iMagine – Imaging data and services for aquatic science

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On behalf of the iMagine consortium

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Outline

- Project facts
- Partners
- Technical architecture
- Imaging services and applications

Marine environmental management and policy making

Source: EU MSFD website

Relevant EU Directives and initiatives for aquatic domain, such as:

- Marine Strategy Framework Directive (MSFD)
- Water Framework Directive (WFD)
- European Green Deal
- Mission Starfish 2030 "Healthy oceans, seas, coastal and inland waters"
- United Nation's 2030 Agenda for Sustainable Development
- United Nation's Decade of Ocean Science (2021-2030)

Green Deal

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

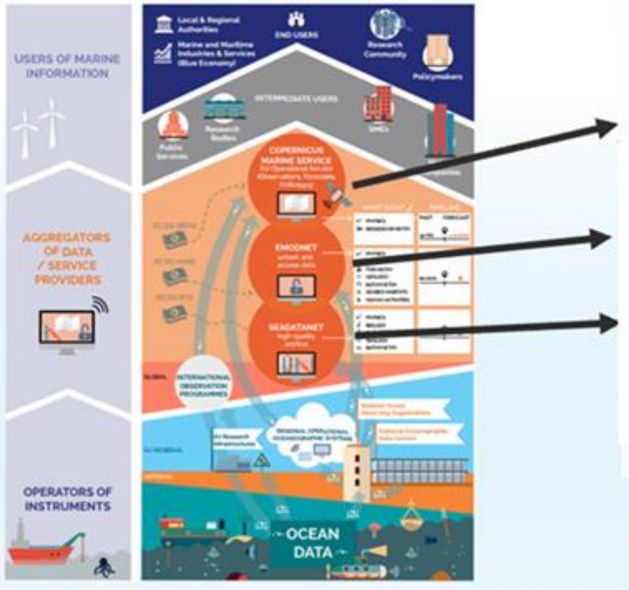
Implementation requires knowledge

The implementation requires an increase of our overall knowledge, demanding more science and improved access to observation data and analytical processing.

In Europe we spent circa 1.4 Billion Euro a year in marine data acquisition (1.0 BE in-situ; 0.4 BE remote sensing)

European landscape marine data management

Blue-Cloud



EuroGOOS European Global Ocean Observing System
EurOBIS
Copernicus Marine Service
ICOS Ocean Thematic Centre
EMBRC ERIC
EMODnet European Marine Observation and Data Network
elixir
ICES CIEM
PANGAEA.
SeaDataNet
Euro-Argo
ENA European Nucleotide Archive
EGDI

Data aggregators and providers of data products and services

Europe already has developed an impressive capability for aquatic environmental observation, data-handling and sharing, modelling and forecasting, second to none in the world. This builds upon national environmental observation and monitoring networks and programs, complemented with EU initiatives such as the Copernicus programme (CMEMS) and EMODnet, and European Research Infrastructures (RIs).

Project factsheet

OBJECTIVE:

*To deploy, operate, validate, and promote a dedicated **iMagine AI framework** and platform, connected to EOSC and AI4EU, giving researchers in **aquatic sciences** open access to a **diverse portfolio of AI based image analysis services and image repositories** from multiple RIs, working on and of relevance to the overarching theme of 'Healthy oceans, seas, coastal and inland waters'.*

- **36** months
- From **Sept. 2022** until **Aug. 2025**
- **€4.5 million** EC funding
- **24** participants (**19** beneficiaries + **5** affiliated partners)
- **18** service installations (Virtual Access)

Specific Objectives and indicators

O1	Objective 1. Deliver a scalable, shared IT platform for image analysis in marine and freshwater research	*Operational iMagine platform with common AI development framework*
O2	Objective 2. Advance existing image analytical services to increase research performance in aquatic sciences	*Launch of 5 aquatic AI image analytics services, running operationally on the iMagine platform*
O3	Objective 3. Develop & prototype new image analytical services and datasets that can accelerate progress towards healthy oceans, seas, coastal and inland waters	*3 AI-based imaging processing application pilots, 8 scientific image repositories*
O4	Objective 4. Capture and disseminate development and operational best practices to imaging data and image analysis service providers	*Best Practices documentation, interaction with EOSC and AI4EU platforms. Training programme*
O5	Objective 5. Deliver a portfolio of scientific image and image analytics services targeting researchers in marine and aquatic sciences	*Portfolio: operational services, image repositories, Best Practices, iMagine framework and platform*

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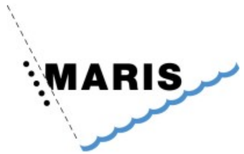
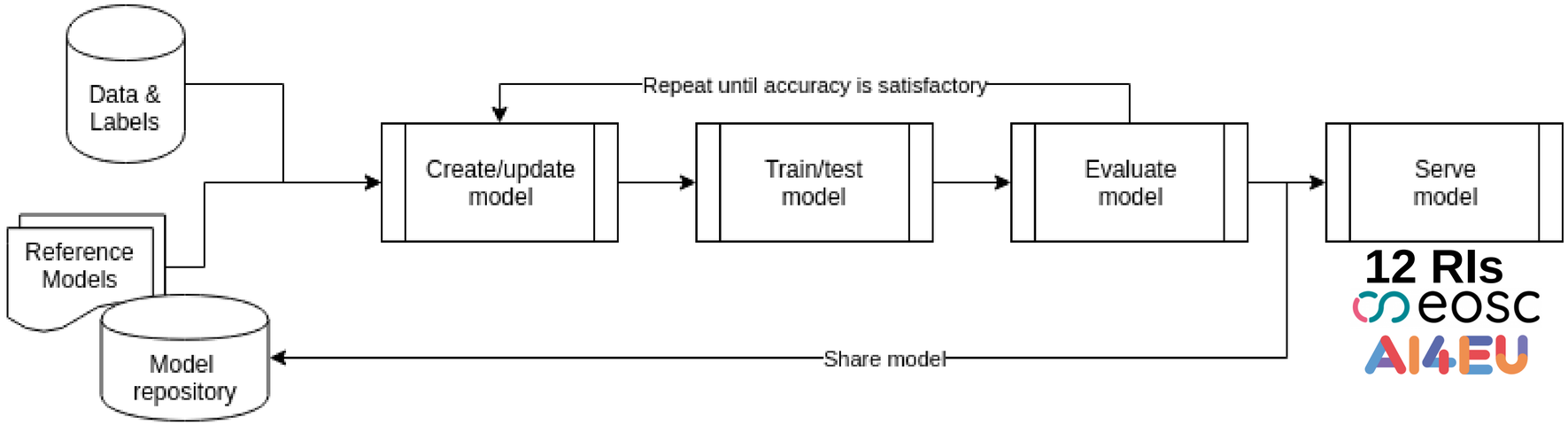
Consortium Overview



Enabling scalable AI/ML services

4 national cloud compute centres (*TUBITAK, CSIC, INCD, Walton*) and **5** AI/ML technology development institutes (*LIP, CSIC, IISAS, KIT, UPV*) support services and pilots from **12** research infrastructures:

Our technical architecture



12 RIs

eosc

AI4EU

- 5 production AI services
- 3 AI application prototypes

…for aquatic sciences

Hybrid DataCloud

Generic, scalable platform for AI/ML applications

TÜBİTAK

CSIC Consejo Superior de Investigaciones Científicas

INCD

WALTON Institute for Information and Communication Systems Science

EGI federated cloud infrastructure
OpenStack GPUs, CPUs, Storage in Spain, Portugal, Turkey, Ireland

1500 TB-months
132,000 GPU-hours
6,000,000 CPU-hours

8 Use Cases & Their Links to RIs and Initiatives

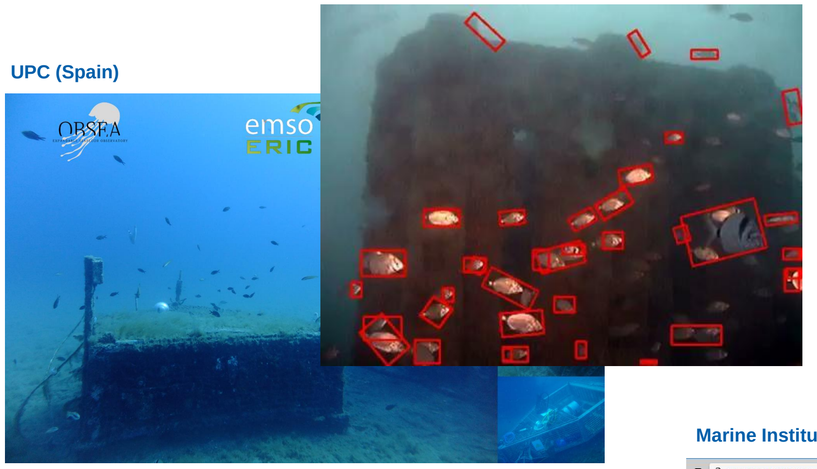
Services with Virtual Access	Aquatic Litter Drones: Aquatic Litter monitoring system using drones	SeaDataNet, EMODnet
	Zooscan – EcoTaxa pipeline: Taxonomic identification of zooplankton using Zooscan	LifeWatch ERIC, EMBRC
	Ecosystem monitoring at EMSO sites by video imagery	emso ERIC, PAP, Euro-Argo, LifeWatch ERIC, JERICO RI, EMBRC
	Oil Spill Detection: Oil spill detection from satellite images	JERICO RI, emso ERIC, Copernicus Marine Service, LifeWatch ERIC
	Flowcam phytoplankton identification: Taxonomic identification of phytoplankton using Flowcam images	LifeWatch ERIC, JERICO RI
Validated application prototypes	Underwater Noise Identification: Underwater noise identification from acoustic recordings using spectrograms	LifeWatch ERIC
	Beach Monitoring: Posidonia oceanica berms and rip-currents detection from beach monitoring systems	JERICO RI, EMODnet, Copernicus Marine Service
	Freshwater diatoms identification: Identification of freshwater diatoms using microscopic images	LifeWatch ERIC

Ecosystem monitoring at EMSO sites by video imagery

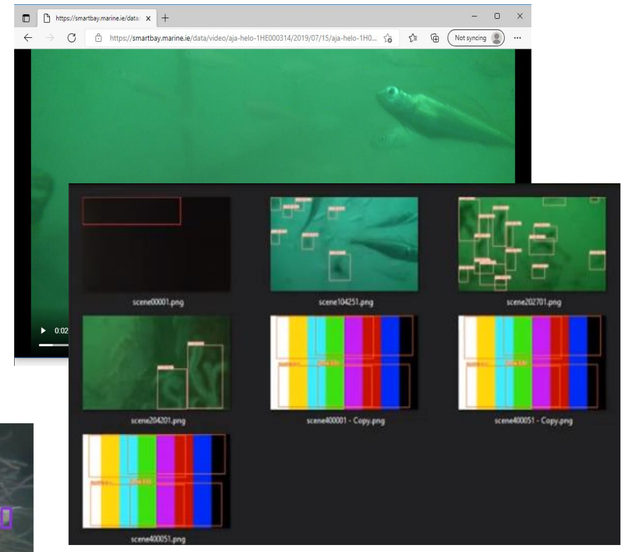
Use case with Ifremer involvement

- Partners
  - EMSO ERIC (IT), UPC (ES), Ifremer (FR), MI (IE)
- Objective
  - Establish an operational service automatic processing of video imagery, collected by cameras at EMSO underwater sites
  - Identify and further analyse images for ecosystem monitoring
- Expected impact
  - Having a common capacity which can be adopted by all EMSO-sites, contributing to generating and making available relevant input for biodiversity and ecosystem studies

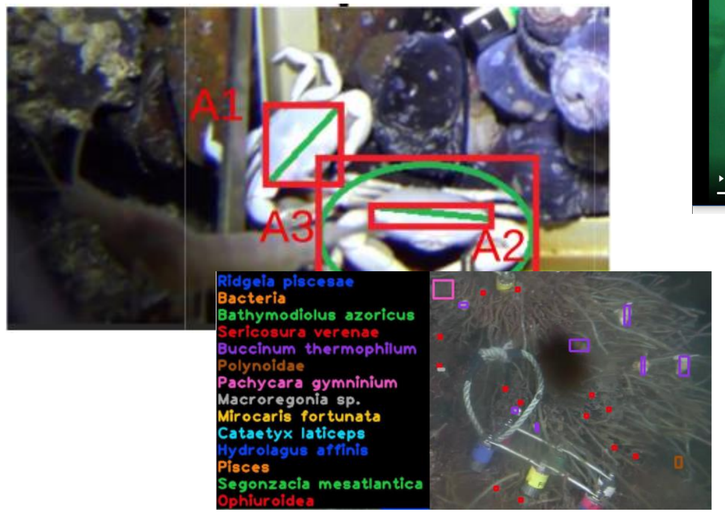
UPC (Spain)



Marine Institute (Ireland)



Ifremer (France)



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Summary:
iMagine will achieve impact by providing…

1. A common iMagine AI framework and computing platform, based upon earlier DEEP developments and to be built on EGI resources, connected to EOSC, facilitating researchers in development, testing, training, hosting, and operating of AI based image analysis services, following FAIR practices.

2. Five operational and three prototype AI based image analysis services with image repositories, highly relevant for aquatic sector, to be deployed at the iMagine AI platform for open access and exploitation by researchers. These will demonstrate value and foster further uptake.

3. Best Practices consisting of documentation and training materials, giving practical guidance and examples to end-users on how to exploit image datasets and analysis applications offered by the iMagine portfolio, and to research engineers who wish to develop and deliver similar services, making use of the facilities of the iMagine AI platform

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Interested in partnership?

Contact us:

- *Gergely Sipos (gergely.sipos@egi.eu) - Project director*
- *Dick Schaap (dick@maris.nl) - Scientific director*

https://www.imagine-ai.eu (coming soon...)

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