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Horizon Europe
candidate partnership

**A climate neutral,
sustainable and
productive blue
economy**



Draft Strategic Research
and Innovation Agenda

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The Draft Strategic Research and Innovation Agenda* of the Sustainable Blue Economy Partnership has been prepared by a drafting group on the basis of input and feedback from representatives of Member States and Associated Countries, key stakeholders - including representatives from the regional sea-basin coordination and support actions, associated experts and in close collaboration with the European Commission, under coordination by the Directorate-General for Research and Innovation.

The drafting group**, led and coordinated by the JPI Oceans Secretariat and representatives from France and Ireland, is comprised of nominated volunteers from Member States and Associated Countries, representatives of the European Commission and representatives of the regional sea-basin coordination and support actions.

*The status of this Strategic Research and Innovation Agenda will remain a draft until its approval by the formal partners of the Sustainable Blue Economy Partnership.

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1. Background and context

Many hopes and opportunities for sustainable prosperity and wellbeing are associated with the blue economy. Interpretation of the scope and character of the blue economy concept, however, can vary. This Partnership refers to the definition in the EU Blue Economy Report 2020¹. It is described to include ‘all sectoral and cross-sectoral economic activities based on or related to the oceans, seas and coasts’ and further categorises them as either established (marine living resources, marine non-living resources, marine renewable energy, ports activities, shipbuilding and repair, maritime transport and coastal tourism) or emerging maritime sectors (ocean energy, blue bioeconomy and biotechnology, marine minerals, desalination, maritime defence and submarine cables). Similarly, the Organisation for Economic Co-operation and Development (OECD) defined the ocean economy as ‘the sum of the economic activities of ocean-based industries, together with the assets, goods and services provided by marine ecosystems.’²

The blue economy is comprised of both marine- and terrestrial -based activities (e.g. fish processing, sensor production, desalination) and is influenced by the land-sea (coastal) interface (e.g. riverine input, human activities). Yet blue economy value chains will always incorporate some form of application in or use of marine and coastal space, resources or information.

The European partnership for “A climate neutral, sustainable and productive blue economy” (herein after referred to as the ‘Sustainable Blue Economy Partnership’) is envisaged as a co-funded partnership under the Horizon Europe Research & Innovation (R&I) framework programme 2021-27. The core group of formal members and signatories will be comprised of relevant ministries and funding agencies from the participating countries.

The Strategic Research and Innovation Agenda (SRIA) is a framework of agreed high-level ideas for thematic partnership priorities, on which the development of Annual Work Plans by the formal parties to the Partnership will be based. The SRIA is an integral and necessary part of the proposal for the Sustainable Blue Economy Partnership that centres on the structuring and focus of the thematic agenda. It reflects some of the contextual information on the rationale, vision and objectives, expected impacts, collaboration and synergies, and implementation modalities of the draft proposal of the Sustainable Blue Economy Partnership.³ The development of this SRIA has been coordinated by the Joint Programming Initiative for Healthy Seas and Oceans (JPI Oceans) with the support from representatives of Member States and Associated Countries, regional initiatives and the European Commission.

This SRIA builds on the extensive analysis, priority setting, and stakeholder consultation performed while developing the strategic agendas of regional and pan-European initiatives. Many of the already identified research priorities and activities of the European Union (EU) and single nations are similar

¹ European Commission (2020). The EU Blue Economy Report. 2020. Publications Office of the European Union. Luxembourg.

² OECD (2016), *The Ocean Economy in 2030*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264251724-en>.

³ https://ec.europa.eu/info/files/climate-neutral-sustainable-and-productive-blue-economy_en

and therefore offer an opportunity for pan-European alignment over all European sea basins. Accordingly, this Partnership SRIA takes into account commonalities among JPI Oceans new Strategy Framework and existing SRIAs from the EU sea basins and builds on them, including the Mediterranean SRIA⁴, the Black Sea SRIA⁵, the joint Baltic and North Sea SRIA⁶, as well as developments in the Atlantic, including the ongoing implementation work under Galway and Belém Statements⁷ and the Atlantic Action Plan 2.0⁸. These roadmaps are supported by Horizon 2020-funded Coordination and Support Actions (AORA-CSA, AANChOR-CSA, BlueMed CSA, Black Sea CONNECT and BANOS CSA) and offer demonstrated achievability of policy targets at sea basin scales, allow common issues to be jointly addressed and facilitate the development of national marine and maritime strategies for a climate neutral, sustainable and productive blue economy in a consistent way.

Furthermore, the BlueMed and Black Sea SRIAs rely on the established cooperation and coordination within the EU sea basin strategies in the West Mediterranean and in the Black Sea⁹. The BlueMed SRIA also benefits from the framework provided by the Union for the Mediterranean 2015 Ministerial Declaration on blue economy¹⁰ that will be updated in early 2021 with a new Ministerial Declaration. Similarly, the BANOS CSA has considered the EU Strategy for the Baltic Sea Region (EU SBSR) in the development of the SRIA for the Baltic and North Sea.

At the global level, of particular relevance is the implementation plan for the United Nations Decade of Ocean Science (2021-2030)¹¹ which articulates a common global framework for ocean science themes that support actions towards the ocean dimensions of sustainable development in the context of the UN 2030 Agenda for Sustainable Development.

In addition, a number of related EU strategies and initiatives within the remit of the Sustainable Blue Economy Partnership will need to be considered during the implementation of the SRIA, these are detailed further in Appendix 1.

To address aspects related to the influence of freshwater, transitional water, terrestrial environments and land-based activities on the blue economy, as well as to connect with relevant communities and stakeholders, this Partnership will collaborate with diverse activities and projects funded under Horizon Europe, particularly those in the clusters on 'Food and Natural Resources' and 'Climate, Energy and Mobility', such as the partnerships 'Water4All', 'Rescuing Biodiversity', 'Waterborne', 'Clean Energy Transition' and 'Driving Urban Transitions' and the Mission 'Ocean, Seas and Waters' (detailed further in Section 9).

⁴ <http://www.bluedmed-initiative.eu/strategic-research-and-innovation-agenda/>

⁵ <http://connect2blacksea.org/the-sria/>

⁶ https://www.banoscsa.org/banos_csa

⁷ <https://allatlanticocean.org/whoweare>

⁸ <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1395674057421&uri=CELEX:52013DC0279>

⁹ https://ec.europa.eu/maritimeaffairs/policy/sea_basins_en

¹⁰ https://ufmsecretariat.org/wp-content/uploads/2015/11/2015-11-17-declaration-on-blue-economy_en.pdf

¹¹ <https://www.oceandecade.org/>

Thematic areas of common European interest are extracted from the agendas mentioned above and collectively offer a high potential for this cross-sectorial Partnership to align public R&I funding and maximise the coherence and impact of the investments. This SRIA focusses on actions where joint national and EU support can generate momentum and impact well above what could be achieved by a single country or region and thus contributes significantly to a high-performing European Research Area (ERA) in the blue economy domain, in line with the objectives laid out in the recent Communication on a new European Research Area for Research and Innovation¹².

2. Rationale for the Sustainable Blue Economy Partnership

Europe is a maritime continent. In 2018, the EU blue economy directly employed close to 5 million people, generating more than €750 billion of turnover¹³. Although many sectors were severely affected by the COVID-19 crisis, the blue economy has an enormous potential to contribute to a 'greener' economic recovery. The UN Global Compact 'Blue Resilience Brief'¹⁴ highlights how the challenges presented by the pandemic can advance science-industry collaboration to achieve a more resilient and sustainable recovery of the blue economy.

The High-Level Panel for a Sustainable Ocean Economy recently concluded that sustainable offshore investments could provide at least five times greater returns than costs¹⁵, demonstrating that sustainability and economic development are not mutually exclusive goals, but in fact reinforce one another. A study commissioned by the World Ocean Initiative predicts that the ocean can sustainably provide six times more food than it does today through better management and technological innovation¹⁶. In addition, research has shown that restoring and protecting the world's large marine ecosystems would not only result in a healthier ocean, with associated positive impacts for coastal communities and livelihoods, but also transform a number of maritime sectors resulting in significant opportunities for job creation¹⁷. This has already been demonstrated in the offshore wind energy sector, where jobs have increased nine-fold in less than 10 years, surpassing employment in the fishing industry. With an expected 30-fold increase of renewable offshore capacity (340 GW) in the EU by 2050, this trajectory is expected to increase further.

¹² Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, A new ERA for Research and Innovation, COM/2020/628 final, September 2020. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2020:628:FIN>

¹³ European Commission (2020). The EU Blue Economy Report. 2020. Publications Office of the European Union. Luxembourg.

¹⁴ <https://oceansdecade.org/assets/uploads/documents/Towards-a-More-Resilient-and-Sustainable-Blue-Economy-sept20-1598949409.pdf>

¹⁵ Konar, M. & Ding, H. A Sustainable Ocean Economy for 2050: Approximating Its Benefits and Costs (World Resources Institute, 2020).

¹⁶ Costello, C., L. Cao, S. Gelcich et al. 2019 The Future of Food from the Sea. Washington, DC: World Resources Institute.

¹⁷ Hudson, A. (2017) Restoring and Protecting the world's large marine ecosystems: An engine for job creation and sustainable economic development. Environmental Development 22: 150-155 <https://doi.org/10.1016/j.envdev.2016.10.003>

The potential of a climate neutral and sustainable blue economy to deliver innovation, value creation and employment is high, and its role in addressing challenges as articulated in the European Green Deal and in the 2030 Agenda for Sustainable Development, such as energy security, healthy productive and biodiverse ecosystems, human health and well-being, climate change and sustainable food provision is substantial¹⁸.

Marine ecosystems provide a wide range of goods and services that, both directly and indirectly, benefit economies and support human health and wellbeing, in ways we are only beginning to understand. Many blue economy sectors involve or impact those operating and living in the coastal space. Therefore, we need to take a wider view on how to foster sustainable, equitable and resilient coastal enterprise and communities. These communities need more secure opportunities for subsistence and they must play a role in creating a more sustainable, resilient and just blue economy, one that ensures a fair distribution of benefits to those who are often most affected by sectoral activities¹⁹. An outstanding example is marine and coastal tourism, which accounted overall for 62% of the jobs, 41% of the gross value added and 34% of the profits in the EU's blue economy in 2018²⁰, thus being one of its key assets. Greener and more sustainable marine and coastal tourism solutions will further underpin the ecological and socioeconomic basis for this sector. Such a transformation offers urgently needed opportunities to accelerate recovery and build resilience in a sector and in communities that have been severely affected by the COVID-19 pandemic²¹.

Marine and coastal environments do not stop at political borders and neither do the challenges they face. Challenges and risks from land-based and sea-based human activities, climate change and unsustainable growth in the blue economy impact Europe's regional sea areas in different ways, with areas such as sea-grass meadows, shallow coastal embayments, coral reefs, mangroves and the Arctic being extremely vulnerable. At the same time, Europe's seas create regional cohesion and connect countries to one another. Europe's ocean, seas and coasts are host to complex systems of globally interlinked commercial activities, often competing for the same dynamic space and resources. About 70% of marine waters are experiencing increasing cumulative harmful anthropogenic impacts²². Seabed habitats are under significant pressure across European seas from the cumulative impacts of demersal fishing, coastal developments, aquatic pollutants and other activities.

Sustainability solutions in the ocean are interdependent with those on land, particularly in coastal areas. The coastal zone serves as the interface between land-based society and ocean economic activity. Coastal and maritime spatial planning (MSP) and integrated ocean governance and management are

¹⁸ Stuchtey, M., A. Vincent, A. Merkl, M. Bucher et al. 2020. "Ocean Solutions That Benefit People, Nature and the Economy." Washington, DC: World Resources Institute. www.oceanpanel.org/ocean-solutions.

¹⁹ Bennett, N. J., Blythe, J., White, C. S., & Campero, C. (2021). Blue growth and blue justice: Ten risks and solutions for the ocean economy. *Marine Policy* 125, 104387 <https://doi.org/10.1016/j.marpol.2020.104387>

²⁰ European Commission (2020). The EU Blue Economy Report. 2020. Publications Office of the European Union. Luxembourg.

²¹ The COVID-19 Pandemic and the Blue Economy: New Challenges and Prospects for Recovery and Resilience.

UNCTAD/DITC/TED/INF/2020/2

²² IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany

therefore critical elements of a just transition to a sustainable blue economy. The ecosystem approach to management (EAM) has been demonstrated to enable the transition to sustainable blue economy practices. EAM promotes restoration of good environmental status (GES), in line with the objective of the Marine Strategy Framework Directive (MSFD) and the conservation and sustainable use of the whole ecosystem, and it recognises humans, with their cultural diversity, as an integral component of ecosystems. It is thus an interdisciplinary approach, based on scientific knowledge and requiring stakeholder involvement, that balances ecological, social and governance principles to achieve sustainable resource use. Applying EAM is an iterative process and already a legal requirement under both the MSFD and the MSP Directive.

A recent report commissioned by the High Level Panel for a Sustainable Ocean Economy²³ stresses that a healthy ocean and a sustainable blue economy requires a new relationship with the ocean, one that ensures effective protection, sustainable production and equitable prosperity.

3. Vision

The vision for the Sustainable Blue Economy Partnership is to enable a just and inclusive transition from the current, widely non-sustainable ocean economy to a regenerative and circular blue economy that contributes to restoring the ocean's health, resilience and the services it provides to people, by being climate-neutral, sustainable and productive.

Europe stands at a crossroads: the European Green Deal provides an ambitious action plan and tremendous opportunity to achieve a climate-neutral EU by 2050 through a just and inclusive transformation to a regenerative, sustainable and circular economy, with zero net emissions of greenhouse gases, restoring biodiversity and safeguarding a healthy and toxic-free environment. The associated paradigm shifts both necessitate and support the Sustainable Blue Economy Partnership's vision to provide key knowledge and innovation empowering the transition to a regenerative, sustainable and productive blue economy, which in turn provides enormous opportunities to boost post-pandemic recovery in our maritime sectors, delivering jobs, value-creation and the "blue" component of the European Green Deal.

The OECD report Rethinking Innovation for a Sustainable Blue Economy²⁴, identifies advances in a number of maritime sectors which have the potential to deliver 'win-win solutions', i.e. strengthening economic development while at the same time supporting ecosystem preservation and restoration.

²³ Stuchtey, M., A. Vincent, A. Merkl, M. Bucher et al. 2020. "Ocean Solutions That Benefit People, Nature and the Economy." Washington, DC: World Resources Institute. www.oceanpanel.org/ocean-solutions

²⁴ OECD (2019), Rethinking Innovation for a Sustainable Ocean Economy, OECD Publishing, Paris, <https://doi.org/10.1787/9789264311053-en>

Delivering such win-win scenarios across all maritime sectors will require changes to ocean business, in some cases incremental, but in others, transformative.

On the basis of research, knowledge and data, ocean industries and SMEs can drive the innovation needed to address the grand challenges of climate change, biodiversity loss and post-pandemic recovery, and meet the Green Deal targets. Technological and nature-based solutions, knowledge-based governance and decision-making systems, societal innovation, Open Science²⁵, enhanced Ocean Literacy and engagement of citizens are further essential components to fast-track the transition to a climate-neutral, sustainable and productive blue economy. Digitalization and equitable access to FAIR (Findable Accessible Interoperable and Reusable) data²⁶ to support information, knowledge, innovation and Ocean Literacy are described as cornerstones for the success of the UN Ocean Decade.

Through the concerted effort of this Partnership, existing knowledge and know-how from European R&I programmes will be synthesised and implemented to optimise societal and economic value creation. In addition, new technical and environmental knowledge, open knowledge infrastructures and scientific evidence will be delivered to support actions across society, policy and the economy. These activities will build the substrate and tools for a sustainable blue economic transition driven by trans-disciplinary and cross sectoral collaboration, creative ideas and solutions, information access, and knowledge-based policies.

The Sustainable Blue Economy Partnership will work closely with stakeholders from industry, public bodies and civil society as an ambitious and expanding cross-sectoral collaboration initiative that aligns European, national and regional research efforts and resources. It will support joint activities to co-design and co-deliver the R&I basis consisting of existing and new information, infrastructure, literacy and social participation necessary for the blue economic transition to sustainability. The Partnership will act as an incubator promoting the development of new skills and the realisation of sustainable jobs for European citizens and neighbouring countries.

This Partnership's vision reflects the notion of the central global initiative, the UN Decade of Ocean Science for Sustainable development that "the only possibility to move from the 'ocean we have' to the 'ocean we want' is to convince key stakeholders that the world requires a transformational, large-scale, innovative campaign of ocean science and partnerships to improve delivery"²⁷.

²⁵ Open Science is an umbrella term that describes sharing via internet any kind of output, resources, methods or tools, at any stage of the research process, of relevance in this context are Open Access, Open Data and Open Innovation

²⁶ Wilkinson, M., Dumontier, M., Aalbersberg, I. et al. (2016) The FAIR Guiding Principles for scientific data management and stewardship. *Sci Data* 3, 160018. <https://doi.org/10.1038/sdata.2016.18>

²⁷ <https://www.oceandecade.org/resource/108/Version-20-of-the-Ocean-Decade-Implementation-Plan->

4. Objectives

The Sustainable Blue Economy Partnership aims to achieve four general objectives:

A. Alignment of priorities and investments across Europe

A powerful alignment and structuring among the EU Member States' and Associated Countries' R&I priorities, resource allocations, activities and programmes in sustainable blue economy domains in which R&I requirements converge across Europe, regional sea basin areas and international partners.

B. Cooperation across socioeconomic sectors and scientific disciplines

Pan-European and international R&I cooperation at an unprecedented level of integration that includes all relevant socioeconomic sectors and cultures from research, innovation and industry to education and science diplomacy. The community involved is open and growing, inclusive of international partners, in particular those bordering Europe's seas and ocean.

C. Provision of knowledge for a sustainable development of the blue economy

A strong, multi-disciplinary evidence-base of knowledge, information and know-how to support sound policymaking, regulatory frameworks, sustainable blue economy business opportunities and solution generation. This will contribute to unlock, demonstrate and enable sustainable and responsible use of the full socioeconomic potential of our seas and ocean, within the boundaries of healthy and resilient ecosystems.

D. Transformation to a more digital knowledge-based climate-neutral and sustainable blue economy

Rapid progress in the digitalisation of the ocean over the next decade to support the transition, by mid-century, to a blue economy that is climate-neutral, ecologically sustainable, socially just and inclusive, resilient, productive and competitive, improves ocean health and resilience and people's well-being and reduces human induced risks to nature. This will contribute to sustainable jobs and economic/societal value creation while enhancing biodiversity and ecosystem functioning. It will also support compliance with legal and policy requirements under the Integrated Maritime Policy (IMP), the MSFD, the Water Framework Directive (WFD) and the MSP Directive and contribute to EU strategic priorities (including the European Green Deal, Digital Europe, Cohesion Policy, Circular Economy Action Plan, Zero Pollution ambition, the Bioeconomy, Farm to Fork and Biodiversity Strategies, the Strategic Research Agenda for Ocean Energy and the soon-to-be adopted EU Communication on a new approach on Sustainable Blue Economy as well as to the UN 2030 Agenda and associated 17 Sustainable Development Goals (SDG), in particular SDG 14 'Life under water'.

The four general objectives are depicted as a logical sequence of value creation from priority alignment to transformative impact (Fig. 1). Their sequence is a seamless continuum. This does not, however, imply that they are addressed sequentially. Rather, they will be pursued in parallel.

Intervention logic to achieve the general objectives

Each general objective has been interwoven with four **specific objectives** that form the basis of an **intervention logic** for each general objective (Fig 1). The specific objectives are:

- 1. Integration - To promote interlinked approaches and systemic thinking for integrated information for the blue economy transition
- 2. Solutions - To stimulate innovation through science-informed solutions
- 3. Tools - To offer tools and information to enable climate neutrality and sustainability of blue economy activities
- 4. Frameworks - To ensure supportive framework conditions for the blue economy to thrive in a climate-neutral and sustainable way

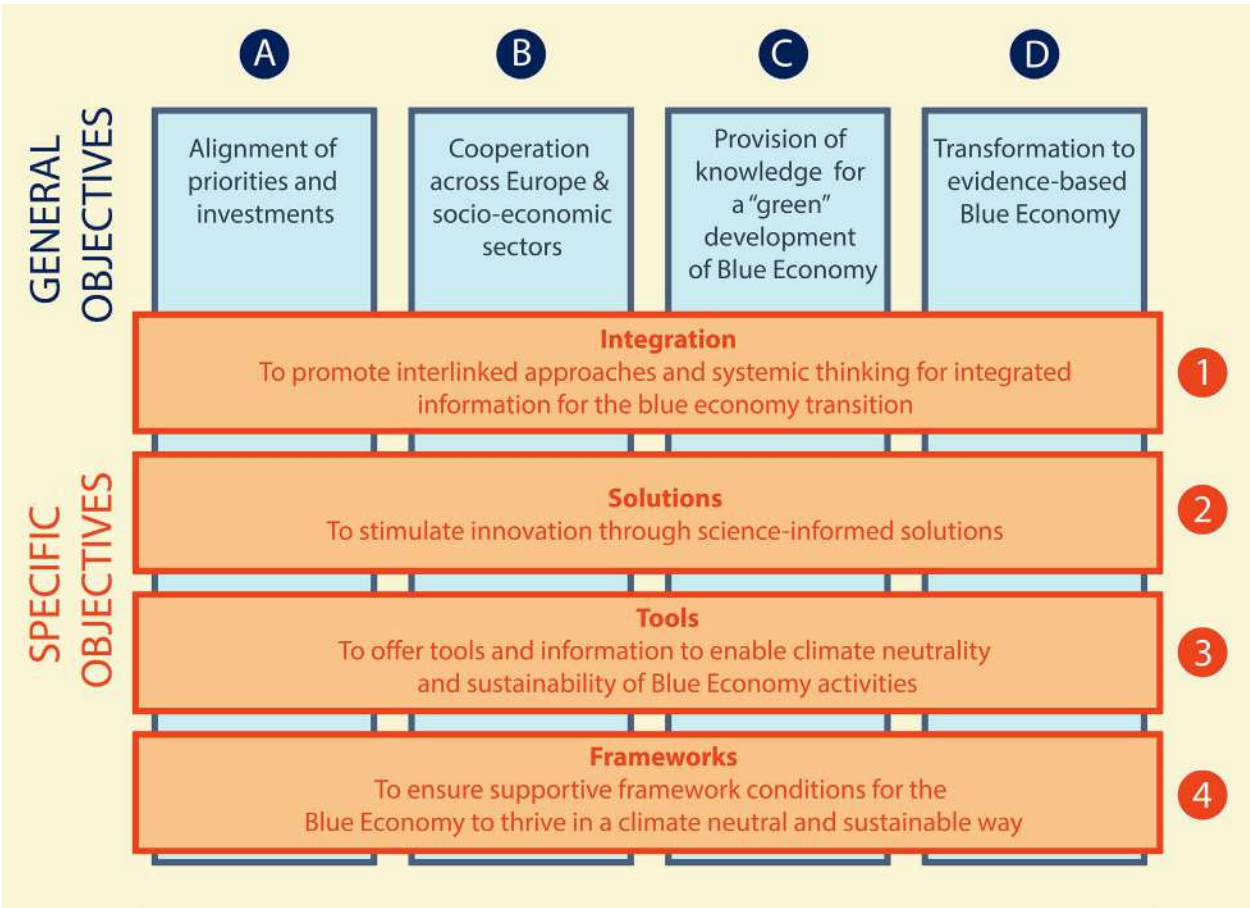


Figure 1. Schematic illustration of the matrix formed by the seamless sequence of four strategic general objectives A-D (blue) and four specific objectives 1-4 (red).

An overview of the aims of the respective general objective (A-D), and an illustrated summary of the intervention logic based on **thematic objectives, inputs, activities and outputs** is presented in Appendix 2. The evolution of a successful Sustainable Blue Economy Partnership will necessitate a feedback loop of continuous learning and adjustment, where transformative progress (D) will affect and modulate priorities (A). This learning loop will be systematically considered during the development of the annual work plans.

5. Expected impacts

The Sustainable Blue Economy Partnership will generate positive impact through the transformation to a climate-neutral, sustainable and productive blue economy, operating in a healthy and resilient marine environment, in which the benefits are distributed fairly. In the near-term, by 2027, the Partnership will deliver concrete impacts on R&I structures, instruments, practices and relevant policies, both at EU and Member State level. In the medium and longer-term, the positive impacts of the Partnership will be delivered across the three interlinked aspects of sustainability, leading to environmental, economic and societal benefits (as suggested in the Key Impact Pathways monitoring concept for EU Framework Programmes). A number of suggested key performance indicators (KPIs) on the programme level of the Sustainable Blue Economy Partnership have been detailed in the associated Proposal for this Partnership²⁸. These KPIs and their methodologies will be elaborated during the Partnership focusing process, also considering the ultimate scope and composition of the Sustainable Blue Economy Partnership.

Impact for Sustainability: Environment

The Partnership will be a significant mechanism to support the achievement of GES in European seas and put Europe's marine biodiversity on a path to recovery by 2030. By definition, the transition of the blue economy towards climate-neutrality and sustainability will deliver beneficial environmental impacts, reducing human pressures from pollution (litter, plastics and microplastics, chemicals, noise, etc.), a changing climate and unsustainable extraction of marine resources. Digitalisation and advanced technologies will enable the reduction of impacts from economic activities and the development of innovative solutions to prevent or counter environmental degradation, restoring and enhancing natural capital and marine ecosystem goods and services. Environmental policy impacts will stem from the development of innovative actions and nature-based solutions that help prevent or reverse the deterioration of aquatic and marine resources, improve sustainable practices, and increase the resilience of ocean ecosystems in the face of change. The Partnership will mainstream marine biodiversity conservation and contribute to a new deal for nature and people.

²⁸ https://ec.europa.eu/info/sites/info/files/research_and_innovation/funding/documents/ec_rtd_he-partnership-climate-neutral-sustainable-productive-blue-economy.pdf

Impact for Sustainability: Economy

While the overall transition of the current blue economy to a productive, climate-neutral and sustainable mode will continue well beyond a decade, the Sustainable Blue Economy Partnership will impact the process. It will lay the required foundations and deliver innovation stimulus for products and services that create high-value jobs and opportunities for investment in those maritime sectors that address the objectives of the European Green Deal. Foundation elements for a sustainable blue economy will include informed policies and governance architectures, an array of available infrastructures and information access, educational elements to ensure ocean literacy, capacity and skills among society, enablers and workforce. In addition, the Partnership is expected to deliver stimuli for concrete innovative solutions, best practice and pilots to be tested and scaled up in all relevant economic sectors, where they benefit start-ups, SMEs and established maritime businesses. This will attract creativity, investments and entrepreneurship to deliver a transformation to a blue economy that is productive for all relevant economic sectors but also just and ethical, in particular for coastal communities.

Impact for Sustainability: Society

The Partnership will aim to deliver impacts for the equitable benefit of society as a whole rather than for ocean business alone. The transformation to a blue economy will establish a system of science-based informing of policies and governance. This will enable the fulfilment of existing obligations in the nexus of ocean health, climate change and sustainable economic development, resulting in safe and equitable employment opportunities, better livelihood and health, and generally higher social standards. The Partnership will further equip society with advanced methodologies for achieving a sustainable future, such as through development and implementation of systematic MSP and management tools (e.g. Marine Protected Areas). New knowledge will contribute to improving societal safety and resilience (e.g. in coastal communities), and to increasing the capacity to harness the health and well-being benefits of interacting with blue spaces. Citizen engagement and a more ocean literate population will also deliver greater awareness and support for the importance of R&I in achieving sustainable development of our ocean resources.

Impact for Research & Innovation: Cooperation Structures, Policies and Practice

The Partnership will catalyse a systemic, structural and cultural transformation in the approach to marine and maritime R&I. Results will include greater alignment in strategic priorities and implementation modalities across all relevant scales of blue economy R&I, including at national, macro-regional, EU, pan-European and international levels. This is anticipated to result in a multiplying effect of collaborative investments to support joint activities, with potential for significant complementary contributions from external private sector collaborators. The Partnership will nurture a diverse and vibrant community across research disciplines, socioeconomic sectors and policy arenas, and find agreed mechanisms and tools to support industry-academia-policy collaboration that can be applied across borders in the context of the single European Research Area. This community is expected to

become the innovation engine for the anticipated transition, indispensable to the development of a regenerative and sustainable blue economy.

Cross-sectoral and cross-disciplinary R&I cooperation co-created with societal stakeholders will increasingly be the norm. Such cooperation may arise, for example, from advancement and realisation of digital ocean concepts and from the promotion of Europe-wide systems for integrated monitoring, observation, data, modelling and forecasting capacities. The Partnership will seek to deliver R&I outputs that are not just incremental but transformative. In doing so, it must leverage existing knowledge tools and structures, building on progress that has already been delivered, e.g. through Horizon 2020. R&I actions will be underpinned by best practice in Open Science, i.e. Open Access, Open Data, and Responsible Research and Innovation (RRI). Optimising structures and tools for knowledge transfer and pathways to impact will be central to the success of the Partnership.

What success looks like by 2030:

In line with the objectives of the European Green Deal and Digital Europe priorities, the Partnership will contribute to the sustainability and resilience of the blue economy by supporting the establishment of innovative governance models. It will also contribute to strengthening the EU and international science-policy interfaces in marine- and maritime-related domains as well as the Global Earth Observation System of Systems (GEOSS) by supporting the further deployment and exploitation of Environmental Observation data and products and of digital and data technologies.

More specifically, the Partnership is expected to contribute to the following outcomes:

- EU and national multi-level cooperation and alignment across and within regional seas of R&I programmes, priorities and investments are enhanced, based on established strategic R&I agendas and related cooperation activities, including international agreements and outreach; as well as cooperation with other Horizon Europe initiatives, European Partnerships and Missions.
- Europe's role in ocean science, research, social and technological developments, innovation and productivity in the marine domain is clearly strengthened by 2030 and transformative governance enables the advances of the role of Europe in business, finance and social developments in the marine/maritime domain.
- By 2030, Europe has contributed significantly and in a measurable way to the climate neutrality of the blue economy, the European Green Deal objectives and its different strategies.
- The science-based implementation of EU marine-related legislation, regulations and objectives is supported, as well as the advanced sustainability of activities, practices and existing and new products and services of the blue economy value chains throughout European regional seas and the Atlantic.
- Transformative change is promoted and enabled through actionable science and sustainable, fair and just solutions for the blue economy and for communities, involving a participatory and multi-stakeholder approach.

- The deployment of digital, nature-based and social innovations as well as community-led and purpose-driven technology for the blue economy is supported.
- Ocean literacy in the EU and beyond is increased.
- Sustained ocean and coastal observations and availability of FAIR data for environmental, climate and blue economy purposes are substantially increased.
- Global cooperation with key partners bordering the different EU sea basins is strengthened.

6. Thematic pillars and scope

The analysis of regional-scale strategic agendas revealed important knowledge gaps and associated R&I themes of high relevance, shared across sea basins. It inspired the architecture of a pan-European agenda for the Sustainable Blue Economy Partnership, with four high-level thematic pillars under which priority R&I objectives were clustered:

1. A blue economy in harmony with nature
2. Blue economy solutions towards climate neutrality
3. A thriving blue economy for the people
4. Integrated and responsible ocean governance

The pillars reflect the transformative change required to achieve a sustainable transition of the blue economy that will benefit people, planet and economy. All pillars are highly interconnected. Pillars 1-3 relate to the three blue economy aspects mentioned in the Partnership title, namely **sustainability**, **climate neutrality** and **productivity**. In the context of this Partnership, these key terms are considered in the broad sense of their meaning. Sustainability refers to a desired system that reconciles long-term environmental and economic health. Climate neutrality includes the goal of a net zero effect of all activities on the climate system throughout entire value chains and considering socioeconomic climate resilience. The term productivity refers to a sustainable blue economy's contribution to secure provision of requirements for the well-being of all people, such as sustainable jobs, income, food, health, safety and recreation.

Pillars 1-3 are connected by the integrative element of **governance** represented by pillar 4. While governance is relevant to all pillars, its critical importance in achieving the aims of the Sustainable Blue Economy Partnership and its outstanding relevance for European countries and the European Union, means it is afforded its own pillar and associated R&I objectives. Due to the relevance of governance to all Pillars, the governance pillar is visualised as a transversal pillar in Figure 2.

The thematic pillars should not be considered in isolation from each other but as interconnected elements. Seven cross-cutting key enablers have been identified (Fig. 2). They connect and support all four pillars. These enablers are essential catalysts to achieve the objectives of all four thematic pillars, but do not themselves have R&I objectives associated with them.

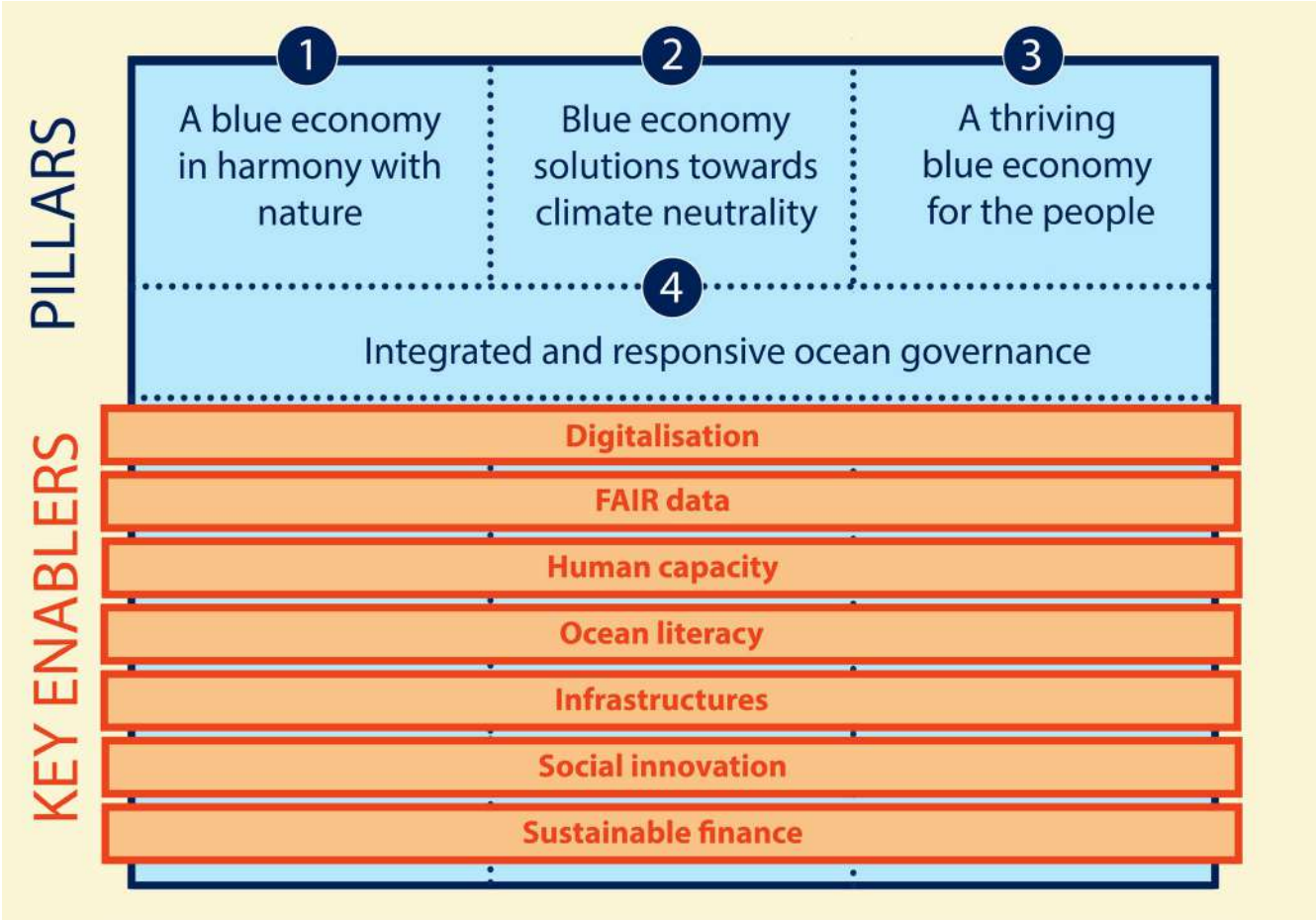


Figure 2. Thematic pillar structure and underpinning key enablers.

This high-level SRIA of the Sustainable Blue Economy Partnership is deliberately not centred on sector-specific agendas and does not explicitly mention all potentially relevant blue economy sectors. Aspects of a particular sector could be addressed under all thematic pillars. This is clearly demonstrated in Figure 3 (below) which maps established and emerging sectors of the blue economy to the thematic pillars demonstrating the industrial relevance of the SRIA.

Sector Labels*	Pillar 1 sustainability	Pillar 2 climate	Pillar 3 people	Specifications for this partnership
Marine living resources				fisheries, aquaculture and processing
Marine non-living resources				including dredging, sand, gravel and aggregate extraction
Marine renewable energy**				offshore wind, tides, waves, solar, hydrographic gradients
Ports activities				including smart ports and marinas
Shipbuilding and repair				including recreational boats, dredging of shipping lanes
Maritime transport				including shipping at low environmental impact
Coastal tourism				including marine tourism and recreation
Bluebioeconomy & biotechnology				including bioprospecting
Marine minerals				mining of metals
Desalination				
Maritime defence	n/a	n/a	n/a	not addressed in the architecture of this partnership
Submarine cables				including for energy and communication

*Sector Labels as in EU Blue Economy Report 2020
** Including the sector "Ocean energy" mentioned in the EU Blue Economy Report 2020

Figure 3. Illustration of how strongly the blue economy sectors, as defined in the EU Blue Economy 2020 report, relate to the three thematic pillars of the Sustainable Blue Economy Partnership. The intensity of the blue colouring depicts an estimate of relative relevance. Other sectors are considered to be of substantial importance to the Sustainable Blue Economy Partnership but are not categorised in the EU Blue Economy 2020 report. These include e.g. maritime technology (development and production of sensors, carriers, automation technology, digital infrastructures and ICT applications), marine construction, and innovative coastal protection and restoration.

Research and Innovation Objectives

The R&I objectives specified within each of the pillars are impact-driven. They include critical knowledge gaps, which must be addressed to achieve the desired impact and inspire technological and community-driven innovation actions. These are diverse in nature, ranging from fundamental understanding of marine and coastal ecosystem functioning and resilience necessary to underpin the blue economy, to delivering innovative technical and engineering solutions to restore natural capital and support industrial competitiveness in the transition.

The identified R&I objectives are those considered most relevant to support the transition to a climate neutral, sustainable and productive blue economy operating in a clean healthy and resilient marine environment, in line with the Partnership's four general objectives (Fig. 1). The R&I objectives are furthermore selected to avoid duplication while enabling collaboration with areas that will be undertaken within the scope of other partnerships such as, but not limited to, the Zero-Emission Waterborne Transport, Rescuing Biodiversity, Water4All and Clean Energy Transition partnerships (detailed further in section 9).

The thematic pillars and associated R&I objectives are described in more detail in Section 7 and the key enablers are further elaborated in Section 8. An overview table of thematic pillars, R&I objectives, enablers and relevant links is provided in Appendix 3.

Fundamental principles of this Partnership

Translating high-level R&I objectives into regional and local solutions that deliver economic, environmental and societal benefits will necessitate quadruple helix actors (academia, industry, government and civil society). Responsible research and innovation (RRI) is a fundamental principle of this Partnership to ensure that these societal actors work together in order to better align R&I process and outcomes with the values, needs and expectations of society. Capacity-building efforts will also be integrated, promoted and embedded in activities funded by the Partnership.

Engagement with industry (start-ups, SMEs and established maritime businesses) will be a priority for this Partnership to ensure the co-creation and uptake of new sustainable solutions. This requires a sound basis in the form of common language and a clear definition of what is ‘sustainable’. To that end, the Partnership adheres to the EU taxonomy for sustainable activities as a reference (see also Section 8.7 on sustainable financing).

Open Science makes science more efficient, reliable, and responsive to societal challenges. The Covid-19 pandemic has demonstrated the significance of opening up science, sharing knowledge and collaborating to accelerate mitigation and prevention measures. The current incentive structures in academic research often fail to recognize value and reward efforts to open up scientific research. Barriers also exist when collaborating with industrial operators. This Partnership commits to Open Science and the FAIR data principles. It will draw on existing tools such as Plan S²⁹ and develop explicit policies on Open Science with a clear description of roles and responsibilities for each stakeholder as this is a key aspect in fostering the necessary change in research culture.

Although a European Partnership, the geographical scope of the SRIA extends beyond Europe, recognising the interconnectedness of marine environments and the global impact of European R&I. The SRIA also does not specify regional priorities, instead, the themes are overarching allowing flexibility to address specific sea-basin priorities. Whilst the focus of the R&I actions are on marine and coastal zones and their resources, the SRIA takes a holistic approach to blue economy activities that extend upstream of the coastal zone (as defined in Section 2) and again will work synergistically with other Partnerships (e.g. Water4All, Rescuing Biodiversity) to ensure efficient and effective use of resources.

²⁹ <https://www.coalition-s.org/>

7. Thematic pillars – detailed explanation

7.1 Pillar 1. A blue economy in harmony with nature

How can the blue economy contribute to the sustainable use of marine goods and the restoration and regeneration of marine ecosystems?

7.1.1 Why this area is important?

Preserving and increasing the natural capital of coastal and marine ecosystems in a rapidly changing ocean is critical to safeguard and enhance the sustainable ecosystem services that underpin the blue economy, to deliver GES in European waters, to put Europe's biodiversity on a path to recovery by 2030 and for the EU to achieve the UN SDGs by 2030. The new blue economy will be a knowledge- and innovation-driven economy. It will develop and deliver a new generation of ocean observing technologies, advanced data products and services, and digital and nature-based solutions. It will transition from an economy that is largely extractive and resource depleting, to one that provides solutions for the protection and preservation of natural capital and the restoration of degraded marine ecosystems. The sustainable development of the blue economy is not feasible without comprehensive knowledge of our marine ecosystems, and the environmental, socio-economic, and ecological effects of cumulative human activities, both now and in the future.

7.1.2 Research and innovation objectives

Cluster A: Economic development within environmental boundaries

- i. Enabling good environmental status by characterising ocean health and cumulative impacts of blue economy activities from catchment to the deep sea.
- ii. Protecting, monitoring and restoring ecosystem resilience and marine biodiversity considering also nature-based solutions.
- iii. Understanding and quantifying the ecosystem responses to effects of natural and economic processes that differentiate basin systems from each-other.

For an effective management of human activities based on an ecosystem approach, an adequate knowledge base is essential. Pillar 1 of the Sustainable Blue Economy Partnership will provide the knowledge to determine the capacities and limits of Europe's seas, ocean and coastal zones to sustainably support the blue economy and regeneration of marine ecosystems and restoration of marine biodiversity. New information and knowledge will provide both a benchmark of the effects of economic activities on marine ecosystems and the feasibility of continued or new economic activities, as well as proper considerations of historical and cumulative impacts. R&I activities will develop and explore the potential of new business models which protect, monitor and contribute to the restoration

and sustainable use of ocean resources. The development and deployment of nature-based solutions³⁰ (i.e. solutions inspired or supported by nature) to support the regeneration of natural capital and to protect and restore biodiversity will be a central focus of work in this area.

Cluster B: Reduction of pollution and other forms of disturbance of the marine ecosystem

- i. Providing innovative technological, circular and nature-based solutions for prevention and remediation of ecosystem disturbance and pollution including eutrophication, hazardous substances, litter and underwater noise.
- ii. Designing economic practices that reconcile the conservation and restoration of habitats with their sustainable use.
- iii. Scientifically underpinning criteria for the responsible use of non-living marine resources (e.g. sand, gravel, minerals), including from the deep sea.

Preventing and reducing marine and coastal pollution, and the introduction of energy (e.g. underwater noise and light), will be central to facilitate a blue economy in harmony with nature. Actions will identify innovative and nature-based reduction and remediation solutions to prevent and minimise land-derived pollution reaching the sea via carriers (i.e. rivers), as well as pollution from all maritime sectors, including historically accumulated pollution. Other forms of pressures, such as seafloor disturbance, habitat loss, hydrological changes and the introduction of non-indigenous species will also be considered. The adverse environmental impacts that extraction of non-living marine resources generates will be evaluated against the benefits of their use. Adopting a circular approach will break the linear ‘take-make-use-dispose’ production-consumption model. Accordingly, the use of innovative bio-based or biodegradable new material (also referred to in Pillar 3) will be a focus for the reduction of pollution. Furthermore, the development of environmentally friendly, cost-effective and sustainable products from marine non-living resources will reduce the need for their extraction.

Cluster C: Sustained observation, monitoring and digitalisation of seas and oceans

- i. Advancing the Digital Ocean concept and developing digital twins for the comprehension of marine ecosystems.
- ii. Achieving more effective and biologically relevant monitoring, surveying and sampling.

In addition to being an economic activity on its own, ocean observation and monitoring and forecasting of the marine environment play a growing role in the development of a productive and truly sustainable blue economy. Actions in this area will focus on the continued development of innovative, low-cost and durable sensors and sensor networks, in particular for biological parameters such as for environmental

³⁰ Nature Based Solutions as defined by the European Commission are ‘Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions. Hence, nature-based solutions must benefit biodiversity and support the delivery of a range of ecosystem services.’ <https://ec.europa.eu/research/environment/index.cfm?pg=nbs>

DNA. This will be complemented by actions on underwater connectivity, including real-time communication to land-based data centres and platforms, digital tools, robotics and infrastructures. These enhanced capacities will be leveraged to improve the monitoring and observation needed to underpin a sustainable blue economy, to achieve the European Green Deal targets and to implement marine policy objectives. They will build on and ensure interoperability with Europe's existing marine observation and data systems. This will enable more sustained and continuous observation and monitoring of maritime activities and of the biological, chemical, physical, geological and hydrological characteristics of ocean ecosystems, ensuring harmonisation of data collection and abundant delivery of diverse FAIR data. Research will address key knowledge gaps that are fundamental to baseline assessments and forward projections of ocean health and mitigation of climate change and ocean acidification. Advanced ICT will create an intelligent digital environment - the Digital Ocean concept - a new paradigm for marine research, integrating existing technologies and tools with new digital technologies. It comprises large FAIR data, connections, models and simulation tools, superimposed on physical space. Ocean Digital Twins (ODT) will thus leverage growing amounts of data to study, at basin- and at global scale, the relations among different aspects (morphological, geological, chemical, physical, biological, socio-economics of coastal communities) of the ocean system. By continuing to collect and learn from data, ODT will follow the real dynamic changes of the marine environment over time with ever increasing accuracy.

Knowledge transfer activities in this Pillar will encourage start-ups, entrepreneurs and SMEs to leverage the Digital Ocean to develop new products and services. Maritime sectors will be enabled to use the data and tools developed to reduce their own costs and risks, develop new business models and share their data with existing data infrastructures to enrich Europe's FAIR data offering.

7.1.3 Expected results

Actions under Pillar 1 will enable a blue economy transition aligning economic development with achieving GES of European waters and the objectives set in the framework of the EU Biodiversity Strategy 2030. They will contribute to better assessments of the trade-offs between ecological dynamics and socioeconomic needs, thereby also considering historical and cumulative impacts. Knowledge transfer along the value chain with industry, policy, and civil society will contribute to achieving the R&I objectives in Pillars 2 and 3 and provide the data and information to underpin governance actions in Pillar 4. Joint actions and knowledge-sharing with the Rescuing Biodiversity and Water4All Partnerships, amongst others, will ensure that all actions in this Pillar achieve maximum impact by extending activities beyond the marine realm to systemically address the land-river-sea continuum as it relates to the blue economy. At the international level, advanced European ocean observation capacities will contribute to strengthening the Global Earth Observation System of Systems.

7.2 Pillar 2. Blue economy solutions towards climate neutrality

How can the blue economy contribute to climate resilience and climate neutrality by 2050?

7.2.1 Why this area is important

Staying within the global warming limits of the Paris Agreement and meeting the greenhouse gas emission targets of the European Green Deal requires solutions to fast-track climate neutrality also in the blue economy. This requires curbing greenhouse gas emissions to net zero by mid-century, which means decarbonisation of all economic processes, moreover the removal and storage of CO₂ from the atmosphere, so-called negative emissions. While some processes such as fossil-fuel based energy production and transport are obvious greenhouse gas emitters, most production and consumption processes also result in emissions during their life cycle. A climate neutral economy must find alternative ways. Even if global warming in this century can be kept well below 2°C, as per the Paris Agreement, ongoing climate change and related impacts require forward-looking planning for adaptation to a climate resilient blue economy and coastal settings.

7.2.2 Research and innovation objectives

Cluster A: Zero and negative carbon emissions

- i. Underpinning innovation to upscale renewable ocean energy.
- ii. Fostering the carbon sequestration capacity of coastal and marine environments ('blue carbon') and preventing carbon seepage to the atmosphere.

With about a quarter of CO₂ emissions currently coming from electricity generation, harnessing the huge potential of marine renewable energy is instrumental for achieving the EU's energy transition objectives of zero GHG emissions by 2050. This will necessitate an expansion of marine energy installations which will further increase the competition for marine space and associated impacts on marine environmental integrity and biodiversity. Work in this area will focus on multi-use of marine space, considering also circular inspired design and end-of-life phase. New methodologies and stakeholder engagement approaches are required to identify suitable installation sites that consider climate change effects and the increasing, potentially conflicting demands for space with other sectors, e.g. aquaculture, fisheries, or tourism. Developing multi-use platforms that serve the needs of multiple offshore industries, integrating for example renewable energy and aquaculture installations, could deliver synergistic benefits and efficiencies. Mitigation interventions of the impacts on the environment, marine biodiversity, users of the sea and coastal communities will be optimised. Actions in this area will be developed in collaboration with the Clean Energy Transition partnership.

The importance of coastal habitats and marine ecosystems in sequestering and storing carbon from the atmosphere, known as 'blue carbon,' has become increasingly recognised in recent years. Human activities can either enhance or disrupt the capacity of these ecosystems to act as carbon sinks. Hence their conservation and restoration must be an integral component of climate policy. Significant

knowledge gaps remain including the extent of these ecosystems, an understanding of the factors that influence carbon uptake and storage processes in them, and related management actions³¹. Research in this area will focus on addressing these knowledge gaps and inform optimum management strategies for blue carbon ecosystems. It will also examine the role of release of sub-marine carbon (e.g. methane and carbon dioxide) to the atmosphere, how climate change will influence it and what measures can prevent its leakage.

Cluster B: Purpose-driven technological innovations transforming blue economy sectors to climate neutrality

- i. Developing sustainable and cost-efficient solutions for construction, maintenance, reuse and multi-use of off-shore platforms
- ii. Designing green and smart ports, marinas and transport links
- iii. Enabling novel materials and technologies for sustainable manufacturing and product life cycle management
- iv. Contributing to innovative and sustainable concepts for ships and recreational boating

Substantial obstacles in the quest for achieving climate neutrality are locked in maritime infrastructures including their design, functionality and life cycle. Major such infrastructures include offshore platforms, ports and marinas, and ships and boats. These represent challenges but also opportunities for structural transformation with a sustained effect. This Partnership will enable cross-sectorial technological cooperation to advance innovations with the goal of making the maritime domain smarter, more circular and optimized for multi-use of marine space. To that effect, a fundamental approach of R&I will be the development of novel materials and technologies to enable flexibility in manufacturing and full life cycle management of products of constructions. Off-shore platforms will continue to be important sites for blue economy operations. The Partnership will research making platforms more cost-efficient and climate-neutral with innovative ways of construction, maintenance and multiple use, but also reuse for secondary purposes after decommissioning. For their counterparts on land, ports and marinas, the Partnership will foster smart design development to make them 'green' hubs for sustainable operation of trade and transport, both commercial and touristic. The Partnership will further seek to innovate concepts for ships and recreational boating considering life cycle analysis, in collaboration with the Partnership on Zero Emission Waterborne Transport.

Cluster C: Climate resilience of coastal socioeconomic and marine ecological systems

- i. Developing nature-based solutions to improve responsiveness to natural disasters, increase natural capital and restore ecosystems

³¹ Macreadie, P.I., Anton, A., Raven, J.A. et al. (2019). The future of Blue Carbon science. Nat Commun 10, 3998. <https://doi.org/10.1038/s41467-019-11693-w>

- ii. Quantifying at regional-scale, and across basins, the impacts of climate change (acidification, sea-level rise, deoxygenation, ocean warmings and other stressors) to strengthen ocean and coastal resilience

The impacts of climate change on the ocean and its ecosystems will be a reality for many generations, with particular relevance for coastal communities, but also professionals, entrepreneurs and investors in the blue economy. In the light of this non-negotiable certainty the Partnership will also addresses challenges and opportunities for strengthening resilience to the anticipated climate-related changes, such as ocean warming, acidification, sea-level rise, extreme weather events, changing weather patterns, and deoxygenation. The essential knowledge for any effective measures to optimise resilience are that the anticipated changes are quantified with the level of detail that is necessary for adaptive solutions, i.e. from local to regional and cross-basin scales. On that basis, the Partnership will particularly harness the multiple benefits of nature-based solutions to improve responsiveness to (climate-induced) natural hazards, while also increasing natural capital and restoring ecosystems. The ecosystem conservation, management and restoration interventions envisioned here will contribute to both climate adaptation and mitigation, provide regional and local solutions, and restore coastal resilience and the ecosystem services that support local communities.

7.2.3 Expected results

Actions under Pillar 2 will further develop the marine contribution to curb greenhouse gas emissions towards net zero, provide solutions targeting climate neutrality from the major maritime infrastructures, and strengthen societal and economic resilience against climate-change impacts. The pillar content will be further co-designed and potentially implemented with other Horizon Europe partnerships, such as Zero Emission Waterborne Transport, Clean Energy Transition, and EIT Climate KIC and with the Joint Programming Initiative Climate. This Partnership will contribute to transformational progress in maritime operations, smart ports and marine renewable energy.

7.3 Pillar 3. A thriving blue economy for the people

How can the blue economy contribute to people's health, well-being and prosperity in a sustainable, resilient and equitable way?

7.3.1 Why this area is important

Human health and well-being and the resilience of coastal communities are interdependent on prosperous economic development and the quality of marine and coastal ecosystems, their productivity, goods, and services. A thriving and productive blue economy can provide jobs, sustainable and nutritious food and feed, bioactive compounds (nutraceuticals, pharmaceuticals, cosmeceuticals, biomaterials, bioenergy) and recreational opportunities, while also contributing to ecosystem protection and restoration. Achieving the European Green Deal targets will depend on how efficiently, safely and sustainably marine bioresources, energy and seascapes can be used in a way that is fair and beneficial to all.

7.3.2 Research and innovation objectives

Cluster A: Sustainable, accessible and safe food, feed and bioproducts

- i. Developing new and optimising existing blue bioeconomy and biotechnology value chains
- ii. Reducing and valorising waste, promoting circularity and ensuring safe, healthy, affordable and traceable products
- iii. Innovating sustainable seafood production systems, including offshore, closed, low- and multi-trophic aquaculture and low impact sustainable fisheries

There is immense potential for innovation across the blue bioeconomy and an immediate need to make it more sustainable. Actions in this area will identify crucial knowledge gaps, enhance the circular use of bioresources and use enabling technologies such as biotechnology and ICT to ensure an efficient and sustainable development of the blue bioeconomy. Solutions will increase the productivity and competitiveness of the sector, while advancing sustainability. Existing value chains, from producer (or harvest) to user, will be optimised. New ones will be developed through product innovation and differentiation and by exploring new and low trophic bioresources. A “value chain approach” will identify solutions that consider all steps of a value chain. These may include food quality assurance and certification, food security and traceability, waste reduction, complete utilization of biomass and sidestreams through biorefining, extracting bioactive compounds for food, feed and industrial markets, bioremediating environmental impacts, and considering market developments and consumer experiences. Rapid advances in ‘omics’ coupled with digital innovations will be leveraged to realise the enormous genetic potential of marine biodiversity.

Activities will also focus on diversified and low carbon food systems, such as low trophic and multitrophic aquaculture (e.g. algae and bivalves alongside that of fish and shrimps), aquaponics and low-impact fisheries. Off-shore, closed and land-based aquaculture will be explored, building on the technological capacity work in Pillar 2. R&I activities will target animal health and welfare, as well as nutrition, sustainable feed and seafood safety. This should lead to the provision of alternative sources of proteins for food and feed which are expected to contribute to healthier and more sustainable diets and reduce pressures on land resources. The sustainability and stress-resistance of food chains will be optimized using technological enablers, such as automation and robotics, to advance fish processing practices and develop new solutions to extend shelf life. The sustainability of the food system as a whole will be enhanced by reducing food losses and waste and new opportunities to create products from locally sourced and processed biomass. Digitalisation, ICT, biotechnology, machine learning and robotics will enable major advancements in both processes and transparency throughout the entire food chain. It will support sustainability, traceability, strong guidance for responsible consumption, fraud prevention and increased trust – all to the benefit of consumers.

Cluster B: Resilient, sustainable and safe coastal communities

- i. Fostering innovation, circularity and job creation in coastal communities through a fair, just and inclusive transition
- ii. Exploring economic opportunities of innovative and sustainable concepts for marine and coastal tourism sectors
- iii. Reducing disaster risk for coastal communities and sectors through strengthened resilience and preparedness to climatic, geological and anthropogenic hazards

Coastal communities are most vulnerable to the impacts of climate change and threats to ocean health and biodiversity. Employment opportunities for coastal communities in peripheral, insular or rural areas are often limited to fishing and tourism, both of which can be affected by seasonality and weather. R&I actions in this area will adopt innovative participatory and multi-stakeholder bottom-up approaches (e.g. living labs) to develop new solutions to build resilience in these communities and enterprises. Social innovation will be a key mechanism to identify and implement opportunities for diversifying coastal and marine-based enterprises to achieve more secure and equitable employment, particularly for women, vulnerable and indigenous communities. As one of the most important blue economy sectors, both financially and in terms of impact on coastal environments and communities, developing more sustainable traditional and new tourism business models (including eco-tourism³²) will be a focus of activities in this area. These will be tailored to local needs, build on regional specificities, characteristics and features, and factor in natural and cultural heritage. Enabling technologies (e.g. digitalisation) will be exploited to reduce costs and develop new services for the tourism industry, promoting synergies with other sectors, adopting a circular approach to reduce waste and environmental footprint. Building on activities in Pillar 1 and 2, climate and earth system modelling prediction capabilities will contribute to the development of effective monitoring and early warning systems. This will enable better risk management, especially when applied in combined risk reduction approaches that consider multiple hazards and cascading effects. Novel technological and nature-based solutions will be developed to protect coastlines. These solutions will be developed in an ecosystem-based and systemic way to enhance the resilience of coastal communities and businesses.

Cluster C: Equitable health and well-being

- i. Investigating the benefits of blue spaces in enhancing human health
- ii. Reducing human health risks from marine borne pathogens, toxins and toxicants
- iii. Using biodiscovery to develop applications for human-health and well-being

Ocean and coastal environments present both benefits and risks to human health and well-being. A healthy and biodiverse ocean maximises health benefits (nutrition, medicines, nutraceuticals and

³² The International Ecotourism Society defines ecotourism as “responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education” (TIES, 2015) <https://ecotourism.org/>

recreational opportunities) and reduces risks (pollution, toxins,). The positive health impacts of interacting with blue spaces will be further explored and quantified to understand how these lead to positive health outcomes and how they can be replicated and access to them be made more equitable. Evidence has shown that these benefits may be greatest among lower socio-economic status groups³³ who often have limited access to these environments. Partnership activities in this area will also focus on how digitalisation, enabling technologies and nature-based solutions can mitigate the risks to human health from interactions with ocean environments, through e.g. early warning systems for harmful algal blooms. Activities will also link to work in Pillar 1 to restore ecosystems and prevent land-derived pollution. Marine biodiscovery has enormous potential for the isolation of novel bioactive compounds with potential applications for human health and well-being (drugs, nutraceuticals and cosmetics). Activities will build on existing marine biobanks and culture collections and ensure that new sampling is carried out in an environmentally responsible way and in compliance with relevant legislation to ensure equitable benefit-sharing with local and indigenous communities.

Cluster D: A safe marine environment and blue economy

- i. Realising safe and cost-effective offshore operations
- ii. Advancing technologies for autonomous processes and navigation
- iii. Advancing strategies to minimise risk from novel maritime technologies
- iv. Contributing to efficient maritime surveillance

Operating in the marine environment presents unique risks and hazards for people, infrastructures and investments. Under this objective, and building on work in Pillar 2, opportunities to reduce these risks through developing new and autonomous technologies and robotics, for example for maintaining and monitoring offshore platforms, will be explored, to reduce time spent at sea and exposure to harsh conditions. These innovations for remote monitoring and maintenance of offshore platforms, autonomous navigation of vehicles and vessels (in addition to new materials and coatings) must themselves be safe, both for people and planet. Building on the Digital Ocean concept in Pillar 1, more effective maritime surveillance will be enabled through advanced data acquisition, sharing and management to support enforcement of and compliance with marine and maritime regulations and further reduce risks for off-shore operators, maritime infrastructure investments, recreational sea-users and coastal communities.

7.3.3 Expected results

Work under Pillar 3 will advance the greening of the blue bioeconomy and coastal enterprises. In doing so it will reduce pressures on marine resources, such as wild fish stocks and contribute to global food security through the development of new sustainable food, feed, bio-based products and business models. These will enable new start-ups and SMEs. Outputs will result in concrete benefits for coastal

³³ Wheeler B. W., White M., Stahl Timmins W., and Depledge M. H. (2012) Does living by the coast improve health and well-being? *Health & Place* 18(5): 1198–1201. <https://doi.org/10.1016/j.healthplace.2012.06.015>

communities, businesses and the environment, as well as wider human health and wellbeing benefits. New business models will be developed to provide just and secure employment for those whose livelihoods are intertwined with the seas and ocean. Finally, it will ensure that economic activities from established and emerging blue economy sectors are safe for people and planet and the benefits generated by them are fairly distributed. Activities with relevant partnerships, such as the Circular Bio-based Europe, Driving Urban Transitions and Safe Food Systems partnerships could advance activities in this pillar to maximise impact.

7.4 Pillar 4. Integrated and responsible ocean governance

How can knowledge-based, inclusive, integrated and responsible ocean governance support the transformation towards a sustainable blue economy?

7.4.1 Why this area is important

Human well-being relies on the biosphere, including resources provided by ocean ecosystems. Without a transformation to sustainability, the projected world population of 9-10 billion by 2050 will substantially increase pressures on the ocean. Global demand for raw materials, food, feed and clean water will rise, while illegal- and over-fishing, climate change, and marine pollution are already putting multiple pressures on our ocean's health and productivity, contributing to the breaching of planetary boundaries. Ocean governance faces the challenge of reflecting the multi-dimensional and interconnected role that the ocean plays for environmental health, economic prosperity and human well-being, including justice and equity. Innovation, novel technologies and digital tools will help the transition towards a more knowledge-based ocean management. Ocean governance addresses multiple human activities, but there is no single policy, institution or actor that has exclusive authority over this complex realm. Many of the human activities at sea are, furthermore, directly linked beyond the land-sea divide, e.g. transport networks and energy infrastructures, and thus governed also by overall sectoral policies. However, without a transformative change in ocean governance based on better, multi-disciplinary scientific knowledge and an ecosystem approach to management, it will become increasingly difficult to ensure the provision of ecosystem services. To ensure that the blue economy is truly sustainable and just in the long term, with limited impacts on the health and productivity of the ocean and equitable distribution of benefits, the current frameworks for ocean governance at global, regional and national scales, and the implementation of ensuing obligations, must be advanced to effectively deal with the increased use of ocean space and resources as well as emerging challenges. Coordination among sectoral policies must be strengthened considerably to achieve this and avoid detrimental impacts and conflicts due to fragmentation of governance.

7.4.2 Research and innovation objectives

Cluster A: Co-created innovative and knowledge-responsive governance at appropriate geographic scale

- i. Aligning and advancing scientific and regulatory, environmental and local knowledge towards new opportunities in the blue economy
- ii. Identifying trade-offs and synergies and balancing conflicting economic and societal interests
- iii. Exploring models of effective, responsive and integrated governance systems for European, national and local levels
- iv. Creating intelligent digital support systems for environmental decision-making, and reduction of uncertainties for maritime businesses

In recent decades, ocean governance frameworks have evolved from unsophisticated sector-based regulation and decision making to becoming more integrated and cross-sectoral. The 2008 EU Integrated Maritime Policy³⁴ is an example of such progress. However, in light of the complexity of environmental, social and economic factors that are applicable to effective governance of the marine space, there is scope for much greater innovation and systemic change in governance systems and management of marine resources. Analyses of the strengths and weaknesses of current integrative policy frameworks such as the EU's IMP and MSP would provide an evidence-base for new governance innovations necessary to strengthen inter-sectoral coordination and integration. The transition to the climate-neutral, productive, equitable and sustainable blue economy envisioned by the Partnership will be data-driven and knowledge-based. R&I actions will inform policy making and provide decision-support tools underpinned by advances in the digital ocean concept in Pillar 1. Activities will explore and demonstrate more responsive and agile systems of ocean governance, e.g. polycentric governance. The natural sciences which provide the knowledge base on marine systems and processes complement aspects of social science and humanities. Pillar 4 will also address emerging challenges tied to a digitally transformed blue economy leveraging advanced robotics, autonomous systems and real-time access to a multitude of data, to ensure safe and responsible use of these new capabilities. Advancing ocean governance that resolves complex trade-offs, balances different interests and maximises synergies will require progress in stakeholder engagement, ocean literacy, social acceptance, social innovation and the use of local and tacit knowledge. Intelligent digital support systems and tools will be used to support decision making. Solutions will also be sought to allow for greater transboundary integration in governance, especially at sea basin scale.

Cluster B: Operationalisation of the 'Ecosystem Approach to Management' in the blue economy

- i. Contributing knowledge to achieve coherence in policy implementation, including transboundary contexts, across sea-basins, between countries, between terrestrial, coastal and marine/maritime policies, and across sectors

³⁴ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52007DC0575>

- ii. Delivering data and scientific knowledge for coherent area-based management including Marine Protected Areas, Maritime Spatial Planning and multi-use of marine space
- iii. Developing operational assessment frameworks to evaluate the status of the marine environment and sustainability of human uses

For more than 20 years ecosystem-oriented environmental management has been a common endeavour. The concept of the EAM, is a widely accepted approach in ocean governance, contained in EU legislation, such as the WFD, the MSFD and the MSP Directive. As water and seas cross national borders the differences in how Member States apply and operationalise EAM has impeded its systematic implementation³⁵. In the context of this Partnership, the EAM, Integrated Coastal Zone Management and MSP are fundamental to ensure a sustainable transformation of the blue economy. To make EAM and MSP operational requires an adaptive and evolving management approach and involvement of stakeholders, industry and other key actors. R&I actions will target knowledge gaps and barriers to implementation and operationalisation of EAM in a transboundary context. Central to this will be a better understanding of interactions between ecological and socioeconomic systems, and between the legal, management and institutional frameworks through which EAM must be deployed across Member States. In addition to the generation of new knowledge, successful operationalisation of the EAM can also use existing knowledge. The Partnership will aim to provide solutions and demonstrations to enable coastal Member States to successfully implement EAM to their marine space and resources, through operational assessment frameworks and drawing on a coherent and accessible base of tools and evidence.

Cluster C: Behavioural, structural and socio-economic analysis in support of social innovation

- i. Supporting a just transition of all blue economy sectors
- ii. Informing the reform of ocean-related subsidies
- iii. Investigating and valuing ecosystem services for strategic and economic decision-making

A fair and just transition of Europe's blue economy will depend upon finding solutions across all sectors that achieve sustainability and climate neutrality whilst safeguarding competitiveness and equitable access to sustainable jobs. Currently, implementation of important EU policies, notably the Common Fisheries Policy and the MSFD, is hampered by a lack of understanding of the (cumulative) impacts of human uses on marine ecosystems. As a consequence, the various elements of the MSFD's GES are difficult to define which leads to inconsistency of implementation across Member States. R&I supported by this Partnership will be key to providing clarity and consistency about appropriate indicators, criteria and implementation of effective measures to support coherent transboundary implementation of the MSFD. Identification of effective measures to protect or restore the marine environment is equally uncertain. In addition to contributions from natural sciences to support further development of objectives for ecosystem quality and sustainable use (Pillar 1) pragmatic solutions are needed based on

³⁵ Langlet, D., & Rayfuse, R. (2018). Challenges in Implementing the Ecosystem Approach: Lessons Learned. In D. Langlet, & R. Rayfuse (Eds.), *The Ecosystem Approach in Ocean Planning and Governance* (Publications on Ocean Development; Vol. 87). Brill. https://doi.org/10.1163/9789004389984_015

social sciences and humanities to support the implementation of the policies. Methods and techniques for ecosystem valuation exist in abundance but are only occasionally implemented in policy decisions. The impacts of human activity on ecosystem services and their social and economic consequences can be evaluated with ecosystem valuation and natural capital accounting studies. The outcomes can highlight the trade-offs between actions that reverse the declining states of marine biodiversity and ecosystems and potentially competing economic interests³⁶. These can be accompanied by analyses of institutional factors that enact the trade-offs as well as analyses of institutional barriers and enablers for reversing the declining states.

The Partnership will develop knowledge, measures and tools to support a just transition across all blue economy sectors. It will provide solutions to include ecosystem valuation in marine management models and decision-making, to promote the harmonization of ecosystem service frameworks, and to identify and agree a set of indicators for ecosystem services that can be included under existing monitoring programmes. Actions will also enable a just and inclusive transition to more sustainable sectoral supports and subsidies, and engender social acceptance of new economic activities (e.g. aquaculture, renewable energy sites, low-impact fishing) and new circular and bio-based products. Socioeconomic analyses and transdisciplinary research into policy instruments will ensure that the right toolbox including social, legal and regulatory, and economic instruments is there to encourage and motivate different actors to initiate institutional change and market (re)formation. Identification of science-based safe and sustainable thresholds for economic operations and the social licence to operate will be prerequisites for new and continuing blue economic activities. Co-creation of knowledge, participatory, multi-stakeholder and cross-sectoral approaches are essentials for an integrated and adaptive knowledge-based ocean management. This should underpin the coherent and effective implementation of ecosystem-based management and of existing policies between different European countries, regional seas and sectors.

7.4.3 Expected results

Activities in Pillar 4 will provide the tools, information, platforms and incentives necessary to support all actors from policy, industry, R&I, and civil society to drive the just and inclusive transition. It will pave the way for increased ocean literacy in Europe and thereby a more inclusive, transparent and holistic governance of marine and coastal resources and support the effective implementation of the European Union's maritime and marine environmental legislation and policies and contribute to achieving the Agenda 2030 and European Green Deal targets.

³⁶ Austen M.C., Andersen P., Armstrong C., Döring R., Hynes S., Levrel H., Oinonen S., Ressurreição A. (2019) Valuing Marine Ecosystems - Taking into account the value of ecosystem benefits in the Blue Economy. Coopman, J., Heymans, JJ., Kellett, P., Muñiz Piniella, A., French, V., Alexander, B. [Eds.] Future Science Brief 5 of the European Marine Board, Ostend, Belgium. 32pp. ISBN: 9789492043696 ISSN: 4920-43696 DOI: 10.5281/zenodo.2602732

8. Cross-cutting enablers supporting the transition

The key enablers, described in more detail below, have been identified as necessary mechanisms to support and facilitate Partnership activities and achieve impact across all four thematic pillars. They are usually much broader than the scope of this Partnership or the blue economy. Partnership activities can also contribute to developing the quality of the key enablers.

8.1 Digitalisation

Digitalisation will enable actions across all thematic pillars of the Partnership, from providing rapid, remote and accessible data about the marine environment and maritime activities, to disruptive new technologies across all sectors. An increasingly digital society results in more consumer choices. Access to digital tools will be enabled by the Digital Ocean concept and Digital Ocean Twins will advance science and education, catalyse innovation and enable improved governance. They will also furnish society with information about our ocean, seas, coasts and have the potential to advance Ocean Literacy leading to a more informed society with a closer connection to the ocean. These technologies offer opportunities to reduce the environmental footprint and increase the sustainability and performance of existing and emerging blue economy sectors. Digitalisation further supports the creation of start-ups, SMEs, and enables existing enterprises to develop new business models, products and services.

8.2 FAIR data

Access to reliable, quality controlled and harmonized research and monitoring data, across a range of marine disciplines and human activities is fundamental to the sustainable transformation of the blue economy. Such data can support innovation, advance our understanding of marine ecosystems, assess the (cumulative) impacts of human activities, reduce costs and risks for maritime operators, inform decision making, enable good governance, and increase Ocean Literacy. The EU has strongly promoted the principle of Open Access and FAIR data, notably through the European Open Science Cloud, and is a global leader in the provision of marine and maritime data, with EMODnet (the European Marine Observation and Data network) for in-situ data and Copernicus Marine (CMEMS) for satellite data. The RRI principles, embedded into the Sustainable Blue Economy Partnership, will ensure that data from all activities correspond to the FAIR principles. These data will contribute to filling temporal, spatial and thematic data gaps, to develop a common European ocean data space and to implement the European Ocean Observing System (EOOS). As a key stakeholder in the Partnership, industry will be encouraged to contribute to the development of EOOS.

8.3 Human capacity

Human capital is a crucial factor to responsibly unlock the potential of the blue economy and create sustainable and equitable employment opportunities. There is a need to close skills gaps between the education on offer and the labour market by increasing cooperation between academia and industry. Building on relevant past and on-going initiatives and transnational cooperation, up-skilling human

resources should be linked to the four Pillars of the Sustainable Blue Economy Partnership. The enhancement of human resources can encompass: training, reskilling and up-skilling to take advantage of opportunities offered by new business models and emerging blue economy sectors; aligning higher-education curricula, designing transdisciplinary MSc and PhD programmes and short-term mobility exchanges. This can be complemented by preparing the next generation of blue economy analysts, technologists and entrepreneurs, connecting them to platforms for e-mentoring, setting up virtual incubators, and exploiting new digital technologies for training purposes.

8.4 Ocean Literacy

Creating a collective responsibility for marine environments and making the ocean, seas and coasts a common interest for citizens of Europe and beyond is critical to achieving the objectives of this Partnership. An ocean literate society contributes to better ocean stewardship, increases the possibilities for blue innovation and promotes investments in sustainable blue economy enterprises. Educating and enhancing societal understanding of the importance of ocean health and of the goods and services the seas and ocean offer to society encourages behavioural change. This leads to more responsible engagement with marine environments and marine resource consumption, which in turn further reinforces the transformation to sustainable economic practices. Citizen science and social innovation are also conducive to ocean literacy, since they increase engagement, heighten awareness of ecosystem services and human impacts and foster a sense of social responsibility. The Partnership will commit to enhanced ocean literacy and ocean engagement among European citizens to bridge the emotional gap between people and the ocean.

8.5 Infrastructures

Through alignment of investments, in-kind contributions and sharing of research infrastructure the Partnership will also contribute to optimising the use of the costly infrastructure often required for marine and maritime R&I activities. In that regard the Partnership will complement the new European Strategy Forum on Research Infrastructures (ESFRI) Roadmap planned for 2021 and its associated projects and landmarks across thematic areas. Openness and access to commercial facilities for education, testing, demonstration or technology transfer will provide science extension services and contribute to increased public awareness and societal involvement.

8.6 Social Innovation

Social innovation can result in changes of attitude, behaviour or perception, lead to new or improved ways of collaborative action and develop new institutional structures³⁷, thereby contributing to systemic change. It will be key to achieving the ‘win-win solutions’ central to the Partnership’s vision, i.e. solutions that strengthen economic development while also supporting ecosystem preservation and

³⁷ Soma K., Van den Burg S.W.K., Hoefnagel E.W.J., Stuiver M. and Van der Heide C.M. (2018) Social innovation – A future pathway for Blue growth? Marine Policy 87: 363-370 <https://doi.org/10.1016/j.marpol.2017.10.008>

restoration. It can help to identify shared value opportunities amongst different stakeholders and result in new solutions to environmental problems by providing a local context to global issues. This will be fundamental to translating over-arching R&I objectives into local solutions and will facilitate community-led innovation.

8.7 Sustainable financing

Sustainable finance has a key role to play in enabling the transition of the blue economy to sustainability. By supporting sustainable economic activities it reduces the pressures on the marine environment and its resources, taking account of social aspects and governance aspects. This will ensure increased long-term investments in sustainable projects and activities. It will also incentivise key blue economy actors to undertake the required transition to a climate-neutral, climate-resilient, resource-efficient and just blue economy. This Partnership will support EU taxonomy compliant blue economy activities and integrate into its work the sustainable blue economy finance principles. The Partnership will enable the development of sustainable blue economy projects that are EU taxonomy compliant and qualify for financing by the European Investment Bank under the Invest EU Programme.

9. Synergies with other Horizon Europe missions, partnerships and activities

The expected impacts of this Partnership (Section 5) will address Horizon Europe's area of intervention 'Seas and Ocean' which falls under the second pillar 'Global Challenges and Industrial Competitiveness'. More specifically, they should contribute to the objective of the Cluster 'Food and natural resources' of "protecting, restoring, sustainably managing and using natural and biological resources from land and sea to address food and nutrition security and the transition to a low carbon, resource efficient circular economy". In addition, the expected impacts of the Sustainable Blue Economy Partnership will also be relevant to the achievement of the objective of the Cluster 'Climate, Energy and Mobility' of "fighting climate change by better understanding its causes, evolution, risks, impacts and opportunities, and by making the energy and transport sectors more climate and environment-friendly, more efficient and competitive, smarter, safer and more resilient"³⁸.

The Sustainable Blue Economy Partnership will take into consideration the priorities identified in the strategic planning of Horizon Europe for the period 2021-2024 in cluster 5 and 6 and the work programmes that will be implemented during this period to avoid overlaps with topics implemented through regular calls.

³⁸ Annexes to the Proposal for a Regulation of the European Parliament and of the Council establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination, COM (2018) 435 final, Brussels, 7.6.2018.

The relationship to industry, in particular SMEs, will be crucial to achieving the objectives of the Sustainable Blue Economy Partnership and advancing innovations to market. To this end, the Partnership will connect with Horizon Europe's third Pillar "Innovative Europe". Of particular relevance will be the European Institute of Innovation and Technology, but also the European Innovation Council for providing equity investment to innovative start-ups and SMEs.

9.1 Missions

The EU Missions are an innovative and integral component of Horizon Europe³⁹ to better relate EU R&I to society and citizens' needs. They are described as 'commitments to solve some of the greatest challenges facing our world' and include fighting cancer, adapting to climate change, protecting our oceans, living in greener cities and ensuring soil health and food. It is envisaged that each mission will operate as a portfolio of actions, such as research projects, policy measures or even legislative initiatives, to achieve a measurable goal that could not be achieved through individual actions.

The five Missions listed in the Horizon Europe Strategic Plan are: 'Cancer', 'Adaptation to Climate Change', 'Ocean, Seas and Waters', 'Climate Neutral and Smart Cities', and 'Soil Health and Food'. While all five missions could relate to the Sustainable Blue Economy Partnership, clearly 'Ocean, Seas and Waters' will be the most relevant. At the time of developing the high-level SRIA, missions were still being implemented. Synergies could therefore not yet be identified. They will be elaborated as more information becomes available and will be considered in the development of the Partnership work programmes.

9.2 Partnerships

The Sustainable Blue Economy Partnership is one of 49 candidate partnerships⁴⁰ identified in the strategic planning for Horizon Europe. To avoid duplication of efforts, identify synergy potential and optimise resources and capacities, the Sustainable Blue Economy Partnership initiated dialogues with each of the partnerships identified during the Partnership proposal development phase as being most relevant (Figure 4).

These inter-partnership dialogues have focused on identifying areas of common interest and potential joint actions (summarised in Table 1). Dialogues will continue as the work programmes are being developed to delimit areas that can be best addressed within specific partnerships. In general where there is significant potential for overlap, for example with the Rescuing Biodiversity Partnership, this Partnership will focus more on activities that would be relevant to SMEs and industry (e.g. sensor development, ICT, impacts of maritime activities). Other partnerships, beyond those in Figure 4 were identified to be of potential relevance for specific thematic pillars of the SRIA (Table 2 in Appendix 3). They will also be considered for dialogue, complementarity and collaboration.

³⁹ https://ec.europa.eu/info/horizon-europe/missions-horizon-europe_en

⁴⁰ https://ec.europa.eu/info/horizon-europe/european-partnerships-horizon-europe_en

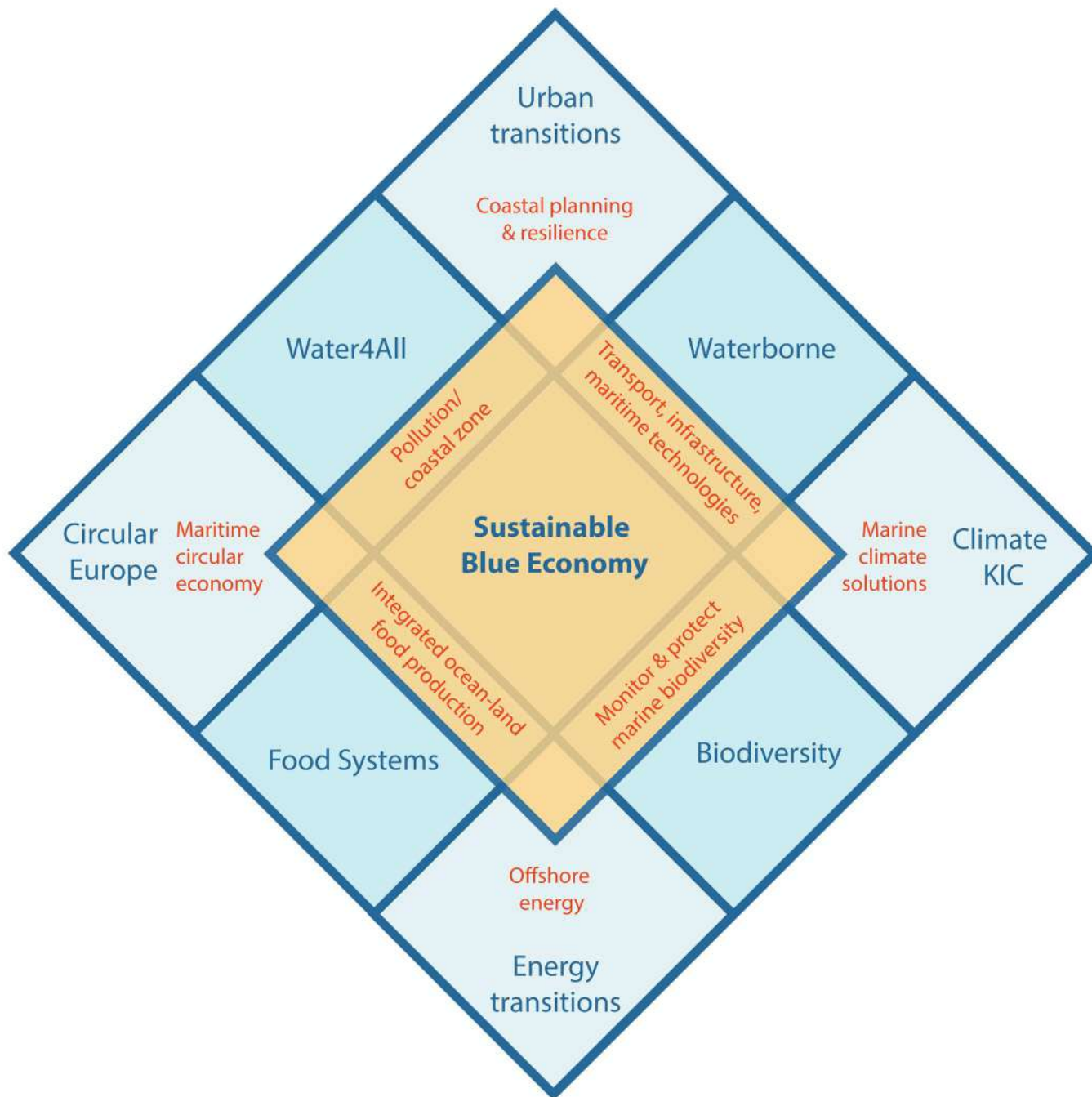


Figure 4. Complementary scopes of partnerships at the fringes of the Blue Economy Partnership and opportunities for collaboration across sectors on potential topics of shared interest (in red).

Table 1. Overview of discussions with other related partnership candidates highlighting potential areas of common interest and joint activities.

Partnership	Potential areas of common interest	Potential modes of interaction
Rescuing Biodiversity	Marine protected areas Monitoring Nature-based solutions Ocean governance Valuing ecosystem services	Joint calls Knowledge sharing and synthesis Strategic inter-partnership dialogue group
Clean Energy Transition	Blue carbon Ocean energy / offshore wind Ports & green energy supply Regulatory issues Upscaling	Ideation Joint calls Knowledge sharing Workshops
Circular Bio-based Europe	Advancing TRL levels of biotechnology and bio-based products Blue bioeconomy value chains Consumer behaviour /market uptake Local/ regional solutions Novel marine biomass	Joint match-making events Knowledge exchange Workshops
Driving Urban Transitions	Circularity, waste reduction, smart port cities Coastal urban areas Green/blue spaces Governance (coastal areas) Resilient coastal communities Social licence to operate Sustainable (and eco) coastal tourism	AGORA stakeholder dialogues Identification of challenge driven R&I Impact creation (synthesis, policy research, trainings and success cases) International outreach Knowledge hubs Models for replication & mainstreaming Urban living labs (place-based studies)
Clean Energy Transition	Blue carbon Ocean energy / offshore wind Ports & green energy supply Regulatory issues Upscaling	Ideation Joint calls Knowledge sharing Workshops
EIT Climate KIC	Innovation in port-city nexus (also marinas) Decommissioning offshore platforms Blue carbon Circularity	Stakeholder engagement (systemic thinking, workshops and online tools) Co-design and local solutions Start-up support Human capacity building and training
EIT KIC on water, marine and maritime sectors and ecosystems	To be launched in 2026	To be launched in 2026

Food systems	The Food Systems Partnership is at an earlier stage of development. Detailed dialogue will therefore take place later over the course of 2021.	
Waterborne	Ships emissions: underwater noise & ballast waters (invasive species) technological: anti-fouling coating & sustainable modernisation of the fishing fleet Digital infrastructure: digitalisation of ships (of opportunity) Safety of shipping Analog infrastructure: efficiency in logistics (trade, fuelling), risks of new fuels, technologies and infrastructures	Knowledge exchange and synthesis activities Consider bi-lateral ToR or MoU
Water4All	Desalination Governance Monitoring, observation and data collection/sharing Nature based solutions Pollution Research infrastructures Sea-level rise Valuing coastal ecosystem services in coastal areas	Demonstrations International activities Joint calls Young researchers mobility

10. Implementation modalities

The Sustainable Blue Economy Partnership should be implemented through a joint programme of activities for high impact, ranging from R&I to demonstration, coordination and networking activities connecting existing knowledge, technologies and stakeholders from the whole value chain⁴¹.

To ensure effective and impactful realisation of the Partnership, it will carry out a range of different activities of three different types:

- i. Joint calls for proposals with co-funding from the European Union**
- ii. Joint activities without co-funding from the European Union:**
 - a. Joint calls (IA/RIAs) for cross-national R&I (applying principles of variable geometry and fair return);
 - b. Joint public procurement of knowledge demands;
 - c. Knowledge Hubs, Synthesis Calls, Policy Labs, or Sandpits to address e.g., knowledge gaps and policy challenges building also on knowledge outputs from completed projects and initiatives;
 - d. Research infrastructure sharing and cooperation e.g., cooperation on collection, storage and dissemination of surveillance and monitoring data of the marine environment and ecosystems, for use by industry, academia, public bodies and wider societal actors;
 - e. Structured coordination among relevant sea basin programmes, strategies and initiatives, including relevant macro regional strategies;
 - f. Instruments aimed at a Technological Readiness Level above 6 where relevant;
 - g. EU business tools and platforms such as in the Start-up Europe initiative for stimulating innovation at local and SMEs scale, the European Investment Council (EIC) and particularly the BlueInvest Platform⁴².
- iii. Horizontal activities supporting coordination, international cooperation, engagement and outreach, uptake of results, showcase etc. to significantly increase the impact of the Partnership**

The Partnership will build on the outputs and experience of the Regional Sea's CSAs and initiatives. The range of activities envisaged could include, but is not limited to the following:

⁴¹ A detailed portfolio of activities, milestones, concrete outcomes and timeline will be further developed at a later stage in the Partnership's preparation process.

⁴² <https://webgate.ec.europa.eu/maritimeforum/en/frontpage/1451>

- a. Capacity development, including mobility and repatriation schemes (e.g. for early-career researchers and professionals), citizen science initiatives, and programmes for science-policy, advocacy, ambassadorship and ocean literacy;
- b. R&I cooperation models based on quadruple helix to involve university, industry, government and public actors;
- c. Capacity building in the blue sector through academia-industry interaction (researcher / student / company mobility), continued education schemes, thematic business-research matchmaker events;
- d. Knowledge transfer and exploitation initiatives to fully capitalise on “key exploitable results” from completed R&I projects associated with the Partnership;
- e. Exploitation of the future interregional partnerships resulting from DG REGIO 2021/2027 Interregional Innovation Investment Programme (I3)⁴³;
- f. Initiatives to overcome non-technological barriers to sustainable blue economy realisation;
- g. Living labs as a user-centred format to co-create place-based R&I with local communities for their real-life challenges;
- h. Hackathons and prize competitions to stimulate innovation on specific topics.

⁴³ Outlined in the European Commission (EC) communication ‘Strengthening Innovation in Europe’s regions’ is the reinforcement of interregional cooperation for innovation between 2021-2027. A new Interregional Innovation Investment (I3) initiative has been proposed in this context which is aimed at helping actors involved in smart specialisation strategies (S3) to cluster together, scale up and bring innovation to the European market.

12. Appendices

Appendix 1: Related strategies and initiatives

Related EU and international strategic agendas and policies within the remit of the Sustainable Blue Economy Partnership will also be considered. These include:

- Biodiversity Strategy for 2030⁴⁴
- Farm-to-Fork Strategy⁴⁵
- Circular Economy Action Plan⁴⁶
- Zero Pollution Action Plan⁴⁷
- Blue Bioeconomy Roadmap⁴⁸
- Future EU Communication on a new approach for a sustainable blue economy
- Future EU initiative on ocean observations⁴⁹
- Strategic Research Agenda for Ocean Energy⁵⁰
- Communication for an 'EU Strategy to harness the potential of offshore renewable energy for a climate neutral future'⁵¹
- Future Updated Strategic Guidelines for the sustainable development of EU aquaculture⁵²
- Strategic Research Agenda for Oceans and Human Health (OHH) in Europe⁵³ from the Seas Oceans and Public Health in Europe project
- Waterborne Strategic Agenda⁵⁴
- Global Ocean Observing System 2030 Strategy (GOOS)⁵⁵
- Recommendations by the European Aquaculture Technology and Innovation Platform (EATiP)⁵⁶, and the European Fisheries and Aquaculture Research Organisations (EFARO)⁵⁷

Moreover, the Report from the Commission to the European Parliament and the Council on the implementation of the Marine Strategy Framework Directive⁵⁸ and the International Ocean

⁴⁴ https://ec.europa.eu/environment/strategy/biodiversity-strategy-2030_en

⁴⁵ https://ec.europa.eu/food/farm2fork_en

⁴⁶ https://ec.europa.eu/environment/circular-economy/pdf/new_circular_economy_action_plan.pdf

⁴⁷ https://ec.europa.eu/environment/strategy/zero-pollution-action-plan_fr

⁴⁸ <https://webgate.ec.europa.eu/maritimeforum/en/node/4448>

⁴⁹ See the Inception Impact Assessment and public consultation on this initiative on ocean observation:

<https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12539-Ocean-Observation>

⁵⁰ https://www.oceanenergy-europe.eu/wp-content/uploads/2017/03/TPOcean-Strategic_Research_Agenda_Nov2016.pdf

⁵¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2020:741:FIN>

⁵² <https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12261-Strategic-Guidelines-for-EU-aquaculture-update>

⁵³ <https://sophie2020.eu/strategic-research-agenda/>

⁵⁴ https://www.waterborne.eu/images/pdf/190121-waterborne_sra_web_final.pdf

⁵⁵ https://www.goosocean.org/index.php?option=com_content&view=article&id=168:goos-2030-strategy&catid=22&Itemid=207

⁵⁶ <https://eatip.eu/>

⁵⁷ <https://efaro.eu/>

⁵⁸ Report from the Commission to the Council and the European Parliament, The first phase of implementation of the Marine Strategy Framework Directive (2008/56/EC) The European Commission's assessment and guidance, COM/2014/097 final. Available at:

<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52014DC0097>

Governance⁵⁹ work by the European Commission can also provide relevant inputs. Finally, the four Regional Sea Conventions in Europe (OSPAR, HELCOM, Barcelona Convention/UNEP MAP and the Black Sea Commission) and the International Council for the Exploration of the Sea (ICES) function as platforms for collaboration between EU and non-EU member states for sustainable use and protection of marine ecosystems. They contribute to coherent implementation of the MSFD and will be key stakeholders of the Partnership.

⁵⁹ https://ec.europa.eu/maritimeaffairs/policy/ocean-governance_en

Appendix 2: Elaboration of intervention logic to achieve Partnership objectives

As outlined in Section 4 the general objectives are centred on **frameworks, tools, solutions** and **integration**, as identified in the draft proposal for the Sustainable Blue Economy Partnership⁶⁰. These are elaborated below together with further detail on each objective and the accompanying intervention logic:

1) “Integration” - To promote interlinked approaches and systemic thinking for integrated information for the blue economy transition

This includes an agenda for co-design and co-production, transfer of both existing and new knowledge, sharing of resources, infrastructures, expertise and experience across sectors, and collaboration on cross-domain challenges and solutions between land- and sea-based sectors, between ocean and climate, and across all water resources.

2) “Solutions” - To stimulate innovation through science-informed solutions

These include solutions for societal demands by stimulating innovation in the blue economy and unlocking, demonstrating and enabling sustainable harvesting and production and sustainable, circular and regenerative use of Europe’s ocean and seas’ resources in key sectors such as food and nutrition, recreation and health, bio-based products, renewable energy, transport, technology, climate mitigation and adaptation, and others.

3) “Tools” - To offer tools and information to enable climate neutrality and sustainability of blue economy activities

These include policy guidance, monitoring and scientific information and approaches to achieve Good Environmental Status, applying the Ecosystem Approach to Management (EAM) and establishing MSP in all EU waters. These tools will allow forecasting of climate change effects, provide information on the marine carbon cycle, such as carbon leakage and storage of blue carbon, and early warning for various risk factors, new skills development, as well as provide expert knowledge and information, and data access, on smart water management, sustainable aquaculture systems, restoration and other nature-based methods, and several other aspects at the interface of economy and ecology. Information Communication and Technology (ICT) tools such as predictive analytics, artificial intelligence big data, cloud and edge computing, simulations, machine-learning, data visualisation, and digital-twins will support the underlying methodology.

⁶⁰ https://ec.europa.eu/info/sites/info/files/research_and_innovation/funding/documents/ec_rtd_he-partnership-climate-neutral-sustainable-productive-blue-economy.pdf

4) *“Frameworks” - To ensure supportive framework conditions for the blue economy to thrive in a climate-neutral and sustainable way*

These include supporting the implementation of relevant EU regulations and policies, EU sea basin strategies, EU macroregional strategies and the proposed Horizon Europe Mission Areas, in particular the Mission ‘Ocean, Seas and Waters’, as well as regional and international conventions and global initiatives. This will contribute to a strengthened ocean governance, but also ethics for the responsible use of seas and ocean, as well as societal awareness and ocean literacy on the potential and challenges of the blue economy, sustainable finance, multi-use of seas, and synergies and trade-offs between interlinked economic sectors and environmental health aspects.

Overview of the aims of general objective A *‘Alignment of priorities and investments across Europe’* and an illustrated summary of the intervention logic based on thematic objectives, inputs, activities and outputs

We aim for a powerful alignment and structuring among the EU’s, MS’s and AC’s R&I priorities, corresponding strategies and initiatives, resource allocations, activities, funding instruments and programmes in blue economy domains where R&I needs converge across Europe, regional sea basin areas and international partners.

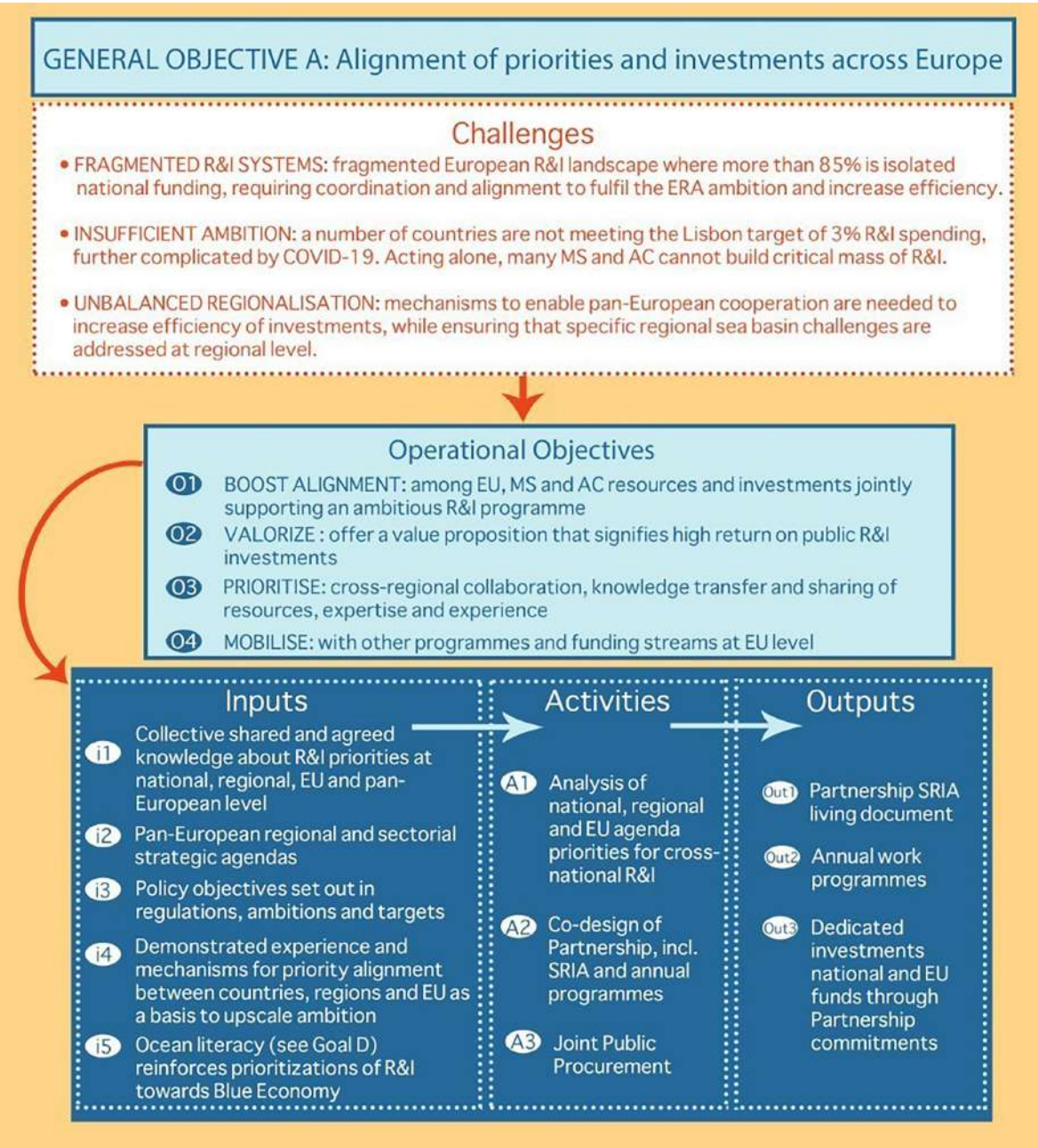


Figure 5: Schematic illustration of intervention logic for general objective A (taken from the draft proposal for the Sustainable Blue Economy Partnership).

Overview of the aims of general objective B ‘*Cooperation across socioeconomic sectors and disciplines*’ and an illustrated summary of the intervention logic based on thematic objectives, inputs, activities and outputs

We aim for a pan-European and international R&I cooperation at an unprecedented level of integration that includes all relevant socioeconomic sectors and cultures from industry to education and science diplomacy. The community involved is open and growing, inclusive of international partners, in particular those bordering Europe’s seas and oceans.

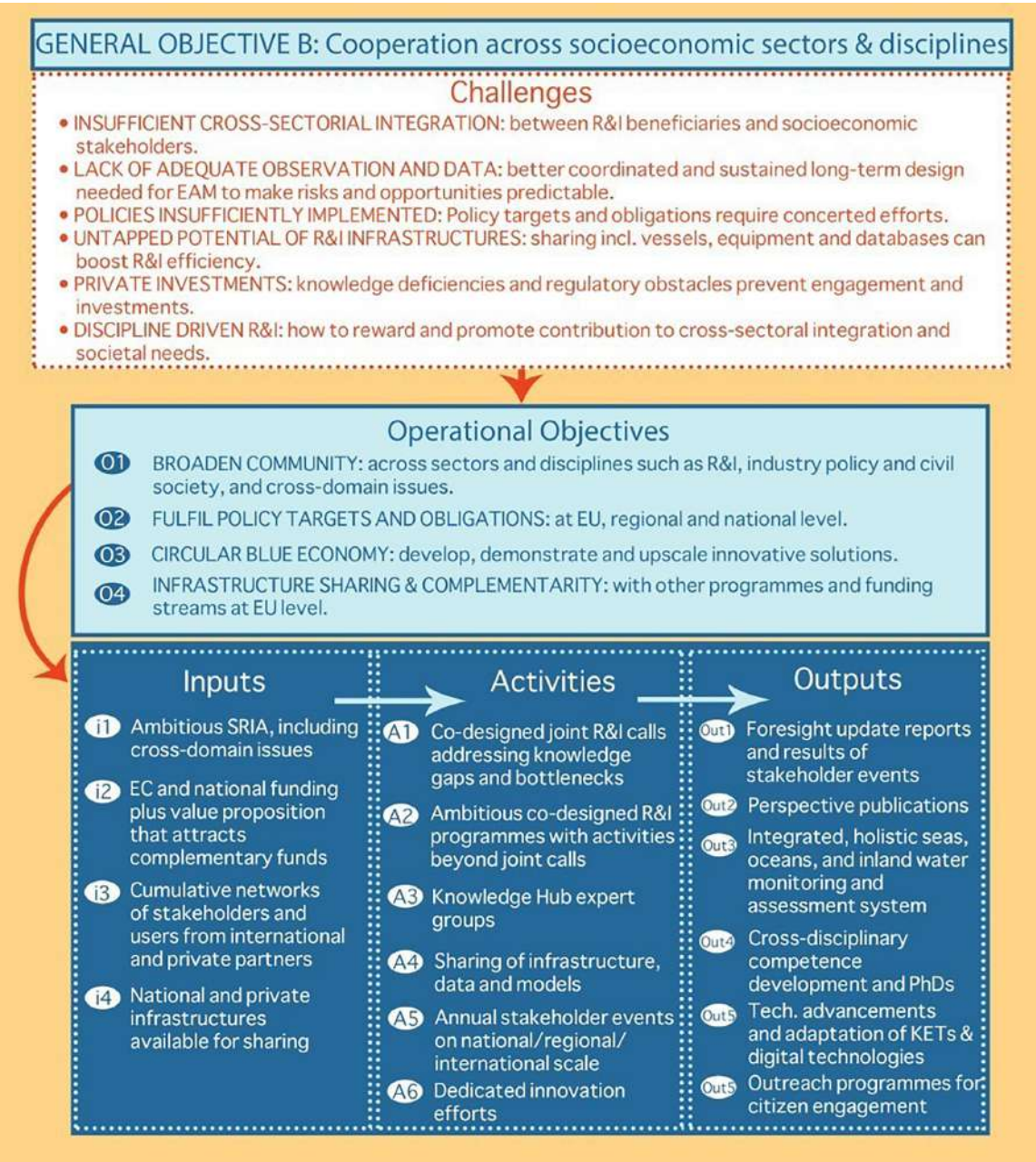


Figure 6: Schematic illustration of intervention logic for general objective B (taken from the draft proposal for the Sustainable Blue Economy Partnership).

Overview of the aims of general objective C 'Provision of knowledge for a "green" development of the blue economy' and an illustrated summary of the intervention logic based on thematic objectives, inputs, activities and outputs.

We aim to generate of a strong evidence-base of knowledge, information and know-how to pursue sound policymaking and foresight capacities to anticipate challenges and new opportunities, regulatory framework, sustainable and restorative blue economy business opportunities and solution generation. This will contribute to enhancing and increasing natural capital, and to unlock, demonstrate and enable sustainable and responsible use of the full socioeconomic potential, within the boundaries of healthy and resilient ecosystems of seas and ocean.

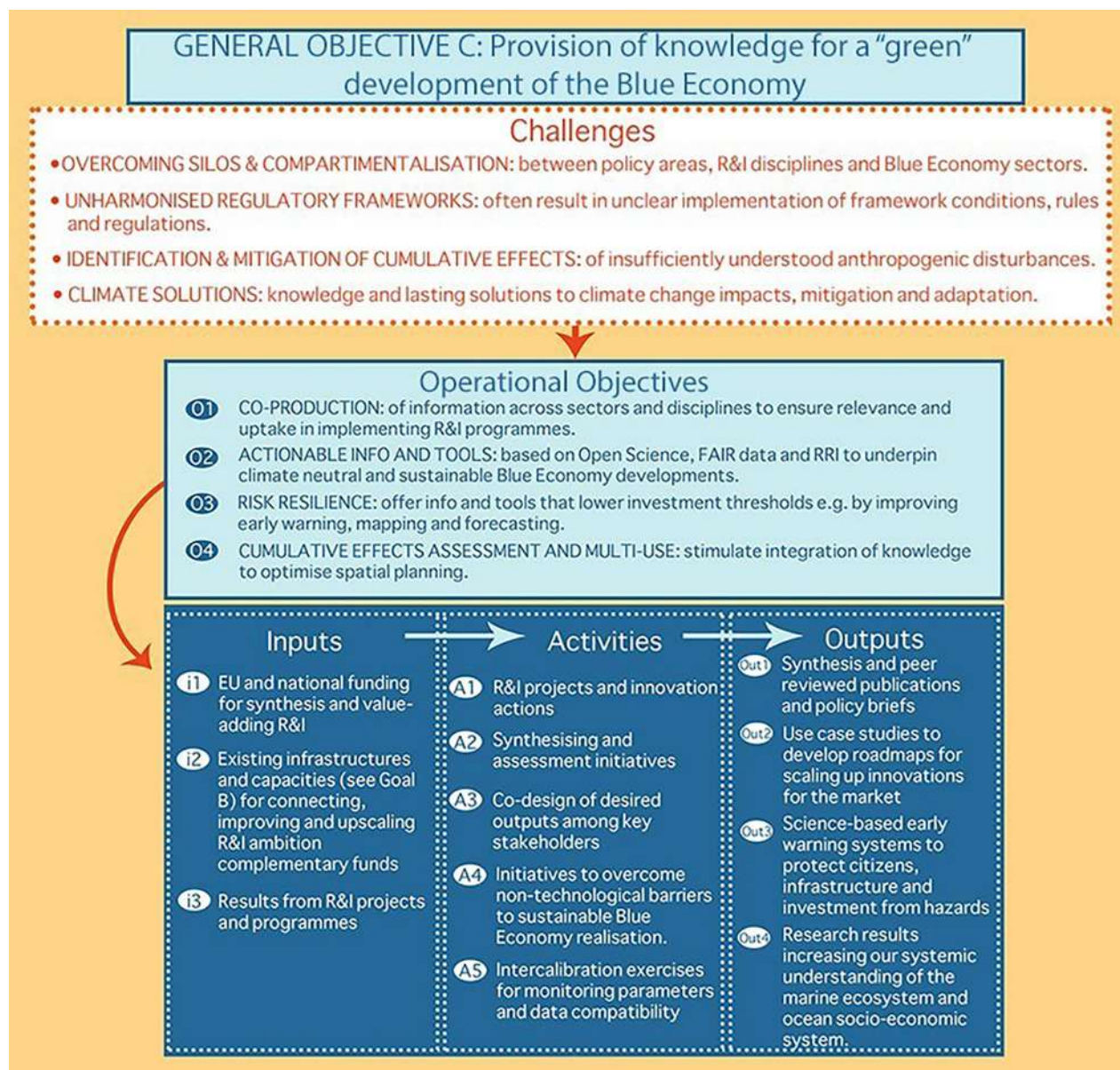


Figure 7: Schematic illustration of intervention logic for general objective C (taken from the draft proposal for the Sustainable Blue Economy Partnership).

Overview of the aims of general objective D, '*Transformation to an evidence and knowledge based blue economy*' and an illustrated summary of the intervention logic based on thematic objectives, inputs, activities and outputs.

We aim to facilitate rapid progress over the next decade towards transitioning to a blue economy that by mid-century is climate neutral, ecologically sustainable, competitive and productive to improve ocean's health and people's well-being and reduce risks to nature. This will facilitate job and value creation, as well as biodiversity conservation and restoration. It will also support compliance with legal and policy requirements under the Integrated Maritime Policy, the MSFD, the WFD and the MSP Directive and contribute to EU strategic priorities (including the European Green Deal, Digital Europe, Cohesion Policy, Circular Economy Action Plan, Zero Pollution ambition and the Bioeconomy, Farm to Fork Strategy and Biodiversity Strategies) and to the UN 2030 Agenda and associated 17 SDGs, and in particular SDG 14 'Life under water'.

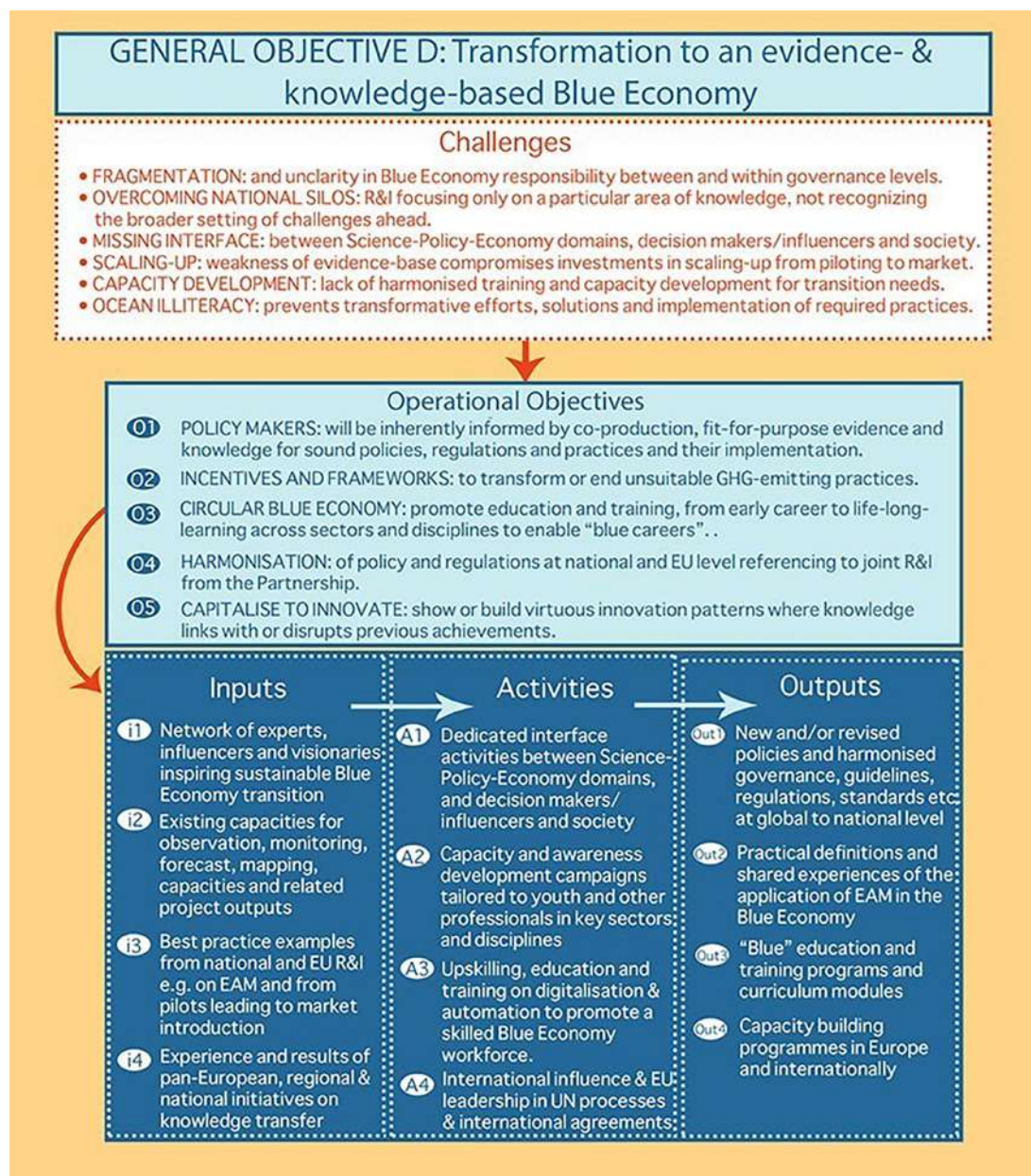


Figure 8: Schematic illustration of intervention logic for general objective D (taken from the draft proposal for the Sustainable Blue Economy Partnership).

Appendix 3 Schematic overview of the elements of the Sustainable Blue Economy Partnership SRIA

Table 2. Overview of the four thematic pillars of the Sustainable Blue Economy Partnership SRIA, their specific R&I objectives and key enablers, highlighting also linkages to relevant Horizon Europe activities and other initiatives.

THEMATIC PILLARS			
1 A blue economy in harmony with nature	2 Blue economy solutions towards climate neutrality	3 A thriving blue economy for the people	4 Integrated and responsible ocean governance
How can the blue economy contribute to the sustainable use, protection and regeneration of marine ecosystems?	How can the blue economy contribute to climate resilience and climate neutrality by 2050?	How can the blue economy contribute to people's health, well-being and prosperity in a sustainable, resilient and equitable way?	How can knowledge-based, inclusive, integrated and responsible ocean governance ⁶¹ support the transformation towards a sustainable blue economy?
Research and Innovation Objectives			
A. Economic development within environmental boundaries i. Enabling Good Environmental Status by characterising ocean health and cumulative impacts of blue economy activities	A. Zero and negative carbon emissions i. Underpinning innovation to upscale renewable ocean energy	A. Sustainable, accessible and safe food, feed and bioproducts i. Developing new and optimising existing blue	A. Co-created innovative and knowledge-responsive governance at appropriate geographic scale i. Aligning and advancing scientific and regulatory,

⁶¹ The term ocean governance in this document refers to governance at multi-levels

from catchment to the deep sea ii. Protecting, monitoring and restoring ecosystem resilience and marine biodiversity considering also nature-based solutions iii. Understanding and quantifying the ecosystem responses to effects of natural and economic processes that differentiate basin systems from each-other B. Reduction of pollution and other forms of disturbance of the marine ecosystem. i. Providing innovative technological, circular and nature-based solutions for prevention and remediation of ecosystem disturbance and pollution including eutrophication, hazardous substances, litter and underwater noise ii. Designing economic practices that reconcile the conservation and restoration of habitats with their sustainable use	ii. Fostering the carbon sequestration capacity of coastal and marine environments ('blue carbon') and preventing carbon seepage to the atmosphere B. Purpose-driven technological innovations transforming blue economy sectors to climate neutrality i. Developing sustainable and cost-efficient solutions for construction, maintenance, reuse and multi-use of off-shore platforms ii. Designing green and smart ports, marinas and transport links iii. Enabling novel materials and technologies for sustainable manufacturing and product life cycle management iv. Contributing to innovative and sustainable concepts for ships and recreational boating C. Climate resilience of coastal socioeconomic and marine ecological systems	bioeconomy and biotechnology value chains ii. Reducing and valorising waste, promoting circularity and ensuring safe, healthy, affordable and traceable products iii. Innovating sustainable seafood production systems, including offshore, closed, low- and multi-trophic aquaculture and low impact sustainable fisheries B. Resilient, sustainable and safe coastal communities i. Fostering innovation, circularity and job creation in coastal communities through a fair, just and inclusive transition ii. Exploring economic opportunities of innovative and sustainable concepts for marine and coastal tourism sectors iii. Reducing disaster risk for coastal communities and sectors through strengthened resilience and preparedness to climatic,	environmental and local knowledge towards new opportunities in the blue economy ii. Identifying trade-offs and synergies and balancing conflicting economic and societal interests iii. Exploring models of effective, responsive and integrated governance systems for European, national and local levels iv. Creating intelligent digital support systems for environmental decision-making, and reduction of uncertainties for maritime businesses B. Operationalisation of the 'Ecosystem Approach to Management' in the Blue Economy i. Contributing knowledge to achieve coherence in policy implementation, including transboundary contexts, across sea-basins, between countries, between terrestrial, coastal and
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iii. Scientifically underpinning criteria for the responsible use of non-living marine resources (e.g. sand, gravel, minerals), including from the deep sea C. Sustained observation, monitoring and digitalisation of seas and oceans i. Advancing the Digital Ocean concept and developing digital twins for the comprehension of marine ecosystems ii. Achieving more effective and biologically relevant monitoring, surveying and sampling	i. Developing nature-based solutions to improve responsiveness to natural disasters, increase natural capital and restore ecosystems ii. Quantifying at regional-scale, and across basins, the impacts of climate change (acidification, sea-level rise, deoxygenation, ocean warmings and other stressors) to strengthen ocean and coastal resilience	geological and anthropogenic hazards C. Equitable health and well-being i. Investigating the benefits of blue spaces in enhancing human health ii. Reducing human health risks from marine borne pathogens, toxins and toxicants iii. Using biodiscovery to develop applications for human-health and well-being D. A safe marine environment and blue economy i. Realising safe and cost-effective offshore operations ii. Advancing technologies for autonomous processes and navigation iii. Advancing strategies to minimise risk from novel maritime technologies iv. Contributing to efficient maritime surveillance	marine/maritime policies, and across sectors ii. Delivering data and scientific knowledge for coherent area-based management including Marine Protected Areas, Maritime Spatial Planning and multi-use of marine space iii. Developing operational assessment frameworks to evaluate the status of the marine environment and sustainability of human uses C. Behavioural and structural socio-economic analysis in support of social innovation and social licence to operate for the blue economy i. Supporting a just transition of all blue economy sectors ii. Informing the reform of ocean-related subsidies iii. Investigating and valuing ecosystem services for strategic and economic decision-making
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Key Enablers

Digitalisation
 FAIR data
 Infrastructures
 Ocean literacy
 Social innovation
 Sustainable finance
 Human capacity

Links to EU policy/ legislation

- EU Green Deal - Shaping Europe's Digital Future - EU Biodiversity Strategy for 2030 - Farm to Fork Strategy - EU Chemicals Strategy for Sustainability - Zero Pollution Action Plan for Air, Water and Soil - The EU Strategy for Plastics and the Circular Economy Action Plan - Single-Use Plastics Directive - Birds and Habitats Directives - Marine Strategy Framework Directive - Maritime Spatial Planning Directive - Common Fisheries Policy - Water Framework Directive and related directives	- EU Green Deal - Shaping Europe's Digital Future - Strategy for Sustainable and Smart Mobility - Offshore Renewable Energy Strategy - EU Climate Law - EU Adaptation Strategy - Marine Strategy Framework Directive - Birds and Habitats Directives - Maritime Spatial Planning Directive - Recommendation on Integrated Coastal Zone Management - EU Biodiversity Strategy for 2030 - Farm to Fork Strategy	- EU Green Deal - Shaping Europe's Digital Future - Farm to Fork Strategy - Common Fisheries Policy - Birds and Habitats Directives - EU Bioeconomy Strategy - EU Biodiversity Strategy for 2030 - European Agenda for Tourism 2050 - Marine Strategy Framework Directive - Maritime Spatial Planning Directive - Recommendation on Integrated Coastal Zone Management,	- International Ocean Governance Agenda - EU Green Deal - Shaping Europe's Digital Future - European Strategy for Data - Regulation on European data governance (Data Governance Act) - Space regulation - European Education Area - Maritime Spatial Planning Directive - Recommendation on Integrated Coastal Zone Management, - Marine Strategy Framework Directive - Widening 2.0 strategy
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- Common Agricultural Policy - Recommendation on Integrated Coastal Zone Management - Widening 2.0 strategy - Port Reception Facilities Directive	- Common Fisheries Policy - Widening 2.0 strategy	- Mapping and Assessment of Ecosystem Services and Natural Capital Accounting - Widening 2.0 strategy - Sustainable finance taxonomy – Regulation (EU) 2020/852	- Common Fisheries Policy - Water Framework Directive and related directives - EU Cohesion Policy
Links to other partnerships/initiatives			
- Rescuing Biodiversity Partnership - Water4All Partnership - European Partnership for Chemicals Risk Assessment - EIT Raw materials-KIC	- Zero Emission Waterborne Transport Partnership - Clean Energy Transition Partnership - EIT Climate-KIC - European Partnership Innovative SMEs - Hydrogen Partnership - Water4All Partnership	- Animal Health Partnership - Safe and Sustainable Food System Partnership - European Partnership for a Circular bio-based Europe - EIT Health-KIC - EIT Food-KIC - European Partnership Innovative SMEs	- EIT Digital-KIC - Open Science Cloud Partnership - Rescuing Biodiversity Partnership - Water4all Partnership
Links to the future Horizon Europe Missions⁶²			
Ocean, Seas and Waters Adaptation to Climate Change Soil Health and Food	Ocean, Seas and Waters Adaptation to Climate Change Climate Neutral and Smart Cities	Ocean, Seas and Waters Adaptation to Climate Change Cancer Climate Neutral and Smart Cities Soil Health and Food	Ocean, Seas and Waters Adaptation to Climate Change Climate Neutral and Smart Cities Soil Health and Food

⁶² Official Mission names in the Horizon Europe strategic Plan

Links to funding streams

Possible funding streams (non-exhaustive list):

- Horizon Europe
- European Maritime, Fisheries and Aquaculture Fund
- BlueInvest Fund
- Relevant ERA-NET CoFunds (e.g. BlueBio)
- InvestEU
- LIFE Programme
- NextGenerationEU and RRF
- European Regional Development Fund
- Cohesion Fund
- INTERREG
- Interregional Innovation Investment initiative
- Just Transition Fund
- National funds
- Private investments

The Sustainable Blue Economy Partnership will only cover EU Taxonomy-aligned activities⁶³

⁶³ https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en

Appendix 4 List of abbreviations and acronyms

AANCHOR	All Atlantic Cooperation for Ocean Research and Innovation
AORA CSA	Atlantic Ocean Research Alliance Coordination and Support Action
BANOS	Baltic and the North Sea
BANOS CSA	The Baltic and North Sea Coordination and Support Action
BLUEMED	Research and Innovation Initiative for blue jobs and growth in the Mediterranean Sea
CMEMS	Copernicus Marine Environmental Monitoring Service
COPERNICUS	European Union's Earth Observation programme
COVID 19	Coronavirus Infectious Disease 2019
CSA	Coordination and support actions
DG RTD	Directorate-General for Research and Innovation
EAM	Ecosystem Approach to Management
EATiP	European Aquaculture Technology & Innovation Platform
EC	European Commission
EIC	European Investment Council
EIT	European Institute for Innovation and Technology
EMODnet	European Marine Observation and Data Network
EOOS	European Ocean Observing System
ERA	European Research Area
ERA-NET	European Research Area Net
ESFRI	European Strategy Forum on Research Infrastructures
EU	European Union
FAIR Data	Findable Accessible Interoperable Reusable Data
GES	Good Environmental Status
GOOS	Global Ocean Observing System
GEOSS	Global Earth Observation System of Systems
HELCOM	Helsinki Commission - Baltic Marine Environment Protection Commission
IA	Innovation Action
ICES	International Council for the Exploration of the Sea
ICT	Information and Communications Technology
IMP	Integrated Maritime Policy
IOC-UNESCO	Intergovernmental Oceanographic Commission of UNESCO
JPI	Joint Programming Initiative
JPI Oceans	Joint Programming Initiative Healthy and Productive Seas and Oceans
KIC	Knowledge and Innovation Community
KPI	Key Performance Indicator
MarTERA	Maritime and Marine Technologies for a new ERA
MPA	Marine Protected Areas
MSFD	Marine Strategy Framework Directive
MS	Member States

MSP	Maritime Spatial Planning
ODT	Ocean Digital Twins
OECD	Organisation for Economic Co-operation and Development
OSPAR	Protection of the Marine Environment of the North-East Atlantic
RSC	Regional Sea Conventions
R&I	Research and Innovation
RRI	Responsible Research and Innovation
SDG	Sustainable Development Goal
SME	Small and Medium-sized Enterprise
SOPHIE	Seas, Oceans & Public Health in Europe
SRIA	Strategic Research and Innovation Agenda
TRL	Technology Readiness Level
UN	United Nations
UNEP MAP	United Nations Environment Programme Mediterranean Action Plan
UNESCO	United Nations Educational, Scientific and Cultural Organization
WFD	Water Framework Directive

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