

Acronym: COLUMBUS

Title: Monitoring, Managing and Transferring Marine and Maritime

Knowledge for Sustainable Blue Growth

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Guidelines on carrying out COLUMBUS Knowledge Transfer and Impact Measurement

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understanding Competence Node Eventual Impact targeted sustainable
stakeholder MSFD specific information consider scenario technology
most message Value Chain marine particular progress
results successful activities value plan provide steps many
profile methodology communication Transfer target process channels guide
partners provide details training leader pathway field use indicate
completion identified key output impact able activity effective
complete support cycle using knowledge needs indicators
current develop science stakeholders project Template need profile reach
Growth media identify policy Target User industry assess
essential section application COLUMBUS Knowledge Fellow fields
exploitation case study end user research important society
Blue Growth network milestones

1. The COLUMBUS Project

Funded under the EU Horizon 2020 programme, COLUMBUS (www.columbusproject.eu) is a 36-month EU project (March 2015 - February 2018), involving 26 partners with a budget of €4 million (Figure 1). These partners cover a broad range of expertise and work is divided into nine thematic Competence Nodes:

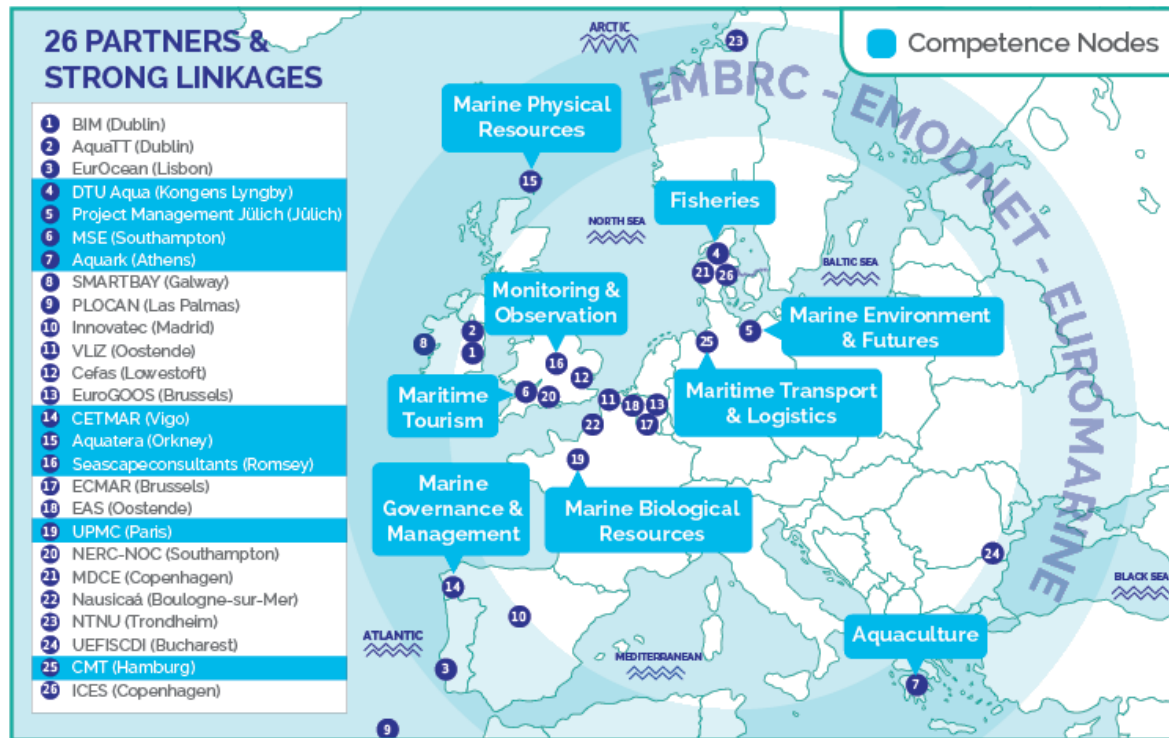


Figure 1: Location of COLUMBUS partners

Developed to “monitor, manage and transfer marine and maritime knowledge for sustainable blue growth”, COLUMBUS’ main objective will be to produce qualitative case studies that illustrate how the project activities have successfully transferred knowledge to policy, industry, science and society resulting in impacts that measurably contribute to “Blue Growth”.

Comprising eight work packages shown in Figure 2, COLUMBUS is centred on a Knowledge Transfer cycle (Work Packages 4, 5 and 6), where Knowledge Outputs are identified (or supplied via the Marine Knowledge Gate, Section 5.2), analysed and transferred to a targeted audience, to create impact.

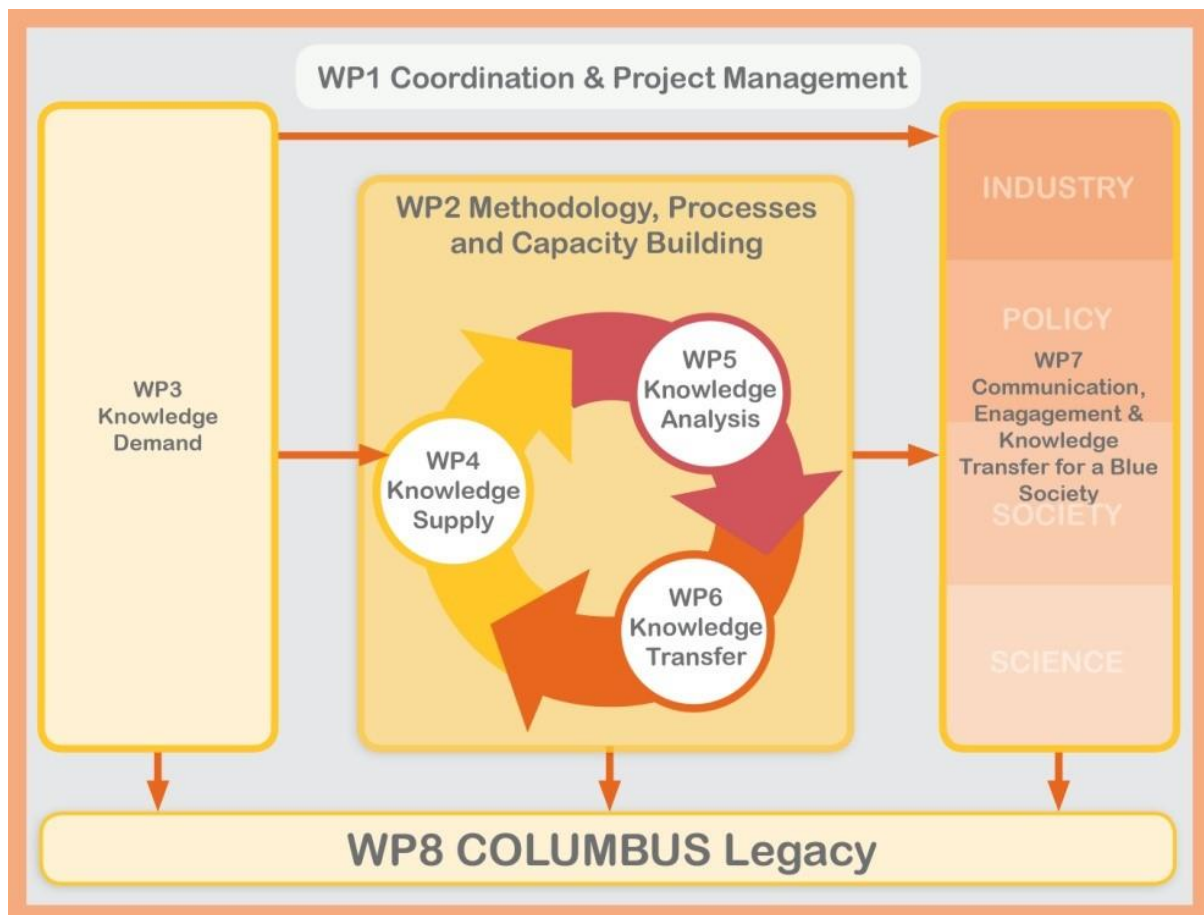


Figure 2: Structure of the COLUMBUS project

2. Introduction to COLUMBUS Knowledge Transfer

The knowledge acquired from marine and maritime research is hugely important to its stakeholders, whether they be from industry, policy, society or from other academic backgrounds. For industry and science, it can catalyse innovation and the subsequent emergence of new technologies and business thus advancing economic growth; and, for the policy community, it provides the latest scientific evidence for informed decision making. Not only are these improved economic and political landscapes advantageous for society; but an improved understanding of the marine environment, resulting from research, allows us to maintain a sustainable and healthy world in which to live.

These guidelines are a core component of the COLUMBUS internal capacity training provided under Work Package 2. They have been developed to familiarise the project partners with the COLUMBUS Knowledge Transfer Methodology that will support them through the process of maximising these aforementioned benefits from existing research. It is anticipated that following this training, COLUMBUS Knowledge Fellows will be able to combine those practical skills that they have learnt with their own creativity and innovation to transfer research findings, or “Knowledge Outputs”, to relevant policy, industry, science and societal stakeholders.

Knowledge Output: *A unit of knowledge / key learning generated by or through research activity. They are not limited to de-novo or pioneering discoveries but may also include new methodologies/processes, adaptations, insights, alternative applications of prior know-how/knowledge.*

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

The learning objectives for internal capacity training are:

1. To be able to define key terms relating to COLUMBUS Knowledge Transfer Methodology.
2. To be familiar with the Knowledge Output collection process, including Knowledge Output Table completion.
3. To be able to assess, analyse and prioritise Knowledge Outputs.
4. To be able to identify potential end (and target) users and audiences.
5. To learn how to plan, carry out and measure Knowledge Transfer.
6. To be able to predict and assess if impacts have been achieved from implemented Knowledge Transfer activities.
7. To be able to develop Case Studies illustrating successes of the COLUMBUS Knowledge Transfer Methodology.

This handbook is a first iteration and will be updated based on the feedback received during the internal capacity training course and over the lifetime of the project. It should be used as reference material for remote working. AquaTT would appreciate receiving any feedback, amendments and comments that the Knowledge Fellows may have, to enrich future iterations of this document.

2.1 The Knowledge Transfer Fellows

The core of the activities undertaken within the Knowledge Transfer cycle will be performed by an established “Knowledge Fellowship”; a network of nine full-time (minimum 24 person months each), Knowledge Transfer Fellows, one for each Competence Node. The Fellows have a support structure in place, in the form of a Competence Team, consisting of a Node Lead from their own organisation and a number of elected partners. Work Package Leaders will be assisting the Knowledge Fellows

throughout the project lifetime to ensure a smooth flow between work packages and that milestones are met, tasks are completed and deliverables are met. Fellows are also encouraged to draw upon support from all partners, who have a collective broad range of expertise that can assist the work of the Knowledge Fellows (Figure 3).

Working together as a remote team and active network, this combined critical mass team will use a multi-disciplinary approach to help achieve measureable impacts and to develop a blueprint for future activities in this field of work, ultimately contributing to the development of a thriving and sustainable marine and maritime economy.

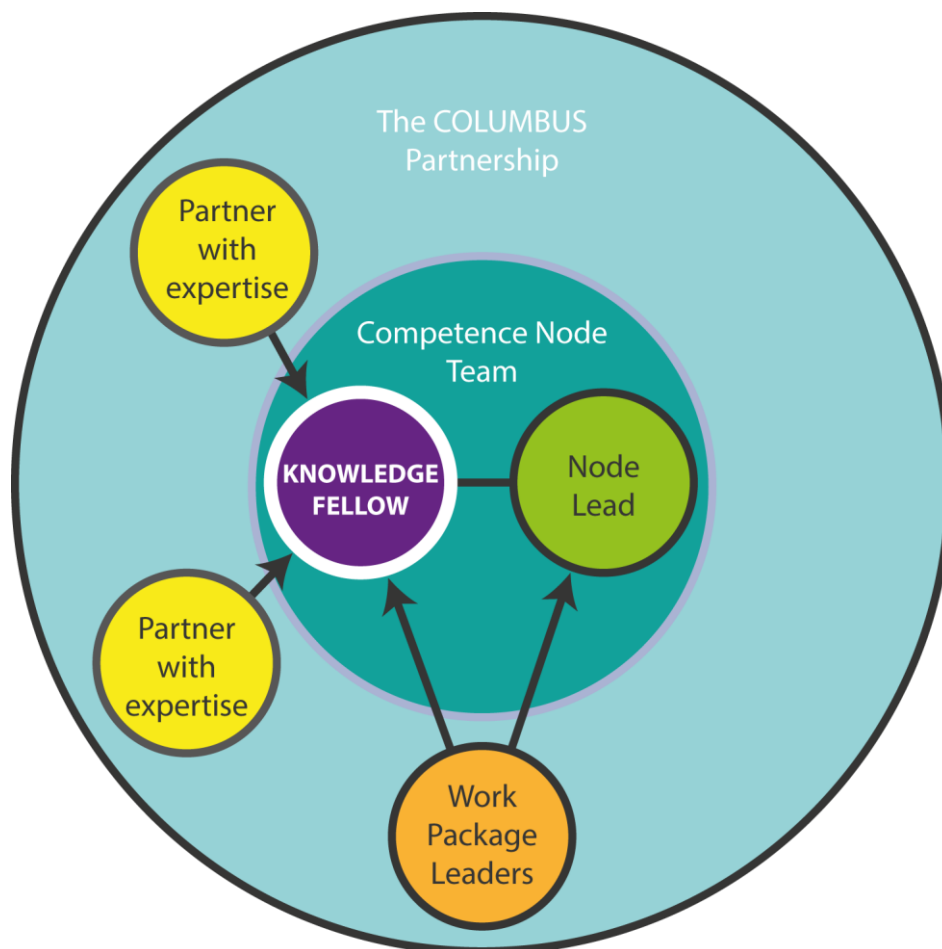


Figure 3: Support network surrounding the Knowledge Fellows

3. Key Terms

A number of terms are regularly used in this handbook and this section provides an explanation of how these terms relate to each other. The definitions below may differ from other sources but should be the adopted definitions for the purpose of COLUMBUS implementation.

3.1 Definitions

Knowledge Transfer: The term for the overall process of moving knowledge between knowledge sources to the potential users of knowledge. Knowledge Transfer consists of a range of activities which aim to capture, organise, assess and transmit knowledge, skills and competence from those who generate them to those who will utilise them.

Knowledge Output: A unit of knowledge or learning generated by or through research activity. They are not limited to de-novo or pioneering discoveries but may also include new methodologies/processes, adaptations, insights, alternative applications of prior know-how/knowledge.

Knowledge Output Pathway: This can be one step or a series of steps required to carry a Knowledge Output to its Eventual Impact. Where there are a series of steps, it will include detailed mapping of the steps, the users involved at each step and their predicted role in the pathway to Eventual Impact.

Eventual Impact: The ultimate end benefit of the application of the Knowledge Output. It is defined as an enhanced situation that is contributing to “Blue Growth” including the implementation of the Marine Strategy Framework Directive (MSFD). See Step 5 for examples. *(This is not to be confused with the impact of an intermediary user taking up knowledge and transferring it down a step in the knowledge output pathway to Eventual Impact. This is termed “Transfer Impact”).*

Transfer Impact: The demonstrable evidence that a Knowledge Output has travelled down a single step on the Knowledge Output Pathway.

Target User: The individual(s) who you have identified in your Knowledge Output Pathway to whom a Knowledge Fellow will transfer the Knowledge Output.

End User(s): The individual(s) who will apply the Knowledge Output at the end of the Knowledge Output Pathway.

Exploitation Partner: An external organisation/institution/individual who has an interest and/or expertise that may assist in transferring the Knowledge Output down the Knowledge Output Pathway to its Eventual Impact.

3.2 Abbreviations

During the course, you may hear a number of abbreviations being used in conversation. The following list can be used as a reference:

EC	European Commission	KT	Knowledge Transfer
IP	Intellectual Property	KTP	Knowledge Transfer Plan
KO	Knowledge Output	MSFD	Marine Strategy Framework Directive
KOP	Knowledge Output Pathway	ToR	Terms of Reference
KOT	Knowledge Output Table	WP	Work Package

4. Protocols

COLUMBUS' success is reliant on the existence of robust working relationships between the Knowledge Fellows and within Competence Node Teams. The Knowledge Fellows will be working as a remote team. For this reason, pre-agreed protocols and processes of how the Knowledge Fellows and Competence Teams will work is necessary.

4.1 Terms of Reference

Terms of Reference have been developed for the COLUMBUS project. These have been presented as a "Reference Guide for Competence Node Interactions and Collaboration". This document forms Deliverable 2.1 which will be made publicly available through the COLUMBUS website (www.columbusproject.eu) as well as made available to all partners through basecamp.

4.2 Communication

As previously stated, interaction, cooperation and communication is essential and necessary for the success of the project. Below the methods are proposed for:

- Communicating within the Competence Node network
- Communicating with Work Package Leaders
- Communicating with external stakeholders

4.2.1 Key Principles for Communicating within the Competence Node Network

Between the Knowledge Fellows: Sharing Knowledge Outputs

All Knowledge Outputs will be allocated a code, a "Unique Identifier". To acquire a Unique Identifier when you have uncovered a Knowledge Output, you will be allocated upon contacting the leader of Work Package 4 (Cristina Costa, EurOcean; see Section 4.3 for contact details). Once a code is allocated, it will not be transferrable and will be unique to the Knowledge Output. This means that if a Knowledge Output is uncovered within a project by a Knowledge Fellow and is determined to be more relevant to another Competence Node, ownership can be passed over (informing the Project Coordination team) to another Competence Node. The Unique Identifier for that Knowledge Output will remain the same, allowing tracking and monitoring to take place across Work Packages and Nodes.

Between the Knowledge Fellows: Building a Remote Team

The Knowledge Fellows will meet with each other on a quarterly basis remotely (using conferencing facilities). A dedicated session for the Knowledge Fellows and relevant Management Team members will also be organised at future partner meetings. These meetings will facilitate open discussion and the development of a support network between the Knowledge Fellows. As well as offering the opportunity to share experiences, it will provide a platform for support, e.g. knowledge collected in one Competence Node could enable or facilitate other Nodes. Depending on the results of Work Package 3, the scope of each Competence Node may be adjusted to achieve the best results.

Within the Competence Node Teams

The Knowledge Fellows and Node Leads have a dedicated Competence Node Team surrounding them (Figure 3). Furthermore, as all COLUMBUS partners have a time allocation under Work Packages 4, 5 and 6 and have a broad and varied expertise, the Knowledge Fellows are encouraged to draw upon their expertise to assist their Knowledge Transfer activities. The leader of Work Package 2 should be informed when expertise is sought from non-Competence Node Team partners, so that this collaborative impact is recorded.

4.2.2 Key Principles for Communicating with Work Package Leaders

Support Provision

The leader of Work Package 2 (Georgia Bayliss-Brown, AquaTT) will be in contact with every Knowledge Fellow on a fortnightly basis to provide support and ask for updates, and will act as a switchboard to pass on queries to the other Work Package leaders.

Reporting Processes

All steps undertaken under the COLUMBUS Knowledge Transfer Methodology are aligned with tasks and deliverables of Work Packages 4, 5 and 6. The leaders of these Work Packages will need to be informed of the Knowledge Fellows' progress and findings. The templates that will be completed at each step of the Methodology should be submitted to the relevant Work Package Leader to satisfy reporting requirements.

4.3 Key Contacts

The contact details for all of the partners can be found on Basecamp. The key contacts relevant to this activity are provided below:

LEADER	NAME	Email
Project Manager	Cliona Ní Cheallacháin	cliona@aquatt.ie
Work Package 2	Georgia Bayliss-Brown	georgia@aquatt.ie
Work Package 4	Cristina Costa	cristina.costa@eurocean.org
Work Package 5	Rosa Fernandez	rfernandez@cetmar.org
Work Package 6	Simon Powell	sp@mseuk.org

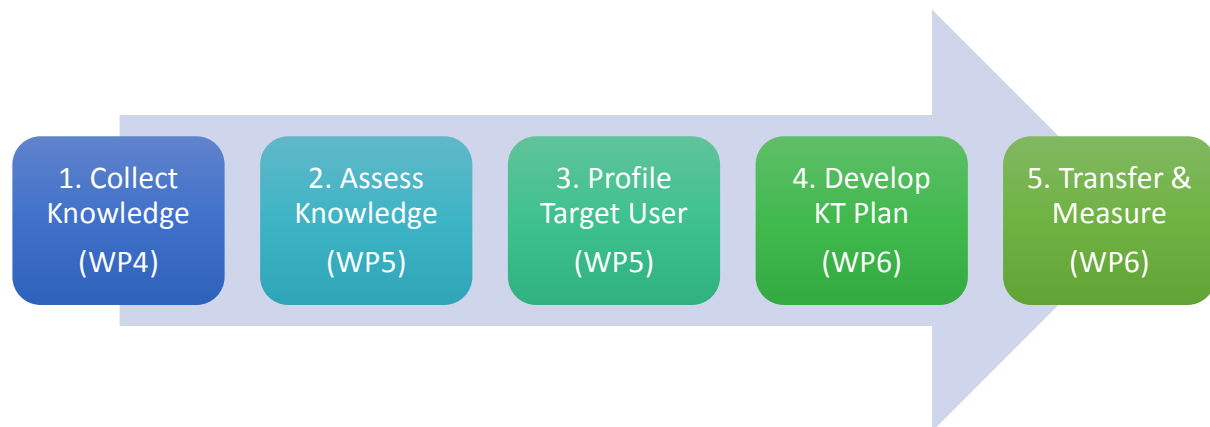
*“See yourself as a researcher of knowledge –
be self-questioning, be inquisitive*

5. The COLUMBUS Knowledge Transfer Methodology

The COLUMBUS Knowledge Transfer Methodology ensures that the transfer of the collected Knowledge Outputs is strategic, coordinated and effective. This section of the course handbook is intended to be a user-friendly resource for Knowledge Fellows. It provides guidance through all of the steps of transferring Knowledge Outputs; from collection to planning Knowledge Transfer activities and reporting its impact.

The Overview

The step-by-step guide is comprised of five steps:



The steps are progressive, however as each step is implemented it may be necessary to go back to earlier steps in light of new findings or insights. Each step requires a template, or a number of templates, to be completed. These templates can be downloaded by COLUMBUS partners from Basecamp.

Step 1: Collect Knowledge

Objective: To be able to identify Knowledge Outputs and complete a Knowledge Output Table for a project.

Context: Before devising a Knowledge Transfer Plan (Step 4), it is essential to have a proper in-depth and critical understanding of each Knowledge Output. To help do this, a table has been developed that contains fields to assist the Knowledge Fellow in describing key information about each Knowledge Output.

The Knowledge Output Table

The Knowledge Output Table is presented in the format of an Excel file to be used when collecting Knowledge Outputs from a project. Each project should have one Knowledge Output Table listing all of the knowledge outputs on completion of Step 1.

Knowledge Output: A unit of knowledge / key learning generated by or through research activity. They are not limited to de-novo or pioneering discoveries but may also include new methodologies/processes, adaptations, insights, alternative applications of prior know-how/knowledge.

Overview: In order for COLUMBUS to achieve its objective of bringing new knowledge from marine research to relevant users, it is first necessary to capture, and have a thorough understanding of, the collected knowledge.

The methodology focuses on Knowledge Outputs in the form of exploitable results. The 'collect and understand' phase aims to identify the Knowledge Outputs from marine and maritime projects; to obtain an understanding and clear description of these outputs; and, to identify potential applications and respective End-Users of the knowledge. This phase of the Knowledge Transfer methodology can be divided into three parts:

i. Gather knowledge and develop a Knowledge Output Table (KOT)

The COLUMBUS Knowledge Fellows will begin by carrying out a desktop review on any publicly available material, such as project reports, publications and presentations, to provide initial information on the Knowledge Outputs coming out of the project. This information can be used to begin populating the Knowledge Output Table (KOT), and formulating questions to ask the Project Coordinators during the arranged interviews.

ii. Interview the Project Coordinators of selected projects

The COLUMBUS Knowledge Fellows will make contact with the Coordinator of the project from which they are collecting Knowledge Outputs. Using a prepared script and the drafted KOT, the COLUMBUS Fellow will guide the Project Coordinator through the collection exercise. A COLUMBUS interview script has been provided to the Knowledge Fellows to provide direction and scope, particularly in the initial interviews. This script comprises an introduction of the COLUMBUS project; a description of the exercise; and, outlines the benefits to the Project in collaborating with COLUMBUS. The objective of this interview is to allow the COLUMBUS Knowledge Fellow to capture all of the Knowledge Outputs generated by the project and enough information to describe them fully in the Knowledge Output Table. The COLUMBUS Fellow may wish to complete additional desk-base studies to complete the KOT, if directed to additional material by the Project Coordinator.

iii. Prioritise the collected Knowledge Outputs

All Knowledge Outputs collected in Step 1 of the COLUMBUS Knowledge Transfer methodology, will be made publicly available through the Marine Knowledge Gate¹. COLUMBUS recognises, however, that collecting and making descriptions of the Knowledge Outputs publically available is only the first step in carrying out Knowledge Transfer. Following collection, therefore, the COLUMBUS Knowledge Fellows, using their expertise and the competences of the COLUMBUS partners, will prioritise high potential Knowledge Outputs to be carried through the COLUMBUS Knowledge transfer methodology. Case studies of both successful and unsuccessful transfer will be made available to facilitate adaptation and evolution of the process.

The result of Step 1 is the identification and description of a project's Knowledge Outputs being made publicly available, and those prioritised as being high potential progressing to Step 2.

¹ www.kg.eurocean.org

Step 2: Assess Knowledge

Objective: To understand the positioning and profile of a Knowledge Output to be better able to carry out impactful Knowledge Transfer activities.

Context: COLUMBUS Knowledge Fellows have limited time to produce case studies of successful Knowledge Transfer; hence, efforts have to be focused. This Step will identify potential applications, End Users and Eventual Impacts for a Knowledge Output. This information will inform the development of a Knowledge Output Pathway and the identification of a Target User.

Overview: In Step 1, all of the Knowledge Outputs were identified and described in a Knowledge Output Table. At this stage, it may or may not be clear what specific applications, and resulting End Users, the Knowledge Output might have. Step 2 will help clarify how a Knowledge Output could be beneficial to different stakeholders. It is important to consider the Knowledge Output landscape: the relevant authorities, influential parties, their roles, responsibilities and mandates and, by doing so, identify the Eventual Impact of the Knowledge Output. An Eventual Impact could, as examples, include the adoption of a best-practice standard in research laboratories world-wide; a change in monitoring protocols for a particular marine policy; a more sustainable fishmeal reaching the market; or, a vessel that allows for less intrusive marine tourism. If the Knowledge Output is a pre-commercial technology application, assessing the Technology Readiness Level could inform the development of an appropriate Knowledge Output Pathway, where a Knowledge Output requires further research, validation or scaling.

Knowledge Output Pathway: This can be one step or a series of steps required to carry a Knowledge Output to its Eventual Impact. Where there are a series of steps, it will include detailed mapping of the steps, the users involved at each step and their predicted role in the pathway to Eventual Impact.

Eventual Impacts can vary widely depending on the knowledge and End User(s). Some examples might include but are not exclusive to:

- Development of Blue Economy: Commercialisation of a product or service; improving existing business performance; creating new markets for an existing product or service; establishment of a new businesses; a strategic collaboration between businesses to market a new service; or attracting inward investment, i.e. by finding new ways to exploit environmental resources and services optimally.
- Sustainable Blue Growth: the application of the knowledge to inform policy and regulation, that improves environmental monitoring programmes, knowledge that enables the development of ecosystem services etc.
- Towards a Blue Society: enhancing public health and well-being; saving public sector money; enabling a resilient society (e.g. protecting vulnerable people, places and infrastructure; providing a secure supply of food, energy, water)

The result of Step 2 is the identification of the Target User to whom Knowledge Transfer should be planned.

Step 3: Profile Target User

Objective: Understand how to profile an identified Target User to gain valuable data to inform a successful Knowledge Transfer Plan.

Target User: The individual(s) who you have identified in your Knowledge Output Pathway to whom you will transfer the Knowledge Output.

Context: Profiling the Target User is a crucial step. These individuals are not necessarily the ultimate user or beneficiary of the Knowledge Output; rather they can be the person that should be targeted in order to place the Knowledge Output into a pathway that hopefully leads to an Eventual Impact.

Overview: A Target User is not an organisation; rather it is the individual (or individuals) within an organisation, with a specific mandate or responsibility to carry out activities, who you want to reach. Within any organisation, the exact department and individual to be targeted should be identified based on their job title, role and level of influence. This individual should be targeted because they have a specific role and responsibility which positions them to be the person best suited to apply the Knowledge Output and carry it along the Knowledge Output Pathway, towards its Eventual Impact.

With policy, for example, it may be that there is only one Target User of a Knowledge Output at a national level (e.g. Chief Scientific Advisor to the Ministry on water quality issues related to the Marine Strategy Framework Directive); however, at the transnational level, there could be a similar individual in each country or even several at regional level with the same mandate and responsibility. In which case, there will be several Target Users of a similar profile. Similarly, in industry, a global aquaculture distributor may have a number of regional managers with the same mandates and responsibilities and they might all, therefore, be considered Target Users.

It is important to consider the following when profiling a Target User as it could provide relevant data to inform the Knowledge Transfer Plan:

- Understand the Target User's mandate or responsibilities
- Consider their background knowledge, attitude and practice in relation to the issue
- Understand their knowledge needs
- Understand what and who may influence their decisions
- Be aware of their preferred sources of information and knowledge

General Notes on Stakeholders by Type

Policy Actors Remember that persons associated with policy (e.g. politicians, policy makers, decision-makers) typically come from very different backgrounds, including scientific disciplines. They have many issues to deal with in their job and varying roles and responsibilities, you are unlikely to be their priority. They also have conflicting sources of information and knowledge. They are likely to be getting information from mass media, lobby groups, civil society organisations, or other scientists.

Definition: Any individual(s) who by mandate or interest plays a role in policy decision making at any stage within the policy process. The position encompasses many roles from influence or direct involvement in the creation of a particular policy, to enabling its compliance.

Industrial Stakeholders In industry, profitability will be at the forefront of any organisational decision. It is important to be aware of any competition in existence, whether there is a market for your product/service and have a deep understanding of the landscape of that distinct industry. The breadth of industry relevant to marine science is near to endless, so you will need to use innovative thinking to discover opportunities for transferring knowledge to create value, and successful case studies. **Definition:** *Any individual(s) who by employment, association or interest plays a role in decision making at any stage of the industrial process. The position encompasses many roles including investment, invention or distribution and to enabling its adoption through marketing.*

Peer Scientists and Academics Albeit operating in a similar way (testing hypotheses and reporting the outcomes), academics and peer scientists will often be a specialist in a very particular discipline, and may have no comprehension of closely related fields and cross-disciplinary opportunities. The level of their understanding within a specific area will be robust and rigorous. Their depth of knowledge in associated fields, and therefore the insight into what benefits their Knowledge Outputs could lead to, may be lacking. **Definition:** *Any individual(s) who by employment, association or interest plays a role in decision making at any stage within the research acquisition and development process. The position encompasses many roles from influence or direct involvement in the creation of a particular policy to enabling its compliance.*

Society and Its Citizens This group will cover a greater scope of backgrounds than the aforementioned stakeholder groups, in culturally and academically, and also varying in age and interest. They are likely to be getting disproportionate information from mass media, lobby groups and civil society organisations, and competition for intellectual space, particularly to lead to action, will be high.

Step 4: Develop Knowledge Transfer Plan

Objective: To be able to develop a successful Knowledge Transfer Plan (KTP) by selecting the appropriate messages, communication channels, materials and tools customised to the Target User profile.

Context: Implementing an efficient KTP that is tailor-made to the needs and capacities of specific Target User will maximise the chance of successful transfer resulting in uptake and application. The key to success is achieved through fully understanding the Target User and developing the Knowledge Transfer plan around them.

Overview: The profile of the identified Target User, developed in Step 3, will provide the insights required to develop a tailored Knowledge Transfer plan, with high potential for success. In this step, specific consideration should be given to the type of message, as well as the channel by which it is, to be communicated.

The Message:

- ✓ What is the technical level of the Target User; depth of information needed; and, the style and language used (i.e. a layperson is less likely to read and interpret a scientific paper, as a scientific adviser is not likely to extract information from an outreach article)?
- ✓ Consider the background knowledge of the Target User.
- ✓ Consider any preconceived ideas that the Target User may have relating to the area of interest.
- ✓ Identify ways to relate the knowledge to examples that they are familiar with or can easily envisage.
- ✓ What is the level of evidence or validation that the Target User requires?

The Communication Channel:

- ✓ How does the Target User prefer to receive and assimilate knowledge?
- ✓ How will the channel affect the message (i.e. highly technical knowledge would not be used in a Twitter post or on the radio)?
- ✓ Combining communication channels as part of the Knowledge Transfer Plan can have several benefits:
 - It makes it possible to layer the knowledge, thereby firstly catching the attention of the Target User and then providing in-depth material once they are engaged.
 - Where there is a mixed profile of Target Users, it allows them to have a choice of their preferred channel to receive the same knowledge (e.g. different age profiles of the same Target User).
- ✓ If the Target User profile allows for a choice of channels, then compare the cost versus effectiveness of each channel by considering the following questions:
 - How many Target Users can be reached by this channel?
 - How much would it cost to use this channel?
 - How much time resource would it require?

Step 5: Transfer and Measure

Objective: To carry out and report on Knowledge Transfer activities; whilst measuring the impact of both the activity and the application of the Knowledge Output by the Target User.

Context: Once a KTP has been developed, Knowledge Transfer activities can begin. As well as having a monitoring process in place to ensure that Knowledge Transfer activities are being effective, measurement indicators need to be in place to quantify and qualify the success of their impact. The application of each Knowledge Output by the Target User and any subsequent user will be assessed and recorded in a case study.

Overview: All elements of a KTP were designed in Step 4. Step 5 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. You should continually assess risk and, if necessary, be prepared to adapt the KTP. Measuring the successful completion of Knowledge Transfer activities can be done using both quantitative and qualitative measures. Usually a combination of both will help assess if transfer was successful and the knowledge was taken up by the Target User. Some examples of the measurements that could be taken to measure uptake might be the number of people attending an event, the feedback received following a meeting or the number of people that signed up to a project newsletter.

If knowledge has been transferred, it does not mean that it has been applied. Even if a Target User said they would use the knowledge, does not mean that they actually did. It is important, therefore, to try and assess if the activity had the intended result. This impact measurement should be based on whether the Eventual Impact was achieved, e.g. were changes observed in a Target User's knowledge, attitude or behaviour?

After the transfer activity has taken place and impact measurement taken into account, the COLUMBUS Knowledge Fellows will describe the results in case studies, of both successful and unsuccessful Knowledge Transfer. Successful case studies will be used to promote the benefits and applications of a Knowledge Transfer methodology, while unsuccessful case studies will be reviewed to identify the cause of failure. Where possible, insights and learnings from the process will be used to adapt, evolve and better the COLUMBUS Knowledge Transfer methodology.