



Deliverable 7.3

Curriculum for offshore course, guideline, and learning manual

Work Package 7

Implementation of Multi-Use Concepts within Pilots

April 30th, 2021



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Author(s)	Nancy Nevejan, Eva Strothotte, Annelies Declercq, Manuel Lago, Thomas Kerkhove, Ioanna Drigkopoulou, Frank Maes, Ivana Lukic, Maria Jaeger, Tim Staufenberg, Roderik Hoekstra, Youssef Zaiter, Manon Berge	
Editor	Ghada El Serafy	
Approved by	Ghada El Serafy	
Project Officer	Giuseppe La Ciura	
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Table of Contents

1.	Acronyms	4
2.	Definitions	5
3.	Abstract	6
4.	Executive Summary	7
4.1.	Objective, approach and outcome	7
4.2.	Structure of the deliverable	8
4.3.	Connection with other deliverables	8
5.	Offshore Course Curriculum	10
5.1.	Facilities and infrastructure	10
5.1.1.	Teachers and instructors	10
5.1.2.	Location and infrastructure	10
5.1.3.	Requirements for participants	10
5.2.	Training and capacity building	10
5.2.1.	Method and teaching concept	10
5.2.2.	Feedback	10
5.3.	Training modules	11
5.3.1.	Environment and biology workshop: Including “Environmental regulations related to handling and disposal of wastes in an appropriate manner” and “Basic knowledge on the biology of target species employed and offshore aquaculture”	12
5.3.2.	Multi-use offshore Operation, Safety and Logistics Workshop: Including “Offshore platform operation” “Basic knowledge on operational needs for land-based support systems”, “Basic knowledge on legislation and operation for special support boats	13
5.3.3.	Technology workshop: Including “Basic knowledge on aquaculture technology employed in marine offshore farming”, “Basic knowledge on operational needs for land-based support systems”	15
5.3.4.	Law and regulation workshop: Including “Basic knowledge on legislation and operation for special support boats”	16
5.3.5.	Socio-Economic workshop: Including “Handling procedures and management issues of aquaculture offshore systems”, “Basic knowledge on operational needs for land-based support systems”	17
5.3.6.	Stakeholder engagement training for pilot leads	18
6.	Learning Material	20
6.1.	Public deliverables	20
6.2.	Manuals and guidelines	20
6.3.	Reports	20
7.	Conclusion and Recommendation	21
8.	References	22
	Annex A – Workshop Flyer	23

1. ACRONYMS

EIA	Environmental Impact Assessment
EMD	European Maritime Day
EU	European Union
GA	Grant Agreement
IP	Intellectual Property
MU	Multi-use
MUCL	Multi-use colocation
SEA	Strategic Environmental Assessment
TRL	Technology Readiness Level
WP	Work package



2. DEFINITIONS

No new definitions are used in this document

3. ABSTRACT

The ocean multi-use concept (e.g. combination of coastal tourism and aquaculture) is considered a potential solution to space scarcity and viability of offshore operations (e.g. combination with other offshore industries such as offshore wind energy production). Due to these most promising opportunities, several countries have begun to integrate the concept of multi-use in their maritime spatial plans or they at least plan on doing so. However, promoting multi-use requires a development of personnel capacity building alongside, in order to reduce risks and assure a safe work environment in the offshore sector. Hence, the objective of UNITED is not only to examine the economic, ecological, technical, social, political and legal aspects of multi-use, but also to push the trend of a modern and versatile offshore education concept that allows future employees to multifunctionally work in more than one offshore sector. Especially for the recruitment of experienced staff for multi-purpose industries, an educational program is highly important. This deliverable represents the multi-level (international, EU, national, local) and multi-sector (different marine and maritime industries) stakeholder workshop series, designed by the UNITED team, to address various offshore related topics. It describes a transferable interdisciplinary training concept, which allows stakeholders of different backgrounds (industry, scientific community, social and administrative representatives) to be informed and taught about, as well as actively be engaged in future multi-use activities. The newly designed training and teaching program provides a pandemic conform dissemination of knowledge and will provide the participants with a certificate, confirming they received a basic training in offshore multi-use operations. The proposed topics reflect the knowledge gaps and needs that were identified during the MUSES project.

This report synthesizes the workshop concept for capacity building of personnel, incorporating elements of hands-on experience as well as extensive technical competencies. The aim of the training workshops is not only to educate aquaculture researchers and industry stakeholders but also to facilitate a trans-disciplinary knowledge exchange of best practices from different offshore activities, to combine skills and possibly tools in order to advance an innovative, sustainable and safer multi-use sector.

4. EXECUTIVE SUMMARY

Background and context

UNITED demonstrates the benefits of the concept of multi-use of marine space through the development of five pilots under real environmental conditions, while relying on the *five pillars*: technical, regulatory, economic, social and environmental viability. Optimal multi-use concepts and co-location activities are implemented in *five pilots* across European regional seas in close cooperation of local stakeholders and industrial actors.

Based on identified promising designs and tackled regulatory and technological barriers for Multi-Use platforms and/or Co-Location at platforms (MUCL) from previously funded projects, *UNITED enhances on the five pilots across the North Sea, the Baltic and the Mediterranean involving industrial actors and integrating the knowledge, technologies and facilities, in multi-use platforms and/or co-location of different activities in a marine space*. The five pilots exhibit a wide range of dynamic conditions in different regional seas and demonstrate the benefits of different combinations of marine activities. UNITED elaborates on the economic benefit of combining activities for renewable energy (wind and solar), aquaculture, bio-resources, environmental restoration (oyster reef restoration), maritime transport, and tourism services, in the same marine space. This is achieved by increasing the efficiency of monitoring aspects, dividing and reducing the costs of offshore operations and the demand on space, and expanding and enhancing previously developed business models to reduce risk for operators and investors. UNITED includes a business plan and a commercial feasibility assessment that addresses possible trade-offs and costs for other sectors. It highlights the ways for optimal combined activities to generate revenue.

In this way, UNITED will *enhance the technology readiness level (TRL)* of the technology validated in a relevant environment (TRL 5) to a demonstration in an operational state (TRL 7+). Promoting multi-use requires a development of personnel capacity building alongside, in order to reduce risks and assure a safe work environment in the offshore sector. UNITED therefore aims to spearhead the trend of a modern and versatile offshore education concept that allows future employees to multifunctionally work in more than one offshore sector. The educational program is highly important particularly for recruitment of experienced staff for ongoing and future development of multi-purpose industries and future MU projects. At the same time, it will enhance the visibility of the five UNITED demonstration pilots and will improve the information exchange between UNITED and the stakeholder community. It will create public awareness about the economic sustainable opportunities of multi-use at sea. It is also envisaged that training and capacity building of personnel will significantly reduce risks, and increase safety and efficiency of the operations.

4.1. Objective, approach and outcome

- Objective:

This deliverable covers **training and capacity building of personnel** in order to **reduce risks, increase safety and efficiency for operation**. It is therefore closely linked to the **societal engagement in WP5** and **training activities in WP9**. The subtask will **prepare public awareness materials** not only for **touristic** purposes but also for **educational** objectives. The educational program is highly important for recruitment of experienced staff for ongoing and future development of multi-purpose industries. The necessary infrastructure teaching facility and staff with proper knowledge to develop such a **curriculum is available at the pilots**. The educational learning and training blocks are developed during the project while incorporating elements arriving from hands-on experience. As mentioned in the Grant agreement (GA), several learning modules (**GA module**) are obligatory from the start, including the regulations and legal rules applying to: **a) General aspects of offshore platform operation** (e.g. health and safety standards) (all pilots) **b) Environmental regulations** related to handling and disposal of wastes in an appropriate manner (all pilots) **c) Basic knowledge on the biology** of target species employed and offshore aquaculture (pilot 1,2,3,5) **d) Basic knowledge on aquaculture technology** employed in marine offshore farming (pilot 1,2,3,5) **e) Handling procedures and management issues** of aquaculture offshore systems (e.g. maintenance, stocking, harvesting) (pilot 1,2,3,5) **f) Basic knowledge on operational needs** for land-based support systems (spare parts logistics, perhaps data processing, further handling of harvest, storage and distribution) (all pilots) **g) Basic knowledge on legislation and operation** for special support boats (including courses on navigation, safety at sea and other regulatory requirements) (all pilots).

The curriculum for the offshore course, guideline and learning manual is documented in this deliverable D7.3. It intends to coordinate the training requirements of the industry and provides an educational program that raises awareness about multi-use of space. It covers training and capacity building of personnel through the organization of several courses. The hands-on experience should be practised during the first year of the nearshore testing phase. Once a certificate is achieved by following one of more training sessions as described by this deliverable 7.3, one may consider those certificate holders to be involved in the next phase of the project at the real offshore site. All other training and learning elements should be executed on the land-based facility.

- Approach:

Courses will consist of two elements: **1) 'training'** i.e. providing information to stakeholders (see further Chapter 4.3) and **2) 'workshop'** i.e. collecting information from stakeholders for the purpose of various WPs and the project in general. The latter may consist of a demonstration, or a visit to the pilot in person (which may be possible only in some pilot cases) or having a presentation about it be it in-person or online.

The training modules offered will be diverse. Some will encompass topics on regulations and legal rules, while for others educational learning and training blocks will be developed during the project while incorporating elements arriving from hands-on experience, especially practiced during the first year of the nearshore testing phase. Most training and learning elements are executed on the land-based facilities. The proposed training modules are elaborated on in Chapter 4.3.

Several teaching methods will be used, including lectures, demonstrations, online knowledge testing, and practical exercises. The organization of these training modules will rely on the knowledge and experience of the consortium partners who will provide pilot-specific material (e.g. graphics, handling instructions, operational schemes, etc.), but will also make use of existing training programs. The AquaTT network (<https://www.aquatt.ie/about/aquatt>) for example could be consulted to help organize some training sessions.

- Outcome:

A curriculum for the offshore course, guidelines and learning manual is documented. It also includes a description of its practical implementation.

4.2. Structure of the deliverable

This deliverable gives an overview about the topics and teaching content as well as suitable teaching methods that will be applied. Moreover, adaptations to the COVID-19 circumstances will be presented. Since conditions will change with time and since it is anticipated that the world will never be able to fully return to what we previously called "normal" conditions, this information material will need continuous updating, based on changing regulations in the jurisdictions of operation but also based on improved knowledge and adjusted strategies to cope with the societal response to pandemics.

4.3. Connection with other deliverables

As mentioned above, this subtask covers training and capacity building of personnel in order to reduce risks, increase safety and efficiency for operation. Taking this into account, a selection of specific workshops was already defined in D9.2. This overview is the basis for the description of the workshops found below. A more detailed description is made possible thanks to the experience of the pilots in the pre-operational phase and the progress made in the supporting five work packages that deal with the technical, environmental, legal, societal and economic aspects.

It is clear that this deliverable is closely linked to the societal engagement in WP5 (D5.2, D5.3, D5.4, D5.5) and training activities in WP9 (D9.2, D9.4, D9.5, 9.6). The list of stakeholders as collected under WP5 ("Stakeholder registers tool") and explained under Workshop 5.3.6 Stakeholder engagement training for pilot leads, will be used

to announce the workshops in order to contact the stakeholder community envisaged by each workshop and to enhance the number of subscriptions. A flyer has been developed for that purpose (see Annex A – Workshop Flyer) as well which should encourage people to subscribe. Also, the questionnaire developed under WP5 (D5.4 Questionnaire SHE) for the participants to evaluate public activities of the United project, will be used after each workshop in order to learn how the workshop is appreciated and how things should possibly be improved for the workshops to follow. Under WP9 (D9.5 and D9.6) training sessions will be undertaken to specifically facilitate transfer of knowledge and technology. The organization of the workshops, as described under this deliverable 7.3 are part of these sessions.

5. OFFSHORE COURSE CURRICULUM

5.1. Facilities and infrastructure

5.1.1. Teachers and instructors

The training will be provided by different people, depending on the pilot and topic. They include qualified and experienced staff working at the pilot site; invited experts from renowned research institutes, private companies and universities. This may include members of the steering committee of UNITED; and members of the UNITED pilots.

5.1.2. Location and infrastructure

- Conference rooms (enough space, software, hardware, catering, ...) will be provided that are large enough to accommodate a selected number of participants (number adjusted to the local COVID-19 situation and regulations);
- Key operational equipment items that can be displayed during the workshop (in the lecture room) will be provided whenever possible;
- Outdoor training opportunities at the site of the pilot will be considered whenever possible, logistically and financially.

5.1.3. Requirements for participants

- Each workshop will have targeted audience, depending on the topic. Selection will be made with the help of the stakeholder's list (see Deliverable 5.1). In general though, it can be said that the curricula will be specifically developed for people with direct relation to and/or employment in the blue economy, such as the offshore renewable energy production industry, adventure tourism, open ocean aquaculture and nature restoration;
- COVID-19 hygiene concept for in-person trainings/visits: upon registration, all course participants will receive a detailed hygiene concept based on the then ruling specific COVID-19 requirements at the training location.

5.2. Training and capacity building

5.2.1. Method and teaching concept

- The aim of the training sessions is to provide the participants with
 - o cognitive skills (understanding/gaining knowledge),
 - o psychomotor learning (physical skills such as movement, coordination, manipulation, dexterity, strength, speed—hence actions which demonstrate fine or gross motor skills),
 - o affective learning (social competency, team spirit...).

Different teaching tools will be applied such as lectures and exercises. This may happen in person or virtually, depending largely on the COVID-19 situation at the time. When virtual, online tools such as mentimeters should allow the training sessions to be feedback-oriented and interactive. In case people are physically present, other possibilities such as hands-on practica can be included as well.

- The practical experience gained by the UNITED partners during the pre-operational phase nearshore concerning installation and maintenance of infrastructure at sea, will be shared with the participants of the workshop and will encourage a dialogue whereby lessons learnt from both sides will be exchanged.

5.2.2. Feedback

- A questionnaire in the form of e.g. a mentimeter will be developed to collect immediate feedback on the training sessions. The questionnaire will be based on the indicators established for evaluating the impact of communications and engagement in the project. These are formed following the principles of salience, credibility, legitimacy and feasibility. Questions may include:

- What is the foreseen impact of these workshops on your current work?
- Do you think these workshops and the certificate will be useful to you?
- What factors, content, participants, dissemination methods should be used, to reach a positive effect after the termination of the workshops/for future projects?
- What do stakeholders expect, what are their needs for such workshops from your point of view?
- Do you have experience from former events, trainings, workshops with the same aim (e.g. AquaTT), please describe?
- Was this event inclusive enough and do you feel that everyone was involved in a fair way?
- Was the information you received relevant and sufficient?
- Has your knowledge increased compared to before the event?
- Do you think that the presenters and moderators have enough expertise in the given topics?

5.3. Training modules

Several modules on regulations and legal rules are considered as defined in the GA (4.1: Objectives) and are met by the 5 workshops (5.3.1 – 5.3.5) that are described in detail below. The educational learning and training blocks are developed during the project while incorporating elements arriving from hands-on experience. As mentioned in the GA, several learning modules are obligatory from the start.

Workshop Environment and biology (5.3.1) will cover training on environmental regulations related to handling and disposal of wastes in an appropriate manner (**GA module b**) and will provide basic knowledge on the biology of the target species employed in the offshore aquaculture systems (**GA module c**) (German, Dutch, Belgian and Greek pilot)

Workshop Multi-use offshore operation, safety and logistics (5.3.2) covers **GA module a** where health and safety standards for offshore platform operations are taught. This workshop applies to all pilots. Also, basic knowledge on operation for special support boats (including courses on navigation, safety at sea and other regulatory requirements) are incorporated in this workshop (**GA module g**).

Workshop Technology (5.3.3) will provide basic knowledge on aquaculture technology employed in marine offshore farming (German, Dutch, Belgian and Greek pilot) (**GA module d**), handling procedures and management issues of aquaculture offshore systems (e.g. maintenance, stocking, harvesting) (German, Dutch, Belgian and Greek pilot) (**GA module e**), and basic knowledge on operational needs for land-based support systems (spare parts logistics, perhaps data processing, further handling of harvest, storage and distribution) (**GA module f**) (all pilots)

Workshop Law & Regulation (5.3.4) covers the need for knowledge on and operation for special support boats (including courses on navigation, safety at sea and other regulatory requirements) (all pilots), as described under **GA module g**.

Workshop Socio-economic (5.4.5) offers knowledge on operational needs for land-based support systems (spare parts logistics, perhaps data processing, further handling of harvest, storage and distribution) (all pilots) (**GA module f**) and handling procedures and management issues of aquaculture offshore systems (e.g. maintenance, stocking, harvesting) (German, Dutch, Belgian and Greek pilot) (**GA module e**).

5.3.1. Environment and biology workshop: Including “Environmental regulations related to handling and disposal of wastes in an appropriate manner” and “Basic knowledge on the biology of target species employed and offshore aquaculture”

Knowledge, skills and competences to be acquired

This workshop aims to improve capacities and knowledge of aquaculture related businesses in the context of:

- Environment: Identification and the impact of the application of regulations (e.g. related to handling and disposal of wastes in an appropriate manner, introduction of new species and infrastructure, ...) on aquaculture activities in a multi-use context
- Biology: Basic knowledge on the target species employed and impact of offshore conditions on performance

Content

This training workshop aims to raise the awareness and knowledge about multi-use for those working in the aquaculture sector but also more in general for those people who are working in the maritime sector, be it private companies or public agencies. The workshop especially focuses on aquaculture given that the aquaculture offshore and associated value chain is still a relatively ‘young sector’ in the EU. The workshop consists of two parts. The first part is more oriented towards offering training to project partners and people already familiar with aquaculture, and marine users, based on the lessons learnt after two years of experience in the UNITED project. This encompasses two modules: 1) one covering different issues related to the measurement of the environmental parameters and 2) the use of these parameters to test an environmental assessment framework in the second module. The second part of the workshop is meant to share the experience of the different multi-use pilots with the broader community.

The result of the workshop will help to fine-tune the environmental assessment framework that is developed under WP4 (Environmental gain of multi-use of marine space and infrastructure) and hence to the definition of the UNITED multi-use global assessment framework, which is one of the final main products of the project.

Part 1: Training & demonstration

The interactive workshop will allow for the exchange of lessons learned across pilots in the sphere of aquaculture and allow for cross-pilot learning to occur. It may include the invitation of external experts, in order to place things in a broader perspective. A total of two training sessions, over two modules, are envisaged:

MODULE 1: TRAINING ON STANDARDIZATION OF SELECTION AND MEASURING PARAMETERS

In three UNITED pilots (German, Dutch and Belgian), biological and environmental parameters of seaweed aquaculture will be collected. Which parameters will be investigated, and how the measurements will be collected, may however differ between pilots. There is clearly a need to harmonize the choice of parameters and the way they are measured in order to be able to compare them with each other.

This module will present and discuss the different parameters applied in the pilots and the tools and methods to measure them. The ultimate goal is to come to ‘lessons learnt’ for streamlining data collection on biological and environmental parameters of seaweed production for future multi-use projects involving seaweed aquaculture. Examples such as the farm management system (called “IMS”) developed during the Horizon2020 Impact project, where parameters have been identified that are determinant for the seaweed related business requirements, may serve as a basis. They include basic parameters such as Secchi depth to determine the light penetration depth; light intensity at the surface; temperature in 3m, 6m, 9m (according to light penetration), salinity and nutrient (N, P, Fe) concentrations. Based on these measurements, promising algae species and depth of growth can be determined. Furthermore, access to existing public data on these parameters and others may be included as well.

Target audience: seaweed producers, academics, project partners

MODULE 2: DEMONSTRATE THE APPLICABILITY OF THE ENVIRONMENTAL ASSESSMENT FRAMEWORK AS A GUIDANCE AND DECISION TOOL

In Task 4.2 of the Environmental Work Package (WP4), an environmental assessment framework is developed to assess the environmental impacts of different activities occurring in a multi-use setting. This framework will be applied in the five UNITED pilots, as part of Task 4.3. The goal of this module is to demonstrate the usefulness and applicability of the environmental assessment framework for future application in a multi-use context. It will be demonstrated e.g. how activities generate impacts on ecosystem components, how key impacts are selected, how the combination of activities (i.e. multi-use) can increase or decrease environmental impacts in comparison with a single-use setting, etc.

Ultimately, this part of the workshop will present and discuss experiences and lessons learnt of the application of the environmental assessment framework, and can give advice for its future application in multi-use projects.

Target audience: Marine users (developers, businesses, ...), governmental bodies (public authorities, advisory bodies, ...)

Part 2: Communication (exchange with stakeholders)

A networking event has been identified by some partners as a need amongst the different stakeholders. Such an event will exist of two different sessions. In the morning, a session aimed at a non-specialized public will be organized, where general information on aquaculture and its potential to be part of multi-use activities in open sea will be presented. In the afternoon, a specialized session will be organized for people who are already familiar with aquaculture and/or offshore activities. Preliminary results of the offshore production of bivalves and seaweed will be presented and compared amongst the pilots in function of the different environmental conditions in which the pilots are active. Focus is put on the biological performance and challenges encountered.

Target audience: broad public, aquaculture producers, governmental bodies

5.3.2. Multi-use offshore Operation, Safety and Logistics Workshop: Including “Off-shore platform operation” “Basic knowledge on operational needs for land-based support systems”, “Basic knowledge on legislation and operation for special support boats

Although offshore safety as well as logistics are vital topics, they represent a rather complex subject in the field. Thus, FuE conducted a literature research on particular stakeholder needs and requests regarding an offshore operation, safety and logistics workshop, in order to tailor the workshop topics according to stakeholder interests. A number of stakeholder events were conducted in the framework of “the Ocean of Tomorrow” EU Horizon2020 projects (e.g. MUSES, MERMAID). From these events, the most prominent topics were selected to be addressed in this workshop.

Overall, the major discussion points concerning the stakeholders, actively engaged in offshore operations, participating in different MU workshops were :

- i) **Operational and logistical solutions for offshore multi-use while realizing tangible and monetary benefits** (e.g. via shared logistics) and convince wind farm operators of new business models that also create mutual trust between concession holders;
- ii) **The difficulty to insure multi-use operations: How to organize a smooth and safe operation** of all kinds (act of god, work accidents, personal/tourist injuries, etc.).

These most valid questions are addressed from different angles together with a qualified team of scientists, entrepreneurs and skilled offshore workers/trainers in the health, safety and logistics workshop.

Knowledge, skills and competences to be acquired

The participants acquire an insight into

- The processes of offshore operation, maintenance and transportation
- Organizational and marine safety culture
- A basic understanding of offshore health and safety regulations
- Assessment of risks that are associated with offshore work

Following a participative training approach, the workshop promotes knowledge exchange and mutual learning between participants from academia and industry:

- Case studies for multi-use operational and logistic solutions
- Lessons learned from the UNITED pilots

Content

The workshop aims to improve knowledge transfer in the context of health and safety standards for offshore platform operation and multi-use logistics. The workshop focusses on questions such as “what are safety requirements of a multi-use offshore platform” and “how to properly plan and organize offshore operations”.

The workshop has two parts

- 1) Hands-on training that will communicate the project findings related to safety of multi-use offshore platforms and related logistics, and demonstrate work conducted at one of the pilot sites. Moreover, the workshop aims to discuss questions on whether some of the operations and maintenance activities can be combined in a multi-use system. Basic knowledge on operational needs for land-based support systems (spare parts logistics, perhaps data processing, further handling of harvest, storage and distribution) will be taught.

This part of the workshop provides the participants with the opportunity to acquire:

- Common vocabulary: Need for discussing proper use of vocabulary in multi-lingual definitions
- Skills and understanding of offshore health, safety and logistics
- Team management and leadership skills such as communication, operating effectively, planning and coordinating skills as these competencies will facilitate working side by side in a multicultural team or crew, of various professional backgrounds and different levels of qualifications, on board a vessel or on a remote offshore platform
- Discuss possibilities of which infrastructure or operational needs for land-based support systems (data processing, further handling of harvest, storage and distribution) required in offshore wind energy production, aquaculture or tourism may also be used for MU
- How operations and maintenance activities can be combined in a MU system

- 2) The interactive part will allow for the exchange of lessons learned across different case studies and UNITED pilots which work with offshore platforms and allow for cross-pilot learning to occur.

The aim is not only to educate researchers and industry stakeholders but also to facilitate a trans-disciplinary knowledge exchange of best practices from different offshore operations, to combine skills and possibly tools in order to advance an innovative, sustainable and safer MU sector. This workshop encourages innovative peer-to-peer networking and an up-to-date knowledge transfer between practitioners. It is crucial for the lecturers and course organizers to be in touch with the technical and safety developments in the offshore industry, in order to provide state-of-the-art up-skilling solutions (generic and subject-specific skills). Hence, new methodologies and approaches in the field of health, safety and logistics, originating from this workshop, will be included in the overall UNITED roadmap and the Deliverable D5.3 ‘Report on training workshops for stakeholder engagement’, which builds upon the course’s output and aims to improve the existing training material or develop new course material, where required. This way, the course is continuously honed, following a modular approach prompting flexible learning pathways for specific qualifications.

2.1. Health and Safety

This part covers the current occupational health and safety best practices across the sectors of the maritime industry. In this regard, **health and safety standards** for offshore platform operation and related **EU legislation** as well as **good seamanship** are addressed. Furthermore, legal obligations and restrictions regulating emergency cases and everyday work on offshore platforms and aboard vessels/ships will be communicated.

The 'Health and Safety' module is based on the project partners' vast expertise in the field of 'Maritime health and society: legal, safety and security-related aspects of multi-use platforms' (University of Southern Denmark, SDU), 'Safety regulations of Tourist Diving Expeditions' (Planet Blue) and 'General safety, Identification of hazards of offshore platforms' (Danish Pilot lead SPOK ApS).

2.2. Logistics

With increasing distances from the shore and growing sizes of offshore plants, the offshore industry faces the challenge of developing a sustainable logistics concepts in order to conduct projects and operations in the anticipated cost and time frame (Lange et al., 2012). This module addresses the frequent logistic strategies in maritime supply chains. Besides the type-dependent aquafarm operational needs, there are a number of logistic issues that are common to all, regardless whether farming involves fishes, molluscs or seaweeds or a combination of these target culture species and combinations with other resource users such as offshore wind farms, solar energy, oil rigs or any other industrial uses. These logistic issues relate specifically to weather-dependant transportation, operation and service work (in relation to the distance of the unit from the shore base, affecting the need for certain spare part availability onsite or at the land base, frequency of service visits in relation to season, product development and monitoring). These logistics have to be designed on examples of best practices from both the wind and aquaculture industry, accounting for an efficient use of restricted resources as e.g. installation vessels or port facilities. Next to offshore installation, challenges are the proper planning and flexible alternative scheduling for all types of operational modes (e.g. synchronization of work on timely stock inventory, production and delivery times as well as harvesting schedules).

To add a more practical component to the course, vivid examples from lessons learned in the UNITED pilots are presented, to also provide a basis for discussion about "alternative MU" scenarios. Questions will be raised about how pilot logistics may be improved, how risks and barriers can be solved and overcome and what future alternatives are possible.

The project findings related to efficiency and safety of logistics, as well as opportunities for combined operations and maintenance and work conducted at one of the pilot sites will be communicated.

Ultimately, this training workshop aims to raise the awareness and knowledge about multi-use for those working in offshore construction/operations (i.e., offshore wind/aquaculture/hydrogen storage/solar) and logistics i.e., boat operators and maintenance.

Target audience: all stakeholder levels: workers, managers, administrators, investors, regulatory authorities, scientists

5.3.3. Technology workshop: Including "Basic knowledge on aquaculture technology employed in marine offshore farming", "Basic knowledge on operational needs for land-based support systems"

Knowledge, skills and competences to be acquired

In this module, participants acquire knowledge on selected subject areas of offshore aquaculture and methods for designing a "multi-use co-location" facility, this includes the following competencies:

- introduction to different offshore aquaculture facility types.
- Understanding the technical, context of a multi-use facility and evaluation of the impacts

Content

The training aims to improve capacities and knowledge of aquaculture related businesses in the context of technology. This focuses on technical challenges and suitable aquaculture technology employed in marine offshore farming. The workshop especially focuses on these actors and topics given that aquaculture offshore and the associated value chain is still a relatively 'young sector' in the EU. The training will last two separate days and includes

- 1) An interactive training that will allow for the exchange of lessons learned across pilots in the sphere of technical aspects of aquaculture and allow for cross-pilot learning to occur;
- 2) A workshop to communicate and discuss the project findings in the technical challenges of aquaculture integrated with other activities, and demonstrate work conducted at one of the pilot sites (i.e. field trip);
- 3) A workshop focussed on WP2: "identification and the assessment of the optimal financial, economic and social location and management of relevant investments and sites over time and space, while considering different risk, technology, geospatial and policy frameworks";
- 4) Hands-on training to practice with the interactive data platform which will be developed in WP2. The data that will be collected by the pilots and disseminated on the data platform, allow the user to analyse the progress of several relevant pilot variables and correlated them to the evolution of e.g. ambient conditions, to facilitate optimization of the planning, installation and maintenance activities.

Ultimately, this training workshop aims to raise the awareness and knowledge about multi-use for those working in aquaculture sector.

Target audience: all UNITED partners, but in particular the partners with offshore field operations, hence the pilot operator and pilot owners.

5.3.4. Law and regulation workshop: Including "Basic knowledge on legislation and operation for special support boats"

Knowledge, skills and competences to be acquired

The objective of this workshop is to share the legal and insurance experiences of MU of the UNITED pilots. From this legal practice, the lessons learned and MU best legal practices will be collected and discussed with the participants of the workshop. This workshop will contribute to D6.2 (Case specific report on legal aspects and insurance issues).

Content

The workshop especially focuses on the legal and insurance aspects the MU actors are concerned with, and will be based on the experiences of the pilots, such as:

- Policy support to encourage MU of zones and installations;
- The regulatory framework to support multi-use, with focus on substance, such as concessions, permits, safety measures for third parties, decommissioning, nature restoration, and on procedures, such as for permits, SEA, EIA's, stakeholder and public participation;
- The insurance requirements in case of MU of zones and installations;
- How maritime spatial planning can consider multi-use in spatial plans (e.g. multiple-use zones).

Target audience: all UNITED pilots, in particular the MU operators, their legal department or services, their stakeholders, insurance companies, governmental bodies (public authorities, advisory bodies, ...).

5.3.5. Socio-Economic workshop: Including “Handling procedures and management issues of aquaculture offshore systems”, “Basic knowledge on operational needs for land-based support systems”

Knowledge, skills and competences to be acquired

The objective of this workshop is to share the results of socio-economic assessments of the UNITED pilot MU solutions, and to ensure legacy of the project by training professionals to make/adapt business models for ocean multi-use, and to take into consideration its socio-economic components. It will also help inhabitants, local and regional planners, and decision makers to understand how their area could benefit from multi-use.

The workshops will build on the following competencies:

- Have a clear view on (socio- economic) impacts and benefits of MU on an area/pilot
- Provide hands -n experience on how to adapt/build a business plan for multi-use
- Validate the recommendations from UNITED, and share critical views
- Define conditions for successful future of MU, and integration with policy

Content

Building on the work done in terms of multi-use economic assessment and commercialisation in previous multi-use related projects including TROPOS, MARIBE, MERMAID, and MUSES, the workshop aims to discuss and fine-tune the UNITED business cases with potential users and other relevant stakeholders. The workshop will generate ideas and maximise socio-economic benefits of multi-use solutions resulting from the five UNITED pilots. Following are some of the questions that this workshop will consider:

- How to market and exploit multi-use products and create added benefits for both sectors and local communities?
- How can multi-use contribute to a more just use of the ocean and distribution of associated benefits?
- What are some transferable benefit sharing models that can be applied in the context of multi-use (i.e. cooperative ownership)?
- How to create the market pull/push for different multi-use solutions present in UNITED pilots?
- What are some not so obvious marketable products of multi-use and UNITED in general? e.g. IP rights, multi-use certification schemes, etc.
- How can MU contribute to a more just use of the maritime and coastal space and bring more local benefits to the local communities (e.g. what is the role of local cooperatives)?

This workshop will encourage

- Exchange of lessons learned across pilots with special engagement of marketing and business experts;
- Communication of project findings related to business opportunities and exploitation of multi-use products and services (e.g., multi-use certification, shared ownership structures);
- Session WP3 (Economics of MU platforms), WP5 (Societal interactions and engagement), WP8 (Assessment and validation), WP9 (Dissemination, exploitation and training activities) specific topics.

The workshop will also contribute to the Commercialisation Roadmap, which is one of the final main products of the UNITED project.

Practically, the workshop will consist of three parts:

Part 1: Open a dialogue with participants on the issues of the use of marine space. Possibility to invite high-level speakers (e.g. from Advisory board) to launch this discussion.

- What is in stake for the participant's own activity, their way of life, their principles in life?

Part 2: Hands-on experience training sessions (these could be parallel sessions each focusing on one respective MU combination). How can ocean multi-use help to address these issues?

- Training on how to develop business models for MU and evaluate it: train professionals to identify internal/external factors influencing the pilots and identifying the key elements (partners, and resources) for a good MU functioning
- Training on the different aspects of social impacts of MU? (e.g. impact on food security, local energy supply, fair business, ...). How to make sure that the social impacts are adequately considered?
- Experience feedback from one or two pilots on economic and social impacts (directly from one of the pilot partners)

Part 3: Discussion and data collection from participants

- Presenting results of socio-economic assessment (8.2) and business analysis, discussion, validation, open issues, collecting missing information and what conditions need for successful uptake
- Presenting and discussing the draft Ocean multi-use commercialisation roadmap

This workshop could be organized back-to-back to another event (e.g. EMD), possibly with a side event, which will bring together our target audience.

Target audience: businesses along the relevant value chains already involved in multi-use development (could potentially be involved/interested in multi-use development), coastal urban planners, local/regional decision makers, authorities, inhabitants. Specific emphasis will be put on engagement of young businesses such as aquaculture, sustainable small-scale fisheries, sustainable tourism operators, etc., which often lack the necessary soft skills.

5.3.6. Stakeholder engagement training for pilot leads

Knowledge, skills and competences to be acquired

Engaging and receiving input from stakeholders is critical to the success of the project. Conducting a stakeholder engagement training workshop helps the project partners understand the context for the project and receive support from key players. The workshop took place back to back with the UNITED Project Assembly 2021. The workshop focused on project partners' needs that were collected during the interviews that took place with each of the pilot and WP leads prior to the training workshop. The following aspects were tackled during the workshop, among others:

- Validate situation analysis findings;
- Fill information gaps identified during the MU business analysis, technical analysis or societal acceptance;
- Better understand the potential risks during the operational phase;
- Begin to prioritize audiences, challenges to address and communication channels;
- Develop campaign concepts or messages;
- Ensure commercial success by directly engaging stakeholders.

Content

According to the Stakeholder Register Tool, as identified in deliverable D5.1, the UNITED project stakeholders are registered for certain solicitation measures and follow-up actions to be individually specified. More specifically, at this point, these registers have been created in order to have a list of the relevant stakeholders; to be able to find the contacts and basic information quickly and also to be able to have an overview of the different kind of stakeholders relevant in the project from both local pilot and general WP perspectives.

For the development of stakeholder engagement training, the stakeholder registers were further categorized:

- **Internal** (operational) stakeholders of the different MUs, participating in the MU activities
- **External** stakeholders, indirectly affected by the MUs, that could find potential in their own businesses through the UNITED project

These two categories could also be further divided in more purpose-specific categories. For instance: Internal stakeholders could be divided in operational team (working in day-to-day activities) and business stakeholders, the staff that manages the business activities at a higher level. Accordingly, for the external stakeholders, the division could be carried out in terms of their business interest (e.g. public authorities have a different interest from fish wholesalers). For the rollout of the stakeholder engagement in pilots, each pilot lead should first decide which stakeholders to invite based on their stakeholder categorization, the number of workshops, the data already collected and available for use, by also considering:

- Stakeholder business interest (according to stakeholder categorization);
- Stakeholder availability;
- COVID-19 constraints;

A number of questions should be raised in order to create meaningful workshops that would address the needs of these stakeholders, such as:

- What are the core business activities of the stakeholders and their involvement with the MU?
- What are the key business objectives?
- What are the challenges they face?
- Internal understanding and engagement with the MU.
- What they think about the MU and its potential?
- What is the expected result of the workshop in every case?

At least two workshops for selected internal and external stakeholders will be organized in each pilot. Given the circumstances of the pandemic, all workshops should be considered to be held online, with the use of tele-conference and online-meeting tools.

6. LEARNING MATERIAL

6.1. Public deliverables

Deliverables will be available on UNITED website and include amongst others:

- **Movies** (SOMOS framework) and online workshops and webinars
- **Briefing material** that will be sent to participants prior to the workshop. This may include, but not be limited to, the project deliverables, summaries and policy briefs, and reading material and questions for the interactive part of the workshop.
- **Recorded learning material** that will be sent to participants and posted on the website post workshop. Apart from the workshop report, this material will also include presentations given at the workshop, video recorded lectures and interviews with experts. Such material will be shared not only with participants, but also with all those identified as potentially interested in the topic. Modes and methods for such dissemination activity will rely mostly on the project website, social media, partner networks, working groups and associations. Relevant university alumni networks and ongoing courses participants will also be reached out to (Erasmus Mundus Alumni Network). Sharing of such material on learning platforms such as UDEMY and MASTERCLASS will also be considered.

6.2. Manuals and guidelines

- Simplified installation & maintenance manuals (derived from D7.2 “Developing a blueprint for the off-shore site operation”) without releasing confidential information
- Hands-on presentation on the needs for economic and business analysis to promote marine multiuse
- Presentations and step-by-step practical short guidance reports in the application of the business analysis framework under a marine multi-use setting
- Presentation and step-by-step practical short guidance report in the application of the economic analysis framework under a marine multi-use setting

6.3. Reports

- Presentations
- Research articles
- Academic literature (books, journal articles)

7. CONCLUSION AND RECOMMENDATION

Specific workshops were defined in D9.2 in accordance to the GA and thanks to the experience of the pilots in the pre-operational phase and the progress made in the supporting five work packages that deal with the technical, environmental, legal, societal and economic aspects. A detailed outline of the training courses can be found in this delivery 7.3. Courses will consist of two elements: 1) 'training' i.e. providing information to stakeholders and 2) workshop i.e. collecting information from stakeholders for the purpose of various WPs and the project in general. Uncertainties on how the workshops will be organized practically, due to COVID-19, do however not prevent the project partners to define the aim of the workshop and its content in detail.

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ANNEX A – WORKSHOP FLYER

Multi-Use Offshore Community Workshops

2021-2022

Throughout the UNITED project, the consortium organises a series of five training workshops. Workshops are addressing current and most pressing topics in the field of ocean multi-use activities. By examining diverse potential multi-use concepts from economical, ecological, legal, social and technical perspectives, these events offer a platform to bring together stakeholders from different ocean sectors, research community as well as the representatives of public administration and society.

During the workshops there will always be the opportunity for discussion, exchange of views and critical debates about national and international opportunities, obstacles and potentials of the blue economy. The outcomes of such discussions will be reflected in project deliverables and reports. The participants of the training workshops will receive briefing material before the event and a certificate following their involvement.

Sept/Nov 2021

WORKSHOP 1
Offshore Platform Operation, Safety and Logistics within the context of Multi-Use

The workshop aims to improve knowledge transfer of health and safety standards for offshore platform operation and multi-use logistics. As such it addresses questions such as "what are safety requirements of a multi-use offshore platform" in two parts:

1. Hands-on training will communicate the project findings related to safety of multi-use offshore platforms and related logistics. The workshop aims to discuss questions about whether some of the operations and maintenance activities can be combined in a multi-use system. Basic knowledge on operational needs for land-based support systems (water ports logistics, handling of harvest, storage and distribution) will be taught. Next to offshore installation, challenges such as the proper planning and flexible alternative scheduling for all types of operational modes are covered. Current occupational health and safety best practices across the sectors of the maritime industry (health and safety standards for offshore platform operation and related EU legislation) as well as good examples will be addressed.
2. The interactive part will allow for the exchange of lessons learned across different cost studies and UNITED pilots, which work with offshore platforms and allow for cross-pilot learning to occur.

Ultimately, this training workshop aims to raise the awareness and knowledge about multi-use for those working in offshore construction operations (i.e. offshore wind / aquaculture / hydrogen storage / oil) and logistics (i.e., boat operators and maintenance).

Feb/Apr 2022

WORKSHOP 2
Aquaculture Multi-Use Offshore: Environment and Biology

The workshop aims to improve capacities and knowledge of aquaculture related businesses in the context of:

- Environment: Identification and the impact of the application of regulations on aquaculture activities in a multi-use context.
- Biology: Basic knowledge on the target species employed and impact of offshore conditions on performance.

The workshop especially focuses on these actors and topics given that the aquaculture offshore and associated value chain is still a relatively "young sector" in the EU. The workshop consists of two modules:

1. In three pilots (Greece, Dutch and Belgium), biological and environmental parameters of seaweed aquaculture will be collected. This module will present and discuss the different parameters applied in the pilots and the tools and methods to measure them. The ultimate goal is to come to "lessons learnt" for streamlining data collection on biological and environmental parameters of seaweed production for future multi-use projects involving seaweed aquaculture. They include basic parameters such as Secchi depth to determine the light penetration depth, light intensity at the surface, temperature in 1m, 5m, 10m, salinity and nutrient (N, P, Fe) concentrations. Based on these measurements, promising strain species and depth of growth can be determined.
2. An environmental assessment framework is developed to investigate the environmental impacts of different activities occurring in the UNITED pilots. Ultimately, this training workshop aims to raise the awareness and knowledge about multi-use for those working in aquaculture sector. Furthermore, the identification and collection of relevant environmental data for the application of the assessment approach will be determined. Ultimately, this part of the workshop will present and discuss experiences, and lessons learnt of the application of the environmental assessment framework, and can give advice for its future application in multi-use projects.

May/June 2022

WORKSHOP 3
Multi-Use Offshore: Technology

The workshop aims to improve capacities and knowledge of aquaculture related businesses in the context of technology, focusing on technical challenges in marine offshore aquaculture farming. Given that the aquaculture offshore and associated value chain is still a relatively "young sector" in the EU, the workshop focuses on relevant actors and topics, consisting of two parts:

1. Interactive workshop that will allow for the exchange of lessons learned across pilots in the sphere of aquaculture and allow for cross-pilot learning to occur.
2. Workshop to communicate and discuss the project findings in the sphere of aquaculture, and demonstrate work conducted at one of the pilot sites (i.e. field trial).

Participants acquire knowledge about selected subject areas of offshore aquaculture and methods for designing a "multi-use co-location" facility, including the introduction to different offshore aquaculture facility types. Furthermore, the technical context of a multi-use facility and evaluation of impacts is provided.

Sept/Oct 2022

WORKSHOP 4
Multi-Use Business Cases and Economics

The workshop discusses UNITED business cases with potential actors and stakeholders to generate ideas and maximise socio-economic benefits of multi-use solutions. The following questions will be addressed:

- How to market and exploit multi-use products and create added benefits for both sectors and local communities?
- What are some transferable benefit sharing models that can be applied in the context of multi-use (i.e. cooperative ownership)?
- How to create the market pull/push for different multi-use solutions present in UNITED pilots?
- How to derive benefits for both sectors and encourage multi-use?

Moreover, the workshop will encourage the exchange of lessons learned across pilots with special engagement of marketing and business experts, while project findings related to business opportunities and exploitation of multi-use products and services is communicated (e.g. multi-use certification, shared ownership structures). The objective of this workshop is to ensure legacy of the project by training professionals to mainstream business models for ocean multi-use, and to take into consideration its socio-economic components. It will also help stakeholders, local and regional players, and decision makers to understand how their area could benefit from multi-use.

Nov/Dec 2022

WORKSHOP 5
Politics and Regulations affecting Multi-use

The objective of this workshop is to share the legal and insurance experiences of MU of the UNITED pilots. From this legal practice, the lessons learnt and MU best legal practices will be collected and discussed. The workshop focuses on legal aspects, actors are concerned with, when engaging in multi-use activities:

- What type of policy support is needed to encourage and/or force multi-use?
- What kind of regulatory framework can support multi-use?
- What kind of information is needed in order to become more confident about multi-use and start engaging in new projects?
- How can maritime spatial planning consider multi-use in spatial plans (e.g. multiple-use zones)?
- How can the ownership of multi-use farms be regulated for the space plot and products coming out of it?