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DELIVERABLE 1.3.2
CO-DESIGNING AND FINETUNING OF SOLUTIONS FOR ACCELERATION OF BBT TRANSFER IN BLUE ECONOMY SECTORS

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Deliverable ID

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Abbrevations

BP	Best Practices
BBt	Blue Biotechnology
BBH	Blue Biotechnology Hub
DS	Demonstration Site
EU	European Union
GD	Green Deal
GES	Good Environmental Status
IMTA	Integrated Multi-Trophic Aquaculture
IoT	Internet of Things
KERs	Key Exploitable Results
KPIs	Key Performance Indicators
LTA	Low Trophic Aquaculture
MedBBHub	Mediterranean Blue Biotechnology Hub
NBS	Nature-Based Solutions
PI	Performance Indicators
PPPs	Public-Private Partnerships
R&I	Research and Innovation
S3	Smart Specialization Strategies
SMEs	Small and Medium-sized Enterprises
T-Labs	Transformative Lab
WP	Work Package

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About 2B-BLUE project

The Blue Biotechnology (BBt) sector can have a significant impact on the environment, human wellbeing and economic growth, however in the Mediterranean basin it is currently in its infancy. B-Blue project has built a preliminary network of actors related to BBt and analysed best practices (BP), key drivers, barriers and readiness factors of EuroMed companies for adopting blue biotechnologies, concluding with the most promising value chains for EuroMed area. The project allowed the establishment of 5 interactive Blue Biotechnology Hubs (BBHubs) to facilitate collaborations, knowledge transfer and spill-over effects to spur innovation and business within the marine biotechnology value chains and address the challenges detected. At once, a digital community has been developed, using an ICT tool called B-Blue Matchmaking Tool, to support new joint initiatives.

Moreover, the MedIA – Mediterranean Innovation Alliance for Sustainable Blue Bioeconomy – has been set-up in collaboration with BlueBioMed and 2 specific collaborative working groups on BBt. 2B-BLUE aims to capitalize on B-Blue positive results to:

Exemplify evidence-based BP identified to help communities turn BBt research into practice,

- Build national demonstration sites (DS) to experiment emerging technologies or practices in local field conditions and bridge the gap among BBt research and industry for new technologies adaptation while help improve marine environment,
- Establish strategic alliances of 5-helix stakeholders for the uptake of advanced blue biotechnologies by Med industries with the help of Transformative Labs (T-Labs) and
- Improve regional policies for enhancing sustainability, research and innovation capacities in in emerging value chains of BBt in the Euro-Med area (Figure 1).

Thus, the main challenges detected in the B-Blue work – most related to funding, normative, public and private collaboration – can be transformed into opportunities in 2B-BLUE and result in more sustainable and efficient practices as well as better structuring of the BBt sector in the Mediterranean.

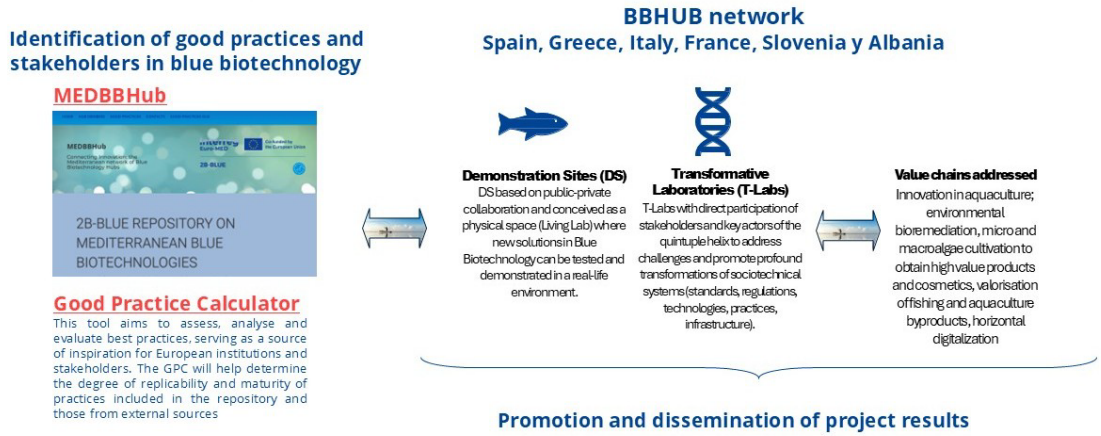

Figure 1. General overview of 2B-BLUE methodology and solutions for acceleration of BBt transfer in blue economy sectors

1. Executive summary

The 2B-BLUE project is designed to accelerate the adoption and transfer of Blue Biotechnology (BBt) solutions across the Mediterranean, ensuring that innovations transition effectively from research to industry. Recognizing the sector's vast potential in areas such as marine bioremediation, sustainable aquaculture, bio-based industries, and carbon sequestration, the project addresses the key barriers that have historically slowed the integration of BBt into blue economy sectors. These challenges include technological and financial constraints, regulatory fragmentation, and the need for effective knowledge transfer mechanisms.

To overcome these barriers, 2B-BLUE has established an integrated framework centred around Demonstration Sites (DS), Blue Biotechnology Hubs (BBHs), and Transformation Labs (T-Labs). These mechanisms serve as testing grounds, collaboration platforms, and innovation accelerators, ensuring that BBt applications are refined, validated, and of BBt aligned with industry and policy needs. DSs allow for real-world testing of pilot actions, enabling the collection of Key Performance Indicators (KPIs) to assess the technical, economic, environmental, and social impact of each BBt innovation. Meanwhile, T-Labs bring together key stakeholders, including researchers, industry representatives, policymakers, and civil society actors, fostering an environment of continuous learning, adaptation, and co-creation.

A crucial outcome of the project has been the identification and deployment of pilot actions that target high-priority BBt applications. These include macroalgae-based bioremediation, Integrated Multi-Trophic Aquaculture (IMTA), carbon footprint tokenization, and biorefinery models. Each pilot is evaluated using a structured set of KPIs, ensuring that solutions are not only scientifically viable but also financially sustainable and environmentally beneficial. The alignment of BBt solutions with regional market needs and sustainability goals is a key priority, ensuring that pilot outcomes can be scaled and transferred across different blue economy sectors.

To support the long-term success and scaling of BBt solutions, 2B-BLUE emphasizes a set of strategic actions aimed at bridging the gap between policy frameworks, financial mechanisms, and industry adoption. These efforts include harmonizing regulations to facilitate market entry, fostering knowledge transfer through specialized training programs, expanding industry partnerships via Joint Research Units (JRUs), and creating circular business models that attract sustainable investment. Additionally, the project highlights the importance of dedicated financial instruments, such as EU-backed venture capital funds and risk-sharing programs, to help BBt enterprises move from pilot validation to large-scale deployment.

By integrating policy support, targeted investments, cutting-edge technologies and structured implementation strategies, 2B-BLUE ensures that BBt innovations transition smoothly into real-world applications. The project's collaborative approach, facilitated through DSs and T-Labs, not only accelerates the commercialization of BBt solutions but also reinforces the Mediterranean's leadership in sustainable blue biotechnology. Ultimately, 2B-BLUE is laying the foundation for a resilient, innovation-driven blue bioeconomy, one that balances economic growth with environmental sustainability and secures long-term prosperity for the region's marine-based industries.

This deliverable consolidates the key findings of the previous deliverables - D1.2.1 Preliminary study to fine-tune BBt pilot activities and D1.3.1 Definition of challenges to be addressed - in section 2; and defines the toolkit of solutions to accelerate BBt transfer to blue economy sectors in section 4.

D.1.3.2 is also aligned with Output 1.1 Co-designing and fine-tuning of solutions for the acceleration of blue biotechnology transfer in target blue economy sectors of Mediterranean area, as it gathers structured information from consultations with key actors and organisations belonging to the BBHs. Partners representing each country (6) contributed to the common methodology described in section 3 by compiling key policies, financial channels, innovative technologies and a list of actions that favour the sustainable implementation of BBt in their respective contexts.

2. Key challenges in the BBt innovation and transfer

The transfer of BBt from research to commercialization faces significant hurdles spanning scientific, technological, regulatory, economic, and sustainability barriers. While marine biotechnology presents vast opportunities for pharmaceuticals, food, and bio-based industries, **knowledge gaps and technological constraints** hinder its full potential. More than 90% of marine species remain unidentified, making bioprospecting unpredictable and complex. This knowledge gap limits the discovery of novel bioactive compounds essential for high-value industries. Addressing these challenges requires advancements in high-throughput screening, omics technologies, and bioinformatics.

The extreme and intricate nature of marine environments poses additional technological hurdles in exploration, sampling, and cultivation. Overcoming these requires **interdisciplinary collaboration and innovative methodologies**. The integration of synthetic biology, pharmacological analysis, and bioinformatics remains in its infancy. While crucial for advancing research, these technologies face technical complexities, scalability issues, and high investment costs. The industrialization of marine biotechnology also encounters **commercialization barriers**, particularly in optimizing cultivation, harvesting, and extraction processes. Direct harvesting of marine bio-active compounds is often ecologically damaging and unsustainable, necessitating alternative production methods such as aquaculture, enzymatic synthesis, and biorefineries. However, scaling up production is costly and logistically challenging due to **regulatory constraints**.

A key obstacle in BBt transfer is the **intricate web of international and national regulations governing marine resources**. Compliance with frameworks such as the Nagoya Protocol (NP) and Access and Benefit-Sharing (ABS) agreements creates legal uncertainties, increasing administrative burdens for researchers and businesses. **Fragmented policies** across different countries hinder seamless technology transfer, discouraging investment and slowing down innovation adoption. Moreover, awareness of ethical and legal frameworks, including Responsible Research and Innovation (RRI) principles and intellectual property rights (IPR), remains low among researchers and industry players, further complicating commercialization.

The high costs associated with marine bioprospecting, development, and scaling up production create **financial barriers to commercialization**. Extracting and refining marine-based compounds is

often more expensive than synthetic or terrestrial alternatives, leading to high financial risks that deter private investment. Public funding, such as Horizon Europe initiatives, plays a crucial role in supporting research, but greater industry engagement and investment incentives are needed to bridge the gap between research and market viability.

Even when marine-derived bioproducts are successfully developed, **market adoption** remains a challenge. Competition with well-established products, consumer scepticism, and regulatory requirements hinder penetration into mainstream industries. Many marine bioactive compounds struggle to compete with synthetic alternatives due to pricing, availability, and complex approval processes. Additionally, the fragmented nature of the blue biotech industry, dominated by small and medium enterprises (SMEs), makes achieving economies of scale and consistent supply chains difficult.

Sustainability concerns also play a critical role in hindering BBt transfer. Environmental variability, high energy consumption, and the need to reduce organic waste and toxic solvents complicate the development of economically viable production systems. A **circular bioeconomy approach**—integrating industrial symbiosis and waste valorisation—offers potential solutions. Initiatives such as valorising aquaculture and fisheries by-products, implementing integrated multi-trophic aquaculture (IMTA), and developing algae-based value chains present promising avenues for sustainable marine biotechnology applications.

2.1. Bridging the Gap: Innovation and Strategic Approaches

Statistical analysis of scientific literature and high-TRL European projects shows that while biochemical and molecular characterization remains dominant in marine biotechnology, omics technologies, pharmacological analysis, and bioinformatics have grown significantly, particularly for drug discovery. To bridge the gap between research and commercialization, efforts must shift **from early-stage discovery to process optimization in cultivation, harvesting, and extraction**. These technologies, alongside recombinant DNA techniques, are essential for enabling large-scale, cost-effective, and sustainable production of marine bioactive compounds.

The **quintuple helix model**—collaboration among government, industry, academia, civil society and environmental agencies/NGOs/CSOs —is increasingly recognized as a key enabler for overcoming barriers in marine biotechnology transfer. Strengthening **public-private partnerships**, fostering **interdisciplinary collaborations**, and **harmonizing policies** across jurisdictions are essential steps for **bridging the gap between scientific discovery and industrial scalability**. National and regional **blue biotechnology hubs**, such as those in the Mediterranean region, serve as innovation ecosystems that facilitate knowledge exchange, technology transfer, and stakeholder engagement. These hubs provide essential infrastructure, funding mechanisms, and regulatory guidance, fostering a more coordinated approach to marine biotechnology development.

A review of European-funded projects indicates that high-TRL business models have successfully focused on nutraceuticals and functional foods, leveraging consumer demand for health-enhancing natural products. The development of **innovative cultivation systems**, such as photobioreactors and sustainable aquaculture solutions, is emerging as a market-driven approach integrating

sustainability with economic viability. While marine pharmaceuticals remain a high-value segment, regulatory barriers and long development timelines make nutraceuticals and functional foods more attractive for commercialization.

2.2. Addressing Challenges in Marine Biotechnology Transfer

Marine biotechnology holds significant potential to address global challenges in health, food security, and sustainable energy. However, regulatory complexities, financial constraints, technological limitations, and sustainability concerns continue to hinder its full-scale industrial application. Addressing these challenges requires **strategic interventions through policy frameworks, financial mechanisms, and international collaboration**.

Regulatory barriers remain one of the most significant hurdles. The variability in national legislation regarding marine genetic resources creates legal uncertainties for researchers and companies, as seen in the fragmented implementation of the NP. Additionally, the absence of **specialized regulatory agencies** in many countries leads to inconsistencies in risk assessments and product approvals. Ethical concerns and regulatory complexities further discourage investment, emphasizing the need for **training and awareness programs on RRI principles**.

To streamline regulatory processes, efforts should focus on harmonizing global and regional regulations, establishing cross-border frameworks, and integrating RRI principles into marine biotechnology research. This can enhance public trust and compliance while ensuring sustainable use of marine resources. The creation of **national blue biotechnology hubs** could further support the legal, technical, and economic aspects of marine biotechnology.

Financial constraints also pose a challenge, particularly for startups and SMEs looking to scale up marine bio-based innovations. Expanding funding through **Horizon Europe and national R&D grants** can help bridge financing gaps. Additionally, the development of **sustainable finance models**, such as tax credits and green bonds for low-carbon marine biotechnology solutions, can attract investment. Establishing dedicated **business incubators and accelerators** would provide financial, technical, and regulatory support to emerging marine biotech ventures.

From a technological perspective, the industrialization of marine biotechnology requires advancements in **bioprospecting, sustainable cultivation, and processing technologies**. Investing in **high-TRL (Technology Readiness Levels 6-9)** technologies can accelerate the transition from pilot projects to market-ready solutions. Adopting **circular bioeconomy models**, such as waste valorisation strategies, can enhance both economic and environmental sustainability. The implementation of **IMTA**, combining algae, shellfish, and fish cultivation, offers an opportunity to improve resource efficiency while minimizing waste.

By fostering interdisciplinary collaboration, regulatory harmonization, and strategic investment, BBt can drive economic growth while preserving marine ecosystems.

In this sense, and in line with the above, a synthesis of the most important challenges identified in 2B-BLUE (and B-Blue) that hinder the advancement of innovation and transfer of BBt and how to address them are presented below in Table 1.

Regulatory Frameworks and Policy Challenges *Marine biotechnology operates within a highly complex regulatory environment, which includes international agreements such as the Nagoya Protocol on Access and Benefit-Sharing (ABS), the European Union's Blue Economy Strategy, and national frameworks governing intellectual property rights (IPR) and biosafety. While these regulations are crucial for ensuring fair and sustainable use of marine genetic resources, they also introduce compliance challenges that slow down innovation and commercialization.*	**Financial Strategies for Marine Biotechnology Growth** *Marine biotechnology is capital-intensive, requiring significant investment in R&D, infrastructure, and commercialization pathways. Despite growing global interest, funding remains a major challenge, particularly for startups and SMEs seeking to scale up marine bio-based innovations.*	**Technological Innovation and Value Chain Development** *The industrialization of marine biotechnology requires breakthroughs in bioprospecting, sustainable cultivation, and processing technologies. The lack of scalable production methods and the high cost of extraction and purification remain significant bottlenecks.*	**Stakeholder Engagement and International Collaboration** *A quintuple helix approach is essential for fostering sustainable marine biotechnology development.*
Key Regulatory Barriers • ***Fragmented Implementation of the Nagoya Protocol*** *– Variability in national legislation regarding access to marine genetic resources creates legal uncertainties for researchers and companies.* • ***Lack of Dedicated Oversight Bodies*** *– Many countries lack specialized regulatory agencies to govern marine biotechnology, leading to inconsistencies in risk assessments and product approvals.* • ***Limited Awareness of Responsible Research and Innovation (RRI)*** *– Ethical concerns and regulatory complexities often discourage investment in marine biotechnology, highlighting the need for improved awareness and training programs.*	**Key Financial Mechanisms** • ***Blue Finance Initiatives*** *– Blue finance involves legal and institutional mechanisms to increase investment in marine innovation and sustainable ocean development.* • ***Regional Financial Development*** *– Coordinating financial policies at the regional level can optimize resource allocation and foster cross-border investments in marine biotechnology.* • ***Public-Private Partnerships (PPPs)*** *– Engaging governments, industries, and investors in collaborative funding models can enhance financial sustainability for marine biotech ventures.*	**Innovation Challenges** • ***High Costs of Bioprospecting –*** *Discovering and isolating bioactive marine compounds is expensive and resource-intensive, requiring advanced genomic and synthetic biology.* • ***Sustainability of Biomass Production*** *– Large-scale marine cultivation must address issues such as carbon footprint, habitat impact, and variability in biomass yield.* • ***Limited Infrastructure for Scaling Production*** *– The transition from lab-scale research to industrial-scale production requires significant investment in bioreactors, aquaculture facilities, and eco-friendly extraction technologies.*	**Key Collaboration Strategies** • ***Establishing International Knowledge Hubs –*** *Initiatives such as Ocean4Biotech facilitate transnational knowledge-sharing and commercialization support.* • ***Building Multi-Stakeholder Partnerships –*** *Engaging policymakers, researchers, and investors through policy dialogues and co-development programs can accelerate marine biotech adoption.* • ***Enhancing Ocean Literacy and Public Awareness –*** *Raising awareness about the societal benefits of marine biotechnology can improve public perception and market demand for sustainable marine products.* •***Leveraging on already existing projects/activities*** *- Taking advantage of related activities and their results could increase the success rate of the technical aspects and the public acceptance/involving,*

			thus accelerating the adoption of BBt innovations
Policy Recommendations • ***Harmonizing Global and Regional Regulations –*** *Establishing cross-border regulatory frameworks can help streamline approval processes and facilitate international collaboration.* • ***Integrating Responsible Research and Innovation (RRI) Principles –*** *Embedding ethical considerations, stakeholder engagement, and environmental safeguards into marine biotechnology research can enhance public trust and compliance* • ***Establishing National Blue Biotechnology Hubs –*** *Creating dedicated research and policy centres can support the legal, technical, and economic development of marine biotechnology.*	**Investment Recommendations** • ***Increase Horizon Europe and National R&D Grants –*** *Expanding funding opportunities under Horizon Europe and other regional initiatives can bridge financing gaps for marine biotechnology startups.* • ***Develop Sustainable Finance Models –*** *Incentivizing low-carbon marine biotechnology solutions through tax credits and green bonds can drive investment in eco-friendly production systems.* • ***Support Business Incubators and Accelerators –*** *Establishing dedicated marine biotech incubators can provide financial, technical, and regulatory assistance to emerging companies.*	**Strategies for Overcoming Technological Barriers** • ***Invest in High-TRL Technologies –*** *Focusing on Technology Readiness Levels (TRLs) 6-9 can accelerate the transition from pilot projects to market-ready solutions.* • ***Adopt Circular Bioeconomy Models –*** *Implementing waste valorisation strategies (e.g., using fishery by-products for high-value bioactives) can enhance economic and environmental sustainability .* • ***Develop IMTA –*** *Combining algae, shellfish, and fish cultivation can reduce waste and enhance resource efficiency.*	

Table 1: Summary of the main challenges facing BBt and potential solutions to address them.

3. 2B-BLUE methodology for acceleration of BBt transfer in blue economy sectors

2B-BLUE aims to overcome key barriers to BBt transfer through a **multi-pronged strategy focused on strategic alliances, real-world testing environments, and policy advancements**. Building on the foundations of the B-Blue Project, which strengthened the Mediterranean BBt sector by establishing **BBHs**, 2B-BLUE seeks to expand and enhance this network. Designed to reduce sector fragmentation, connect research and industry, and facilitate knowledge transfer, BBHs follow a **5-helix model** integrating research institutions, industry stakeholders, policymakers, civil society, and environmental actors. They have mapped key stakeholders, identified promising BBt value chains—including algal biotechnology, waste valorisation, and sustainable aquaculture—and developed a digital matchmaking tool to foster public-private partnerships and policy alignment. Additionally, BBHs have played a crucial role in training, business incubation, and regulatory support while providing testing environments for emerging BBt solutions under real-world conditions.

Now, 2B-BLUE leverages this structured framework to scale up pilot projects, integrate BBt innovations into policy frameworks, and strengthen transnational cooperation, particularly by extending collaboration to non-EU Mediterranean countries such as Tunisia and Libya. A key innovation introduced by 2B-BLUE is the establishment of **national DSs,** which will serve as experimental platforms for adapting and implementing emerging BBt technologies under local field conditions while contributing to marine environmental sustainability. These DS will be integrated within the BBHs to facilitate collaboration across research, industry, policy, and civil society.

By addressing regulatory and financial barriers, 2B-BLUE will advocate for improved regional policies that enhance sustainability, research, and innovation capacities in the Euro-Mediterranean area. This approach builds on the structured efforts of B-Blue, which established BBHs by fostering regional innovation ecosystems, defining BBt value chains, and promoting public-private collaboration, where it is possible, through co-creation spaces, joint research initiatives, and business development programs. BBHs have been instrumental in reducing fragmentation, bridging research and industry, shaping regional BBt strategies, and supporting capacity-building efforts. 2B-BLUE now strengthens and expands the existing BBHs by **implementing BBt solutions in real-world conditions, extending cooperation to non-EU Mediterranean regions, integrating BBHs into policy frameworks, and developing knowledge transfer mechanisms to scale up BBt adoption**. Through these efforts, 2B-BLUE ensures the continued growth, sustainability, and market integration of the BBt sector across the Mediterranean, transforming previously identified funding, regulatory, and collaboration challenges into opportunities for structured and sustainable development.

3.1. The Blue Biotechnology Hubs

BBHs serve as strategic enablers for the **acceleration of BBt transfer**, fostering collaboration, bridging knowledge gaps, and facilitating the commercialization of marine-based innovations. In the Mediterranean, these hubs proved to be instrumental in **identifying high-potential value chains**—such as algal biotechnology, waste valorisation, and integrated multi-trophic aquaculture—while addressing systemic bottlenecks that hinder innovation. Research centres and universities acting within these hubs have played a critical role in **linking academia with industry**, streamlining technology transfer, and **accelerating the adoption of BBt into key sectors of the blue economy**. The integration of open innovation strategies has

been central to ensuring that BBt solutions contribute to the broader bioeconomy by enabling sustainable practices and fostering stakeholder co-creation.

Building on the foundations established by B-Blue, 2B-BLUE expands the BBHs network, transforming them into **structured innovation ecosystems that drive research-to-market transitions across the Mediterranean**. Designed to reduce sector fragmentation, connect research and industry, and strengthen knowledge transfer, the hubs operate under a **5-helix model** that integrates research institutions, industry stakeholders, policymakers, civil society, and environmental actors. A key strategic enhancement introduced by 2B-BLUE is the establishment of **national DSs,** which function as real-world experimental platforms for validating and adapting emerging BBt technologies to local field conditions. These DS are integrated within the BBHs, enabling collaborative efforts between researchers, industry actors, and policymakers to de-risk innovation, ensure feasibility, and facilitate market adoption.

Beyond their role in technology testing, BBHs act as business incubators, offering **structured support to SMEs, start-ups, and research-driven enterprises**. By providing matchmaking services, financial advisory, and regulatory guidance, they help innovators navigate complex funding and commercialization landscapes, ensuring that promising BBt solutions transition effectively from research to industry. Their strategic networking capabilities span Spain, France, Italy, Slovenia, Greece, and Albania, fostering **cross-border collaborations** and aligning with major EU initiatives, such as the Mission Restore our Ocean and Waters. To further strengthen the innovation ecosystem, 2B-BLUE expands cooperation to non-EU Mediterranean countries such as Tunisia and Libya, reinforcing BBt uptake across the broader Euro-Mediterranean region.

At a policy level, 2B-BLUE integrates BBHs within **strategic governance frameworks**, ensuring their role in shaping regional and European innovation policies. Through their participation in the Mediterranean Innovation Alliance for Sustainable Blue Bioeconomy (MedIA-SBBE), the hubs contribute to long-term policy dialogues, helping define investment priorities, regulatory frameworks, and funding mechanisms that enhance research and innovation capacities. Their involvement in **technology foresight and market intelligence** ensures that BBt innovations are aligned with emerging industry trends, fostering proactive, demand-driven innovation strategies. Digital integration further strengthens their strategic role by accelerating stakeholder connectivity, knowledge exchange, and the formation of transnational consortia.

With 2B-BLUE's structured expansion, BBHs now serve as **open-access innovation environments, integrating Public-Private JRUs that formalize collaborations between academia and industry through Collaborative Research Agreements (CRAs)**. The establishment of **T-Labs** provides additional platforms for engaging local stakeholders in co-creation processes, ensuring that innovation uptake is inclusive and aligned with regional socio-economic contexts. These strategic enhancements position BBHs as key drivers of sustainable entrepreneurship, transnational cooperation, and market integration, ensuring that BBt contribute effectively to the Mediterranean's blue economy.

Through these combined efforts, 2B-BLUE transforms previously identified barriers—such as funding gaps, regulatory constraints, and industry-research fragmentation—into structured opportunities that facilitate sustainable, long-term development of the blue biotechnology sector. By scaling pilot initiatives, integrating BBt into policy frameworks, and fostering transnational innovation ecosystems, BBHs are shaping the Mediterranean's future as a leader in sustainable blue biotechnologies, securing their impact on the global bioeconomy.

3.2. 2B-BLUE Demonstration Sites

The **DS** in the 2B-BLUE project are designated areas where **BBt solutions, practices, and technologies** are tested, validated, and showcased in real-world conditions. These sites serve as experimental platforms that allow for the **controlled assessment of feasibility, efficiency, and impact**, facilitating the transition from research to applied solutions. By integrating into the BBHs network, the DS ensures **cross-regional collaboration, stakeholder engagement, and knowledge transfer**, supporting innovation and business development in the Mediterranean's blue economy.

Located in France, Spain, Italy, Slovenia, Greece and Albania, the DS focus on testing and validating the **most promising BBt solutions**, assessing their **technological performance, economic viability, and environmental impact**. To foster effective industry collaboration, each BBH will establish **JRUs**, engaging research institutions, businesses, policymakers, and civil society in structured partnerships. These JRUs provide a framework for co-design, testing, and validation, aligning innovations with market needs and regulatory frameworks while ensuring their long-term sustainability.

A defining feature of JRUs is their capacity to support **business model development**, encouraging investment in sustainable BBt. By bridging research and industry, JRUs facilitate the **commercialization of research-driven innovations**, reinforcing the Euro-Mediterranean leadership in BBt**.** Embedded within industrial processes and policy frameworks, they ensure that validated technologies can be scaled and sustained, contributing to a more resilient and innovative blue economy.

Each DS will implement **pilot activities**, following rigorous **monitoring and evaluation plans** to assess impact. The results will be documented, analyzed, and modeled, ensuring **effective knowledge transfer and replication** in other regions. These efforts will generate key outputs, including solutions to accelerate BBt transfer, pilot studies on sustainable aquaculture and algae-based products, strategic policy recommendations, and capacity-building initiatives.

Collaborative Research Agreements and the Establishment of JRUs

To formalize the JRUs, **CRAs** will be established, defining the structure and operational terms for joint research activities. These agreements provide a legally binding framework for collaboration between research institutions, industry stakeholders, and government agencies, ensuring clear expectations, responsibilities, and contributions from each party.

A CRA lays the foundation for effective cooperation by detailing research objectives, methodologies, funding mechanisms, and resource allocation. It also establishes **IPR, data-sharing protocols, confidentiality measures, and governance structures** to guide decision-making and dispute resolution. Compliance with legal, ethical, and regulatory standards is an integral part of these agreements, ensuring research integrity and sustainability.

Within 2B-BLUE, CRAs will play a pivotal role in enabling **public-private collaboration (without excluding the private-private collaboration)** at the DS, ensuring that research efforts are translated into market-ready innovations. By fostering **technology transfer and innovation adoption**, CRAs provide a **scalable model** that aligns with industry standards and regional policy frameworks, ultimately driving investment in BBt solutions.

The process for setting up JRUs will begin with the launch of a **transnational Expression of Interest (EoI)** to select third partners interested in participating and hosting pilot activities. The **Terms of Reference (ToRs)** will define clear participation criteria, including:

- Technical capabilities relevant to BBt solutions,
- Sustainability criteria to ensure environmental responsibility,
- Commitments to knowledge-sharing to facilitate technology transfer.

A structured methodology will guide the piloting and monitoring process, ensuring that results contribute to the broader BBt ecosystem in the Mediterranean. The successful implementation of **pilot activities** is critical to the validation process at DS. Each site will carry out rigorous testing and monitoring to evaluate the **technical feasibility, economic potential, and environmental impact** of selected BBt innovations. The results will be documented, analyzed, and modeled, facilitating knowledge transfer and supporting replication and scalability in other regions. These pilot actions will form the backbone of the **2B-BLUE project's innovation ecosystem**, laying the groundwork for policy recommendations, capacity-building initiatives, and strategic investments in the BBt sector.

3.3. 2B-BLUE Transformation Labs

Transformative innovation is a systemic approach to change that reshapes structures, practices, and mindsets to address complex societal challenges in a sustainable and inclusive way. Unlike incremental innovation, which focuses on improving existing processes, or disruptive innovation, which introduces new technologies to replace older ones, transformative innovation drives deep, long-lasting change across economic, social, and environmental dimensions. It goes beyond technical advancements by challenging the root causes of systemic issues, requiring multi-actor collaboration, adaptive experimentation, and continuous learning to support transitions in industries and policies.

In the context of BBt, transformative innovation is essential for ensuring that marine bio-based solutions are not only technically feasible but also economically viable, environmentally sustainable, and socially accepted. The integration of BBt innovations into value chains, business models, and regulatory frameworks is critical for their success. The adoption of algae-based bioplastics or sustainable aquaculture feed alternatives, for example, is not just a technological shift; it requires industry engagement, regulatory adaptation, consumer awareness, and alignment with sustainability goals to generate meaningful impact.

Within the 2B-BLUE project, T-Labs act as key mechanisms to facilitate knowledge exchange, co-design solutions, and accelerate the adoption of BBt innovations. These participatory spaces bring together research institutions, industry representatives, policymakers, environmental organizations, and civil society actors to drive collaborative experimentation, validation, and technology transfer. By addressing barriers such as market hesitancy, regulatory gaps, and fragmented knowledge, T-Labs enhance the scalability and long-term sustainability of emerging BBt solutions.

T-Labs play a particularly important role in the DS and pilot actions, providing a structured framework for testing and refining BBt technologies under real-world conditions. Their involvement ensures that innovations are not only scientifically sound but also aligned with industry needs, policy frameworks, and environmental objectives. Through participatory research and policy co-design, T-Labs help resolve systemic challenges in sectors such as aquaculture, marine bioremediation, algae-based industries, and the circular bioeconomy.

By fostering an iterative learning environment, T-Labs ensure that tested solutions go beyond laboratory experiments and are effectively adapted, validated, and embedded in industry and governance structures. Their role extends beyond research, actively supporting the transition of scientific advancements into market-ready applications that contribute to a resilient Mediterranean blue bioeconomy. Through this multi-stakeholder, impact-driven approach, 2B-BLUE embraces transformative innovation as a driver of systemic change, ensuring that BBt solutions are **not just developed but also serve as catalysts for broader economic and ecological sustainability**.

The Role of T-Labs for BBt Transfer

The DS established in the 2B-BLUE project are central to testing and validating BBt solutions under real-world conditions. These sites serve as innovation hubs, where BBt technologies are evaluated for technical feasibility, economic viability, and environmental sustainability. However, their success depends not only on the technologies they assess but also on how effectively they integrate into industry and policy frameworks, engage stakeholders, and facilitate knowledge transfer.

T-Labs play a pivotal role in ensuring that DS are not just passive testing grounds but dynamic spaces for innovation, collaboration, and commercialization. Their integration into the DS framework fosters structured engagement among research institutions, industry representatives, policymakers, and civil society actors, ensuring that pilot actions are contextually relevant, industry-driven, and aligned with sustainability objectives.

T-Labs operate in close synergy with the DS, making BBt pilot actions more effective, scalable, and aligned with real-world challenges. Their main functions include:

- **Co-Designing and Refining Pilot Actions:** Before implementation, T-Labs bring together scientists, industry stakeholders, policymakers, and civil society to shape pilot projects. By bridging scientific knowledge with practical industry needs, they ensure that pilot actions are realistically applicable and scalable.

- **Facilitating Knowledge Exchange and Capacity Building:** As hubs for training and knowledge-sharing, T-Labs equip stakeholders with the technical and strategic expertise needed for BBt adoption. They organize workshops, industry roundtables, and expert panels to foster engagement between businesses, researchers, and policymakers.

- **Enhancing Industry Integration through Public-Private Partnerships (PPPs):** By working closely with JRUs, T-Labs create a platform for companies to assess investment opportunities, develop commercialization strategies, and integrate validated BBt solutions into their operations.

A fundamental role of T-Labs is the monitoring and evaluation of pilot actions at DS, ensuring that tested BBt solutions are not only scientifically validated but also economically viable and socially accepted. Their structured impact assessment framework includes:

- **Defining Key Performance Indicators (KPIs):** T-Labs establish clear evaluation metrics to measure the technical efficiency, economic feasibility, environmental impact, and market readiness of pilot actions.

- **Real-Time Adaptive Learning:** By collecting and analysing data throughout the pilot phase, T-Labs enable iterative adaptation of BBt solutions, allowing for continuous refinements based on real-world performance feedback.

- **Facilitating Stakeholder Feedback Mechanisms:** Engaging stakeholders through focus groups and workshops, T-Labs ensure that pilot findings are interpreted in ways that support practical decision-making in industry and policy.

- **Supporting Policy Integration:** By collaborating with public authorities, T-Labs translate pilot results into policy recommendations, ensuring that validated BBt solutions have a clear pathway for regulatory approval and market adoption.

Beyond testing and refining BBt innovations, T-Labs play an instrumental role in scaling up successful solutions and fostering resilient innovation ecosystems. Their ability to connect research, industry, and policy ensures that validated pilot projects transition smoothly from experimental validation to market adoption.

By embedding transformative innovation principles into the 2B-BLUE project, T-Labs ensure that DS are not just experimental spaces but catalysts for systemic change in the Euro-Mediterranean blue economy. Their participatory and iterative approach guarantees that BBt solutions are not only developed but also positioned for long-term industry and policy integration. Through co-design, adaptive learning, and stakeholder engagement, T-Labs help bridge the gap between research and practical implementation, fostering a sustainable and commercially viable blue biotechnology sector.

3.4. Process for the identification of 2B-BLUE Pilots

The **pilot actions** in the 2B-BLUE project are designed to test, validate, and demonstrate innovative BBt solutions under real-world conditions. These actions will be implemented within the DS and supported by T-Labs, across France, Spain, Italy, Slovenia, Greece and Albania, providing a structured and collaborative environment for experimentation. Through JRUs, the project will engage research institutions, industry stakeholders, policymakers, and civil society to ensure the successful transfer and adoption of blue biotechnology innovations.

The pilot actions aim to:

- **Validate emerging BBt solutions** by testing them in operational settings.

- **Assess their feasibility, environmental impact, and economic viability** before large-scale implementation.

- **Promote collaboration between public and private sectors** through **PPPs**.

- **Facilitate knowledge transfer and business model development** for sustainable commercialization.

- **Support policy alignment and regulatory improvements** to encourage BBt sector growth.

The pilot actions in 2B-BLUE will follow a structured methodology to ensure the **effective testing, monitoring, and evaluation of blue biotechnology (BBt) solutions**. The process begins with the **selection of technologies and solutions** to be tested within the DS. These technologies are identified based on **prior research, feasibility studies, and industry needs**, ensuring that only the most **promising innovations** are piloted.

A preliminary study conducted within 2B-BLUE (D1.2.1 - Preliminary Study to Fine-Tune BBt Pilot Activities) provided a framework for this selection process. The study, carried out through the six National BBHs, identified **high-potential BBt value chains** as the focus of pilot actions. These include algae cultivation for added-value products, IMTA, and the valorisation of fisheries and aquaculture by-products.

The selection of pilot actions follows then a structured process designed to maximize learning, minimize risks and costs, and ensure scalability, sustainability, and adaptability across different contexts and scenarios. The process begins with **identifying key challenges** in the BBt sector, ensuring that pilot activities address real industry and environmental needs. A **value proposition** is then developed to define the expected impact and benefits of the pilot actions, aligning them with broader sustainability and market objectives.

To strengthen decision-making and **validate assumptions, real-world data** is collected, enabling an iterative learning process that refines pilot strategies based on practical field conditions. This data-driven approach helps assess feasibility, risk factors, and market readiness, ensuring that pilot actions can progress from small-scale demonstrations to broader industry and policy adoption. A key element of this process is the definition of **KPIs** to measure success or failure. These metrics track adoption potential, revenue growth, cost efficiency, and overall scalability, helping to evaluate growth opportunities and the long-term viability of BBt solutions.

By following this systematic and data-driven approach, 2B-BLUE ensures that its pilot actions not only test and validate BBt innovations but also **facilitate their transition into market-ready and policy-supported solutions** for the sustainable development of the Euro-Mediterranean blue economy.

The Role of BBHs in Identifying Pilot Actions

The BBHs play a pivotal role in identifying feasible pilot actions across the Mediterranean and ensuring their effective implementation, monitoring, and evaluation. As part of the project activities, BBH members were actively engaged through surveys, the collection of BP, and T-Labs to establish an initial framework for pilot selection and management.

The first step in this process was the identification and collection of BP, which were compiled into a project repository—MedBBHub Repository. This repository serves as a comprehensive knowledge hub, facilitating the organization and dissemination of successful approaches in BBt. It consolidates scientific, technical, industrial, and policy-related BP, supporting the scaling and replication of BBt solutions across the Mediterranean. In this context, the tool Good Practice Calculator has been designed to assess, analyse and evaluate best practices, serving as a source of inspiration for European institutions and stakeholders. The GPC helps determine the degree of replicability and maturity of practices included in the repository and those from external sources.

As a dynamic resource, the repository enables stakeholders—including researchers, industry representatives, policymakers, and environmental organizations—to access, exchange, and apply proven methodologies. This collaborative platform strengthens innovation, sustainability, and market integration within the BBt sector, fostering knowledge transfer and capacity building to accelerate the adoption of BBt solutions.

The repository is also designed to capture and share knowledge derived from pilot actions, DS, T-Labs, and stakeholder engagement. Its primary objectives include facilitating knowledge transfer by documenting successful experiences, lessons learned, and replicable models from previous and ongoing BBt initiatives. By serving as a centralized knowledge hub, the repository enables stakeholders to access, analyse, and apply BP, fostering the scalability and replication of innovative BBt solutions across the Mediterranean.

Following the collection of BP, the BBHs identified a set of pilot actions, which were further analysed in the preliminary study (D1.2.1) and also the main challenges to be addressed in each pilot were defined and identified (D1.3.1 - Definition of Challenges to be Addressed). These actions were selected based on their alignment with key BBt value chains, their market and regulatory potential, and their capacity to address regional environmental and socio-economic challenges. The identified pilot actions focus on high-potential BBt applications, particularly in algae cultivation for added-value products, IMTA, and the valorisation of fisheries and aquaculture by-products. These initiatives not only support technological innovation but also enhance sustainability, market integration, and policy alignment, strengthening the role of BBt in the Euro-Mediterranean blue economy.

Pilot Actions Identified and Their Strategic Focus

1. **Slovenia – Microalgae-Based Bioproducts and Valorisation of Fishery By-Products**
   The Slovenian pilot focuses on scaling microalgae production for cosmetics and biomedical applications while also developing biopolymers from fisheries by-products. These activities address technical and regulatory challenges in bioproduct commercialization while promoting sustainable use of marine resources. The project emphasizes technology transfer, public-private collaboration, and scaling production capacity to integrate marine-derived compounds into high-value industries.

2. **Spain – Marine Bioremediation and Carbon Footprint Tokenization (CFT)**

   Spain's pilot explores macroalgae-based bioremediation combined with Information and Communications Technology solutions for improving coastal water quality and carbon sequestration in the port of Alicante. This initiative integrates CO_2 tracking and offset strategies into aquaculture and maritime industries, creating a market mechanism for carbon credits. It also demonstrates how macroalgae-based systems can contribute to pollution control, nutrient recycling, and the development of a circular blue economy.

1. **France – Algae Cultivation and Multi-Trophic Aquaculture Development**
   The French pilot emphasizes the development of high-value algae-based compounds for use in health, cosmetics, and industrial biomaterials. In addition, it integrates IMTA systems that incorporate sea cucumbers, shellfish, and macroalgae to create a balanced and resource-efficient aquaculture model. The focus is on enhancing regional collaboration, aligning research with industry, and fostering regulatory alignment to accelerate market adoption.

3. **Italy – IMTA Development and Nature-Based Solutions for Marine Restoration Italy's pilot consists of two complementary initiatives:**

    - **IMTA for Sustainable Aquaculture (CNR-led):** This action integrates fish farming, bivalves, and macroalgae into a closed-loop production system that reduces nutrient pollution while generating valuable biomass for nutraceuticals and bio-based industries.

    - **Nature-Based Solutions for Marine Restoration (ENEA-led):** Focused on marine habitat rehabilitation, this initiative aims to valorise mussel farming value chain discards to restore degraded ecosystems and valorise aquaculture waste through circular economy approaches.

4. **Greece – Restorative and Regenerative Aquaculture**
   The Greek pilot targets IMTA applications for mussel farming by integrating sea cucumbers and other benthic species to improve sediment quality, nutrient recycling, and ecosystem resilience. The initiative also explores technological innovations, such as precision monitoring tools and biorefineries, to optimize aquaculture practices while supporting biodiversity conservation.

5. **Albania – IMTA for Sustainable Aquaculture and By-Product valorisation**
   The Albanian pilot establishes an IMTA system in the Bay of Vlora, integrating bivalves, sea cucumbers, and fish species to enhance marine ecosystem health and biomass production. Given the lack of an existing algae value chain in Albania, the focus is on valorising fisheries and aquaculture by-products while improving water quality and reducing environmental impact. This pilot also aims to overcome regulatory barriers and encourage investment in sustainable aquaculture models.

Once the pilot actions were defined, the BBHs organized a series of co-design workshops within the framework of T-Labs. These workshops provided structured engagement among researchers, industry representatives, policymakers, and civil society actors, ensuring that the development of pilots was aligned with real-world needs, industry feasibility, and sustainability objectives.

Designed to address the specific challenges and opportunities of BBt in the Mediterranean, the co-design workshops mobilized key stakeholders from the Mediterranean BBHs to contribute expert insights on regional priorities, industry demands, and technological feasibility. This participatory approach was critical in defining site-specific criteria for DS, ensuring that pilot activities were scientifically and technologically robust, economically viable, and environmentally sustainable.

One of the key outcomes of the workshops was the identification of the most promising BBt technologies to be tested within the DS. Based on the preliminary study conducted in Deliverable 1.2.1, five high-potential value chains were prioritized: algae cultivation for added-value products, IMTA, valorisation of fisheries and aquaculture by-products, bioremediation technologies and digital practices. This process ensured that pilot actions were strategically aligned with market trends and regional development goals.

A critical component of the workshops was the development of a common evaluation framework for DS, ensuring that pilot effectiveness could be systematically monitored and continuously improved. The workshops facilitated the co-creation of KPIs designed to assess technical performance, economic impact, environmental sustainability, and social acceptance. These KPIs included:

- Technical performance, evaluating the feasibility, efficiency, and adaptability of BBt solutions.

- Economic impact, focusing on cost-effectiveness, investment potential, and commercial scalability.
- Environmental sustainability, ensuring that BBt applications contribute to ecosystem conservation and climate resilience.
- Social acceptance and stakeholder engagement, addressing community involvement and industry adoption potential.

The definition of KPIs followed an iterative, evidence-based approach, incorporating common evaluation methodologies such as Good Environmental Status (GES) criteria, Performance Indicators (PI), and Environmental Impact Indicators (EII). This ensured that pilot actions aligned with scientific and industry standards while remaining adaptable to policy and regulatory frameworks.

The insights gathered during the workshops formed the basis for the implementation phase of the pilot actions in WP2. By integrating stakeholder-driven perspectives, the workshops ensured that DS were not just experimental testing grounds but strategically embedded within local and regional BBt value chains.

The outcomes of these co-design workshops have strengthened the operational framework of DS, making them more effective, adaptable, and impactful. Through co-creation, shared expertise, and continuous dialogue, the workshops have created a collaborative environment where BBt innovations transition from research to real-world applications, ensuring their long-term sustainability and contribution to the growth of the Euro-Mediterranean blue bioeconomy.

4. 2B-BLUE solutions for acceleration of BBt transfer in blue economy sectors

4.1. MedBBHub – 2B-BLUE Repository of Solutions for Acceleration of BBt transfer

The **2B-BLUE repository** plays a crucial role in accelerating the transfer of BBt solutions by ensuring that valuable knowledge is not confined to isolated projects but is made accessible to a broader community. By continuously evolving and integrating BP, pilot action insights, and stakeholder-driven innovations, the repository serves as a **dynamic tool that fosters collaboration, scalability, and real-world application of BBt solutions**.

A key advantage of this structured knowledge hub is its ability to reduce barriers to adoption by providing a comprehensive reference for businesses, researchers, policymakers, and investors. By consolidating scientific findings, technological advancements, and policy frameworks, the repository enhances BBt transferability across different blue economy sectors, enabling stakeholders to replicate and adapt solutions in various contexts. It acts as a bridge between research and industry, guiding businesses in assessing the feasibility, investment potential, and commercialization strategies of emerging BBt technologies while ensuring alignment with regulatory and sustainability standards.

Through its **knowledge-sharing framework**, the repository accelerates innovation and strengthens the Mediterranean blue bioeconomy, ensuring that scientific advancements transition into scalable, market-ready solutions. It facilitates cross-border collaboration, enhances policy integration, and provides tools for capacity building, ensuring that BBt adoption is not only technologically viable but also economically sustainable.

Ultimately, the repository serves as a **catalyst for systemic change**, reinforcing the Euro-Mediterranean region's leadership in sustainable marine biotechnology. By making knowledge accessible, actionable, and widely disseminated, 2B-BLUE creates a more cohesive and resilient BBt ecosystem, fostering long-term growth, investment, and environmental sustainability in the region.

List of Solutions Collected:

The BP were collected through a survey (Annex II) addressed to BBHs members, who had previously been identified as external collaborators *via* a prior survey (Annex I). The responses from BBHs members were recorded and integrated into the **MedBBHub Repository** (D 1.1.1 - Dynamic Database with Map of BBt Best Practices and Stakeholders), ensuring structured access to their contributions and fostering knowledge exchange within the platform. To facilitate their transferability and scalability, the collected BP were analysed and categorized based on (A) the specific BBt fields in which they are developed or applied and (B) their potential for transfer and innovation (Annex III). In this sense, the categories were defined as follows in order to provide a first **toolkit of solutions for transfer and innovation in the target BBt Fields**:

A) BBt fields:

- **Aquaculture:** BPs related to the cultivation, breeding, and harvesting of aquatic organisms, including fish farming, algae production, and sustainable fisheries management;
- **Novel foods:** innovations in food production, including alternative proteins, microalgae-based foods, functional ingredients, and sustainable food sources derived from marine organisms;
- **Waste reuse:** solutions that focus on circular economy approaches, including the valorisation of marine and aquatic waste, biorefinery processes, and the development of new products from bio-waste;
- **Pharmaceuticals and biotech:** innovations that leverage marine and aquatic resources for drug discovery, biopharmaceuticals, nutraceuticals, and medical applications;
- **Cosmetics and personal care:** BPs in the development of skincare, beauty, and personal care products derived from marine organisms, including microalgae, seaweed extracts, and marine collagen;
- **Environmental applications:** BPs aimed at mitigating environmental challenges, such as bioremediation, marine pollution control, habitat restoration, and the development of eco-friendly marine technologies;
- **Energy and biofuels:** BPs related to marine-based energy sources, including biofuels derived from algae, blue energy, and other renewable energy solutions linked to aquatic resources;
- **Feed industry:** BPs related to using marine-based ingredients to create sustainable and nutritious animal feed;
- **Industrial processes (enzymes, catalysts, etc.):** applications of marine biotechnology in industrial manufacturing, including enzyme production, catalysts, and other bioprocesses.
- **Other:** BPs that do not fall under the main categories but still contribute to blue biotechnology in unique ways.

B) Transferring and innovation potential

- **Market-ready and scalable solutions:** these BPs have already been deployed in the market or are at a stage where they can be easily scaled for commercial application. They have a clear business model, customer base, and demonstrate effectiveness in real-world settings;
- **Technology validation and demonstration:** these BPs are in the prototype or pilot phase, where they are being tested in real-world conditions but have not yet reached full-scale commercial deployment. This stage often involves trials, proof-of-concept projects, and demonstration studies;
- **Early-stage research and innovation:** these BPs are in the research and development phase, focusing on fundamental discoveries, proof-of-concept work, or novel technological approaches that have not yet been validated in applied environments.
- **Technology transfer**: these solutions emphasize the transfer of scientific knowledge, patents, or technological advancements from research institutions to businesses, startups, or industry players. They often involve licensing agreements or collaborative innovation.
- **Collaborative innovation and networking:** these BP rely on multi-stakeholder partnerships, innovation clusters, and cross-sector collaborations to drive progress. They often involve knowledge-sharing, co-development of technologies, or joint ventures between research and industry;
- **Strategies and policy management:** these BPs focus on policy development, regulatory frameworks, or strategic planning for blue biotechnology, sustainability, or marine resource management;
- **Business creation:** these BPs involve the development of startups, incubators, or accelerators aimed at supporting entrepreneurs in the blue biotechnology sector.
- **Funding Mechanisms:** these BPs focus on securing financial resources for innovation, including public-private funding programs, grants, investment schemes, or crowdfunding initiatives.

List of Solutions Capitalized into 2B-BLUE DS and Pilots:

The DSs of the project will serve as the first test to **replicate and adapt the solutions for accelerating BBt transfer**, which have been collected through the MedBBHub repository, within their specific contexts. To this end, **the following BP have been analyzed by BBHs to match technological solutions in the target BBt fields with regional challenges** identified through pilot actions. **This process has contributed to refining the initial toolkit of solutions**, ensuring their alignment with real-world needs and enhancing their applicability.

A. **Market-Ready and Scalable Solutions -** These BPs have already been deployed in the market or are at a stage where they can be easily scaled for commercial application. They have a clear business model, customer base, and demonstrated effectiveness in real-world settings.

1. **Subitec Company:** Provides expertise in microalgae applications for cosmetics, ensuring high-value market outputs.

2. **Marevitea:** Develops microalgae-based cosmetic and nutritional products, bridging health and sustainability.

3. **Algaktiv:** Specializes in active ingredients from microalgae for natural product development.

4. **Stolt Sea Farm valorisation Room:** Transforms aquaculture by-products into proteins, enzymes, and other valuable compounds.

5. **App Lonja 2.0:** Supports short marketing channels and sustainable production for artisanal fisheries, fostering local economies.
6. **SICA Smart Sensor**: Optimizes aquaculture feeding, reducing waste and enhancing productivity.
7. **Aquaponics Tilamur System:** Promotes circular economy by integrating aquaculture and hydroponics.
8. **Kraken XL ROV:** Provides remote monitoring capabilities for aquaculture services, improving operational efficiency.
9. **WiSea System:** Utilizes advanced surveillance technologies for fisheries and aquaculture monitoring, emphasizing resource management and sustainability.
10. **STRULITT**: Creates fertilizers from shellfish waste, demonstrating a circular approach to marine by-products.
11. **SEAVOLUTION**: Enhances oyster resilience through innovative aquaculture practices, addressing pathogen-related challenges.
12. **HOLOPROD**: Scales Holothuria farming for sustainable food production and aquaculture diversification.
13. **MEDUS'OC**: Investigates the socio-economic impacts of gelatinous biomass, ensuring sustainable lagoon management.

B. **Technology Validation and Demonstration -** These BPs are in the prototype or pilot phase, where they are being tested in real-world conditions but have not yet reached full-scale commercial deployment.

1. **VASCO3** – Demonstrates CO_2 capture for microalgae production, linking carbon sequestration with biomass generation in early validation.
2. **Marine Bioremediation – BIOREMED ALGAE** – Uses macroalgae for water quality improvement and biomass production, undergoing validation in real-world trials.
3. **MEDUS'OC** – Evaluates the socio-economic impacts of gelatinous biomass, still in pilot testing.
4. **Remedia Life Project** – Applies bioremediating organisms to mitigate aquaculture waste, currently demonstrating impact.
5. **Integrated Bivalve-Fish Aquaculture, Montenegro** – Trials integrated fish and bivalve farming to reduce eutrophication, with field validation.
6. **Boka Kotorska Bay Pilot Study** – Evaluates how fish farm waste influences oyster growth, collecting trial data to confirm feasibility.
7. **RAISE project (funded under PNRR) -** Nature-based solutions for marine restoration through circular economy approach

C. **Early-Stage Research and Innovation -** These BPs are in the research and development phase, focusing on fundamental discoveries, proof-of-concept work, or novel technological approaches that have not yet been validated in applied environments.

   1. **PNRR already existing project –** A research-driven initiative exploring BBt solutions for potential implementation.

   2. **The University of Crete's IDMA Project –** Investigates Holothuria farming as a bioremediation tool, with research-driven outcomes.

D. **Technology Transfer -** These solutions emphasize the transfer of scientific knowledge, patents, or technological advancements from research institutions to businesses, startups, or industry players.

   1. **IMTA Experimental Plant in Mar Grande of Taranto –** A model for transferring knowledge on Integrated Multi-Trophic Aquaculture (IMTA) to aquaculture operators and policymakers.

   2. **Boka Kotorska Bay Pilot Study –** Evaluates IMTA models, contributing to the knowledge base for wider application in aquaculture**.**

E. **Collaborative Innovation and Networking -** These BP rely on multi-stakeholder partnerships, innovation clusters, and cross-sector collaborations to drive progress.

   1. **Blue Economy Partnerships –** A stakeholder dialogue platform connecting fisheries and aquaculture actors to share knowledge and innovations.

   2. **Circular Economy Stakeholders Platform (ICESP) –** Fosters knowledge-sharing and BP on circular economy applications in blue biotechnology.

F. **Strategies and Policy Management -** These BPs focus on policy development, regulatory frameworks, or strategic planning for blue biotechnology, sustainability, or marine resource management.

   1. **Carbon Footprint Tokenization –** A policy-driven initiative enabling carbon offsetting for fisheries and aquaculture, requiring regulatory frameworks for adoption.

G. **Business Creation -** These BPs involve the development of startups, incubators, or accelerators aimed at supporting entrepreneurs in the blue biotechnology sector.

   1. **Blue Economy Partnerships:** Stakeholder dialogue and collaboration in fisheries and aquaculture through the Blue Growth National Technology Cluster (BIG).

4.2. 2B-BLUE Pilot Actions - testing of solutions for the acceleration of BBt Transfer

The **2B-BLUE pilot actions** aim not only to test BBt in real-world settings but also, through DSs, to develop a **toolkit of solutions that accelerates their transfer** or refines those identified via the MedBBHub

Repository. Implementing these pilots within DSs is crucial for assessing the socio-economic and environmental impacts of emerging BBt technologies and practices. They serve as testing grounds for **innovation transfer**, ensuring BBt solutions support sustainable resource use and a fair market transition.

For BBt solutions to move from pilot validation to full-scale adoption, their implementation requires an **integrated approach** combining policy frameworks, financial support, technology deployment, and structured evaluation methods. The 2B-BLUE project ensures that BBt applications remain **economically viable, regulatory-compliant, and environmentally sustainable**, securing their long-term success within the Euro-Mediterranean blue bioeconomy. A key component of this transition is the structured **KPI-based evaluation framework** established within DSs, enabling quantifiable performance assessments and continuous refinement of pilot actions.

To support this process, a **preliminary study by 2B-BLUE** (D1.2.1), integrating insights from scientific literature and expert assessments, defined a set of **categorized metrics to evaluate the feasibility and scalability of BBt applications**. This study identified the **Key Exploitable Results (KERs)** emerging from DS development and operation, ensuring that innovations are effectively assessed for market integration and long-term sustainability. To systematically measure the impact of BBt solutions, key metrics have been categorized into economic, environmental, technical, regulatory, and social dimensions, serving as benchmarks for performance evaluation, technology refinement, and scalability strategies.

Findings from DS assessments informed co-design workshops conducted by T-Labs, where researchers, industry stakeholders, policymakers, and local communities collaboratively defined **KPIs** for each pilot action and corresponding DS. These workshops structured pilot activities to align with regional market demands, sustainability goals, and policy frameworks. A key outcome was the harmonization of evaluation methodologies, ensuring a common set of performance metrics across DSs. The KPIs cover technical, economic, and social dimensions, measuring aspects such as nutrient removal efficiency in bioremediation projects, biomass production in aquaculture, and CO_2 sequestration rates in carbon capture pilots. Additionally, economic viability indicators—including cost-effectiveness, revenue generation, and stakeholder engagement—were integrated to assess the broader socio-economic impact of BBt solutions.

A) <u>DS Performance Evaluation Based on KPIs</u>

1. DS Spain – Marine Macroalgae for Bioremediation and Carbon Footprint Reduction

- Technical KPIs: Nutrient removal efficiency, CO_2 sequestration rates, biomass productivity
- Economic KPIs: Revenue from algae-derived products, return on investment
- Environmental KPIs: Reduction in eutrophication levels, biodiversity enhancement
- Social KPIs: Participation in carbon credit schemes, job creation in algae-based industries

2. DS Slovenia –valorisation of Fishery and Aquaculture By-Products

- Technical KPIs: Conversion efficiency of fishery waste, production of bioplastics and biostimulants
- Economic KPIs: Cost reduction in waste disposal, market penetration of BBt-based products

- Environmental KPIs: Reduction in organic waste, circular economy contribution
- Social KPIs: Public awareness on sustainable fishery by-products

3. **DS France – IMTA and Algae Production for Bioproducts**
   - Technical KPIs: Yield per unit area, organic waste reduction
   - Economic KPIs: Profitability of IMTA systems, investment attractiveness
   - Environmental KPIs: Water quality improvement, carbon sequestration
   - Social KPIs: Knowledge transfer and industry engagement
4. **DS Italy – Sustainable Aquaculture and Nature-Based Solutions**
   - Technical KPIs: Bioremediation efficiency, IMTA production yield, improvement in water quality, biodiversity promotion, system efficiency
   - Economic KPIs: Market adoption of BBt-based solutions, revenue from algae and bivalves, reduction in operational costs, partnerships created
   - Environmental KPIs: Reduction in hypoxia, decrease in antibiotic use, footprint reduction, support for biodiversity, reduction in CO_2 emissions
   - Social KPIs: Community involvement in habitat restoration, jobs created, participants involved in training
5. **DS Greece – Restorative Aquaculture and Bioremediation**
   - Technical KPIs: Bioremediation efficiency, scalability of nature-based solutions
   - Economic KPIs: Revenue from sea cucumber farming, cost savings in sediment management
   - Environmental KPIs: Water quality improvements, biodiversity recovery
   - Social KPIs: Training of fishermen and aquaculture operators
6. **DS Albania – Integrated Aquaculture and By-Product valorisation**
   - Technical KPIs: Nutrient recycling efficiency, bioproduct yield
   - Economic KPIs: Cost reduction for circular economy models, investment in BBt startups
   - Environmental KPIs: Reduction of fish farm waste, CO_2 offset potential
   - Social KPIs: Public acceptance of BBt-based products

By establishing this KPI-based framework, 2B-BLUE ensures a **systematic evaluation of DSs** while driving the sustainable deployment and **accelerated transfer of BBt solutions**. The T-Labs, acting as multi-stakeholder platforms that bring together key players in BBt technology transfer, will play a pivotal role in the continuous application of the KPI-based framework for the evaluation of pilots. Beyond assessment, they facilitate study visits, capacity-building initiatives, and cross-sector knowledge exchange, ensuring that DS results are accessible, replicable, and scalable. Their function within the innovation hubs enhances **technology validation and fosters industry adoption**, bridging the gap between research advancements and commercial application.

Through targeted stakeholder engagement, investment facilitation, and policy alignment, 2B-BLUE ensures that validated BBt solutions seamlessly transition into industrial and regulatory frameworks. By incorporating pilot evaluations, collaborative assessments, and cross-border cooperation, the project **accelerates the commercialization of BBt solutions** while strengthening the long-term resilience and sustainability of the Euro-Mediterranean blue economy.

B) Sustainable Implementation and Acceleration of BBt

The pilot actions within 2B-BLUE are built upon **advanced BBt solutions** that contribute to biomass production, environmental restoration, waste valorisation, and digital monitoring. These technologies include**:**

- **Macro - and Microalgae-Based Bioremediation**: Facilitates nutrient capture, pollutant removal, and CO_2 sequestration, improving marine water quality and supporting carbon credit markets**.**
- **Integrated Multi-Trophic Aquaculture (IMTA):** Promotes aquaculture sustainability by incorporating filter-feeding bivalves, macroalgae, and deposit feeders to recycle organic waste and optimize water conditions.
- **Carbon Footprint Tokenization (CFT):** Utilizes blockchain and digital tools to track, quantify, and offset CO_2 emissions, promoting climate accountability in maritime and aquaculture industries.
- **Smart Aquaculture Sensors and IoT Monitoring:** Enhances aquaculture efficiency through real-time data analytics, enabling optimized feeding strategies, nutrient cycling, and marine ecosystem health monitoring.
- **3D-Printed Artificial Reefs and Nature-Based Solutions (NBS):** Supports marine habitat restoration, biodiversity enhancement, and wave energy mitigation, aligning with EU ocean restoration objectives.
- **Biorefineries and Blue Bioplastics:** Converts marine biomass into bioactive compounds, bio-stimulants, and sustainable industrial materials, reinforcing circular economy models**.**
- **Marine-Derived Pharmaceuticals:** Research-driven innovations developing bioactive compounds for medical applications, some of which have already progressed through regulatory approval stages.

To ensure the long-term viability of BBt solutions and enhance the effectiveness of BBt transfer, DSs will complement the testing of these BBt solutions with **strategic actions for facilitating policy integration, industry adoption, and financial sustainability,** as follows:

- **Macro- and Microalgae-Based Bioremediation:** Regulatory engagement for bioremediation approval, partnerships with industries to integrate algae biomass into commercial products.
- **Integrated Multi-Trophic Aquaculture (IMTA):** Collaboration with aquaculture associations, certification programs for sustainable aquaculture**.**
- **Carbon Footprint Tokenization (CFT):** Partnerships with technology providers, awareness campaigns to promote tokenization adoption.
- **Smart Aquaculture Sensors and IoT Monitoring:** Integration of sensor data into management platforms, training programs for aquaculture operators.
- **3D-Printed Artificial Reefs and Nature-Based Solutions (NBS):** Collaboration with marine biologists for ecological design, community-led monitoring initiatives.
- **Biorefineries and Blue Bioplastics:** Development of marine biomass supply chains, partnerships with manufacturers.

Such strategic actions will be further enforced by the following project **enabling initiatives**:

- **Collaboration with policymakers** to streamline regulations, accelerate licensing processes, and integrate BBt into sustainability agendas, removing barriers that hinder market entry.
- **Knowledge transfer and capacity building** through training programs, workshops, and academia-industry partnerships for BBt implementation and upscaling.
- **Industry partnerships and public-private collaboration,** through JRUs and co-creation platforms, for commercial application.
- Development of **scalable models** and roadmaps for pilots' expansion and replication.
- Development of **circular business models** that make BBt commercially attractive.
- Strengthening of **regional and transnational cooperation** and cross-border partnerships.

By integrating cutting-edge technologies and structured pilot actions with targeted solutions for BBt transfer, along with a KPI-based evaluation framework, the scaling of DSs, and the facilitation of T-Labs, 2B-BLUE ensures that BBt innovations transition from experimental research to real-world applications within industry and policy frameworks. This structured approach enhances the long-term sustainability and scalability of BBt solutions, reinforcing the Euro-Mediterranean region's leadership in the marine bioeconomy and innovation ecosystem.

5. Conclusions

The 2B-BLUE project establishes a structured and multi-stakeholder framework to **accelerate the transfer of BBt solutions** across the Mediterranean blue economy. Through **DSs, BBHs** and **T-Labs**, the project

ensures that BBt innovations are tested, refined, and aligned with industry and policy needs, facilitating a seamless transition **from pilot validation to full-scale market adoption**.

The project's **integrated approach** enables the **identification and validation of high-potential BBt applications**, including macroalgae-based bioremediation, IMTA, carbon footprint tokenization, and biorefinery models. These innovations are assessed using **KPIs**, providing a systematic method to evaluate their **technical, economic, environmental, and social feasibility**. This KPI-driven assessment ensures that BBt solutions are scalable, sustainable, and economically viable, fostering their long-term success.

A fundamental element of this process is the **co-design methodology** applied in T-Labs, which engages researchers, industry stakeholders, policymakers, and local communities to **harmonize evaluation methodologies and align pilot activities with regional market demands, sustainability goals, and policy frameworks**. This participatory approach ensures that BBt solutions are not only scientifically validated but also practical for real-world implementation.

Additionally, policy integration, financial sustainability, and industry engagement play a crucial role in accelerating BBt adoption. The project actively works to **harmonize regulatory frameworks**, **foster investment in bio-based industries**, and **expand joint research initiatives** to create a more **resilient and competitive blue bioeconomy**. By combining policy support, structured evaluation, strategic investments, and multi-stakeholder engagement**,** 2B-BLUE provides a replicable and scalable **toolkit of solutions to accelerate BBt transfer**. This toolkit comprises:

- **BP and case studies** to guide future BBt adoption.
- **A structured KPI-based assessment framework** for evaluating innovation performance.
- **DS models** for real-world testing and refinement.
- **T-Lab methodologies** for co-design and stakeholder engagement.
- **Financial and regulatory roadmaps** to facilitate BBt market integration.

Thus, by bridging the gap between research, industry, and governance**,** 2B-BLUE strengthens the Mediterranean's leadership in sustainable marine biotechnology, ensuring economic growth, environmental conservation, and long-term innovation within the blue bioeconomy**.**

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7. Annex I – Survey "Mediterranean stakeholders in the blue bioeconomy and biotechnology"

Mediterranean stakeholders in the blue bioeconomy and biotechnology

Fields marked with * are mandatory.

Disclaimer
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2B-BLUE | Interreg Euro-MED | Co-funded by the European Union

The 2B-Blue project is organizing national BLUE BIOTECHNOLOGY HUBs in Spain, Italy, Greece, Albania, France, and Slovenia. Each of these hubs will represent a collaborative space dedicated to marine biotechnologies and their sectors, open to the participation of all stakeholders.

If you are a stakeholder from one of these countries and want to join the network, please fill out the following form!

AUTHORISATION FOR PROFILING FOR THE CREATION OF A PUBLICLY ACCESSIBLE WEB GALLERY
By checking the following box, you provide explicit consent for collecting and using your personal data provided herein. The data will be used to create a web gallery accessible through the 2B-Blue project's REPOSITORY in Blue Biotechnologies and for analysis and processing purposes outlined by the project. The partners of the 2B-Blue project will collect your personal data in compliance with Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation), hereafter referred to as GDPR. Under Article 5 of the GDPR, the 2B-Blue partner's project will handle personal data by lawfulness, fairness, transparency, and minimisation (please see the complete 2B-Blue Project Policy privacy (https://ec.europa.eu/eusurvey/files/[illegible]).

*
☐ I accept your Terms

GENERAL INFORMATION

* NAME OF THE ORGANIZATION

* REGISTERED OFFICE ADDRESS

PHONE NUMBER

* EMAIL

WEBSITE

* ORGANIZATION LOGO
Please upload your file(s)

Select file(s) to upload

CONTACT PERSON

* FIRST AND LAST NAME

* ROLE IN THE ORGANIZATION

PHONE NUMBER

* EMAIL

ORGANIZATION PROFILE

* Enter a brief description of your organization's activities (previous experiences, services and products offered, etc.)

If your organization is a company or other economic operator, briefly describe the related business model.

* Sectors in which your organization is involved

- [ ] Aquaculture and fisheries technologies
- [ ] Waste valorization
- [ ] Food and feed
- [ ] Agriculture
- [ ] Biomedical
- [ ] Pharmaceutical
- [ ] Bio-inspired materials
- [ ] Energy
- [ ] Cosmetics and wellbeing
- [ ] Bioremediation, ecosystem restoration, climate change mitigation and other environmental biotechnology
- [ ] Biorefinery
- [ ] Circular economy
- [ ] Other

* Does your organization play an active role in the development and/or application of Blue Biotechnologies in the selected sectors?

- ( ) Yes
- ( ) No

ENGAGEMENT IN THE PROJECT

* At what level would you like to be involved in the BLUE BIOTECHNOLOGY HUB?

- [ ] INFORM – We will keep you informed about BBH progresses and initiatives.
- [ ] CONSULT - We will keep you informed, listen to and acknowledge your inputs, and provide feedback on how they influenced the decisions about the development and implementation of the BBH.
- [ ] INVOLVE - We will work with you to ensure that your inputs are directly reflected in the alternatives developed and provide feedback on how they influenced the decision of the BBH.
- [ ] COLLABORATE - We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.
- [ ] EMPOWER – Where possible, we will implement what you decide within the BBH.

Submit

Existing solutions for acceleration of blue biotechnology in the Mediterranean

Fields marked with * are mandatory.

Disclaimer

The European Commission is not responsible for the content of questionnaires created using the EUSurvey service - it remains the sole responsibility of the form creator and manager. The use of EUSurvey service does not imply a recommendation or endorsement, by the European Commission, of the views expressed within them.

2B-BLUE | Interreg Euro-MED | Co-funded by the European Union

Compared to its Northern counterparts, the Mediterranean region is lagging behind the development of marine biotechnology value chains. This is partially due to the high fragmentation of business innovation initiatives as well as due to the lack of information on existing solutions.

To overcome this, the 2B-BLUE project will build a repository of good practices and we need your participation to promote the existing solutions that were developed (or are being developed), where at least 1 contributing partner/organization represents the Euro-MED region (Portugal, Spain, France, Malta, Italy, Slovenia, Croatia, Bosnia and Herzegovina, Montenegro, North Macedonia, Greece, Cyprus).

Please fill in this survey separately for each existing and/or past good practice. No more than 10 minutes are foreseen for its completion.

Thank you for your collaboration, your 2B-BLUE team!

---

* Please identify a short name (title) of the solution/good practice.

Text of 1 to 250 characters will be accepted

0 out of 250 characters used.

* At least one of the partners/organizations that is developing this solution should be from an Euro-MED country. Please name the organization(s) in English.

Text of 1 to 500 characters will be accepted

0 out of 500 characters used.

* Please state the country of the organizer (one or more, if they are from the Euro-MED region)

Text of 1 to 500 characters will be accepted

0 out of 500 characters used.

Funding sources

- [ ] National (ministries, agencies, regions)
- [ ] Private funders
- [ ] Own funding
- [ ] EU- Framework Programmes (i.e., FP7, Horizon 2020, Horizon EU)
- [ ] EU other - LIFE, COST, DG, EMFAF...
- [ ] Regional - Interreg (Med, Euro-MED, bilateral, trilateral, Adrion)
- [x] Other

Please, specify:

Text of 1 to 500 characters will be accepted

* What is the general idea of the good practice? *Provide a description that highlights the aims, the needs/challenges addressed and the impact of the good practice. It can also be the copy-paste from the abstract, summary or website presentation.*

Text of 1 to 3000 characters will be accepted

0 out of 3000 characters used.

* Does the good practice focus on specific organisms?

- [x] Yes
- [x] No
- [x] Indirectly

Which ones?

- [ ] Viruses
- [ ] Archaea, bacteria, cyanobacteria
- [ ] Fungi and Thraustochytrids
- [ ] Microalgae
- [ ] Macroalgae
- [ ] Metazoa (tunicates, molluscs, sponges, Cnidaria, etc.)
- [ ] Other

Please, specify:

Text of 1 to 600 characters will be accepted

0 out of 600 characters used.

* Does the good practice focus on any specific sectors?

- [x] Yes
- [x] No
- [x] Indirectly

Which one(s)? Select all that apply.

- [ ] Aquaculture and fisheries technologies
- [ ] Waste valorization
- [ ] Food and feed
- [ ] Agriculture
- [ ] Biomedical
- [ ] Pharmaceutical
- [ ] Bio-inspired materials
- [ ] Energy
- [ ] Cosmetics and wellbeing
- [ ] Bioremediation, ecosystem restoration, climate change mitigation and other environmental biotechnology
- [ ] Biorefinery
- [ ] Circular economy
- [ ] Other

Please, specify:

Text of 1 to 600 characters will be accepted

0 out of 600 characters used.

* To the best of your knowledge, what is the technology readiness level of this good practice?

- [x] TRL 1-3
- [x] TRL 4-6
- [x] TRL 7-9

* Who is involved in this good practice? Select all that apply from any partner contributing to this good practice (inside or outside the Euro-MED).

- [ ] Research performing organizations and academia
- [ ] SME
- [ ] Large industry
- [ ] Ministries, agencies, local administration
- [ ] NGOs and civil organizations
- [ ] Networks, clusters, associations, societies
- [x] Other

Please, specify:

Text of 1 to 600 characters will be accepted

0 out of 600 characters used.

* This data collection is aimed at developing a publicly accessible repository of best practices in the field of Blue Biotechnologies. Are the information you have shared publicly accessible?

- [x] Yes
- [x] No

* Please provide links to any publicly accessible resources about this good practice. It can be a website, link to an article, report, deliverable, book or similar, where more information about the good practice can be found.

Text of 1 to 1600 characters will be accepted

0 out of 1600 characters used.

Other comments. Please provide any additional comments, remarks or similar, including (but not limited to) copyrights and intellectual property rights, transferability, acceptability, or other relevant information about this good practice.

Text of 1 to 1600 characters will be accepted

0 out of 1600 characters used.

AUTHORISATION FOR THE CREATION OF A PUBLICLY ACCESSIBLE GALLERY OF GOOD PRACTICES

By checking the following box, you provide explicit consent for collecting and using your personal data provided herein. The data will be used to create a web gallery accessible through the 2B-Blue project's REPOSITORY in Blue Biotechnologies and for analysis and processing purposes outlined by the project. The partners of the 2B-Blue project will collect your personal data in compliance with Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation), hereafter referred to as GDPR. Under Article 5 of the GDPR, the 2B-Blue partner's project will handle personal data by lawfulness, fairness, transparency, and minimisation (please see the complete 2B-Blue Project Policy privacy (https://ec.europa.eu/eusurveyfiles/30b7125e-ebf1-4cde-8689-d3566cecb768/8e7e88ed-621e-4818-b8c5-2be71ceb4ee8)). At the same time, 2B-Blue partners will process and care for information and data related to the submitted good practice in compliance with the copyrights and intellectual property rights described here above.

*

- [ ] I accept your Terms

* Are you the person authorized to grant us permission to publish the data collected here?

- [x] Yes
- [x] No

Please, provide us with the contacts of the person authorized to grant us permission to publish the data collected here:

* FIRST AND LAST NAME

* NAME OF THE ORGANIZATION

ROLE IN THE ORGANIZATION

* EMAIL

Other comments. Please provide any additional comments, remarks or similar, including (but not limited to) copyrights and intellectual property rights, transferability, acceptability, or other relevant information about this good practice.

Text of 1 to 1600 characters will be accepted

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AUTHORISATION FOR THE USE OF PERSONAL DATA

By checking the following box, you provide explicit consent for collecting and using the personal data provided herein. The data will be used for analysis and processing purposes outlined by the project. The partners of the 2B-Blue project will collect your personal data in compliance with Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation), hereafter referred to as GDPR. Under Article 5 of the GDPR, the 2B-Blue partner's project will handle personal data by lawfulness, fairness, transparency, and minimisation (please see the complete 2B-Blue Project Policy privacy (https://ec.europa.eu/eusurveyfiles/30b7125e-ebf1-4cde-8689-d3566cecb768/8e7e88ed-621e-4818-b8c5-2be71ceb4ee8)).

*

- [ ] I accept your Terms

Please, provide us with your contacts and the permission to publish the data collected here:

* FIRST AND LAST NAME

* NAME OF THE ORGANIZATION

* ROLE IN THE ORGANIZATION

* EMAIL

Please provide us with any other resource about this good practice (deliverable, article, report, etc.) where more information can be found and for which you authorize us to use.

Select file(s) to upload

Other comments. Please provide any additional comments, remarks or similar, including (but not limited to) copyrights and intellectual property rights, transferability, acceptability, or other relevant information about this good practice.

Text of 1 to 1600 characters will be accepted

0 out of 1600 characters used.

AUTHORISATION FOR THE CREATION OF A PUBLICLY ACCESSIBLE GALLERY OF GOOD PRACTICES

By checking the following box, you confirm that you are the owner of the information provided or have been authorized by the owner to provide the requested information. You also provide explicit consent for collecting and using your personal data and the information provided herein. The data will be used to create a web gallery accessible through the 2B-Blue project's REPOSITORY in Blue Biotechnologies and for analysis and processing purposes outlined by the project. The partners of the 2B-Blue project will collect your personal data in compliance with Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation), hereafter referred to as GDPR. Under Article 5 of the GDPR, the 2B-Blue partner's project will handle personal data by lawfulness, fairness, transparency, and minimisation (please see the complete 2B-Blue Project Policy privacy (https://ec.europa.eu/eusurvey/files/30b7125e-abf1-4cda-8669-d3566cecb768/8e7e85ad-821e-4818-b8c5-2be71ceb4ee8)). At the same time, 2B-Blue partners will process and care for information and data related to the submitted good practice in compliance with the copyrights and intellectual property rights described here above.

*

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Submit

9. Annex III - Categorization of the collected BPs

Best Practice	**Transferring and Innovation potential category**	**Blue Biotech Field category**
Adding value to by-products from fisheries - COPALIS	Market-Ready & Scalable Solutions	Nutraceuticals
ALGADISK - CO2 capture via algae	Technology Transfer	Environmental Applications
Algae Biorefineries for Europe - D FACTORY	Technology Transfer	Energy & Biofuels
Algae for the Cosmetic and Aquaculture Industry - Algae 4B-A	Technology Transfer	Aquaculture, Cosmetics
Algae For Healthy World (A4HW) - Microalgae in Food Applications	Technology Transfer	Nutraceuticals, Feed Industry
Algae to Save the World - Blockchain for Algae Markets	Technology Transfer	Aquaculture

AlKoSol - Marine Microorganisms for Cosmetics	Technology Transfer	Cosmetics & Personal Care
Allocated Zones for Circular Aquaculture (AZA4ICE)	Strategies & Policy Management	Aquaculture, Environmental Applications
App Lonja - Enhancing small-scale fishing products	Market-Ready & Scalable Solutions	Aquaculture
App Lonja - Market Platform for Artisanal Fisheries	Market-Ready & Scalable Solutions	Aquaculture
App Lonja - Sustainable Fisheries & Short Supply Chains	Market-Ready & Scalable Solutions	Aquaculture
Application of microbiota-based approaches for shrimp farming	Technology Validation & Demonstration	Aquaculture
Applied Blue Biotechnology Master	Training & Education	All Sectors
AQUABIOPRO-FIT - Bioactives from Fisheries & Aquaculture Waste	Technology Transfer	Nutraceuticals, Feed Industry

BioApp - Biopolymer transfer platform	Collaborative Innovation & Networking	Waste Reuse
Biocontrol of bacteria using phages	Technology Validation & Demonstration	Aquaculture, Pharmaceuticals
BIOECO-R.D.I. – Biomass valorisation	Early-Stage Research & Innovation	Waste Reuse
Biogas Digestate Treatment (AlgeBioGas)	Technology Transfer	Energy & Biofuels
Biomolecular and energetic enhancement of residual biomass - BIO4BIO	Technology Transfer	Feed Industry, Energy
Bioremediation of Contaminated Sediments (LIFE SEDREMED)	Technology Validation & Demonstration	Environmental Applications
Biorepository of organisms for bioactive compound research (BioRepBA)	Technology Transfer	Pharmaceuticals & Biotech
BIOSEA - Aquatic Biomass for Pharma & Nutraceuticals	Technology Transfer	Pharmaceuticals, Nutraceuticals, Feed Industry

Biotechnological potential of selected microorganisms from Sečovlje Saltpans	Technology Validation & Demonstration	Cosmetics & Personal Care
Blue Bio Value - Acceleration Programme	Business Creation	All Sectors
Blue Innovation Hub	Collaborative Innovation & Networking	All Sectors
Blue Innovation Voucher Scheme	Funding Mechanisms	All Sectors
Brine and metal waste valorisation for water treatment	Technology Transfer	Waste Reuse, Environmental Applications
CIBBRiNA - Bycatch Reduction in North Atlantic & Mediterranean	Strategies & Policy Management	Aquaculture, Environmental Applications
Circular Solutions for the Textile Industry (Glaukos Project)	Technology Transfer	Waste Reuse
COMPOUND.AI - AI platform for marine species monitoring	Technology Validation & Demonstration	Environmental Applications

CREA&MAR - New Products from Fisheries Discards	Market-Ready & Scalable Solutions	Aquaculture, Nutraceuticals
Development of biosoluble microalgae extracts for skincare	Technology Transfer	Cosmetics & Personal Care
Eco-Friendly Solutions for Aquaculture Health	Technology Transfer	Aquaculture, Pharmaceuticals
ECONYL® - Recycled Nylon	Market-Ready & Scalable Solutions	Waste Reuse
Effective - Marine Ecosystem Restoration Program	Strategies & Policy Management	Environmental Applications
EU-CONEXUS - European University for Smart Urban Coastal Sustainability	Training & Education	All Sectors
Explias -valorisation of invasive marine species	Technology Transfer	Aquaculture, Nutraceuticals, Cosmetics
FISH-AGRO-TECH - Agriculture & Fisheries Innovation	Collaborative Innovation & Networking	Aquaculture

FRUALGAE - Food Shelf-Life Extension via Marine Biomaterials	Technology Validation & Demonstration	Nutraceuticals, Environmental Applications
GHANA - Exploring Haslea Diatoms for Blue Biotechnology	Technology Validation & Demonstration	Pharmaceuticals, Aquaculture, Nutraceuticals
GoJelly - Jellyfish-Based Microplastic Filters	Technology Transfer	Environmental Applications
Happy Shrimp's Meal - Sustainable Beta-Carotene for Shrimp Farming	Market-Ready & Scalable Solutions	Aquaculture
Innovative Development of Multi-Trophic Aquaculture (IDMA)	Technology Validation & Demonstration	Aquaculture
Innovative metallization of polymers	Early-Stage Research & Innovation	Industrial Processes
Integrated multitrophic aquaculture for bioremediation	Technology Validation & Demonstration	Aquaculture, Environment

Integration of Marine Sponges in Fish Aquaculture (SPINAQUA)	Technology Validation & Demonstration	Aquaculture, Environmental Applications
Jellyfish biomass for feed	Technology Transfer	Feed Industry
Jellyfish Cosmetics	Technology Transfer	Cosmetics & Personal Care
Kraken XL - ROV for aquaculture services	Technology Validation & Demonstration	Aquaculture
MACBIOBLUE - Blue Biotechnology for Macaronesia	Collaborative Innovation & Networking	All Sectors
MACUMBA - Cultivation Methods for Marine Microorganisms	Technology Validation & Demonstration	Pharmaceuticals & Biotech
Mar3BIO - Marine Biomass Biorefinery	Technology Transfer	Waste Reuse
MARBLE - Maritime Robotics in Blue Economy	Collaborative Innovation & Networking	All Sectors
Marine management plan	Strategies & Policy Management	Environmental Applications

Marine Microalgae Immunostimulant for Aquaculture (ALGABOOSTER)	Technology Transfer	Aquaculture, Feed Industry
Maritime Strategy of Catalonia	Strategies & Policy Management	Environmental Applications
MedAID - Improving Mediterranean Aquaculture	Collaborative Innovation & Networking	Aquaculture
Mediterranean Aquaculture Regenerative Center	Collaborative Innovation & Networking	Aquaculture
Microalgae Cosmeceuticals & Nutraceuticals - AlgaeCeuticals	Technology Transfer	Cosmetics, Nutraceuticals
Microalgae cultivation for water & nutrient recovery	Technology Transfer	Environmental Applications
Microbiota-Based Approaches for Sustainable Shrimp Farming	Technology Validation & Demonstration	Aquaculture
Ocean4Biotech - Marine biotechnology platform	Collaborative Innovation & Networking	Pharmaceuticals & Biotech

PerformFISH - Sustainable Growth of Aquaculture	Collaborative Innovation & Networking	Aquaculture
PHAGETHERAPY - Alternative to Antibiotics in Aquaculture	Technology Validation & Demonstration	Aquaculture, Pharmaceuticals
Photorespirometer project	Technology Validation & Demonstration	Environmental Applications
PIPECES - Beer Waste for Aquaculture Feed	Technology Transfer	Aquaculture, Feed Industry
PNRR SUS MIRRI-IT - Marine Bioresource Management	Collaborative Innovation & Networking	Pharmaceuticals & Biotech
Production and use of Salicornia spp.	Technology Transfer	Nutraceuticals, Feed Industry, Environment
Production of High-Quality Biomolecules from Fish Waste	Technology Transfer	Nutraceuticals, Feed Industry
Production of Spirulina for food consumption	Market-Ready & Scalable Solutions	Aquaculture, Nutraceuticals

PROMISEANG - Zero-waste protein production from marine biomass	Technology Validation & Demonstration	Nutraceuticals, Feed Industry
RAMBLA - Microalgae for Water Purification	Technology Transfer	Environmental Applications
REBECA - Network of Excellence in Blue Biotechnology	Collaborative Innovation & Networking	All Sectors
Recovery	Technology Transfer	Environmental Applications
Savefeed - Smart feeding system for aquaculture	Technology Validation & Demonstration	Aquaculture
Science, Technology & Innovation Plan of Murcia	Strategies & Policy Management	All Sectors
SPINAQUA - Sponge Integration in Aquaculture Systems	Technology Validation & Demonstration	Aquaculture, Environmental Applications
Sponge mariculture for bioremediation	Technology Validation & Demonstration	Aquaculture, Cosmetics

SRIP – Circular Economy Networks	Collaborative Innovation & Networking	Waste Reuse
Strategy for Innovation and Business Competitiveness (Region of Murcia)	Strategies & Policy Management	All Sectors
Survey & Treatment of Ghost Nets (STRONG SEA LIFE)	Strategies & Policy Management	Environmental Applications
TASTE - Edible Seaweed for Flavor Enhancement	Technology Transfer	Novel Foods
The Greek Spirulina - Spirulina Production	Market-Ready & Scalable Solutions	Aquaculture, Nutraceuticals
Tokenization System for Carbon Offsetting in Aquaculture	Technology Transfer	Environmental Applications
Transformative Co-Creation Innovation Labs (BLUE ECOSYSTEM)	Collaborative Innovation & Networking	
Use of fish skin as a substitute for leather	Technology Transfer	Other (Textile Industry)

Use of marine algae for biofertilizer and biostimulants	Technology Transfer	Environmental Applications
Use of shells from mussel farm for poultry feed	Technology Transfer	Feed Industry
Valorisation of invasive algae - Rugulopteryx okamurae	Technology Transfer	Environmental Applications
VALORISATION OF INVASIVE ALGAE RUGULOPTERYX OKAMURAE	Technology Transfer	Environmental Applications
Vanguard - Smart Specialization Strategy	Strategies & Policy Management	Other
VIOAXIOPIO - High-value biomolecules from fish by-products	Technology Transfer	Nutraceuticals, Feed Industry
Wastewater Treatment using algae	Technology Transfer	Environmental Applications
WiSea - 5G-Based Aquaculture Monitoring	Technology Validation & Demonstration	Aquaculture

YONDELIS - Marine-Origin Anti-Cancer Drug	Technology Transfer	Pharmaceuticals & Biotech
ZepzelcaTM (Lurbinectedin) - Marine-Based Cancer Drug	Technology Transfer	Pharmaceuticals & Biotech

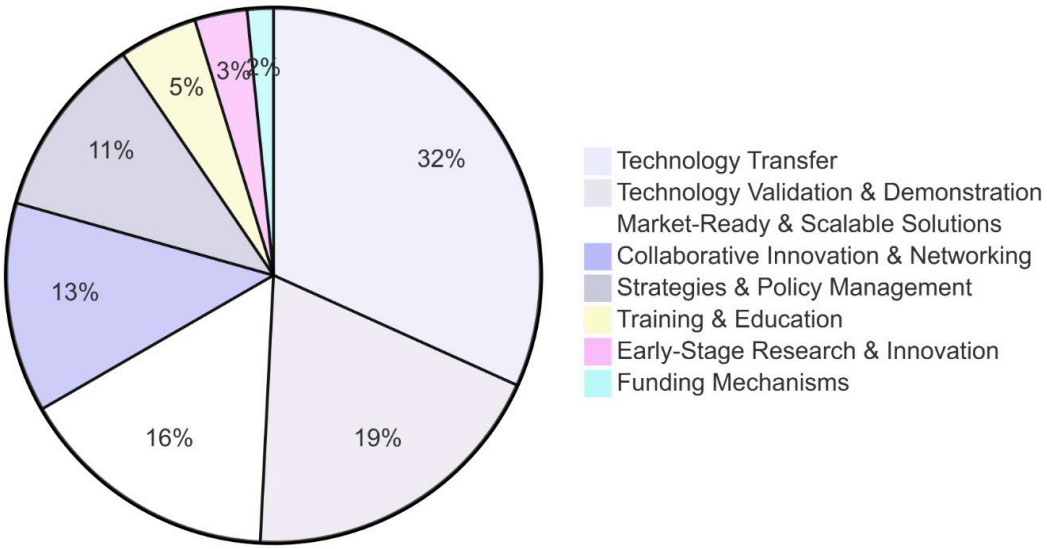

Figure 1. Distribution of Best Practices based on transferring and innovation potential.

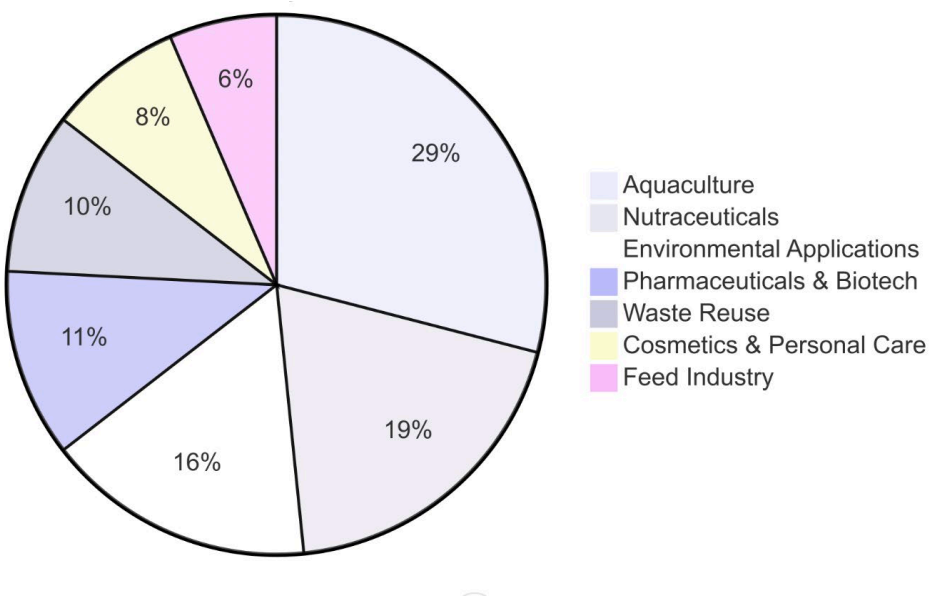

Figure 2. Distribution of Best Practices based on the BBt field of application/development.