Sustainability of Coastal Ocean Services

Co-chairs: Muriel Lux, Audrey Hasson
(Mercator Ocean International, GEO Blue Planet EU Office)

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European Commission

Sustainability of Coastal Ocean Services

The session aims at understanding the need for sustained Coastal Services from the Copernicus Marine Service to national and private service providers in Europe and globally.

- Give an overview of some key European service providers,
- Discuss their contribution at the local, national and regional levels,
- Provide guidance for the programme of an upcoming workshop.

House Keeping rules :

- The floor will be open to questions at the end of all presentations during the round table
- Speakers: please keep your presentation in time so we have time for questions – Muriel will raise her hand when you need to wrap up. thx

Sustainability of Coastal Ocean Services

Copernicus Marine service, Copernicus Coastal hub and the Marine Forum
A sustainable EU solution:
Muriel Lux *(Mercator Ocean International, France)*
A member state vision:
Andrea Taramelli *(ISPRA-Copernicus User Forum, Italy)*

Detecting and forecasting Sargassum
Marion Sutton *(CLS, France)*

NextOcean: Next Generation Fishing and Aquaculture Services
Pedro Robeiro *(DEIMOS, Portugal)*

Providing early warning system for coastal pollution - CANCELLED
Ghada El Serafy *(Deltares, The Netherlands)*

Round table discussion
Guided, then open to the floor

Overview of the Copernicus Marine service, The National Collaboration Programme, The Marine Forum The Copernicus Coastal Thematic hub

The Copernicus Marine service : a sustainable service in support to Coastal services.

Muriel Lux, Mercator Ocean Intl

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EUROGEO WORKSHOP 2023

Overview of the Copernicus Marine service,

The National Collaboration Programme,

The Marine Forum

The Copernicus Coastal Thematic hub

The Copernicus Marine service : a sustainable service in support to Coastal services.

BOLZANO 2-4 OCTOBER 2023

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« The Ocean », according to **marine.copernicus.eu**

Satellite, in situ observations and 3D models for Essential Ocean Variables, translated by experts into verified data, indicators, reports and training sessions, seen by 700,000 users worldwide/year, and integrated as regular information by more than 55 000 subscribers.

PROGRAMME OF THE EUROPEAN UNION
Copernicus Europe's eyes on Earth
implemented by MERCATOR OCEAN INTERNATIONAL

Copernicus Marine service in brief

Global and Regional Ocean Monitoring and Forecasting

COPERNICUS MARINE REGIONAL OCEAN PRODUCT DIVISIONS

1. Global Ocean
2. Arctic Ocean
3. Baltic Sea
4. European North West Shelf Seas
5. Iberian Biscay Ireland Seas
6. Mediterranean Sea
7. Black Sea

MULTI-YEAR 10 to 45 years › **REAL-TIME** Daily, hourly › **FORECAST** 2 to 10 days

ESSENTIAL MARINE VARIABLES

BLUE OCEAN	WHITE OCEAN	GREEN OCEAN
Physics	Sea Ice	Biogeochemistry

OBSERVATIONS In-situ & satellites › **NUMERICAL MODELS** & data assimilation

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Working with **the Copernicus Space and In-Situ components**

- Preparing for expansion missions (in particular Arctic Ocean).
- Supporting the EC for New Generation Sentinel mission design
- Working with EEA, EuroGOOS, EOOS to strengthen in-situ coordination and development of in-situ observing system.

Copernicus Marine service in brief

Copernicus Marine Offer : Observation and Model products

- Observation products
- Model products (data assimilation)
- Access to products: A cloud-based infrastructure (Marine Data Store)
- Description of each product
- Information on quality
- Service desk / expert advice

Extensive use of Sentinel data (S1, S2, S3 and S6) and contributing missions

PROGRAMME OF THE EUROPEAN UNION
Copernicus
implemented by MERCATOR OCEAN INTERNATIONAL

Copernicus Marine service in brief

2021 - 2028 : An ambition plan aligned with the EU Green Deal and Digital Strategies to remain a marine reference worldwide and to foster User Uptake

- **Sustainability of the service** with incremental evolution driven by user and policy needs.
- User and Policy needs: KCEO, Regional Sea Conventions, EEA, EUSPA
- Reinforced governance (Member States): **Marine Forum**
- Start coastal extension of the service with Member States
- Synergies with the other Copernicus services and EMODnet: **Thematic hubs**
- Embrace the **new capabilities of digital services** in synergy with **Digital Twin Ocean** and Destination Earth initiatives.
- Prepare post-2024 evolutions through our **Service Evolution innovation activities** and H2020 and Horizon Europe programmes
- Integration in the UN Decade of Ocean Science

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Overview of the Copernicus Marine service,

The National Collaboration Programme,

The Marine Forum

The Copernicus Coastal Thematic hub

The Copernicus Marine service : a sustainable service in support to Coastal services.

National Collaboration Programme

CONTEXT

- Need to better support EU Member and Contributing States activities
- Need to improve Copernicus Marine data uptake **at national level**
- Need to develop joint work between Copernicus Marine and EU Member and Collaborative States
- Need to better understand each national context and expectations from EU Member and Collaborative States

A NEW PAN-EUROPEAN INTEGRATED SERVICE FOR THE COASTAL OCEAN

- **IMPROVED COASTAL ZONE MONITORING:** New satellite products. Synergies with EMODnet. Provision of standardized modelled river discharges (freshwater, nutrients, particulate and dissolved matter).
- **CO-DESIGN/CO-PRODUCTION WITH MEMBER STATES :**
  - Interfaces between Copernicus Marine and a series of **Coastal models operated by member states**.
  - Integration of Coastal model derived information in Marine portfolio.

National Collaboration Programme

FOCUS ON EU MEMBER AND CONTRIBUTING STATES (27 MS + 2 CS)

3 OBJECTIVES

1. Reinforce downscaling collaboration with **national marine COASTAL** monitoring activities
2. Support EU Member and Collaborating States with the implementation of EU environmental Policies and Directives
3. Support transnational collaboration for COASTAL monitoring activities

2 IMPLEMENTATION PHASES

PHASE1: 2023-2024 - 1.5M€ -
Projects started in July 2023

PHASE2: 2025 - mid 2028 - 4.5M€

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NATIONAL MARINE STAKEHOLDER FORUM

- A consultative instance created in November 2022

- Objectives of the **Marine Forum**:
  - Foster deeper interactions with Member and Contributing States (MS) in the marine domain.
  - Contribute to a better integration of the Copernicus Marine Service with MS expectations and assets.
  - Co-design and implement actions with MS in the coastal marine areas.

- **Marine Forum** expected outcomes:
  - Co-design and implement the next Copernicus Coastal Marine Service
  - Co-design and implement actions with Copernicus MS for marine policies
  - Help to improve propositions to the Copernicus User Forum and Space Programme Committee.

NATIONAL MARINE STAKEHOLDER FORUM

- **17 EU Member and Contributing States** are now represented at the **Marine Forum**

- 2 meetings per year

contact: marineforum@mercator-ocean.eu

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Copernicus Europe's eyes on Earth
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COPERNICUS COASTAL THEMATIC HUB

- A DG DEFIS initiative to enable new and existing users to take advantage of the **full Copernicus offer**.
- Mercator Ocean is the entrusted entity for the implementation of the **Coastal Hub**

A new web portal, www.coastal.hub.copernicus.eu

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Copernicus
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COPERNICUS COASTAL THEMATIC HUB

Overall objectives

Facilitate the access to data and enable both new and existing users to take advantage of Copernicus.

- Help implement EU policies
- Facilitate the use of Copernicus at national to local scale;
- Cross-fertilize between Copernicus Services;
- Facilitate the thematic collection of needs and gaps.

• www.coastal.hub.copernicus.eu

COPERNICUS COASTAL THEMATIC HUB

Coastal HUB

- A transverse **thematic window** across all Copernicus Services and Ground Segments implemented through collaborations with DGDEFIS, all the Entrusted Entities and KCEO
  - A selection of thematic products throughout the Copernicus portfolio
  - A selection of **use cases** throughout the Copernicus use cases
  - A dedicated user support

www.coastal.hub.copernicus.eu

Conclusions

The **Copernicus Marine Service** and its related initiatives is a **sustainable service** implemented to support the development of **sustainable coastal services**

It offers ocean information necessary to feed coastal services (coastal interfaces)

It supports such interfaces through its **National Collaboration Programme** and the related User Engagement calls for tenders

It evolves thanks to its service evolution programme and associted call for tenders

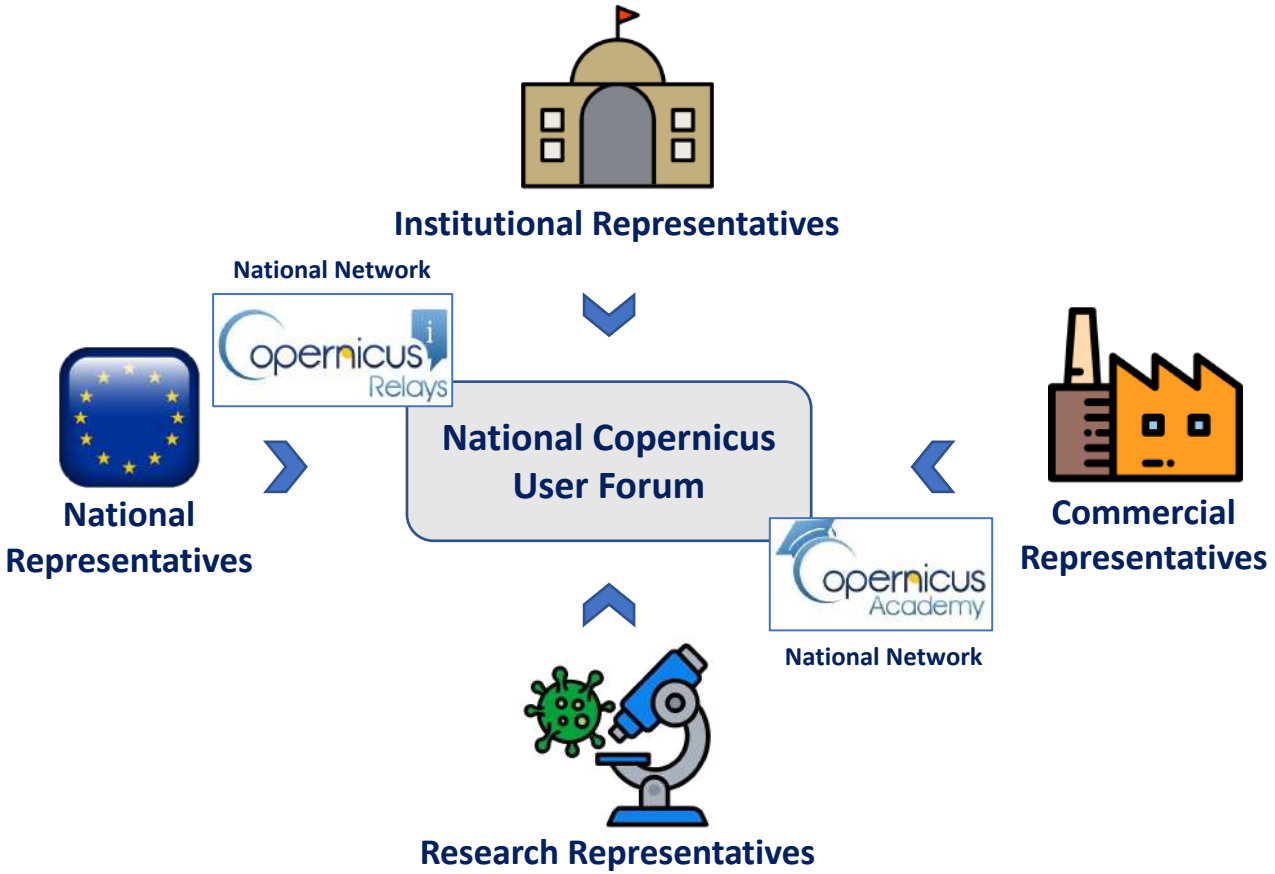
It evolves following a user-driven approach and has enlarged the communities of users to Member States and contributing States in order to **co-design/co-produce the coastal component** of Copernicus with national stakeholders to support the implementation of environmental policies.

Copernicus Marine Service and the Copernicus Coastal Hub: A member state vision

Prof. Andrea Taramelli

Goals

- to **disseminate** information about the ongoing and foreseen activities of Copernicus Bodies;
- to **collect** in coordinate way national **user** communities **needs**, troubles, expectation vs. Copernicus Programme;
- to **stimulate** a qualified, authoritative and coordinated national **uptake** of all Service offered by the Programme;
- to support an **user-driven approach** with respect to **national and European space-based developments**.



Copernicus products for Coastal users

Coastal areas are a key topic for Copernicus that hence drafted a “Roadmap for the evolution of Copernicus Core Service products to better serve coastal users” (MOI and EEA in 2018, under the umbrella of the EU Commission).


Copernicus Environment Monitoring Service

MERCATOR OCEAN

Roadmap for the evolution of Copernicus marine and land services to better serve coastal users

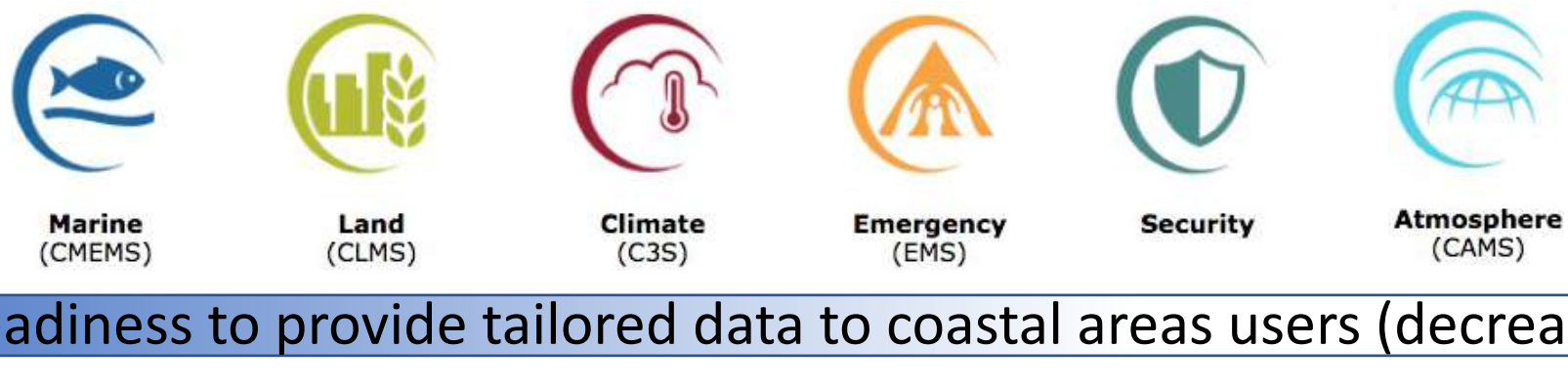
December 5th, 2018

Long term strategy

- **Evolution of products delivered by the Core Services**
- **Sinergy of Core Services**
- **Link with national services**

Copernicus products for Coastal users

Coastal areas topics range from land to seas, including habitat, atmosphere and extreme events. It is a cross-cutting theme with reference to the 6 Copernicus Core Services



Data of interest for users in coastal areas are hence produced (or will be produced) by each Core Service. A «Thematic Hub» devoted to coastal areas is going to be created to gather all the different products together.

Copernicus products for Coastal users

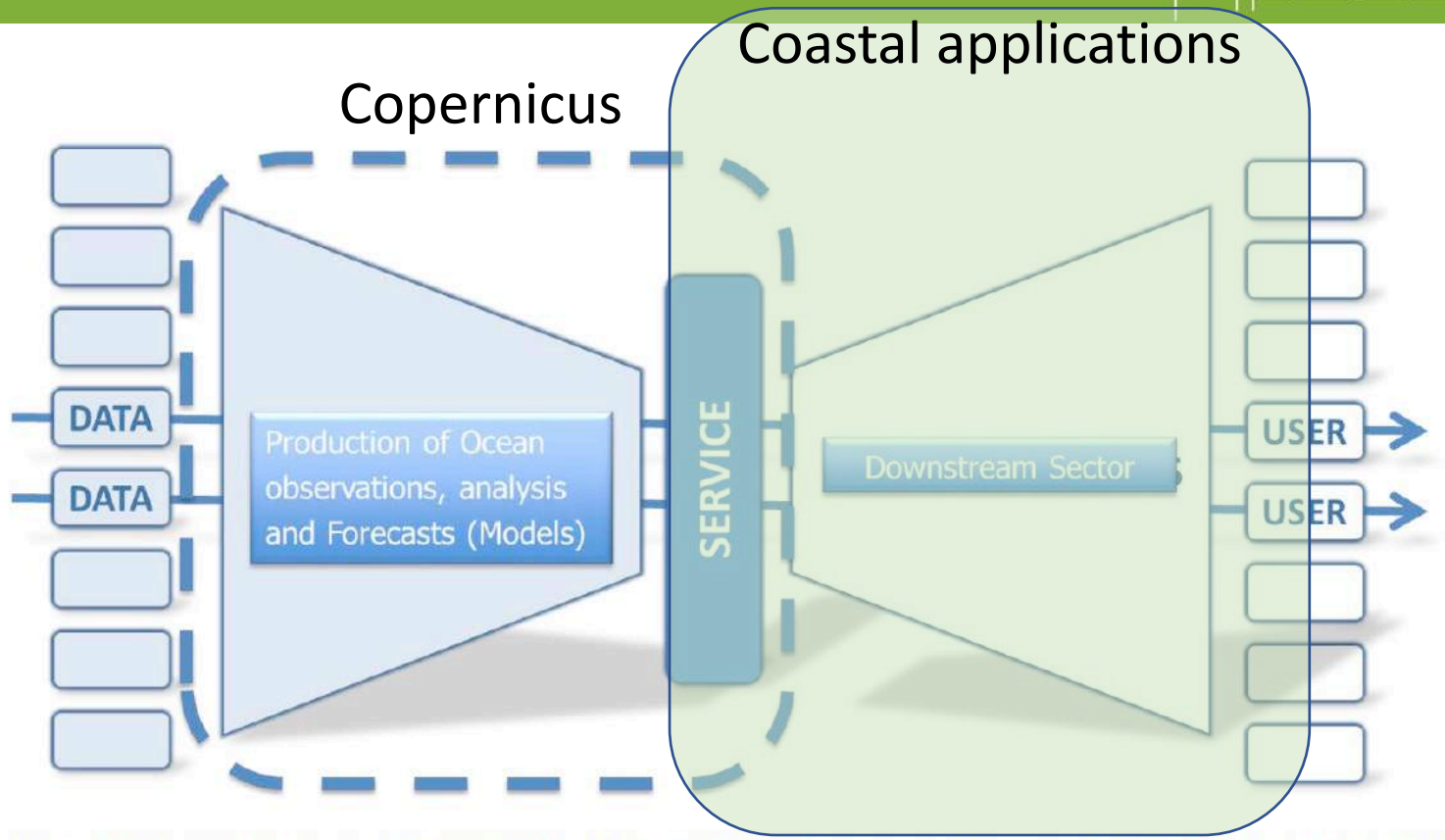
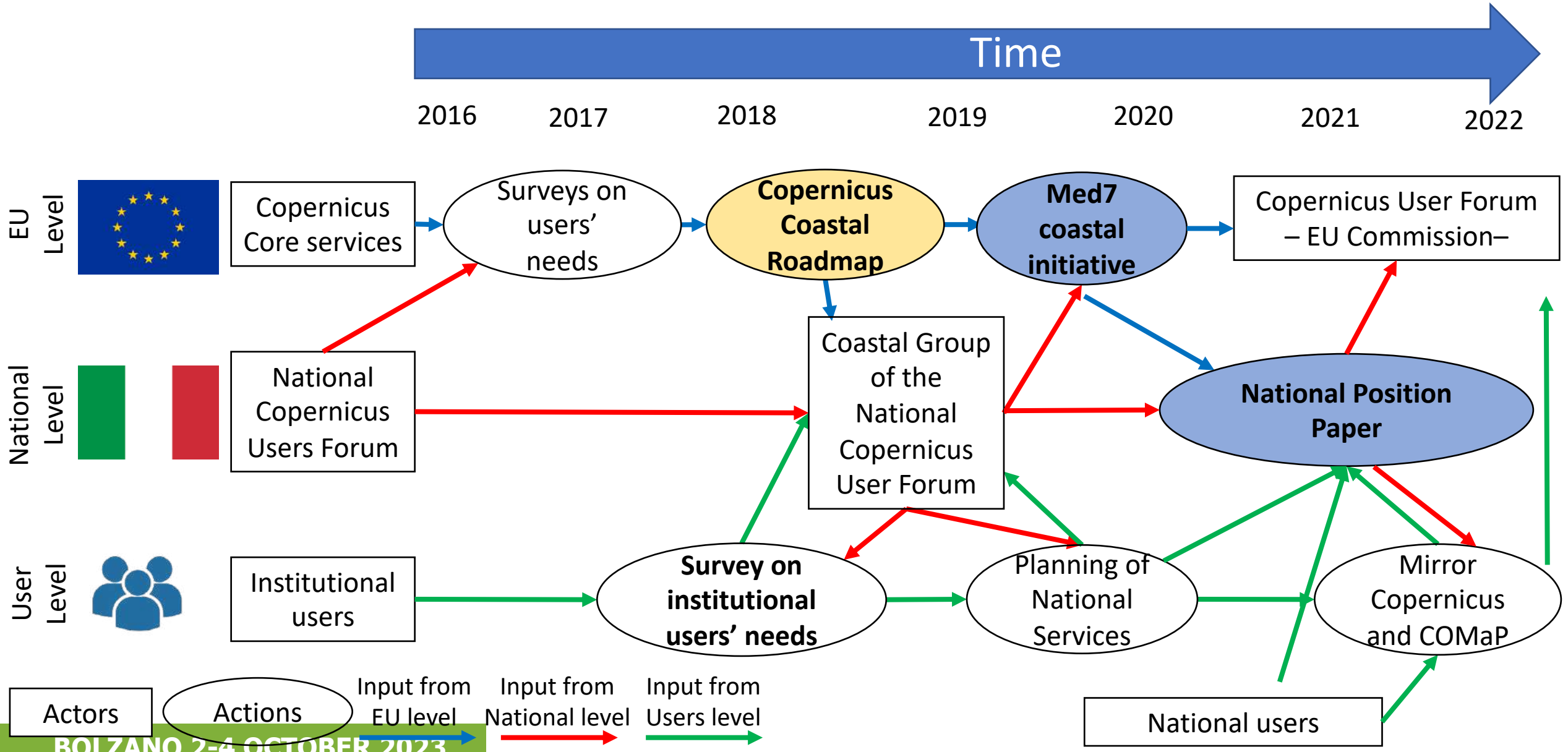


Figure 2. Schematic illustrating the relationship between CMEMS Production and Services (within dashed shape) and (left) the provision of data from observation networks and systems, and (right) users and the downstream sectors.

Coastal applications are mainly left to the “Downstream Sector”, since they generally relay on local data. Copernicus products provide a set of robust, homogenous and operational data and information necessary to provide the general framework for the desired application (e.g. off-shore forcing conditions, land use for costal areas)

Italian RoadMap to sustain Copernicus uptake for delivering products in coastal areas: Actors and Actions



Med7 “Copernicus for Coastal” initiative

COPERNICUS FOR THE BLUE ECONOMY IN THE MEDITERRANEAN SEA AND BEYOND

White Paper | Final | 5 June 2020

Written by:

the Permanent Representations to the European Union of Greece, Spain, France, Italy, Cyprus, Malta and Portugal.

With contributions from:

the European Climate Medium-range Weather Forecast, the European Environment Agency, the Istituto Superiore per la Protezione e la Ricerca Ambientale, Mercator Ocean International

1

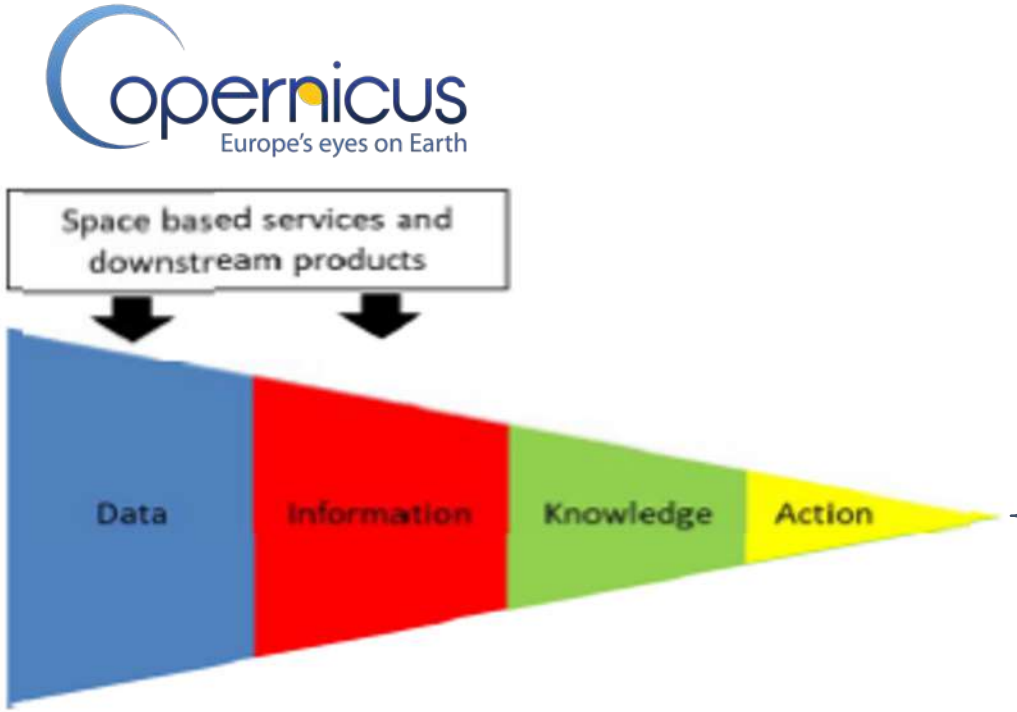
The **white paper “Copernicus for the Blue Economy in the Mediterranean Sea and Beyond”** is the main product of this initiative

- 28th of February 2019: First Med7 meeting to plan this action
- 9th of October 2019: Initiative briefly presented at CUF
- 5th of June 2020: White paper finalised and formally sent to DG DEFIS
- September 2020: extended presentation at CUF
- May 2021 Council of the Europen Union: “Space for people in coastal areas” recall and acknowledge white paper approach

It presents a **concerted and action-oriented approach** to develop further the **relation between Copernicus and Member States’ costal monitoring and managing capacities**, to the benefit of a sustainable and environment-friendly development in the coastal areas.

Med7 “Copernicus for Coastal” initiative

The **white paper** highlights the importance of EO for a **knowledge based approach** in the enforcement of EU **political agendas relevant for coastal areas**



Data and information facilitate the monitoring of coastal areas, including natural phenomena and human activities, supporting decision makers to understand and tackle the environmental challenges

Med7 “Copernicus for Coastal” initiative

Main messages in the white paper (1):

- Sharing coastal data and information for use and re-use to give added value to existing products

Measure once, use many times. Existing data and information should be exploited at maximum, avoiding the production of the same data or information twice under different umbrellas.

- Government – Law A
- Government – Law B
- Research
- Business
- …

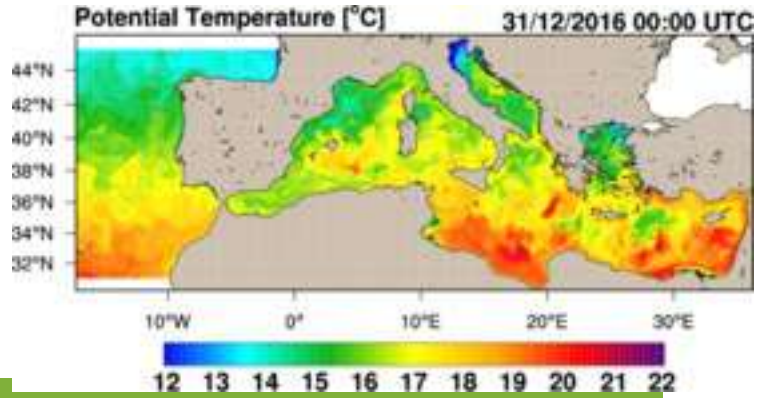
Easy access to data. Data and information should be easy to access. A national access point to coastal data and information would provide a complete picture of the available data

Med7 “Copernicus for Coastal” initiative

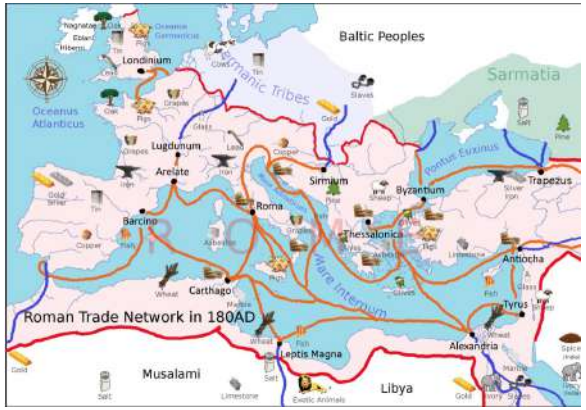
Main messages in the white paper (2):

- 
  Harmonisation of local coastal products across MSs and neighbouring countries

To obtain a homogeneous picture of the whole basin: To help EU Member States in the management of their coastal zones and neighbouring areas and fostering the use of Copernicus and downstream services in non-EU Countries.

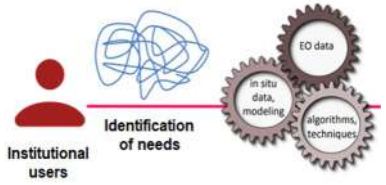


To help the development of commercial initiatives in the basin. The availability of homogeneous products favours the development of the market and attracts large scale investments.



Med7 “Copernicus for Coastal” initiative

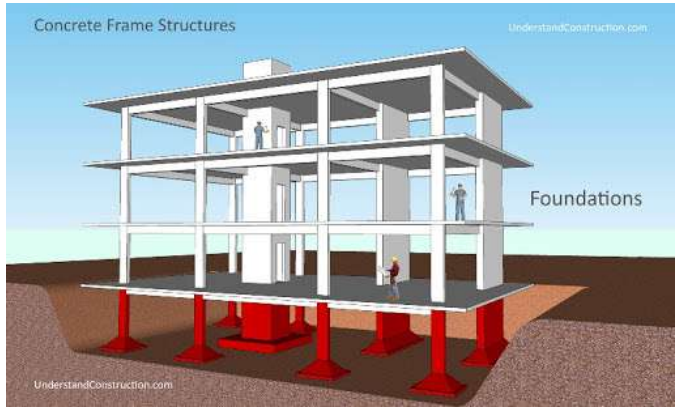
Main messages in the white paper (3):

- 

Identification of user needs starting from the institutional market

To design tailored products: To help EU Member States in the use of EO products for institutional tasks

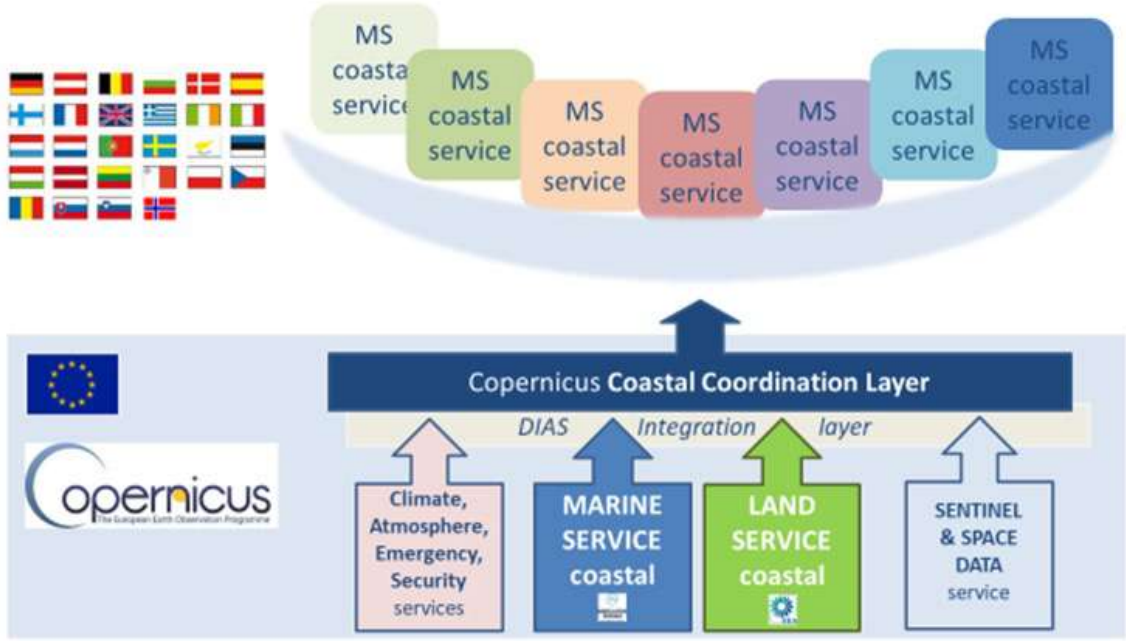
To help the development of commercial downstream products: The institutional market through the **expression of a qualified demand** provides a core set of products and services to favour the profitability of private investments.



Med7 “Copernicus for Coastal” initiative

Call for actions in the white paper
Priority and coordination

- **Set up a Copernicus coastal Thematic hub** to continue the current coordination of marine and land Copernicus Services and extend it to other Core Services (relevant to the coastal issues), and **appropriate interfaces with the national nodes**



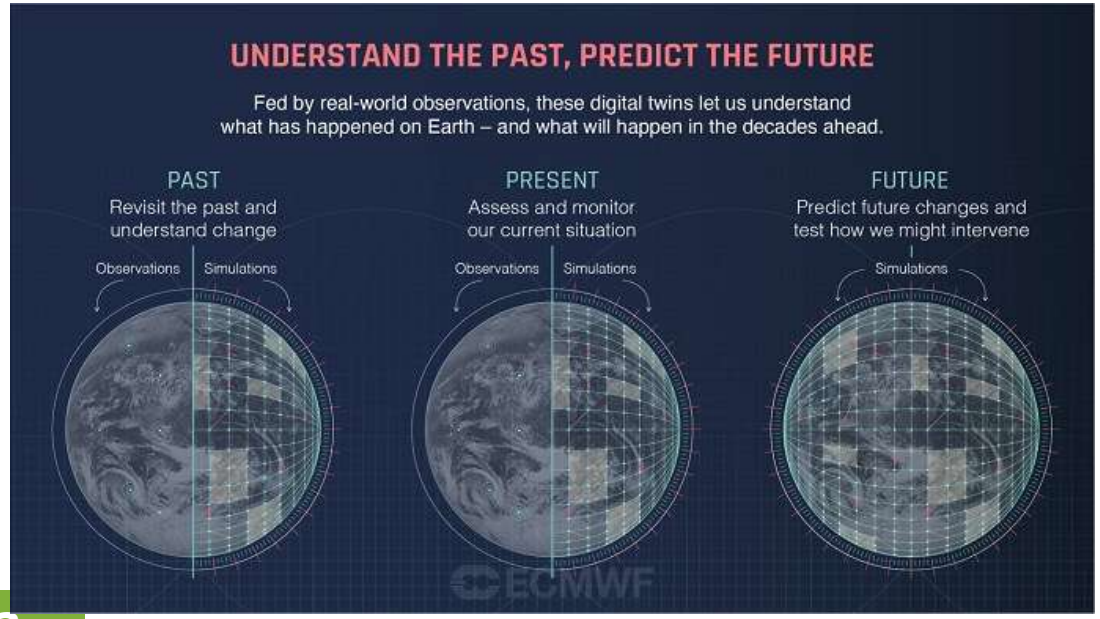
National position paper on coastal areas

MED7 white paper highlights the importance of a **knowledge-based approach** to support a sustainable **Blue Economy**.

Therefore, reliable coastal data and information are central.

This approach is also strongly linked to several **European Union objectives**, such as:

- the development of the **Copernicus** programme
- creating digital twins foreseen in the framework of the **Destination Earth** initiative
- recovery plans implemented in the framework of **Next Generation EU** fostering a knowledge-based economy



National position paper on coastal areas

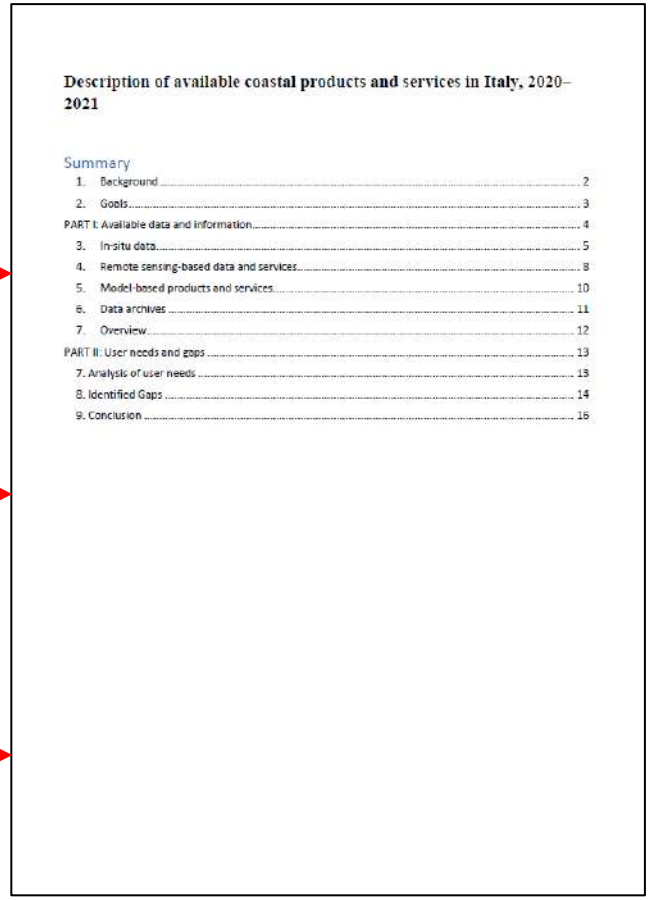
In order to map the state of the art of existing tools and users' needs in Italy, in June 2020, the coastal discussion group of the Italian Copernicus User Forum started an action to draft a position paper.

It is based on 3 ad-hoc surveys aimed at collecting representative data from national actors.

1) Survey aimed at Institutional Users involved in Mirror Copernicus → **Institutions**

2) Survey aimed at participants to the coastal discussion group → **Research**

3) Survey aimed at participants to the Valorization - Industry and Enterprises board of the National User Forum → **Commercial**



Description of available coastal products and services in Italy, 2020–2021

Summary

1. Background ... 2
2. Goals ... 3
PART I: Available data and information ... 4
3. In-situ data ... 5
4. Remote sensing-based data and services ... 8
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PART II: User needs and gaps ... 13
7. Analysis of user needs ... 13
8. Identified Gaps ... 14
9. Conclusion ... 16

Hints about the evolution of Ocean Reports supporting the Enforcement of EU Directives: eg the MSFD

It is important to clearly define roles in implementing MSFD.

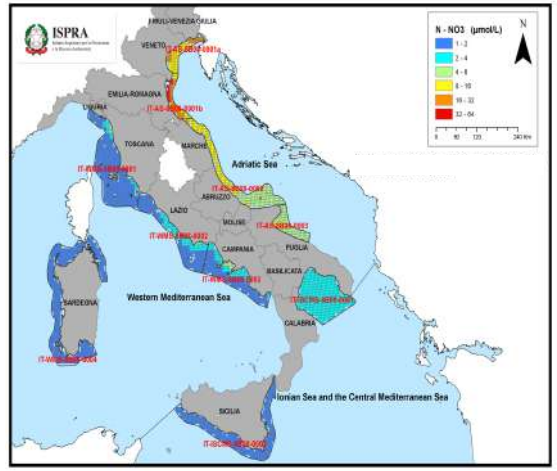
- **CMEMS** and EMODNet have the important role of **providing useful data**
- **Member States** have the responsibility to **select and/or collect data of relevance to enforce MSFD** in their marine waters and specific National Public Bodies have the Institutional task to provide tailored products for MSFD

In the framework of implementing **MSFD**, **Member States** should be hence considered as **Intermediate Users**

Data catalogues collecting data useful for MSFD

General overviews of marine basins features and trend

Processed by ISPRA using CMEMS and national in-situ data



Processed information layers tailored for MSFD

Not so useful

National products

Detecting and forecasting Sargassum

Marion SUTTON, CLS, France

eurac research
Institute of Atmospheric Pollution Research
National Research Council of Italy
European Commission

Since 2011, huge sargassum mass strandings (Sargassum fluitans and Sargassum natans) have occurred in the wider Caribbean region, West African countries and Gulf of Mexico, having **strong societal and environmental impacts**.


Crédit : NBC SARL

Public authorities:

- Mandates in public beach management and public health management
- In charge of cleaning beaches and monitor H2S concentration

Tourism sector:

- Key source of revenue for most countries
- Sargassum ruins the visual aspect of beaches and nuisance for nautical activities

Fisheries :

- Hampered by floating sargassum, especially net fishing
- Fishermen can be trapped in port by Sargassum

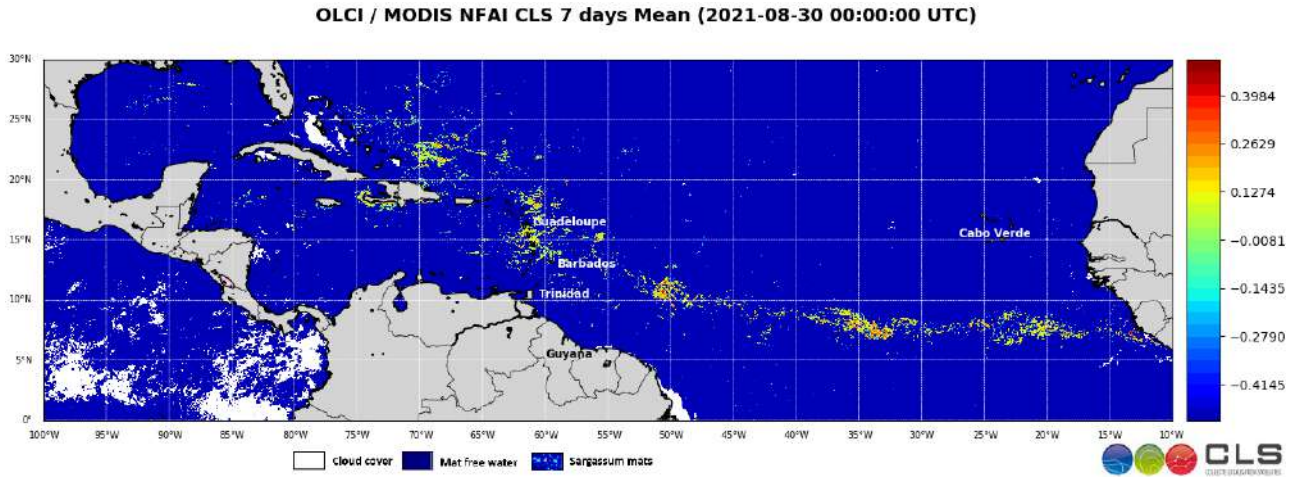
Operations at sea & marine safety:

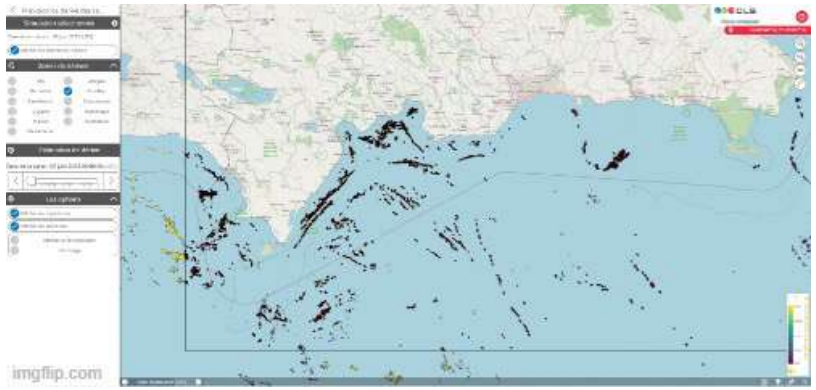
- Seismic surveys stopped by floating sargassum
- Small-size vessels, sailing boats trapped in Sargassum mats

Wildlife protection and valorisation :

- Floating sargassum is a protection for juveniles
- Collection for valorization,

- Need to monitor the situation at Atlantic basin and Islands scales
- Satellite technology and drift models are key tools to help mitigation: anticipate size and timing of influxes to correctly size the responses





2 founding projects

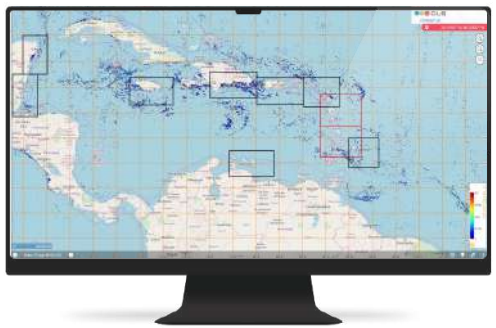
2018-2020

- EO science for society

ESA AO/1-9101/17/I-NB - EOEP-5 BLOCK 4

Valorisation of satellite data to answer a need from society: Development of SAMTool

6 satellite sensors including medium and high resolution



5 days forecast

24/7 operational & scalable service

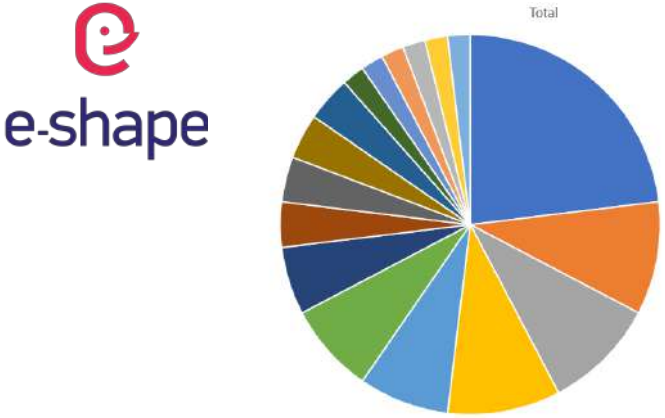
2 founding projects

2019-2023

- E-Shape EUROGEO Showcases

EU Horizon 2020 / GA 820852

Expanding the user community with co-design actions: Scaling up from Operational to Seasonal planning



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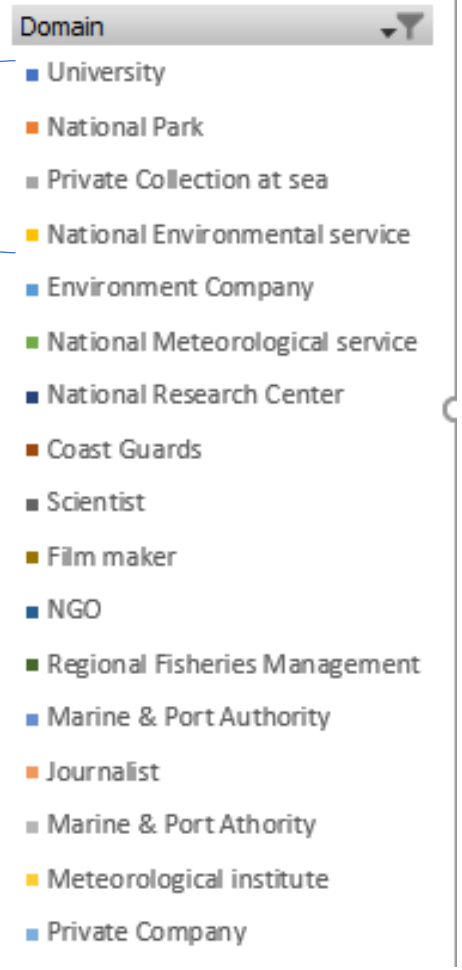


+60 USERS OF THE SYSTEM SINCE 2019 IN +12 COUNTRIES

Consolidation phase

2013-2025

Need to support to International Public Sector by sharing the satellite detection products with the scientific community , sponsored by EU Copernicus Marine Service and CNES

- **SODA:** https://marine.copernicus.eu/about/research-development-projects/2022-2024/soda
  - **Improving Sargassum Operational Detection Algorithms**

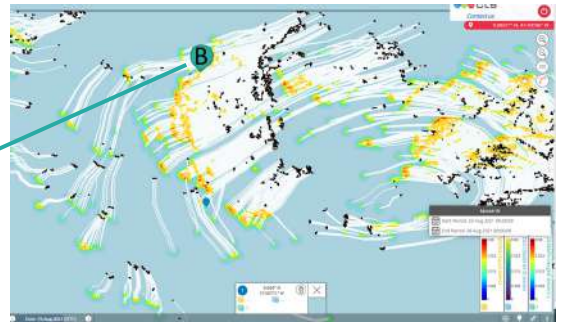
- **SeSAM:** https://www.spaceclimateobservatory.org/sesam
  - **Satellite data will be shared through AVISO, GEO Blue Planet Sargassum Hub**
  - **Seasonal forecast will be produced operationally (IRD &MOI))**

Consolidation phase

2013-2025

Need to support operational actions for sargassum management with SAMTool

- Anticipate sargassum influxes and landings
  - Coastal management & cleaning operations
- Localise sargassum mats at sea
  - Plan for collection operation
- Estimate amount of sargassum for valorisation
  - Support development of private sector



Conclusion & future steps

2025+

- Earth Observation data is a key tool for sargassum monitoring
- Valorizing space date to answer a real need from society
- Need to support the offer for the public & scientific sector through International & European actions (EuroGEO, Copernicus)
- Different needs for the private sector will need different answers

NextOcean: Earth Observation Services for Sustainable Fishing and Aquaculture

Pedro Ribeiro

deimos

NEXT OCEAN
CLEAR INSIGHTS INTO FISHERIES AND AQUACULTURE

eurac research

Institute of Atmospheric Pollution Research
National Research Council of Italy

European Commission

Legacy from e-shape

Deimos led the Water showcase, with 7 pilot applications

- e-shape's co-design framework allowed for including stakeholders needs in the development process and empowering them as 'co-owners' of the result
- Sustainability and communication transversal activities greatly supported different forms of commercial exploitation
- DIAS services limitations were not compatible with operational needs, both in terms of coverage and reliability
- Difficulty in accessing sensitive proprietary data hinders the accuracy and scalability of applications & services

Fishing services developed by Deimos in e-shape were integrated as commercial services within NextOcean

e-shape

e-shape.eu/
helpdesk.e-shape.eu/

4 years - 37 pilots
EU contribution ≈ 15 M€

Showcase 5 - Pilots

Pilot 5.1 | Improved historical water availability & quality information service

Pilot 5.2 | Satellite Earth Observation-derived water bodies & floodwater record over Europe

Pilot 5.3 | Dive - Diver Information on Visibility in Europe

Pilot 5.4 | Sargassum detection for seasonal planning

Pilot 5.5 | Monitoring fishing activity

Pilot 5.6 | EO based phytoplankton biomass for WFD reporting

Pilot 5.7 Rheticus® AquaculturePlus

The e-shape project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 820852

EUROGEO WORKSHOP 2023

Service Providers

deimos IPMA CLS PML Plymouth Marine Laboratory

Technical Integration

deimos TERRAQUE

Business Development

NOVA SCHOOL OF BUSINESS & ECONOMICS

Alpha Users

i2S SINTEF

NEXT OCEAN

CLEAR INSIGHTS INTO FISHERIES AND AQUACULTURE

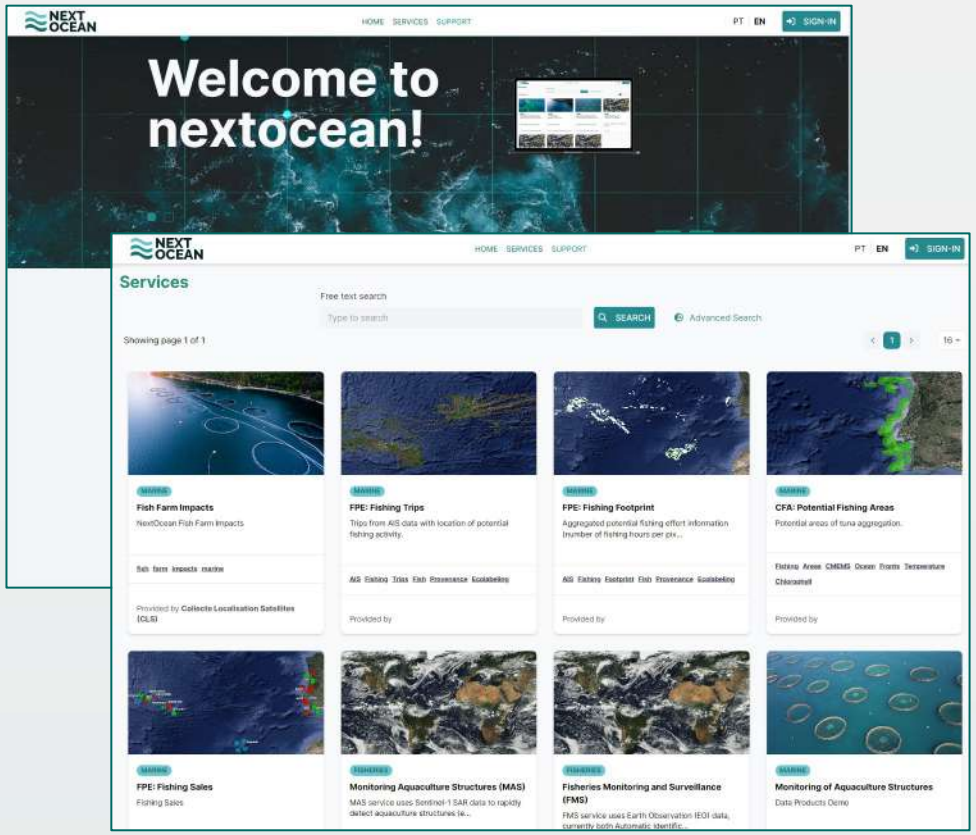
NextOcean is working to co-develop a suite of Earth observation based services for **sustainable fisheries and aquaculture**.

Services will enable valuable insights into the performance and impact of operations to enable informed management decisions

www.NextOcean.eu | @NextOcean_EO | NextOcean-EO

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No.101004362

NextOcean Store & Service Portfolio



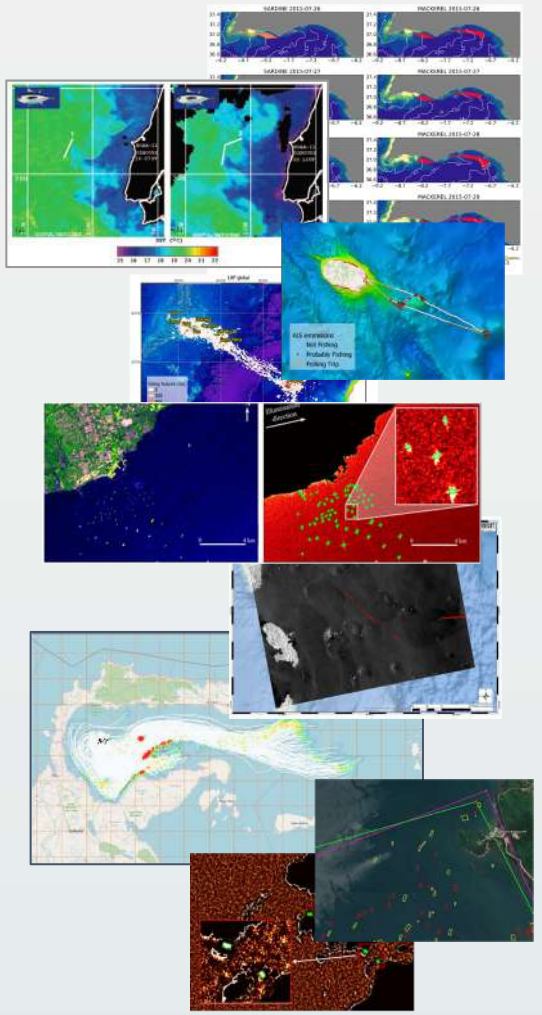
https://nextocean.services4eo.com

Fisheries:

- Characterisation of Fishing Areas
- Fish Provenance and Ecolabeling
- Fisheries Monitoring & Surveillance

Aquaculture:

- Monitoring of Aquaculture Structures
- Site Risk Assessment
- Fish Farm Impacts



Value proposition

For the **consumers:**

A user-friendly one-stop-shop for quick access to a range of accurate, high resolution, up-to-date and competitively priced individual and bundled EO services with proven success in fishing and aquaculture.

For the **service providers**:

To provide a simple, automated platform, with low operating and sales costs, for selling individual or bundled EO services in fishing and aquaculture, reaching new customers globally.

Key Methods & Tools

Co-design with users

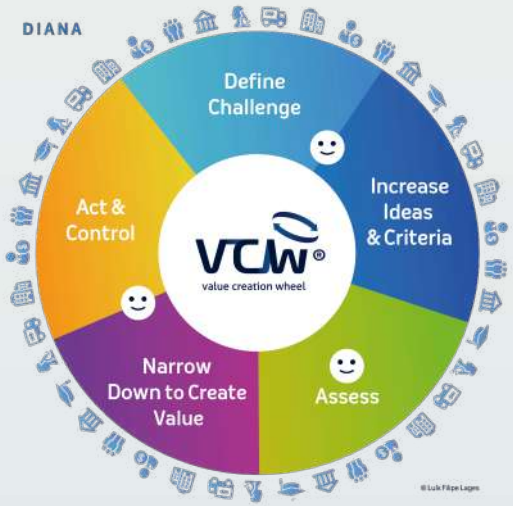
EO exploitation platforms

ELLIP
Collaborative Earth Science Services

+

services4EO
Powering Earth observation services

Value Creation Wheel



Main challenges

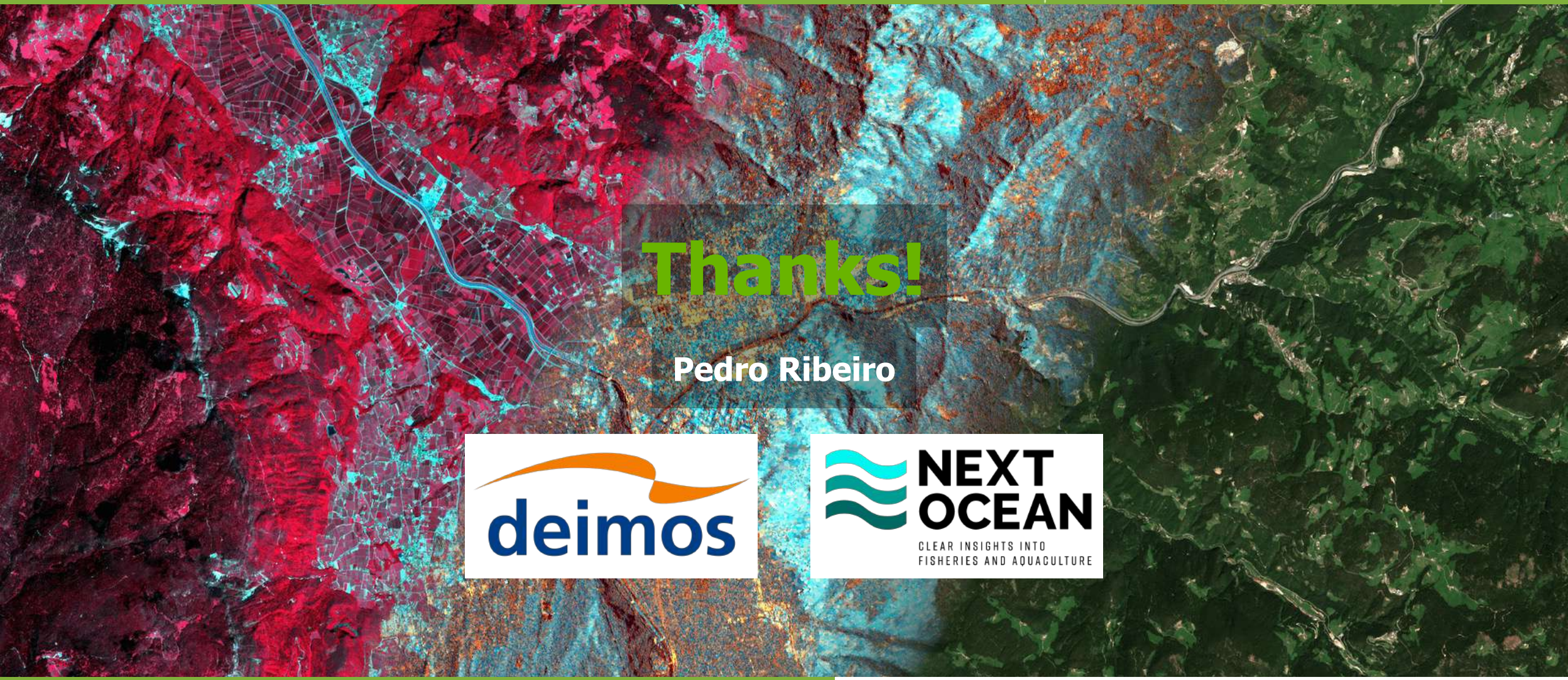
- Technical framework
  - EO limitations (resolution, revisit time)
  - 24/7 operations in cloud infrastructure
  - help desk support

Main challenges

- Technical framework
- Define business model and refine value proposition
  - target customers
  - legal framework
  - cost & pricing models

Main challenges

- Technical framework
- Define business model and refine value proposition
- Bridge the “gap” between potential buyers and service providers
  - use cases definition
  - co-design methods
  - market segmentation & funding options
  - service customisation



Thanks!

Pedro Ribeiro

deimos

NEXT OCEAN
CLEAR INSIGHTS INTO FISHERIES AND AQUACULTURE

eurac research

Institute of Atmospheric Pollution Research
National Research Council of Italy

European Commission

Sustainability of Coastal Ocean Services

Panel Discussion

Muriel Lux *(Mercator Ocean International, France)*
Andrea Taramelli *(ISPRA-Copernicus User Forum, Italy)*
Marion Sutton *(CLS, France)*
Pedro Robeiro *(DEIMOS, Portugal)*
Ghada El Serafy *(Deltares, The Netherlands)*

EUROGEO WORKSHOP 2023

Sustainability of Coastal Ocean Services

Co-chairs: Muriel Lux, Audrey Hasson
(Mercator Ocean International, GEO Blue Planet EU Office)

MERCATOR OCEAN INTERNATIONAL

BLUE PLANET

BOLZANO 2-4 OCTOBER 2023

eurac research

Institute of Atmospheric Pollution Research
National Research Council of Italy

European Commission

Sustainability of Coastal Ocean Services

Copernicus Marine service, Copernicus Coastal hub and the Marine Forum
A sustainable EU solution:
Muriel Lux *(Mercator Ocean International, France)*
A member state vision:
Andrea Taramelli *(ISPRA-Copernicus User Forum, Italy)*

Detecting and forecasting Sargassum
Marion Sutton *(CLS, France)*

NextOcean: Next Generation Fishing and Aquaculture Services
Pedro Robeiro *(DEIMOS, Portugal)*

Providing early warning system for coastal pollution - CANCELLED
Ghada El Serafy *(Deltares, The Netherlands)*

Round table discussion
Guided, then open to the floor

Sustainability of Coastal Ocean Services - Take Home Messages –

Copernicus Marine Service is a sustainable public service that supports the development of sustainable coastal services.
The coastal component of Copernicus is **co-designed/co-produced with national stakeholders.** Member States have the responsibility to select and/or collect data of relevance to **enforce EU policies in their marine waters**.

Some tools have 2 identified types of sectors of application : Public/ scientific and private. It is sometimes **necessary to leverage both to ensure sustainability**.

The E-shape programme provided essential **co-deisgn tools and community support** that are essential for further **sustained commercial exploitation**.

GEO Blue Planet EU Office to work with EuroGEO to provide concerted support incl. The EC transversal collaboration programmes.