FORCOAST

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

PROJECT DELIVERABLE REPORT

Deliverable Number: D6.5
Deliverable: Initial Exploitation Strategy
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Work Package Number: WP6
Work Package Title: Innovation Management, Exploitation & Business Planning

FORCOAST Project Information

Project full title	Earth Observation Services For Wild Fisheries, Oystergrounds Restoration And Bivalve Mariculture Along European Coasts
Project acronym	FORCOAST
Grant agreement number	870465
Project coordinator	Ghada El Serafy, Deltares
Project start date and duration	1st November 2019, 36 months
Project website	https://forcoast.eu/

Deliverable Information

Work package number	WP6
Work package title	Innovation Management, Exploitation & Business Planning
Deliverable number	D6.5
Milestone title	Initial Exploitation Strategy
Description	This initial deliverable involves integrating project outcomes from other WPs into a comprehensive exploitation strategy, including identifying relevant market(s), most promising customers, and core business case(s), modelling the prospective business development, and together with relevant partners both from industry and the end-users' side, developing coherent business plans (task 6.3).
Lead beneficiary	Marine Instruments (MI_ES)
Lead Author(s)	Sandra Brion, Daan Delbare, Carlos Romay, Daniel Lowe, Begoña Vila
Contributor(s)	Luis Rodriguez, Daniel Twigt, Ghada El Serafy
Revision number	6
Revision Date	14/10/2022
Status (Final (F), Draft (D), Revised Draft (RV))	F
Dissemination level (Public (PU), Restricted to other program participants (PP), Restricted to a group	PU

specified by the consortium (RE), Confidential for consortium members only (CO))	

Document History			
Revision	**Date**	**Modification**	**Author**
Initial draft			Sandra Brion
Initial draft	01/05/2021	Putting in format	Daan Delbare
Initial draft review	11/05/2021	1st Review, comments	Daniel Twigt
Initial draft review	11/05/2021	1st Review, additional comments and small changes	Luis Rodriguez
Initial draft review	11/05/2021	1st Review, comments	Ghada El Serafy
Second draft	14/05/2021	Added information; addressed arisen issues	Carlos Romay, Daniel Lowe
Second draft	17/05/2021	2nd Review	Ghada El Serafy
Second draft	17/05/2021	2nd Review, formatting	Luis Rodriguez
Prefinal draft	29/06/2021	Updated with requested notes, review comments	Sandra Brion
Final draft	07/10/2021	Updated with requested notes	Sandra Brion
Final draft review	22/10/2021	Review based on reviewer's requests, including comments and changes	Luis Rodriguez
Final draft	03/11/2021	Updated with requested notes and review comments	Begoña Vila
Revised draft	09/05/2022	Updated to address reviewers' comments: abbreviations, competitors, and SWOT analysis, IPR and	Begoña Vila

		references section included. Rewritten pricing strategies	
Revised draft review		Review and formatting	Luis Rodriguez
Review Draft	14/10/2022	Inclusion of "Reviewer comments and reply" table below, referencing to the right deliverable and section where the points of attention are addressed.	Luis Rodriguez

Approvals				
	Name	**Organisation**	**Date**	**Signature (initials)**
Coordinator	Ghada El Serafy	Deltares	14/10/2022	GES
WP Leaders	Daan Delbare	ILVO	14/10/2022	DD

Reviewer comments and reply		
Date	**Comment**	**Reply**
Sep 2022	The exploitation strategy shall include a clear IPR analysis showing the potential dependencies of the project's developments on different models/algorithms/processing blocks and their corresponding licensing and use conditions. Under IPR, the text indicates software source code is stored in private repositories and there will be a copyright statement. However, both the GitHub and Zenodo archive for SM-R1 are publicly available,and there are no copyright statements for the Python code that appears to originate from FORCOAST. Also, as the Drift model has GNU licensing then improved versions must also be free. This use of open-source licensed code, and its resulting obligations, are not clearly detailed. It remains concerning the consortium are unable to define a business plan, according to this deliverable, but the presentation at the Progress Meeting indicated that progress will be made more rapidly now an expert on business development is included.	In deliverable D6.6 – Final Exploitation Strategy, the IPR agreement addresses the aspects of project dependencies according to Section 4 of D6.4. The final IPR agreement will be included in D6.6 following the licensing conditions expressed by the partners in https://docs.google.com/spreadsheets/d/1Low64H6e5oHBrO21CHS8poJ29DN2rFR5yJdTrsfZLUQ/edit#gid=0. The project repositories are being made private and their respective licensing conditions have been applied to them. The business model plan is defined across D6.4 – Final Business Plan using input from D6.2 – Final Market Analysis, following the structure and indications of Marcel Bruggers, business development expert appointed to lead these activities in the project.

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Executive Summary

This document is a revised version of D6.5 – Initial Exploitation Strategy, submitted as a final version at the beginning of November 2021.

This document presents the first 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 who are deeply involved in them, and their experience in these fields is of capital importance to understand how they work.

A FORCOAST prototype will be made available soon and will be tested during the life of the project in a supervised environment setting. The results of the evaluations of this first prototype will be key to define in detail how the product can be exploited and be used as input to develop a more detailed market analysis.

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

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

In the first section of this document, we define the strategy to ensure that valuable intellectual property is identified and appropriately protected.

In the second section, we present the services FORCOAST will offer its end-users grouped by Service Modules, together with the identified potential customers the project will be oriented to. The pricing strategy to be applied to the services to be developed in the project has been defined, taking into account the needs and objectives of the consortium.

Finally, a section with the conclusions reached from this work is included.

Updated and refined information on the aspects developed in this deliverable will be included in D6.6 – Final Exploitation Strategy. The information present in this deliverable is complemented with the aspects presented in deliverables D6.1 – Initial Market Analysis and D6.3 – Initial Business Plan.

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Abbreviations

Abbreviation	Description
4P	Product, Price, Place, and Promotion
D	Deliverable
DoA	Document of Agreement
HAB	Harmful Algal Blooms
IPR	Intellectual Property Rights
MSFD	Marine Strategy Framework Directive
NGO	Non-Governmental Organization
R&D	Research and Development
SAR	Search and Rescue
SM	Service Module
SWOT	Strengths, Weaknesses, Opportunities and Threats
TRL	Technology Readiness Level
WP	Work Package

1. Introduction

1.1. Purpose and Scope

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.

Therefore, this technical analysis will give an insight of the different Service Modules 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, that will individually carry out market research in their fields to evaluate the predisposition of their own internal market.
- At the level of the project partnership 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 will also address IPR issues and protocols that are key to ensure the protection of the whole FORCOAST consortium. It will also describe some general guidelines, strategies, and ideas that could greatly increase the chances of success of FORCOAST and could boost the global value proposition.

1.2. Relationship with other FORCOAST Deliverables

The relationship of D6.5 with other FORCOAST deliverables is described in Table 1 below.

Deliverable	Relation
D2.1	Stakeholders' interests and needs by sector and pilot site: D2.1 is needed in order to identify sectorial user requirements.
D3.9	Sector-specific decision workflow synthesis: D3.9 is crucial to identify possible synergies and transferability among the different sectors.
D6.1	Initial Market Analysis is highly linked to exploitation strategy.
D6.3	Initial Business Plan is highly linked to exploitation strategy.
D6.6	Final exploitation strategy. D6.6 is an update of this deliverable.
D7.2	Communication and marketing plan for the FORCOAST project: D7.2 is needed in order to identify sectorial user requirements and potential customers.

Table 1. Relationship with other FORCOAST Deliverables.

2. Intellectual Property Rights

Intellectual property is extremely important to be addressed when creating innovation and preparing the market launch of a new and disruptive technology. IPR includes patent, 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 protection, wherever in the world arising or available; but excluding rights in Confidential Information or trade secrets.

2.1. Intellectual Property Strategy

As FORCOAST involves a great amount of actors that constantly interact among them, the Intellectual Property 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 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 trade-marked 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.

2.2. 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 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:

- The Consortium agreement.
- The Exploitation agreement.

The final exploitation plan (D6.6) will include an Intellectual Property Rights (IPR) agreement, which is being discussed, planned and in the process of drafting among the different partners according to their role in the project and the two aforementioned agreements.

2.2.1. 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.

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 its own results in order to be able to prove its 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).

2.2.2. The Exploitation 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 convert 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 of 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 IPR which they own or ensure that it is exploited in further research activities. They can also exploit 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 Table 2. 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 - Marine Conditions	Instituto Superior Técnico, DMI	https://github.com/FORCOAST/FORCOAST_SM_A1	Attribution-NonCommercial 4.0 International (CC BY-NC 4.0)
Service Module A2 - Land Pollution	Jailoo / seamod.ro, Université de Liège	https://github.com/acapet/ForCoast-SM-A2	Apache 2.0
Service Module A3 - Site Prospection	Aarhus University	https://github.com/FORCOAST/Test-FORCOAST-SM-A3	Apache 2.0
Service Module A4 - Spat Capture Assistance	RBINS	https://github.com/FORCOAST/Test-FORCOAST-SM-A4	Apache 2.0
Service Module F1 - Suitable Fishing Areas	TerraSigna, University of Sofia	https://github.com/FORCOAST/Test-FORCOAST-SM-F1	Apache 2.0
Service Module F2 - Fronts Detection	Marine Instruments, AZTI	https://github.com/dminst/ForCoast-SM-F2	Apache 2.0
Service Module R1 - Contaminants Source Retrieval	Marine Institute	https://github.com/Diego1991/forcoast-sm-r1	GPL2.0

Table 2. Service Modules license conditions.

3. Initial Exploitation Strategy

Any good exploitation and business plan is based upon iterations over market feedback. As of now, it is too early to define a complete business plan, as we are yet analysing the first outputs from the market.

The first point to note is that the FORCOAST project is involved in three main activity sectors: wild fisheries, bivalve mariculture and oysterground restoration. Therefore, FORCOAST's exploitation strategy will take into account the specific characteristics of each of them and apply the experience of the different partners that make up each Service Module to come up with a strategy that adapts to the challenges each one of them poses.

Although at first glance these three sectors appear to be very different when it comes to developing an exploitation strategy, the diverse nature of the project's partners can be seen as one of its strengths, as they can learn from each other and apply the knowledge gained in one sector to the others.

3.1. FORCOAST Service Modules

Each activity sector, i.e., wild fisheries, aquaculture and oysterground restoration, have end-users with specific user requirements, which makes it important to setup specific Service Modules for each of them. These sectorial user requirements are described in part 3 of Deliverable *D2.1 Stakeholders interests and needs by sector and pilot site* and are translated to deployable sets of post-processing tools and communication strategies that allow to turn marine information/data sets (local and remote sensing) into tailored services to the end-users, resulting in cost-saving solutions.

The identified Service Modules were defined in Deliverable *D3.9 Sector-specific decision workflow synthesis*, section 9 "Operational workflow for the Service Modules", established after analysing the work done by each Pilot, identifying possible synergies and transferability among them that belong to each of the three main activity sectors the project is divided into.

The idea behind this strategy is to offer each customer a portfolio of services applicable to their activity, whether it be fishing, bivalve mariculture or oysterground restoration, and each of these services will benefit from the experience of the different Pilots who carry out their activity in these sectors.

The Service Modules that resulted from this analysis are grouped by sector as follows:

3.1.1. Fisheries

SM-F1 – Suitable Fishing Areas

Gives the fishermen maps of suitable habitats, via a fish suitability index, of small pelagic fish, as well as information on avoiding other species (bycatch), based on sea surface temperature, salinity, currents, mixed layer depth, sea surface height, chlorophyll-a concentration, primary production and euphotic zone depth.

SM-F2 – Fronts Detection

Gives the fishermen locations where fronts (shelf, shelf-break, coastal-upwelling and estuarine fronts, and frontal areas in the deep ocean) are located, based on sea surface temperature and/or chlorophyll-a concentration, as these are areas usually linked to high fish concentrations.

3.1.2. Aquaculture

SM-A1 – Marine Conditions

This Service Module will give the shellfish farmer the marine conditions at given farming sites in near real time mode and can support in daily operations and planning, based on weather, sea level, waves, currents and/or sea surface temperature.

SM-A2 – Land Pollution

Gives the shellfish farmer the opportunity to foresee troubleshooting due to contamination of harmful discharges arriving their site of interest and adapt their plan of action. The Service Module makes use of data on currents and the specific behaviour of pollutants in the water column.

SM-A3 – Site Prospection

This Service Module can support the shellfish farmer in the planning of new sites and evaluation of existing sites for aquaculture, based on hindcast products of surface sea temperature, salinity, currents, turbidity, food flux, chlorophyll-a, oxygen concentration, growth and condition indices from shellfish species.

SM-A4 – Spat Capture Assistance

Gives the shellfish farmer the opportunity to predict the spat arrival and therefore increase the efficiency of the spat collectors. This Service Module is based on surface sea temperature and source areas of shellfish larvae.

3.1.3. Oysterground restoration

SM-R1 – Contaminants Source Retrieval

The objective of this Service Module is to provide end-users with an estimation of the source of identified contaminants at their site by combining hydrodynamic modelling with backward particle-tracking modelling, highlighting the areas with a higher probability to be the source of contamination at the user's area of interest.

3.2. FORCOAST Pilots

In order to achieve FORCOAST's goals, various technological and operational innovations are required for a successful implementation. This will contribute to the EU's ambitions of creating and supporting European businesses for a global competitive market. Pilot applications will further develop and implement new technologies as well as new business concepts.

These activities will be implemented in eight pilots around Europe in five different seas (i.e., North Sea, Baltic-North Sea, Black Sea, Mediterranean and Atlantic Ocean).

The relation between the Service Modules and the Pilots is shown in Figure 1.

	Service name		2 Spain	3 Bulgaria	1 Portugal	4 Belgium	7 Romania	8 Italy	6 Denmark	5 Ireland
	Model data use	EO data use	THREDDS	?	THREDDS	ERRDAP	THREDDS	THREDDS	FTP	THREDDS
F1	Fish suitability index		X				X			
	Upwelling index	Calibrated use								
F2	Front detection			X	X		X			
	SST, (Chl)	SST, (Chl)								
A1/5	Marine conditions				X		X X		X	XX
	Any (hindcast + forecast)	blend for hindcast?								
A2	Harmful Land Discharges				X	X				XX
	Currents, Turbulence, (Waves)	/								
A3	Prospection for new sites								X	X
	Phys, BGC, Food Sources	/								
A4	Assistance for Spat Captures					X				X
	Specific	/								
R1	Retrieve source of contaminants			X						X
	Currents, Turbulence, (Waves)	/								

Legend	
Implementing this Service in This Pilot should be a priority	X
Leading Service Module	
Service Module tested	
Feasible	
Require specific calibration	
Require additional data input	
Irrelevant	

Figure 1. Synergies and transferability between the Pilots, and the resulting Service Modules.

3.3. End-users and market analysis

As already mentioned before, at this stage of the project, it is still early to define a final exploitation and business strategy. However, a market study must be carried out in order to evaluate the potentiality of the impact that the intellectual property might have.

We start from the fact that FORCOAST aims to offer information services co-designed with end-users, which provide high-resolution data of water quality and met-ocean variables at coastal zones and nearshore that are used to give focused answers to specific questions from the targeted wild fisheries, bivalve mariculture, and oysterground restoration sectors.
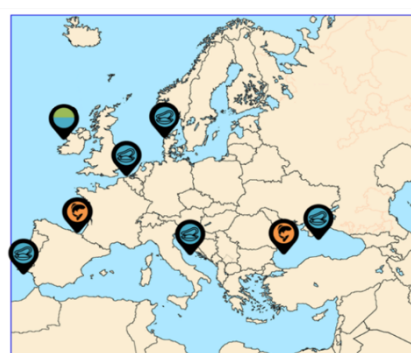
Pilot	Location	FORCOAST partners	Type	Planned activities (i.e. restoration, cultivation)
1	Atlantic, Portugal	Exporsado	SME	Oysters
		IST	Research	
2	Atlantic, Spain	Marine Instruments	SME	Fishery
		AZTI	Research	
3	Black Sea, Bulgaria	Terrasigna	SME	Fishery
		USOF	Academia	
4	North Sea, Belgium	RBINS	Research	Oysters, mussel
		ILVO	Research	
		Brevisco	SME	
5	Atlantic, Ireland	Cuan Beo	SME	Oysters, mussels
		Marine Institute	Research	
6	Baltic-North Sea, Denmark	DMI	Research	Oysters, mussels
		AU	Academia	
		Oyster boat	SME	
7	Black Sea, Romania	ULiege	Academia	Mussels
		NIMRD	Research	
		Jailoo	SME	
8	Northern Adriatic Sea, Italy	CNR	Research	Mussels
		OGS	Research	

Bivalve mariculture · Wild fisheries · Oysterground restoration

Figure 2. User contribution to the service's co-design.

FORCOAST is developing, testing and demonstrating, in operational mode, novel Copernicus-based downstream information services that will incorporate Copernicus Marine, Land and Climate Services Products, local monitoring data and advanced modelling in the service. This allows improving operation, planning and management of different marine activities in these sectors. Such information service categories include, among others, early warning services, real-time crisis management, key performance indicators, and information for planning operations.

In Deliverable *D2.1 - Stakeholders interests and needs by sector and pilot site*, a preliminary study was made of potential users, both internal and external to the project consortium. This initial study has been expanded towards the target sector markets by the work reported in Deliverable *D6.1 - Initial market analysis*.

In this analysis the following aspects will be taken into consideration:

- The proposed Service Modules represent a significant added value to the potential Copernicus data users by providing access to the data in easy-to-use formats and, more importantly, to information derived from this core data that still is hardly used by the common user.

- The FORCOAST team, together with the main beneficiary partner, will identify market opportunities to be opened by these services based on their present experience in delivering similar services fully supported by their users.

- The maintenance of the FORCOAST service after the end of public funding must be guaranteed by the exploitation and the exploiter partners and scaling up of the services by various partners.

3.3.1. Target user groups

A summary of the identified potential users, both internal and external, performed in Deliverable *D2.1 - Stakeholders interests and needs by sector and pilot site*, is present in Table 2, Table 3 and Table 4.

Wild Fisheries

P	Location	INTERNAL USERS		EXTERNAL USERS
		Intermediate	Final	
2	Bay of Biscay	AZTI (Research) Marine Instruments (SME)	-	Purse Seine fleet
3	Black Sea	Terrasigna (SME) USOF (Research)	-	Bulgarian Fisheries companies

Table 3. Potential users identified in the wild fishery sector.

Bivalve Mariculture

P	Location	INTERNAL USERS		EXTERNAL USERS
		Intermediate	Final	
1	Atlantic	IST (Research)	ExporSado (SME, Oyster farmer)	APA (Portuguese Association of Aquaculture, https://www.facebook.com/Associação-Portuguesa-de-Aquacultores-673407849366733/)
4	Southern North Sea	ILVO , RBINS (Research)	Brevisco (SME, Nearshore aquaculture and fishing)	Colruyt group (https://www.colruytgroup.com) UGENT (https://www.ugent.be/en) Jan de Nul Group - Offshore Renewables (www.jandenul.com) DEME (www.deme-group.com) + Dutch, UK and North of France equivalent At sea nova
6	Limfjorden	DMI, AU (Research)	Oyster boat (SME, Oyster production)	Jeka Group, Havnen (https://jeka-group.com/contact/) Vilsund Blue (Blue mussel fishing) https://vilsund.com/en/
7	Black Sea	ULiege, NIMRD (Research) Jailoo (SME)	-	SC MARICULTURA SRL
8	Adriatic Sea	CNR, OGS (Research)	-	AMA - Associazione Mediterranea Acquacoltori (www.a-m-a.it)
5	Galway Bay	Marine Institute (Research)	Cuan Beo (SME, Restoration)	Irish Native Oyster Fisheries Forum (INOFF) (No Website - organization coordinated by Bord Iascaigh na Mhara) Irish Packer's Group (No Website - organization coordinated by Bord Iascaigh na Mhara) Irish Farmers Association Aquaculture https://www.ifa.ie/sectors/aquaculture/ Marine Spatial Planning Unit (Dept of Housing) https://www.housing.gov.ie/planning/maritime-spatial-planning/maritime-spatial-planning-directive/maritime-spatial-planning Bord Iascaigh na Mhara http://www.bim.ie/about-us/contact-us/galway/ Sea Fisheries Protection Authority https://www.sfpa.ie/ Inland Fisheries Ireland https://www.fisheriesireland.ie/ National University of Ireland Galway

Table 4. Potential users identified in the bivalve aquaculture sector.

Oysterground Restoration

P	Location	INTERNAL USERS		EXTERNAL USERS
		Intermediate	Final	
5	Galway Bay	Marine Institute (Research)	Cuan Beo – SME (Restoration)	Irish native Oyster Fisheries Forum (INOFF) Native Oyster network https://nativeoysternetwork.org/ Native Oyster Restoration Alliance (NORA) https://noraeurope.eu/

Table 5. Potential users identified in the oysterground restoration sector.

Other identified potential users in other sectors are:

- Maritime safety (e.g.: SAR operators, coastguard, oil spill response managers, maritime emergency managers, Navy, national and local security agencies, etc.).
- Water pollution management (e.g.: Local authorities, European Marine Strategy Framework Directive - MSFD).
- Offshore energy (e.g.: Energy company managers, Environmental Impact Assessments).
- Tourism & recreational activities (e.g.: recreational sailing, sports sailing/regattas, surfing, diving, NGOs, general population).
- Coastal protection management (e.g.: government environmental agencies, beach and coastal planners, etc.).
- Ports & shipping (e.g.: port managers, port pilots, ferry companies/captains, shipping companies/captains, cruise companies/captains).
- Sustainable Marine Living Resources (e.g.: fisheries managers, fisheries scientists, commercial fishermen, recreational fishermen, sustainability managers, HABs).
- Weather & climate (e.g.: Weather Forecast Centres).
- Basic and applied research in coastal oceanography (e.g.: academia, private research organizations, NGOs).
- Legislative entities (e.g.: governments and their departments, national and international organizations).

3.3.2. Specification of users' needs

To define a true market plan, it is essential to analyse the needs of the FORCOAST project's target group, in order to define the implementation of the product that might be necessary to answer the end-users' expectations.

From the beginning of the project, the partners within each pilot have worked together identifying the information which is most relevant to each activity, improving their algorithms and protocols.

All these activities within the FORCOAST project are creating services that users and potential customers will benefit from. Data providers, who will receive real-time in situ feedback from the sites these activities take place in, will also benefit from the project (Figure 3). This extended feedback loop represents the backbone of the project and the services that will be commercialized after its completion.
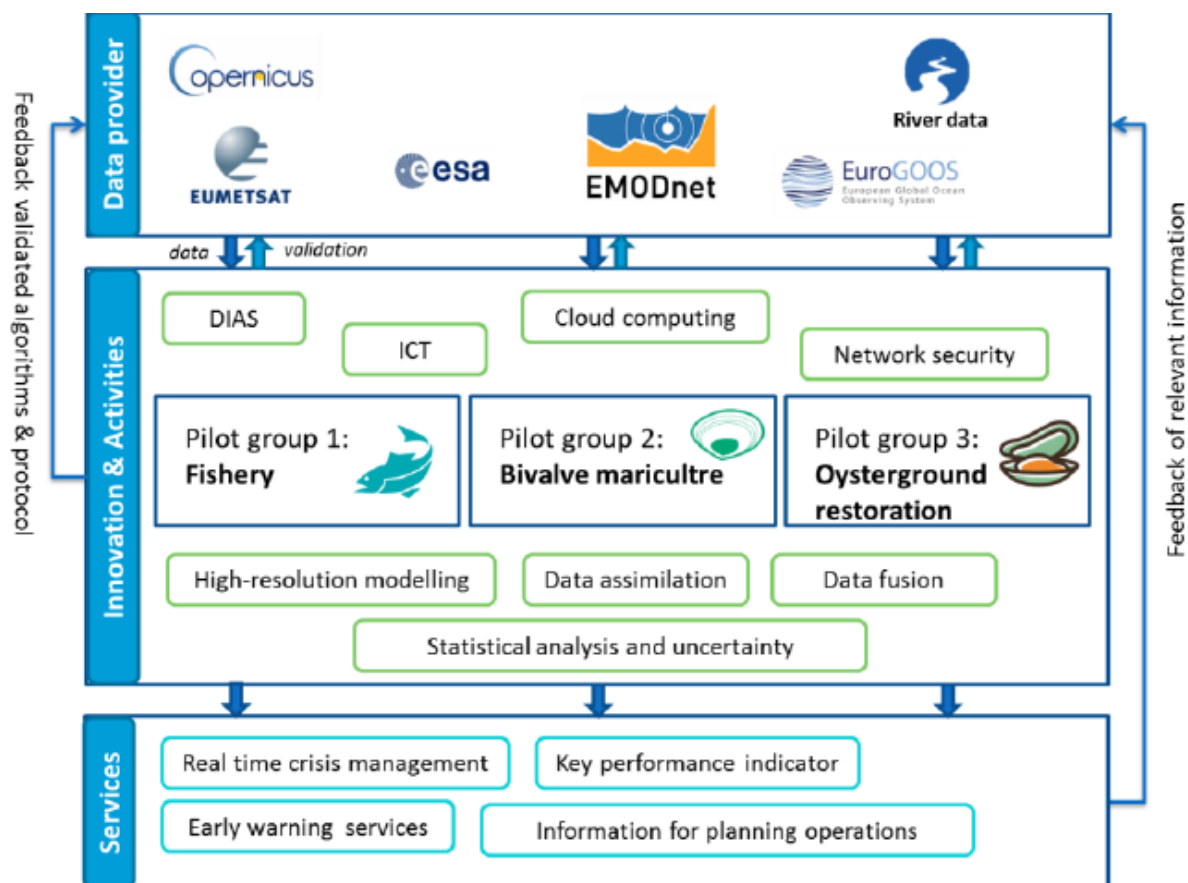
Figure 3. The use of existing data and models in Service Modules for the benefit of the end-user.

To ensure effective exploitation, the potential beneficiaries will keep on being updated and informed through the FORCOAST dissemination process.

Relevant markets and core business cases have been identified in the aforementioned deliverables together with Deliverable *D6.3 Initial Business Plan*, which are being further developed until the end of the project, and the acceptance and take-up of the results of the project will be strengthened through our Stakeholder Advisory Board.

3.3.3. Competitors and SWOT analysis

A market analysis of the main existing services and tools on the market must be performed, to understand the positioning of FORCOAST, and to assess which elements must be implemented to respond to the market needs.

In the same logic, an in-depth analysis of the strengths, weaknesses, opportunities and threats involved in FORCOAST must be conducted, to identify where the product stands and what is its real potential. The SWOT analysis involves specifying the objectives of the project and identifying the internal and external factors that are favourable or unfavourable to achieve its goals. The identification of these elements is key for planning later steps in order to reach the project objectives.

Being aware of the strengths of the project allows for fostering an advantage over others, and knowing its weaknesses can lead to act in order to minimize their effects. It is a tool that provides great insights and allows taking correct business decisions and strategies.

The initial SWOT analysis of FORCOAST services (Figure 4) was carried out during the drafting of the project and is reflected in the Grant Agreement.

Strengthens	Opportunities
- High resolution information; - Integration of existing knowledge by using Copernicus Marine Services; - Sustainable data provision; - Cost effectiveness of data provision; - Targeting the demand of the market; - Highly motivated and skilled consortium.	- Creating sustainable business and job opportunities; - Provide value to existing EU programs and projects; - Use and dissemination of Copernicus Marine services; - Contribute to sustainable fishery and oyster restoration activities.
Weaknesses	**Threats**
- *FORCOAST* service is partially dependent on satellite data availability and its continuity.	- Entities perform similar service; - Sustainability of existing services used in the supply chain platform; - Trust in new services by the end-users.

Figure 4. Initial SWOT analysis.

3.4. Concrete exploitation strategy

A go-to market plan will describe the basic 4P approach of Product, Price, Place, and Promotion [1]. It will however design also a detailed way in order to raise awareness for the innovation that has to be marketed. To proceed towards a concrete exploitation strategy, a go-to market strategy will be drafted to address the best ways to penetrate the market and it will set the different phases, iterations and milestones that will help achieve success for that innovation.

Figure 5. The 4P's of Marketing.

To address the exploitation objectives, special attention will be given to the development of a solid business strategy, estimating the costs for market deployment (for service modules) and describing the overall business model for how to develop a business from the results of this project.

Once we know who our target customer is, what they are looking for and how our product will meet their needs, we must show the end user what makes our product (service) distinctive, what makes our product different from competitors, what are the features of our product and finally what are the advantages of our product.

3.4.1. Exploitation of the FORCOAST Services

Given the different characteristics of the partners that form the FORCOAST project, it was necessary to identify the role each of them is expected or able to play once the current research phase is over (Table 5).

This is crucial to guarantee the sustainability of the project and the exploitation of the results beyond its end date.

Role -------- Partner	End-User	Data Provision	Platform Exploiting	Advise Support	Others (please specify)	Comments
Deltares				X	Project-based expertise.	Deltares cannot be part of the exploitation after the project completion as a non-profit organization.
EuroGOOS				X	Communication and link to the European Operational Oceanography Community.	EuroGOOS as a non-profit organization cannot be part of the exploitation.
Instituto Superior Tecnico		X	X	X		Exploitation probably through other Instituto Superior Tecnico linked institutions and spin-offs.
Exporsado						
AZTI		X	X	X	Horizontal expertise and links towards different sectors of the blue economy and stakeholders managing marine and coastal resources.	AZTI is mainly a technological and research centre focused on transferring solutions and advising managers and service providers. But we can also provide ourselves services to administrations or companies.
Marine Instruments	X	X	X			Marine Instruments will be both a final user and can exploit the service modules as well as provide data.
University of Sofia		X		X	Communications to Fisheries Sector.	
TERRASIGNA		X	X	X		
Marine Institute		X		X	Can act as the first point of contact for Irish users.	Marine Institute, being a state agency, will not be involved in the exploitation.
Cuan Beo	X				Communication to Oyster Restoration Groups.	
University of Liege		X		X		Restrictions apply to the possibility to get involved in non-research activity. Need to be considered internally, depending on the foreseen final form of FORCOAST. ULiege is a non-profit organisation like Deltares. We cannot commit to providing data after the end of the project without any convention/financial support.
NIMRD				X	Communication to the emerging aquaculture sector.	NIMRD is a public research institute, 100% project-based financed, so we cannot commit to providing data after the end of the project without any convention/financial support.
Jailoo						Jailoo is a private entity specializing in research and operational services, hence continuation after the project end strongly depends on financial conditions.

RBINS	X	X		X	
ILVO	X	X		X	Additional biological parameters on spat.
Brevisco					
DMI		X		X	
Aarhus University		X		X	
Oyster Boat	X				
CNR		X		X	
OGS		X		X	

Table 6. FORCOAST partners and their role in the exploitation of the Service Modules.

3.4.2. Exploitation of the Service Modules

In order to come to a comprehensive project exploitation strategy, it is necessary to:

1. Define what the Service Modules are, so that the potential customers know how they can be useful for their business (Section 3.1. FORCOAST Service Modules).
2. Define how the Service Modules will be exploited, i.e., the exploitation possibilities will be explored both in terms of individual exploitation by individual partners and by the consortium as a whole. This step will be carried out throughout the lifetime of the project.
3. Define what steps need to be taken to protect and exploit the Service Modules.
4. Define how the Service Modules evolve and become more precise and substantial during the project, and in our case also after the end of the project. The follow-up exploitation strategy deliverable (*D6.6 – Final Exploitation Strategy*) will also contain a roadmap to Technology Readiness Level (TRL).

3.4.3. Pricing strategies

Three major pricing strategies, namely value-based pricing, cost-based pricing and competition-based pricing can be distinguished. As implied by its name, each pricing strategy has its particular focus:

- Value-based pricing: A pricing method based on the perceived worth of the good or service to its intended customers.
- Cost-based pricing: A pricing method in which a fixed sum or a percentage of the total cost is added (as income or profit) to the cost of the product to determine its selling price.
- Competition-based pricing: A pricing method in which a seller uses prices of competing products as a benchmark instead of considering their own costs or customer demand.

Taking into account the study carried out in Task 6.2 (Business plan), in which the revenue streams by customer segment are defined, it is suggested to go to the market with a value-based pricing strategy.

The benefits of this strategy can help consolidate the FORCOAST platform among customers, since the price set supports product image, the added value helps increase product sales, and finally, differentiation attracts new customers. In addition, this economic plan translates into benefits such as increased efficiency, satisfaction or stability on the part of the customer. This is key for the FORCOAST platform for its consolidation over time.

The consortium is, however, aware that this strategy has its drawbacks, such as the following:

- Calculations may ignore product costs.
- It might forget about existing competitors.
- It might require great selling techniques.

Therefore, it is very important to highlight that the FORCOAST services can provide added value and contribute to cost savings in each of the sectors studied in the scope of this project. In this way, the price of the different products could be adjusted annually to be closer to the cost of their production once the customer loyalty has been gained.

When setting a final price, we must bear in mind that most of the models used to create the final products are available to everyone free of charge. On the other hand, FORCOAST facilitates access via the platform to specific data and tailor-made products. This creates a problem upon deciding a final price. The final product needs to be wanted by the customer, while a need is created in the final client. Keeping this in mind, and following the value-based pricing strategy, the price of the end product must be competitive in a market when there is an open and easily accessible flow of data.

Once further information about the market situation is obtained from the WP6 partners, a more precise picture of the pricing strategy will emerge. As a first approximation, an initial exploitation plan is presented in which each service has a monthly fixed fee and an additional assessment fee upon demand for additional information or more expert advice.

Figure 6 shows an example of the different services provided by the project. In this case, each service has a monthly fee of 100€, and a further 25€ for an optional weekly report delivered by an expert involved in that service. Depending on the number of users that as a group hire one of these services, a wholesale price may be considered with a small discount and other benefits included.

However, the fee for each of the services does not necessarily have to be the same in all cases. Some services will be more generic than others, so it is assumed that the number of customers will vary and therefore the fees for making the service profitable will be different.
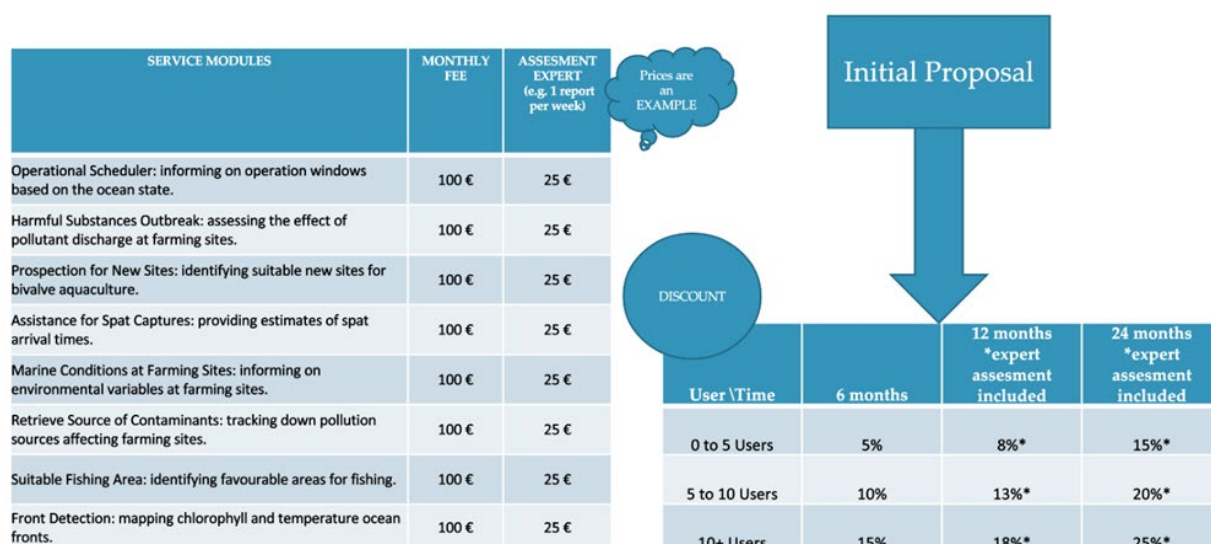

Figure 6. Example of pricing strategy for the different Service Modules. The final price depends on the number of end-users.

Upon analysis and still to be decided, perhaps a free trial period should be included or a minimum amount of information should be free, following the example of several successful online meteorology platforms.

Price should also be managed in number of subscriptions and a contract agreed for a set duration, such as 12 or 24 months. In any case, neither permanence nor churn rates are contemplated when hiring the service, in order to gain customer loyalty.

This strategy will depend on the conclusions reached after a thorough analysis of the market in each activity area.

Based on FORCOAST Deliverable D6.3 results, there appears to be a high number of clients in the overall market, yet these clients are limited and upon all not willing to pay high amounts for services as their daily working costs are already elevated, above market prices. It is therefore for this reason why a low price has been set up for the initial plan, even bearing in mind that this pricing does not fully match the likely costs of the services, including expertise and validation costs. These assumptions and calculations are alarming with costs versus price versus clients yet the only viable way to enter and add value to the product and market is entering via a low-price strategy.

Example of pricing strategy

To get an idea of how to develop the different exploitation plans, we take as an example an oyster farm, which would correspond to pilot number 4, North Sea, Belgium.

From previous projects, Value@Sea and SYMAPA [2], in which one of the FORCOAST partners has been involved in, we already know that an oyster farmer needs to go frequently to their culture site for maintenance and harvesting.

From the same source, it is known that one boat trip costs 2500€/day. Some days, they go out on their boat to the farm site, as planned. But it can happen that upon arrival at the farm site, they cannot perform the necessary actions. In some cases, another trip could be planned; in other cases, there are additional losses due to failure in maintenance or harvesting (Figure 7). These extra costs the oyster farmer would sustain, would have been avoided with a service that had warned them in advance about when to visit his farm, saving them valuable time and money.

In this example, we could use a pricing strategy, whereby each forecasting service has a monthly fee of 100€, and another 25€ for a weekly report delivered by an expert involved in that service. If we apply this pricing strategy to our oyster farmer, they could save a substantial amount of money, around 32500€.

	Planned boat trips	Bad boat trips	Additional losses
January	0		
February	1		4000 Euro due to loss gear
March	2		
April	4		
May	4		2000 Euro due to suffication oysters
June	2		
July	2		
August	3		
September	4		
October	2		6000 Euro due to loss gear
November	2		
December	2		20000 Euro due to loss client
Total		**5x 2500 Euro**	**32000 Euro**
			44500 Euro

Figure 7. Example of losses made by an oyster farmer due to failure in performing the necessary maintenance and harvesting activities. Source: project Value@Sea and project SYMAPA [2].

3.5. Sustainable Services

After the end of EU funding, sustainability will depend on the further commercial success of the service. For this purpose, the following key components will already be addressed within the period of the project:

- Dissemination activities defined in the Marketing and Communication Plan in WP7, which shall be market oriented and have a high degree of professionalism.
- Businesses plan (WP6), which will determine the project's progress. Every action or process, such as algorithmic modules or data infrastructure, is analysed in the context of the value proposition.
- There is an initial agreement among the partners to maintain their part of the service after the project lifetime. Nevertheless, within WP6 this aspect will be further addressed in detail and fully specified in *D6.6 – Final Exploitation Strategy* as part of WP6, the front-end, back end, licenses, IPRs and collaboration agreements are being defined.

As indicated in the previous section, an IPR agreement is being drafted at the moment among providers, partially based on the DoA background IP and extended to the limited foreground IP (FORCOAST platform / Service Modules). This will be part of this document as an attachment in its final form.

4.   Conclusions

This deliverable mainly aims to define guidelines to deliver the future exploitation and business strategy. The main in-depth work for outlining the business strategy will come after the eight pilots' first results, as we will have tangible data from the market in order to draft the best road for success.

The diverse nature of the sectors the FORCOAST project is involved in, makes it necessary to adjust its exploitation plan to each of them. Grouping the partners by Service Module has allowed the project to identify synergies, which means lower costs and greater transfer of knowledge among the partners involved in each of them.

A preliminary analysis allowed the project to identify end-users, both in the public and the private sectors. Further analysis of the market in each Service Module must be carried out to determine what further steps should be taken to awaken interest among these potential end-users, as well as to find out how much they would value such a service (Final Business Plan). The first steps of this analysis were taken during the Users' Day at the General Assembly in February 2021, in which potential users were invited to give their views about the project so far. A more precise approach within each Service Module is taking place to analyse the exact needs of the potential end-users, which will give the project information about how to make its services more attractive to them.

Of all the partners that conform the project, those involved in the future exploitation of its results were identified (Table 5). Within WP6 these partners (forming an Exploitation Group) will work together to put forward a viable exploitation strategy to be followed after the completion of the project. To this end, periodic meetings will be held where, among other topics, the partners involved will discuss what is the feedback from potential clients, what is the minimum cost that the services developed in the project should have, etc.

In addition, regular workshops will be organised with potential customers to present the services to them and to get their feedback both on the suitability of the services and to ask them whether they would use FORCOAST services and at what price. These workshops will also help the consortium to adjust its pricing strategy towards the end of the project in a way that ensures the economic sustainability of the project.

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5. References

[1] "The Marketing Mix and the 4Ps of Marketing" – MindTools, on https://www.mindtools.com/pages/article/newSTR_94.htm, accessed 13/04/2022

[2] "Aquaculture at sea" on https://ilvo.vlaanderen.be/en/dossiers/aquaculture-at-sea, accessed 13/04/2022

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