



Using AI and ML to support marine science research

An overview of iMagine

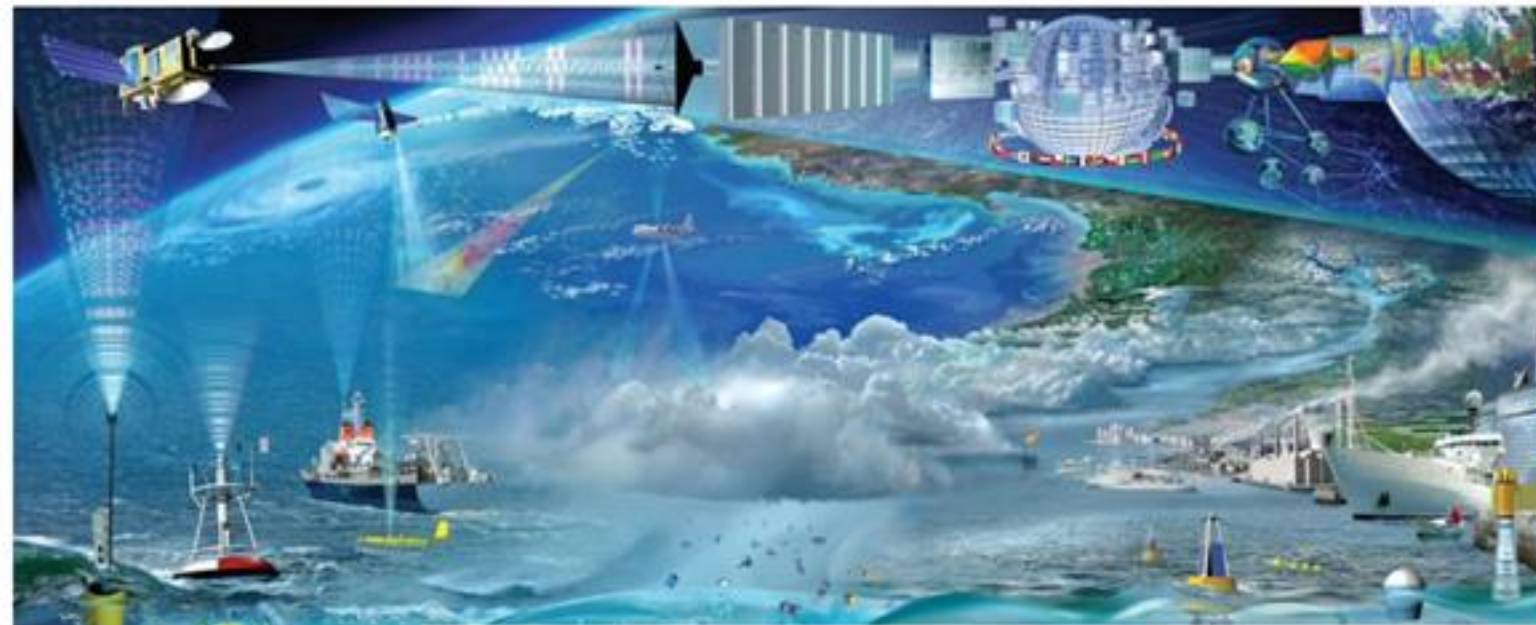
Peter Thijsse – MARIS (NL)



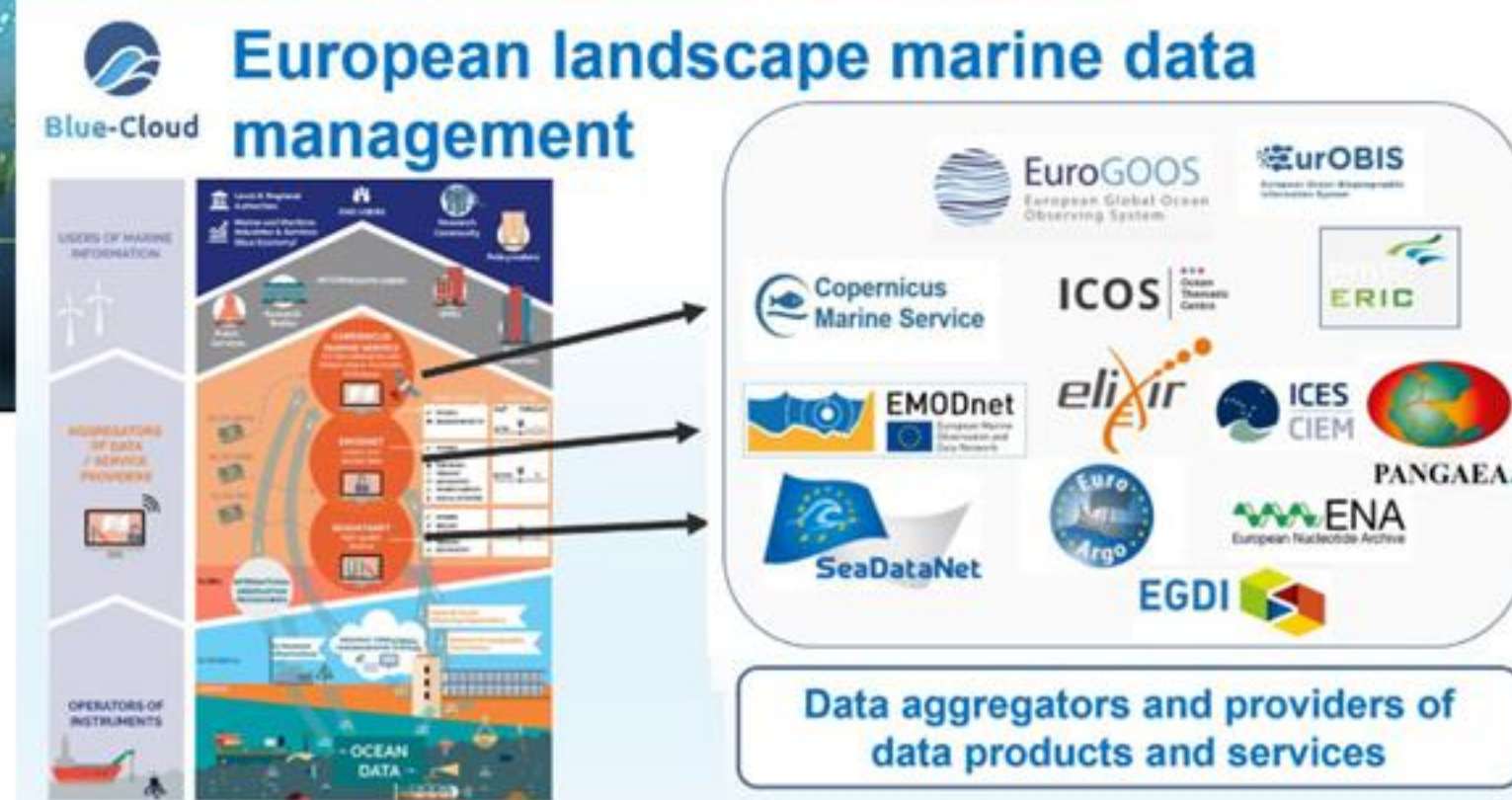
iImagine The background

Marine environmental management and implementing ocean restoration initiatives require more knowledge and understanding

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)



Europe already has developed an impressive capability for aquatic environmental observation, data-handling and sharing, modelling and forecasting.



From DATA to KNOWLEDGE



Specific Objectives and indicators

O1

Objective 1. Deliver a scalable, shared IT platform for image analysis in marine and freshwater research

Operational iImagine platform with common AI development framework from TRL 7 to 9

O2

Objective 2. Advance existing image analytical services to increase research performance in aquatic sciences

Launch of 5 aquatic AI image services, running operationally at the iImagine platform

O3

Objective 3. Develop & prototype new image analytical services and datasets that can accelerate progress towards healthy oceans, seas, coastal and inland waters

Set of AIS-based imaging processing services of relevance to research for healthy oceans, seas, coastal and inland waters

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, iImagine framework and platform



Enabling scalable AI/ML services



- 5 AI/ML technology development institutes (*LIP, CSIC, IISAS, KIT, UPV*)
- 12 research infrastructures supporting use cases
- 4 national cloud compute centres (*TUBITAK, CSIC, INCD, Walton*)



iImagine The iImagine use cases

Services with Virtual Access

Aquatic Litter Drones: Aquatic Litter monitoring system using drones



Zooscan – EcoTaxa pipeline: Taxonomic identification of zooplankton using Zooscan



Ecosystem monitoring at EMSO sites by video imagery



Oil Spill Detection: Oil spill detection from satellite images



Flowcam phytoplankton identification: Taxonomic identification of phytoplankton using Flowcam images



Validated application prototypes

Underwater Noise Identification: Underwater noise identification from acoustic recordings using spectrograms



Beach Monitoring: Posidonia oceanica berms and rip-currents detection from video monitoring systems



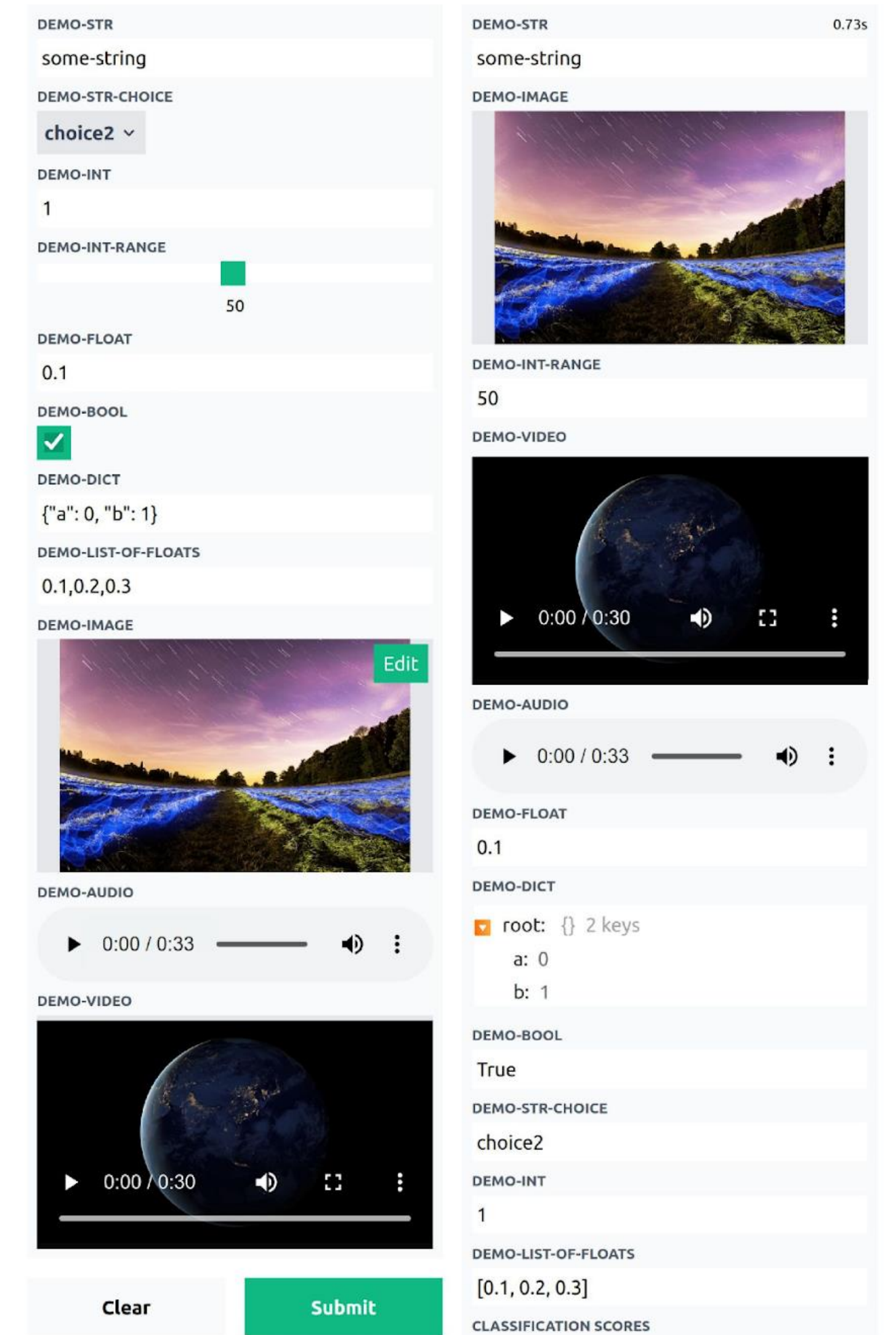
Freshwater diatoms identification: Identification of freshwater diatoms using microscopic images



- Based on DEEP Platform
 - Imaging use cases to exploit it to develop AI/ML/DL applications
 - Exploitation of resources from EGI Federated Cloud sites → onboarding of new providers
 - Transparent access to accelerators
 - Integration with training and inference APIs
- Evolution of DEEPaaS towards on-premises deployments (i.e. self-hosted) and automated deployment of imaging services
- Enhancements on DEEPaaS API as required by user communities
 - E.g. adoption of community standards for inference
 - Integration with friendly web user interfaces, with special focus on images

demo_app

A minimal toy application for demo and testing purposes. We just implemented dummy inference, ie. we return the same inputs we are feed.



The screenshot displays the 'demo_app' web interface, which is a form for testing dummy inference. It is organized into two columns. The left column contains input fields for various data types: DEMO-STR (text input 'some-string'), DEMO-STR-CHOICE (dropdown menu 'choice2'), DEMO-INT (text input '1'), DEMO-INT-RANGE (range slider set to 50), DEMO-FLOAT (text input '0.1'), DEMO-BOOL (checkbox checked), DEMO-DICT (text input '{"a": 0, "b": 1}'), DEMO-LIST-OF-FLOATS (text input '0.1,0.2,0.3'), and DEMO-IMAGE (image input with a landscape photo and an 'Edit' button). The right column shows the corresponding output fields: DEMO-STR (text output 'some-string'), DEMO-IMAGE (image output with a landscape photo), DEMO-INT-RANGE (range slider output '50'), DEMO-VIDEO (video player output with a video of Earth), DEMO-AUDIO (audio player output with a video of Earth), DEMO-FLOAT (text output '0.1'), DEMO-DICT (text output 'root: {} 2 keys', 'a: 0', 'b: 1'), DEMO-BOOL (text output 'True'), DEMO-STR-CHOICE (text output 'choice2'), DEMO-INT (text output '1'), DEMO-LIST-OF-FLOATS (text output '[0.1, 0.2, 0.3]'), and CLASSIFICATION SCORES (empty). At the bottom, there are 'Clear' and 'Submit' buttons.



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