DELIVERABLE 9.4

KNOWLEDGE TRANSFER PLAN

Work Package 9

Dissemination, Exploitation and Training Activities

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Abstract	This deliverable outlines the background literature knowledge on knowledge transfer activities and its application in practice. The insights and efforts used to find methods to support knowledge transfer such as webinars and workshops but also the barriers that are being faced during this procedure and plans to mitigate them is being presented in this report.
Keywords	Knowledge transfer plan, multi-use, stakeholders, end users, barriers

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ACRONYMES

CoP	Community of Practice
DMP	Data Management Plan
EFA	Emergency First Aid
FAIR	Factor Analysis of Information Risk
FAR	Federal Acquisition Regulation
GMDSS	Global Maritime Distress & Safety System
GWO	Global Wind Organisation
H2020	Horizon 2020 (European Commission funding programme)
H2Ocean	Development of a Wind-Wave Power Open-Sea Platform Equipped for Hydrogen Generation with Support for Multiple Users of Energy (FP7-Ocean 2011 funded project, 2012-2014)
H&S	Health and safety
LSA	Life Space Assessment
MARIBE	Marine Investment for the Blue Economy (Horizon 2020 funded project, 2015-2016)
MERMAID	Innovative Multi-purpose Off-shore Platforms: Planning, Design and Operation (FP7-Ocean 2011 funded project, 2012-2016)
MU	Multi-use
MUPS	Multi-use platforms
MUSES	Multi-Use in European Seas (Horizon 2020 funded project, 2016-2018)
NGO	Non-Governmental Organization
O&M	Operations and maintenance
ORDP	Open Research Data Pilots
OWF	Offshore Wind Farm
PESTEL	Political, Economic, Social, Technological, Environmental, and Legal
PFPE	Personal Fall Protection Equipment
PPE	Personal Protective Equipment
RPO	Research Performing Organisation
SAR	Search And Rescue
SME	Small and medium-sized enterprise
SOMOS	Technical Standards for Safe Production of Food and Feed from marine plants and Safe Use of Ocean Space (Lloyd's Register Foundation funded project, 2016-2018)
Space@Sea	Horizon 2020 funded project, 2017-2020
SWOT	Strengths, Weaknesses, Opportunities, Threats
STCW	Standards of Training, Certification and Watchkeeping

TRL	Technology Readiness Level
TROPOS	Modular Multi-use Deep Water Offshore Platform Harnessing and Servicing Mediterranean, Subtropical and Tropical Marine and Maritime Resources (FP7-Ocean 2011 funded project, 2012-2015)
UNITED	Multi-Use offshore platforms demonstrators for boosting cost-effective and Eco-friendly production in sustainable marine activities (Horizon 2020 funded project, 2020-2023)
Win Wind	Project funded by Dutch Top sector Energy, 2018-2020
WP	Work Package
WTG	Wind Turbine Generator

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EXECUTIVE SUMMARY

This Deliverable 9.4 describes the Knowledge Transfer Plan within the UNITED project. As the UNITED project aims to enhance marine multi-use in European Seas, it deals with several different stakeholders. As the field of multi-use is very multi-disciplinary, this needs to be covered by the Knowledge Transfer Plan described in this deliverable. However, in order to successfully overcome knowledge transfer, many other barriers need to be tackled, such as language barriers, and terminology differences. Multi-use is also a novel concept, not well known to the relevant stakeholders. Thus, the main goal of knowledge transfer is to enable and maximise the exchange of knowledge between sources, users and end-users. In order to make knowledge transfer a success, despite the challenges and barriers within this field, several tools can be used such as workshops, training activities, conferences, publications, the website, social media, community of practices and the stakeholder advisory board of the UNITED project. Therefore, it is relevant that joint commitment and actions are taken among all involved parties to make knowledge transfer a success, not only within the UNITED project, but also for other users such as enterprises, NGOs, policy, researchers, academia and education institutes.

1. INTRODUCTION

1.1 Objective of this deliverable

The knowledge acquired from the UNITED project activities and research is hugely important to its stakeholders, whether they may be from industry, policy, society or from other academic backgrounds. For industry and science, it can catalyse innovation and the subsequent emergence of new business models thus advancing economic growth; for the policy community, it provides the latest research and best practices evidence for informed decision making. Not only are these improved economic and political landscapes advantageous for society, an improved understanding of the multi-use marine environment, resulting from the pilot trials, also allows us to further expand business potential as well as to protect the marine environment.

These guidelines are a core component of the UNITED training provided under Work Package 9. They have been developed to familiarise project partners with the UNITED Knowledge Transfer Methodology that will support them through the process of maximising these benefits from existing work. It is anticipated that following these procedures and methodology, the UNITED involved partners will be able to transfer the project's findings to relevant policy, industry, science and societal stakeholders.

This Deliverable provides a step-by-step guide through the UNITED Knowledge Transfer Methodology: collect, analysis and transfer. The project partners will be guided through these steps during the internal capacity training.

The key objectives of this deliverable are:

1. Define key terms related to UNITED Knowledge Transfer Methodology.
2. Lay out the Knowledge Output collection process.
3. Identify any gaps in the project regarding knowledge transfer means and methodology.
4. Assess, analyse and prioritise UNITED Knowledge Outputs.
5. Identify potential end users and target audience.
6. Lay out a plan for carrying out and measuring Knowledge Transfer.
7. Predict and assess if impacts have been achieved resulting from the implementation of the Knowledge Transfer activities.

1.2 Definition of Knowledge Transfer

The aim of Knowledge Transfer in the research process is to maximise the two-way flow of knowledge, such as ideas, concepts, technology, processes and/or intellectual property, between researchers, the users of that knowledge and the final end-users or beneficiaries of the research. The process of knowledge transfer enables various organisations, such as companies or other non-academic organisations (existing and new), community groups and the public sector, to drive innovation leading to economic, environmental and social impacts for the benefit of end-user stakeholders in society, policy and industry. It also enables publicly funded research performing organisations (RPOs) to advance research and teaching.

Knowledge transfer consists of a variety of activities which aim to capture, pass on and generate knowledge, skills and competences between those who generate them and those who can use them.

Therefore, research knowledge transfer is seen as a mechanism for the dissemination of research results, communication with stakeholders and the maximisation of impact. As such, knowledge transfer is considered a recognised activity in which RPOs are expected to engage in alongside or as an integral

part of their teaching and research activities. Indeed, these activities within the research process normally go hand-in-hand with each other as the outputs, results or knowledge of research projects are disseminated and communicated. How they fit into the programme logic of a research project are presented in the figure below (Institute for Work and Health of Ireland, 2020).

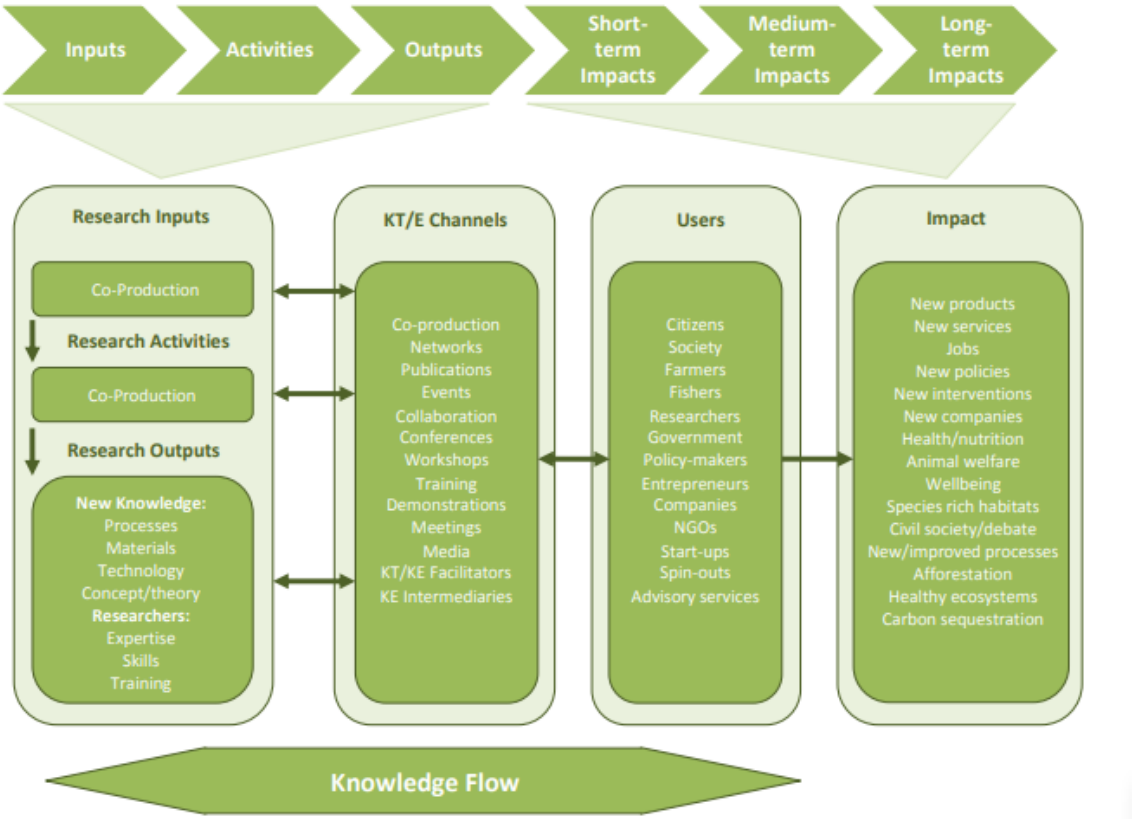

Figure 1 – Knowledge transfer flow – Adapted from: Institute of work and health of Ireland (2020) Knowledge transfer and exchange guide.

1.3 Strategy

The strategy that needs to be followed for defining the Knowledge Transfer Plan is laid out in this deliverable. The strategy can be summarized with the following steps:

Step 1. Identify needs

This first step sets the standard for the rest of the plan. Here, the project needs to pinpoint what type of information needs to be gathered and from whom. Some questions that can be taken into consideration are:

- What knowledge is most needed to develop multi-use?
- How many people possess this knowledge?

- How often this knowledge is required?
- What are the knowledge gaps among the pilots?

Step 2. Classification of knowledge and choice of format

UNITED needs to save the knowledge first into a data management system, then to classify each piece of information whether it is for example:

- **Explicit:** knowledge that's easy to share and document
- **Implicit:** the application of explicit knowledge (i.e. transferable skills)
- **Tacit:** knowledge that's acquired through experiences, observations, and insights
- **Transient:** knowledge that's made, used for a while, and then becomes redundant

Different formats/means to capture the different types of information are:

- Conferences
- Mentorship
- Paired work
- Guided experience
- Workshops
- Informational interviews
- Coaching
- Documentation
- Simulation
- Wikis
- Audio
- Video
- Transcripts
- Graphics and charts

Step 3. Gather knowledge

Here is where the plan starts forming. The identification and classification of the information has already been carried out as well as of the key stakeholders. The significant point at this step is how to organize the information and then categorize this per relevant stakeholder, meaning, what types of questions UNTED needs to provide answers to. These could include:

- Any critical tasks and their importance level
- When and how often each task or activity is carried out
- If there are any dependencies (is there anything that needs to be done before or after)
- Who's impacted
- Why multi-use is important
- What resources are required to carry out the multi-use
- What technical information is needed (logins, access rights, etc.)
- Any risks that could prevent delivery/completion
- What type of information are you trying to capture?

Step 4. Transfer knowledge

Factors that need to be considered when transferring knowledge:

- What is the skill or knowledge being transferred?
- What time and resources are or need to be available?
- How many people are involved?
- What are the preferred channels of communication of the people involved?

Step 5. Evaluate the implementation of the knowledge transfer plan

All the steps and tasks of knowledge transfer will be continuously monitored and evaluated taking into account specific key performance indicators through the established communication and documentation plan and enable for any modifications that may needed quickly enough in order to mitigate any risks.

1.4 Guiding Principles of Knowledge Transfer

In principle, the main characteristics for successful knowledge transfer according to Institute for Work and Health of Canada (2006) can be described as:

- Planning of the knowledge transfer with clear and simple objectives and creating some evaluation measures in order to track and demonstrate if and how the knowledge transfer objectives have been succeeded.
- Outputs or findings from proposed research becoming understood and making their connection and/or impact to the related stakeholders.
- Recognize and categorize the related key stakeholders and end users based on the influence and importance of the objectives. Consider the wider audience or specific stakeholders that may be included for enlarged stakeholders' group. A comprehensive stakeholder analysis may be required.
- Involvement of key stakeholders from the outset of the research project. This could offer a better understanding of the issues and opportunities of the research area and exploitation by stakeholders.
- Experimentation of new ideas for knowledge transfer activities on familiar people. This will be helpful for the most appropriate way of presenting them.
- Allowing space for serendipitous events to take place at any stage throughout or after the research.

1.5 Barriers to Knowledge Transfer

A brainstorming session organized in the context of the UNITED project as well as the dedicated desk research have identified several possible barriers to a successful knowledge transfer in the context of ocean multi-use. It has also suggested several mitigation measures and solutions to overcome these barriers.

Language

The UNITED Knowledge Transfer takes place across the EU and beyond. Thus, the fact that countries use different languages may hinder the successful knowledge transfer. This can be especially apparent in the cases where knowledge briefs are disseminated, in case of workshops and other knowledge communication material such as briefs, reports and press releases.

UNITED overcomes this challenge by scoping the needs in each of the pilot areas ensuring that dedicated communication materials are translated if needed, and that smaller local events are held in national languages, where needed.

Terminology

The concept of multi-use is in itself multidisciplinary, implying that people with different backgrounds and from different disciplines may need to work together and share knowledge and experiences to improve each other's capacities. Thus, the terminology used in different disciplines can become a barrier in terms of knowledge transfer.

UNITED will address this barrier by ensuring that the terminology used is adjusted to the target group and that additional explanations are provided when needed.

Time management issue

Many of the UNITED key target groups and stakeholders are professionals working offshore and/or in a fast-paced environment. Thus, usually only communication that is targeted and of high interest can reach them.

UNITED will ensure that the communication of knowledge and the knowledge exchange organized during the project is using an efficient, targeted and digestible approach, thus respecting limited time that UNITED stakeholders have and ensuring that the methods used are efficient and concise.

Barriers to knowledge transfer: Specific case of the UNITED Danish pilot

The UNITED pilot in Denmark focuses on the combination of offshore wind and tourism. Education and knowledge transfer is one of the key elements of this pilot, and is taking place in the context of boat tours to the offshore turbines. The educational boat tour to the wind farm organised for universities, and professionals working in the offshore wind energy sector is one of the main service offers provided by the pilot.

Nevertheless, the knowledge transfer in the context of educational offshore boat tours faces several challenges. A barrier to the transfer is related to the recruiting of new offshore tour guides. The person opening a wind turbine for visits needs to know a lot about the risk and how the turbine is operating. This person also has to be approved by the board of the Cooperative owning the turbine. Namely, stopping the turbine can result in loss of income for the Cooperative i.e. if one forgets to shift from manual control to remote control someone has to hire a boat and physically enter the turbine and reset the baton.

Novelty of the multi-use concept

Multi-Use is a new approach implying overall low understanding of and interest about it.

UNITED is using a variety of innovative approaches for the knowledge transfer. Some of these include the virtual tours that in a simple and attractive way convey the message to the audience and maximize interest in the project and the knowledge it generates.

Professions have been developed in silos

Offshore professions such as renewable energies, fisheries, shipping or tourism have been developed in silos. Professionals working in one of these fields often have a limited knowledge of how other ocean uses are functioning. The related education and specialized courses are also usually sector specific. This

challenges the multi-use development and knowledge transfer. Multi-use is in itself multi-disciplinary thus requiring a diverse set of skills and understanding of how several ocean uses function and interact with each other.

UNITED is addressing this barrier by organizing knowledge transfer training workshops that are multi-disciplinary thus bringing together a wider selection of stakeholders with different backgrounds. Such events and exchanges allow stakeholders to learn from each other and better understand each other's needs and gaps. Moreover, UNITED is collaborating with several knowledge transfer and capacity building initiatives such as PACT4SKILLS[1], MATES[2] and CAPACITY4MSP[3] ensuring that the message about the need for a more multi-disciplinary training is needed and will become even more relevant in the future.

1.6 Relationship to Other Plans and Deliverables within the UNITED project

The UNITED project has produced several plans that have relevance in the context of the Knowledge Transfer Plan. These include the initial plan for the communication and dissemination in the project, the plan for trainings and workshops, as well as the plan for stakeholder engagement.

Of particular relevance to the knowledge transfer are the following plans and procedures already developed in the UNITED project:

"Framework and practical guideline for stakeholder engagement" (UNITED Deliverable 5.1)

The report highlights the key stakeholder groups, and defines engagement means and methods for each of the groups. The report emphasizes that it is crucial to have those with the power actively involved throughout the project, in order to ensure the acceptance, feeling of ownership and implementation of final project recommendations (i.e. UNITED Commercialisation Roadmap). Therefore, it is of utmost importance to identify the needs and transfer the knowledge to those groups that are or will be working with the topic of ocean multi-use in the future. Building capacities of planners, regulators and developers may lead to increased utilisation of tools and methods developed in the project, and better uptake of ocean multi-use approach in general.

A series of workshops, interviews and other stakeholder methods undertaken in the context of UNITED will serve, among others, to improve the overall understanding of multi-use and improve knowledge about and uptake of UNITED tools and methods. Several workshops rolled out in the project will have the training character thus ensuring that the technology, knowledge and information collected in each of the pilots is transferred effectively to the key interest groups. Moreover, the training workshops also involve experts in the fields identified to be of relevance in terms of the current knowledge gaps. For example, the workshop that focused on the multi-use logistic, risks and safety involved several experts in the field of risk assessment, health and safety offshore to give lessons and answer possible questions from the public as well as from the UNITED pilots. Thus, the knowledge transfer goes both ways – from

[1] Pact for Skills, launched by the European Commission, is a shared engagement model for skills development in Europe. More info about the Pact4Skills available under: https://ec.europa.eu/social/main.jsp?catId=1517&langId=en

[2] MATES is an Erasmus+ project. It is a maritime alliance for fostering the European Blue Economy through a marine technology skilling strategy. More information about MATES project is available online under: https://www.projectmates.eu/

[3] Capacity4MSP is an Interreg Baltic Sea Region co-financed project focusing on the improvement of capacities of maritime spatial planners in the region and beyond. More information about the Capacity4MSP project is available online under: https://vasab.org/project/capacity4msp/

the UNITED project to the interest groups, as well as from the external experts to UNITED partners, especially those dealing with the implementation of pilots in practical terms.

"Initial communication plan" (UNITED Deliverable 9.2):

The UNITED project uses several channels of communication to raise the awareness about the multi-use topic and increase the visibility of the UNITED project. The communication takes place with many different parties on several levels. Firstly, internally between the large number of partners, secondly communication flows specific to the communities surrounding and involved with the demonstration pilots, and lastly with external entities that are concerned with the development, deployment, and management of multi-use from the local to international scales. As part of the UNITED communications, continuous dialogue with national and local authorities, insurance agencies, expert consultancies and other relevant stakeholders to enable the smooth implementation of pilots. Their direct involvement in the pilot activities increases their interest about the topic of multi-use, and improves their capacities for better consideration of the topic of multi-use in their work (e.g. consideration of multi-use in future rounds of wind energy tender criteria, consideration of multi-use in insurance policies, etc.). Specific stakeholders, relevant in the context of the UNITED demonstration pilots and project activities, have been identified and listed through the efforts of UNITED Work Package 5, notably in the initial communication plan. These specific stakeholders are aggregated into more broad and generalized stakeholder groups with whom the demonstration pilots will engage with on local and regional levels. The stakeholder lists are further expanded upon to include national, European, and international level actors with whom communication flows of critical outputs, defined in the implementation section of this document, will be employed for effective awareness raising and uptake of project results. This initial communication plan will be further adapted and enhanced as new stakeholder groups come to light throughout the execution of the project and additional details on specific items of importance for communication to stakeholders are developed through project activities. The final communication plan will reflect these evolutions and will be delivered at the end of the project to summarize overall communication actions taken throughout the life of the UNITED project.

"Curriculum for offshore course, guideline and learning manual" (UNITED Deliverable 7.3)

UNITED aims 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 programme 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. Ultimately, the 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.

The learning manual intends to coordinate the training requirements of the industry and provides an educational programme that raises awareness about multi-use of space. It covers training and capacity building of personnel. Courses will consist of two elements:

1) 'training' i.e. providing information to stakeholder - the training session may consist of a demonstration, or a visit to the pilot in person (which may only be possible in some pilot cases) or having a presentation about it be it in-person or online;

2) workshop i.e. collecting information from stakeholders for the purpose of various WPs and the project in general.

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 facility. The proposed training modules are elaborated in the manual. Several teaching methods are used, including lectures, demonstrations, online knowledge testing, and practical exercises. The subtask will rely on the knowledge and experience of the consortium partners who will provide pilot-specific material (e.g. graphics, handling instructions, operational schemes et cetera), but will also make use of existing training programs. The Knowledge Transfer Plan builds on these activities to clearly identify the knowledge transfer needs and to assign specific knowledge transfer activities to each of the relevant stakeholder groups, as presented in the following chapters.

2. THE KNOWLEDGE TRANSFER FRAMEWORK

2.1 Gap Analysis and Needs Fulfilment

2.1.1 – MU projects and good practice examples

The gaps and needs in terms of knowledge needed for the multi-use development have been collected in the context of this report. The literature review took place to identify the key knowledge gaps highlighted in past and ongoing multi-use projects. Additionally, a survey with the MATES PACT4SKILLS partnership was conducted in order to collect additional perspectives especially focusing on the offshore renewable energies sectors (see Annex 1 for the survey). Finally, a set of good practice examples are provided to motivate the action on the UNITED project and beyond in terms of the effective knowledge transfer and capacity building. The following information is a result of the above mentioned literature review and surveys.

Key skills necessary for the development of multi-use

Transdisciplinary and integrated approach is needed for addressing knowledge gaps related to new technologies, materials and processes

Transdisciplinary approach is needed for the implementation of ocean multi-use. Therefore, skills that allow to integrate technical, economic and social aspects of the problem are very important.

New knowledge skills should be developed, related to the new construction materials, new maintenance systems, autonomous vehicles, etc. However, the goal for the new skills will be to have a holistic vision of the ocean and answer the technical issues together with the social and environmental ones.

Specific skill gaps identified for different target groups

Different target groups, be it engineers, aquaculture farmers, offshore wind developers have different knowledge gaps. For example, for engineers, there is in general a lack of knowledge about biological need of aquaculture. For biologist, knowledge of the behaviour and environmental effects of wind turbines may be lacking. This further emphasizes the fact that a more integrated and transferal knowledge is needed, going across different sectors and disciplines. Moreover, it has been highlighted that the overall knowledge of social impacts is important for all multi-use combinations and professions.

Development of transversal skills

Beside technical knowledge and capacities, the following transversal skills are of utmost importance:

- Social and Communication Skills and Competences: Social and communication skills and competences allow the individual to interact with other people. *The skills and competences referred to under this heading relate to the ability to interact positively and productively with others. This is demonstrated by communicating ideas effectively and empathetically, coordinating one's own objectives and actions with those of others, seeking resolutions to differences, building trust and settling conflicts, ensuring the well-being and progress of others, managing activities and offering leadership.*
- Civic skills and competences: Multi-use will require co-development and involvement of a wide variety of actors who need to have a levelized understanding of multi-use. A joint decision making and methods for conducting these decision-making exercises will gain on importance. For example, the multi-use proposal should be seen by the expert group as a basis for further developments: Participating in democratic decision-making at all levels. i.e. acting according to the principles of justice. Acting with respect for social diversity and cohesion. Engaging in

community or neighborhood activities. *(Towards a structured and consistent terminology on transversal skills and competences 2nd report to ESCO Member States Working Group and EQF Advisory Group on a terminology for transversal skills and competences (TSCs), September 2020)*

The special case of aquaculture operators – advised by the Ocean Multi-Use Action Plan

Ocean Multi-Use Action Plan (2018) has highlighted that even where MU solutions may produce significant benefits, multiple barriers are stalling the transfer of MU from concept to implementation. Whereas earlier projects have mainly dealt with technological development, major barriers exist relating to regulatory, financing, liability and insurance issues; environmental concerns; stakeholder perceptions; and lack of appropriate skills. Namely, the action plan highlights that there is a need to equip aquaculture operators with skills and knowledge necessary for multi-use activities, especially those related to safety and service-oriented businesses. Fishers and aquaculture operators often lack experience and **skills regarding safety issues, entrepreneurship, permits and customer care, and language skills** needed to work with tourists, amongst other challenges of marketing and managing this type of business opportunity. Comprehensive training standards and guidelines that cover these aspects are yet to be developed. The lack of such skills tends to discourage fishers and farmers, especially after negative feedback from dissatisfied customers. The following sections provides a set of suggested actions on how to overcome the identified knowledge gaps:

1) Lack of experience and skills of fishers and aquaculture operators on how to work with tourists.
Suggested actions:

- Train fishers and farmers on skills and knowledge necessary for 'pescatourism', especially those related to safety and service-oriented businesses.
- develop comprehensive and bespoke training guidelines for fishers and farmers, and
- allocate time and funding towards such capacity building.

2) Aquaculture operators face barriers in relation to legislation regarding hosting tourists on board their vessels; regulations related to insurance against accidents; lack of standards and guidelines for aquaculture operators; and limited entrepreneurial and customer service skills.
Suggested actions:

- Provision of training and capacity building to aquaculture operators to improve their service skills. Educational opportunities to visit aquaculture farms should also be organised to increase the number of young people looking to take a job in aquaculture.
- Create educational opportunities for aquaculture operators to train members of the public to boost and sustain this MU operation.

Methods to address the above identified knowledge gaps and needs

The multi-use approach requires a change of paradigm and therefore needs a very practical approach to integrate transversal capacities and facilitate the combination of different perspectives (or at least the negotiation between different interests). The following methods have been highlighted as relevant for addressing the gaps related to the multi-use knowledge:

A. Changing the curriculums (e.g. university or spatialized schools curriculums): this is especially important in order to address the fact that future development in the ocean requires a more multi-disciplinary approach and thus the application of transversal skills and knowledge is of key relevance.

B. Supplementary vocational trainings: many of the professionals trained in one sphere of work e.g. engineering of the wind energy offshore will need to take supplementary courses to address possible knowledge gaps related to the innovative developments and combinations with other sectors that may require physical connection offshore be it in the form of a joint offshore island, joint infrastructure, or other.

C. **Certification trainings**: new certifications may be required for the combined activities offshore, or to cover the new technologies and activities that are just emerging such as floating renewables, diving in fish cages or other.

D. **Short voluntary courses** (no certification): short voluntary courses organised in the context of existing initiatives and projects such as UNITED and MUSICA are increasingly important to familiarize a wider range of actors about the concept of ocean multi-use, its functioning and general challenges.

E. **Reading and video material**: short videos, visual briefs and infographics are especially relevant to quickly gain attention of wide set of professionals working offshore and raise interest about multi-use and knowledge outputs of related projects.

F. **Training webinars/workshops**: knowledge exchange events, especially if developed in an interactive manner, can have an important role in improving skills and knowledge about specific topics such as multi-use business plans, product development, marketing or impact assessment.

Good examples - knowledge transfer and capacity building in aquaculture/ fishing sectors

1. Bespoke course for FLAG in Sodankylä, Finland

The following bespoke course content was developed for fishermen by the FLAG in Sodankylä, Finland, complemented by visits to businesses and tourism exhibitions. Four of the twenty local fishermen who attended the course went on to develop successful tourist packages. Course content:

→ Licence to carry passengers/ safety at work certification
→ First aid
→ Training in safety procedures/ consumer safety (legislation)
→ Product development (collective and individual)
→ Development of fishing tourism as a product
→ Training in English terminology specific to fishing tourism/ Russian culture and language
→ Public grants available for the promotion of tourism
→ Introduction to social media
→ Rescue activities on and around water
→ Greeting and guiding customers
→ Specifications and quality charter
→ Running the excursion ("story telling")

2. Bassin dÅLArcachon FLAG

Bassin dÅLArcachon bay (France) is popular area for Tourism and Aquaculture multi-use. Over a period of 45 years, the Bassin dÅLArcachon Fisheries Local Action Group (FLAG) lost around 700 oyster farms. This had negative socio-economic and environmental effects due to the importance of oysters in maintaining water quality. In response, the Regional Shellfish Farming Committee partnered with a local maritime college and careers office to promote oyster farming as an attractive career to students. Oyster farmers visited 13 schools to talk about their work and excursions were organised outside school hours for pupils to visit the area's oyster farms. Boats specially equipped for aquaculture tourism gave pupils an immersive experience of the activity, followed by an opportunity to taste the oysters. Around 10 youngsters a year are now starting up as oyster farmers in the area and the FLAG has further plans to promote the local fishing activity and the availability of local seafood in school canteens.

3. Education Center of Larnaca fishers trainings

After members of the PanCyprian Association of Professional Fishermen highlighted their interest in pescatourism training, and the legal and technical requirements to engage in direct sales related to these activities, a training programme was developed and implemented by the Educational Center of Larnaca (Cyprus) to train 35 fishers. It included two separate sessions, amounting to a total of 180 hours. These sessions were specifically aimed at professional fishermen and included an educational trip. The main topics addressed through training were:

→ marketing
→ new technologies and computers
→ logistics
→ legislation (including health and safety)
→ an educational trip to Crete (Greece)

Following the completion of the training, one of the fishermen launched a pescatourism activity, while four others increased their income through the development of direct sales activities. In addition to these immediate results, the training was also considered highly beneficial by other participants, who appreciated that the FLAG was taking their specific needs and expectations into account.

2.1.2 – Gap analysis and needs fulfilment in the UNITED pilots

The following table provides a summary of the knowledge transfer survey that has taken place with the UNITED pilots between December 2021 and February 2022. The aim of the questionnaire was to identify the key gaps that pilots may have in terms of the knowledge about multi-use development, and to

highlight possible lessons learned in terms of existing trainings in which the pilots have taken part. The lessons learned encompassed questions such as: 'Was the multi-use disciplinarity adequately addressed during the course?' and 'What trainings may still be lacking to properly address the multi-use development knowledge?' The survey template is provided in annex 2 of this report.

Table 1 – Summary of the results of the UNITED pilots' knowledge transfer survey

1. Trainings that UNITED pilots have taken part in for the purpose of multi-use
Almost all pilots took part in different training programmes and workshops, including safety and survival training. Some of them had more specific trainings such as diving and first aid courses in order for them to be able to have safe access and operation in the pilot area. While some pilots have no intention (except if it is asked for or needed) of attending new trainings but to put in practice everything they learned so far, others intend to retake courses like Survival and First aid, so as to maintain their validation during the project and get familiar with new practice introduction.
2. Importance of the trainings taken for the implementation of the multi-use activities in pilots
All pilots addressed the importance of trainings/courses for both visitors and workers. Specifically, safety training was considered of greatest importance since in case of emergency the rescuers could take up to an hour to arrive to the location and in the meanwhile everyone who has attended the courses can provide aid to those in need. Moreover, some courses were prerequired by the authorities or special training was needed in order for visitors to have access in more difficult parts of the pilots.
3. Content of the training
During the courses, participants acquired theoretical and practical training on prevention and safety topics in offshore emergencies, including legislations, survival, PPE – Personal Protective Equipment, LSA – Life Saving Appliances, PFPE - Personal Fall Protection Equipment, WTG – Work at Hight & Rescue, SAR – Search and Rescue, GMDSS - Global Maritime Distress and Safety System, FAR – First Aid Response + EFA – Elementary First Aid. Participants had also the chance to train on different topics like pingers, as well as get familiar with algae. Participants from other trainings acquired knowledge of personal survival techniques, fire prevention and personal safety, and underwater practical sessions, depending on the pilots' needs. All pilots were satisfied by the structure and content of the training courses. The providers were professional and gave attendants the chance to put in practice everything they were taught, thus combining theory and practice for optimal understanding. Participants obtained essential skills and realized the importance of emergency situations. Overall, the trainings were appropriate but there is always need for updating and keeping up with newest technology and practises.
4. Multi-disciplinarity of trainings
The training content for survival and safety courses (e.g. FINO3) applied to all MU activities, regardless if that is an aquaculture farm or offshore wind farm. Likewise, more specific courses (i.e. underwater environment, pinger etc.) are also adapted for training different sectors, while some have to be taken separately, since they are very specific to aquaculture or wind.

Apart from a few specialized courses, most of the survival and safety training included participants with different specializations and background knowledge (i.e. technicians, pilots, researchers, sailors etc.). This gave the attendants the opportunity to acquire a sphere of knowledge and listen to questions from various field of works.
5. Certifications obtained
Survival and First aid trainings came along with certifications by GWO, while CPOD confirmed participations and for some pilots from other organisations. Accordingly, STCW participants were assessed on the learning outcomes and those who succeeded were granted a 5-year certification. Some certifications enable participants to gain access to operators in offshore wind farms or open water dive up to 18m.
6. Certifications renewal
While CPOD handling and open water diving certifications do not expire, Survival and First aid certifications are valid for 2 years, but can be renewed while still valid if the holder takes another course. STCW Basic Safety Training needs to be refreshed every five years. There are cases of certification expirations in case of new technologies or practice introductions (e.g. audio system).
7. Gaps in terms of trainings needed to address the multi-use development
Even though there was no situation reported, in which lack of training/course could not cover lack of skill relevant to MU implementation, it is advised that courses train employees diversely, rather than training experts for each MU sector. Last but not least, there is always room for improvement for both courses that should always try to enrich their content and participants who should seek out for more experience and certifications.
8. Key elements of multi-use training/course
Key elements of multi-use related courses should include information of how to manage and operate safely (including special tools and equipment that is needed), dos and don'ts while working on multi-use installations, tactics – skills and mindset training, maintenance of other infrastructure and general safety requirements depending on the type of each installation (e.g. when climbing the turbine). Last but not least, biological background and ecological knowledge are also key elements for some of the trainings.
9. Key skills for the MU implementation
The importance of employee individual skills and the safety training are the key skills for MU implementation. Individual skills refer to background knowledge and education (e.g. technical skills, biotechnology, aquaculture, management etc.). Cooperation, understanding and willingness from all employees to learn is needed from all parties for the better implementation of the offshore multi-use. For the employees that work on difficult accessible installations, more specialized skills are needed such as health safety and diving or wind energy operating training.

2.1.3 – Target end users

The main key stakeholders that are involved in the knowledge transfer include people, groups, companies, and of course the public sector that will use the research project outputs and bring about change that will lead to impact. Two main categories of stakeholders exist and these are the target users and the end users. The target users are those who will take up the research and transform it into a product, service or policy. An example of them is an entrepreneur, policy maker, researcher, an established company or start up, or an NGO. The end users are the stakeholders that will use and benefit operationally from the research application such as educational institutions, research partners, public administrators, companies owning the boats or diving services, suppliers of mussels and algae, aquaculture farmers and owners of wind farms.

Both types of stakeholders are involved in the exchange of knowledge and dissemination from the research to promote the uptake and use. These types of stakeholders can be part of the research activities and they are also responsible for the development of the research outputs and the dissemination. An example of this can be the owner of the wind farm or an aquaculture site whose farm or site is used for research as part of the dissemination and communication activities of a research project.

Example of the Danish pilot: Knowledge transfer to new tour operators as end users

In the Danish pilot the actual knowhow transfer is conducted by having the new boat tour operators to follow an experienced operator to the guided tour. Thus the new operator is receives a training, and is also handed the written manual for visits. The knowledge transfer training is ideally done during a guided tour to avoid the extra expenses of a separate 'knowledge transfer tour'.

2.2 Knowledge Transfer Tools and Methods

Knowledge data includes not only the hard data and information products generated through direct and remote observation or modelling of the pilot sites. It further extends to the technical solutions, barriers to implementation, and recommendations on future policy, legal, financial, and technical aspects of multi-use within marine space. As the types of knowledge largely vary, an array of methods is implemented in order to disseminate and transfer this information to various stakeholder groups.

2.2.1 – Community Workshops

The main aim of these events is to engage relevant stakeholders in order to transfer knowledge in the form of a training workshop, and/or create ownership and encourage uptake of UNITED outputs through co-creation such as a user workshop. These workshops should ideally, whenever possible, be combined events to maximise impact and minimise travels. There will be at least five such workshops throughout the project. These may be organised as multi-day events to accommodate both 1) input to the project throughout the workshop with relevant experts, and 2) communicate with and teach the wider community. For example, the first day of the workshop may be structured as a focus group workshop with invited experts to gather input and exchange across pilots, and the second day may be structured as a training workshop, where a wider audience would be invited and both lectures, hands on exercises and field trips would be held. A detailed breakdown of the topical lists and methods of implementation of these workshops can be found in the communication plan, UNITED project Deliverable 9.2 – Initial Communication Plan.

2.2.2 – Project Communication Outlets

Through the communication plan, a number of continuous information and knowledge outlet facilities have been instituted. The UNITED project Deliverable 9.2 – Initial Communication Plan details these methods at length with the associated fulfilment criteria but those relevant to knowledge exchange are highlighted below.

2.2.3 – Training Activities

Training activities took place by different pilots in order for the people related to them to gain new skills and insights in the multi-use cases. Some of them included first aid trainings and others more advanced specialized to each pilot's needs.

2.2.4 – Participatory Webinars

These events have an overall aim to increase the visibility of UNITED project pilots and their activities, facilitate a wider discussion and raise awareness about the ocean multi-use topic. The interactive webinars are used to showcase advancements in five real-life ocean multi-use UNITED demonstration pilots and support the exchange of knowledge between participants. For example, attendees have an opportunity to interact with the pilot leads throughout the sli.do Q&A tool, exchange directly in breakout groups and answer polls/ see poll results. A wide range of topics and methods are used for conducting webinars to reach out to stakeholders at various knowledge levels. While UNITED webinars are aimed at a wide range of stakeholders, some of the webinars target only specific stakeholders in order to cover the above identified knowledge gaps in specific groups.

2.2.5 – Stakeholder Advisory Board and Community of Practice

UNITED engages with a number of relevant industry actors who have a place at the Stakeholder Advisory Board (SAB). These people provide a connection directly with other research venues and industry actors who would have interest in the data and knowledge generated in the project and they work to establish the *multi-use community of practice* that can collaborate throughout the project and continue this collaboration beyond the UNITED project. UNITED engagement activities such as workshops, interviews, webinars and joint development and review of outputs will serve to collect interest and first ideas for establishing such community. The initial phase has already been achieved by connecting to the existing Dutch COP. Through this initiative, the stake in multi-use will be enhanced and broadened in order to engage with the other regional European Seas. To do so, the outreach and communication activities will begin building on such a group through inclusion of specifically targeted webinars and group meetings (either virtually or in person, dependant on capacity). The momentum and connections developed along the lifetime of the UNITED project will be bundled into a stand-alone COP which will represent one of the legacy elements of the project and carry forth the final findings, good will, communication channels, and connections developed through the realization of the project work.

The UNITED website will have an important role in the formation and functioning of the community. It shall serve as a multi-use information gateway, including the multi-use FAQ section, examples and lessons learned from various multi-use related projects and interactive discussion pages. We aim to engage a wider multi-use community that would contribute to the updates of the platform in terms of multi-use related data, information, journal papers and pilots, beyond the UNITED project, and collaborate on organisation of joint events and future development opportunities in the context of multi-use.

2.2.6 – Conference Sessions/Presentations, Participation and Publications

The UNITED team already had the chance to participate in real life and in virtual conferences and many more are to follow. During the latest conference that UNITED partners participated, the session was dedicated to sharing experiences, opportunities, and limitations of multi-use in maritime spatial planning. A key point of discussion was how multi-use in the EU policy will be supported and how EU policies

aim to promote the rollout of multi-use approaches. Due to the intensive debate about marine multi-use, the UNITED team handed in a full paper to the proceedings of the WindEurope journal, sharing the many aspects and experiences made during the course of the project, when implementing multi-use pilot sites. UNITED uses every opportunity to join forces with other multi-use related projects, relevant initiatives, and multipliers to ensure that the maximised impact is reached in terms of knowledge transfer and outreach. For example, a joint session is organised at the European Maritime Days between EU-SCORES[4] project and UNITED targeting maritime spatial planners, among others, while a joint online workshop is also organised together with the MUSICA[5] project to cross compare lessons learned and ensure streamlined and synchronised knowledge transfer to the offshore renewable energy industry.

2.3 Knowledge & Data Collection and Transfer

The following subchapters link the key UNITED project activities in terms of knowledge and data collection per each of the Work Packages with relevant user groups and knowledge transfer activities.

2.3.1 – Site Monitoring and Modelling Data

Through the research and operational phases of the UNITED project, vast amounts of data are collected and utilized. These originate from the various sensors deployed within the pilot sites, process-based and statistical modelling activities to support the activities, and the results from the lab tests executed across the design, testing, and operational phases. Given the breadth of the data collected and variables involved, there is a need for a standardized framework to manage and treat project data. Under Horizon2020, the EU insists all projects to adhere to the FAIR data policy. The FAIR Data Principles are a set of guiding principles in order to make data findable, accessible, interoperable and reusable (Wilkinson et al., 2016). Additionally, the support and implementation of the UNITED Data Platform was lead by partner HIDROMOD and executed in Work Package 2. Frameworks that adhere to ISO standards and FAIR principles like INSPIRE and Sea Datanet will be followed by UNITED as will be discussed. Furthermore, the pilots in UNITED are Open Research Data Pilots (ORDP) adhering to the European Commission's request for open access of research data and publications generated under Horizon2020. This enables data to be reused by other researchers and all kind of stakeholders, since the goal is to ensure that third parties can freely access, mine, exploit, reproduce and disseminate data and publications. This means that ORDPs also provides related information, metadata, identification and tools to read the raw data. This is reflected in the UNITED Data Management Plan (DMP), where an outline of ORDP and therein prescribed processes and infrastructure are key for project success.

Key user profiles: researchers, developers, spatial planners, environmental monitoring agencies, sectoral permitting authorities, technology certification bodies.

Key collection and transfer activities: In the framework of UNITED Work Package 2 the key data about UNITED pilots functioning is being collected and centralised. The UNITED Data Platform is a key method for the collection of data and it is actively shared with stakeholders in each of the pilot sites as well as at key events where the key user groups can be reached.

2.3.2 – Commercialization Requirements

In order to commercialize MUCL, a range of knowledge and data is relevant. For that, costs and benefits at the implementation and pilot level are assessed in WP3. The developed assessment framework

[4] EU-SCORES is a multi-use project focusing on the combination between different types of renewable energies offshore, off the coast of Portugal. More about the EU-SCORES project: https://euscores.eu

[5] MUSICA is a sister project to UNITED, conducting a pilot off the coast of Greece. More about MUSICA project is available at: https://musica-project.eu/

consists of two blocks. One of them is the UNITED economic assessment framework (as developed and presented in D3.2 – UNITED Assessment Framework to Determine Economic Feasibility of Multi-Use Platforms). A partial cost-benefit analysis as the key decision support tool is proposed in this part of the framework. Through this tool, the costs and benefits of different marine (multi-) use options can be weighed up by decision makers. The second part of the assessment framework for commercialization is represented by the business analysis framework. It supports the pilots in developing viable business models. The systematic evaluation of multi-use business models including their financial performance is enabled by this part of the framework. PESTEL and SWOT techniques are used for an analysis of internal/external factors influencing the pilots. Values created and captured by the pilots are identified using business model canvas techniques. Besides, the costs and incomes of the pilots are assessed, and the feasibility shown via a financial and risk analysis. To ease the applicability of the described assessment framework, a guidance protocol for the application of the economic assessment framework and for the application of the business assessment will be developed later in this project.

Key user profiles: parties developing and operating the multi-use solutions (e.g. wind energy companies, aquaculture companies, tourism operators), investors, cooperatives.

Key collection and transfer activities: The UNITED Work Packages 1 and 9 have a central role in collecting the key knowledge relevant to the commercialisation of multi-use – and specifically the UNITED pilot solutions. These are recorded in a form of roadmaps showcasing key milestones, preconditions and actors needed for the viable development and commercialisation of multi-use. The key knowledge transfer activities entail co-development workshops, industry briefs and outreach at relevant events where key user groups can be found such as WindEurope, and Aquaculture Europe conferences.

2.3.3 – Policy Adaptations and Recommendations

Among the previously described knowledge and data collection, this is also done for legal and policy related issues. For that, WP6 mainly addresses challenges and support for roll-out and upscaling, as well as health and safety aspects of multi-use. Legal and insurance issues at the beginning of the project were collected and described in D1.1 (Challenges, risks and barriers for large-scale commercial roll-out) and D1.2 (Report on the State of the art implementation of an integrated pilot approach). However, it is apparent that legal and insurance issues have become more specific in nature and increased in numbers compared to those deliverables. Besides the already identified legal and insurance issues identified in D1.1 and D1.2, others have appeared during the pilots' development process. Here it is relevant to collect and assess them and to then transfer relevant information. However, these legal and insurance issues can vary for each country.

In order to identify risks, assess and mitigate them within the UNITED project, the framework described by van Hoof et al. (2020) will serve as a basis.

Key user profiles: parties developing and operating the multi-use solutions (e.g. wind energy companies, aquaculture companies, tourism operators), investors, cooperatives.

Key collection and transfer activities: The UNITED Work Packages 1 and 9 have a central role in collecting the key knowledge relevant to the commercialisation of multi-use – and specifically the UNITED pilot solutions. These are recorded in a form of roadmaps showcasing key milestones, preconditions and actors needed for the viable development and commercialisation of multi-use. The key knowledge transfer activities entail co-development workshops, industry briefs and outreach at relevant events where key user groups can be found such as WindEurope, and Aquculture Europe conferences.

2.3.4 – Environmental assessment data and knowledge

The data and related knowledge about the environmental impacts is being collected in UNITED in the context of WP4. The data is collected per each of the UNITED pilots taking into consideration relevant national and regional environmental assessment requirements and procedures. The information collected per each pilot, will be used for the development of the UNITED environmental assessment framework and for the implementation of this framework in pilots, in concert with the overall assessment framework for the project integrating the environmental, economic, societal and other pillars. The parameters used in the existing environmental assessments of single uses presented for each of the pilots, will advise the development of the assessment approach. The information collected on potential impacts will feed into the application of the assessment approach.

User Groups: Environmental authorities, developers, NGOs, environmental researchers

Key collection and transfer activities: The environmental assessment conducted for each of the UNITED pilots is presented in the form of a report and is shared at relevant conferences where the key target groups can be reached. Moreover, the link is made locally with relevant authorities and NGOs for a direct knowledge transfer also via the local engagement and workshops.

3. EVALUATION OF THE KNOWLEDGE TRANSFER

3.1 Measuring the Success of Knowledge Transfer and Success Metrics

To measure the actual amount of knowledge transferred is virtually impossible. A very common approach is not to measure the knowledge but the transfer and more explicitly the number of manifestations of knowledge transfer as activities in various transfer channels. In order to measure the effectiveness of knowledge transfer, several approaches were used. The most effective way to measure the effectiveness of the knowledge transfer process is to measure changes in the skill competency of the recipients.

Skill competency will be measured through skill-based surveys, evaluations, and after-action reviews, as well as the use of customized questions such as the pilots training questionnaire. The other tool we will use to measure knowledge transfer effectiveness is recipient surveys. These provide an assessment by the recipient on the quality of the knowledge transferred from the source. These surveys cover quality metrics such as comprehensiveness and usefulness like the stakeholder engagement questionnaire of deliverable 5.4 which had as aim to monitor and evaluate the interactions with our stakeholders and a more society wide group of people interested in UNITED. The indicators of the approaches that were used for the knowledge transfer are the number of workshops, trainings and capacity building activities but also the number of people who participated. The number of stakeholder workshops and empowerment sessions, but also the visitors of the website of the project and the followers on social media platforms and the number of commercial contacts for supports were key elements for the success of the knowledge transfer.

All elements of a Knowledge transfer plan were designed previously. This step requires for this Knowledge Transfer activity to take place. It is a good idea to continually monitor the KTP to ensure that it is effective. Risk should continually be assessed and, if necessary, the KTP should be adapted.

3.2 Mitigation and Contingency Plan

The knowledge transfer team has been formed to ensure a continuous follow up on the KTP and to ensure that the knowledge transfer objectives are tracked, addressed and reported as soon as possible. Effective coordination is ensured by the managerial structure and through the Project Work Plan. Eventual problems will be solved by cooperative effort. In the section 1.5 Barriers to Knowledge, mitigation steps have been described for each barrier that may occur. A mitigation strategy for the barriers and risks of knowledge transfer has been developed, executed when needed and monitored.

4. CONCLUSIONS

The knowledge transfer in UNITED takes place in two directions – **1) transfer of the knowledge to the project, specifically by its pilots**, and **2) transfer of knowledge from UNITED** i.e. lessons learned from UNITED pilots, to other projects, developments, research and planning processes. Thus, **knowledge exchange** is a key element of the UNITED knowledge exchange strategy, taking place via dedicated training workshops, communication and dissemination campaigns and engagements.

The concept of **multi-use is multi-disciplinary** encompassing many ocean sectors and a diversity of professions. Therefore, the knowledge transfer undertaken for the purpose of multi-use related capacity building needs to be carefully planned, using **targeted approach and variety of tools and methods**.

The Knowledge Transfer Plan laid out here relies on the **joint commitment and action** of not only UNITED partners, but also its advisory board and continuous collaboration with the UNITED multi-use community of practice and a wider group of multi-use related projects. A prerequisite for success is also the close collaboration with other multi-use projects and initiatives such as MUSICA, EU-SCORES, Wier and Wind as well as the joint action together with the relevant multipliers such as WindEurope, United Nations Global Compact Offshore Wind working group, ICES working group on offshore wind and fisheries as well as the Offshore Coalition for Energy and Nature.

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ANNEX

1. Gap analysis and needs fulfilment questionnaire

UNITED KNOWLEDGE TRANSFER PLAN

GAP ANALYSIS AND NEEDS FULFILMENT – QUESTIONS FOR THE PROJECT MATES / PACT4SKILS

Please answer the below lined out questions trying to refer to the suggested length (estimated word count).

The questions should be answered from your/ your teams collective experience.

Please send back the filled-out questionnaire to **il@submariner-network.eu**

latest by 10 January 2022.

The results will be used for the development of the Knowledge Transfer Plan for the ocean multi-use – under the UNITED project.

What is UNITED? The UNITED project stands for '*Multi-**U**se offshore platforms demo**N**strators for boost**I**ng cost-effec**T**ive and **E**co-friendly pro**D**uction in sustainable marine activities'. The project* is working to advance the ocean multi-use solutions in 5 demonstration pilots across the EU. More about UNITED here: https://www.h2020united.eu/

What is ocean multi-use? The ocean multi-use is understood as the intentional joint use of resources (physical space, platforms, logistics, etc.) by two or more users. This is a marked change from the traditional concept of exclusive resource rights to include sharing of resources by multiple users.

QUESTIONS

1. What is the type of organisation you work for?

Public authority

Private company

Education/university/research

Cluster/network

2. What ocean sector do you represent?

Renewable energy

Aquaculture

Fisheries

Tourism

Environmental conservation

Other, please specify _____

3. In your opinion, what are the key skills necessary for the implementation of ocean multi-use?

Open answer: approx. 500 words

2. What skills may be lacking for each of the multi-use combinations (not each field needs to be filled out – please provide answers for those combinations you have knowledge about)

- Offshore wind and aquaculture

- Offshore wind and tourism

- Offshore wind and nature restoration

- Offshore aquaculture and tourism

- Other type – please specify

3. What would be the most appropriate way to address the lack of skills mentioned above (tick box – multiple answer possible):

A. Changing the curriculums (e.g. university or spatialised schools curriculums),
B. Supplementary vocational trainings,
C. Certification trainings;
D. Short voluntary courses (no certification),
E. Simple reading, video material,
F. Training webinars/ workshops
G. Close interaction/workshops with experienced offshore users e.g. Offshore wind meets Offshore aquaculture producers
H. Other – please specify

1. What should be the key elements of one such training/course?

Open answer approx. 700 words

2. If you have had experience with multi-disciplinary or multi-use related trainings to date, what is your experience i.e. what worked and what did not work well? What knowledge gaps / skill gaps you may still have regarding the multi-use concept?

Open answer approx. 700 words

If you would like to be contacted for a follow up chat on this topic and learn more about the UNITED project please leave your name and contact here:

Name:_____

Contact:_____

If you would like to subscribe to the UNITED newsletter, please tick the box and leave your email address below.

Yes, I would like to subscribe to the UNITED newsletter

Email address: _____

2.Template of the knowledge transfer plan survey (with answers)

1. *What trainings have you conducted/taken part in so far for the purpose of multi-use (MU)?*
German pilot: In order for FuE staff to be allowed to access or work on the FINO3 platform, a minimum requirement of safety training must be completed. Therefore, we participated in the following trainings: • **GWO BST Sea Survival** • **GWO Enhanced First Aid (FAR + EFA)** The FuE staff was instructed in the handling and installation of CPODs and pingers. • **Workshop for the handling and operation of CPODs and pingers** Training in handling and seeding algae was necessary to conduct in situ preparation of algae lines • **Algae workshop** **Belgian pilot:** Everyone who does not belong to the vessel crew needs the following certificates that allow the entering of the wind farm: •Basic safety training STCW A_VI/I •Health certificate after clinical examination from a physician Furthermore, safety regulations regarding equipment is discussed in advance. In line with internal procedures of the offshore wind farm concession holder, amongst which induction trainings, emergency procedures, good communication, and training of the crew. Minimum PPE requirements during the execution of the works on deck shall be: •Safety helmet •Safety footwear •Safety glasses •High visibility clothing

Task-specific PPE requirements shall be:

•Life jacket

•Safety harness

•Hearing protection

When working on the aft deck (zone between accommodation and stern), a life jacket must be worn. Risk assessments will be made for each specific operation offshore and be attached to the method statement.

Dutch pilot: All pilot owners have followed an offshore course for safety and sea survival

This is the one that North Sea Farmers followed, including the first aid module: https://deltasafetytraining.com/en/certificates/gwo-safety-training-courses/

Danish pilot: No special training taken part in.

Training conducted to have more guides. The training is "on the job training" for new guides following an experienced guide.

It is important to notice that the people used today as guides all have a background understanding of how the project was established (the COOP approach) and how a wind turbine is working.

Greek pilot: In order for someone to investigate the aquaculture site underwater should be a certified diver. The trainings must have 6 theoretical sessions, 6 pool water sessions and 4 offshore diving sessions. Except for that the staff is also trained for the use of ROVs.

2. Why was it important that you take these courses/trainings?

German pilot:

GWO BST Sea Survival

It is part of the safety concept of the FINO platform that all visitors and workers who enter the platform have completed this safety training, because due to the remote location (45nm offshore) the arrival of rescue forces takes at least 1 hour.

GWO Enhanced First Aid (FAR + EFA)

The same applies for the First Aid training, in the event of an accident, those present must be able to care for the victim and/or themselves until the emergency services arrive.

Workshop for the handling and operation of CPODs and pingers

The installation and handling of CPODs and pingers is necessary and must be trained to ensure that the devices record the data correctly and are properly attached in harsh weather conditions.

Algae workshop

The training in handling algae spores was necessary to ensure proper seeding of the algae lines. Time, moisture, exposure to air and time until replacement of seeded substrate are of crucial importance. Mistakes in seeding can lead to total loss of algae.

Belgian pilot: This training is requested by the Belgian authorities to enter the offshore wind farms on a vessel.

Dutch pilot: The offshore environment is dangerous so people should be regularly trained and updated on working in these conditions.

Danish pilot: The guide must stop and start the turbine among other things. Not stopping correctly is dangerous for the visitors and not starting correctly results in in lost power production and extra cost for the service company.

Greek pilot: People with no open water diving certification are not allowed to dive in the aquaculture site.

3. What was learned/trained during the course?

German pilot:

GWO BST Sea Survival

By means of theoretical and practical training components, the FuE staff learned important basic knowledge about safe action and preventive measures that must be observed in emergency situations in all areas of offshore activity. In particularly realistic practical exercises (in an indoor wave pool with thunderstorm simulation), the use of rescue equipment and boats, man overboard and scenario-based practical exercises for survival at sea have been trained.

Theoretical training:

- Legislation, risks and threats
- Hypothermia and drowning
- Life saving equipment and PPE
- Safe boat transfer
- SAR (Search and Rescue) and GMDSS (Global Maritime Distress and Safety System).

Practical exercises:

- Survival at sea,
- Boat transfer
- Man overboard

GWO Enhanced First Aid (FAR + EFA)

GWO has developed an industry standard tailored to the special working environment of the onshore and offshore wind industry. The training included theoretical and practical

components of First Aid. Additionally, many of the terms have been explained in the English so that these vocabulary terms can then be understood in the international working environment. A major focus was on scenario-based exercises.

Theoretical training:

- National and International Legal Bases
- Special hazards rescue chain offshore and special rescue teams
- Teleconsultation/Telemedicine
- Pain management
- Psychological first aid

Practical exercises:

- Intubation
- Special dressings (for burns, bleeding, etc.)
- Patient transport
- Structured procedures and treatment algorithms e.g. "C "ABCDE, AVPU
- Water emergencies

Workshop for the handling and operation of CPODs and pingers

The training for handling of CPODs and pingers was a very practical learning session conducted by experienced employees.

There was training on how to prepare the CPODs for placement at the offshore site, as well as training on how to maintain and read out the data. For this purpose, the insertion and removal of the batteries (and battery holder), the silica gel and the memory card were practiced on two sample devices. Furthermore, the various operating states were explained and demonstrated on the sample devices.

Algae Workshop

Practical handling was the focus during the workshop. The crucial steps were explained to prevent drying and thereby dying of the algae suspension. Furthermore, the timeframes when and how the seeding mixture has to be applied. In addition, the most effective soaking and handling procedures were explained and discussed. Also proper handling of pre-seeded ropes was shown and trained.

Belgian pilot:

Objectives of the STCW Basic Safety Training course:

Receive appropriate approved Basic Training of instruction in:

- Personal Survival Techniques as set out in table A-VI/1-1
- Fire Prevention and Fire-Fighting as set out in table A-VI/1-2

- Elementary first Aid as set out in table A-VI/1-3
- Personal Safety And Social Responsibilities as set out in table A-VI/1-4

Course Contents of the STCW Basic Safety Training course

- Personal Survival Techniques (Table A-VI/1-1)
- Fire Prevention and Fire Fighting (Table A-VI/1-2)
- Elementary First Aid (Table A-VI/1-3)
- Personal Safety and Social Responsibilities (Table A-VI/1-4)

Dutch pilot:

This is an extract from the course:

The GWO Sea Survival module aims to give trainees the tools to act safely and take the right preventive measures during offshore activities.

The GWO Sea Survival training course is one of the five modules of the GWO Basic Safety Training course developed by the Global Wind Organisation for people working in the wind industry.

The full package teaches participants everything they need to know to work safely in the wind industry and consists of the modules:

- First Aid
- Manual Handling
- Fire Safety (Fire Awareness)
- Sea Survival
- Working at Heights

The GWO Sea Survival - Basic course covers the following topics:

- Dangers and symptoms of hypothermia and drowning
- Understanding the benefits and limitations of the various LSA, PPE and PFPE commonly used in the offshore wind industry and how to use them
- Safe transfer from vessel to jetty, vessel to platform and vessel to vessel
- Know emergency procedures and safety on the installations, vessels and WTG
- Knowledge of SAR, GMDSS Recovery and First Aid after 'man over board'.
- Evacuating a WTG (Wind Turbine Generator) on water with a Constant Rate Descender
- Perform individual and collective survival techniques at sea.

Danish pilot: The handed over written manual was not covering all situations; one example: the procedure for two different turbines was not exactly the same; even though they should be. An experienced guide has learned that but not realised how to explain in the written manual.

Greek pilot: Most professional divers are required by national or state legislation to be qualified first aid providers to a specified standard.

First Aid, Fire Fighting, Personnel Survival Techniques, Personal Safety & Social Responsibilities.

Occupational health and safety are important aspects of professional diving.

Underwater practical sessions also take place in order for divers to familiarize with the aquatic environment.

4. Was the content and structure of the training/course appropriate?

German pilot: As listed above, the structure of the courses **"Sea Survival"** and **"Enhanced First Aid"** was very good and coherent. Due to the years of experience in the execution of the courses by the provider, they are very well coordinated in terms of time and content. The combination of theory and practice made it easy for the participants of FuE to immediately apply and test what they had learned. This gave the course instructors an immediate opportunity to see whether what had been taught had been understood.

Same applies for the **CPOD and pinger Workshop** although it was a workshop requested at short notice. The participants from FuE were able to quickly learn how to use the equipment through the practical exercises and were also provided with manuals to take away, so that they could read up on the details again in the event of any uncertainties. Also on short notice the "Algae workshop" was well done and provided everything

Belgian pilot: The STCW Basic Safety Training definitely seems crucial as all who took the course agree on the necessity of being prepared at working at sea.

Not only are the obtained skills essential when one is offshore, participants also learn to realize how crucial group effort, good organization, and good communication is in a crisis – and even more so at sea.

Dutch pilot: It was appropriate although really working on wind turbine structures is not relevant for most multi-users.

Danish pilot: Small improvements had to be done.

More training is needed to learn about the newly acquired audio system.

Greek pilot: It was appropriate only for people who work in diving company and need to dive for inspection or to control the ROV.

5. Were these trainings multi-disciplinary and how?

German pilot: The trainings **"Sea Survival"** and **"Enhanced First Aid"** were designed for a broad audience from the maritime offshore sector. During the welcome round, participants from the following areas introduced themselves.

- Service Technicians - Maritime Sensor Systems
- Service Technicians - Offshore Wind Farms

- Pilots - Helicopter Pilot for transport and maintenance flights to OWP and offshore platforms
- Sailors (private person)
- R&D

The teachers responded to specific questions from the individual participants and consulted colleagues from other disciplines when necessary. Through the questions from other fields of work, all participants were able to learn something new.

The CPOD Workshop wasn't a multi-disciplinary training since it was for one reason only and only for the FuE staff.

Algae workshop

This workshop was a specialized workshop for FUE staff for the specific circumstances at the offshore location. A general workshop how to seed nets, lines, handle algae would be possible in a multi-use context.

Belgian pilot: The STCW Basic Safety Training only focussed at safety of lives during working at sea. To be able to perform the multi-use activities at sea, the different experts joined these missions and followed step-by-step written and approved (by all parties) method statements to be followed by each expert party. As all partners were included in the project for this expertise, no extra courses needed to be followed to implement the multi-use activities.

Dutch pilot: You can't really consider this multi-disciplinary. Although, it's focussed at offshore wind and that is (partly) also applicable for multi-use activities in wind farms.

Greek pilot: No, the trainings were about specific skills. Either scuba diving skills or controlling of ROV.

6. ***Was the training covering only one MU sector or multiple sectors? i.e. was it only for aquaculture or was it for both aquaculture and offshore wind***

German pilot: The trainings "Sea Survival" and "Enhanced First Aid" covered a large field of work for various jobs on sea. The main hazards and risks at an offshore location like FINO3 apply for all MU activities no matter if the assigned employee is working at an aquaculture farm or is entering a research platform by boat. The CPOD and pinger workshop is suitable staff working in multiple offshore sectors. The algae workshop can be adapted to train multiple sectors

Belgian pilot: The training only covered safety of lives at sea while working in an offshore windfarm. Hence this training did not teach anything on aquaculture or restoration. For the latter, expert parties with the required expertise had been taken on board of the Belgian pilot project.

Dutch pilot: It is actually only for wind. This has to do with the nature of the course, it's organised by GWO, Global Wind Offshore.

Danish pilot: The training was covering both: 1) how to open and close the wind turbine, but also 2) how to approach the foundation when the wind, the waves and the current was giving trouble.

Greek pilot: The divers have been already trained for underwater investigation which also includes the aquaculture site.

7. Have these trainings ended up with some sort of certification? Please explain

German pilot: Yes, certificates were issued for all trainings. The certificates for **"Sea Survival"** and **"Enhanced First Aid"** are official certificates of the GWO (Global Wind Organization) and are globally accepted for work at sea.

The certificate for the **CPOD Workshop** is more a kind of protocol that confirms the participation in the training course.

Algae workshop

There is no certification for it. This would definitely be a good idea to standardize the procedure internationally.

Belgian pilot: Participants of the STCW Basic Safety Training were assessed against the learning outcomes specified in section VI/1 of the STCW Code 1978, as amended and the IMO Model Courses 1.13, 1.19, 1.20 and 1.21 by using direct observation and oral and/or written questions as appropriate. The successful completion of the Basic Training, resulted in a certification valid for five years.

Dutch pilot: Yes, you receive a certificate that is actually needed in case you wish to enter an offshore wind farm. Operators will ask for this certificate before you receive a access permit.

Danish pilot: Not formally, but only guides with sufficient training will be allowed to climb the wind turbine.

Greek pilot: Yes, for the divers that have participated certification of open water diver until 18 m depth is given.

8. Will you need to periodically renew the certification? Please explain

German pilot: Yes, certificates for **"Sea Survival"** and **"Enhanced First Aid"** are only valid for 2 years. They may be renewed at any time, while they are still valid or after they expire, by taking a new course.

The "certificate" for **CPOD handling** does not have an expire date.

Algae workshop

There is no date of expire but a refresher to learn about new methods or any improvements would be a good idea.

Belgian pilot: With the implementation of the Manila Amendments 2010, participants must provide evidence of having the competencies by completing refresher training every five years, as described in the STCW Code 1978, as amended section VI-1 Table A-VI/1.

Dutch pilot: Yes, this is standard. Each certificate has a maximum duration. It depends per certificate but a term of 3 years is common.

Danish pilot: Yes, if new features are introduced like the audio system

Greek pilot: No, this certification has unlimited validity.

9. ***Were you in a situation where you had a lack of skill but there was no training/course offer to cover these? Or in other words, do you think trainings may be lacking for some of the skills relevant for MU implementation?***

German pilot: No, so far there was no situation with lack of skill. This may potentially occur for other multi-use cases where there are different risks that need to be dealt with differently. Depending on how a MU business is to be conducted, it may be useful in the future to offer courses that train employees diversely, rather than having only experts for each individual area of the MU. Experts should be the leaders of each individual area of the MU and the remaining team should be trained diversely. Some additional special training may be needed, when handling different organisms.

Belgian pilot: As the combined skills of all partners made sure that all needed expertise was present to safely implement the multi-use goals, no extra training could provide easier implementation of the MU. It is however so that the Belgian pilot is still a pilot, and hence results in a lot of lessons learnt which will facilitate easier implementation for future projects.

Dutch pilot: The only thing that could be added is working directly from the vessel, over the railing. This is an aspect that is generally not covered in offshore training courses as this is deemed dangerous. However, working over the railing is quite common in fishing and will also be required in multi-use installations in wind farms.

Danish pilot: No, but we have been doing this over more years and have slowly learned. If starting from scratch you may not have people with hands on experience in climbing a wind turbine as we had.

Greek pilot: Yes, visiting the aquaculture site e.g. for checking the conditions doesn't need any skills but in order to do the underwater investigation, you have to be a certified diver which need the appropriate skills and experience.

10. What should be the key elements of one such training/course?

German pilot

Training in sampling procedures for food safety, conducted by regional veterinary

- Training to recognise mussel and algae health
- Training for handling mussels and alga properly
- Maintenance of other infrastructure (PV systems)

Belgian pilot:

As described in the objectives higher, the key elements of the STCW Basic Safety Training are the following:

- Personal Survival Techniques
- Fire Prevention and Fire-Fighting
- Elementary first Aid
- Personal Safety And Social Responsibilities

Dutch pilot:

How to work safely on multi-use installations

Dos and dont's while working on multi-use installations

Man overboard specific to multi-use installations

Special tools and equipment to reduce safety risks

General safety management for working offshore with multi-use installations

Danish pilot:

- Boat operation with focus on what to do in situations with critical wind/wave/current including different types of boats.
- How a wind turbine is working and manufactured back in 2000 and today.
- How to operate the wind turbine (closing down production, starting again including what to do if the emergency system has been activated).
- General safety requirement when climbing the turbine, where is the risk.
- How the Middelgrunden Wind project was established including the COOP approach.
- The history of how the Danish wind energy industry has developed from the 1980-iers
- How the Danish energy system in general has developed from the 1970-ies.
- How to operate the audio system

Greek pilot:

-Personal Survival Techniques

- Fire Prevention and Fire-Fighting

- Elementary first Aid

- Personal Safety And Social Responsibilities

- Diver's physiology and physics, Diving equipment

11. ***What trainings are you planning to take in the future (if any) for the purpose of the MU implementation (or decommissioning)?***

German pilot: To not lose the validation of the certificates **"Sea Survival"** and **"Enhanced First Aid"** and to be able to operate throughout the whole project (operational phase and decommissioning) it is planned to renew those trainings in 2022.

Belgian pilot:

No extra training will be followed in the purpose of MU implementation or decommissioning. The Belgian pilot will rely on the knowledge present within the UNITED consortium.

Dutch pilot: We don't expect to take any future trainings, as this is not required for the pilot activities and the current trainings are still valid.

Danish pilot: Introducing new guides.

Greek pilot: No special trainings are needed in future except if it is asked for.

12. ***In your opinion/ and your pilot experience so far what are the key skills for the MU implementation in your pilot?***

German pilot: On the one hand, the individual skills of each employee from their pre-acquired knowledge and education (biology, technology and project management) are important skills to realize the implementation of MU. On the other hand, safety training and the willingness of employees to learn and understand the new areas of expertise are important in order to work together for the success of the MU.

Belgian pilot: Apart from The STCW basic safety training, below are listed some of the key skills for MU implementation:

- Biotechnology skills: Aquaculture knowledge on seaweed and flat oyster farming in rough sea conditions

- Biotechnology skills: Knowledge on requirements for oyster restoration in offshore wind farms. E.g., working with prediction models on suitable habitat requirements, residual currents knowledge to choose position of brood stock animals versus scour protection materials in the wind farms (restoration) and where to install the aquaculture longlines (aquaculture).
- Technical skills: Engineering knowledge and craft to design, build and deploy aquaculture and restoration structures at sea
- Technical skills: Design of longlines to be installed offshore
- Technical skills: Excellent steering skills for the Captain of the vessel

Dutch pilot: The GWO safety training is useful

In addition trainings for multi-use specific activities could be considered, e.g. working from the vessel, working on high-voltage installations, etc.

Danish pilot: Just a basic understanding of how a wind turbine is functioning. Even that can be learned if you have some basic understanding/respect for industrial systems.

Greek pilot: For the people that mainly focus in the coordination of the pilot an understanding of the technical and biological background of the specific MU system is needed. For the employees that work on the underwater investigation, more specialized skills are needed such as health safety and diving training. Cooperation and understanding is needed from all parties for the better implementation of the offshore multi-use.