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Deliverable 9.6

Training Sessions for Technology Transfer

Work Package 9

Dissemination, Exploitation and Training Activities

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Abstract	This report provides an overview of the technology transfer, exploitation and Intellectual Property Rights management undertaken in the project. For each of the UNITED pilots an overview of the IPR considerations has been laid out. Capacity building has been an important activity in UNITED especially in terms of technology transfer within the project,

	across other multi-use projects and initiatives and to the wider industry and technology providers. Numerous sessions both in person and online have taken place with relevant stakeholders in order to maximise the technology transfer in the project. Moreover, the Online Technology and Knowledge Transfer Hub has been created to make all the guidance, video lessons, trainings and other material readily available to the stakeholders.
Keywords	Technology transfer, multi-use offshore, IPR

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1. ACRONYMES

ADCP	Acoustic Doppler Current Profiler
D	Deliverables
DO	Dissolved Oxygen
OWF	Offshore Wind Farm
RIB	Rigid Inflatable Boat
ROV	Remote Operator Vehicle
TDS	Total Dissolved Oxygen
UAF	UNITED Assessment Framework
WP	Work Package

2. EXECUTIVE SUMMARY

The scope and objective of this deliverable encompass the UNITED project's commitment to advancing sustainable development and economic growth in line with the European Union's ambitious goals. Funded by the Horizon 2020 programme, the project, spanning from 2020 to 2023, specifically focuses on Multi-Use offshore, demonstrating cost-effective and eco-friendly production in sustainable marine activities. Aligned with the EU's 2030 climate and energy framework, the project addresses environmental protection, renewable energy increase, and enhanced energy efficiency. Intellectual property (IP) and technology transfer play pivotal roles in achieving these objectives. Recognizing the importance of IP, the project aligns with the EU's IP Action Plan, emphasizing predictability, transparency, and legal certainty. Technology transfer within the project focuses on passing knowledge and experience systematically, with IP rights crucial for protecting innovations and fostering creativity. The goals of technology transfer align with the EU's objectives, aiming to transfer knowledge, achieve product realization, and continually improve. Embracing the principles of the EU IP Action Plan, the UNITED project seeks to address legal challenges, enhance protection mechanisms, and facilitate knowledge and technology sharing within favourable conditions, in line with EU initiatives.

The German pilot (FINO 3) within the UNITED project effectively achieved its primary objective in Task 9.4, focusing on knowledge transfer and technical solutions uptake for blue mussel and seaweed cultivation combined with wind energy production. Through training sessions, both on-site and online, the pilot disseminated technical know-how for the unique combination of aquaculture and wind energy production, addressing specific challenges of the North Sea. Leveraging the FINO 3 research platform, the pilot tested solutions and explored innovative ways to make aquaculture feasible in extreme environments. Intellectual property protection was a key focus, involving patent investigations and collaboration with authorities to establish potential legal frameworks. Commercialization efforts explored scale-up possibilities and supported spin-off companies, contributing to the advancement of aquaculture technologies and demonstrating the feasibility of co-locating aquaculture with wind energy production. Collaboration with Belgium and the Netherlands enhanced aquaculture practices across different sites. While multi-use is not anchored in German policy, discussions with permitting authorities indicate a growing interest, paving the way for potential future projects and progress toward legislation and permitting procedures, albeit requiring further development and hands-on experience.

The Dutch pilot at the "North Sea Farmers" Offshore Test Site, situated 12 km off the coast of The Hague, successfully implemented two seaweed cultivation systems and the world's first offshore floating solar installation, addressing the challenges of co-use with offshore wind farms. The pilot, conducted by UNITED partners "The Seaweed Company" and "Oceans of Energy," demonstrated seaweed's economic viability and versatility, along with the feasibility of offshore solar energy production. Intellectual property protection measures were implemented, focusing on the business potential of seaweed and addressing challenges associated with offshore production. Commercialization efforts included developing economically viable seaweed cultivation models and fostering the establishment of The Seaweed Company. The pilot influenced policy-making in the Netherlands, contributing to the development of multi-use area passports for wind farms and influencing offshore solar inclusion in wind farm tenders. Stakeholder engagement, including the Community of Practice North Sea, further disseminated the pilot's results, while the demonstration of feasibility in harsh sea conditions showcased sustainable and efficient ocean resource utilization for renewable energy and food production, potentially influencing global policymaking.

The Belgian pilot, situated in Belgian offshore wind farms, is dedicated to investigating the co-location of seaweed cultivation, flat oyster aquaculture, and flat oyster restoration efforts. Addressing challenges related to distance, sea conditions, and optimal growing conditions, the pilot has strategically approached technology transfer, intellectual property protection, commercialization, collaboration, and spin-off support.

Within the technology transfer and exploitation realm, the Belgian pilot prioritized effective knowledge transfer through training sessions, leveraging deliverables for proactive knowledge dissemination. Intellectual property protection measures were implemented, including patent investigations and legal frameworks for co-location, aligning closely with legal aspects explored in WP6. The commercialization efforts focused on developing

blueprints for commercial co-location, exploring economic benefits, and conducting strategic initiatives to strengthen commercialization and exploitation. Notably, the pilot explored novel business models, innovative funding streams, and procedures for risk mitigation and insurance processes.

The collaborative approach emphasized industrial partnerships, recognizing industry partners as solution owners and fostering collaboration for impactful solutions. Although no spin-off companies were created during the pilot, the techniques developed are being explored for integration into existing farm techniques within Colruyt's Zeeboerderij.

The Belgian pilot's influence on policy-making and regulation in Belgium has been substantial. The government, already focused on key aspects like flat oyster restoration, blue corridors, offshore wind energy, and marine protected areas, has undertaken significant initiatives. The pilot's positive impact is evident in the government's active engagement, including invitations to present specific aspects, particularly the innovative flat oyster restoration within an offshore wind farm. The project has played a supportive role in policy discussions and initiatives, contributing to the broader goals of promoting sustainable practices in the blue economy sector.

The Danish pilot within the UNITED project uniquely combines wind energy with tourism, utilizing existing wind turbines for visits and creating opportunities for recreational activities. The pilot has undergone professionalization during the project period, introducing boat tours and turbine climbing experiences, aligning with the objectives of Task 9.4.

Technology Transfer and Exploitation in the Danish Pilot focused on addressing legal and insurance challenges associated with recreational activities, enhancing boat services, and training new guides. A feedback survey was implemented to track visitor satisfaction and make continuous improvements. The pilot demonstrated adaptability by exploring new avenues for commercialization, including scuba diving and fishing around the wind farm, although certain activities were found impractical. The location's strategic appeal was leveraged to enhance tourism, aligning with Denmark's sustainability image.

No Intellectual Property Protection (IPP) issues were reported in the Danish pilot.

Commercialization and Public Policymaking involved diversifying multi-use opportunities beyond traditional tours and investigating new avenues for commercialization. The strategic location of Middelgrunden was emphasized to enhance its appeal for tourists and locals, contributing to Denmark's sustainability image.

Collaboration and Spin-Off Support showcased innovative collaborations with new boat operators, leading to a significant increase in the number of tours. The pilot fostered collaboration with local boat companies, stakeholders, and creative solutions to address challenges. Virtual tours were conducted in collaboration with local museums and universities, showcasing adaptability and innovation.

Regarding the influence on policy-making and regulation in Denmark, continuous monitoring and engagement with stakeholders are essential for evaluating the pilot's impact on policy development in the region.

The Greek Pilot PATROKLOS, located in Cape Sounio, successfully integrates fish aquaculture and diving tourism. Operated by KASTELORIZO AQUACULTURE, the site collaborates with Planet Blue, a local diving center, and utilizes WINGS ICT solutions for monitoring. Certified divers undergo specific training for underwater investigations, and aquaculture production parameters are monitored in real time. The AQUAWINGS platform facilitates co-management of aquaculture and tourism activities. The pilot demonstrates the feasibility and benefits of combining aquaculture and scuba diving tourism, emphasizing collaboration, scuba diving tours, and ROV integration. Legal challenges, environmental monitoring, and community engagement are addressed, showcasing positive impacts and promoting sustainable practices. While specific details on policy influence are pending, the pilot contributes to the broader policy landscape through ongoing assessment and engagement with relevant authorities.

In the domain of technology transfer and exploitation, the UNITED project has undertaken various sessions and initiatives. In the policy domain, an online session facilitated collaboration among marine spatial planners, sectoral authorities, and industry stakeholders, discussing the applicability of policy recommendations. The project has

engaged with the North Sea Community of Practice, fostering collaboration with the eMSP project and developing multi-use procedures for the Netherlands and Belgium. Direct input from the project has influenced government planning and policy processes in Germany, Ireland, and Sweden, addressing legal challenges and contributing to maritime spatial plans. In the arena of technology transfer and commercialization, the project has organized sessions within the North Sea Community of Practice and SUBMARINER Network, facilitating discussions on multi-use technology, regulation, and related aspects. Thematic workshops and collaborative events aimed at reaching investors and the industry community have been conducted, showcasing project outputs and fostering wider knowledge transfer.

Expanding future marine-related study curricula has been a priority for UNITED. The project has linked with relevant projects and initiatives such as FLORES, Pact4Skills, and WIN BIG Women in Blue, providing direct input and organizing joint workshop sessions. Collaboration with universities has led to the introduction of new courses at Ghent University, integrating insights from the UNITED project into aquaculture and health management curricula. Educational excursions and school projects in the German pilot have provided valuable opportunities for students to explore aquaculture intricacies and multi-use platforms. The project has actively engaged with multiplier platforms like the United Nations Global Compact Working Group and ICES Working Group, contributing to the Climate Smart MSP Roadmap and discussions on fisheries and offshore wind farms.

The establishment of a Training Hub for Knowledge and Technology Transfer under the project's website facilitates easy access to materials, including training videos, guides, and other resources. The project's influence extends to follow-up initiatives such as ULTFARMS, North Sea Farmers, and the Ireland Offshore wind energy Multi-use Study, ensuring the continued development and commercialization of multi-use solutions. Notably, the Belgian demonstration project within UNITED received the Blue Innovation Swell Award at the Blue Innovation Awards 2022, recognizing its excellence in integrating offshore wind, aquaculture, and restoration practices. The final event in Gothenburg provided a comprehensive exploration of multi-use sustainability, featuring discussions, workshops, and insights into the achievements of the UNITED pilot projects.

In conclusion, the UNITED project demonstrates the European Union's dedication to environmental sustainability, innovation, and economic growth. Through a comprehensive approach encompassing policy engagement, technology transfer, educational initiatives, and recognition through awards, the project contributes significantly to shaping a sustainable and competitive future for ocean activities in the EU.

3. INTRODUCTION

3.1. Scope and Objective of this deliverable

In the pursuit of the European Union's ambitious goals for sustainable development and economic growth, the UNITED project, funded by the European Union Horizon 2020 programme, stands as a beacon of innovation in the Blue Economy. The project, running from 2020 to 2023, focuses on Multi-Use offshore platforms, showcasing demonstrators that boost cost-effective and eco-friendly production in sustainable marine activities. With a vision aligned with the EU's objectives, UNITED endeavours to address bottlenecks, demonstrate business synergies, and provide a roadmap for the deployment of ocean multi-use activities.

The five distinctive pilots within the UNITED project exemplify the commitment to achieving key European Union goals, ranging from environmental protection to the promotion of scientific and technological progress. As part of the broader context, the project aligns with the EU's 2030 climate and energy framework, emphasizing the reduction of greenhouse gas emissions, the increase in renewable energy share, and enhanced energy efficiency.

In parallel with these efforts, intellectual property (IP) and technology transfer play pivotal roles in realizing the objectives of the UNITED project. Understanding the European Union's goals for IP and technology transfer, particularly the IP Action Plan, is crucial. The plan aims to enhance predictability, transparency, and legal certainty, fostering high levels of research and development investments in key technologies.

3.1.1. IPR Management and Technology Transfer

Technology transfer, the systematic procedure of passing documented knowledge and experience gained during development and commercialization, forms the basis of the UNITED project. Intellectual property rights, encompassing patents, trademarks, copyrights, and trade secrets, are instrumental in protecting innovations and fostering creativity. The project acknowledges the significance of IP in promoting innovation, protecting investments, and enabling a thriving digital and green economy.

The goals of technology transfer within the UNITED project align with the EU's objectives for IP and technology. They encompass transferring product and process knowledge, achieving product realization, and continual improvement. This aligns with the broader EU perspective of effectively managing intellectual property to harness creativity and promote innovative enterprises.

3.1.2. EU IP Action Plan

The EU's IP Action Plan, adopted in November 2020, serves as a roadmap for maximizing the EU's innovative potential. It outlines specific measures across five key areas, including improving IP rights protection, boosting the uptake of IP by SMEs, facilitating licensing and sharing of IP, ensuring better enforcement against infringements, and promoting fair play at a global level.

The UNITED project, in embracing the principles of the IP Action Plan, seeks to address legal challenges, enhance protection mechanisms, and facilitate the sharing of knowledge and technologies. In accordance with these EU initiatives, the project objectives aimed, within the pilot studies, to assess the viability of multi-use scenarios and explore potential avenues for technology transfer, all while ensuring fair access to intellectual property within favourable conditions.

4. LINK WITH OTHER WORK PACKAGES

The development of UNITED Deliverable 9.6 has necessitated extensive collaboration with various other working streams within the UNITED project. For instance, the organization of technology transfer sessions, both in-person and through video lessons, depended on the broader dissemination efforts conducted within Work Package 9. Furthermore, the dissemination of these sessions occurred through various channels, including events, social media platforms, newsletters, and the project website. Collaboration with external partners and multipliers played a pivotal role in maximizing our outreach.

The development of the UNITED Ocean Multi-Use Commercialization Roadmap within Work Package 9, as well as the creation of business models within Work Package 3, helped us pinpoint key exploitable results and gain insights into the broader industry's needs and challenges concerning the management of intellectual property rights.

Working in tandem with all other Work Packages was instrumental in identifying crucial questions that required addressing during the technology transfer sessions. For instance, our collaboration with Work Package 2 facilitated the creation of two videos focusing on information technology in the context of multi-use, one of which demonstrated the HiSea Data Platform.

Our collaboration with Work Package 4, focusing on “Environmental gain of multi-use of marine space and infrastructure”, serves as a critical link in ensuring the ecological feasibility of the UNITED project. Through tasks such as revisiting the environmental assessment of pilot sites and developing an assessment framework for added value, this work package lays the foundation for informed decision-making and impact evaluation. This Communication Workpackage (WP9), plays a pivotal role in amplifying the outcomes of these environmental assessments. By establishing effective communication channels, this deliverable aims to disseminate essential information to stakeholders, project developers, and policymakers. This collaborative effort ensures that the insights, lessons learned, and recommendations from the Environmental WP are effectively communicated, contributing to the overall success and acceptance of the UNITED project.

Our partnership with Work Package 5 aided in identifying key stakeholders and potential collaborators for organizing events and expanding our outreach efforts. It also helped us identify individuals who may benefit from information or guidance regarding multi-use within the framework of the pilot projects.

The preparation of this deliverable, particularly the clarification of key exploitation results and intellectual property rights, has been of utmost importance to ensure proper exploitation both during and after the project's conclusion. Adhering to the exploitation plan will play a crucial role in establishing clear lines of ownership and facilitating a seamless transition to subsequent endeavours within ULTFARMS or other projects involving pilot initiatives.

Identifying the key exploitable results for each pilot has also streamlined their transfer to relevant dissemination platforms and multipliers, such as the Horizon Booster Platform, Blue BioMatch, ENLIT, or similar initiatives. This ensures that the valuable outcomes of our efforts reach the appropriate channels for further dissemination and utilization.

5. TECHNOLOGY TRANSFER, EXPLOITATION AND IP PROTECTION IN THE DIFFERENT PILOTS

5.1. German Pilot

5.1.1. Description of Implemented Design

The German Pilot site, situated 80 km west of Sylt in the North Sea, faces extreme conditions with waves up to 8m (max. 16m), strong currents (1.5m/sec), and strong winds. Due to its remote location and proximity to offshore wind farms, a robust system design is crucial to withstand these forces and prevent potential damage or loss. Robust and durable modular design approach reduces environmental, financial, and safety risks while minimizing maintenance costs.

The site integrates various aquaculture setups: a submerged mussel system benefiting from nutrient-rich waters and currents, acting as natural filters to enhance water quality and stabilize the ecosystem. An algae cultivation system at the water surface efficiently removes excess nutrients, contributing to ecological balance. Instruments like fluoroprobe, ADCP, and echosounder mounted under and on the other systems collect vital data on algae productivity, water currents, and fish presence, facilitating comprehensive monitoring.

This combined approach maximizes sustainability, supports local food production, and contributes to ecological balance. The collected data aids informed decision-making, optimizing aquaculture practices, preserving the marine environment, and benefits both aquaculture and wind farm operations while spreading the costs of monitoring across multiple users.

5.1.2. Technology Transfer and Exploitation summary

The German pilot (FINO 3) conducted effective transfer of knowledge and uptake of technical solutions related to blue mussel and seaweed cultivation in combination with wind energy production. This was accomplished through:

- Training sessions in the nearshore site, and also during online meetings. Conducted training sessions to disseminate technical know-how and managerial solutions for the unique combination of aquaculture and wind energy production.
- Promoted the adoption of developed solutions by various end-users, emphasizing the challenging conditions of the North Sea.
- Going into technical detail to allow handling of the systems.
- Site-specific challenges Addressed the specific challenges posed by the harsh conditions of the North Sea, exploring innovative ways to make aquaculture feasible in extreme environments.
- Leveraged the existing research platform (FINO 3) to test and adapt solutions, establishing the feasibility of aquaculture in conjunction with wind energy production.
- Scarce availability of ships, sharing ship time where applicable.

5.1.3. IP Protection

Given the innovative nature of the pilot, intellectual property protection was paramount. The focus was on how drafting and filing patents to safeguard the developed technologies and approaches could be reached in the future It is noteworthy that many solutions already exist and different components are already made and can be taken “off the shelve", Protection of IP developed using known and readily available components is hence of great importance. Key actions included:

1. Patent investigations:
    - Conducted comprehensive investigations to identify patentable technologies associated with blue mussel and seaweed cultivation in challenging offshore conditions.
    - Researching possibilities to protect non tangible intellectual property and ways to protect ways of conducting certain tasks (Geschmacksmuster Schutz)
2. Legal frameworks:
    - Work together with authorities to establish the potential for future legal frameworks to govern co-locating aquaculture and wind energy activities, ensuring proper management of intellectual property and adherence to legal requirements.

5.1.4. Commercialization

Commercialization efforts aimed to translate research outcomes into economic benefits. This involved:

1. Scale-up possibilities:
    - Explored the potential for scaling up the aquaculture and wind energy combination by understanding the economic viability of operations in extreme offshore conditions.
2. Spin-off companies:
    - Provided support for the creation of spin-off companies, offering technical assistance in developing business cases and marketing strategies for seaweed products.
    - Ensured the continuity and scalability of the solutions developed within the German pilot.
    - Spreading the word: Informing stakeholders and investors of possibilities in different workshops and presentations during conferences and in meetings with wind park owners.

5.1.5. Collaboration and Comparative Analysis within UNITED

Collaboration with Belgium and the Netherlands enabled researchers to relate findings, compare results, and collectively address shared challenges. The exchange of knowledge and solutions across different sites enhanced the overall robustness of aquaculture practices in extreme offshore environments.

The German pilot's successful navigation of these tasks contributed not only to the advancement of aquaculture technologies but also to the broader blue economy by demonstrating the feasibility of co-locating aquaculture with wind energy production in extreme offshore conditions during the project.

5.1.6. Impact on the policy-making and regulation

Multi-use is not anchored in German policy, thus no regulation concerning multi-use itself exists. The permitting authorities have shown significant interest in the possibilities of combining future uses of the ocean. Although uncertainties and concerns were present, open discussions and numerous fruitful meetings have led to a mutual respect and understanding. This progress paves the way for potential future projects and marks an initial step toward legislation and permitting procedures. These procedures must, of course, be meticulously written and established, requiring more time to develop. Therefore, further project work will be necessary to gain more hands-on experience and assist in preventing potential pitfalls and problems.

5.2. Dutch Pilot

5.2.1. Description of Implemented Design

The Dutch pilot was installed at the “North Sea Farmers” Offshore Test Site, 12 km off the coast of The Hague and therefore subject to the rough exposed offshore conditions of the North Sea. At this location, two seaweed

cultivation systems were installed by UNITED partner "The Seaweed Company" together with "North Sea Farmers" for two growing seasons. Next, a floating solar pilot (the first offshore floating solar installation in high waves in the world) was installed by UNITED partner "Oceans of Energy". Additionally, a few measuring devices were installed. Both as part of the pilots (for example force measurements on the system) as well as with a big and a small data buoy by "North Sea Farmers". All pilots were tested with the goal of installing them as multi-use solutions in between the offshore wind turbines. A full description of the systems can be found in D.7.1 (Review of pilot TRL, legal aspects, technical solutions and risks), D7.2 (Blueprint for the offshore site operation) and D7.4 (Joint production, monitoring, operation and maintenance protocol) for additional detailed information as the specifications and technical elements.

Deliverables D6.1 and D6.2 include additional elements on the policy cohesion in the Netherlands.

5.2.2. Technology Transfer and Exploitation Summary

The Dutch pilot at the North Sea Offshore Test Site successfully addressed the challenges of seaweed cultivation, floating offshore solar and co-use with offshore wind farms, presenting opportunities for economic viability and technical feasibility. The technology transfer and exploitation efforts involved:

1. Open Offshore Test Site:
2. Utilized the North Sea Farmers Offshore Test Site as an open sea-based incubator and independent test site, fostering research, pilots, and upscaling of seaweed cultivation, offshore solar and other types of co-use of wind farms.
    - Facilitated accessibility for various stakeholders aiming to pilot new technologies or test blue innovations. In the UNITED project, the focus was on seaweed cultivation and offshore solar energy production; next also, for example, nature restoration, marine energy and mussel cultivation can be tested.
3. Seaweed cultivation:
    - Demonstrated offshore seaweed cultivation by the Seaweed Company & North Sea Farmers.
    - Recognized seaweed as a versatile and commercially valuable resource with applications in food, feed, biomaterials & biostimulants, etc.
4. Offshore solar energy
    - Demonstrated the first offshore solar farm in high waves in the world, by Oceans of Energy

5.2.3. IP Protection

No intellectual property protection measures were implemented in the NL pilot related to seaweed cultivation, data buoy and co-use of wind farms. However, the key actions of this pilot included:

- The economic potential of seaweed:
    - Explored the enormous business potential of industrial-scale, high-quality seaweed production in collaboration with wind farming, aiming to lower costs and increase overall efficiency.
    - Addressed challenges associated with offshore production, including higher costs and challenging environmental conditions.
- Commercial seaweed production:
    - Initiated the first commercial enterprise, the Seaweed Company, to test seaweed production in offshore conditions at the North Sea Farmers Offshore Test Site.
    - Focused on developing economically viable and technically feasible seaweed cultivation methods, showcasing the potential for integration within wind farms.

- Offshore floating solar:
    - While UNITED did not support the actual offshore solar pilot or its technology developments, it supported the offshore activities and the possible synergies with the seaweed pilot by combing offshore trips. Therefore, no IP considerations for the pilot need to be taken into account.

5.2.4. Commercialisation

The Dutch pilot at the North Sea Offshore Test Site was not only focused on technological advancements but also placed a strong emphasis on the commercialization aspects of seaweed cultivation in wind farms. The commercialization aspects of offshore solar were not specifically taken into account, as partner Oceans of Energy was not able to provide input data for this piece of work. Key elements of the commercialization of seaweed include:

1. Economic Viability:
    - Strived to develop economically viable models for seaweed cultivation in challenging offshore environments, addressing the specific economic challenges associated with offshore production.
    - Investigated and demonstrated the potential integration of seaweed cultivation with wind farms, aiming for a sustainable and economically feasible venture.
2. Business Potential:
    - Explored the vast business potential of seaweed as a high-quality biomass, highlighting its diverse applications in industries such as cosmetics, food, fuel, and building materials.
    - Positioned the offshore test site as a starting point for commercial activities offshore, providing a unique opportunity for businesses to pilot and test innovations.
3. First Commercial Enterprise:
    - Pioneered the establishment of The Seaweed Company as the first commercial enterprise to test seaweed production in offshore conditions.
    - Leveraged this commercial initiative to gather valuable insights into the challenges and opportunities of offshore seaweed cultivation from a business perspective.
3. Steps towards commercialisation
    - The follow-up of the seaweed pilot of UNITED is the North Sea Farm #1 project, where a seaweed cultivation installation will be placed inside a wind farm. This project is executed by a consortium of partners that take this first step together. The project is financed by a donation from Amazon's Right Now Climate Fund. This is the first step towards commercialization and a result of the exploitation of the Dutch pilot activities within UNITED.

Thanks to the years of leanings offshore at the Offshore Test Site, Oceans of Energy was able to advance the design and the offshore processes to higher (commercial) TRL levels. Oceans of Energy landed a first commercial contract with Crosswind (a joint venture of Shell and Eneco), who will build a (grid-connected) offshore solar farm within the Hollandse Kust Noord (HKN) Dutch wind farm to be operational in Q3 2025.

The Dutch pilot, through its comprehensive approach, not only advanced the technological aspects but also laid the groundwork for future commercial ventures in seaweed cultivation, offshore floating solar and the co-use of offshore wind farms in general. This commercialization focus aligns with the broader goals of the UNITED project to drive sustainable and economically viable solutions in the blue economy sector.

5.2.5. Collaborative Approach and Challenges

The pilot recognized the importance of collaboration and knowledge exchange, emphasizing the need to overcome challenges associated with offshore production. Activities were strategically aimed at demonstrating the feasibility of seaweed cultivation and offshore floating solar in challenging North Sea conditions, establishing a foundation for future economic activities offshore.

The Dutch pilot's initiatives significantly contributed to the project's overall objectives, pushing the boundaries of seaweed cultivation and offshore energy production, and setting the stage for further advancements in the blue economy sector.

See the section below 5.2.6 under no.2 for the description of the collaboration with the Community of Practice North Sea.

5.2.6. Impact on the policy-making and regulation

Multi-use in the Netherlands is policy-driven: every new offshore wind farm will be open for multi-use. Open means that a multi-use party can apply for a permit. Within the Dutch UNITED pilot, two innovative solutions (offshore seaweed cultivation & offshore solar) have demonstrated the viability and benefits of these new technologies in practice. The experiences of these pilots have influenced policymaking and regulations in several ways.

1. Policy regulations: Successful implementation and positive outcomes from the Dutch pilot led to policy recommendations. In The Netherlands, a new offshore wind farm gets a “multi-use areal passport”. This is a map of the wind farm, indicating which type of multi-use can take place at certain parts of the wind farm. Both North Sea Farmers and Oceans of Energy have been involved in the development of these multi-use areal passports, where the experiences of the UNITED project were used as input. Next, offshore solar policy influence resulted in new offshore wind farm tenders, including the need for combining offshore wind with offshore floating solar. For the upcoming IJmuiden Ver wind farm, innovation points can be won if 50 MW offshore solar is implemented. Moreover, offshore solar is earmarked as one of the potential measures needed to accelerate the Dutch energy transition at sea (in Dutch: Overzicht Aanvullend Klimaatpakket | Publicatie | Rijksoverheid.nl). The Dutch government has therefore set an intention to roll out 3 GW by 2030 in already existing wind parks (https://www.reuters.com/world/europe/netherlands-spend-31-billion-drive-meet-2030-climate-goals-2023-04-26/
2. Stakeholder engagement: North Sea Farmers has a network of ~130 partners involved in the seaweed industry. This network was updated during the project on the developments of the Dutch UNITED pilot. Next, all Dutch pilot partners are also part of the Community of Practice North Sea (CoP). This is a network of entrepreneurs, research institutions, social organizations, governments and key industrial sectors. Within the CoP the goal is to strengthen the balance between energy, nature and food in the North Sea and stimulate a Sustainable Blue Economy. This platform was often used for presenting and discussing the results of the Dutch UNITED pilot. Part of the CoP is also the development of a “Maripark”: a maritime nature-inclusive business park in an offshore wind park. The North Sea Farmers Offshore Test Site, including the Dutch UNITED pilot, is a blueprint for this Maripark.
3. Demonstration of feasibility in harsh sea conditions: by demonstrating the technical and economic feasibility of combining seaweed cultivation and offshore solar in rough North Sea conditions, the Dutch pilot has showcased a sustainable and efficient way to utilize ocean resources for renewable energy and food production. Dutch demonstrations can encourage policymakers across the world to consider similar approaches in future regulations or policies. In The Netherlands, this is an interesting alternative, having a lot of discussion on land & fresh water use at the moment.

5.3. Belgian Pilot

5.3.1. Description of Implemented Design

The Belgian pilot investigates the co-location of seaweed cultivation, flat oyster aquaculture and flat oyster restoration efforts in Belgian offshore wind farms. The pilot addresses challenges related to distance, sea conditions, and optimal growing conditions. More information about the Belgian pilot is available in the final technical report of the project and UNITED Deliverable 8.1.

5.3.2. Technology Transfer and Exploitation Summary

In terms of technology transfer and exploitation the focus in the Belgian pilot entailed:

1. Training for effective knowledge transfer:
    - Conducted training sessions emphasizing technical and managerial solutions for flat oyster aquaculture.
    - Leveraged deliverable D9.6 to structure comprehensive training, ensuring proactive knowledge transfer.
2. End-user uptake:
    - Facilitated training to diverse end-users, ensuring a broad spectrum of stakeholders benefited from the acquired knowledge.
    - Aimed for measurable impacts, emphasizing the practical uptake of knowledge for tangible outcomes.

5.3.3. Intellectual Property Protection

1. Patent investigation and filing:
    - Investigated technologies related to flat oyster aquaculture and restoration for potential patenting, ensuring a strategic approach.
2. Legal frameworks for co-location:
    - Established legal frameworks for co-locating restoration and aquaculture activities in wind parks as determined in WP6 (Legal WP).
    - Collaborated with legal experts, aligning closely with legal aspects explored in WP6, especially Task 6.2.

5.3.4. Commercialization and Public Policymaking

1. Blueprint for commercial co-location:
    - Developed a blueprint for co-locating aquaculture and restoration activities in wind parks, emphasizing practical commercial applications.
    - Explored economic benefits, aligning with the task's directive to use results for commercial purposes.
2. Exploration of economic benefits:
    - Systematically explored and assessed the economic benefits of flat oyster aquaculture within offshore wind farms.
    - Positioned results for potential integration into public policymaking, contributing to broader policy discussions.
3. In the scope of the pilot project conducted in Belgium, which involved offshore wind energy, flat oyster aquaculture, and seaweed cultivation, a series of strategic initiatives were implemented to strengthen the commercialization and exploitation of the key exploitable results, aligning with the goals set forth in the commercialization flyer.
    - One notable aspect was the exploration of novel business models, centering on the development of premium products and sustainability, all while underscoring the minimal spatial impact

of multi-use practices. Simultaneously, innovative funding streams were piloted, particularly directed at activities lacking clear economic gains, such as the restoration of wind farms and the creation of blue corridors along wind farms. The latter will be further explored in a newly granted EU-project "BLUECONNECT".

- On the policy front, there was a strong call for the integration of nature restoration, sustainable local seafood production, and renewable energy priorities. Specific guidance on offshore multi-use was proposed, drawing insights from implemented research projects and best practices.
- To mitigate risks and streamline the insurance and certification processes, comprehensive procedures were formulated, detailing market consultation, crucial considerations, and an optimized preparation process for securing insurers.
- The support for national policy changes was another pivotal aspect, calling for a clear legal framework for multi-use implementation, precise guidance and procedures for permitting, and the introduction of regulatory incentives in areas where multi-use could yield socio-economic or environmental benefits.
- For the facilitation of market entry, the active involvement of aquaculture farmers was encouraged through social and economic workshops organized specifically for the Belgian pilot. In tandem, a thorough investigation of financial obstacles hindering the profitability of aquaculture was conducted as part of the business case.
- Stakeholder engagement and capacity building were prioritized through various channels, including social and economic workshops tailored for the Belgian pilot. The presentation of pilot results at numerous international conferences and events, including national broadcasts, contributed to a broader public understanding. Furthermore, efforts were directed at integrating multidisciplinary skills into relevant curricula, with a specific focus on encouraging cross-sectoral assignments. For instance, offshore aquaculture within offshore wind farms has been incorporated into a new Master course intended to be taught to Erasmus students and international students in the Master's in Aquaculture starting from 2024.

In essence, these concerted efforts collectively advance the promotion, marketing, and eventual commercialization and exploitation of the key exploitable results identified in the commercialization flyer, and as presented in the exploitation plan presented in the UNITED Final Technical Report.

5.3.5. Collaboration and Spin-Off Support

1. Industrial partnerships and solution ownership:
    - Engaged industrial partners actively in the partnership, recognizing them as solution owners.
    - Encouraged collaboration with industry for enhanced knowledge transfer and impactful solutions.
2. Support for spin-off companies:
    - No spin-off companies were created during the pilot project. The newly developed techniques are however being explored to be integrated into already existing farm techniques within Colruyt's Zeeboerderij. The oyster cultivation technique is for exampled being investigated to be applied into the existing farm nearshore, now producing mussels. As this farm wants to expand its products to oyster farming, the economic feasibility are being explored in the Belgian business case (D1.3 and D3.3) and its feasibility is explored.

In summary, the Belgian pilot not only addressed the challenges of seaweed and flat oyster aquaculture and restoration but also strategically aligned with Task 9.4 objectives, ensuring effective knowledge transfer, IP protection, exploration of economic benefits, and fostering collaboration for sustainable outcomes. The continuity and scaling up of the solution will be explored in the follow-up project ULTFARMS.

5.3.6. Impact on the policy and regulation

The pilot project in Belgium has positively influenced the policy in the country. The government, already focused on aspects like flat oyster restoration, blue corridors, offshore wind energy, and marine protected areas, has undertaken significant initiatives. The FPS Public Health's participation in the newly granted EU project BLUECONNECT and their grant for large-scale oyster restoration in the Belgian part of the North Sea suggest a tangible impact from the pilot. While it may not be the sole influencer, the project has played a supportive role, benefiting from open communication channels with decision-makers. Notably, the government has actively engaged with the project, inviting the team several times to present specific aspects, particularly the innovative flat oyster restoration within an offshore wind farm.

5.4. Danish Pilot

5.4.1. Description of Implemented Design

The Danish pilot is combining wind energy with tourism. One or two of the existing wind turbines, in total 20 turbines (Bonus today Siemens Gamesa each 2 MW from 2000), are used for visits.

20 years ago, the kind of visits were following an old Danish tradition made available at the annual wind day – 3rd Sunday in June – for the 8500 shareholders. Slowly, the possibility of visiting a wind turbine from the inside became known to universities and companies working in the offshore renewable energy field, and since 2012 the number of visitors has slowly increased.

During the UNITED project period, the visits have been professionalized. Two boat operators are now having a visit on their tour program for tourism in Copenhagen. And two new guides have been trained, making it that three guides are now active.

At the Danish pilot, two kinds of trips are organized:

- A simple trip with lecture and sailing around the turbines (at about 50 meters from the turbines); duration 2 hours.
- A trip including climbing to the turbine nacelle:
    - with Zodiacs duration 1½ hours;
    - With a boat having a stair in the front giving the opportunity of access from 4 different directions; duration 3-4 hours.

The existing wind turbine owner – a cooperative with 8500 shareholders – has stipulated in its bylaw that the visits will be used to promote wind energy.

The visiting of the turbines is only possible, if

- The wind turbine is of the old type from before 2007, where there are more floors in the turbine, so it is possible to climb without safety equipment (8 meters between the floors is the maximum).
- The visiting is only possible when the turbine owners allow it.
- Usually, no special investments are needed as the access to the turbine used by service providers is used. If boats of another type are used for the tourism, investments such as installation of a stair in the front of the ship may be needed.

To make use of the combination of wind energy farming and tourism in other countries, it is mandatory to make agreements with the owner of the wind turbine.

There may be an opportunity for establishing visits such as sailing around the wind turbines without entering the wind turbine. About half of the trips in Denmark is of this kind. Here, we are sailing in the sea where there are no restrictions, until a safety distance of 50 to 100 meters from the turbines.

Companies such as utilities and manufacturers of wind turbines have difficulties in accepting visits to their turbines. The reasons are conflicts between safety rules used by the people servicing the turbines and the safety rules used when having tourism. There is a difference as the turbines are not in operation when having tourism visits.

In some countries there are rules about sailing close to the wind turbines. As tourism must be done in close cooperation with the turbine owner, these rules are irrelevant. The tourism operator must be taken as part of the wind turbine organisation in the same way as an external service provider. More info can be found in UNITED Deliverable 8.1.

5.4.2. Technology Transfer and Exploitation Summary

In the Danish pilot, the focus aligned with this task, addressing the challenges of multi-use, specifically utilizing offshore wind sites for tourism and recreation. The initiatives undertaken are as follows:

1. Legal and insurance challenges:
    - Investigated and addressed existing legal and insurance challenges associated with recreational activities, particularly climbing turbines.
    - Provided solutions for dedicated insurance coverage for climbing turbines, ensuring the safety of visitors and addressing uncertainties.
2. Enhanced boat service:
    - Responded to the challenge of limited visits by expanding tours through enhanced boat services.
    - Improved logistics and accessibility, allowing more visitors to experience the wind farm and contributing to increased tourism.
    - Feedback survey on an ongoing basis to track the visitors satisfaction and conduct associated improvements, in terms of safety, duration of the tour and educational content provided.
3. Knowledge transfer to new wind turbine investors in Denmark and worldwide.
4. Knowledge transfer via training several new guides and developing a 'Danish Pilot Manual for guides'. This training manual has been established which is publicly available and can be a useful help for people there want to establish similar activities other places in Denmark or around the World.
5. Two new guides trained in the framework of UNITED to be able to meet the demand.

5.4.3. Intellectual Property Rights Management

No intellectual property has been created during the pilot project.

5.4.4. Commercialization and Public Policymaking

1. Diversification of multi-use opportunities:
    - Expanded multi-use opportunities beyond traditional tours to explore activities like scuba diving and fishing around the wind farm. It has been concluded that this is not possible as these activities is already taken care of by other people. And the time to be used for these activities does not fit into the time schedule used for tourism related to the wind turbines.
    - Investigated new avenues for commercialization, leveraging the site's visibility and its potential impact on tourism.
2. Strategic location for tourism:
    - Leveraged the strategic location of Middelgrunden, visible from Copenhagen's city beaches, to enhance its appeal for tourists and locals.
    - Positioned the site as an ideal location for exploring and expanding the potential of ocean multi-use, aligning with Denmark's sustainability image.
3. Marketing and outreach activities to attract new visitors and raise the awareness. Several Open House days were organised to conduct local outreach at the pilot site maximising interest for the tours. Moreover, a collaboration has been established with local museums and other relevant high rise buildings in Copenhagen to place a QR code virtual visit to the wind farm and thus promote the tour and the renewable energy.

5.4.5. Collaboration and Spin-Off Support

Innovative collaboration:

1. An innovative collaboration was established, resulting in the engagement of new boat operators during the UNITED project. Notably, the number of tours has more than tripled over the UNITED project period. This substantial increase can be attributed to the promotional efforts of the UNITED webpage and the advertising initiatives undertaken by the new boat operator. It's worth noting that at the project's inception, only one collaborating company existed, and this has now expanded to two. For detailed insights into the increase, please refer to Figure 1, which effectively illustrates the compelling growth achieved.

Business	2017	2018	2019	2020	2021	2022	2023
Trips	31	35	48	4	13	75	90
Guests	676	930	1117	130	246	1687	1912
1.000 €	38,9	44,3	55,6	4,4	19,5	102,1	136,1

Figure 1 Overview of boat tours number over the years

   - Fostered collaboration with local boat companies to enhance the overall tourism experience.
   - Collaborated with stakeholders (tourism organisation, boat operators, universities, conference organisers) to create a synergy between wind energy production and recreational/educational activities.
   - Integrated the info centre QR codes and virtual tours in several locations around the city to better promote the tours, and renewable energy in general, and engage local universities, museums and other landmarks in the marketing and awareness raising. Several locations now host or are in the process of integrating the QR code with a virtual tour of the turbine.
2. Creative solutions for challenges:
   - Demonstrated the UNITED team's commitment to finding creative solutions for challenges, showcasing adaptability and innovation.
   - Encouraged the exploration of new possibilities for collaboration, ensuring the sustained success of multi-use activities.
   - Conducted virtual tours in collaboration with local museums and universities during the time of COVID-19 when in-person tours were restricted.

In conclusion, the Danish pilot of the UNITED project effectively addressed the challenges of multi-use by focusing on technology transfer, exploitation, and IP protection. Through strategic initiatives, the pilot aimed to not only overcome existing challenges but also explore new opportunities, contributing to the broader goals of the project.

5.4.6. Impact on the policy and regulation

Given the pilot's context in Denmark, it is currently unclear if the project has had a direct influence on policy-making or regulation. Further evaluation is required to determine the extent to which the pilot has contributed to shaping policy or regulatory frameworks in this specific domain. Continuous monitoring and engagement with relevant stakeholders will provide a clearer understanding of the project's impact on policy development within the region.

5.5. Greek Pilot

5.5.1. Description of Implemented Design

The Greek Pilot denoted as the PATROKLOS Pilot site, is situated at the 59th km of Athens-Sounio Ave., Palaia Fokaia, Attiki, Greece, in the wider area of Cape Sounio. The wider area is protected by NATURA 2000 and the Treaty of Barcelona due to a number of significant characteristics that this Pilot site has to offer. The area is a characteristic example of the Mediterranean landscape. It includes an area declared a National Park since 1971 and is regarded as an archaeological site of great importance. Furthermore, 68% of the area is accessible and declared public.

The current operator of the site is KASTELORIZO AQUACULTURE, a company that operates in the field of production, marketing and exploitation of fish farms with all kinds of fish, shellfish in fresh or frozen form as well as distribution of products at Greek premises and abroad. On the opposite of the aquaculture unit, there is an islet called “Patroklos”. The island has a great coastline where local people, as well as tourists from the wider Attica area, enjoy swimming and spending time on the beach. The project partner, Planet Blue, is a local diving center based in Lavrio, Greece, 60 km south of Athens and not far from Patroklos. They offer diving tours for groups and individuals. Planet Blue also has a business providing Remote Operating Vehicles (ROVs) to aquacultures, including mapping the underwater landscape of aquaculture sites or conducting inspections or repairs of aquaculture infrastructure placed in great depths. In addition, Blue Planet offers diving expeditions for cleaning up waste in the aquaculture area. Co-existence scenarios are facilitated with the use of WINGS’ monitoring and management platform, AQUAWINGS, which is deployed to ensure the best multi-use of aquaculture and tourist activities and minimisation of environmental impact.

The Greek pilot combines fish aquaculture and diving tourism. Hence in order for someone to investigate the aquaculture site underwater the respective visitor should be a certified diver. The trainings must have six theoretical sessions, six pool water sessions and four offshore diving sessions. Except for that the staff is also trained for the use of ROVs. People with no open water diver certification are not allowed to dive in the aquaculture site. Moreover, most professional divers are required by national or state legislation to be qualified as first aid providers to a specified standard as occupational health and safety are important aspects of professional diving. For the specific pilot, no extra training was required since the divers had already been trained for underwater investigation, which also included the site of the aquaculture farm.

Within the Greek pilot aquaculture production parameters are monitored in real time. These parameters are salinity, temperature, Dissolved Oxygen (DO), pH, electrical conductivity, total dissolved solids (TDS), turbidity, Chlorophyll-a, Nitrates (NO3) and ammonium (NH4). Furthermore, the co-location activities connectivity is monitored, and the aquaculture infrastructure by using underwater sensors, fish sensors, water quality sensors and meteorological sensors. Also, the sea transportation infrastructure is monitored (vessel movements and speed, meteorological sensors). By the use of underwater cameras, the fish behaviour and performance is monitored. Monitoring infrastructure continues in diving activities by using individual diver position sensors and mechanisms for unexpected surface events such as rapid weather changes or other incidents. For the aquaculture infrastructure that are placed in great depths (such as anchors) a ROV is used. A Real-time data management and decision support system is in place and the water quality data are being uploaded continuously in real time in the AQUAWINGS platform where the users of the pilot can have access to them. The AQUAWINGS platform was co used in the pilot for the planning of different activities that take place in the aquaculture farm e.g. diving and feeding. Fish behaviour was continuously monitored through cameras in order to check the fish stress when diving activities were taking place.

The most important parameters monitored concerning fish aquaculture are: dissolved oxygen, water temperature, ammonia, and of course the number of tourist divers is also of great importance. More info can be found in UNITED Deliverable 8.1.

5.5.2. Technology Transfer and Exploitation in the Greek Pilot Summary

In the Greek pilot, which involves the Patroklos area and the Skironis aquaculture farm, the focus was on demonstrating the feasibility and benefits of combining aquaculture and scuba diving tourism. The initiatives undertaken align with the task description:

1. Collaboration for synergies:
    - KASTELORIZO aquaculture farm collaborated with the local scuba diving center, Planet Blue, to strengthen synergies between aquaculture and tourism.
    - Joined forces with WINGS ICT solutions to enhance operational efficiency and support the integration of aquaculture and scuba diving activities.
2. Integrated scuba diving expedition tours:
    - Integrated the Kastelorizo aquaculture farm into scuba diving tours organized by the Planet Blue dive center.
    - Offered a unique underwater scene with abundant wild fish attracted by the fish farm's feeding activities.

5.5.3. Intellectual Property Protection

While no IPR has been used for this pilot, some unique achievements include ROV integration, scheduling platform and monitoring tools and procedures. While these do not accound under the IPR their innovation potential is high and expected to be extensively exploited in the coming years. Namely the pilot developed and utilized remote operating vehicles (ROVs) from Planet Blue dive center for marine surveillance and aquaculture activities. The dive center collaborated with Wings ICT to create a platform scheduling co-activity work, managing the farm, and monitoring key environmental and aquaculture parameters for a better integrated multi-use solution of fish aquaculture and tourism provided by the diving center.

5.5.4. Commercialisation and Public Policymaking

1. Legal feasibility:
    - Addressed legal challenges related to the combined use of marine space for aquaculture and scuba diving under existing laws.
    - Explored certification requirements for trained scuba divers, such as those needed for net repair, ensuring compliance with regulations.
2. Environmental monitoring:
    - Monitored stress factors in farmed fish caused by visitors and employed cameras to observe their behaviour.
    - Demonstrated the sustainable integration of aquaculture and tourism while ensuring the well-being of marine life.
3. Marketing and promotional activities
    - An extensive outreach campaign has been organised locally to raise the awareness, transfer the knowledge to other dive centres and attract more divers to join the multi-use exploration. A new procedure was developed including all the relevant educational material to raise awareness and offer a new diving exploration service ‘OR code scavenger hunt’. Extensive collaboration with local Kastelorizo restaurants and groceries was also established for the joint promotion of the diving service and attract additional attendees via the win a dinner prize contest. Joint branding of aquaculture products has also been assessed (integration of the diving expedition information in the restaurant menus or at the seafood packaging).

5.5.5. Collaboration and Spin-Off Support

1. Community engagement:
    - Conducted extensive outreach in the area to engage local stakeholders and identify strategies for increased tourism.
    - A new diving expedition service created a 'QR code scavenger hunt'.
    - Explored additional benefits through partnerships between the fish farm and local businesses, such as restaurants, groceries, tourism offices and hotels.
2. Community perception transformation:
    - Changed the local perception of the site by showcasing the positive impacts of multi-use activities. The outreach and educational campaign using the info material and videos about multi-use and the pilot helped improve the understanding and acceptance.
    - Using the surveys and oral exchange, the pilot team notices that the community now sees the area with different eyes, recognizing the benefits of sustainable and collaborative practices.

In conclusion, the Greek pilot successfully addressed the challenges by implementing collaborative solutions, ensuring legal compliance, and demonstrating the positive impact of multi-use activities on the local community and environment.

5.5.6. Impact on the policy and regulation

Concluding the assessment, the Greek pilot effectively implemented collaborative solutions, ensuring legal compliance, and illustrating positive impacts on the local community and environment. While specific details on how the pilot has directly influenced policy-making and regulation in the country are currently not available, the implemented solutions and demonstrated positive impacts suggest a potential contribution to the broader policy landscape. Further assessment and engagement with relevant authorities are ongoing to provide a more comprehensive understanding of the pilot's influence on policy-making and regulation.

5.6. Technology transfer training sessions

UNITED has organised several online and in person events focusing on the technology transfer. Moreover, recorded lessons and written manual have also been produced for an easier transfer of technology related knowledge . These are readily available to stakeholder on the UNITED Training HUB: Knowledge and Technology Transfer.

Organisation of collaborative events to reach the industry and technology providers

A series of collaborative workshops and outreach activities took place to reach the investors and wider industry community. Namely, a workshop took place during the European Maritime Days in 2021, in collaboration with the United Nations Global Compact, MUSICA and EU-SCORES project to discuss the outputs of the project and their wider transferability. Moreover, a collaborative stand and discussion session was organized at the Dutch Marine Energy Center (DMEC) opening event together with the EU SCORES and MUSICA project. An annual SUBMARINER Network Members Assembly and Working groups on shellfish and seaweed has also been used to discuss the topic of ocean multi-use, transferability of the UNITED results to other potential future projects in the region. Several online and in person session have also been done together with Wind Europe to better reach the offshore wind stakeholders.

Thematic UNITED training workshops focusing on the technology transfer

A series of thematic training workshops and online webinars have been organized in the scope of the project to both present the results and progress of the project, gather external experts to provide an advise and provide for a moderated discussion among the participants thus ensuring the effective knowledge transfer. Each workshop had a dedicated theme. While in the first 3 workshops also focus was given to technological advances and implementation the last two were aiming to look into business cases and the political landscape. During the more technical workshops experts form governance, safety, offshore trawlers , shipping-, material- and technology-providers met and discussed solutions and ways forward.

For example, the first UNITED training workshop focused on offshore multi-use platform technology operations, safety and logistics. Sixty attendees from 18 countries joined the workshop to hear not only from UNITED pilots but also from invited speakers covering different topics related to the offshore operations and safety. The workshop contributed to the capacity building of professionals working in offshore operations and logistics and reduces risks for the ongoing and future development of ocean multi-use solutions. The key takeaway from the workshop was that multi-use may result in new risks and while new standards and procedures may also be needed, it is important not to create the red table. Ensuring understanding between users, and having flexibility will play an important role.

The third UNITED training workshop "Aquaculture-Multi-use offshore: Technology Transfer hosted presentations of three pilot projects (Greece, Belgium and Germany) focusing on aquaculture technology and biofouling issues among others. Each presenter provided an update on the current status of their pilot and the approaches in place to tackle these issues. Guest speakers from three companies also shared their innovative solutions to prevent fouling on marine structures. The solutions introduced can provide long-term sustainable remediation systems that do not harm the environment. In between and after both sessions, there was great engagement with the attendees, whose questions allowed for an active conversation among the panelists, particularly on the extent of biofouling on the pilots' structures and the transferability, scalability and impacts of the solutions implemented.

The presentations and reports from most of the training workshops and other relevant events that took place in the framework of the UNITED project can be found under the UNITED Publications website page.

Online sessions and webinar with Horizon Results Booster and BlueInvest

Several events were specifically designed to encourage technology transfer and tackle questions of exploitation and intellectual property rights management. Extensive collaboration was established with the Horizon Result Booster and BlueInvest to facilitate the technology transfer 1) within the consortia and 2) to the external stakeholder focusing on the industry, certification bodies, insurance companies and technology providers. Additionally, recorded fireside chats at various events have engaged industry and technology professionals on topics such as insurance and regulation.

Technology transfer sessions in the framework of the SUBMARINER Network mussels and algae working groups

A series of events took place in collaboration with the SUBMARINER Network Accelerator and mussels and seaweed working groups. UNITED pilots had an opportunity to pitch their results and receive the feedback from participants ranging from aquaculture businesses, investors, scientists, and policymakers/regulators. The groups contain over 500 participants working in the field of low trophic aquaculture who benefited from learning about the technological solutions applied on the pilots, and associated lessons learned related not only to the technology per se but also to other relevant enablers including the certification, insurance, necessary offshore trainings, species selection, etc. The feedback from the group members was also used where needed to finetune the outputs in pilots.

Technology transfer sessions in the framework of the North Sea Community of Practice

A series of online and in person technology transfer interventions at the Community of Practice (CoP) meetings took place to exchange on the multi-use technology, regulation and other related aspects related to the advancement of the overall technology readiness level of the multi-use solutions. The role of the CoP is not only to support the wider technology transfer to the different sectors and industries but to also allow for the wider discussion about relevant enablers for the technology transfer incl. the regulation, business plans, etc. Some of the key outputs of this engagement facilitated by the CoP include the multi-use procedures developed for the Netherlands and Belgium. Moreover, in the context of the CoP the link has also been established with the eMSP project led by the Dutch authorities (Dutch Enterprise Agency) to discuss the key enablers for the application of the multi-use solutions incl the infrastructural enablers necessary in the context of so called 'MariParks'and the role of government to facilitate these.

Recorded training and tech transfer lessons at the online HUB

The UNITED Training HUB: knowledge and Technology Transfer contains several guides, manuals and recorded lessons that serve to transfer the knowledge gained on the technology to the relevant stakeholders. For example, guides and manuals are covering the topis of IPR, and offshore wind technology, several videos are covering the topics of the aquaculture and monitoring technology. Moreover, a series of 9 videos were produced to guide risk assessment in multi-use context. These materials are described in Deliverable 9.1 in more detail and are available at the UNITED Training HUB: knowledge and Technology Transfer. https://www.h2020united.eu/publications

Figure 2 Promotional social media card giving the link to the recorded training lesson from the Aquaculture Company

Short recorded fireside chats

Short recorded fireside chat style interviews were conducted at relevant events to gain and spread knowledge about multi-use technologies or related technology enablers. This innovative approach served well to both engage people directly at the event exhibition booth and to share the recorded material to the social media of the project.

5.7. Policy exploitation sessions

Policy, planning and regulation knowledge transfer online session:

A session was organized online to bring together all the marine spatial planners (GD MARE MSP MSEG) and sectoral authorities and industry to discuss the applicability and exploitation of the policy recommendations of

UNITED. The direct link was made with the authorities which were in the process of developing or planning the multi-use related studies to supplement their marine spatial plans and associated policy (e.g. Sweden, Germany) The link to the report highlighting the key recommendations gathered at the event: https://www.h2020united.eu/images/Webinar_Reports/UNITED_event_report/20230106_Online_session_Policy_Summary_Report.pdf

Moreover, several local workshops have also been held focusing on the policy aspects such as the one that took place in Belgium in November 2022. A draft report of D6.2 (Case specific report on legal aspects and insurance issues of MU) was distributed before the workshop, and participants were asked to provide comments. Giving stakeholder insight into the work in progress and inviting them to contribute has increased the feeling of ownership among them and build commitment towards the dissemination and exploitation of the report and uptake of its recommendations.

Capacity4MSP, HELCOM-VASAM MSP working group Planners Forum Workshop Session

A session was organised in the framework of the Capacity4MS project and collaboration with the HELCOM-VASAM MSP working group Planners Forum bringing together maritime spatial planners from the Baltic and North Seas. The session discussed the current state of play on offshore multi-use, its integration in maritime spatial planning, related planning tools and prerequisites. One of the outputs of this engagement is the Capacity4MSP *Synthesis Report on the Experience from Maritime Spatial Planning Projects in the Baltic Sea Region and the Resultant Policy Messages* to which UNITED has contributed.

North Sea Community of Practice

in the context of the CoP the link has also been established with the eMSP project led by the Dutch authorities (Dutch Enterprise Agency) to discuss the key enablers for the application of the multi-use solutions including the infrastructural enablers necessary in the context of so called 'MariParks' and the role of government to facilitate these. Some of the key outputs of this engagement facilitated by the Community of Practice include the multi-use procedures developed for the Netherlands and Belgium.

Direct input to the government planning and policy processes

Input from the project has been provided directly to the German, Irish and Swedish government. Summary of all the relevant published reports and results has been put together for the planning authorities to be used as a basis for the planning and policy making process in the two countries. Moreover, the German pilot lead has extensively exchanged with the German authorities thus directly affecting the latest provisions of the maritime spatial plan in the German EEZ which now integrated the aquaculture in wind farms in one of the provisions. Moreover, a policy session was organized online for the authorities and a summary report with key recommendations was produced and distributed among stakeholders and permitting authorities as aid for further actions.

5.8. Dissemination materials supporting the technology transfer

Several written dissemination sources produced in UNITED provide an easy access to the key UNITED results and recommendations, summarising the often complex content provided in the project deliverables.

These materials include among others:

Pilot BUSINESS BRIEFS:

- Belgian Pilot
- Danish Pilot
- German Pilot
- Greek Pilot

UNITED Policy Briefs have also been developed in the framework of UNITED to address relevant topics including the environmental impacts assessment, economics and logistics and operation.

- Legal, Governance, & Insurance for Multi-Use Pilots
- Economics - Assessment on the added value of Marine Multi-Use within UNITED pilots
- Key findings and recommendations for pilots in terms of operation and maintenance

Commercialisation flyers: To showcase the commercialization potential of the project, UNITED has released a series of commercialisation flyers marketing its key multi-use technology products and services, among others:

- GERMAN PILOT FLYER
- DUTCH PILOT FLYER
- BELGIAN PILOT FLYER
- DANISH PILOT FLYER
- GREEK PILOT FLYER NO.1
- GREEK PILOT FLYER NO.2

5.9. Expanding future marine related study curricula

5.9.1. Linking with relevant projects and initiatives

UNITED has provided direct input to several projects and platforms focusing on the capacity building in the maritime realm:

FLORES project – UNITED, represented by SUBMARINER Network has been a part of the Pact4Skills, industry-research collaboration aiming to enhance skills in the offshore sectors. UNITED has used its role to provide input to the concept of FLORES project with an aim to promote and improve the renewable energy multi-use related training materials and curricula. Therefore, FLORES is in the process of turning the resources and findings from the UNITED project into training materials for youth education on offshore renewable energy multi-use. FLORES utilizes UNITED research findings, including UNITED video materials, interview recordings created in partnership with UNITED pilots and the WIN-BIG (Women IN Blue Economy) project, to create interactive video materials for youth education and comprehensive training video materials for both youth and trainers. The completed materials will be also published on the Training HUB: Knowledge and Technology Transfer on UNITED's website. FLORES ensures UNITED's branding is prominently featured in all materials where UNITED's findings are being used.

WIN BIG Women in Blue – A collaboration on gender issues in blue economy sectors has been ongoing with this project. Several recorded interviews with UNITED female colleagues have been conducted to use the storytelling as a tool in motivating and empowering the youth and women to endeavour into blue economy multi-use. A joint session has also been organised during the Ocean Mission Arena, bringing together WinBIG, UNITED and FLORES.

5.9.2. Marine Training Platform BE UGENT

The Marine Training Platform has been utilised during the UNITED project to disseminate its videos, written materials, announcements. The training material produced in the framework of UNITED and in collaboration with FLORES project has been shared with the Marin Training Platform for the integration into several training streams categorised on the website.

5.9.3. Collaboration with Universities and affecting their curricula

Learning and experience gained from the UNITED project have not only enhanced the capabilities of professors but also guarantee the integration of the multi-use concept into future curricula and lessons. This involvement extends to students, doctoral and post-doctoral candidates, as well as interns, fostering a broader understanding and capacity-building across various domains, including legal, policy, technology, marine engineering, and marine biology. As a significant stride in marine education enrichment, the UNITED project has played a pivotal role in expanding future study curricula. A groundbreaking initiative in Belgium involves the introduction of new courses, 'Basic Principles in Aquaculture Techniques' and 'Advanced Aquaculture Techniques,' within the Master of Science in Aquaculture and the Master of Science in Health Management in Aquaculture at Ghent University, scheduled for implementation in 2024. While not entire courses dedicated to the pilot, these programs prominently incorporate insights from the H2020-funded UNITED project and its Belgian pilot, presenting a compelling case study within the curricula. These courses, influenced by experiences from European flat oyster aquaculture, restoration practices, and sugar kelp cultivation within offshore wind farms, exemplify the lasting impact of the UNITED project on marine-related education and program expansion

5.9.4. Collaboration with schools

A series of educational excursions unfolded near the shore in the German pilot, welcoming not only students from local schools but also anyone keenly interested in aquaculture. This inclusive initiative provided a valuable opportunity for participants to delve into the intricacies of aquaculture and the pilot while understanding the critical need to harmonize food security (aquaculture) with energy security (offshore wind) through a multi-use platform. One notable event within this series involved a collaborative school project with a local “Gymnasium.” The project, conducted in partnership with teachers, commenced with a brief introduction to the UNITED project by the German FuE project team. Subsequent lessons explored the fundamental concepts of algae cultivation, including its applications and challenges. Theoretical background information was complemented by a hands-on experimental setup, showcasing small-scale algae propagation. The students actively participated in conducting sporulation using algae sorus, caring for algae seedlings settling on various net and rope materials. After a 3-week pre-cultivation phase in tanks at the school, the nets were relocated to a private jetty in the open sea, close to the school. The students monitored environmental parameters and meticulously documented weekly algae growth through photographs and detailed logs of measured parameters. The experiments concluded in April 2023, prompting the students to collect samples, record measurements, weigh the algae, and compare their results in comprehensive reports. The school project garnered additional attention when a film crew visited the school, subsequently featuring the initiative on regional television..

The television reportage is accessible online under the following link of the Ardmediathek website.

Figure 3 Screenshot of the TV reportage about the school outreach activity

5.10. Expanding exploitation via using the targeted Multiplier platforms

The UNITED D9.1 provides a detailed account of all the key multipliers used it the project for a targeted approach towards technology transfer. Here we provide just a selection of some key platforms used for this purpose. Some of the general EU-wide platforms used for technology transfer purposes, among others, include the UNITED Results Platform as well as the CORDIC portal.

For example, the "Results in Brief" article about UNITED, a part of the Marine Biodiversity Results Pack, assessable in six languages, was published on the Cordis (https://cordis.europa.eu) website.

Offshore wind related multipliers

- United Nations Global Compact Working Group – UNITED has provided input to the WG sessions and and supported the development of the Climate Smart MSP Roadmap as a concrete output that contains the multi-use concept as one of the key tools for climate smart planning https://unglobalcompact.org/library/5977
- ICES Working Group on fisheries and offshore wind farms – online sessions
- WindEurope – joint sessions online and in person at the WindEurope Copenhagen conference
- Renewable Grid Initiative – UNITED BE pilot at the Offshore Nature 22 videos series
- ENLIT – UNITED page

Aquaculture related multipliers

- SUBMARINER WGs – online WG sessions and presentations
- Ritch North Sea – active exchange, joint events and collaboration on the blueprint development
- Blue Bio Match – Collaboration with the BlueBioClusters, AlgaeProBanos and BalticMuppets on the topic of blue bioecoomy
- EU4Algae – joint promotional activities

5.11. Training Hub: Knowledge and Technology Transfer

An online hub for technology transfer has been developed under the project website in order to facilitate easy access to all the technology transfer-related materials produced under the project. The following list presents all the tech transfer materials produced in the context of the project:

Training Technology and Knowledge Transfer Videos:

What is Ocean Multi-Use?

Offshore wind:

- Offshore wind farm cooperative ownership – tourists climbing the Middelgrunden turbine
-

Aquaculture:

- How to develop the seaweed farming multi-use – A Lesson from The Seaweed Company
-

Tourism:

- How to organise diving tours in collaboration with fish farming – Lesson from the Planet Blue Dive Centre

Information technology:

ICT in the Context of Offshore Multi-Use and HiSea Data Platform Demo

Training Guides:

Delivering An Effective Investor Pitch On Ocean Multi-Use Solutions: An Essential Guide (July 2023)

Guidance for Managing the Intellectual Property Rights in Multi-Use Projects

5.12. Knowledge and Technology transfer to the UNITED follow-up project

In 2022, a collaborative effort unfolded to craft a plan for extending the UNITED project in the form of the ULTFARMS project, which secured approval as part of the BANOS Ocean Mission Lighthouse call for projects. Several UNITED partners joined forces to develop a follow-up project aimed at leveraging the outputs of UNITED, ensuring the ongoing Technology Readiness Level (TRL) development within the UNITED pilot, and maximizing the commercialization and exploitation potential of the project. This endeavor involved a series of meetings where collaborative writing techniques were employed to collectively shape the new project proposal. Further enhancing the project's depth, additional partners—particularly those specializing in exploitation and product development—were identified through gatherings within the SUBMARINER Network's mussels and seaweed working group events, conducted in collaboration with UNITED. Notably, insights from two of the UNITED pilots, DE and BE, were directly integrated into the ULTFARMS project, incorporating valuable lessons learned from UNITED and aiming to scale up solutions, enhancing not only the technology but also the commercial readiness of the initiative.

5.13. Innovation Awards

UNITED and its pilots have won several innovation awards. This work has helped spread the work about the multi-use technology and motivate further developments. It also stands as a proof of UNITED achievements in this field.

For example, the Belgium pilot received the Blue Innovation Swell award 2022 for collaboration. Followed with a video presented here and the corresponding press release here. The Blue Innovation Awards are an initiative of the Blue Cluster to give exposure to promising projects, products and services of companies, consortia and government institutions within the blue economy. They were launched successfully during the G-STIC 2020 conference in Brussels.

Figure 4 UNITED BE pilot at the award ceremony

The Belgian demonstration project within UNITED, a collaborative initiative involving the Ghent University, Jan De Nul Group, Brevisco, Colruyt Group, the Royal Belgian Institute of Natural Sciences, and Parkwind, proudly secured the Blue Innovation Swell Award at the prestigious Blue Innovation Awards 2022 by the Blue Cluster in Belgium. The project, recognized for its exceptional quality, focuses on the integration of offshore wind, aquaculture, and the restoration of flat oysters and seaweed cultivation. This recognition celebrates the innovative character, economic relevance to activities in and around the sea, market potential, international aspirations, and alignment with the United Nations' sustainable development goals. Winning this esteemed honour not only acknowledges the dedication and excellence of the UNITED partners but also highlights their contribution to advancing the blue economy. The winners will be featured prominently at the Blue Cluster events throughout the year and have the privilege of displaying the unique Blue Innovation Awards logo. For further details, you can explore the announcement of winners here.

Several news items giving more information about UNITED awards are available under the Newsletter section of UNITED website.

5.14. Technology Transfer at the UNITED Final Event

The Ocean Multi-Use Final UNITED Event, held in Gothenburg from November 14-16 alongside the Mission Arena, successfully brought together experts, panellists, and stakeholders in a comprehensive program exploring various aspects of multi-use sustainability. With sessions ranging from discussions on reconciling different national priorities in offshore wind multi-use to insights into the achievements and impacts of the UNITED pilot projects, the event facilitated rich discussions and offered a glimpse into the latest technological advancements. Attendees had the opportunity to engage in solution-based discussions, explore the Ocean Multi-Use Blueprint's practical applications, and learn about the potential of multi-use innovation through the Ocean Multi-Use Industry Sounding Board. The event also featured workshops, including one addressing the gender gap in the blue economy. Participants were encouraged to actively contribute to discussions and explore ways to gather data on women's roles in the blue economy across the BANOS region. The agenda and details of the sessions can be found here and on the UNITED website here, ensuring a valuable experience for those seeking a sustainable future for ocean activities.

In particular, a session titled 'Multi-Use Technology Roadshow' dedicated to technology was held during the UNITED final event. A comprehensive overview of all technology solutions developed in UNITED have been presented during the event. This session served to present and discuss a comparison of tools and techniques used across pilots, in close to shore versus far offshore environments, different materials and technologies used etc.

Moreover, a session titled 'From Benefits to Business: Strategizing Commercialization of Ocean Multi-Use with UNITED' focusing on the commercialisation and exploitation of UNITED results and outputs also took place during the event.

The section below provides the summary of the two mentioned workshop sessions that have contributed to the technology transfer in UNITED.

5.14.1. From benefits to business: strategizing commercialization of ocean multi- use

Date: Wednesday, November 15th, 2023

The session focused on unlocking the innovation and commercialization potential of ocean multi-use. Participants explored UNITED's Ocean Multi-Use Commercialization Roadmap, business plans, and broader socio-economic benefits. Insights were shared by the expert panel on the commercialization and intellectual property aspects of ocean multi-use solutions.

In the workshop session, Ivana Lukic presented the Ocean Multi-Use Commercialization Roadmap, tracing the evolution of multi-use and discussing key policy levers at both EU and national levels. Challenges in insurance and the leveraging of market forces, including aquaculture, tourism, and offshore wind, were explored. The realization of business opportunities, such as the Danish cooperative ownership model, was discussed. Youssef Zaiter from Acteon provided insights into socio-economic benefits and business plans, utilizing SWOT analysis and the Business Model Canvas. Thordur Reynisson from Nordic Innovation introduced their joint Nordic push towards multi-use at sea and presented an open call for funding Nordic MU projects. The lectures offered a comprehensive view from benefits to business, emphasizing practical applications and the potential for ocean multi-use projects to reach a commercial state.

PANEL: Commercialisation potential of multi-use pilot projects: what are the benefits, to whom, and how could these be exploited?

- Tim Staufenberger - Kieler Meeresfarm GmbH & Co. KG; Joost Wouters - The Seaweed Company;
- Hans Chr Sørensen – SPOK;
- Brigitte Vlaswinkel - Oceans of Energy

Offshore wind and solar as a solution to maximise the renewables generation offshore: The panel discussion highlighted the potential synergies of solar energy and offshore wind, achievable through shared infrastructure leading to economic benefits. Brigitte Vlaswinkel's addressed the commercialization challenges associated with

transitioning from near shore to offshore ventures, referring to harsher environments and more time spent onboard to reach the offshore location. Grid connection challenges were also acknowledged. The first Belgian commercial offshore solar farm operational by 2025 within a wind farm was announced to showcase government support through incentives and non-financial tendering criteria. It has been emphasized that this multi-use solution is not feasible only for the future wind farms but integrating solar energy into existing wind parks should also be increasingly considered due to the clear added benefits that can be derived.

5.14.2. Technology Roadshow

Date: Wednesday, November 15th, 2023

The MULTI-USE TECHNOLOGY ROADSHOW session at the UNITED final event, moderated by Roderik Hoekstra from Deltares, focused in the technological challenges, lessons learned, and recommendations for future multi-use endeavors, drawing on experiences from the UNITED and EU-SCORES pilot projects. The session highlighted complexities of deploying and maintaining multi-use infrastructures in offshore environments, showcasing the technological adaptations needed to withstand harsh marine conditions and the importance of data-centric approaches to monitoring and assessing environmental impacts.

Multi-Use Infrastructure and Technology Insights: Eva Strothotte (FuE-Zentrum FH Kiel GmbH) and Annelies Declercq (Ghent University) presented the decision-making processes and lessons learned from the German and Belgian pilots. The session emphasized overcoming the offshore environment's challenges, focusing on technology robustness. In the Belgian pilot, for example, 46km offshore at the Belwind site, innovations in longline designs and screw anchors were tested to minimize bottom impact. The importance of seeding techniques in seaweed cultivation in such exposed environments was highlighted, with a two-step direct seeding and a nursery period proving to be more successful compared to a direct seeding method.

The effectiveness of oyster cultivation techniques showed variation, hinging on factors such as fouling, design, weight, and the precise timing of installation. Success in offshore cultivation, especially in exposed areas like the Belgian part of the North Sea, was greatly influenced by these factors, emphasizing the importance of careful consideration and weather-dependent planning.

The opportunity for nature restoration within offshore wind farms was highlighted, especially with the incorporation of oyster cages into scour protection structures. Despite the modest scale of the restoration cages, they demonstrated success with observed flat oyster settlement on the scour and the presence of reef-building species such as Sabellaria.

Modelling and Monitoring: Ajie Brama Krishna Pribadi (Ghent University) discussed offshore aquaculture system design assessments using a numerical tool. Pedro Galvao from Hidromood presented the HiSeas data platform, highlighting the importance of centralized data in multi-use projects. Contributions from Evaggelia Labrakopoulou (WINGS ICT) focused on various monitoring techniques and ICT solutions for environmental parameters in multi-use settings.

Renewable Energy Integration: The session also spotlighted the integration of solar and wind energy, with Brigitte Vlaswinkel (Oceans of Energy) sharing insights from the Dutch UNITED pilot, and Irina Temiz (Uppsala University) discussing the EU SCORES project's wind and wave energy combination. These presentations illuminated the potential of such technologies to contribute significantly to renewable energy targets, optimizing space between wind farms for solar or wave energy generation. Pelle van den Heuvel (Ventolines) addressed the industry-related challenges of these multi-use combinations, calling for government action through regulatory incentives. He also announced an upcoming report on the subject to be released on the UNITED website in December 2023. The session concluded with a forward-looking statement about the Netherlands' first commercial offshore solar farm within a wind farm, expected to be operational by 2025 at Hollandse Kust Noord, featuring 200 floaters with a total capacity of 500 kWp PV.

6. CONCLUSION:

As the UNITED project progressed through its diverse pilots in Germany, the Netherlands, Belgium, Denmark, and Greece, it exemplified the EU's commitment to environmental sustainability, innovation, and economic growth. By integrating technology transfer, exploitation, and robust IP protection measures, the project not only met its specific goals but also aligned with the broader aspirations of the European Union for a sustainable and competitive future.

Next steps and recommendations for future endeavours

Moving forward, the next steps and recommendations for future endeavours should involve sustained collaboration among stakeholders, policymakers, and industry players to further **integrate multi-use solutions into national policies and regulatory frameworks.**

Efforts should be directed towards **establishing standardized procedures for technology transfer, intellectual property protection, and commercialization** across diverse geographical contexts. Future projects and pilots, such as ULTFRAMS and OLAMUR could play an important role in paving the way to multi-use commercialisation. The Mission Ocean BANOS also could have a relevant role in bringing relevant projects together in the Baltic and North Sea Regions for the joint policy advise and the development of new industry standards and procedures.

Additionally, **fostering educational initiatives** and expanding marine-related study curricula at both academic and professional levels will be crucial for cultivating a skilled workforce.

Continuous engagement with relevant projects, platforms, and multiplier organizations should be prioritized to leverage synergies and contribute to the evolving landscape of marine activities. The recognition and incentivization of innovative solutions, as exemplified by the Blue Innovation Swell Award, should be encouraged to stimulate further advancements.

Embracing a holistic approach that encompasses legal, technological, and educational dimensions will be pivotal in ensuring the sustained success and growth of multi-use initiatives in the maritime domain.

DELIVERING AN EFFECTIVE INVESTOR PITCH ON OCEAN MULTI-USE SOLUTIONS: AN ESSENTIAL GUIDE

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INTRODUCTION:

When presenting a multi-use solution to potential stakeholders and investors, a captivating pitch that resonates with their unique interests is needed.
This guideline outlines key findings on effective pitching, highlighting its relevance in conveying the value proposition of the multi-use solution.

STEP BY STEP GUIDELINE

1 EFFECTIVE PRESENTATION TECHNIQUES:

Make a lasting impact with a fast, engaging, and well-structured pitch. Utilize concise, clear sentences, maintaining an energetic tone and pace. Summarize the concept in easy-to-understand points and use visual aids or demos to enhance comprehension. Emphasize the value proposition, focusing on the benefits for the audience. Respect allocated time and start strong to capture attention, encouraging active participation and follow-up actions.

2 TAILORING THE STORY TO THE MULTIDISCIPLINARY AUDIENCE:

Ocean multi-use solutions are inherently multidisciplinary, bringing together different sectors such as offshore wind and aquaculture in a shared offshore platform. As a result, effectively presenting these solutions requires **adapting the terminology and language to ensure clarity and understanding for both sectors in the audience.** It is important to acknowledge the diverse backgrounds and expertise of the stakeholders and bridge the language gap, enabling effective comprehension among stakeholders from various sectors.

3 LEVERAGING THE POWER OF EXAMPLES IN AN INNOVATIVE LANDSCAPE:

In the absence of a traditional track record on ocean multi-use, **draw on successes from involved industries or land-based projects to showcase the multi-use scenario's potential.** Instill confidence and credibility through compelling parallels.

4 PIONEERING SUSTAINABILITY AND SPACE EFFICIENCY:

Go beyond economic gains; **emphasize the multi-use scenario's contribution to sustainability and efficient use of sea space.** Present its positive environmental and societal impacts, appealing to stakeholders seeking responsible investments.

5 UNITING STAKEHOLDERS WITH A SINGULAR VISION:

Craft a cohesive narrative, uniting stakeholders under the shared vision of the multi-use scenario. **Mission, vision, and core values become guiding beacons that foster alignment and purpose.**

6 DEMONSTRATING RESILIENCE AND ADAPTABILITY:

Address inherent challenges with resilience and a robust strategy. **Showcase adaptability**, instilling confidence in the project's ability to navigate uncertainties and evolve. In the context of pitching an offshore wind farm project, resilience reflects its ability to withstand harsh weather conditions and unforeseen challenges in the open sea, while adaptability showcases its capacity to leverage technological advancements and adapt strategies to optimize energy production. For example, the wind farm's use of robust turbine designs and weather-resistant materials demonstrates its resilience against strong storms and turbulent conditions, while its ability to implement flexible energy storage solutions exhibits adaptability in managing fluctuations in energy demand and supply.

7 VISUAL STORYTELLING AND INTERACTIVE ENGAGEMENT:

Immerse the audience with dynamic visual storytelling and interactive elements. Utilize visual aids and encourage participation for active engagement and follow-up actions. Given that multi-use is a relatively new concept, it can be challenging for the audience to visualize and comprehend it solely through verbal descriptions. Therefore, the use of visuals, such as pictures and videos, becomes crucial in helping the audience imagine and grasp the essence of multi-use and thus bridge the gap between the abstract concept and the audience's understanding or how multi-use looks and functions in practice.

This document has been crafted as a result of the Pitching service provided by Horizon Result Booster.

GUIDANCE FOR MANAGING THE INTELLECTUAL PROPERTY RIGHTS IN MULTI-USE PROJECTS

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IP DEFINITION:

IP Definition: Intellectual Property (IP) refers to creations of the human mind such as literary works, artistic works, inventions, designs, symbols, names, images, computer code, etc.

INTELLECTUAL PROPERTY RIGHTS (IPR):

IPR refers to the legal rights given to the inventor or creator to earn recognition or financial benefit from what they invent or create. These legal rights confer an exclusive right to the inventor/creator, or his assignee, to use and exploit his invention/creation for a given period of time.

By striking the right balance between the interests of innovators and the wider public interest, the IP system aims to foster an environment in which creativity and innovation can flourish.

Over the past few decades, the center of wealth creation has been shifting from tangible assets to Intangible Assets or, as OECD calls it, the "knowledge-based capital".

In the current economy, Intangible Assets are giving important competitive advantages to companies (entrepreneurial ability, client's fidelity...). IPRs are considered the core part of Intangible Assets.

8 COMMON INTELLECTUAL PROPERTY RIGHTS (IPR) IN THE CONTEXT OF OFFSHORE MULTI-USE:

1.**Patents**: grant inventors exclusive rights to their inventions for a specific period, typically 20 years. In the context of offshore multi-use, patents may cover innovative technologies, equipment, or processes related to offshore energy production, aquaculture, desalination, or other activities.

2.**Trademarks**: protects brand names, logos, and symbols associated with offshore multi-use businesses or products. These rights prevent others from using similar marks that could cause confusion among consumers.

3.**Copyrights**: protect original creative works such as software, designs, reports, and publications related to offshore multi-use projects. Authors or creators have exclusive rights to reproduce, distribute, and display their works.

4.**Trade Secrets**: involve confidential and valuable information, such as processes, formulas, or data, that provide a competitive advantage in offshore industries. Protecting trade secrets often involves maintaining confidentiality through agreements and security measures.

5.**Industrial Design Rights**: protect the aesthetic and ornamental aspects of offshore structures or equipment, ensuring that their unique designs are not copied without permission.

6.**Utility Models**: similar to patents, protect innovations in the functionality or utility of offshore technologies and equipment. They often have shorter protection periods and may offer a less rigorous examination process than patents.

7.**Geographical Indications**: In some cases, offshore regions may be known for producing specific products related to multi-use activities, such as high-quality seafood. Geographical indications protect the reputation and authenticity of these products by restricting their use to the designated region.

8.**Plant Breeders' Rights**: If offshore multi-use involves activities like seaweed farming, plant breeders' rights can protect new and distinct varieties of seaweed developed through breeding programs.

1 RECOGNIZING IPR'S VALUE IN THE MULTI-USE CONTEXT:

IP, especially patents, acts as a versatile tool in multi-use projects, extending beyond protection:

- Marketing tool
- Demonstrates reliability
- Safeguards potential partners
- Allows multi-annual exploitation plans
- Represents a store of value
- All costs contribute to value
- Forms basis for licenses or technology transfers

2 VALIDATING INNOVATIONS FOR MULTI-USE SOLUTIONS DEVELOPMENT:

Patents validate technological innovation's validity and provide exclusive rights:

- Exclusive exploitation for 20 years
- Prohibits unauthorized use, production, sale
- Can be assigned or licensed
- Expands the public domain after 20 years

3 FOUNDATIONS FOR COLLABORATION AND MULTI-USE BENEFITS:

Patents foster collaboration, technology transfer, and value creation in multi-use scenarios:

- Promote knowledge exchange
- Facilitate mutually beneficial relationships

4 CRITERIA FOR PATENTABILITY IN MULTI-USE SETTINGS:

Understand patentability requirements for inventions in multi-use contexts:

- Novelty, inventiveness, industrial applicability
- Clear and concise descriptions

5 STRATEGIC PATENT SEARCHES FOR OFFSHORE MULTI-USE:

Scope of Patent Searches:

- **Identify the "Prior art"** or the relevant documents before a first patent application.
- This type of research, which is normally carried out by the examiner of the European patent office after the patent application or by the inventor before applying for a patent, focuses on the search for previous art documents that may be relevant for assessing the novelty and the invention step of the patent application. These prior art documents include a wide range of materials, such as patents granted, published patent applications, journals, and other non-patent literature, and may have been made public at any time prior to the filing of the invention

Search Methodology:

Aim to find documents claiming similar technical features, not mere word matches.

- **Searches based on keywords (intuitive but subjective):**

1- Operators: AND, OR, NOT

2- Proximity (i.e.: 3 words away from)

- **Searches by classification codes (IPC and CPC):**

1- IPC (International Patent Classification): a hierarchical system with sections, classes, subclasses, groups, subgroups. It includes 70.000 entries.

2- CPC (Cooperative Patent Classification): a joint project between the EPO and the United States Patent and Trademark Office. It includes 260.000 entries.

- **Searches by citations (cited or citing documents) into a specific application**.

Free of Charge Sources:

- Espacenet – patent search (National/Regional Patent Offices)
- PATENTSCOPE (wipo.int) (National/Regional Patent Offices)
- GOOGLE PATENTS (Independent Producers)

Fee-Based Sources:

- Derwent Innovation
- Orbit Intelligence
- Patbase
- Total Patent

When to conduct a patent search

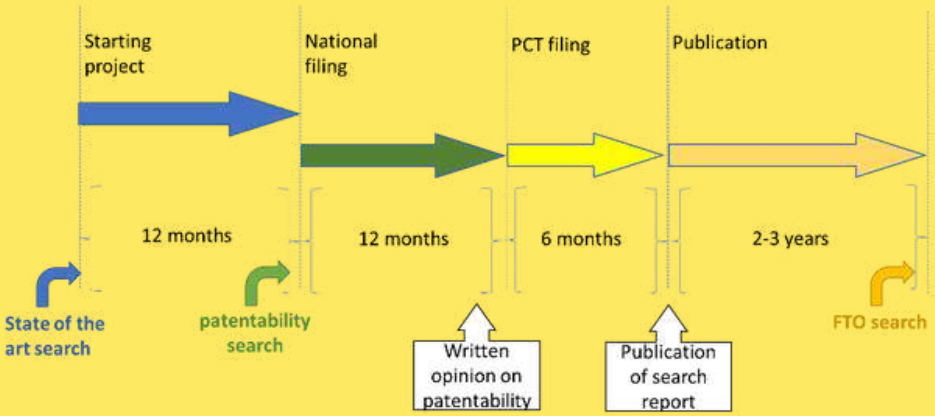
- As soon as the idea is formed, and it is possible to provide a schematic description of the invention.
- Before filing the patent application.
- Before introducing a product in the market to avoid infringing third party's IP rights.

Type of search

- **State of the art search:** to determine existing solutions and potential competitors within a given technology sector.
- **Patentability search:** to identify the "Prior art" or the relevant documents before a first patent application.
- **Freedom to operate search:** performed before introducing a patented product in the market. It identifies third-party patents potentially dangerous to the freedom to operate in the market and to the use the invention.

5 STRATEGIC PATENT SEARCHES FOR OFFSHORE MULTI-USE:

WHEN TO PERFORM WHAT TYPE OF SEARCH:



HOW TO CONDUCT THE SEARCH:

1. **Identify Essential Features:** Determine the key features of the invention.
2. **Select Databases:** Choose suitable patent databases for the search.
3. **General Keyword Search:** Start with a broad search using essential features as keywords.
4. **Refine with Advanced Search:** Combine keywords using Boolean operators for more precise results.
5. **Consider Classification Search**: Use classification codes to focus the search on specific technologies.
6. **Analyze Documents**: Evaluate search results for relevance.
7. **Select Promising Documents:** Choose documents most relevant to the invention.

- **Smart Search:** Use the smart search field to input keywords separated by AND/OR operators. Use the NOT operator to exclude specific terms.
- **Advanced Search:** Utilize advanced search fields for parameters like names, numbers, dates, or search locations (title, abstract, full text).
- **Classification Search:** Search with classification codes to refine results within specific technology areas.
- **CPC Classification Search by Keywords:** Input keywords to suggest relevant classification codes for the searched technology.

5 STRATEGIC PATENT SEARCHES FOR OFFSHORE MULTI-USE:

- **Search by keywords:** Multi-purpose, Multi-use, Multifunction, platform, offshore, wind energy, energy saving, aquaculture, cultivation.
- **Example of Classification search:**

-Y02E10/00: Energy generation through renewable energy sources
-Y02E10/70: Wind energy
-A01G33/00: Cultivation of seaweed or algae
-Y02A40/81: Aquaculture, e.g., of fish
-Y02A40/818: Alternative feeds for fish, e.g., in aquaculture

- **Example of a search query using some keywords and some classification codes:**

-[Multi-purpose OR Multi-use OR Multifunction] AND [platform OR offshore] AND [A01G33/00 OR Y02E10/70 OR Y02A40/81]

6 ENSURING CONFIDENTIALITY IN MULTI-USE VENTURES:

- Prioritize confidentiality with non-disclosure agreements during investor interactions. File patents pre-interaction to secure IP rights within the multi-use landscape.
- Trade Secrets are the secrets that you use in your business. Unlike patents, trade secrets are not registrable with an IP office, yet they are protected. Generally, protection of Trade Secrets is provided by specific laws, or within the domestic IP laws. Some examples of trade secrets:
- Business information (e.g.: information relating to customers and suppliers, their names, addresses, contact details..)
- Strategic information (e.g.: special techniques for marketing and for providing after-sale services, results of market surveys..)
- Technical information (e.g.: test results, quality control methods..)
- Financial information (e.g.: sales data, pricing lists..)
- To make sure that the information can be protected:
- Take any measure to keep the information secret
- Trade Secrets should essentially be of commercial significance to your business, precisely because they are not known to your competitors.

7 STRATEGIC PATENT SEARCHES FOR MULTI-USE OPTIMIZATION:

Regularly review and adapt IP strategies to align with project evolution and market shifts within multi-use scenarios.

GENERAL IP STRATEGY TAKEAWAYS:

- The best strategy is always to **patent all cutting-edge technologies in as many countries as possible** (including new markets);
- Combine a good patent strategy with a high level of secrecy of any non-patentable method or technology;
- **Tailor IP contracts** to suit the protectable IPRs, and make sure to include sufficient specific details in the contracts' key provisions;
- **Sign an NDA** or ensure that there is adequate protection in contracts addressing confidentiality issues (never start business negotiations without previously contractually securing trade secrets which are to be disclosed);
- **Include confidentiality provisions in all employee contracts.**

This guidance brief has been developed in the framework of the UNITED project in a series of sessions with the Horizon Results Booster. It is meant to be of use to the offshore multi-use innovators to advance the technological and commercial readiness level of multi-use solutions.

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