



Acronym: COLUMBUS

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Knowledge for Sustainable Blue Growth  
Grant agreement n° 652690

## Deliverable 4.4

# Upgraded Marine Knowledge Gate

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## CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>4</b>
<b>INTRODUCTION .....</b>	<b>6</b>
Background .....	6
Organisation of this report .....	9
Terminology .....	9
<b>MARINE KNOWLEDGE GATE UPGRADE.....</b>	<b>15</b>
Information Fields.....	17
Search Functionality .....	18
Display Options and Tools.....	22
Navigation Tools.....	20
Update Functionalities.....	24
<b>CONTENTS OF THE MARINE KNOWLEDGE GATE 3.0 .....</b>	<b>11</b>
<b>MARINE KNOWLEDGE GATE MAINTENANCE .....</b>	<b>25</b>
<b>CONCLUSION .....</b>	<b>26</b>
<b>ACRONYMS .....</b>	<b>27</b>
<b>REFERENCES.....</b>	<b>27</b>
<b>ANNEXES .....</b>	<b>28</b>



## LIST OF FIGURES AND TABLES

### List of Figures

<b>Figure 1-</b> COLUMBUS Knowledge Transfer Methodology.....	7
<b>Figure 2-</b> COLUMBUS Collection Results a) COLUMBUS Marine-Funded Projects Universe b) COLUMBUS Marine-Funded Projects with Collected KOs c) COLUMBUS Marine-Funded Projects with Validated KOs d) COLUMBUS Collected KOs.....	14
<b>Figure 3-</b> COLUMBUS Knowledge Output Collection Step in Numbers .....	15
<b>Figure 4-</b> COLUMBUS Collected Knowledge Outputs per Knowledge Output Type .....	15
<b>Figure 5-</b> Marine Knowledge Gate Header and colour code navigation From Left to Right: Homepage; Projects; KOs; Statistics; Services; Data Download and Add and/or Update Data Top – Homepage and Services colour scheme Middle - Projects component colour scheme Bottom – KOs component colour scheme .....	20
<b>Figure 6-</b> Marine Knowledge Gate three-tier information level Top – Homepage Middle Left - Search Filter and Search Records page (Project component example) Middle Right - Record Detail page (Project component example) Bottom – Service page - Funding Programmes component access page (design mock-up).....	21
<b>Figure 7-</b> Marine Knowledge Gate Map Visualisation Tool Top – Institutional Record page (KO component example) Bottom Left - Record Detail page collapsed view (KO component example) Bottom Right - Record Detail page extended view (KO component example).....	22

### List of Tables

<b>Table 1-</b> COLUMBUS Collection Results by Competence Node .....	12
<b>Table 2-</b> Marine Knowledge Gate 3.0 User Statistics.....	23





## EXECUTIVE SUMMARY

The objective of Work Package (WP) 4 – Knowledge Supply – is to identify, collect and monitor past and current research activity with a view to collecting Knowledge Outputs (KOs) focused on priority and knowledge gaps defined in WP3 – Knowledge Demand. The vital aim of the Knowledge Supply step is thus to collect relevant KOs from European Commission (EC) funded research projects to progress to WP5 – Knowledge Analysis - and WP6 – Knowledge Transfer. The goal is that KOs of a higher potential will be transferred and make an impact in the context of Blue Growth and marine and maritime governance.

Given the nature of the Knowledge Transfer process (which can require an extensive time period and/or implies the involvement of several target users), and given the nature of the projects themselves (which have limited financial and time resources), it stands to reason that not all the COLUMBUS collected KOs were subject to Knowledge Transfer actions within the project timeframe. Additionally, the full impact of a transferred KO may go beyond the COLUMBUS lifetime. Hence as to guarantee wide accessibility, transparency and increase synergies of ready-to-use knowledge/results of publicly funded research, COLUMBUS ensured that all collected knowledge would be made publicly available in the pre-existing Marine Knowledge Gate 2.0 infobase.

This report aims to provide an overview of both the Marine Knowledge Gate infobase content update and technical upgrade within the COLUMBUS remit, aimed to ensure its up to date and fit for purpose status, and thus aligned with the EC Marine Research Information Platform by 2015 (COM(2014) 254 final/2).

While the infobase content update mainly focused, project-wise, on the final set of the 7<sup>th</sup> Framework Programme (FP7) funded projects (given the collection remit defined by the consortium members as mainly the entirety of marine-related FP7-funded projects), Horizon 2020 (H2020) marine-related projects (funded in the first two years of the programme) were also identified collected and made publically available. This was at the request of a few of the COLUMBUS Competence Nodes (CNs) due to their sector innovation rate. A total of circa 693 marine-related projects were thus identified and made publicly available in the Marine Knowledge Gate (circa 370 FP7 and 310 H2020 and the remaining from a range of different programmes). This represents an increase of circa 11% with regards to the total number marine-related funded projects available in Marine Knowledge Gate.

The final outcome of the COLUMBUS collection step resulted in a total of 1,779 collected KOs. While most of these were collected from FP7-funded projects (186 out of a total 208 projects, circa 89%), the diverse array of project aims and objectives as well as of the diverse funding programmes and sub-programmes nature validate the adequacy of COLUMBUS Knowledge Transfer Methodology.

Out of these collected KOs, circa 70% (1,238 KOs) were uploaded to the Marine Knowledge Gate after being validated by Project Coordinators, representing an increase of circa 52% of the total number of marine-related KOs available in the infobase. These KOs were derived from 112 marine-funded research projects, including the Ocean of Tomorrow projects (31 in total, funded under FP7) which account for circa of over 40% of the validated KOs (531 KOs out of 1,238).



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Similarly to the collected projects, all the collected KOs were made publically available in the Marine Knowledge Gate infobase.

The infobase – “widely recognised as the baseline to help different users understand research efforts and activity, to reduce likelihood of duplication and help to identify synergies” – proved no longer to fully respond to the users’ needs, which were assessed through a wide public consultation carried out between the last quarter of 2016 and the first quarter of 2017.

The consultation not only allow the validation of the Marine Knowledge Gate main structure (of two autonomous but interlinked components of Projects and KOs) and information tier (to allow fastest access to detailed information), as gave rise to several improvement and modernisation suggestions, namely:

- Improved content completeness by expanding the Marine Knowledge Gate coverage to additional funding programmes, both European and national
- Improved search options such as advanced free text search, multiple options per search filter, thematic categorisation of Projects and KOs, among others
- Improved provision of services such as user-specific basic statistics and infographics, open and free access to infobase content in line with the European Union Open Data Policy
- Improved integration and interoperability with external databases, thus ensuring maximisation of resources and the establishment of further synergies, consequently supporting a stronger content completeness and up-to-date status

The selected technical upgrades started in April 2017 and took into consideration COLUMBUS’s aim, remit and resources, as well as those of EurOcean as the infobase owner and trustee. The Marine Knowledge Gate 3.0 main technical upgrades, made publicly available through a BETA version and launched on January 2018 for the 2<sup>nd</sup> COLUMBUS Annual Conference, can be categorised into:

- Information Fields
- Search Functionality
- Navigation Tools
- Services
- Additional Functionalities

The main technical developments are related to improved search options through the provision of Boolean<sup>1</sup> free text search, multiple options per choice of filter fields, and a streamlined and minimised number of available search fields, as well as a map visualisation tool of the institutions involved in selected Projects and KOs. Other main technical developments are related to vaster and more relevant services, such as the provision of a set of statistical indicators of a user-defined universe, among others.

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<sup>1</sup> Boolean text search is a type of search allowing users to combine keywords with operators (or modifiers) such as AND, NOT and OR to further produce more relevant results



Noteworthy is the fact that Marine Knowledge Gate 3.0 was developed to take into consideration future interactions not only with individual users, but also with institutional users and/or information providers. In fact, by securing the coding of its information, following multiple internationally recognised data standards, Marine Knowledge Gate 3.0 is a step closer to future automatic interoperability with external users and/or databases.

The final version of the new Marine Knowledge Gate 3.0, delayed due to technical implementation issues, is expected for June 2018, thus reflecting the final comments of the COLUMBUS partnership. Further suggested developments will undergo interrogation as a new internal infobase structure had to be developed given the nature and magnitude of some of the new functionalities.

Additionally, the Marine Knowledge Gate 3.0 will be in place after the end of the COLUMBUS project as part of EurOcean's institutional remit. It will be subject to further content updates and technical upgrades, thus ensuring its continuous status as a relevant, recognised, fit-for-purpose, one-stop tool for and KOs from marine-related funded research.

## INTRODUCTION

### **Background**

The **COLUMBUS** project – Monitoring, Managing and Transferring Marine and Maritime Knowledge for Sustainable Blue Growth – is an H2020 Coordination and Support Action (March 2015 – February 2018) focused on unlocking the potential of applicable knowledge generated mainly through relevant past and current European Commission-funded science and technology research. This is achieved by ensuring the accessibility, transfer and uptake of knowledge by end-users (policy, industry, science and wider society)<sup>2</sup>.

In order to demonstrate the value of EU-funded research outputs, COLUMBUS concentrated on the identification and collection of Knowledge Outputs (KOs; see “Terminology” section) from marine-related EC-funded projects, in the form of exploitable results, and their subsequent analysis and transfer. This process was based on prioritised knowledge needs (challenges, bottlenecks and gaps identified in Deliverable 3.2<sup>3</sup>) and perceived impact potential for the achievement and implementation of Blue Growth and EU marine and maritime legislation

These steps outline the proven COLUMBUS Knowledge Transfer Methodology<sup>4</sup>, designed to ensure the strategic, coordinated and effective transfer of the collected KOs, thus maximising the impact from EU-funded research.

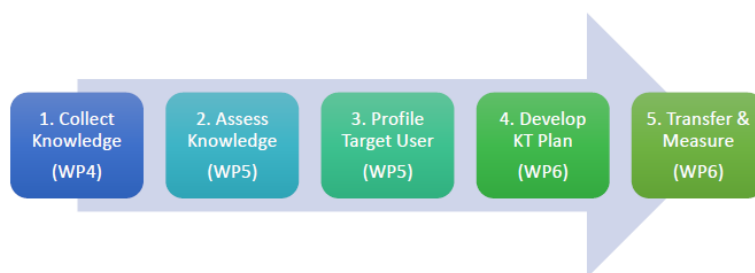
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<sup>2</sup> COLUMBUS Project Description of Action; 13<sup>th</sup> February 2015

<sup>3</sup> [COLUMBUS Deliverable 3.2](#), “Knowledge Demand: Assignment of Knowledge needs to Competence Nodes”, March 2016

<sup>4</sup> COLUMBUS Knowledge Transfer Methodology, developed based on past validated efforts of the [MarineTT](#) and [STAGES](#) projects funded under the 7<sup>th</sup> Framework Programme (FP7)





*Figure 1- COLUMBUS Knowledge Transfer Methodology*

Given that KOs were collected and prioritised according to their perceived ability to respond to the identified needs and potential impact (as well as the available resources for a given project), it stands to reason that not all KOs collected by COLUMBUS were subject to Knowledge Transfer activities within the project timeframe.

Furthermore, it is worth acknowledging that further impact from KOs subject to future Knowledge Transfer actions could be achieved. To guarantee wide accessibility, transparency, and to increase synergies of ready-to-use knowledge/results of publicly funded research, all validated knowledge collected by COLUMBUS has been made available through the pre-existing Marine Knowledge Gate 2.0<sup>5</sup> infobase.

The Marine Knowledge Gate 2.0 is an innovative, open-access, online infrastructure developed and hosted by EurOcean. It collates, manages and presents information from nationally and EU-funded marine-related research projects and their KOs. Marine Knowledge Gate “is widely recognised as the baseline to help different users understand research efforts and activity, to reduce likelihood of duplication and help to identify synergies”<sup>7</sup>.

The Marine Knowledge Gate is thus a “gateway into insights emerging from research projects that can accelerate the uptake of new ideas”<sup>8</sup> by different types of stakeholders, and therefore very much in line with the aims of the European Commission’s Information Sharing Platform on Marine and

<sup>5</sup> Marine Knowledge Gate 2.0: <http://www.kg2.eurocean.org/>

A second generation upgrade of the pre-existing EurOcean European Marine Research Funded Projects Infobase (EurOcean\_MaP Infobase) developed and launched by EurOcean in 2007 to i) facilitate the access to information on marine-related projects and, ii) to enhance communication and synergies among the different actors/stakeholders:

<sup>6</sup> 1<sup>st</sup> upgrade in 2012 through the [MarineTT](#) project with the inclusion of FP7 projects; KO’s and institutions; 2<sup>nd</sup> upgrade in 2013 through the [STAGES](#) project with the inclusion of nationally funded projects.

<sup>7</sup> Please refer to Footnote n°1

<sup>8</sup> Innovation in the Blue Economy: realising the potential of our seas and oceans for jobs and growth, COM(2014) 254 final/2 of 13 May 2014



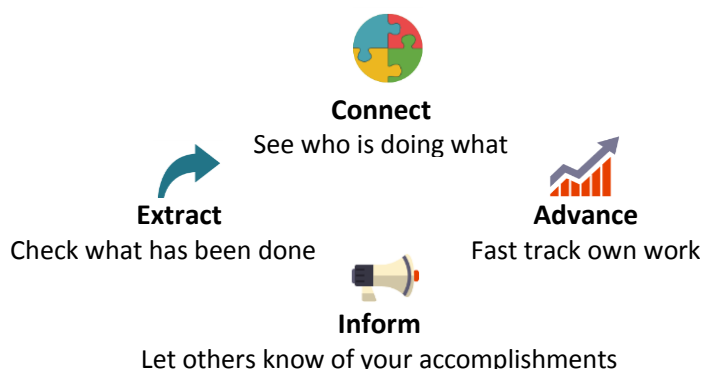


Maritime Research<sup>9</sup> (ref.COM(2014) 254 final/2 of 13 May 2014) – and hence also the COLUMBUS Impact 1<sup>10</sup> keystone.

In addition to the Marine Knowledge Gate continuous content update, an upgrade of its technical structure/functionalities was carried out to ensure its fit-for-purpose status by meeting the needs of all stakeholders and end-users. Consequently, after a wide public consultation, Knowledge Gate 3.0 Beta version<sup>11</sup> was launched in January 2018 as part of WP4 activities (Knowledge Supply – Monitor, Identify and Collect Research Activity and Outputs).

The Marine Knowledge Gate 3.0 – expected to be fully developed by June 2018 upon integration of the final comments of the COLUMBUS partnership – will continue to be hosted, maintained, updated and upgraded by EurOcean, given its institutional remit. This is to ensure it continues to be perceived as a one-stop portal for Projects and KOs from EC and nationally-funded research.

EurOcean will also continue to seek cooperation with other initiatives and institutions – such as the official project and project results information repositories like CORDIS<sup>12</sup> – to promote synergies and maximise resources, ensuring that the Marine Knowledge Gate continues to be the tool of reference for the marine and maritime community to:



<sup>9</sup> European Commission's Information Sharing Platform on Marine and Maritime Research - [https://cordis.europa.eu/packs/marine-information-platform\\_en.html](https://cordis.europa.eu/packs/marine-information-platform_en.html)

<sup>10</sup> COLUMBUS Impact 1 as described in Description of Action; 13<sup>th</sup> February 2015 - Identify and make available ready-to-use knowledge/results to advance the Blue Growth Agenda and/or support the implementation of the EU Marine Strategy Framework Directive and the revised Common Fisheries Policy

<sup>11</sup> Marine Knowledge Gate 3.0: <http://kg.eurocean.org>

<sup>12</sup> CORDIS – Community Research and Development Information Service: [https://cordis.europa.eu/projects/home\\_en.html](https://cordis.europa.eu/projects/home_en.html)





### ***Organisation of this report***

While the **Identification** step of the Knowledge Supply component was already described in Deliverables 4.1 and 4.2<sup>13</sup>, and the **KO Collection and Validation** process was the aim of Deliverable 4.3<sup>14</sup>, this report provides an overview of the Marine Knowledge Gate update and upgrade process carried out within the COLUMBUS sphere of activity. Additionally, this report briefly presents the final COLUMBUS Collection results.

The document is structured into four main sections:

- This section, which briefly introduces the COLUMBUS project and the structure of this report
- The following section, which highlights the final COLUMBUS collection results
- The third section, which describes the methodology and rationale for the upgrade of the Marine Knowledge Gate
- The final section, which presents the upcoming steps regarding Marine Knowledge Gate

### ***Terminology***

This document uses several terms, the majority of which have been defined in the COLUMBUS deliverable “*Knowledge Guidelines on carrying out COLUMBUS Knowledge Transfer and Impact Measurement*”<sup>15</sup>, as follows:

**Competence Nodes (CN):** A key objective of the COLUMBUS project, and its legacy, 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 nine CNs addressing key activities, both sectoral and cross-cutting, of particular relevance for Blue Growth and Marine and Maritime Governance. They are:

- Fisheries
- Aquaculture
- Monitoring & Observation
- Marine Biological Resources
- Maritime Transport & Logistics
- Marine Physical Resources
- Maritime Tourism
- Marine Governance & Management
- Marine Environment & Futures

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

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<sup>13</sup> [COLUMBUS Deliverable 4.1](#). “Inventory of Relevant Projects by Priority Focus Area”, April 2016

[COLUMBUS Deliverable 4.2](#). “Portals and repositories and their role in Knowledge Transfer to support Blue Growth”, April 2016

<sup>14</sup> [COLUMBUS Deliverable 4.3](#). “Report on KO’s Identification”, August 2016

<sup>15</sup> [COLUMBUS Deliverable 2.2](#). “Knowledge Guidelines on carrying out COLUMBUS Knowledge Transfer and Impact Measurement”, November 2015



**EurOcean\_KG:** [Marine Knowledge Gate Infobase](#) – the most comprehensive and innovative information repository on marine-related research projects and their results, with over 6,410 projects from more than 20 European and National Programmes and 2,950 validated Knowledge Outputs.

**Infobase:** Repository of compiled, harmonised information which may or may not harbour data.

**Knowledge Fellow (KF):** 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 Output (KO):** 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 Table (KOT):** Record of all relevant information related to the Knowledge coming out of the project and its potential application to various target users: one file per relevant project.

**Knowledge Transfer (KT):** 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.

The ambition of Knowledge Transfer is to expedite innovation.

**Marine-related:** The term encompasses not only all activities commonly considered as marine but also all maritime-related activities.

**Stakeholder:** Person with an interest or concern in marine-related funded research and its outcomes.



## MARINE KNOWLEDGE GATE UPDATE

As previously mentioned, the first step of the COLUMBUS Knowledge Transfer Methodology is to identify where the most relevant knowledge can be found.

Within the COLUMBUS project remit<sup>16</sup>, the identification of potentially relevant marine-related EC-funded research projects was supported by illustrative keywords. These keywords related to the identified key knowledge challenges, bottlenecks, barriers and gaps for the achievement of Blue Growth as well as the implementation of Marine Strategy Framework Directive (MSFD) and the revised Common Fisheries Policy (CFP) (WP3 – Knowledge Demand activities, Deliverable 3.2).

The identified keywords were subsequently cross-checked against the Marine Knowledge Gate project descriptions<sup>17</sup>; however, given the non-specificity of the text string search and the non-sensitive semantic keyword search methodology – already described in Deliverable 4.1<sup>18</sup> – a later project scope refinement was carried out through a project potential prioritisation exercise.

Upon identification and prioritisation of potentially relevant marine-related EC-funded research projects, COLUMBUS Knowledge Fellows initiated the KO collection process following a defined structure, based on the one used by the MarineTT project (European Marine Research Knowledge Transfer and Uptake of Results). These project related KOs, package together in a single table, the Knowledge Output Table (KOT), contain a set of standard information fields, including all possible end-users that could benefit from the KO and its potential applications (KO information fields are described in Deliverable 4.3).

All the captured KOs were easily included into the Marine Knowledge Gate. This was because the infobase has been continuously upgraded in cooperation with a number of initiatives, such as the EC MarineTT and STAGES (Science and Technology Advancing Governance on Good Environmental Status) projects (COLUMBUS precursors with regards to Knowledge Transfer which counted with the participation of the infobase manager- EurOcean), and hence its research results component is, not surprisingly, based on and evolved in line with the KO concept, and so the information collected on each KO is aligned with the infobase metadata template.

Acknowledging that KO quality and accuracy is vital, COLUMBUS focused not only on the extraction of information of the completed KOs, but also on their quality control description wise and validation. Consequently, the COLUMBUS KO collection process – “aimed to identify the Knowledge Outputs from marine and maritime projects; to obtain an understanding and clear description of

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<sup>16</sup> COLUMBUS remit as described in the project Description of Action “Identifying and collecting “Knowledge Outputs” from past and current EC [and national, if relevant] projects” and further refined in the 2<sup>nd</sup> Partner Meeting (Berlin, Germany; 9<sup>th</sup> July 2015) as being primarily FP7 Funded projects from all of the four main Specific Programmes: i) Cooperation; ii) Ideas; iii) People and iv) Capacities.

<sup>17</sup> Marine Knowledge Gate 2.0 has been continuously updated throughout the lifetime of the COMUBUS project mainly with the last identified FP7 marine-related funded batch of 370 projects (March to August 2015) and, the first identified H2020 marine-related funded projects batches of 310 (August 2015 to May 2017, related to available information in CORDIS database as of December 2016).

No further H2020 marine-related projects updates were carried out through the COLUMBUS project due to the decision taken at the 4<sup>th</sup> Partnership Meeting (Vigo, Spain; 12<sup>th</sup> and 13<sup>th</sup> July 2016) regarding the actual number of Knowledge Transfer Cycles (a single cycle instead of the foreseen three).

<sup>18</sup> Please refer to Footnote n°9



these outputs and, to identify potential applications and respective end-users of the knowledge” – comprise three fundamental steps (already described in Deliverable 2.2<sup>19</sup>). These are:

- Step 1 – Gathering of Knowledge and Development of a Knowledge Output Table (KOT)
- Step 2 – Project Coordinator Interview
- Step 3 – Quality Control of Collected KOs to ensure a clear and understandable KO description
- Step 4 – Validation of the KOTs and Prioritisation of the Collected KOs

KO validation is, however, heavily dependent on Project Coordinator and/or Knowledge Owner engagement. Consequently, despite COLUMBUS Fellows’ continuous efforts culminating in a final exercise carried out on January 2018 (which was supported by an accompanying letter from the COLUMBUS WP4 Leader organisation, EurOcean; online display in Marine Knowledge Gate 2.0 of non-validated KOs; and access to the online update tool), not all collected KOs were signed off.

The remaining non-validated KOs will consequently no longer be featured in Marine Knowledge Gate as their accuracy cannot be guaranteed. Nonetheless, EurOcean will continue to seek their validation beyond the project lifetime as part of its annual infobase update request, through direct email consultation.

To better reflect the effort carried out by all CNs, this report takes into consideration all collected KOs, including those extracted from the Ocean of Tomorrow (OoT) pilot exercise<sup>20</sup>.

Competence Nodes	Total n° Marine Projects	Potentially Relevant Projects	KOTs Completed	KOTs Validated	Validated KOs	Total KOs
Fisheries	34	18	14	12	136	141
Aquaculture	102	54	20	8	41	80
Biological Resources	171	29	22	15	135	154
Env & Futures	86	15	14	9,5	88	110
Physical Resources	92	39	28	17	201	286
Governance	129	61	55	30	401	491
Tourism	136	9	9	2	34	54
Transport	123	85	22	11,5	112	235
Monitoring	96	30	26	9	90	228
<b>TOTAL</b>	<b>967</b>	<b>338</b>	<b>208</b>	<b>112</b>	<b>1 238</b>	<b>1 779</b>

*Table 1- COLUMBUS Collection Results by Competence Node*

<sup>19</sup> Please refer to Footnote n° 11

<sup>20</sup> Further information on the COLUMBUS Ocean of Tomorrow pilot exercise available in Deliverable 4.1

The Ocean of Tomorrow Projects (2010-2013), Directorate-General for Research and Innovation, European Union, 2014



The final outcome of the COLUMBUS project Knowledge Supply step, in terms of the number of addressed projects, is similar to that already reported on August 2016 in Deliverable 4.3. In fact, despite a 3% increase in the total number of addressed projects (n=967 versus the previously reported 937 projects), only circa 35% of projects were prioritised for KO collection (n=338, including OoT and other additional projects, versus n=967, total identified marine-related projects). Such outcomes should come as no surprise given the nature of the keyword exercise, previously described.

Of these potentially relevant projects, over 60% (n=208 Completed KOTs out of n=338 projects) were subject to KO collection, thus clearly revealing the time-consuming nature of KO collection. Furthermore, only circa of 54% (n=112 Validated KOTs out of n=208 Completed KOTs) of the completed project KOTs were validated by Project Coordinators and/or Knowledge Owners, showcasing the high dependency of the process in securing their engagement. Nonetheless, it should be noted that once Project Coordinator engagement is secured, validation of all KOs collected from the projects is secured.

Once more KO validation appears to follow previously identified trends:

- KOs tend to be validated at the KOT/project level, meaning that once the Project Coordinator and/or Knowledge Owner engages, all the project-associated KOs are taken through the validation process
- FP7 projects from the Cooperation Specific Programme<sup>21</sup> tend to have a higher validation rate, which is a characteristic also observed in previous projects

Despite a  $\cong$  56% increase in the number of KOs that had been collected since August 2016 to January 2018 from a total of 1,141 collected KOs to a total of 1,779 collected KOs (and also despite the final validation effort), the KO validation rate did not reach higher than 70% (n=1,238 Validated KOs out of n=1,779 Total Collected KOs) (see Figure 2).

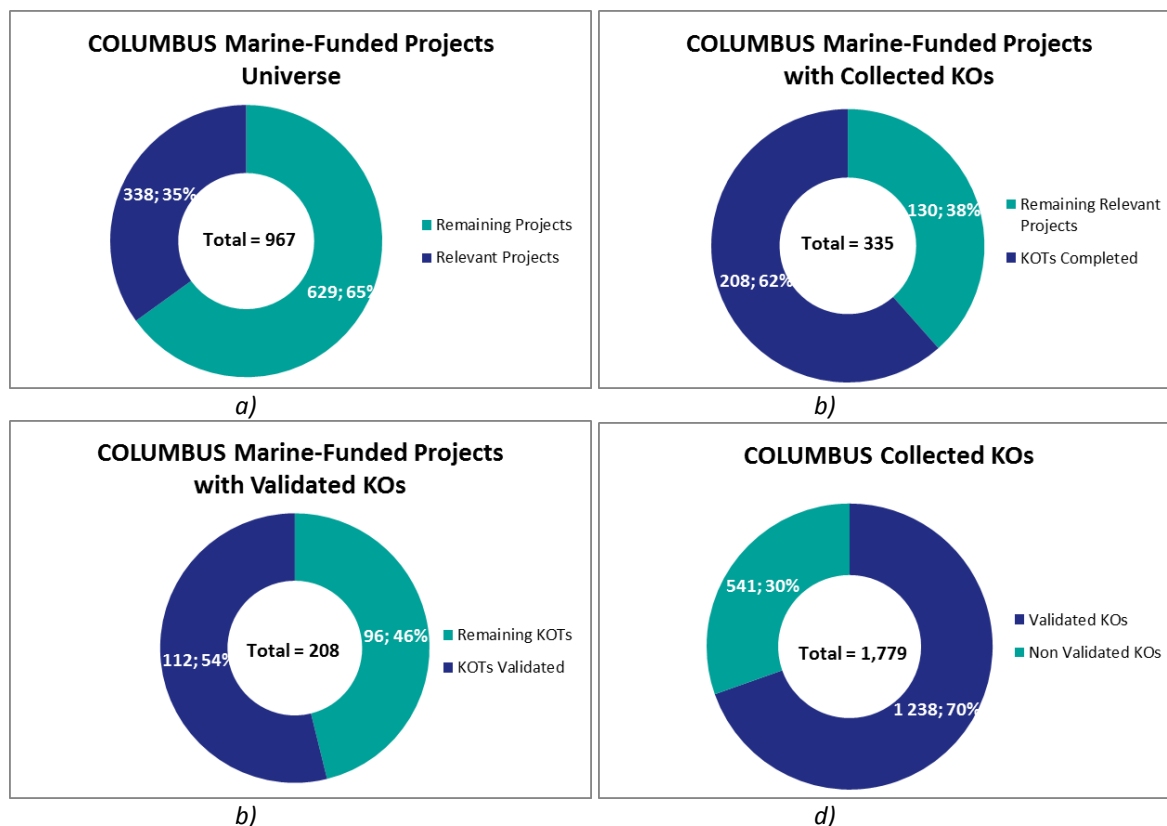
Noteworthy is the fact that the nature of the Ocean of Tomorrow projects funded under the FP7 cross-thematic calls aimed “to foster multidisciplinary approaches and cross-fertilisation between various scientific disciplines and economic sectors on key cross-cutting marine and maritime challenges”<sup>22</sup> involving the participation of business. 31 projects (15% of all projects with collected KOs; n=208) generated circa 31% of all collected KOs (n=560 OoT projects versus n=1,779 total collected KOs).

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<sup>21</sup> FP7 Cooperation Specific Programme - Tackling major research themes, together- [https://cordis.europa.eu/programme/rcn/846\\_en.html](https://cordis.europa.eu/programme/rcn/846_en.html)

<sup>22</sup> The Ocean of Tomorrow Projects (2010-2013), Directorate-General for Research and Innovation, European Union, 2014





**Figure 2- COLUMBUS Collection Results**  
a) COLUMBUS Marine-Funded Projects Universe  
b) COLUMBUS Marine-Funded Projects with Collected KOs  
c) COLUMBUS Marine-Funded Projects with Validated KOs  
d) COLUMBUS Collected KOs

Collected and validated KOs vary significantly, both in number and type (where there are sixteen types), across CNs due to the nature of the CNs' research areas, size, expertise and main activity focus. *Reports* and *Scientific Publications* stand out as the top KO types, both in terms of validated and non-validated KOs (see to Figure 4). Interestingly, the third most common KO type out of the reported is *Exploitable Scientific Result*. Discarding the *Other* category, this is followed by *Service/Tools*, *Software/Modelling Tools* and then *Prototypes*. This trend is somewhat representative of the main nature/type of FP7-funded projects and the evolving nature of the 7<sup>th</sup> Framework Programme, with an increasing emphasis in industry partnerships (e.g. the requirement of OoT Projects).

With regards to the collection step – identifying and collecting marine-related projects (from a total of 693) and KOs (from a total of 1,779) – all the COLUMBUS efforts were made available through the Marine Knowledge Gate infobase throughout the project lifetime. Annex I of this report (please refer to page 28) lists all projects with collected KOs and their validation status.





The upgraded version of the infobase (Marine Knowledge Gate 3.0, detailed in the section below) will publicly feature all the marine-related projects collected by COLUMBUS and beyond, as well as all collected and validated KOs. Hence the COLUMBUS non-validated KOs included in the infobase upon the final validation exercise will no longer be accessible by the user. Nonetheless, all relevant collected information will be recorded in the infobase admin area as much as feasible, including the non-validated KOs which will be subject to an annual validation request under EurOcean's annual infobases update protocol.

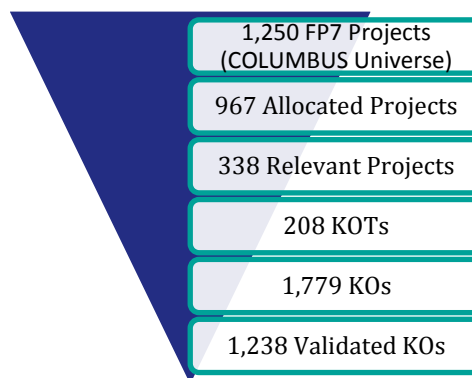


Figure 3- COLUMBUS Knowledge Output Collection Step in Numbers

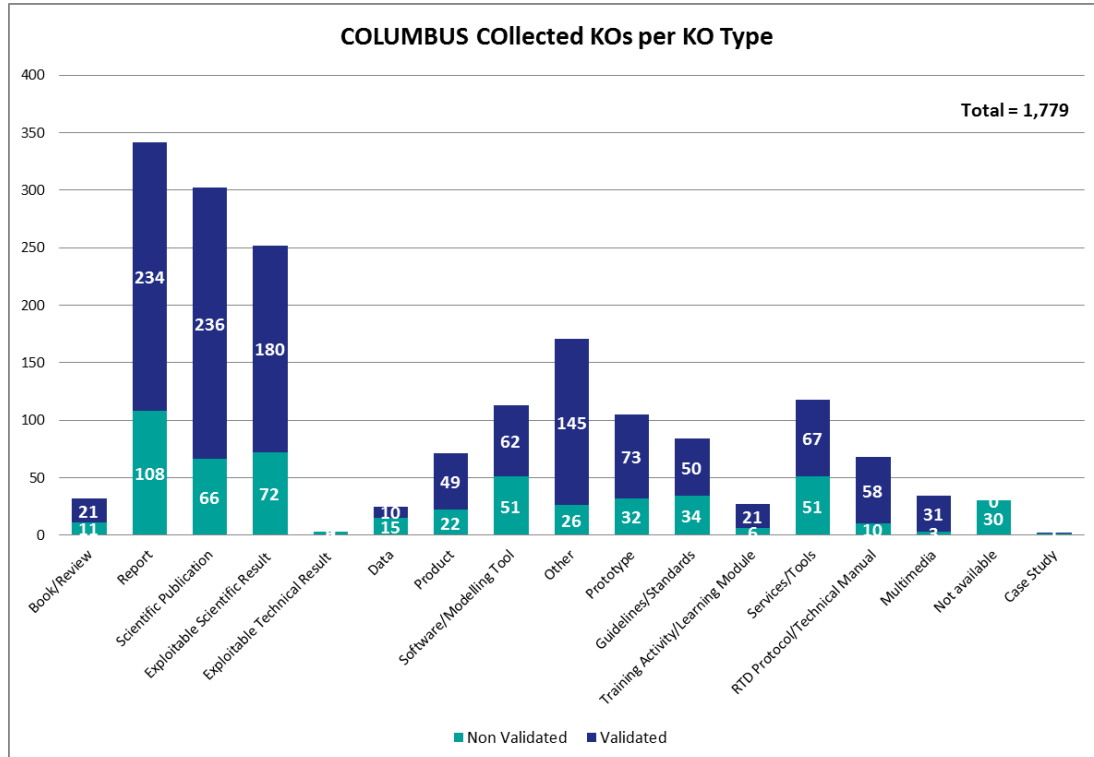


Figure 4- COLUMBUS Collected Knowledge Outputs per Knowledge Output Type



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## MARINE KNOWLEDGE GATE UPGRADE

By acknowledging that an infobase is as relevant as the quality of its content (i.e. its completeness, relevance, and whether it is timely, up-to-date and trustworthy among others) and the quality of its user interface (i.e. accessibility, accuracy, comprehension, ease of navigation, attractiveness, alignment with user needs etc.), a wide stakeholder and end-user consultation was carried out to ensure the immediate and long term relevance and fit-for-purpose status of Marine Knowledge Gate.

The wide public consultation, carried out over a number of months, took into consideration:

- Marine Knowledge Gate users, through a dedicated online survey opened from mid-October to end of November 2016. This was embedded in EurOcean's webportal and infobase and disseminated through EurOcean's platforms (e-newsletter, Facebook and LinkedIn)
- COLUMBUS consortium members and their networks
- COLUMBUS External Advisory Board
- EurOcean Members as Marine Knowledge Gate owners and trustees

As a result<sup>23</sup>, the overall Marine Knowledge Gate relevance was acknowledged and the main infobase structure was validated – both in terms of (1) the Projects and KO components and the interlink between them aimed at facilitating access to (and navigation across) the information available; and (2) in terms of the information tier structure (Homepage, Search Records page and the Individual Records page).

Nonetheless, the Marine Knowledge Gate 2.0 user interface, mostly unaltered since its development in 2012<sup>24</sup>, proved no longer adequate in responding to the evolving user needs. Several improvement and modernisation suggestions were put forward, namely:

- Improved content completeness by expanding the Marine Knowledge Gate coverage to additional Funding Programmes, both European and national
- Improved search options such as advanced free text search, multiple options per search filter, thematic categorisation of Projects and KOs, among others
- Improved provision of services such as user-specific basic statistics and infographics, open and free access to infobase content in line with the European Union Open Data Policy
- Improved integration and interoperability with external databases, thus ensuring maximisation of resources and the establishment of further synergies, consequently supporting a stronger content completeness and up-to-date status

Upon evaluation of user-expressed needs and proposed developments – COLUMBUS's aim and remit (as well as those of EurOcean) – a number of technical updates were selected and prioritised for the third Marine Knowledge Gate generation infobase. The main developments of Marine Knowledge Gate 3.0 aimed at achieving a modern, fit-for-purpose, and considerably more user-friendly infobase. It was started in April 2017 with the goal of completion by February 2018, in line with the COLUMBUS project contract.

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<sup>23</sup> Individual results are not provided in the current report given the diversity of addressed stakeholders (over 50) and of issues covered

<sup>24</sup> Marine Knowledge Gate 1.0 developed and launched through with collaboration [MarineTT](#) project



Given the nature and magnitude of some of the new functionalities, however, it soon became clear that Marine Knowledge Gate 3.0 could not take advantage of the pre-existing infobase internal structure, adapted from its 2007 original structure. Consequently, the development of the new Marine Knowledge Gate 3.0 proved far more challenging and resource-heavy than initially foreseen, and thus heavily co-financed by EurOcean.

The Marine Knowledge Gate 3.0 main technical upgrades, described below, were made publicly available through a BETA version and launched on January 2018 for the 2<sup>nd</sup> COLUMBUS Annual Conference. The main technical upgrades can be categorised into:

- Information Fields
- Search Functionality
- Navigation Tools
- Services
- Additional Functionalities

### ***Information Fields***

The information fields provided of Marine Knowledge Gate 2.0 were specific for each of the two infobase components, namely 'Projects' and 'KOs'. Nevertheless, both components were interlinked with the 'Projects' component, providing a list of related KOs, and the 'KOs' component, providing key information on the related projects.

Project information fields are mainly based on the standard project details available from the official EU sources of information and nationally-funded projects. Alternatively, KO information fields were determined in the scope of the MarineTT project as to succinctly, but accurately, describe the capture of knowledge collected by Project Coordinators and/or Knowledge Transfer Fellows. Consequently, while the source of information differs between the Projects and KOs components, these can be deemed relevant and adequate given the absence of specific feedback on the public consultation.

Nevertheless, due to the different Funding Programmes structure, file names were dependent on the Programme specificities (e.g. FP6 Activity Area versus FP7 Themes); hence, aiming to maximise the user experience and decrease potentially confusing terminology, labels of programme structure-related fields were streamlined across all Funding Programmes to the following:

- Programme – this corresponds to the Programme name
- Sub-Programme – this corresponds to the Programme's second structure level and is based on the related programme structure (e.g. Pillar in H2020; Strand in INTERREG)
- Area – this details the project research or geographical area based on the related programme structure (e.g. Theme in FP7; Section in H2020; Regional Area in INTERREG)
- Project Type – this details the project contract type



The Projects and KOs information fields of the upgraded Marine Knowledge Gate 3.0 infobase differ to those of its predecessor only in these concerns:

- Programme-related fields labels
- Inclusion of institutional funding, when available
- MSFD-related information fields<sup>25</sup> deletion
- Inclusion of thematic categorisation-related fields of the projects: i) Sea Basins, ii) Research Areas, iii) Marine Activities, iv) Policies, and v) Topics

The newly-added fields – aiming to support the user through a more focused/refined search based on a set of categories ranging from research geographical area to addressed policies – were based on SeaDataNet<sup>26</sup> and other initiatives/institutionally recognised data standards (e.g. common, established and accepted terminology). These new information fields, not available in the official information repositories, are the result of a EurOcean classification solely founded on the information available in the existing project summary/abstract.

### ***Search Functionality***

While search filter options of both the Projects and KOs components of Marine Knowledge Gate 2.0 were considered relevant, these were clearly no longer in line with the users' needs given the limited search functionalities, such as: i) basic free text search; ii) single option per search filter field; and iii) ever increasing and Programme structure-based search filter fields.

Consequently, aiming to significantly improve the user experience, the upgraded Marine Knowledge Gate 3.0 was developed to provide:

- Stronger and more up-to-date Boolean text search
- Reduced and harmonised number of search fields independent of Funding Programmes structure
- Selection of multiple options per search filter field to a maximum of three per filter (as an example, users can now search for projects with the participation of 3 countries; for instance France, Norway and Romania)
- Search refinement via project thematic categorisation through project summaries assessment, as previously described

These, and other Marine Knowledge Gate 3.0 technical upgrades, were also developed taking into consideration future steps based on additional needs and wishes expressed by users that are currently not feasible to implement, such as semantic-based free text search and publicly available Institution Type search filter. Therefore the technical developments were, as far as feasible, implemented in a flexible structure to better allow future upgrades.

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<sup>25</sup> MSFD related information fields were implemented upon the 2<sup>nd</sup> generation infobase upgrade in cooperation with the [STAGES](#) project. Given that MSFD relevance is partially covered by the new Policies category and that no further information has been collected and/or updated, for simplification and relevance issues the MSFD component of the Marine Knowledge Gate 2.0 has been removed.

<sup>26</sup> [SeaDataNet](#) – Pan-European Infrastructure for Ocean & Marine Data Management



Consequently, the Projects and KOs search filter fields of the upgraded Marine Knowledge Gate 3.0 infobase differs from its predecessor reflecting the changes above reported of the information fields.

#### *Project Information Fields*

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Acronym</li> <li>• Website</li> <li>• Title</li> <li>• Programme</li> <li>• Sub-Programme</li> <li>• Area</li> <li>• Project Type</li> <li>• Start Year</li> <li>• End Year</li> <li>• Project Funding</li> <li>• Summary</li> <li>• Project Partners</li> </ul> | <ul style="list-style-type: none"> <li>• Including related role, country and funding (when available)</li> <li>• Project Coordinator</li> <li>• Project Coordinator Email</li> <li>• Final Report</li> <li>• Sea Basins</li> <li>• Research Areas</li> <li>• Marine Activities</li> <li>• Policies</li> <li>• Topics</li> <li>• Information Source</li> <li>• Last Update</li> <li>• Related Knowledge Outputs</li> </ul> |
|---|---|

#### *Knowledge Outputs Information Fields*

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• KO Title</li> <li>• KO Description</li> <li>• KO Type</li> <li>• Potential End Users &amp; Applications</li> <li>• Sectors &amp; Subsectors to Potentially Benefit</li> <li>• Publicly Available</li> <li>• KO Source</li> <li>• Link to KO Source</li> <li>• IP/Confidentiality</li> </ul> | <ul style="list-style-type: none"> <li>• KO Status</li> <li>• Last Update</li> <li>• Related Project</li> <li>• Acronym</li> <li>• Title</li> <li>• Programme</li> <li>• Start Year</li> <li>• Other Knowledge Outputs from the Project</li> </ul> |
|--|--|

#### *Project Search Fields*

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Free Text</li> <li>• Programmes</li> <li>• Areas</li> <li>• Project Type</li> <li>• Countries</li> <li>• Institutions</li> <li>• Duration</li> </ul> | <ul style="list-style-type: none"> <li>• Project Funding</li> <li>• Sea Basins</li> <li>• Research Areas</li> <li>• Marine Activities</li> <li>• Policies</li> <li>• Topics</li> <li>• Knowledge Outputs Existence</li> </ul> |
|---|---|

#### *Knowledge Outputs Search Fields*

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Free Text</li> <li>• KO Types</li> <li>• Potential End Users</li> <li>• Sectors to Benefit</li> </ul> | <ul style="list-style-type: none"> <li>• Publicly Available</li> <li>• KO Status</li> <li>• Programmes</li> </ul> |
|--|---|



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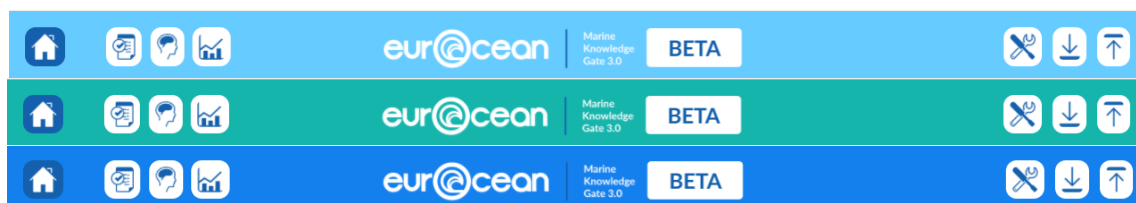
## Navigation Tools

The Marine Knowledge Gate 3.0 has been developed with two main autonomous but interlinked components for easy navigation between information on Projects and information on KOs. This was in keeping with the structure of its predecessor – a structure proven to be in line with the needs of users. Furthermore, Marine Knowledge Gate 3.0 provides a set of new services, fully described in the following section. These services include i) Institution Record Pages; ii) User specific standard statistic infographics; iii) Access to database content following the EU Open Data policies and, iv) Funding Programmes standard information.

Due to the complexity entailed by the different information components, standard navigation tools were considered to secure a user-friendly experience and establish alignment with the information retrieval best practices.

Consequently, the upgraded infobase provides a three-tier information limit for the main components - Homepage, Search Filter and Search Record Page, Record Detail Page, and Service component. This allows the user to easily navigate back and forward within a specific component through Reset and Back buttons (see Figure 6, following page).

Moreover, Marine Knowledge Gate 3.0 ensures continuous user access to any of its components through a fixed header navigation, and supports the user understanding of where it is located through a colour code scheme based on colours used in the homepage image (see Figure 5).



*Figure 5- Marine Knowledge Gate Header and colour code navigation*

*From Left to Right: Homepage; Projects; KOs; Statistics; Services; Data Download and Add and/or Update Data*

*Top – Homepage and Services colour scheme*

*Middle - Projects component colour scheme*

*Bottom – KOs component colour scheme*

Additionally, a map visualisation tool of the institutions involved in selected Projects and KOs is available in the main infobase components. The map also allows access to Institution Records Pages where standard intuition information is provided alongside a list of all its Projects or associated KOs (the Projects listing is displayed under the Project component while a full KOs listing is displayed under the KO infobase component). Given the service nature of the Institution Record Page, navigation within these pages is semi-independent on the main Projects and KOs components. Marine Knowledge Gate 3.0 was designed such that a user can opt, if so desired, for an extended Record Search and/or Record Detail pages. This would enable the user to access information without limit, thus hiding the map visualisation tool (see Figure 7).







**Top – Homepage**

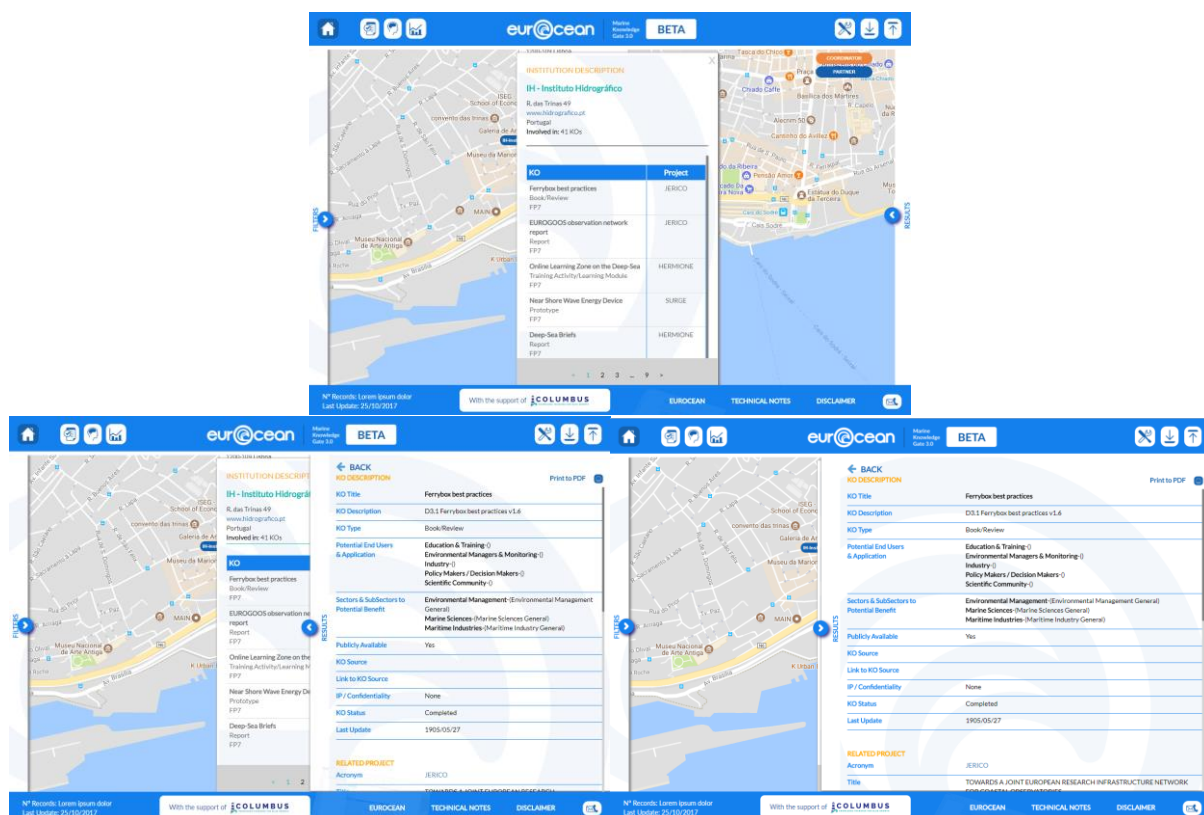
**Middle Left – Search Filter and Search Records page (Project component example)**

**Middle Right – Record Detail page (Project component example)**

**Bottom – Service page – Funding Programmes component access page (design mock-up)**



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**Figure 7- Marine Knowledge Gate Map Visualisation Tool**  
**Top – Institutional Record page (KO component example)**  
**Bottom Left - Record Detail page collapsed view (KO component example)**  
**Bottom Right - Record Detail page extended view (KO component example)**

## Services

The infobase service component was by far the module with the highest number of new developments, in line with the requests and needs of the users. These new developments – ranging from access to “raw data” to basic statistic elements from a user-defined universe (deemed highly relevant) – highlight the diverse nature of the infobase and its multiple roles, from record inventory to trend analysis.

In contrast, the Marine Knowledge Gate 2.0 services were rather limited, only providing access to a set of graphics with basic statistical information on the overall infobase content, and to PDF research records and detailed records pages, if desired.

Expanding and improving on those services, Marine Knowledge Gate 3.0 now allow for full access to the main infobase contents. Project and KOs is given in a simple-to-use and widely accessible format (Excel), thus more aligned with the EU Open Data trends. Nonetheless, the infobase “data download” feature may not reflect the live infobase content at a given moment, similarly to EU Open Data



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Portal, as datasets are not automatically generated and displayed by the system due to the cost of technical implementation.

Moreover, Marine Knowledge Gate 3.0 replaced the generic statistical graphics (e.g. top 15 programmes, countries and funding ranges among the total number of projects and associated KOs) with user-defined statistical information on both Projects and KOs. In fact, the user can access a set of 13 indicators (nine from Projects and four from KOs) and respective graphics upon selection of the desired universe through the same filter options as that of the Projects component. All statics indicators and associated graphics are listed below in Table 2.

Infobase Component	Indicators	Associated Graphics
Projects	Total Number of Countries	Number of Marine-Funded Project per Country (considering all project roles)
	Total Number of Marine-Related Projects	Number of Marine-Funded Project per Funding Programme
	Total Number of Institutions	Number of Marine-Funded Projects Involved Institutions per Country
	Total Allocated Funding (in €)	Total Budget of Marine-Funded Project per Country (based on Coordinator nationality)
	Marine Projects per Area	Number of Marine-Funded Projects per Area
	Top Thematic Categories	Number of Marine-Funded Projects per Thematic Category
	Marine Projects Per Country per Participant Role	Number of Marine-Funded Projects Per Country per Participant Role
	Budget per Area	Total Budget of Marine-Funded Project per Area
	Budget per Thematic Category	Total Budget of Marine-Funded Project per Thematic Category
KOs	Total Number of KOs	Number of Marine-Funded Project KOs per Funding Programme
	Knowledge Outputs per Type	Number of Marine-Funded Project KOs per KO Type
	Top End-Users	Number of Marine-Funded Project KOs per End-User
	Total Number of KOs per Sector	Number of Marine-Funded Project KOs per Sector

*Table 2- Marine Knowledge Gate 3.0 User Statistics*

Furthermore, the provided statistical graphics can be partially modified/tailored to suit the user needs through visualisation between bar and pie charts, graphic annotation, and deletion of non-relevant data series. For instance, in the number of ‘marine-related projects per funding programme’, the user can “hide” information on all programmes considered non-relevant at that time, such as all programmes besides Horizon 2020 and INTERREG V. This would tailor the graphic and prevent the display of superfluous information; instead only displaying information from the two selected programmes.

In addition to the user statistics, the chosen Marine Knowledge Gate 3.0 administrator statistics are also displayed in the infobase homepage. This additional set of statistics aim to i) promote a dynamic infobase homepage; ii) to promote the infobase and its services by highlighting new block updates and relevant thematic statistics, and iii) to capture the user interest in additional to in-depth statistical analysis and trends identification services.

The Marine Knowledge Gate 3.0 administrator-chosen statistics are technically similar to those of the user component. The different is that administrators have a choice on the number and order of indicators and associated graphics to display.

Taking advantage of the information already collected and harmonised regarding project participants, Marine Knowledge Gate 3.0, as previously mentioned, allows users to access an



‘Institutional Record Page’ accessible through the map visualisation tool. This additional service, flagged as relevant by the infobase users internal and external to the COLUMBUS project, provides institutional contact details; conveniently offering an overview of the geographical spread of the participants of a given project(s). This service also provides an overview of institutional activity in the marine and maritime research area.

As an additional service for marine-related information regarding projects and KOs, Marine Knowledge Gate 3.0 plans to provide standard detail information on all of the funding programmes listed on the infobase. The service has yet to be fully implemented but is expected to be launched in the third trimester of 2018. It aims to bring added value by aggregating relevant, related information in the same tool; thus enforcing the status of the infobase as the reference tool for all marine-related research activity.

### ***Additional Functionalities***

In line with its predecessor, Marine Knowledge Gate 3.0 allows users to submit new records and/or updates of existing ones. However, unlike the previous infobase version, this feature is no longer provided through an online form automatically embedded in the infobase structure, but rather through an Excel template which must be submitted by the users via email to EurOcean Office (infobase administrators). Depending on the volume of submitted information, information validation and upload can take between two to four weeks.

Given number of online submitted requests, and the fairly significant implementation cost, this new submission method was seen as a more effective approach. Furthermore, users expressed how cumbersome the online system could be when considering the update and/or inclusion of several records at a time. This was due to each record being treated individually.

Despite a different technical solution, validation of all submitted requests is still carried out by the infobase administrators (EurOcean) prior to being publicly displayed.

Furthermore, the new infobase considers interactions, not only with individual users, but also with institutional users and/or information providers. In fact, the Marine Knowledge Gate 3.0 was developed to allow future interoperability with external users and/or databases. This would support future cooperation and synergies by ensuring the coding of its information following multiple internationally-recognised data standards.

The main information coding standards considered thus far are those of SeaDataNet<sup>27</sup>, British Oceanographic Data Centre (BODC) BODC - <https://www.bodc.ac.uk/> and the CORDIS database, as these are widely recognised and used standards in the marine sphere.

With regards to the capacity for full interoperability, and the established cooperation with the official repositories of the main funding programmes (such as CORDIS and KEEP<sup>28</sup>), further steps are

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<sup>27</sup> SeaDataNet - <https://www.seadatanet.org/>

British Oceanographic Data Centre (BODC) BODC - <https://www.bodc.ac.uk/>

<sup>28</sup> KEEP – Territorial Cooperation projects database (INTERREG) developed and maintained by INTERACT - <https://www.keep.eu/keep/>



envisioned beyond the lifetime of COLUMBUS. This will be part of the continuous plans and strategies for the updating of the infobase.

## MARINE KNOWLEDGE GATE MAINTENANCE

While developing the upgraded Marine Knowledge Gate 3.0, the Marine Knowledge Gate 2.0 has been continuously updated with FP7, H2020 and other marine-related projects – as well as with related KOs through the COLUMBUS WP4 activities. The last infobase content update was carried out on January 2018, thus ensuring all of the KOs collected by COLUMBUS were made publicly available. KG now contains circa 6,410 projects (including those 693 collected by COLUMBUS) and circa 2,950 KOs (including the collected and validated COLUMBUS KOs of circa 1,240).

Additionally, the Marine Knowledge Gate 3.0, delayed to unforeseen issues in interactions with designer and IT subcontractors, will be in place after the end of the COLUMBUS project as part of EurOcean's institutional remit (infobase owner and host). Different funding programmes will be further updated on a regular basis, and also at particular times when relevant events take place (i.e. specific European calls). The KOs component will be subject to an annual update through a dedicated Project Coordinator questionnaire. This is to be issued in the infobase external annual update exercise.

Further additional technical and content upgrades based on identified user needs (e.g. extension of Funding Programme coverage) are already being considered, as well as their implementation schedule. This will ensure the Marine Knowledge Gate's status as a monitoring and trend-analysis tool, making it the infobase of reference in terms of marine and maritime research activity and its corresponding outputs.



## CONCLUSION

The Marine Knowledge Gate is widely recognised as the one-stop-portal for Projects and KOs of marine-related European and nationally-funded research. Marine Knowledge Gate strongly supports the marine and maritime community to:

- Connect – See what work others are doing
- Extract – Check what has been done before
- Advance – Fast-track one's own work
- Inform – Let others know of one's own accomplishments

Marine Knowledge Gate supports the community in the identification of cooperation and synergies; maximises resources by decreasing the likelihood duplication of efforts; and monitors and identifies trends in marine and maritime research.

The Marine Knowledge Gate maintenance involves periodic content updates and technical upgrades, both of which are resource-heavy. Consequently, Marine Knowledge Gate takes advantage of possible synergies with external entities and information providers to obtain the most complete, coherent and reliable sets of information in the fastest possible time.

Through COLUMBUS, the Marine Knowledge Gate was substantially improved, both in terms of content (with an overall increase of circa 60% in the total number of validated KOs) and in terms of technical features. More importantly, however, through COLUMBUS the Marine Knowledge Gate infobase is once more in line with the current user needs.

COLUMBUS legacy with regards to collected Knowledge Outputs and infobase upgrade will be carried over by EurOcean, as the infobase owner and trustee, under its core activities.



## ACRONYMS

CFP	Common Fisheries Policy
CN	Competence Node
EC	European Commission
EU	European
EurOcean_KG	Marine Knowledge Gate InfoBase
FP7	Seventh Framework Programme for research and innovation
H2020	Horizon 2020 EU Framework Programme for Research and Innovation
KF	Knowledge Fellow
KO	Knowledge Output
KOT	Knowledge Output Table (1 per project listing of all collected KOs)
KT	Knowledge Transfer
OoT	FP7 Oceans of Tomorrow projects
MSFD	Marine Strategy Framework Directive
PC	Project Coordinator
WP	Work Package

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## ANNEXES

## ANNEX I – COLUMBUS COLLECTION RESULTS PER RELEVANT PROJECT BY COMPETENCE NODE

Competence Node	Project	Number of Collected Kos	Validation Status
Fisheries	DiscardLess	40	Validated
Fisheries	FAMORAS	2	Validated
Fisheries	Fishermen-research network	1	Validated
Fisheries	IBMAP	3	Validated
Fisheries	LIFE iSEAS	6	Validated
Fisheries	MINOUW	19	Validated
Fisheries	MYFISH	8	Validated
Fisheries	NECESSITY	30	Validated
Fisheries	UTOFIA	1	Validated
Fisheries	BENTHIS	11	Validated
Fisheries	Fast Track	1	Validated
Fisheries	NeXOS	14	Validated
Fisheries	Ecofishman	2	Non-Validated
Fisheries	SOCIOEC	3	Non-Validated
Aquaculture	AQUAEXCEL	3	Non-Validated
Aquaculture	CLOSEDFISHCAGE	1	Non-Validated
Aquaculture	COEXIST	4	Non-Validated
Aquaculture	DEAMMRECIRC	2	Non-Validated
Aquaculture	ENRICH	2	Validated
Aquaculture	IRC-IMTA	5	Non-Validated
Aquaculture	PASSA	5	Non-Validated
Aquaculture	PREVENT ESCAPE	1	Non-Validated
Aquaculture	PRO-EEL	3	Non-Validated
Aquaculture	SALMOTRIP	3	Non-Validated
Aquaculture	SEAT	5	Non-Validated
Aquaculture	SELFDOTT	5	Non-Validated
Aquaculture	SETTLE	2	Non-Validated
Aquaculture	ARRAINA	1	Validated
Aquaculture	FISHINUTRIGEN	6	Validated
Aquaculture	PERCAHATCH	6	Validated
Aquaculture	OYSTERECOVER	4	Validated



Competence Node	Project	Number of Collected Kos	Validation Status
Aquaculture	EnviGuard	11	Validated
Aquaculture	AQUATRACE	10	Validated
Aquaculture	TargetFish	1	Validated
Transport	ADAM4EVE	25	Validated
Transport	HILDA	8	Validated
Transport	INCASS	11	Validated
Transport	RETROFIT	10	Validated
Transport	SELEKTOPE	1	Validated
Transport	THROUGHLIFE	21	Validated
Transport	AQUO	16	Validated
Transport	SEAFRONT	7	Validated
Transport	ECO2	6	Validated
Transport	CYCLADES	8	Non-Validated
Transport	FAUSST	2	Validated
Transport	SMARTYards	1	Validated
Transport	BESST	83	Validated
Transport	A2M	1	Non-Validated
Transport	BIOCORIN	1	Non-Validated
Transport	CLEANSHIP	4	Non-Validated
Transport	EXTREME SEAS	5	Non-Validated
Transport	LEAF	2	Non-Validated
Transport	MINOAS	11	Non-Validated
Transport	MOSAIC	3	Non-Validated
Transport	TEFLES	5	Non-Validated
Transport	TULCS	4	Non-Validated
Monitoring	JERICO	25	Validated
Monitoring	MYOCEAN2	1	Non-Validated
Monitoring	MYOCEAN	1	Non-Validated
Monitoring	PEGASO	18	Non-Validated
Monitoring	SEADATANET	3	Non-Validated
Monitoring	SEADATANET II	6	Non-Validated
Monitoring	SMS	9	Validated
Monitoring	WildSeaEurope	2	Validated
Monitoring	ASIMUTH	8	Non-Validated
Monitoring	BlueBRIDGE	6	Non-Validated
Monitoring	CALYPSO	3	Non-Validated





Competence Node	Project	Number of Collected Kos	Validation Status
Monitoring	CLOSEYE	1	Non-Validated
Monitoring	EuroSITES	5	Non-Validated
Monitoring	iMarine	7	Non-Validated
Monitoring	MELODIES	8	Non-Validated
Monitoring	ODEMM	13	Non-Validated
Monitoring	ODIP	5	Non-Validated
Monitoring	OPEC	27	Non-Validated
Monitoring	OSS2015	3	Non-Validated
Monitoring	COMMON SENSE	10	Validated
Monitoring	SENSEOCEAN	6	Validated
Monitoring	BRAAVOO	12	Validated
Monitoring	SCHeMA	11	Validated
Monitoring	SEA-ON-A-CHIP	2	Validated
Monitoring	MARIABOX	13	Validated
Monitoring	FIXO3	23	Non-Validated
Governance	AIM-HI	5	Validated
Governance	AQUAMAR	8	Validated
Governance	BIOSCROBE	2	Validated
Governance	CC AND MARINE LIFE	2	Validated
Governance	CLIMSAVE	3	Validated
Governance	CODEMAP	16	Validated
Governance	CORALCHANGE	6	Validated
Governance	CREM	11	Validated
Governance	DON-HYPO	2	Validated
Governance	ECOFUN	13	Validated
Governance	EU BON	12	Validated
Governance	FISH4KNOWLEDGE	5	Validated
Governance	HERMIONE	3	Validated
Governance	MEDFISH	2	Validated
Governance	Metoil	1	Validated
Governance	NETBIOME-CSA	8	Validated
Governance	NITRICOS	9	Validated
Governance	OCEANQUANT	9	Validated
Governance	PESI	1	Validated
Governance	REAFCC	3	Validated
Governance	SFS	9	Validated



Competence Node	Project	Number of Collected Kos	Validation Status
Governance	SOUNDMAR	5	Validated
Governance	VIBRANT	12	Validated
Governance	BIOCONNECTENCE	2	Non-Validated
Governance	BIODIVERSA 2	12	Non-Validated
Governance	BIOMETAL DEMO	5	Validated
Governance	BIOPACA	1	Non-Validated
Governance	MINOS	1	Non-Validated
Governance	RADAR	2	Non-Validated
Governance	COMET-LA	2	Non-Validated
Governance	CONPLANK	3	Non-Validated
Governance	D4SCIENCE-II	11	Non-Validated
Governance	DEEPFALL	4	Non-Validated
Governance	DS <sup>3</sup> F	1	Non-Validated
Governance	DYNAMITE	1	Non-Validated
Governance	GENERA	2	Non-Validated
Governance	iMarine	3	Non-Validated
Governance	INVABIOECOF	5	Non-Validated
Governance	LRSB	4	Non-Validated
Governance	LUSOAQUABARCODE	1	Non-Validated
Governance	MAPACO	2	Non-Validated
Governance	MARMICROTOX	5	Non-Validated
Governance	MEDINA	11	Non-Validated
Governance	MICROCOKIT	7	Non-Validated
Governance	MOTAU	1	Non-Validated
Governance	NANOPLAST	2	Non-Validated
Governance	OCEANTUNEIN	1	Non-Validated
Governance	REDMEDINV	10	Validated
Governance	TROPHIC EFFICIENCY	4	Non-Validated
Governance	COCONET	55	Validated
Governance	DEVOTES	21	Validated
Governance	PERSEUS	86	Validated
Governance	STAGES	12	Validated
Governance	ECsafeSEAFOOD	50	Validated
Governance	VECTORS	17	Validated
Environment & Futures	MONARCH-A	16	Validated
Environment &	FIELD_AC	4	Validated



Competence Node	Project	Number of Collected Kos	Validation Status
<b>Futures</b>			
Environment & Futures	CHIBIO	5	Validated
Environment & Futures	OPEN-BIO	4	Validated
Environment & Futures	AFISMON	2	Validated
Environment & Futures	PINBAL	6	Validated
Environment & Futures	MARLISCO	32	Validated
Environment & Futures	N-CHITOPACK	8	Validated
Environment & Futures	ACCESS	8	Validated
Environment & Futures	LAGOONS	6	Validated
Environment & Futures	SIDARUS	5	Non-Validated
Environment & Futures	ARCH	5	Non-Validated
Environment & Futures	AWARE	4	Non-Validated
Environment & Futures	ENHANCE	5	Non-Validated
Biological Resources	ASIMUTH	1	Validated
Biological Resources	AT~SEA	1	Validated
Biological Resources	BIVALIFE	11	Validated
Biological Resources	MESODERM EVOLUTION	5	Validated
Biological Resources	PROTOBRAIN	17	Validated
Biological Resources	SYMBIOCORE	6	Validated
Biological Resources	STRIVE	7	Validated
Biological Resources	COGNISEPLANCTOMYCES	4	Validated
Biological Resources	SEABIOPLAS	1	Validated
Biological Resources	ERA-MBT	1	Validated
Biological Resources	GENMARPHYTO	2	Non-Validated
Biological Resources	GRACE	1	Non-Validated
Biological Resources	HYFFI	4	Non-Validated
Biological Resources	LYNGBYA-KENYA	2	Validated
Biological Resources	PIMCYV	4	Non-Validated
Biological Resources	SEAWEED AD	3	Validated
Biological Resources	SQUID-SWITCH	1	Non-Validated
Biological Resources	SYMBIOX	3	Non-Validated



Competence Node	Project	Number of Collected Kos	Validation Status
Biological Resources	THE WEAKEST LINKS	4	Non-Validated
Biological Resources	BIOCLEAN	7	Validated
Biological Resources	MICRO B3	21	Validated
Biological Resources	MACUMBA	48	Validated
Physical Resources	H2OCEAN	19	Validated
Physical Resources	LEANWIND	27	Validated
Physical Resources	TROPOS	24	Validated
Physical Resources	MERMAID	9	Validated
Physical Resources	MERIKA	9	Validated
Physical Resources	Turnkey	4	Validated
Physical Resources	DEEPWIND	16	Validated
Physical Resources	WAVETRAIN 2	13	Validated
Physical Resources	ACORN	3	Validated
Physical Resources	EQUIMAR	37	Validated
Physical Resources	TIDALSENSE	13	Validated
Physical Resources	TIDALSENSE DEMO	7	Validated
Physical Resources	GEOWAVE	12	Validated
Physical Resources	ReDAPT	1	Validated
Physical Resources	Lakhsmi	1	Validated
Physical Resources	FLOATGEN	16	Non-Validated
Physical Resources	HIPRWIND	9	Non-Validated
Physical Resources	NANOMAR	4	Non-Validated
Physical Resources	PLENOSE	6	Non-Validated
Physical Resources	SNAPPER	8	Non-Validated
Physical Resources	AQUAGEN	7	Non-Validated
Physical Resources	MAGNETIDE	6	Non-Validated
Physical Resources	Annex IV	1	Validated
Physical Resources	AquaRET	5	Validated
Physical Resources	MIDAS	5	Non-Validated
Physical Resources	Blue Mining	2	Non-Validated
Physical Resources	DTOcean	19	Non-Validated
Physical Resources	Pro-EEL	3	Non-Validated
Tourism	CITCLOPS	2	Non-Validated
Tourism	COMEX	2	Non-Validated
Tourism	LUPE	3	Non-Validated
Tourism	SeaChange	1	Non-Validated





Competence Node	Project	Number of Collected Kos	Validation Status
Tourism	4SEAS	3	Non-Validated
Tourism	BOMA	5	Non-Validated
Tourism	STACHEM	4	Non-Validated
Tourism	CLEANSEA	18	Validated
Tourism	SONIC	16	Validated

Note: Projects depicted in red represent those that were subject to KO collection by two different Competence Nodes.

