COLUMBUS Deliverable Number 5.7

COLUMBUS
KNOWLEDGE TRANSFER FOR BLUE GROWTH

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Deliverable 5.7
Update of Progression of Knowledge Outputs to Knowledge Transfer

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CONTENTS

1 EXECUTIVE SUMMARY

Objectives

Work Package (WP) 5 objective is to *develop a comprehensive and robust analysis of different attributes and stipulations of Knowledge Outputs (KOs) collected in WP4.*

The ultimate aim of the analysis step is to identify those KOs with high potential for impact in the context of Blue Growth and the implementation of marine and maritime governance. It is also to determine a Knowledge Output Pathway (KOP) which links a KO to its eventual impact, providing the information needed, to identify and profile Target Users and to ultimately design and carry out a corresponding efficient Knowledge Transfer Plan (KTP).

The generation of a KOP is a key component of the transfer process and leads to the identification of a Target User(s) who is then profiled. The information gleaned from each KOP and the profiling of the identified Target User **provides the basis to design, and subsequently implement, the KTPs** in WP6.

Deliverable 5.7 (D5.7) provides an update on the initial insights on the *Progression of Knowledge Outputs to Knowledge Transfer* gathered in Deliverable 5.2 (D5.2). It adds further detail on the impact of the analysis work in the Knowledge Transfer (KT) process. D5.2 was aimed to illustrate how the KOP that synthesises the outcomes from the analysis process, formed COLUMBUS decisions to move a KO down the pathway to achieve impact.

Rationale

D.5.2 "Progression of Knowledge Outputs to Knowledge Transfer" focused specifically on how to use the information from the analysis process to identify the actions needed to achieve the eventual impact and how to organise these actions to enable the design of a KTP. D.5.7 updates and upgrades this information from a broader perspective; not only because of the longer timeline covered but also for the varied features of the KOPs described (areas/fields covered, users and applications, scope, nature, etc.).

According to D.2.2 "*A Knowledge Output Pathway 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.*"

By looking at the final KOPs developed within COLUMBUS and by discussing the process with the Knowledge Fellows (KFs) some shared patterns as well as highlighted differences were revealed in how the KT processes function in different contexts. The insights about how the analysis process was addressed and what lessons were learnt from practical performance have already been described in detail in D5.6.: "Update of Knowledge Output Analysis including Knowledge Output Pathway Generation and Results". D5.7 ("Update of Progression of Knowledge Outputs to Knowledge Transfer") will focus on the findings relating to the benefit of the analysis output, (i.e. the KOP), during the process of planning and executing KT. It will supplement the preliminary findings about the process reported and submitted in D5.2 ("Progression of Knowledge Outputs to Knowledge Transfer") in month 17 (July 2016). D.5.2 provided detailed information about the kind of questions the KFs and the Competence

Nodes (CNs) should answer at each step of the analysis process, but it did it so from an *ex-ante* perspective.

Conclusions

Following the identification of 1779 Knowledge Outputs, the eight CNs developed 61 KOPs, leading to the development of 58 KTPs, which themselves led to 48 KT stories being presented publicly. This means that **for more than 80% of the KOs that were carried through the full analysis process a suitable pathway for transfer was identified**. This percentage includes individual KOPs developed for a cluster of KOs leading to KT.

From looking at the different KOPs and the information reported after KT activities have been accomplished, it was verified that specific KOs or Clusters of KOs need specific KOPs. **Different KOs and CNs needed specific KT strategies, even in cases where some of the KT actions planned may have, in principle, seemed similar, the amount of effort/resource behind them may have been very different.** It needs to be noticed that time assigned to each step of the process does not always mean continuous activity in each step. The Knowledge Fellows needed to work with many KOs in parallel, combining their activity around different steps and around different KOs and target users. As a result, any conclusions about average efforts, times, most common activities, etc. needs to be properly contextualised.

The KFs measured the time they needed to accomplish the different steps of the transfer process. The time reported associated to each step of the process showed that **the average time needed to address the analysis steps was 3.5 months** (with 75% of the KOPs having been produced in a period of 2 - 5 months). As to be expected, there is a wide variability in the time passed **from the start of the analysis to the measurement of impact from an effectively accomplished KT activity; The average duration of this was 10.5 months,** with most frequent duration ranging from 5 to 15 months (75% of the KT stories), although the whole range of values go from 3 months to 29 (See Table in page 14).

Other conclusions highlighted in this report are the following:

- ✓ When a KOP is long and complex, it can become quite difficult to assess the time and resources required to address it completely. However, it can be worthy to go step by step as it can be easy to plan how long and how much resources are needed for the accomplishment of a KT activity for each step.
- ✓ When a KOP is being prepared, KFs needed to check if the KO was available in a suitable format for presenting to the Target Users. After profiling a Target User, the format of the KO ought to be tailored in accordance with that user in mind in order to maximise uptake. In fact, most of the KT activities have involved some work to adapt the way that knowledge was presented, or its format, in this regard.
- ✓ It has been considered that progressing through the first steps of the KOPs is already an important achievement during the KT implementation. The ambition of the KTP, however, needs to be defined as part of the KOP, for one to have a clear expectation about future steps. In fact, any kind of productive interaction with Exploitation Partners and Target Users will pave the way for future progress and realisation of the eventual impact.
- ✓ The work carried out in COLUMBUS reveals that, for a large majority of the KOs prioritised for KT, the COLUMBUS network has found a way to perform KT and to measure the achievement of impact. Such promising results highlight the value of employing the COLUMBUS methodology. It also bodes well for future prospects of utilising the methodology to maximise other marine and maritime research results.

2 INTRODUCTION

2.1 Background

The COLUMBUS project aims *"to ensure that applicable knowledge generated through EC-funded research can be transferred effectively to advance the governance of the marine and maritime sectors while improving competitiveness of European companies and unlocking the potential of the oceans to create jobs and sustainable economic growth in Europe (Blue Growth)" (COLUMBUS Description of Action[1].)*. **COLUMBUS** has been designed to demonstrate value creation of EU funded research outputs for a wide range of end users in the Blue Growth, and marine and maritime policy context.

The COLUMBUS structure was designed to achieve this aim through completion of a **Knowledge Transfer cycle** underpinned by the accomplishment of some key complementary support actions such as the analysis of the demand, the setup of a standardised Knowledge Transfer methodology and an efficient communication plan.

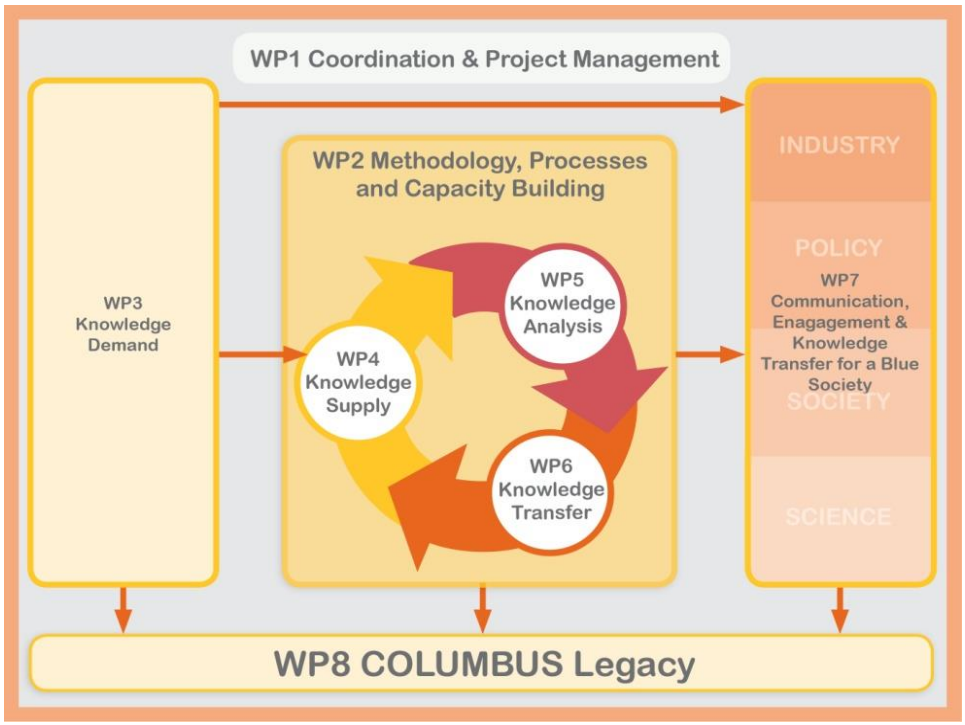

Fig.1. COLUMBUS pert Diagram

The **Knowledge Transfer cycle** consists of implementing a series of methods and tools to connect our insight of knowledge demand (knowledge gaps, needs, challenges, etc.) relevant for Blue Growth and marine and maritime governance with specific users on the industry, administration, academia or society, by increasing and improving for them, the availability of value added knowledge and technologies.

[1]COLUMBUS Description of Action. Grant agreement n° 652690

The WP5 objective is to *develop a comprehensive and robust analysis of different attributes and stipulations of Knowledge Outputs (KOs) collected in WP4 and with this to inform the design of Knowledge Output Pathways (KOPs) and the implementation of Knowledge Transfer Plans (KTPs) and Activities.*

2.2 Organisation of this report

By looking at the final KOPs developed within COLUMBUS and by discussing the process with the Knowledge Fellows (KFs), some shared patterns as well as highlighted differences were revealed in how KT processes function in different contexts. The insights about how the analysis process was addressed and what lessons were learnt from practical performance have already been described in detail in D5.6. "Update of Knowledge Output Analysis including Knowledge Output Pathway Generation and Results". D5.7 "Update of Progression of Knowledge Outputs to Knowledge Transfer" will focus on the findings related to the benefit of the analysis output, (i.e. the KOP), during the process of planning and executing Knowledge Transfer (KT). It will supplement the preliminary findings about the process reported and submitted in D5.2 "Progression of Knowledge Outputs to Knowledge Transfer" in month 17 (July 2016). D.5.2 provided detailed information about the kind of questions the KFs and the CNs should answer at each step of the analysis process, but it did it so from an *ex-ante* perspective.

This report aims to provide supplementary and updated insights from the actual knowledge analysis carried out by the different CNs in COLUMBUS. It also aims to provide insight on the period from month 17 to the end of the project. These aspects illustrate how the KOP informed COLUMBUS' decisions to move prioritised KOs down through their pathways to achieve impact. It explains how different CNs dealt with the results of the analysis process to embed the KOPs into the design and implementation of the KT activities and plans. Finally, this report will extract some points for discussion and conclusions to be considered for the future implementation of the methodology, as part of the lessons learnt from the process.

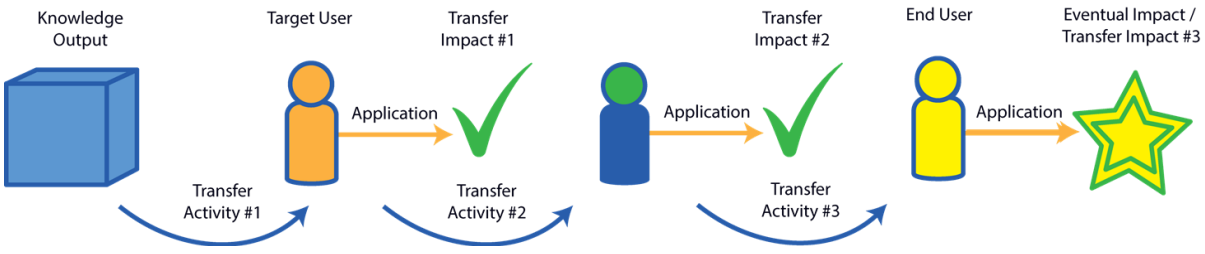

Fig. 2 Visualizing the Knowledge Output Pathway (source: COLUMBUS Knowledge Transfer Handbook)

2.3 Terminology

This document uses several terms which have been defined in the COLUMBUS deliverable "Knowledge Guidelines on carrying out COLUMBUS Knowledge Transfer and Impact Measurement" (D.2.2, 2015) as follows:

- **Knowledge Transfer:** The term for the overall process of moving knowledge between knowledge sources to targeted potential users of knowledge. Knowledge Transfer consists of a range of activities which aim to capture, organize, assess and transmit knowledge, skills and competence from those who generate them to those who will utilize 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. *(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".)*
- **Exploitation partner:** An external organization/institution/individual who has an interest and/or expertise that may assist in transferring that Knowledge Output down to the Knowledge Output Pathway to its Eventual 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.
- **A Competence Node** is a network organised within COLUMBUS to ensure there is a competent team with sufficient critical mass to carry out a technology and knowledge transfer process as a peer community. COLUMBUS comprises a total of 9 Competence Nodes addressing key activities, both sectoral and cross-cutting, of particular relevance for Blue Growth and Marine and Maritime Governance.
- **Knowledge Fellow.** The Knowledge Transfer Fellows' primary job role is to ensure Knowledge generated via European Research is effectively transferred to different End Users who can take up and apply the knowledge resulting in significant value creation. Each Competence Node in COLUMBUS has been assigned a Full-time Equivalent Fellow for a minimum of 24 months.
- **Knowledge transfer cycle:** Each of the three rounds planned in COLUMBUS comprising KO collection, KO analysis (with KOP design and target uses profiled) and transfer planning and development (including the measurement of impact).

2.4 List of acronyms

KO	Knowledge Output	TRL	Technology Readiness Level
KOT	Knowledge Output Table	PC	Project Coordinator
KOP	Knowledge Output Pathway	WP	Work Package
CN	Competence Node	OoT	Oceans of Tomorrow
KF	Knowledge Fellow	FP7	Seventh Framework Programme for research and innovation.
KT	Knowledge Transfer		

3 METHODOLOGY

The generation of **a Knowledge Output Pathway** (KOP) is a key component of the transfer process and leads to the identification of a Target User(s) who is then profiled. The information gleaned from each KOP and the profiling of the identified Target User **provides the basis to design, and subsequently implement, the Knowledge Transfer Plans** in WP6.

Therefore, the objective of characterising a Knowledge Output Pathway is to visualise the picture of the principal elements to be considered for the design of an efficient Knowledge Transfer Plan, i.e.:

- the position of a given Knowledge Output in its context for application
- information about the main drivers and barriers conditioning the application of the identified Knowledge
- basic information about potential users and alternative uses
- basic information about required activities to progress a KO from one Target User to the next in the Pathway until the achievement of impact
- information about the key events representing a chance/obstacle for knowledge transfer
- a deeper understanding of the eventual impact and about who can/should do something to realise this impact.

With this information in place, COLUMBUS knowledge Fellows, having enriched the information they handled with the inputs from their Competence Node Teams, were able to trace the Pathway or Pathways for Knowledge Transfer, to choose the most suitable ones and to profile the Target User(s) playing a role in this Knowledge Output Pathway.

This deliverable will now look at the KOPs retrospectively to examine the kind of KT activities identified, the percentage of KOPs that led to achieved and measured impact, the average time required from analysis to transfer and impact, etc. This report will also look at some examples of KOPs that did not lead to a KT story, to understand what was/were the barrier(s) identified. This analysis used the information provided by the KFs in their templates: a total of 61 KOPs.

4 RESULTS AND MAIN FINDINGS

This deliverable was produced at the end of the COLUMBUS implementation, in February 2018. It was originally planned for submission in month 32 (October 2017) but, at that time, much of the WP5 (Analysis) work by the CNs was still ongoing. The WP5 leader therefore needed to concentrate more on providing support and supervision to the ongoing work rather than focus on a reporting process (for the production of this deliverable) that would not be able to reflect the whole picture of the activities performed in COLUMBUS if this deliverable was to be released by that time.

The total amount of KOPs described by the eight Competence Nodes was 61. These led to the description of 58 Knowledge Transfer Plans, which in turn leading to 48 public Knowledge Transfer stories. This means that **for more than 80% of the Knowledge Outputs which were fully analysed there was identified a suitable pathway for transfer**. Among the Knowledge Transfer activities effectively carried out, there were some referring to clustered Knowledge Outputs. For example, the Marine Governance and Management Competence Node clustered KOs in seven of the 14 KOPs they

developed. This fact delivers a **positive perspective about the opportunities to bring the knowledge generated**, once identified as promising and prioritised, **closer to their potential users (Target or End Users).**

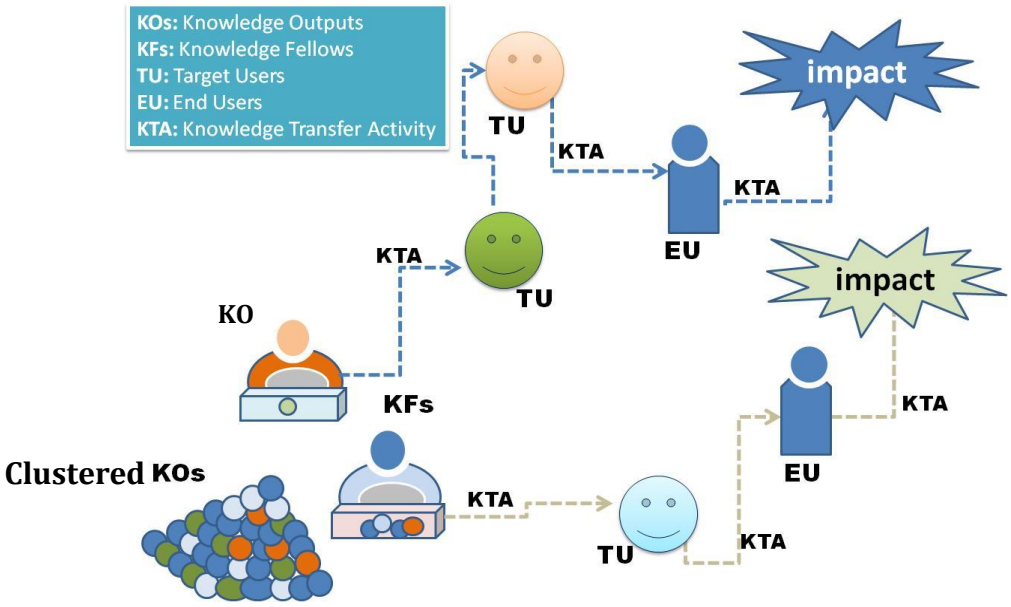

Fig. 3. Schema of two pathways with single KO and clustered KOs, different number of target users, etc.

Considering the definition of a KOP as provided in section 1.4 of this document and the description of the methodology, COLUMBUS recognises that the scope and duration of the full implementation of some of the KTPs described by the KFs and the CNs, and the measurement of **eventual impact might take much longer than the duration of COLUMBUS**. The partnership agreed that providing evidence that a KO has moved one **or two steps down a suitable KOP would be a valuable contribution** during a time-limited project, **paving the way for the realisation of the eventual impact**. This is the reason why one of the components of the analysis, when a KOP is being described, is to determine how pushing the KO or cluster of KOs through their first steps towards the Target User, could accelerate the final uptake of knowledge by End Users (Fig.4)

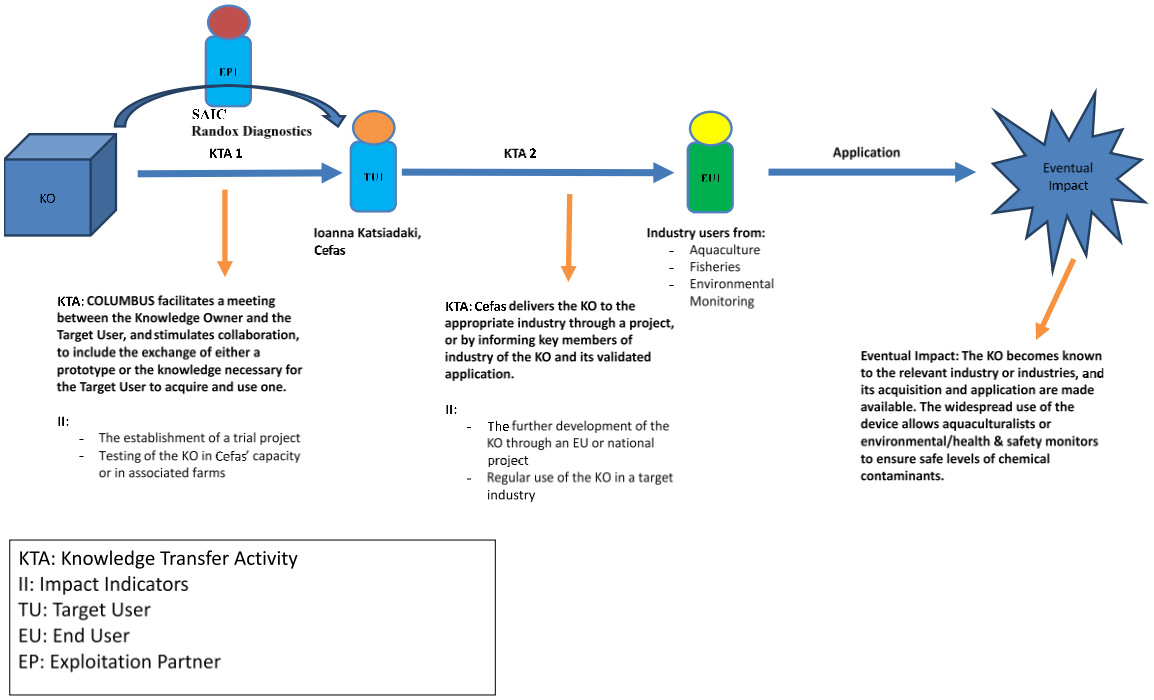

Fig.4. KOP extracted from Marine Biological Resources Competence Node, for KO.IRELAND_EPA_STRIVE.1. Illustrating how COLUMBUS would address the first step in a longer Pathway that was described.

Another relevant finding about the COLUMBUS KT activities first identified in a KOP, then planned in a KTP, performed and reported, is that the **most common channels used to convey the knowledge to the users have been restricted workshops** (targeted to specifically invited users)**, brokerage events** (open to a wider audience) **and face to face meetings** (both in person and remote meetings). This strongly suggests that **KT benefits from direct and targeted interaction** with users, Exploitation Partners, knowledge holders, etc.

- **Meetings** have been identified as main activity needed to carry out knowledge transfer in a total of 21 of the 61 KOPs (34%). In some cases, such meetings have been reported as face to face meetings and some others have used remote means.
- **Workshops based on a specific KO or cluster of KOs and tailored to a specific audience** have been identified as another frequent approach to KT. This was the kind of activity suggested for 11 of the 61 KOPs (18%).
- **Brokerage events** have been identified as major transfer activity in 11 of the 61 KOPs (18%) (most of them concentrated in three of the brokerage events organised by COLUMBUS).

It needs to be explained that all workshops, bilateral meetings and brokerage events may require a significant amount of preparation work. Direct interaction with knowledge holders and potential users was required in advance, during and after the events' accomplishment. It is also important to highlight, that different workshops (in different Competence Nodes and for different KOs) have involved very different amounts of time and resources to organise. Among the **workshops** there were some examples of international workshops, with the involvement of international and national representatives (e.g. VECTORS-AQUANIS from Marine Governance and Management Competence

Node) which involved a significant amount of time and resources to organise, whereas some others needed a much simpler approach, involving just local actors, easier to reach by the organisers. The same happened with **bi-lateral meetings and interviews**; some involved the Fellows needing to travel abroad or to visit the Knowledge holder and/or the target users' facilities (e.g. CN Fisheries IBMAP, CN Marine Physical Resources - H2Ocean), while others could be solved with one or two on-line meetings. Again, KT activities channelled through **telephone and e-mail correspondence**, involved significant work and substantial time dedication. Consultancy was normally provided to digest the knowledge to be transferred making it easier and more attractive for the user(s), and helping the identification of potential applications and impact. Knowledge Transfer Activities carried out during **brokerage events** (normally organised in a more open format) were mostly used as a means to identify potential users, and to get their commitment to participate in future knowledge transfer actions, comprising trainings, field trials and the co-design of the next steps in the KTPs with the KFs. (e.g. CN Aquaculture, with one event organised during the Aquaculture Europe 2017 in Dubrovnik, set the basis for the KT of various of the KOs that had been prioritised by this node). However, brokerage events in COLUMBUS were originally planned as multipliers of KT activity, and for this, most of them were accomplished in the final project period. Despite their successes, the timing may have not been the most suitable to guarantee that more of the subsequent KT steps foreseen in some of the KOPs starting with the brokerage event as first KT activity, could be accomplished within the timeframe of COLUMBUS. This is why next steps for knowledge transfer have been described in the published stories, so that if time and resources are available, the work can be continued until the eventual impact has been achieved and measured.

Direct and targeted interaction (through the kind of events mentioned above or other of a similar nature) **is the only way KT can become traceable, with Knowledge Fellows registering progress achievements, choosing indicators to measure impact and using them**. This means that the KT practitioners, in this case the Knowledge Fellows, are able to identify who commits to make use of the knowledge transferred, what use this will be and from this, they will be able to measure impact achievement, both about the effective KT and about its effects on the Target Users' or End User's activities.

The **preparation and targeted delivery of a particular presentation containing tailored information about one or more KOs** (infographics, reports, projects and KO dossiers, etc.) has been another kind of KT activities identified and integrated in the KTPs, to then be accomplished as part of the KT activity. In fact, one of the barriers often identified for a suitable knowledge transfer is that **knowledge as such is not very often displayed in a format in which a potential user can assimilate it**. One of the roles COLUMBUS Knowledge Fellows have played was to extract the key messages about the prioritised Knowledge Outputs that could make it more easily digested by the potential users. **The production of knowledge is not always encompassed with tailored and suitable communication products.** There were several ways that this gap has been addressed by Knowledge Fellows with the support from the Competence Nodes and, in some cases, from the dissemination partners:

- Preparing presentations to explain the knowledge in workshops, meetings, etc.
- Elaborating infographics, with educational and synthesised content.
- Producing technical briefings that could explain in a nutshell the interest of knowledge to be transferred.
- Preparing or orienting the contents of presentations used by knowledge holders to introduce the knowledge to the potential users.
- Organising knowledge clusters in comprehensive and friendly reports, etc.

Remarkably, this type of KT activity becomes **especially useful when addressing a cluster of Knowledge Outputs**. Aggregated KOs need to be first individually identified and described; they can be embedded in different formats and deliverables from projects (websites, datasets, software, publications, etc.) and there is work needed to explain the value derived from organising a KO cluster as the best way to address KT. Complementary KOs which can contribute to a common impact achievement and which need to be applied by some common target users, were clustered by Knowledge Fellows to gain some efficiency in the KT process. Clustered KOs were in some cases obtained from more than one project. When this happened, the Knowledge Fellows in their role to facilitate the understanding and uptake of the available knowledge for target users, **normally needed to put extra efforts in organising the information of the KO cluster composition, making the knowledge more easily digested by target and End Users**. This need may also be detected for individual KOs, but it is more frequent and more challenging when the clustered approach is followed. This idea is also reflected in one of the information outputs developed by the CN on Marine Observation and Monitoring. At least it is directly related with the reasons behind the elaboration of the "Use and sharing of marine observations and data by industry: Good Practice Guide". In fact, this Node, due to the singularity of the outputs under its scope (marine observations data and data repositories), has addressed almost all its Knowledge Transfer activity within COLUMBUS under a clustered perspective.

Another quite common, though not surprising finding from this process is about the identification of some **opportunities for new applied/demonstration/innovation projects as the best means to move some of the KOs from their current status to a higher readiness level**. Bearing in mind that many of the projects explored had a strong research component, it is not very surprising that relevant and promising KOs were identified which needed further development to adapt to the users' needs and be applied. The role of COLUMBUS in this regard has been to connect knowledge holders with Target Users and End Users and to use the pathways as a support means to design the new projects with an applied and impact-oriented focus, often in a new sector (e.g. CN Fisheries Utophia; CN MGM STAGES-MARINER).

While it can be more or less easy to plan how long and how much resources are needed for the accomplishment of a given KT activity, it is more **difficult to assess the time and resources needed for a full Knowledge Transfer Plan, aimed to address the entire Knowledge Output Pathway**, from the current status of a Knowledge Output to its application and to the measurement of its effects and benefits yielded to the users.

The Knowledge Fellows have measured the time they needed to accomplish the different steps of the KT process, and this information has been released within the public booklet describing the 48 Knowledge Transfer stories from COLUMBUS http://columbusproject.eu/project-results. It needs to be noticed that time assigned to each step of the process does not always mean continuous activity in each step. The Knowledge Fellows needed to work with many KOs in parallel, combining their activity around different steps and around different KOs and Target Users. Moreover, and even more important, with reference to time and resources planning, **the KT process needs to be adaptive to the time availability of third parties, whose agendas were out of the management possibilities of COLUMBUS.** This refers to knowledge holders, Target Users, End Users, Exploitation Partners, etc. In some cases, to prepare a robust KTP, in terms of time and resources needed for its accomplishment, it would be needed some direct iteration with all the parties during the elaboration of the KOP, or at least during the design of the KTP. The latter to understand the priority they would give to acquire the

knowledge and their chances to encompass their agendas with that of the COLUMBUS CNs. The time that the Knowledge Fellows reported associated to each step of the process (see table 1 below) reveals that **the average time needed to address the analysis steps has been 3.5 months** (with 75% of the KOPs having been produced in a period of 2 to 5 months). As could be expected, the variability of the time passed **from the start of the analysis to the measurement of impact from KT activity effectively carried out is much wider, the average is 10.5 months,** with most frequent values ranging from 5 to 15 months (75%), although the whole range of values goes from 3 to 29 months. However, in all the steps it needs to be regarded that normally, different activities were happening at the same time. Therefore, if focus was on one KT after another, then these average times could change.

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Table 1.List of COLUMBUS Case Studies per Competence Node included in '*The COLUMBUS Stories of Marine and Maritime Knowledge Transfer Activities*'. The time needed to accomplish each of the steps of the Knowledge Transfer Process is indicated.

Competence Node	Case Study/Project	KOP	Step1 Collection	Step 2 Analysis-KOP	Step 3 Analysis-Profiling TU	Step 4 Transfer-Developing KTP	Step 5 KT activity and measure impact	Time for Steps 2-3	Time from Step 2-5
Marine Governance and Management	NEAT-Environmental Impact Assessment	1	Nov15	Jan - Feb 16	Mar - Apr 16	Apr 16	Jun17	**4**	**6**
Marine Governance and Management	PERSEUS TEAP/PORTOPIA TEIP	1	Dec 15	Jun - Aug 16	Sep - Oct 16	Oct-16	Nov16	**5**	**6**
Marine Governance and Management	NEAT-Deep Sea	1	Nov15	Mar 17	Mar 17	Mar 17	Apr - Nov17	**1**	**9**
Marine Governance and Management	STAGES-COLUMBUS to D.5.4&5	1	Nov15	Nov17 - Jan18	n/a	Mar-17	Sep17	**3**	**5**
Marine Governance and Management	STAGES-COLUMBUS to MARINER	1	Oct15	Jan - Jun 16	Jul17	Apr 15 - Dec 17	Dec17	**7**	**12**
Marine Governance and Management	Vectors-AquaNIS 1 – National NIS Database structure	1	Nov15	May17	Jun - Jul 17	Jul 17	Sep17	**3**	**5**
Marine Governance and Management	Vectors-AquaNIS 2 – NIS Databases harmonisation	1	Nov 15 - Sep17	May - Jun 17	Jun17	Jul17	Sep - Dec 17	**3**	**5**
Marine Governance and Management	Lifeiseas - EFCA	1	Nov16	Nov - Dec 16	Jan 17	Jan 17	Feb - Mar 17	**3**	**5**
Marine Governance and Management	MINOW - EFCA	1	Nov16	Nov - Dec 16	Jan 17	Jan 17	Nov17	**3**	**13**
Marine Governance and Management	Discardless-EFCA	1	Nov16	Nov - Dec 16	Jan 17	Jan 17	Mar17	**3**	**5**
Marine Governance and Management	Clustered Marine Litter KOs	1	Nov 15 - Sep 17	May - Jun 17	Jun 17	Jul 17	Sep - Dec 17	2	8
Aquaculture	FishTexture Evaluation Tool	1	Aug 16	Sep16	Oct16	Nov 16 - Dec 17	Nov17	**2**	**14**

Aquaculture		VLP Vaccine	1	Jun17	Sep17	Oct17	Nov17	Jan 18	**2**	**5**
Aquaculture		Abalone MTA	1	Nov 16	Dec 16 - Jan 17	Feb17	May17	Nov 17- Jan 18	**3**	**13**
Aquaculture		Fish Shape App	1	Feb17	Jan - Jun 17	Jul17	Aug - Oct 17	Nov17	**7**	**11**
Aquaculture		Feed Premixes	1	Feb17	Jun17	Sep17	Oct17	Nov17	**4**	**6**
Aquaculture		Enteritis	1	Jun17	Sep17	Oct17	Nov17	Jan 18	**2**	**5**
Aquaculture		Vaccination Machine	1	Jun17	Sep17	Oct17	Nov17	Jan 18	**2**	**5**
Marine Resources	**Biological**	MicroB3: Ocean Sampling Day	1	Mar 17	Apr - May 17	Jun17	Jul17	Nov 17- Feb 18	**3**	**9**
Marine Resources	**Biological**	MicroB3: ABS	1	Mar 17	Apr - May 17	Jun17	Jul17	Nov 17- Feb 18	**3**	**11**
Marine Resources	**Biological**	SYMBIOCORE Flexi-chamber	1	Mar 17	Apr - May 17	Jun17	Jul17	Aug - Dec 17	**3**	**9**
Marine Resources	**Biological**	ASIMUTH: HAB Forecast	1	Mar 17	Apr - May 17	Jun-Jul 17	Jul - Aug 17	Sep17-Feb 18	**4**	**11**
Marine Resources	**Biological**	BIOCLEAN	1	Mar 17	Apr - May 17	Jun17	Jul17	ongoing	**3**	**-**
Marine Resources	**Biological**	SEABIOPLAS	1	May17	Jun17	Jul17	Aug 17	Oct 17 - Feb 18	**2**	**9**
Marine Resources	**Biological**	IRELAND_EPA_STRIVE	1	Mar17	Apr - Jun 17	Jul - Aug 17	Sep17	Nov 17 - Feb 18	**5**	**11**
Environ. & Futures		MARLISCO	1	Jun16	Sep16	Nov 16	Mar 17	Nov17	**3**	**15**
Environ. & Futures		Ocean Plastic Lab	1	Nov 15 - Jun 16	May - Jul 17	May17	Oct17	Dec 17	**3**	**8**
Environ. & Futures		N-CHITOPACK/CHIBIO	1	Apr 16 - May 17	May17	Mar 17	May - Dec 17	Mar - Sep 17	**3**	**7**
Environ. & Futures		CLEANSEA	1	Feb16	May17	May17	Aug 17	Aug 17	**1**	**4**
Fisheries		IBMAP	1	Apr 16	Apr 16	Apr - Aug 16	Aug - Sep 16	Sep 16 - Nov 17	**5**	**20**
Fisheries		UTOFIA – 1	1	Sep15	Oct15	Oct 15 - Mar 16	Oct 15 - Mar 16	Oct 15 - Dec 17	**6**	**26**
Fisheries		UTOFIA – 2	1	Sep15	Oct15	Nov 15 - Mar 16	Nov 15 - Mar 17	Nov 15 - Mar 18	**4**	**29**

Fisheries		UTOFIA – 4	1	Sep15	Feb 16 - Mar 16	Feb 16 - May 16	Feb 16 - May 16	May 16 - Mar 18	**4**	**25**
Fisheries		DEEPWIND	1	Oct15	Oct16	Dec 16	Dec 16	Dec 16 - Feb 18	**3**	**17**
Monitoring	**&**	Best practice guide	1	May16	May17	May17	May17	ongoing	**1**	**-**
Observation										
Monitoring	**&**	Cluster - Innovative applications	1	Apr 16	Jul17	Aug 17	Aug 17	Nov17	**1**	**5**
Observation										
Monitoring	**&**	SMS algal sensor	1	Dec 15	July 17	Jul - Nov 17	Nov17	Nov17	**5**	**5**
Observation										
Monitoring	**&**	WildSea Europe	1	May16	Jun16	Jun16	Jun16	Jan 18	**1**	**19**
Observation										
Marine	**Physic.**	H2Ocean	1	Oct15	Oct15	Dec 16	Dec 16	Dec 16 - Dec 17	**15**	**26**
Resources										
Marine	**Physic.**	H2Ocean (FLovaWT)	1	Oct15	Oct16	Dec 16	Dec 16	Oct16	**3**	**2**
Resources										
Marine	**Physic.**	LEANWIND	1	Oct15	Nov 15 - Mar 16	Apr - Jun 16	Apr- Aug 16	Aug 16-Dec 17	**8**	**26**
Resources										
Marine	**Physic.**	ACORN	1	Mar - Jan 17	Nov 16 - Feb 17	Feb - Jul 17	Feb - Jul 17	Jul - Dec 17	**9**	**14**
Resources										
Marine	**Physic.**	Lakhsmi	1	Jul16	Aug 16	Sep16	Oct - Nov 16	Dec 17	**2**	**16**
Resources										
Marine	**Physic.**	AquaRET	1	Nov16	Oct17	Oct - Dec 17	Nov 17	Jan 18	**3**	**4**
Resources										
Marine	**Physic.**	Annex IV - State of the Science	1	Sep16	Sep - Nov 16	Dec 16	Dec 16	Jan - Mar 17	**4**	**7**
Resources										
Maritime Transport		SELEKTOPE	1	Mar16	Jul - Aug 16	Aug 16	Sep16	Oct 16 - Apr 17	**2**	**10**
Maritime Transport		THROUGHLIFE - Sundeck No.1	1	Mar16	Dec 16 - Jan 17	Jan 17	Feb17	Mar - May 17	**2**	**6**
Maritime Transport		THROUGHLIFE - Self-Healing	1	Mar16	Oct - Nov 16	Nov16	Jan - Feb 17	Mar - Jun 17	**2**	**9**
Maritime Transport		FAUSST No.1	1	Jun17	Jul17	Aug 17	Aug - Sep 17	Oct - Nov 17	**2**	**5**

5 CONCLUSIONS

- **TARGETED INTERACTION WITH TARGET AND END USERS**

Direct and targeted interaction is an important requirement for KT to become traceable and measurable. If knowledge is made available (for example through open access repositories) but there is no direct action to underpin access and uptake by specific users, it will be difficult to track when the knowledge has been found and applied, and what kind of benefits this has produced, where and to whom. Most frequent actions envisaged from KOPs and then integrated in KTPs carried out reveal that KT has mostly occurred through tailored and targeted workshops, face-to-face-meetings and brokerage events (that in some nodes have been particularly useful to identify, confirm interest and profile the target users and to identify most suitable subsequent steps in the KOP).

- **TIMELY INTERACTION**

While it can be more or less easy to plan how long and how much resources are needed for the accomplishment of a KT activity, it is more difficult to assess time and resources to address a full KOP, from the initial collection of a KO to its transfer, application, the eventual impact being reached and the measurement of effects and benefits yielded to the End User. Timely intervention is an important driver for the success of a KTP, thus, there is a need to embed the time-frame considerations as part of the KOP, and to revise this information periodically. Quite often, when the KT process is planned in the context of a project, the project lifetime is shorter than that of the KOPs needed for the knowledge generated. It would be convenient that funding agencies considered mechanisms to guarantee that the KT implementation is not interrupted with the termination of the projects.

- **ADEQUATE INFORMATION DISPLAYS**

For catching the attention of Target Users and End Users it is important to assess if the knowledge to transfer is in the appropriate format to be fully understood and up-taken by the users. Most of the KT activities have involved some work in this regard, such as the preparation of synthesis reports, infographics and technical briefings. When a KOP is developed for a cluster of KOs, the need for this kind of support materials is even stronger.

- **PARTIAL IMPACT IS IMPACT**

Some of the KOPs designed involve a long-term action plan that exceeds the timeframe for the accomplishment of COLUMBUS. Providing evidence of progression through the first steps of the KOPs is already an important achievement. The interaction with Exploitation Partners and target users will pave the way for future progress and realisation of the eventual impact. The use of appropriate impact indicators for each KT action along the KOP is the best way of ensuring that progress is adequately measured, and for aiding in future progression.

- **POSITIVE PERSPECTIVE**

The work carried out in COLUMBUS reveals that for a large majority of the KOs prioritised for KT, the network has found a way to perform KT and to measure impact achievement within a relatively short time-frame. The analysis work is one of the steps of the process that more directly contributes to effectively plan the KT activity, assuring the KT activities will serve to realise the value from research outputs to the different actors involved in the KOP, and especially for the users.

As concluded in D.5.2 the analysis process as planned in COLUMBUS has been demonstrated as an important step in generating an efficient Knowledge Transfer Plan as it provided insights into the principal features that were necessary to consider for planning efficient and effective knowledge transfer.

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References

- COLUMBUS Grant Agreement. Annex I: Description of Action.
- COLUMBUS Deliverable 2.2. “Knowledge Guidelines on carrying out COLUMBUS Knowledge Transfer and Impact Measurement”
- COLUMBUS Deliverable 5.2“Progression of Knowledge Outputs To Knowledge Transfer”
- COLUMBUS Deliverable 5.6. “Update of Knowledge Output Analysis including Knowledge Output Pathway Generation and Results”
- COLUMBUS Stories of Marine and Maritime Knowledge Transfer Activities
- COLUMBUS CN Marine Monitoring and Observations “Use and Sharing of Marine Observations and Data by Industry. Best Practice Guidelines”