FORCOAST

Earth Observation Services For Wild Fisheries, Oystergrounds Restoration And Bivalve Mariculture Along European Coasts

PROJECT DELIVERABLE REPORT

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Deliverable: Final Exploitation Strategy
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Contributor(s)	Deltares, Pilot and Service Module teams
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Executive Summary

This document presents the final steps taken towards an exploitation strategy to be followed once the FORCOAST project has ended. The project, involved in the fisheries, aquaculture and oysterground restoration sectors, is composed of public and private entities which are deeply involved in them, and their experience in these fields is of capital importance to understand how they work.

A FORCOAST prototype has been made available and tested during the lifetime of the project in a supervised environment setting. The results of the evaluations of this prototype were key to defining in detail how the product can be exploited and used as input to develop a more detailed market analysis.

The exploitation strategy aims to understand through the prototype outcomes the end-users and market needs and to therefore set the basis for the exploitation of the positive results shown by FORCOAST on an international scale.

Professionals in the fisheries, aquaculture and oysterground restoration sectors around Europe have been invited to participate in the end-user needs and requirement analysis process and discuss their ideas and needs so that the project's results could meet their expectations and requirements.

In the first section of this document, the Key Exploitable Services per End-User per Sector are defined. while in the second and third sections, the Exploitation Readiness Level and its Exploitation Roadmap are outlined.

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1 Table of Contents

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Table of Figures

Table of Tables

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1 Introduction

The aim of this deliverable is to provide a comprehensive, well thought and deeply analysed exploitation plan, that is of major importance to stimulate potential commercial and industrial partners' interest in FORCOAST's goals and results.

In order to give a clear taste of the very promising results that can be achieved through this project, it is fundamental to outline a clear strategy to define how these results will be used in further research activities to market FORCOAST around Europe.

The exploitation strategy must answer the main questions 'How are we going to make it work, create momentum and make the sales/create continuity?'. These questions can be answered by addressing the following sub-questions:

- What are the key exploitable products and services?
- Who are the key targeted stakeholders?
- How will each partner exploit, and benefit from, the products and services?
- How can future exploitation be prepared during the project?
- Is joint exploitation of results by different partners an option, and how needs this to be facilitated?
- What does the exploitation roadmap look like (actions/timeline)?

Therefore, this technical analysis will give an insight into the different Service Modules (SMs) and their application and commercial possibilities, as well as the emerging trends that have been recognized in our market analysis.

The project exploitation potential will be explored at two levels:

- At the level of each Service Module, they will individually carry out market research in their fields to evaluate the predisposition of their own internal market.
- At the level of the project partners as a whole, in order to support the development of the consortium activities and to possibly enable the launch of new connected activities on the basis of the results achieved by FORCOAST.

As this part critically depends on and is interconnected with other deliverables that will provide invaluable inputs from the market, such as WP2, WP6 and WP7, this version will be updated after having extensively gone through some critical deliverables that are currently being processed, to significantly increase the quality and effectiveness of the Exploitation and Business strategy and to keep it market-oriented to captivate the stakeholders' interest.

This deliverable also addresses IPR issues and protocols that are key to ensuring the protection of the whole FORCOAST consortium. It describes some general guidelines, strategies, and ideas that could greatly increase the chances of success of FORCOAST and could boost the global value proposition.

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2 Exploitation Readiness Level

2.1 Technology Readiness Level

Technology Readiness Levels (TRL) are a type of measurement system used to assess the maturity level of a particular technology. Each technology project is evaluated against the parameters for each technology level and is then assigned a TRL rating based on the project's progress. There are nine technology readiness levels. TRL 1 is the lowest and TRL 9 is the highest.

The figure below is used to identify the level appropriate to the individual service modules. As we are still operational in the FORCOAST project the highest level to be achieved is 7, since 8 requires a commercial setting. Some of the service modules have a launching customer already committed and waiting but remain at TRL 7 until the end of the project.

Figure 1. Technology readiness level scale and associated four phases.

2.1.1 SM-R1 – Contaminants Source Retrieval

The current TRL of SM-R1 is 7, with a system prototype demonstration available in an operational environment. The operational environment consists of both the central FORCOAST platform and the Telegram (text message) channel. As the functioning of the service module has been validated through

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successful operation, the next step would be to make the service module commercially available, and with that enter the 'production environment' of TRL 8/9.

2.1.2 SM-A1 – Marine Conditions

The current TRL of SM-A1 is 7, with a system prototype demonstration available in an operational environment. The operational environment consists of both the central FORCOAST platform and the Telegram (text message) channel. As the functioning of the service module has been validated through successful operation, the next step would be to make the service module commercially available, and with that enter the 'production environment' of TRL 8/9. The forecast production and dissemination are also operational (TRL 8/9), and monitored by programs both in the forecast provider and platform host institute.

2.1.3 SM-A2 – Land Pollution

The current Technology Readiness Level of SM-A2 is TRL7, with a system prototype demonstration available in an operational environment. The operational environment consists of both the central FORCOAST platform and the Telegram (text message) channel. As the functioning of the service module had been validated through successful operation, the next step would be to make the service module commercially available, and with that enter the 'production environment' of TRL 8/9. The service is ready to be commercialized for users whose premises are located within the boundaries of existing Forcoast regional pilot models (Romania, Galway Bay and Northern Adriatic).

2.1.4 SM-A3 – Site Prospection

The current Technology Readiness Level of SM-A3 is TRL7, with a system prototype demonstration available in an operational environment. The operational environment consists of both the central FORCOAST platform and the Telegram (text message) channel. As the functioning of the service module had been validated through successful operation, the next step would be to make the service module commercially available, and with that enter the 'production environment' of TRL 8/9.

2.1.5 SM-A4 – Spat Capture Assistance

The current Technology Readiness Level of SM-A4 is TRL7, with a system prototype demonstration available in an operational environment. The operational environment consists of both the central FORCOAST platform and the Telegram (text message) channel. As the functioning of the service module had been validated through successful operation, the next step would be to make the service module commercially available, and with that enter the 'production environment' of TRL 8/9.

The service is ready to be commercialized for users whose premises are located within the boundaries of existing Forcoast regional pilot models, especially in the North Sea, to which circumstances the model is calibrated. Implementation in other areas is possible although in a minimal 'MVP' setting.

2.1.6 SM-F1 – Suitable Fishing Areas

The current Technology Readiness Level of SM-A4 is TRL7, with a system prototype demonstration available in an operational environment. The operational environment consists of both the central FORCOAST platform and the Telegram (text message) channel. As the functioning of the service module had been validated through successful operation, the next step would be to make the service module commercially available, and with that enter the 'production environment' of TRL 8/9.

2.1.7 SM-F2 – Fronts Detection

The current Technology Readiness Level of SM-F2 is TRL7, with a system prototype demonstration available in an operational environment. The operational environment consists of both the central FORCOAST platform and the Telegram (text message) channel. As the functioning of the service

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module had been validated through successful operation, the next step would be to make the service module commercially available, and with that enter the 'production environment' of TRL 8/9.

2.2 Ecosystem Readiness Level

The Ecosystem Readiness Level (ERL) indicates whether the consortium is ready to enter commercial exploitation. The list below marks the indicators for the ERL.

- Level 0. Partners are unaware of their role during commercial exploitation;
- Level 1. Partners are aware of each of their individual responsibilities and tasks;
- Level 2. Partners comprehend all of their individual responsibilities and tasks;
- Level 3. Partners are competent to act on their individual responsibilities and tasks;
- Level 4. Partners have the (financial) capacity to properly act upon their role.

For the exploitation of the service modules, the minimum set of tasks that need to be carried out is described in D6.2 Ch5.2-8 'Key partners and their activities'. In the following paragraphs, the readiness of each of the key partners is indicated per service module.

2.2.1 SM-R1 – Contaminants Source Retrieval

Readiness of key partners

- The Marine institute
  - Tasks: development of SM-R1-code, ensure transferability
  - Readiness level: 4
- Terrasigna:
  - Tasks: exploitation of FORCOAST-platform
  - 4 Readiness level: 4
- Deltares:
  - Tasks: development of FORCOAST-platform
  - Readiness level: 4
- Other FORCOAST-partners, see table D6.2, Ch5.1
  - Tasks: various
  - Readiness level: 4
- Cuan Beo
  - Tasks: launching customers, providing user feedback
  - Readiness level: 4

2.2.2 SM-A1 – Marine Conditions

Readiness of key partners

- CoLAB + ATLANTIC
  - Tasks: exploitation activities, development of SM-A1
  - Readiness level: 4
- Terrasigna
  - Tasks: exploitation of FORCOAST-platform
  - Readiness level: 4
- Other FORCOAST-partners, see table D6.2, Ch5.1
  - Tasks: various

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- Readiness level: 4
- Client
  - Tasks: launching customers, providing user feedback
  - Readiness level: 0

2.2.3 SM-A2 – Land Pollution

Readiness of key partners

- University of Liege
  - Tasks: development of SM-A2
  - Readiness level: 4
- Terrasigna
  - Tasks: exploitation of FORCOAST-platform
  - Readiness level: 4
- Other FORCOAST-partners, see table D6.2, Ch5.1
  - Tasks: various
  - Readiness level: 4
- Client
  - Tasks: launching customers, providing user feedback
  - Readiness level: 0

2.2.4 SM-A3 – Site Prospection

Readiness of key-partners

- DMI
  - Tasks: development of SM-A3, hindcasting in Limfjord
  - Readiness level: 4
- Aarhus University
  - Tasks: development of hindcast model
  - Readiness level: 4
- Terrasigna
  - Tasks: exploitation of FORCOAST-platform
  - Readiness level: 4
- Other FORCOAST-partners, see table D6.2, Ch5.1
  - Tasks: various
  - Readiness level: 4
- Client
  - Tasks: launching customers, providing user feedback
  - Readiness level: 0

2.2.5 SM-A4 – Spat Capture Assistance

Readiness of key partners

- RBINS
  - Tasks: development of SM-A4 larval transport model
  - Readiness level: 4
- EV-ILVO
  - Tasks: provision of data
  - Readiness level: 4
- Terrasigna

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  - Tasks: exploitation of FORCOAST-platform
  - Readiness level: 4
- Brevisco
  - Tasks: data collection
  - Readiness level: 4
- Other FORCOAST-partners, see table D6.2, Ch5.1
  - Tasks: various
  - Readiness level: 4
- Mussel producers
  - Tasks: launching customers, providing user feedback
  - Readiness level: 4

2.2.6 SM-F1 – Suitable Fishing Areas

Readiness of key-partners

- Sofia University
  - Tasks: development of SM-F1 nested wave model
  - Readiness level: 4
- Terrasigna
  - Tasks: exploitation of FORCOAST-platform
  - Readiness level: 4
- Other FORCOAST-partners, see table D6.2, Ch5.1
  - Tasks: various
  - Readiness level: 4
- Client
  - Tasks: launching customers, providing user feedback
  - Readiness level: 0

2.2.7 SM-F2 – Fronts Detection

Readiness of key partners

- ATZI
  - Tasks: development of SM-F2
  - Readiness level: 4
- Marine Instruments
  - Tasks: co-development of SM-F2
  - Readiness level: 4
- Terrasigna
  - Tasks: exploitation of FORCOAST-platform
  - Readiness level: 4
- Other FORCOAST-partners, see table D6.2, Ch5.1
  - Tasks: various
  - Readiness level: 4
- Client
  - Tasks: launching customers, providing user feedback
  - Readiness level: 0

2.3 Commercial Readiness Level

Efforts have been intensified in the last years in European projects to commercialize their products and services. This effort has resulted in the definition of Market Readiness Level (MRL). The European

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project CloudWATCH2 introduced MRL as a complementary methodology to TRL as an instrument for project preparation and review. This MRL scale measures the capacity of a business to be ready to go to market with useful, useable and trusted products/services/solutions. MRL represents the work performed in the development of business processes and administration, as TRL does for technical activities. The different levels are shown in Figure 2.

Figure 2. Market readiness level scale and associated three phases.

This concept has been reviewed and appeared not suitable for FORCOAST service modules, as it lacks IP- and business cases related indicators. It also intertangles marketing efforts, sales results, and team spirit. FORCOAST partners have decided to adopt another concept to assess the readiness for entering the exploitation phase. Within FORCOAST the Commercial Readiness Level (CRL) is used which covers the business case and Intellectual Property (IP) agreements that are most essential to the project at this stage. In a way, CRL encapsulates a simplified straightforward concept of the MRL.

2.3.1 Intellectual Property Strategy

IP is extremely important to be addressed when creating innovation and preparing for the market launch of new and disruptive technologies. Intellectual Property Rights (IPR) include patents, patent applications and other statutory rights in interventions; copyrights (including without limitation copyrights in Software); registered design rights, applications for registered design rights, unregistered design rights and other statutory rights in designs and other similar or equivalent forms of statutory

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protection, wherever in the world arising or available; but excluding rights in confidential information or trade secrets.

As FORCOAST involves a great number of actors that constantly interact among them, the IP strategy is a major concern, as every stakeholder must be protected, and all their pre-existing know-how must be identified.

The following general rules are to be followed by the partners even after the project's completion to maximize results from innovation and intellectual property are listed below:

- The FORCOAST keyword and logo shall be trademarked to protect any future commercial use.
- Software source code is stored in private repositories only accessible by project partners.
- All source code files shall contain a header with the following statement: "(C) Copyright FORCOAST H2020 project under Grant No. 870465. All rights reserved."
- All the publications regarding the project shall have a Section "Acknowledgments" with the following statement "the work presented herewith has been funded by the European Commission under Grant No. 870465."
- All dissemination and promotional materials like brochures, triptychs or datasheets shall contain the aforementioned Copyright clause.
- Innovative outcomes of the project may undergo a patent application in order to grant exclusive rights to the project consortium.
- Any technical or algorithmic details about the FORCOAST system shall be published in peer review journals or conferences before dissemination by any other means like video demonstrations, etc.
- All video demonstrations published shall credit the "FORCOAST H2020 Grant No. 870465. All rights reserved" statement at the end of the footage.

2.3.2 Identification and Protection of the Valuable Intellectual Property

The main outcomes of FORCOAST are classified in documents, scientific articles, a service platform, service (software) applications and designs for specific outcomes of the FORCOAST project and its service catalogue.

The basic principle on which all partners agreed is that research and development results must be available to a large audience to facilitate the wide adoption of the project results, while in the meantime having mechanisms in place for rewarding those that invested time and effort.

As a protection mechanism of the IPR and outcomes of the FORCOAST consortium partners, two agreements are essential:

- Consortium Agreement
- Exploitation Agreement

The final exploitation plan (D6.6) includes an Intellectual Property Rights (IPR) agreement, which is being finalized and under the first signature round (Annex I).

2.3.2.1 The Consortium Agreement

The Consortium Agreement covers the commercial exploitation of the FORCOAST results during the duration of the project, in the terms of what has been specified at the beginning of the project among partners, that goes under the name of jointly owned IPR.

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Results shall be owned by the party who carried out the work generating them, or on whose behalf such work was carried out. In order to avoid or resolve conflicts between project partners about the origin of the results, all the project partners shall maintain evidence showing the development of the generation of their own results in order to be able to prove their ownership and the date of its generation.

When results have been developed jointly by several project partners, and it is not possible to distinguish their individual contributions, the results generated will be jointly owned, unless the project partners concerned agree on a different solution. To better manage joint ownership, project partners shall agree on its terms and conditions, either by incorporating the necessary provisions in the Consortium Agreement or by signing a joint ownership agreement.

All the outcomes of the project that are jointly owned by multiple partners are therefore covered by the Consortium Agreement (FORCOAST Consortium Agreement, FINAL VERSION, 2019-11-07).

2.3.2.2 The Exploitation Agreement

Based on the consortium agreement, the Exploitation Agreement is conceived to protect the pre-existing know-how of the individual partners, as well as their contributions to the project's outcomes, and other substantial contributions or specific outcomes of the project. It should specify the basic terms and conditions for use of one partner's IPR by other partners for internal R&D use of the tools.

These documents are meant to cover the commercial exploitation of the FORCOAST results.

It also contributes to converting the project results into marketable products while protecting the involved partners' rights. Additionally, it helps present the common exploitation strategy of the FORCOAST consortium. The operational model that is going to be embraced by the partners shall promote a common market approach.

The main aim of the exploitation agreement is to avoid merging pre-existing know-how and know-how generated in the project. It shall take into account some basic premises:

- Each partner shall have the right to exploit the knowledge outside the consortium.
- Any partner can join an activity with another partner if they are eligible to according to their IPR status.
- Any partner can exploit specific IPRs that they own or ensure that it is exploited in further research activities. They can also exploit the IPR of other partners, but only when a specific agreement is in place with the IPR owner.
- The exploitation agreement should also be useful to encourage partners to look for synergies with other partners for the definition of new business opportunities, commercialization of the FORCOAST results and other relevant activities for the benefit of the consortium.

Each participant shall ensure that the results it owns are disseminated as swiftly as possible, always in a way that is compatible with the protection of the IPR, confidentiality obligations and legitimate interests of the owners (any disclosure, prior to filing for protection, may invalidate a subsequent or potential valuable protection). Therefore, before any results are made available to the public, a decision on its possible protection should be taken. The other project partners should be previously informed and may object to the dissemination activity if their legitimate interests in relation to their results could suffer great harm.
The writing of the Exploitation Agreement is undergoing, with initial agreements on the license agreements on the used Service Module algorithms already identified by the partners, displayed in

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Table 1. A similar exercise is being undertaken to define the license conditions of the datasets (both inputs and outputs) as well as platform system components.

Algorithm	Organisation (owner)	Source URL	License conditions algorithm
Service Module A1	Instituto Superior Técnico, DMI	https://github.com/FORCOAST/FORCOAST_SM_A1	Attribution-NonCommercial 4.0 International (CC BY-NC 4.0)
Service Module A2	Jailoo / seamod.ro, Université de Liège	https://github.com/acapet/ForCoast-SM-A2	Apache 2.0
Service Module A3	Aarhus University	https://github.com/FORCOAST/Test-FORCOAST-SM-A3	Apache 2.0
Service Module A4	RBINS	https://github.com/FORCOAST/Test-FORCOAST-SM-A4	Apache 2.0
Service Module F1	TerraSigna, University of Sofia	https://github.com/FORCOAST/Test-FORCOAST-SM-F1	Apache 2.0
Service Module F2	Marine Instruments, AZTI	https://github.com/dminst/ForCoast-SM-F2	Apache 2.0
Service Module R1	Marine Institute	https://github.com/Diego1991/forcoast-sm-r1	GPL2.0

Table 1. Service Modules license conditions.

2.3.3 Financial Readiness Level

The steering committee and commercial entity are committed to keeping the services alive and working, both being in an adequate financial readiness level to do so. The steering committee is committed for two years with in-kind contributions (see deliverable D6.4 – Final Business Plan, Section 2). While the commercial partner Hidromod is committed to the FORCOAST service modules for two years and is to be confirmed with a letter of intent.

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3 Exploitation Roadmap

The exploitation roadmap consists of two parts; the first part covers all the essential activities that need to be carried out before launching the service modules. These activities are based on the readiness level. At those points, where the readiness levels do not meet the requirements for exploitation, the listed activities should enable the readiness to get at that point.

When we enter the commercial phase, additional tasks need to be carried out to be able to deliver the service modules sustainably. The first paragraphs show the required activities before launching (pre-exploitation activities) and the second shows the activities after the launch. Paragraph 3 is the roadmap (visualization) and we conclude with some recommendations in the fourth paragraph.

3.1 Pre-exploitation Activities

All of the services are at the end of TRL7 as mentioned earlier and thus no activities are being required in this pre-exploitation phase. Except for SM-F2, they have identified further activities that would allow them to reach TRL8. Those are given below

3.1.1 SM-F2 – Fronts Detection

Prior to launching this service into the market, the following activities must be performed, in terms of:

- Technology
    - In situ validation (short-term);
    - Further information about the intrinsic characteristics of the fronts in the sea surface (medium-term);
    - Add information about the vertical variability of these features (long-term);
    - Add other relevant information about the ocean and meteorological conditions relevant to this activity (medium-term).

- Clients and ecosystem
    - Imply the end user in the validation for compromising in giving constructive feedback (short-term);
    - Dissemination workshops and training materials (short-term);
    - Fostering synergies with the end-users and within the rest of the ecosystem (medium-term).

- Finance
    - Further grants to perform the validation. This validation would be by collaborating with fishers for providing in situ information or by ad-hoc scientific campaigns (short-term).

3.2 Roadmap

The first part of the roadmap includes the organisational setup: steering committee (strategical vision), commercial entity (selling), and their responsibilities in keeping the services running at an exploitation level.

At least for the coming two years, the following entities should plan their activities, aligning with:

Steering committee

- Continuously: Supervising follow-up of FORCOAST agreement

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- Every three months: Organizing Member meetings
- Every two years: Election of Steering Committee Coordinator

Each FORCOAST partner

- Continuously: Investing in (supporting) marketing activities
- Continuously: Nurturing relationships with clients and end-users
- Continuously: Organizing demo events and obtaining user feedback
- Continuously: sharing service module code and keeping the SM up & running
- Continuously: Assuring Service Module software maintenance (updates and upgrades)
- Continuously: Provision of commercial services related to Service Modules
- At the implementation of Service Modules: checking the validity of oceanographic models in use
- Continuously: Exploitation of results

FORCOAST BV

- Continuously: Assuring FORCOAST platform software maintenance (updates and upgrades)
- Continuously: Exploitation of FORCOAST platform

Exploitation partner

- Continuously: Commercial activities such as marketing and sales of the Service Modules
- Continuously: Coordinating, supervising and managing the exploitation of the Results
- Continuously: Exploiting the oceanographic models

The proposed roadmap is a tool designed to help the consortium to identify and plan activities to be performed after the end of the project. The highest risk a consortium faces is not being able to implement the exploitation and dissemination plan and increase the TRL level or go to market, due to a lack of resources. The exploitation roadmap is designed to address this risk, mitigate it and pave the way toward the use and a stronger impact.

3.3 Recommendations

Recommendations to take into account for future developments after the end of the project lifetime include mainly those gathered through contact with users, for example, the ones regarding the following topics:

- Solutions to other potential barriers.
- Inclusion of other fact-based values, magnitudes, etc.
- Sharpened knowledge regarding needs and desired features for existing and new clients.
- Feedback for the commercial entity to look for other penetration scenarios and opportunities for increased exploitation
- Further insights that are not already covered in the deliverables

3.3.1 Technology Developments

3.3.1.1 SM-R1 – Contaminants Source Retrieval

Some of the improvements needed for a future exploitation plan have been already outlined in this document. In particular, the product as it has been delivered is not immediately transferable to other sites, as it has been developed only for areas where a hydrodynamic model exists and with specific variable names for the *u* and *v* components of the currents, which are the only input needed to track

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the contaminants. By complementing the product with a detailed user's guide and with a system to "translate" the oceanic current information in a particular site to the code requirements, this service would be much more transferable. These are steps that can be carried out after the end of the project, with the advantage of the expertise acquired from the work developed under FORCOAST, i.e. the implementation of the service in two vastly different oceanic environments with different hydrodynamic models: Galway Bay and the North Sea.

After these improvements are performed, further exploitation activities would be the publication and dissemination of a manuscript presenting the service to scientists, farmers and policy-makers. Other channels apart from the scientific paper can be considered, such as the organization of workshops with local stakeholders or the use of social networks and institutional web portals.

Another aspect that needs to be considered is the nature of contaminants, as is also discussed for SM-A2 below. Currently, the R1 services treat the contaminants as passive tracers only, moving freely along with the marine currents. This limits the range of applications to which the service can be applied. For example, it is possible to apply it to sewage pollution, but not to oil spills, which cannot be considered a passive tracer due to flotation (the spill always stays at the surface and thus a windage factor needs to be considered) and weathering. Including different types of contamination in the service would greatly increase its range of applications, but it would also increase the complexity of its usage and would require more end user training.

Different oceanic models often use different variable names for referring to the input parameters of interest that are needed to run the service (namely the *u* and *v* components of velocity and the bathymetry and sea surface elevation). One idea that would improve the transferability of this product is to provide a straightforward way to map the variable names in the local oceanic model to a standard naming system. Details about such a standard naming system would be provided as part of a user's guide, and this would make the whole process of extending SM-R1 to other areas much easier. As a result, the selling ability of the product would be improved.

Finally, visualization can be made more flexible too. Currently, the FORCOAST front-end displays the contamination density maps with a fixed resolution for Galway Bay and the North Sea. However, in a future context of a fully transferable R1 product being delivered to any coastal area in the world ocean, the grid resolution used for these types of maps should be flexible too, as different spatial scales need different types of visualization of the results. This can be achieved by asking the user to provide the desired grid resolution, or the "best" resolution can possibly be determined automatically by the software based on the spatial scale.

3.3.1.2 SM-A2 – Land Pollution

The key limitation of the SM-A2 Land Pollution 'as is' lies in the incapacity of constraining temporal variability in the actual pollutant releases. This is very specific information, and the ways to collect this information or relevant proxies have to be devised user-wise. As such the service is most valuable if the users have other external means of assessing the likelihood of pollutant release.

SM A2 is ready to run in the Romanian, Northern Adriatic and Galway Bay pilots. The operational platform allows users to set up 'demonstration' cases (ie. for one given date). A user-specific setup procedure is required to set up routine watches and daily notifications.

To optimize its relevance and value for aquaculture farmers, the SM-A2 Land Pollution would benefit from two major developments. One is general and would benefit all users, the second needs to be considered for each specific case.

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The general development regards the nature of the pollution.

Currently, the service module treats pollutants as passive tracers and is only concerned with the fact that circulation conditions will lead any released substances towards the farm, and by the time elapsed between release and reaching.

Farmers may be concerned with pollutants of a specific nature (e.g. known chemicals, bacterial outbreak), whose evolution under various environmental conditions may be inferred (e.g. bacterial growth according to temperature, pollutant breakdown, under given irradiance conditions, etc.).

For instance, many early users have highlighted a better characterization of bacteria. *E. Coli* outbreaks would be directly relevant to them. If considered, such development would likely be relevant for all potential users.

We believe that at least a full year with two half-time senior researchers would be required to address that issue: one biologist to compile bacterial growth/decay conditions under various environmental conditions, and one numerical oceanographer to implement the inferred behaviour in the service module codes. In addition, both lab (e.g. incubations in a controlled environment) and fieldwork (in-situ sampling) are to be considered.

The user-specific development regards temporal variations in the pollution release.

Depending on the nature of the polluting site, pollutant releases can arise in events (eg. sewage outflows) or continuously with varying intensity (eg. polluted river discharge). Without means to constraint pollutant releases in general terms, SM-A2 currently assumes constant release and derives pollution risk based on the fraction of this release reaching the farm. It would be far more relevant to the user to have the actual concentration of pollutants, but the information required to characterize actual release is considerable.

In several cases, however, proxies can be considered. For instance, sewage outflow in the Romanian pilot is largely related to the touristic season. Pollutants related to a polluted river in Galway Bay are largely related to rain volume. In such cases, interactions with users may lead to the identification of viable proxy information enabling the inference of actual pollution discharge rates or release events. This is less demanding in terms of model development but needs to be done specifically for different users.

It should be noted, however, that addressing this issue for several independent users may lead to the identification of a few common approaches, easily scaled to new interested users.

3.3.1.3 SM-A4 – Spat Capture Assistance

In case of extension to other species and other areas:

- Environmental and biological data needs to be collected for the areas by scientists and remote sensing devices. These need to be identified and contacted in time for the extension of the service module;
- Model developers must be presented with the new data on species and areas mentioned above or new model developers must be attracted to build further on the existing service module;
- New farmers must be attracted to buy the service module.

SM-A4 is ready to run in the Belgium pilot and the North Sea with good performance. A user-specific setup procedure is required to run the services and receive notifications. SM-A4 could easily be implemented in any place, but physical forcing has to be adapted.

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The extension of the service module to other species and areas would result in a much higher sales potential. The first potential species is the Pacific oyster (*Magallana gigas*), which is the fourth largest aquaculture species in the EU. The focus areas are along the French coast and Ireland. The second species is the Mediterranean mussel (*Mytilus galloprovincialis*) in the Mediterranean Sea. Aquaculture production of mussels in the EU peaked in the late 1990s at more than 600,000 tonnes but had dropped in volume by 20% to 480,000 tonnes by 2016, valued at €420 million.

A further extension to other mussel species and areas could even result in much higher returns. Global oyster production of all species in 2018 was 6 million tonnes, with China producing around 85% of the total. The Pacific oyster is mainly culture in the north of China, where seed collection also happens from the wild, for example, on the coast of Shantou in southern Guangdong province, China. On the other hand, global mussel aquaculture production is good for 2 million tonnes (2016), with a value of €3.4 billion (FAO 2019). Europe produces about 20% of the total global production, while China and Chile have a production rate of 43% and 15% respectively. The most important mussel species being cultured in China also include the blue mussel (*Mytilus edulis*) and the Mediterranean mussel (*Mytilus galloprovincialis*), next to the green mussel (*Perna viridis*) and the hard-shelled mussel (*Mytilus coruscus*). The service module should only be further adapted to these two areas.

China. As the length of the coastline of China is about 18,000 km, it is necessary to focus on the areas where mussel culture is the most important aquaculture activity. The map below shows mussel culture is mainly performed in the provinces of Shandong, Jiangsu and Zhejiang. The two hotspots for mussel culture are Haizhou Bay (located between the southern Shandong peninsula and north of Jiangsu province and produces *M. galloprovincialis*) and Gouqi Island in Shengsi county, Zhoushan, Zhejiang province.

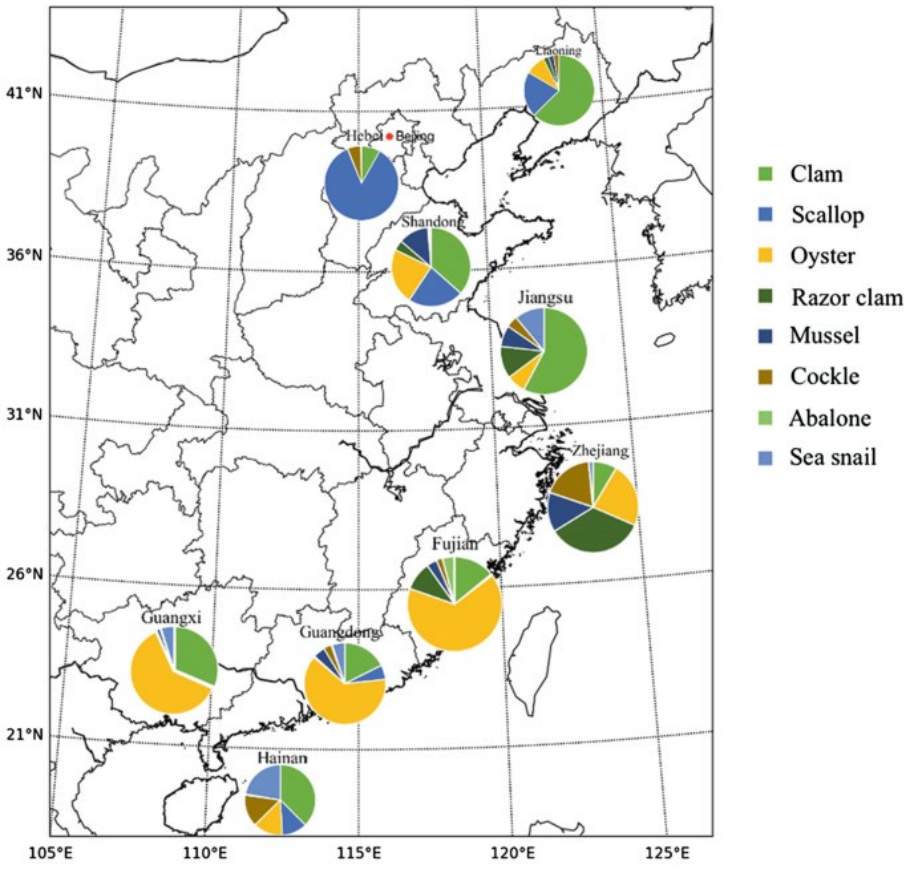

Figure 3. Map with the important locations of bivalve aquaculture.

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Chile. The extension of the Service Module should also include the Chorito or Chilean mussel (*Mytilus platensis*) in the area of the inner sea at Chiloé Island, which concentrates 99% of the Chilean mussel production.

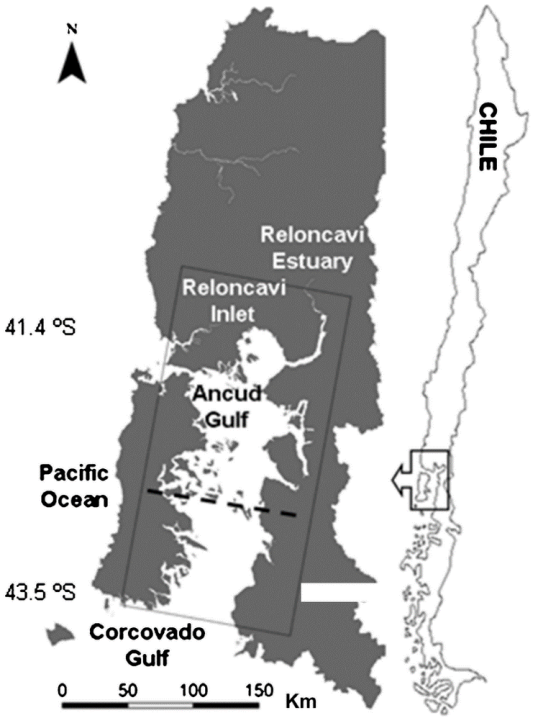

Figure 4. Map of the inner sea of Chiloé Island, Chile

3.3.1.4 SM-F2 – Fronts Detection

Actual user experience is essential in developing the service modules in the right direction. During operation, it is advised to gather feedback on the usefulness, user-friendliness, and near real time data. Further improvements to create better value include:

- Further information about the intrinsic characteristics of the fronts on the sea surface;
- Add information about the vertical variability of these features;
- Add other relevant information about the ocean and meteorological conditions relevant to this activity.

3.3.2 Marketing and Sales Improvements

It would be of great value if we had all service modules easily transferable to other coastal areas. This would strengthen our marketing message, reduce our dependency on the limited number of clients, and it would greatly help to expand the services.

3.3.2.1 SM-F2 – Fronts Detection

Certification through at-sea testing and demonstration would be very welcome to make sales easier.

3.3.2.2 SM-R1 – Contaminants Source Retrieval

Additional demonstrations in other sites would be needed to prove both the transferability of the service and the selling ability of the product. Currently, it would be possible to extend the functionalities of SM-R1 to other sites in Ireland where operational hydrodynamic models are implemented. Hydrodynamic models are necessary for providing information on oceanic circulation, which is then used to track the dispersion of contaminants.

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In addition to Galway Bay, other examples of areas in Ireland where high-resolution hydrodynamic models are already implemented are Clew Bay and Bantry Bay. Extending the functionalities of SM-R1 to these areas would be rather straightforward, and this exercise would demonstrate the transferability of the service. To achieve this, collaboration with local stakeholders would be of paramount importance to gather feedback on their needs and interests.

3.3.3 Clients and Users Requirements

3.3.3.1 SM-R1 – Contaminants Source Retrieval

As the information on oceanic currents is needed to track contaminants in the water, a hydrodynamic model in operation, providing forecasts of oceanic currents, is required for any area where this service is to be implemented.

3.3.3.2 SM-A4 – Spat Capture

The key limitation is determining specific biological parameterization to use locally for the selected species. To use the services, it is recommended to have a screen of scientific literature for the species and selected location to obtain the most adapted parameterization. Local calibration is also helpful to improve model performance. As such the service is most valuable if the users have specific knowledge of the area as described in the user manual.

Prior knowledge of users for the species in the area will improve model performance as data collecting for in-situ calibration.

Identification and approach of the customers

This SM was originally designed for the Belgium Pilot. This Pilot is located at Westdiep and investigates the possibilities of integrated aquaculture (blue mussels, flat oysters and sugar kelp) and passive fisheries (project SYMAPA). During the former project Value@Sea (at the same location), it became clear that finding juvenile flat oysters of good quality and disease-free was very difficult. Therefore, the possibility of capturing flat oyster spat is investigated in the ongoing project SYMAPA. Mussel culture also relies on the availability of mussel spat from nature. Therefore a model was constructed by RBINS to aid the SME (Brevisco) involved in bivalve farming in the project.

As the interest in mariculture in Belgium is increasing, several other SMEs are following. For example, at the end of 2020, the SME CODEVCO V received a user and environmental permit to establish an integrated mariculture farm (105 ha), first with blue mussel and later onwards with European flat oyster and sugar kelp (MD of 23 December 2020). Geo XYZ is a company specialising in hydrographic and topographic services, provides services to local authorities dredging industry, marine and offshore industry engineering companies and research centres, and is also interested in mariculture.

The Belgian knowledge institutes within the project UNITED, UGent and RBINS, are potential customers of this Service Module.

The end users that could benefit from this SM include all bivalve farmers that are depending on spat collection from the wild with spat collectors, and end users that are involved in oyster reef restoration and rely on natural recruitment.

The blue mussel farmers are all the farmers that use the suspended mussel culture with seed collected from the water column (excluding all farmers that uses mussel seed that is fished on natural mussel beds), almost all mussel farmers in Norway and Denmark, and part of the mussel farmers in The Netherlands and France.

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The number of customers could however substantially be increased when the SM would be adapted for two more species: the Mediterranean mussel (*Mytilus galloprovincialis*) and the Pacific oyster. It is believed that this SM can be easily adapted for these species, as the cue parameters for reproduction and spat settlement are already well known.

For the flat oyster farmers, the number of customers is limited, as most of the flat oyster culture relies on spat that is produced in hatcheries. It is, however, believed that the number of flat oyster farmers that will collect oyster spat will spat collectors will increase in the future with the introduction and expansion of oyster reefs through restoration (more availability of natural spat) and stricter regulations on the transfer of oysters between locations within and from outside the EU to prevent the spreading of invasive species and diseases.

For the oyster reef restoration operators, it is believed that with the increase of initiatives and the EU funding for oyster reef restoration projects, the number of customers will grow in the near future. Deliverable 6.1 Initial Market Analysis identified 19 Oyster Reef Restoration (ORR) groups in Europe and three large ORR groups outside of Europe. The industrial partners, knowledge institutes, as well as environmental organisations that are involved in oyster reef restoration are potential customers.

Another important sector that could be a potential end user of the SM-A4 is companies that are involved in coastal protection through biogenic bivalve reefs. The DEME Group (is a world leader in the highly specialised fields of dredging, land reclamation, marine infrastructure, offshore energy and environmental remediation worldwide) and Jan De Nul Group (specialised in dredging and the production of offshore energy, land reclamation, prevention of pollution and marine infrastructures) are both involved in the Coastbusters® consortium, which investigates the possibility of the use of biogenic reefs for coastal protections. Coastbusters® tries with the help of aquaculture techniques to enhance the development of biogenic reefs, such as mussel beds, to stabilize the sediment and prevent fluxes of sand away from the beaches. Both companies are interested in the use of such biogenic mussel beds for coastal protection not only for the Belgian coast but all over the world. Therefore, the spat collectors for mussels must be installed timely, to ensure maximum efficiency and yield. Next to that, DEME Group is a shareholder in the first Belgian commercial seafarm for the production of mussels and Jan De Nul Group is interested in the commercial culture of flat oysters and oyster reef restoration. For these activities, the Service Module A4 - Assistance in spat capture is of great importance to further develop their activities in coastal protection, bivalve culture and oyster reef restoration. As both companies are active worldwide, the extension of the SM-A4 to other species and areas could be of great importance.

According to the process of extension in expanding the species and areas, the end users can be approached individually through email and are invited to download a test application for a limited period of time, in order to show the benefits of this service. Potential end users can also be approached during conferences, such as seafood events.

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4 References

CloudWatchHUB, “CloudWatchHUB,” 2017. [Online]. Available: https://www.cloudwatchhub.eu/. [Accessed 2022].

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Annex 1 Intellectual Property Rights Agreement Draft

IPR AGREEMENT

THIS IPR AGREEMENT is made as of _____, hereinafter referred to as the Effective Date

AMONG:

_____

_____

_____

hereinafter, jointly or individually, referred to as ”Parties” or ”Party”

relating to the Horizon 2020 Action entitled

_____

in short

_____

hereinafter referred to as “Project”

WHEREAS:

The Parties, having considerable experience in the field concerned, have submitted a proposal for the Project to the Funding Authority as part of the Horizon 2020 – the Framework Programme for Research and Innovation (2014-2020)

The Parties wish to ratify or supplement binding commitments among themselves certain of the license provisions of the specific Grant Agreement signed by the Parties and the Funding Authority (hereinafter “Grant Agreement”) and of the specific Consortium Agreement signed among the Parties (thereinafter “Consortium Agreement”).

The Attachments to this Agreement constitute an integral part of the IPR Agreement.

NOW, THEREFORE, IT IS HEREBY AGREED AS FOLLOWS:

1 Section: Definitions

Words beginning with a capital letter shall have the meaning defined either herein or in the Rules for Participation or in the Grant Agreement or in the Consortium Agreement, including their Annexes.

2 Section: Purpose

The purpose of this IPR Agreement is to ratify and specify the provisions contained in the Grant Agreement and the Consortium Agreement, concerning the rights and obligations of the Parties concerning intellectual property rights and Access Rights.

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3 Section: Entry into force, duration and termination

3.1 Entry into force

An entity becomes a Party to this IPR Agreement upon signature of this IPR Agreement by a duly authorised representative.

This IPR Agreement shall take effect from the Effective Date identified at the beginning of this Agreement.

A new entity becomes a Party to the IPR Agreement upon signature of the accession document (Attachment 2) by the new Party and the Coordinator. Such accession shall take effect from the date identified in the accession document.

3.2 Duration and termination

This IPR Agreement shall continue in full force and effect until complete fulfilment of all obligations undertaken by the Parties under the Grant Agreement, under the Consortium Agreement and under this IPR Agreement.

However, this IPR Agreement or the participation of one or more Parties to it may be terminated in accordance with the terms of this IPR Agreement.

If

- the Grant Agreement is not signed by the Funding Authority or a Party, or

- the Grant Agreement is terminated, or

- a Party's participation in the Grant Agreement is terminated,

this IPR Agreement shall automatically terminate in respect of the affected Party/ies, subject to the provisions surviving the expiration or termination under Section 3.3 of this IPR Agreement.

3.3 Survival of rights and obligations

The provisions relating to Access Rights, Dissemination and confidentiality, for the time period mentioned therein, as well as for liability, applicable law and settlement of disputes shall survive the expiration or termination of this IPR Agreement.

Termination shall not affect any rights or obligations of a Party leaving the Consortium incurred prior to the date of termination, unless otherwise agreed between the General Assembly and the leaving Party.

4 Section: Liability towards each other

4.1 No warranties

In respect of any information or materials (incl. Results and Background) supplied by one Party to another under the Project, no warranty or representation of any kind is made, given or implied as to the sufficiency or fitness for purpose nor as to the absence of any infringement of any proprietary rights of third parties.

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Therefore,

- the recipient Party shall in all cases be entirely and solely liable for the use to which it puts such information and materials, and

- no Party granting Access Rights shall be liable in case of infringement of proprietary rights of a third party resulting from any other Party (or its Affiliated Entities) exercising its Access Rights.

4.2 Limitations of contractual liability

No Party shall be responsible to any other Party for any indirect or consequential loss or similar damage such as, but not limited to, loss of profit, loss of revenue or loss of contracts, provided such damage was not caused by a willful act or by a breach of confidentiality.

For any remaining contractual liability, a Party's aggregate liability towards the other Parties collectively shall be limited to once the Party's share of the total costs of the Project as identified in Annex 2 of the Grant Agreement provided such damage was not caused by a willful act. Provided such damage was caused by gross negligence, a Party's aggregate liability towards the other Parties collectively shall be limited to twice the Party's share of the total costs of the Project as identified in Annex 2 of the Grant Agreement.

The terms of this Agreement shall not be construed to amend or limit any Party's statutory liability.

4.3 Damage caused to third parties

Each Party shall be solely liable for any loss, damage or injury to third parties resulting from the performance of the said Party's obligations by it or on its behalf under this IPR Agreement or from its use of Results or Background.

4.4 Force Majeure

No Party shall be considered to be in breach of this IPR Agreement if it is prevented from fulfilling its obligations under the Agreement by Force Majeure.

Each Party will notify the competent Consortium Bodies of any Force Majeure without undue delay. If the consequences of Force Majeure for the Project are not overcome within 6 weeks after such notification, the transfer of tasks - if any - shall be decided by the competent Consortium Bodies.

5 Section: Results

5.1 Ownership of Results

Results are owned by the Party that generates them.

5.2 Joint ownership

Joint ownership is governed by Grant Agreement Article 26.2 with the following additions:

Unless otherwise agreed:

- each of the joint owners shall be entitled to use their jointly owned Results for non-commercial research activities and educational purposes on a royalty-free basis, and without prior consent to the other joint owner(s), and

- subject to the obligations to jointly Exploit Results for commercial purposes as set out in Section 6.4 below, each of the joint owners shall be entitled to otherwise Exploit the jointly owned

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Results and to grant non-exclusive licenses to third parties (without any right to sub-license), if the other joint owners are given:

(a) at least 45 calendar days advance notice; and

(b) Fair and Reasonable compensation.

5.3 Transfer of Results

5.3.1

Each Party may transfer ownership of its own Results following the procedures of the Grant Agreement Article 30.

5.3.2

Each party may identify specific third parties to whom it intends to transfer the ownership of its Results in Attachment (3) to this IPR agreement. The other Parties hereby waive their right to prior notice and their right to object to a transfer to listed third parties according to the Grant Agreement Article 30.1.

5.3.3

The transferring Party shall, however, at the time of the transfer, inform the other Parties of such transfer and shall ensure that the rights of the other Parties as well as the commercialization of the whole device (the "Device") will not be affected by such transfer. Any addition to Attachment (3) after signature of this Agreement requires a decision of the General Assembly.

5.3.4

The Parties recognize that in the framework of a merger or an acquisition of an important part of its assets, it may be impossible under applicable EU and national laws on mergers and acquisitions for a Party to give the full 45 calendar days' prior notice for the transfer as foreseen in the Grant Agreement.

5.3.5

The obligations above apply only for as long as other Parties still have - or still may request - Access Rights to the Results.

5.4 Dissemination

5.4.1 All terms of the Dissemination Clause contained in the Consortium Agreement (Sections 8.4 and 8.5) are hereby incorporated by reference and constitute an integral part of this Agreement.

6 Section: Access Rights

6.1 Background included

6.1.1

In Attachment 1, the Parties have identified and agreed on the Background for the Project and have also, where relevant, informed each other that Access to specific Background is subject to legal restrictions or limits.

Anything not identified in Attachment 1 shall not be the object of Access Right obligations regarding Background.

6.1.2

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Any Party may add further own Background to Attachment 1 during the Project by written notice to the other Parties. However, approval of the General Assembly is needed should a Party wish to modify or withdraw its Background in Attachment 1.

6.2 General Principles

6.2.1

Each Party shall implement its tasks in accordance with the Consortium Plan and shall bear sole responsibility for ensuring that its acts within the Project do not knowingly infringe third party property rights.

6.2.2

Any Access Rights granted expressly exclude any rights to sublicense unless expressly stated otherwise.

6.2.3

Access Rights shall be free of any administrative transfer costs.

6.2.4

Access Rights are granted on a non-exclusive basis.

6.2.5

Results and Background shall be used only for the purposes for which Access Rights to it have been granted.

6.2.6

All requests for Access Rights shall be made in writing. The granting of Access Rights may be made conditional on the acceptance of specific conditions aimed at ensuring that these rights will be used only for the intended purpose and that appropriate confidentiality obligations are in place.

6.2.7

The requesting Party must show that the Access Rights are Needed.

6.3 Access Rights for implementation

Access Rights to Results and Background Needed for the performance of the own work of a Party under the Project shall be granted on a royalty-free basis, unless otherwise agreed for Background in Attachment 1.

6.4 Access Rights for Exploitation

6.4.1 Access Rights to Results and Exclusivity

Access rights to Results for internal research activities and educational purposes shall be granted on a royalty-free basis, prior to information sent to the other Parties.

Given that the goal of the Project is to develop a new device, the Parties agree to take such steps as may be required to protect the IPR of the whole Device and to comply with all terms of the Non-disclosure of information and Dissemination Clauses contained in the Consortium Agreement

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(Sections 8.4 and 10), which are hereby incorporated by reference, constitute an integral part of and will apply also to this IPR Agreement, subject to the necessary adjustments.

Additionally, during an exclusivity period commencing on the date hereof and terminating on the fifth anniversary following the completion of the Project (the "Exclusivity Period"), all the Parties shall Exploit the Results for commercial purposes solely and exclusively in the framework of the Exploitation of the Results as an integral part of the Device as a whole, and solely and exclusively in the framework of joint collaboration among them, whilst acting in good faith, using their best efforts and allocating the obligations, rights and proceeds on Fair and Reasonable conditions. The Parties shall reasonably agree upon the most appropriate method of commercial Exploitation of the whole Device and the responsibilities for IPR protection.

6.4.2

In the event that the Parties fail to commence the above-mentioned commercial Exploitation of the Device within the Exclusivity Period, as well as upon the termination of the above-mentioned joint commercial Exploitation of the Device as a whole, then:

(a) Access Rights to Results if Needed for Exploitation of a Party's own Results, including for the joint exploitation of the whole Device, which is in the interest of all Parties, shall be granted on Fair and Reasonable conditions; and

(b) Access Rights to Background if Needed for Exploitation of a Party's own Results, including for research on behalf of a third party, shall be granted on Fair and Reasonable conditions.

A request for Access Rights under this Section 6.4.2 may be made up to twelve months after the end of the Exclusivity Period.

6.5 Access Rights for Affiliated Entities

Affiliated Entities have Access Rights under the conditions of the Grant Agreement Articles 25.4 and 31.4. If they are identified in [Attachment 4 (Identified Affiliated Entities) to this Agreement].

Such Access Rights must be requested by the Affiliated Entity from the Party that holds the Background or Results. Alternatively, the Party granting the Access Rights may individually agree with the Party requesting the Access Rights to have the Access Rights include the right to sublicense to the latter's Affiliated Entities [listed in Attachment 4]. Access Rights to Affiliated Entities shall be granted on Fair and Reasonable conditions and upon written bilateral agreement.

Affiliated Entities which obtain Access Rights in return fulfil all confidentiality and other obligations accepted by the Parties under the Grant Agreement, the Consortium Agreement or this IPR Agreement as if such Affiliated Entities were Parties.

Access Rights may be refused to Affiliated Entities if such granting is contrary to the legitimate interests of the Party which owns the Background or the Results.

Access Rights granted to any Affiliated Entity are subject to the continuation of the Access Rights of the Party to which it is affiliated, and shall automatically terminate upon termination of the Access Rights granted to such Party.

Upon cessation of the status as an Affiliated Entity, any Access Rights granted to such former Affiliated Entity shall lapse.

Further arrangements with Affiliated Entities may be negotiated in separate agreements.

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6.6 Additional Access Rights

For the avoidance of doubt any grant of Access Rights not covered by the Grant Agreement, the Consortium Agreement or this IPR Agreement - shall be at the absolute discretion of the owning Party and subject to such terms and conditions as may be agreed between the owning and receiving Parties.

6.7 Access Rights for Parties entering or leaving the consortium

6.7.1 New Parties entering the consortium

As regards Results developed before the accession of the new Party, the new Party will be granted Access Rights on the conditions applying for Access Rights to Background.

6.7.2 Parties leaving the consortium

6.7.2.1 Access Rights granted to a leaving Party

6.7.2.1.1 Defaulting Party

Access Rights granted to a Defaulting Party and such Party's right to request Access Rights shall cease immediately upon receipt by the Defaulting Party of the formal notice of the decision of the General Assembly to terminate its participation in the consortium.

6.7.2.1.2 Non-defaulting Party

A non-defaulting Party leaving voluntarily and with the other Parties' consent shall have Access Rights to the Results developed until the date of the termination of its participation.

It may request Access Rights within the period of time specified in Section 6.4.3.

6.7.2.2 Access Rights to be granted by any leaving Party

Any Party leaving the Project shall continue to grant Access Rights pursuant to the Grant Agreement, the Consortium Agreement and this IPR Agreement as if it had remained a Party for the whole duration of the Project.

6.8 Specific provisions for Access Rights to Software

6.8.1 Definitions relating to Software

“Application Programming Interface”

means the application programming interface materials and related documentation containing all data and information to allow skilled Software developers to create Software interfaces that interface or interact with other specified Software.

"Controlled Licence Terms" means terms in any licence that require that the use, copying, modification and/or distribution of Software or another work (“Work”) and/or of any work that is a modified version of or is a derivative work of such Work (in each case, “Derivative Work”) be subject, in whole or in part, to one or more of the following:

a) (where the Work or Derivative Work is Software) that the Source Code or

b) other formats preferred for modification be made available as of right to any third party on request, whether royalty-free or not;

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c) that permission to create modified versions or derivative works of the Work or Derivative Work be granted to any third party;

d) that a royalty-free license relating to the Work or Derivative Work be granted to any third party.

For the avoidance of doubt, any Software license that merely permits (¬but does not require any of) the things mentioned in (a) to (c) is not a Controlled License (and so is an Uncontrolled License).

"Object Code" means software in machine-readable, compiled and/or executable form including, but not limited to, byte code form and in form of machine-readable libraries used for linking procedures and functions to other software.

"Software Documentation" means software information, being technical information used, or useful in, or relating to the design, development, use or maintenance of any version of a software programme.

"Source Code" means software in human readable form normally used to make modifications to it including, but not limited to, comments and procedural code such as job control language and scripts to control compilation and installation.

6.8.2 General principles

For the avoidance of doubt, the general provisions for Access Rights provided for in this Section 6 are applicable also to Software as far as not modified by this Section 6.8.

Parties' Access Rights to Software do not include any right to receive Source Code or Object Code ported to a certain hardware platform or any right to receive Source Code, Object Code or respective Software Documentation in any particular form or detail, but only as available from the Party granting the Access Rights.

The intended introduction of Intellectual Property (including, but not limited to Software) under Controlled Licence Terms in the Project requires the approval of the General Assembly to implement such introduction into the Consortium Plan.

6.8.3 Access to Software

Access Rights to Software that is Results shall comprise:

Access to the Object Code; and,

where normal use of such an Object Code requires an Application Programming Interface (hereafter API), Access to the Object Code and such an API; and,

if a Party can show that the execution of its tasks under the Project or the Exploitation of its own Results is technically or legally impossible without Access to the Source Code, Access to the Source Code should be provided to the extent necessary.

Background shall only be provided in Object Code unless otherwise agreed between the Parties concerned.

6.8.4 Software licence and sublicensing rights

6.8.4.1 Object Code

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 870465.

6.8.4.1.1 Results - Rights of a Party

Where a Party has Access Rights to Object Code and/or API that is Results for Exploitation, such Access shall, in addition to the Access for Exploitation foreseen in Section 6.4, as far as Needed for the Exploitation of the Party's own Results, comprise the right:

to make an unlimited number of copies of Object Code and API; and

to distribute, make available, market, sell and offer for sale such Object Code and API alone or as part of or in connection with products or services of the Party having the Access Rights;

provided however that any product, process or service has been developed by the Party having the Access Rights in accordance with its rights to exploit Object Code and API for its own Results.

If it is intended to use the services of a third party for the purposes of this Section 6.8.4.1.1, the Parties concerned shall agree on the terms thereof with due observance of the interests of the Party granting the Access Rights as set out in Section 6.2 of this IPR Agreement.

6.8.4.1.2 Results - Rights to grant sublicenses to end-users

In addition, Access Rights to Object Code shall, as far as Needed for the Exploitation of the Party's own Results, comprise the right to grant in the normal course of the relevant trade to end-user customers buying/using the product/services, a sublicense to the extent as necessary for the normal use of the relevant product or service to use the Object Code alone or as part of or in connection with or integrated into products and services of the Party having the Access Rights and, as far as technically essential:

- to maintain such product/service;
- to create for its own end-use interacting interoperable software in accordance with the Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs

6.8.4.1.3 Background

For the avoidance of doubt, where a Party has Access Rights to Object Code and/or API that is Background for Exploitation, Access Rights exclude the right to sublicense. Such sublicensing rights may, however, be negotiated between the Parties.

6.8.4.2 Source Code

6.8.4.2.1 Results - Rights of a Party

Where, in accordance with Section 6.8.3, a Party has Access Rights to Source Code that is Results for Exploitation, Access Rights to such Source Code, as far as Needed for the Exploitation of the Party's own Results, shall comprise a worldwide right to use, to make copies, to modify, to develop, to adapt Source Code for research, to create/market a product/process and to create/provide a service.

If it is intended to use the services of a third party for the purposes of this Section 6.8.4.2.1, the Parties shall agree on the terms thereof, with due observance of the interests of the Party granting the Access Rights as set out in Section 6.2 of this IPR Agreement.

6.8.4.2.2 Results – Rights to grant sublicenses to end-users

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 870465.

In addition, Access Rights, as far as Needed for the Exploitation of the Party's own Results, shall comprise the right to sublicense such Source Code, but solely for purpose of adaptation, error correction, maintenance and/or support of the Software.

Further sublicensing of Source Code is explicitly excluded.

6.8.4.2.3 Background

For the avoidance of doubt, where a Party has Access Rights to Source Code that is Background for Exploitation, Access Rights exclude the right to sublicense. Such sublicensing rights may, however, be negotiated between the Parties.

6.8.5 Specific formalities

Each sublicense granted according to the provisions of Section 6.8.4 shall be made by a traceable agreement specifying and protecting the proprietary rights of the Party or Parties concerned.

7 Section: Non-disclosure of information

All terms of the Non-disclosure of information and Dissemination Clauses contained in the Consortium Agreement (Sections 8.4 and 10) are hereby incorporated by reference, constitute an integral part of and will apply also to this IPR Agreement.

8 Section: Miscellaneous

8.1 Attachments, inconsistencies and severability

This Agreement consists of this core text and

Attachment 1 (Background included)

Attachment 2 (Accession document)

Attachment 3 (List of Third Parties for simplified transfer according to Section 5.3.2)

Attachment 4 (Identified Affiliated Entities)

In case the terms of this Agreement are in conflict with the terms of the Grant Agreement, or of the Consortium Agreement, the terms of the Grant Agreement and the terms of the Consortium Agreement shall prevail. In case of conflicts between the attachments and the core text of this License Agreement, the latter shall prevail.

Should any provision of this Agreement become invalid, illegal or unenforceable, it shall not affect the validity of the remaining provisions of this Agreement. In such a case, the Parties concerned shall be entitled to request that a valid and practicable provision be negotiated that fulfils the purpose of the original provision.

8.2 Notices and other communication

Any notice to be given under this IPR Agreement shall be in writing to the addresses and recipients as listed in the most current address list kept by the Coordinator.

Formal notices:

If it is required in this IPR Agreement that a formal notice, consent or approval shall be given, such notice shall be signed by an authorised representative of a Party and shall either be served personally or sent by mail with recorded delivery or telefax with receipt acknowledgement.

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Other communication:

Other communication between the Parties may also be effected by other means such as e-mail with acknowledgement of receipt, which fulfils the conditions of written form.

Any change of persons or contact details shall be notified immediately by the respective Party to the Coordinator. The address list shall be accessible to all Parties.

8.3 Assignment and amendments

Except as set out in Section 5.3, no rights or obligations of the Parties arising from this IPR Agreement may be assigned or transferred, in whole or in part, to any third party without the other Parties' prior formal approval. Amendments and modifications to the text of this IPR Agreement not explicitly listed in Section 6.3.6 of the Consortium Agreement require a separate written agreement to be signed between all Parties.

8.4 Mandatory national law

Nothing in this IPR Agreement shall be deemed to require a Party to breach any mandatory statutory law under which the Party is operating.

8.5 Language

This IPR Agreement is drawn up in English, which language shall govern all documents, notices, meetings, arbitral proceedings and processes relative thereto.

8.6 Applicable law

This IPR Agreement shall be construed in accordance with and governed by the laws of Belgium excluding its conflict of law provisions.

8.7 Settlement of disputes

The parties shall endeavour to settle their disputes amicably.

ICC Arbitration

All disputes arising out of or in connection with this Agreement, which cannot be solved amicably, shall be finally settled under the Rules of Arbitration of the International Chamber of Commerce by one or more arbitrators appointed in accordance with the said Rules.

The place of arbitration shall be Brussels if not otherwise agreed by the conflicting Parties.

The award of the arbitration will be final and binding upon the Parties.

Nothing in this Agreement shall limit the Parties' right to seek injunctive relief in any applicable competent court.

9 Section Signatures

AS WITNESS:

The Parties have caused this Agreement to be duly signed by the undersigned authorised representatives in separate signature pages the day and year first above written.

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