/beneficiaries	Responsibility/Co-responsibility	Indicators	Sources of financing
1.	Digital advancement of the maritime innovation ecosystem					
	Indicators: Level of digitalisation of companies in the maritime ecosystem, Total investment in digitalisation advancement					
	1.1. Introduction of Key Enabling technologies and upgrade of existing ones					
	1.1.1. Demonstration and promotion of digital technologies in Western Slovenia and Adriatic Croatia					
	<p>Purpose: To increase awareness of the potential use of digital technologies and how to implement them</p> <p>Projects/activities:</p> <ul style="list-style-type: none"> Pilot project: Improved fire evacuation VR model of a ship engine room Pilot project: Digital twin of hydrogen supported by AI for sustainable and efficient energy conversion and management for distributed networks Pilot project: Autonomous shipping technology (advanced machine vision support systems integrated into existing navigation systems of the ships) 	Big companies, SMEs, academic institutions, local and regional government	<p>Responsibility: University of Ljubljana</p> <p>Co-responsibility: Project and other partners, University of Rijeka</p>	<p>1) Number of developed and tested digital technologies</p> <p>2) Number of promotion events (at which the technology will be promoted)</p> <p>3) Number of published papers/articles</p>	Primary source EU funds/Programmes/grants, private sector (capital); additional/other possible funding (to a lesser extent) University budgets, state, regional, and local budgets	
	1.1.2. Developing a global digital twin of the port area					
	<p>Purpose: To enable the development of a modern decision-making system, as an important tool for efficient, strategic future-oriented area planning & management</p> <p>Projects/activities:</p> <ul style="list-style-type: none"> Data sharing Initiating collaboration and gaining support through Digital Innovation Hubs Development of digital twins for different segments of port operations (for bridges, planning logistics, ship docking, resources management, managing terminals, warehouses, internal & external logistics, energy management...) Tailor-made AI assistant 	Port authorities, shipping companies, logistic providers, universities, government	<p>Responsibility: Port Authority, private operators</p> <p>Co-responsibility: government level</p>	<p>1) Number of developed digital twins</p> <p>2) Management efficiency (less time required for implementation of activities, increased income, less costs...)</p>	Primary source EU funds/Programmes/grants, private sector (capital); additional/other possible funding (to a lesser extent), state, regional, and local budgets	

No.	Strategic objective	Priority area/Measure	Users/target groups/beneficiaries	Responsibility/Co-responsibility	Indicators	Sources of financing
1.1.3. Use of autonomous and automated solutions within port infrastructure						
	<p>Purpose: to increase management efficiency, to help workers in daily work, decrease exposure to risks related to possible injuries at work, minimize human-based/related errors</p> <p>Projects/activities:</p> <ul style="list-style-type: none"> • Production and use of semi or fully autonomous vehicles • Production and use of semi or fully autonomous vessels • Production and use of semi or fully autonomous cranes • Production and use of semi or fully autonomous bridges • Production and use of semi or fully autonomous devices and tool • Production and use of drones 	Port authorities, employees, shipping companies, logistic providers, companies and SMEs in manufacturing-related sectors, universities	<p>Responsibility: Port Authorities</p> <p>Co-responsibility: end users (to explain the role of end users in implementation of the measures and potential resistance to the implementation of the measure), companies, SMEs. Universities (they need to provide appropriate tools for end users)</p>	1) Number of implemented semi or fully autonomous vehicles, vessels, cranes, bridges, devices, tools, drones 2) Management efficiency (less time, increased income, fewer costs...) 3) Number of newly employed persons 4) Number of persons with upgraded employment/work position/station/post	Primary source EU funds/Programmes/grants, private sector (capital); additional/other possible funding (to a lesser extent), state, regional, and local budgets	
1.2. Improvement of interactions between different systems, entities, and organisations						
1.2.1. Supporting matchmaking and networking						
	<p>Purpose: Establishing collaboration between stakeholders and actors in the innovation ecosystem</p> <p>Projects/activities:</p> <ul style="list-style-type: none"> • Organisation of regular events that bring together all stakeholders in the innovation ecosystem (conferences, thematic events encouraging collaboration...) • Leveraging digital tools for matchmaking and networking • Organisation of study visits (different structures, groups, and organisations visited) 	Big companies/industry, SMEs and R&D actors, academic institutions (public and private), funding organisations	<p>Responsibility: Business support organizations/intermediaries</p> <p>Co-responsibility: project partners, regional development agencies</p>	1) Number of users of digital tools for matchmaking 2) Number of events 3) Number of participants	Primary source EU funds/Programmes/grants, private sector (capital), funding organizations; additional/other possible funding (to a lesser extent) University budgets, state, regional, and local budgets	
1.2.2. Building joint platforms for cooperation on projects						

No.	Strategic objective	Priority area/Measure	Users/target groups/beneficiaries	Responsibility/Co-responsibility	Indicators	Sources of financing
	<p>Purpose: Enhancing virtual collaboration between stakeholders and actors in the innovation ecosystem</p> <p>Projects/activities:</p> <ul style="list-style-type: none"> • Organisation of regular thematic brainstorming sessions on potential platform areas development • Designing and setting up a functional platform for information exchange and learning 		Big companies/industry, SMEs and R&D actors, academic institutions (public and private)	<p>Responsibility: Business support organizations/intermediaries</p> <p>Co-responsibility: project partners, regional development agencies</p>	1) Number of sessions 2) Number of users of the platform 3) Number of joint projects/collaborations	Primary source EU funds/Programmes/grants, private sector (capital), funding organizations; additional/other possible funding (to a lesser extent) University budgets, state, regional, and local budgets
<h3>1.3 Increasing competencies, building capacities, and cross-sectoral technology transfer, research & development in the maritime innovation ecosystem</h3>						
<h4>1.3.1. Supporting the preparation and implementation of tailor-made Programmes for digital advancement in the maritime industry</h4>						
	<p>Purpose: To build the capacity of end users in digital technologies in the maritime industry</p> <p>Projects/activities:</p> <ul style="list-style-type: none"> • Pilot projects for training (technology demonstrator) and skills development • Knowledge exchange from other recognised institutions • Pathway design – From school to maritime industry (cooperation between students and companies, to build stronger relationships to potentially enable employment in companies after school graduating) 		Big companies/industry, SMEs and R&D actors, academic institutions (public and private), scholars (secondary/vocational education)	<p>Responsibility: Academic institutions</p>	1) Number of Programmes implemented 2) Number of participants participating in education Programmes 3) Number of industry partnerships (with education institutions)	Primary source EU funds/Programmes/grants, private sources (capital); additional/other possible funding (to a lesser extent) University budgets, state, regional, and local budgets
<h4>1.3.2. Supporting cross-sectoral technology transfer and enabling further research & development in the maritime ecosystem</h4>						
	<p>Purpose: To increase technology transfer between sectors and explore further areas of research & development in the maritime industry</p> <p>Projects/activities:</p> <ul style="list-style-type: none"> • Fostering cross-sectoral technology transfer • Identification, preparation and implementation of research projects in maritime innovation systems 		Big companies/industry, SMEs and R&D actors, academic institutions (public and private)	<p>Responsibility: Academic institutions</p>	1) Number of cooperations 2) Number of implemented projects	Primary source EU funds/Programmes/grants, private sources (capital); additional/other possible funding (to a less extent) University budgets, state, regional and local budgets

No.	Strategic objective	Priority area/Measure	Users/target groups/beneficiaries	Responsibility/Co-responsibility	Indicators	Sources of financing
	<ul style="list-style-type: none"> Introducing industry-academia collaboration tools and schemes 					
1.4. Support to the positioning of SMEs in the value chain						
1.4.1. Support SMEs and small organisations in the uptake of digital technologies						
	<p>Purpose: Leveraging digital solutions to enable smaller companies to better enter and integrate into the value chain in the maritime industry</p> <p>Projects/activities:</p> <ul style="list-style-type: none"> Tailor-made support schemes for start-ups and SMEs in the value chain to mitigate specific risks Increase offer of training and demonstrator projects for SMEs and start-ups Ensuring engagement of digitalization support hubs in assisting SMEs with digital transition 	SMEs, start-ups	<p>Responsibility: Business support centre, business associations /clusters, HAMAG-BICRO/ Edih Adria</p> <p>Co-responsibility: project partners</p>	<p>1) Number of SMEs and start-ups involved/participated in projects/activities</p> <p>2) Number of SMEs and start-ups who successfully made an uptake of digital technologies</p> <p>3) Number of SMEs and start-ups that received the grant</p>	Primary source EU funds/Programmes/grants, private sources (capital); additional/other possible funding (to a lesser extent) state, regional, and local budgets	
2. Green transition of the maritime innovation ecosystem Indicators: Green transition index for the maritime sector						
2.1. Improved air quality and waste reduction						
2.1.1. Emission reduction, carbon capture and storage, eco-friendly port operations						
	<p>Purpose: to reduce emissions (in line with internationally set target values until 2030)</p> <p>Projects/activities:</p> <ul style="list-style-type: none"> Port emission control system (instalment of measuring machines, regular monitoring of emissions) 	Port authorities, shipping companies, logistic providers, companies, SMEs, universities, government, public health institutions	<p>Responsibility: port authorities, public institutions, marinas</p> <p>Co-responsibility: government</p>	1) CO2 reduction (in tons)	Primary source EU funds/Programmes/grants, private sources (capital); additional/other possible funding (to a lesser extent) state, regional and local budgets	

No.	Strategic objective	Priority area/Measure	Users/target groups/beneficiaries	Responsibility/Co-responsibility	Indicators	Sources of financing
2.1.2. Efficient waste management						
	<p>Purpose: to increase recycling of materials in operations (EU packaging waste directive)</p> <p>Projects/activities:</p> <ul style="list-style-type: none"> Zero waste project (proper separation of waste, proper collection of waste for recycling, appropriate transfer to final waste disposal destinations) Protection of local maritime ecosystems Use of eco-friendly vessels Reduction of plastic products and plastic components (to reduce the use of plastic whenever and wherever possible) and replace plastic with more sustainable materials 	Port authorities, shipping companies, logistic providers, companies, SMEs, universities, government, communal companies, recycling industries/companies, marinas	<p>Responsibility: port authorities, public institutions</p> <p>Co-responsibility: government</p>	1)Waste quantity (in tonnes) 2) Share of recyclable waste in total waste	Primary source EU funds/Programmes/grants, private sources (capital); additional/other possible funding (to a lesser extent) state, regional, and local budgets	
2.1.3. Deployment of Smart Environmental Sensing Technology and specific education						
	<p>Purpose: to reduce environmental risks and potential hazards</p> <p>Projects/activities:</p> <ul style="list-style-type: none"> Use of smart cameras and high-quality sonars Instalment of various detection systems (oil spill, floating debris, dangerous goods...) 	Port authorities, shipping companies, logistic providers, companies, SMEs, universities, government, public health institutions, marinas	<p>Responsibility: port authorities, public institutions</p> <p>Co-responsibility: government</p>	1)Level of environmental risk	Primary source EU funds/Programmes/grants; additional/other possible funding, state, regional and local budgets	
2.2. Improving energy management, increased use of renewables, hydrogen and offshore renewable energy						
2.2.1. Introduction of advanced energy management systems						
	<p>Purpose: to increase energy efficiency and improve energy management</p> <p>Projects/activities:</p> <ul style="list-style-type: none"> Pilot project and simulations of advanced energy management system Subsidy schemes for users of renewables 	Big companies, industry, port authorities, shipping companies, logistic providers, SMEs,	<p>Responsibility: public institutions</p> <p>Co-responsibility: big companies, industry, SMEs, universities, regional and local</p>	1) Level of energy consumption	Primary source EU funds/Programmes/grants, additional/other possible funding, state, regional and local budgets	

No.	Strategic objective	Priority area/Measure	Users/target groups/beneficiaries	Responsibility/Co-responsibility	Indicators	Sources of financing
	<ul style="list-style-type: none"> Analysis of the potential for the use of offshore renewable energy 		universities, marinas	government		
2.2.2. Stimulating use of hydrogen						
	<p>Purpose: to decrease dependency on fossil fuels</p> <p>Project/activities:</p> <ul style="list-style-type: none"> Analysis/studies of possibilities for the introduction of hydrogen in maritime transport systems Pilot project with hydrogen-led vessels Exchange and transfer of knowledge in the field of hydrogen use in the maritime sector Building the basis for a regulatory framework (laws and by-laws) and guidelines for potential users of hydrogen (vessels) Subsidy schemes for users of hydrogen 		Big companies, industry, shipping companies, logistic providers, SMEs, government	Responsibility: public institutions (government)	1) Draft of a relevant regulation	Primary source EU funds/Programmes/grants, state budget
2.3. Biodiversity protection, off-shore aquaculture, oil-spill prevention						
2.3.1. Using alternative fuels and power sources						
	<p>Purpose: to decrease dependency on non-renewable energy sources</p> <p>Projects/activities:</p> <ul style="list-style-type: none"> Exploring alternative fuels and testing new solutions with an aim to increase use of alternative fuels Prevention equipment for old ships that still use fossil fuels Regular checks of old and ships that still use oil (classification check) To implement rigorous regulation also for tourism-related vessels 		Port authorities, shipping companies, logistic providers, companies, SMEs, government	<p>Responsibility: Government</p> <p>Co-responsibility: port authorities, classification associations, regional and local authorities, communities, local companies and SMEs</p>	1) Quantity of alternative fuels used 2) Quantity of oil spilled	Primary source EU funds/Programmes/grants, private sources (capital); additional/other possible funding (to a less extent) state, regional and local budgets
2.3.2. Stimulating development of offshore aquaculture						
	<p>Purpose: to exploit the potentials of aquaculture and contribute to the economy</p>		Local companies, industry, SMEs, research	Responsibility: research institutions	1) Successfully implemented pilot projects in off-shore aquaculture	Primary source EU funds/Programmes/grants, private sources (capital); additional/other

No.	Strategic objective	Priority area/Measure	Users/target groups/beneficiaries	Responsibility/Co-responsibility	Indicators	Sources of financing
	Projects/activities: Exploring potentials for offshore (open water/ocean) aquaculture and testing deeper water opportunities Pilot projects for fish farms Knowledge building in offshore aquaculture field Exploring the potential for co-location of offshore activities (e.g., fish farming/wind energy)		institutions, government , associations , communities	Co-responsibility: regional and local authorities		possible funding (to a lesser extent) state, regional and local budgets
2.4. Circular economy principles in maritime activities and supply chain optimization						
2.4.1. Business support services supporting the transition of companies towards the circular economy						
	Purpose: Enable companies in the maritime sector to transform their business models towards sustainability and the circular economy Projects/activities: <ul style="list-style-type: none"> • Training, workshops, and matchmaking events allowing companies to adopt new knowledge and build innovative “green” business models • Individual consulting/mentoring for business entities who would transit to the circular economy • Analysis of the current supply chain and providing solutions for its optimization 	SMEs, business support organizations, large companies	Responsibility: business support organizations Co-responsibility: regional development agencies, science and technology parks	1) Number of events 2) Number of participating organizations 3) Number of companies/SMEs/start-ups who improved their business against circular economy principles (survey at the beginning of the project/activity) 4) Number of solutions for optimization	EU funding, regional public funds, large companies	
2.4.2. Supply chain optimization and service innovation						
	Purpose: Enable companies and SMEs in the maritime sector to introduce/optimize business models and practices to enhance innovation and sustainability-based competitiveness Projects/activities: <ul style="list-style-type: none"> • Training, workshops, and matchmaking events allowing companies to adopt new knowledge and expand their networks and contacts • Provision of individual consulting/mentoring for business entities interested in the improvement of their business models • Analysis of the current supply chain and providing solutions for its optimisation 	SMEs, business support organizations, large companies, start-ups	Responsibility: business support organizations Co-responsibility: regional development agencies, science and technology parks, Edih Adria	1) Number of events 2) Number of participating organizations 3) Number of solutions for optimization	EU funding, regional public funds, large companies	

No.	Strategic objective	Priority area/Measure	Users/target groups/beneficiaries	Responsibility/Co-responsibility	Indicators	Sources of financing
		through service innovation				
2.4.3. Blue Economy - sustainable growth in the marine and maritime sectors						
	<p>Purpose: to stimulate activities that are oriented towards Blue Growth and contribute to the economy.</p> <p>Projects/activities:</p> <ul style="list-style-type: none"> Exploring potentials for development in renewable energies, aggregate mining, shallow and deep-sea mining, offshore oil and gas, shipping, yachting, and marinas Projects/activities related to sustainable fisheries, maritime security, biotechnologies, desalination, aquaculture, fish farming <p>Searching for smart and adaptive materials and structures required to improve the vessel or offshore platform's ability to operate</p>	Companies, industries, SMEs, universities, R&D institutions, regional and local authorities	<p>Responsibility: regional and local authorities</p> <p>Co-responsibility: companies, industries, universities, project and associated partners</p>	EU Blue Economy Report (indicators) 1) Port activities 2) Shipbuilding and repair Maritime transport	Primary source EU funds/Programmes/grants, private sources (capital); additional/other possible funding (to a lesser extent), state, regional, and local budgets	
2.5. Improvement of connections of the maritime innovation ecosystem and accessibility						
2.5.1. Construction of physical rail infrastructure – connections - optic infrastructure						
	<p>Purpose: to enable/improve connectivity and accessibility between the entities in the ecosystem using physical infrastructure</p> <p>Projects/activities:</p> <ul style="list-style-type: none"> Preparation of relevant technical documentation (corridors, length, type of infrastructure, etc.) Preparation of tender documentation and tender launch Construction of physical infrastructure / optic infrastructure Procurement of trains/wagons 	Ports, shipping, logistics, and other companies, SMEs	<p>Responsibility: Croatian railways, Slovenian railways, telecoms</p> <p>Co-responsibility: government</p>	1) Number of kilometres of newly built infrastructure 2) Optic cables, 5G network	Primary source EU funds/Programmes/grants, private sources (capital); additional/other possible funding (to a lesser extent) state, regional, and local budgets, public-private ventures	
3.	Attractive and in full capacity maritime innovation ecosystem labour market Indicators: Unemployment rate in the maritime sector, Employment rate in the maritime sector					
3.1. Increase of employment opportunities in the maritime innovation sector/ecosystem						
3.1.1. Attracting talents in the maritime innovation sector/ecosystem						

No.	Strategic objective	Priority area/Measure	Users/target groups/beneficiaries	Responsibility/Co-responsibility	Indicators	Sources of financing
	<p>Purpose: to attract highly skilled workers and retain talents to contribute to higher maritime sector production and added value to the economy in general</p> <p>Projects/activities:</p> <ul style="list-style-type: none"> Reconsidering labour tax for employers in the maritime innovative sector Designing the schemes/models with an array of benefits for attracting talent and retaining highly skilled workers Provision of quality service (education incl. kinder-garden, health, transportation, available/affordable housing) 		Early graduates, students of the final years of their studies, companies, industries, universities, secondary (vocational) schools, regional and local authorities	<p>Responsibility: regional and local authorities</p> <p>Co-responsibility: companies, industries, universities, secondary (vocational) schools</p>	1) Number of persons employed in the maritime innovation sector/ecosystem	Primary source EU funds/Programmes/grants, private sources (capital); state subsidies additional/other possible funding (to a less extent), state, regional, and local budgets
3.1.2. Increase of interest in maritime studies and shipbuilding						
	<p>Purpose: to attract potential students and secondary school pupils to continue their education in maritime studies, shipbuilding, etc. to enrich a workforce basis that will contribute to the development of the economy in general</p> <p>Projects/activities:</p> <ul style="list-style-type: none"> Developing new educational Programmes, including joint multidisciplinary Programmes in English language Modernising existing university programs to be more in line with company's needs (use of cutting-edge software, VR, etc.) Activities promoting education in maritime and related studies Scholarships for students Support in finding jobs during and after the formal completion of studies 		Early graduates, students in the final years of their studies, companies, industries, universities, secondary (vocational) schools, regional and local authorities	<p>Responsibility: regional and local authorities, universities, vocational schools</p> <p>Co-responsibility: companies, industries, secondary (vocational) schools, projects, and associated partners</p>	1)Number of students/pupils enrolled	Primary source EU funds/Programmes/grants, private sources (capital); additional/other possible funding (to a lesser extent), state, regional, and local budgets
3.2. Creating economic, social, and environmental benefits from knowledge valorisation						
3.2.1. Pathways to commercial exploitation including valorisation and knowledge transfer						
	<p>Purpose: to increase benefits stemming from commercial exploitation and appropriate valorisation of knowledge transfer</p> <p>Projects/activities:</p>		Companies, industries, R&D institutions	<p>Responsibility: Universities</p> <p>Co-responsibility: big companies,</p>	1)Number of products/services commercially exploited	Primary source EU funds/Programmes/grants, private sources (capital); additional/other possible funding

No.	Strategic objective	Priority area/Measure	Users/target groups/beneficiaries	Responsibility/Co-responsibility	Indicators	Sources of financing
	<ul style="list-style-type: none"> Pilot project of valorisation of knowledge transfer Education on commercial exploitation with successful examples 			industry, R&D institutions, patent offices		(to a lesser extent)
4.	Excellence in Maritime Innovation Ecosystems' governance Indicators: Good governance index					
	4.1. Creation of innovation culture and strengthening collaboration with actors in R&I					
	4.1.1 Fostering innovation culture through identification, preparation, and implementation of shared projects between industries and universities/research organizations					
	<p>Purpose: to build capacity for innovative projects and delivery of innovative products, services, solutions and processes.</p> <p>Projects/activities:</p> <ul style="list-style-type: none"> Collaboration and communication through open and user innovation approaches (innovation acceleration and networking, international/global access, open internationalized society) Preparation of shared innovation-oriented projects, innovation acceleration, and ideation workshops Community facilitation, community trend-watching Activities and initiatives towards strengthening of collaboration in international/EU projects Improvement of the maritime cluster in its operations and functioning (knowledge transfer, recognition of potentials, networking...) 	Companies, industries, R&D institutions, universities, regional development agencies	<p>Responsibility: Universities, innovation incubators/ accelerators, science and technology parks</p> <p>Co-responsibility: companies, industry, R&D institutions, patent offices, regional and local government, development agencies, project and associated partners</p>	1)Number of innovative projects	Primary source EU funds/Programmes/grants, private sources (capital); additional/other possible funding (to a lesser extent)	
	4.1.2. Active contribution to the implementation of existing and development of future (public) policies, strategies, plans, programs and active governance					
	<p>Purpose: To analyse and produce findings related to the alignment of policies and policy instruments concerning R&D and economy in the regions</p> <p>Projects/activities:</p>	Policymakers, development agencies, universities, local and regional	<p>Responsibility: regional development agencies</p> <p>Co-responsibility: universities,</p>	1)Number of events 2)Number of participations in various events 3)Number of	EU funds/Programmes, regional and local authorities	

No.	Strategic objective	Priority area/Measure	Users/target groups/beneficiaries	Responsibility/Co-responsibility	Indicators	Sources of financing
	<ul style="list-style-type: none"> Workshops, conferences and events bringing together experts in policy and strategy development, aiming for alignment and long-term collaboration Establishing transnational working groups Ensure the continuously active role of the Innovation Council in the implementation of strategy measures (projects, activities) Improving safety-related protocols, guidelines, and instructions (ship safety, protection at work, cyber security, etc.) 		authorities	project, and associated partners	outputs (e.g., joint recommendations, solutions, decisions, protocols, guidelines, instructions, etc.)	

IMPLEMENTATION FRAMEWORK

The Joint R&I Strategy is the delivery of a jointly implemented project. As such it is “owned” by partners on both sides of the Institutional and organizational framework

The University of Ljubljana is a key coordinator of the INNO2MARE project in which this Joint R&I Strategy is only one of numerous deliverables. The project duration is 48 months, and it is expected that the Action and Investment Plan will be delivered within the project as well, based on the inputs from the Joint R&I Strategy.

Besides the University of Ljubljana as a key project coordinator, the following project and associated partners are involved in the project in various segments of the project and at the level of the whole project when necessary. They are presented in Table 6 below.

Table 6 List of project and associated partners

Project partners	Associated partners
ISKRA d.o.o. (Slovenia)	Regional energy agency Kvarner (Croatia)
DIGITEH d.o.o. (Slovenia)	Blue cluster (De Blauwe Cluster, Belgium)
Business support Centre Kranj d.o.o. (Slovenia)	URBANEX (Croatia)
Association for Technical Culture of Slovenia (Slovenia)	Port of Antwerpen (Belgium)
Rijeka University (Croatia)	
Rijeka University, Faculty of Maritime Studies (Croatia)	
Rijeka University, Technical faculty (Croatia)	
STEP RI science-technology park of the University of Rijeka d.o.o. (Croatia)	
MS Tech d.o.o. (Croatia)	
Maritime Center of Excellence d.o.o. (Croatia)	
Regional Development Agency of Primorje-Gorski kotar County (Croatia)	
Centre of Technical Culture Rijeka (Croatia)	
University of Antwerp (Belgium)	
Maritime Academy Antwerpen (Belgium)	

Source: Project Summary.

As the Joint R&I Strategy will be adopted at the project level, and there are no strict formal terms, an institutional backup for the implementation, in its early stages of implementation at least, it will rely much on willingness and disposal of resources of the project and associated partners to start and initiate those projects, activities, and actions within their immediate control and power. In that sense mobilization of resources, in particular human resources will be critical to demonstrate devotion to successful strategy implementation. For those measures for which the responsibility is at the institution “outside” of the project, it will be required to present the strategy and introduce these institutions/organizations with planned projects and activities and expectations in terms of their engagement.

The Innovation Council could continue to have a role also in implementation and intensify its work as per strategy implementation requirements. It would be critical in prioritizing of projects and activities, in continuous provision of advice to the project and associated partners, in giving support to strengthening and collaboration-related activities, and in bringing new ideas, concepts, and proposals for implementation of proposed projects and activities. Working groups could be set up as per theme (e.g., the one in charge of strategic objective 1 and corresponding measures), they take the responsibility for implementation of projects and activities, and they coordinate their actions with other working groups. Working groups can have regular e.g. monthly meetings to discuss progress, decide on the level of priority of projects, identify bottlenecks in implementation and take jointly solutions to address challenges arising from the Joint R&I Strategy implementation. In terms of a financial framework, as mentioned above, it includes the most relevant sources of financing for the implementation of the strategy. This will be further investigated and explored at a later stage, when preparing the Action and Investment Plan where more precise financing/funding-related information is required.

Monitoring, reporting and evaluation system should be established and functional, once set. A practice of annual reporting (minimum) should be introduced as soon as the strategy is adopted, and the first projects and activities begin. The Joint R&I Strategy refers to the period of the next 10 years. Therefore, it is envisaged to undertake an interim evaluation (e.g. after 5-6 years of implementation, depending on the number, size, nature and other requirements of the projects and activities that will be implemented). After the strategy is fully or to a large extent implemented, it is envisaged to conduct an ex-post evaluation to check if the Strategy has delivered the desirable results, outputs, outcomes, and to some extent impacts.

In this strategy the most relevant information on the implementation framework is provided as within this project (in WP4) it is envisaged to prepare the Action and Investment Plan which should include the following:

- Actions, responsible actors, required resources, expected results, and timeline for particular plan components
- The overall investment needs and plans for R&I infrastructures and innovation support activities
- Production of annual monitoring report
- Design of common monitoring and evaluation methodology, including relevant quantitative indicators (output, outcome and impact) and qualitative assessments.

Besides a clear link to WP4, the strategy is linked to WP6 in terms of talent attraction as well as WP5 as it is related to the pilot project scale-up and demonstrators, as well as to the objectives:

- O5.1: Support the visionary and operational frameworks set out in the joint ecosystems' R&I strategy and accompanying action & investment plan through the development of roadmaps for the three pilot projects.
- O5.2: Develop and test new approaches for the accelerated uptake of new technologies by the ecosystems' industry through pre-planning for pilots and demonstrators based on the three R&I pilot projects.

In general, this strategy is closely related to WP3, WP4, and WP5 in terms of how our developments can be scaled up, technology demonstrated, and technologies commercialized, as well as WP6 regarding talent attraction and retention, training, and knowledge transfer. We hope this strategy will deliver the expected results, outcomes, and impacts and that Western Slovenia and Adriatic Croatia will become competitive and prosperous maritime innovative regions.

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ANNEXES

- [1] Annex 1 Analytical background for identification and quantification of key economic indicators for Croatian maritime innovation ecosystem

- [2] Annex 2 Belgium Innovation Maritime Ecosystem