Operational Ocean Monitoring and Forecasting Services for decision-making in the coastal ocean.

The NOW Systems User Applications

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MISSION

Be a reliable partner:

- Delivering the **most advanced Operational Services** (24x7) for the marine environment.
- Ensuring the **best infraestructura** and a **highly skill Team**.
  - STEM profiles (inc. engineering, physics, geosciences, IT, etc.)
- NOW Systems: A SME focused on **R&D & Innovation.**

VISION

Co-build digital twin approaches of the ocean (and the coast), as envisaged by our customers.

OUR VALUE PROPOSITION

Provide solutions, knowledge, and services for more sustainable and efficient management of activities in the marine environment.

MONITORING

NRT Integration of In-situ and satellite observations

FORECASTING

Numerical Modelling to simulate the past, present and future ocean

AI-BASED SOLUTIONS

Improvement monitoring and forecastng through AI-based solutions

CLIMATE

Climate assessment of present and future ocean at regional and coastal scale.

PRODUCT QUALITY

Product Quality Assessment. Scientific analysis of products

APPLICATIONS

Value-added services (e.g., alert systems) and customized user interfaces.

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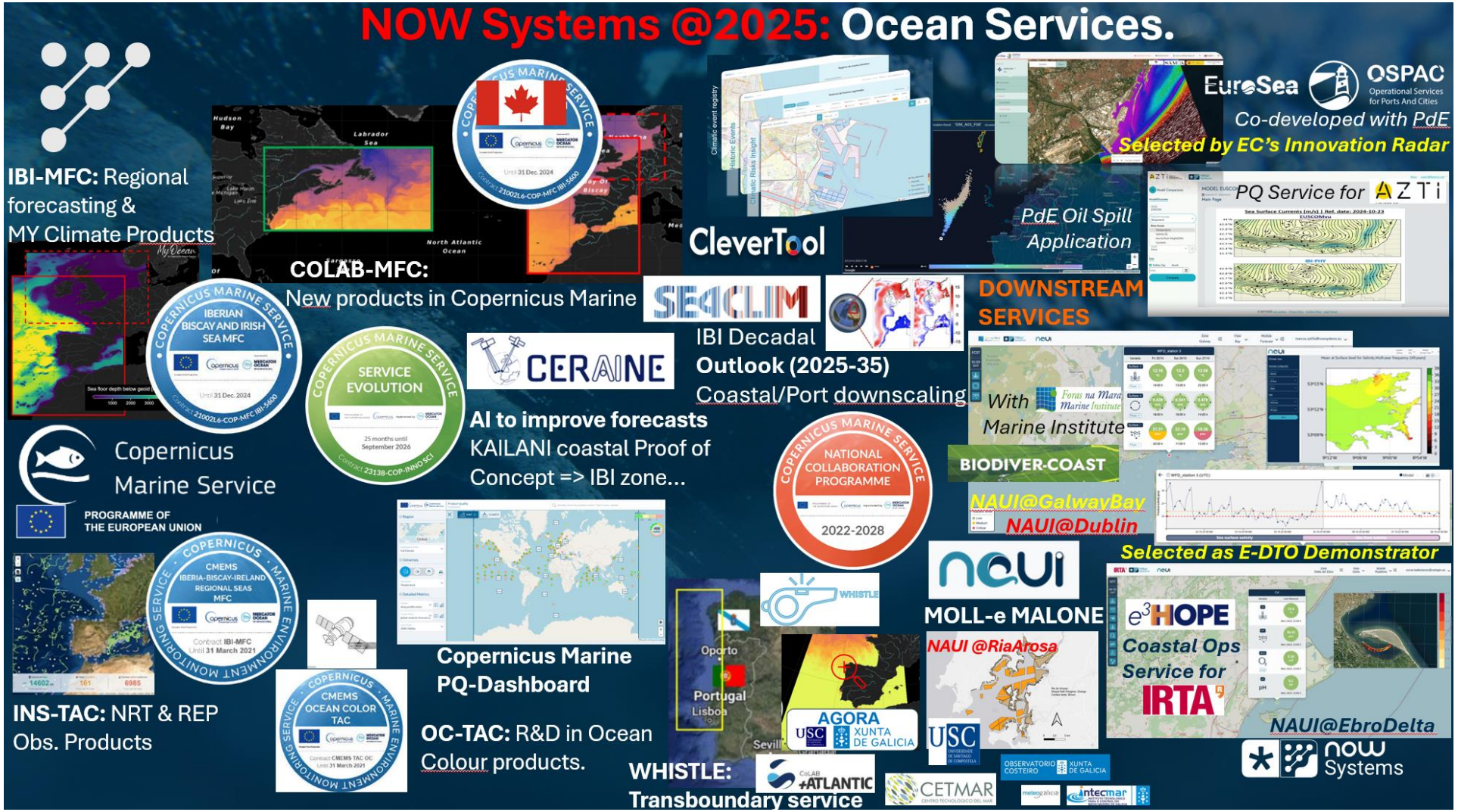
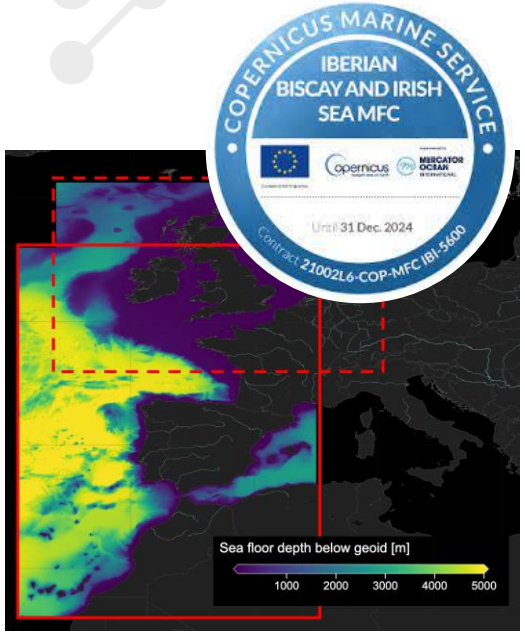
NOW Services in a SeaShell

Core Services:
Copernicus Marine Provider

Downstream Services:
Coastal Services

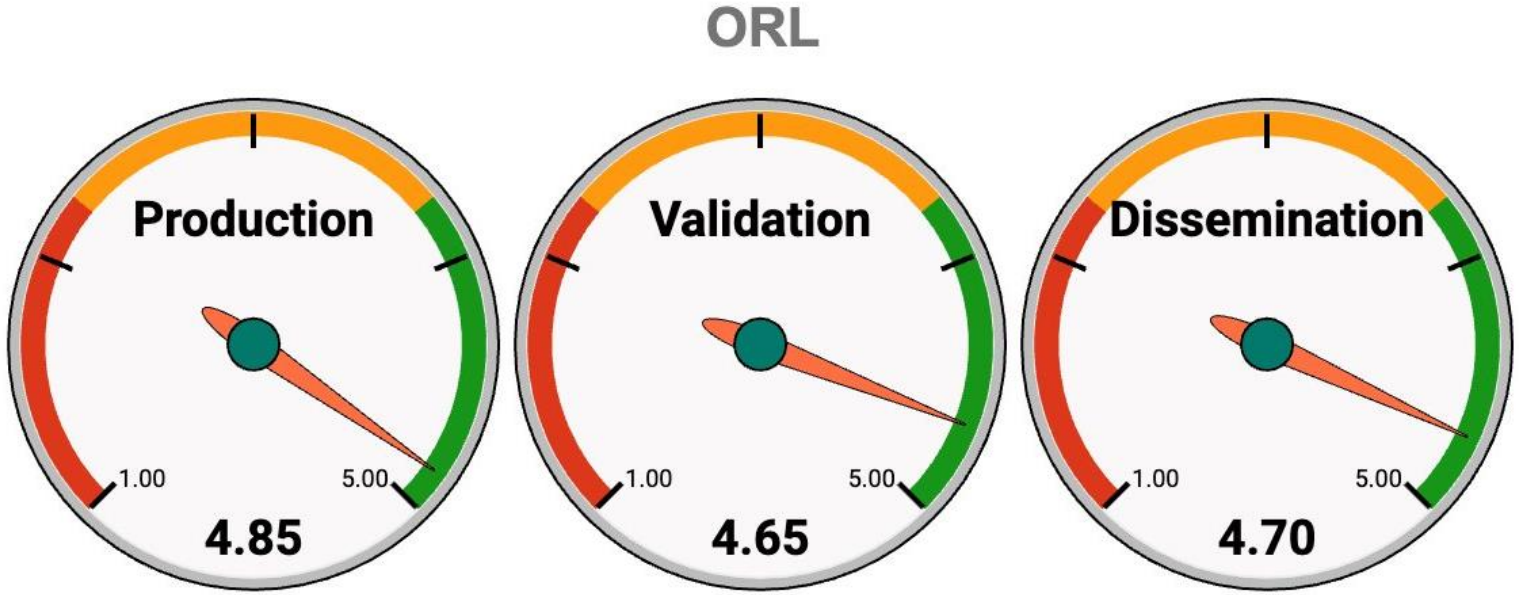


NOW Systems: A reliable Operational Service Provider



Copernicus Marine IBI-MFC Forecast

Operational Readiness Level (ORL) scores achieved by NOW IBI-PHY-NRT-FC System:



ORL based on > 75 criteria. (Fanjul et al. 2024)

Ocean Prediction UN DECADE COLLABORATIVE CENTRE

- ✓ NOW delivers Ops. Services for Copernicus Marine.
  - ✓Based on **robust Operational suites.**
  - ✓Responding to **strong Service Level Agreements** (SLA).
  - ✓ Ensuring a **continuous Service Evolution** (user driven service).

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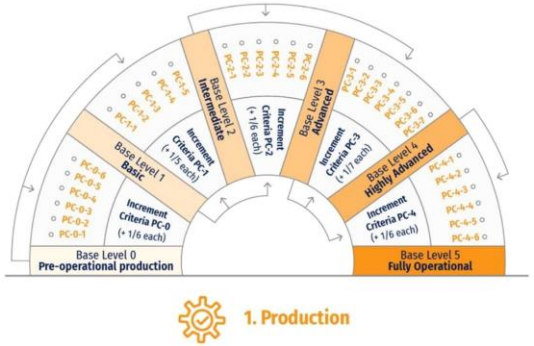
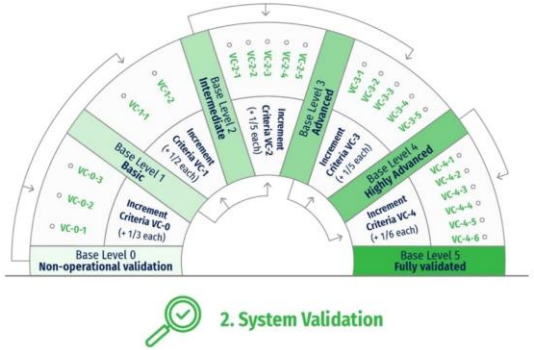
The NOW Coastal Services

Aligned with Downstream Service expectations and ensuring:



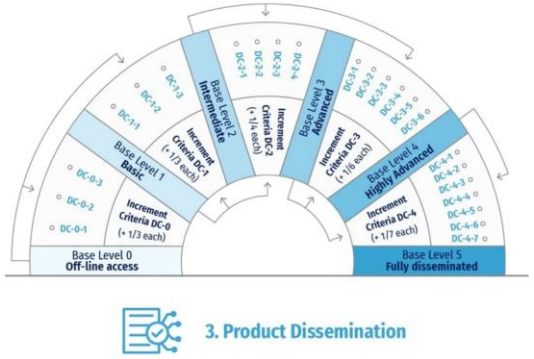
✓ Reliable Operational Production:

✓ **Coastal models run in robust Operational Suites**



✓ Product Quality Assessment:

✓ **Operational Multi-Parameter multi-Model Validation tools**



✓ From data to fit-for-purpose information

✓ **Co-designed User Applications**

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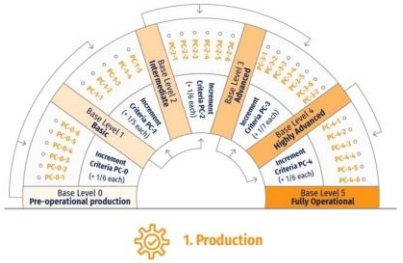
The NOW Coastal Services: Essential Elements

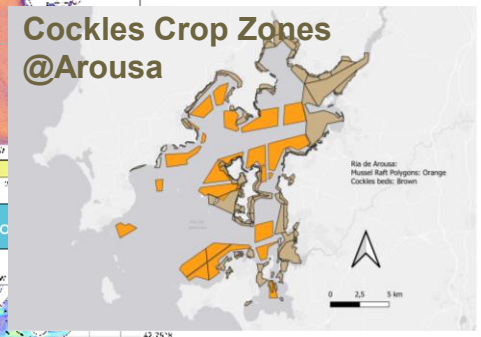


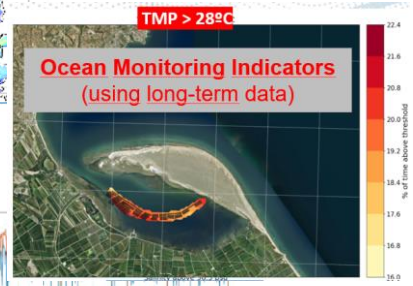
- ✓ **High-resolution Coastal Prediction Systems**.
  - ✓ Benefit & Combined with coastal observations.

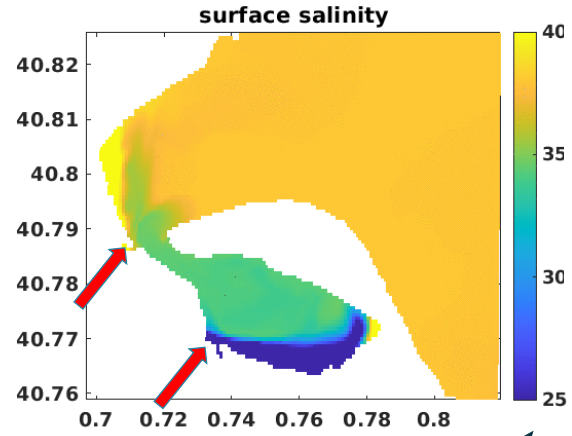
- ✓ **Coastal downscaling.** Seamless modelling from regional to coastal scales:
  - ✓ **Ocean-wave coupled model applications** (COAWST; ROMS-SWAN Apps @350m&70m)

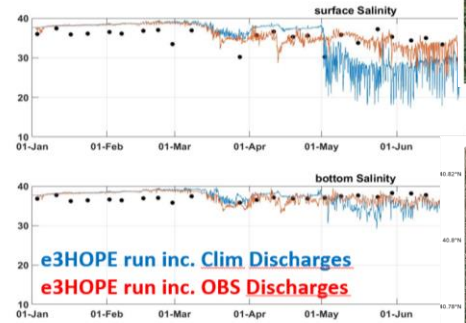
    Systems in **NE Atlantic & Mediterranea**: **@Galicia** (AGORA), **@EbroDelta** (e3HOPE, FLORETHA), **@GenoaGulf** (ALISEO).
  - ✓ Using **wet-and-dry algorithm**.
  - ✓ **Realistic inland freshwater contribution** (using hydrological obs and model data of **rivers, canals**).

- ✓ **AI Approaches** to improve coastal downscaling
  - ✓ ANNs trained to improve wave forecast forcings (winds, and currents, **KAILANI, CERAINE Proj.**).
  - ✓ ANNs to downscale regional climate prediction for coastal areas, focus on ports (**SEACLIM Project**).









Freshwater discharges f

NRT Obs Conferencia Hid

e3HOPE

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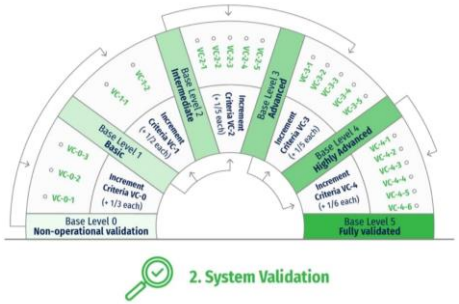
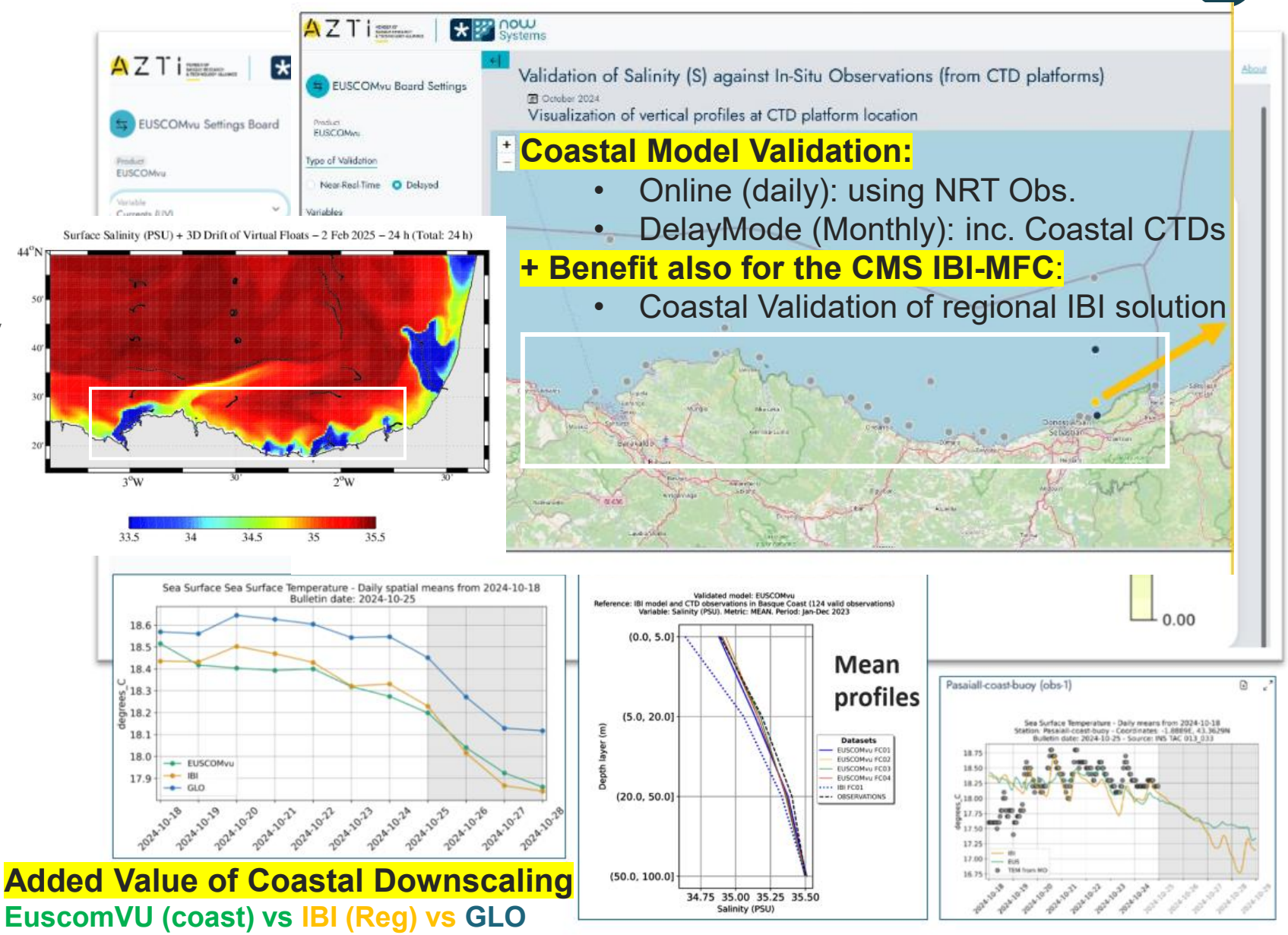
The NOW Coastal Services: Essential Elements

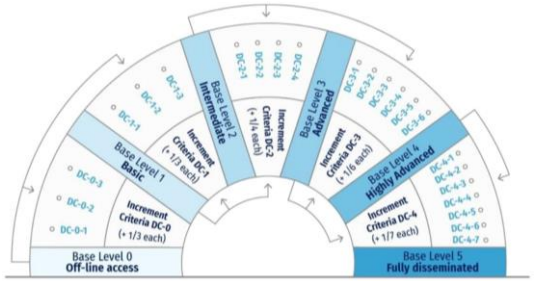


- ✓Ensuring Product Quality assessment by means of **Operational Multi-Parameter Multi-Model Validation tools**:
  - ✓Multi-model comparisons
    - ✓GLO-REG-COAST
  - ✓Use of Coastal OBS
    - ✓NRT & Periodic ones.



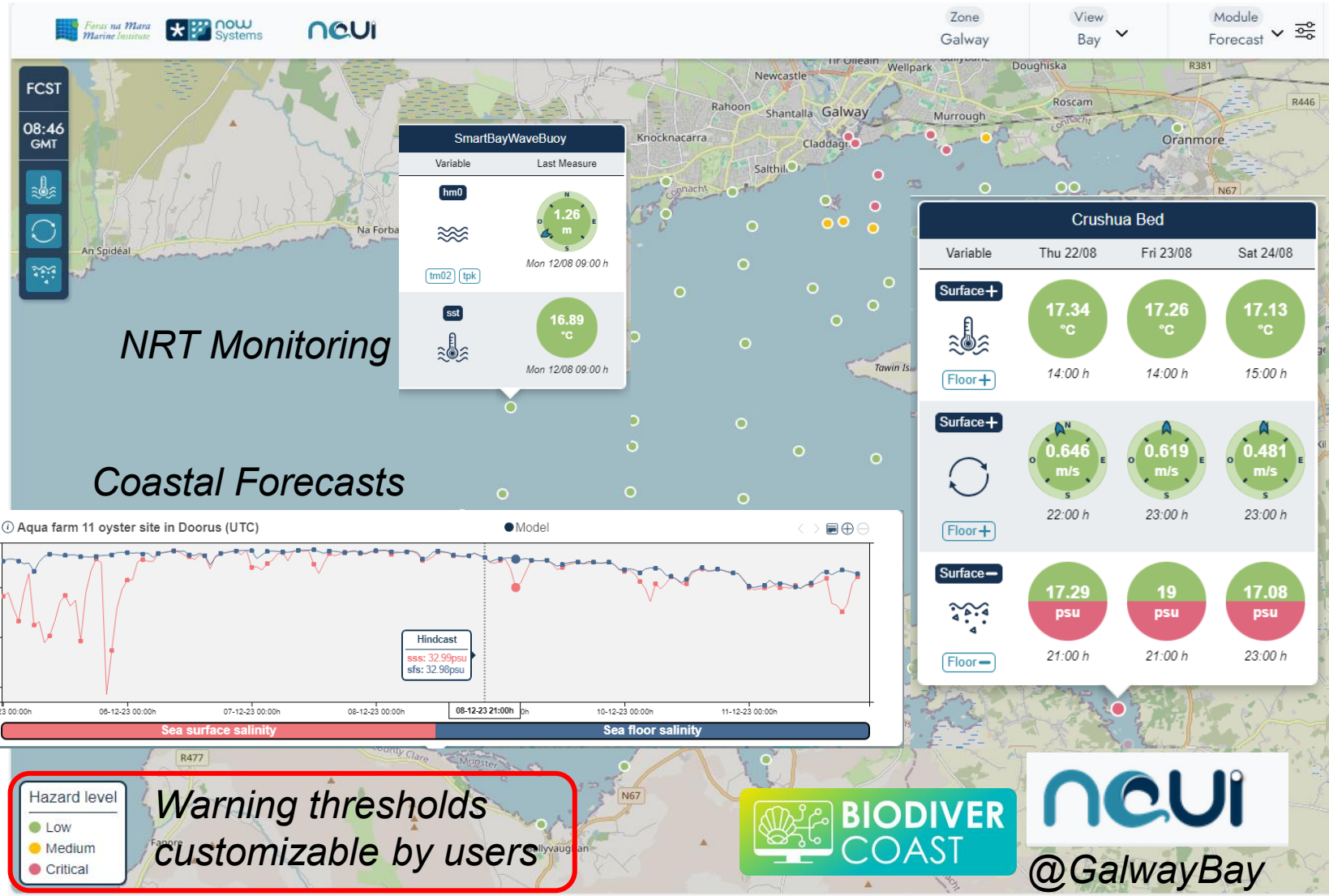
EUSCOMvu Validation Tool (more details in Ferrer et al.).

The NOW Coastal Services: Essential Elements



3. Product Dissemination

- ✓Product dissemination through **Co-designed User Applications.**
- ✓ Ad-hoc **WWW services**.
- ✓ **NAUI:** the Advance User Interface of NOW
  - ✓Services aggregator hosted in NOW Cloud (SaaS).
  - ✓User-friendly access to actionable information.
  - ✓Data from NRT monitoring & forecasting
  - ✓Facilitating stakeholder's decision-making process.



(more details in Dabrowski et al.)

The NOW Coastal Services: Essential Elements

- ✓ Several NAUI Deployments.
  - ✓ Supporting Coastal Services across NE Atlantic & Mediterranean.
- ✓ Strategic Partners & Key Local Stakeholders.
  - ✓ MarineInstitute, IRTA, LIM/UPC, Atlantic+, USC, CETMAR, INTECMAR, MeteoGalicia, etc.
- ✓ Use Cases focused on:
  - ✓ Aquaculture
    - ✓ Mussels (risks related to high temperature)
    - ✓ Salmon (water quality conditions and MHWs impacts)
    - ✓ Cockles (risk index for low salinity events combined with tidal conditions)
  - ✓ Biodiversity
    - ✓ Med *Pinna Nobilis;* suit habitat (only specific salinity and temp conditions).
  - ✓ NBSs
    - ✓ Native oyster restoration in Galway (low salinity events, the higher risk).

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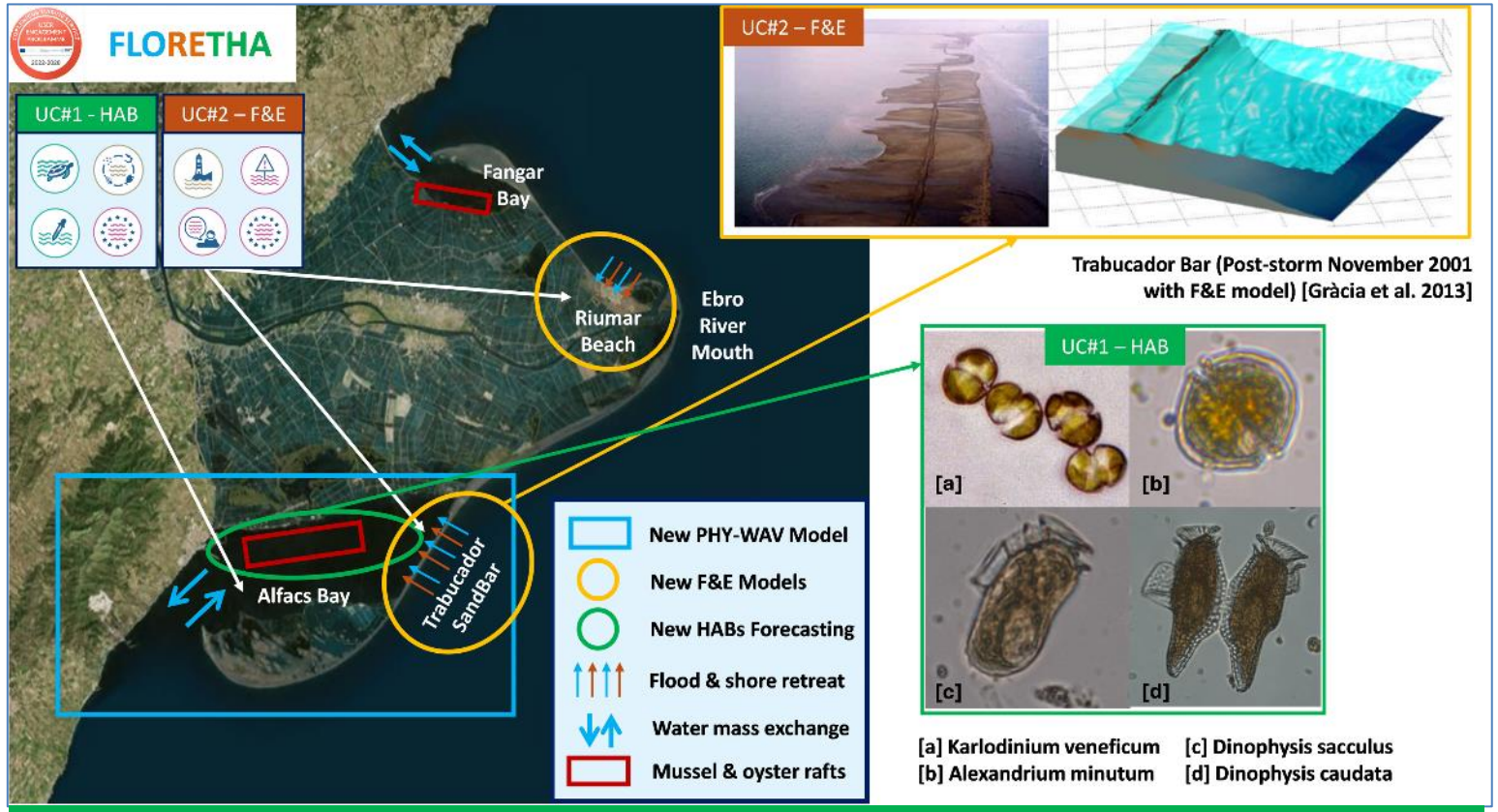
The NOW Coastal Services: Essential Elements

- ✓NAUI: a Modular Tool
  - ✓ Easy to scale for enhanced casuistry.
- ✓ Expanding NAUI (RD&i)
  - ✓New NAUI functionalities & modules on: MHWs, Lagrangian transport (plastic pellets), HABs forecasting, Coastal protection (models run on-demand), etc…
- ✓ DTO approaches
  - ✓The foreseen context to enhance these coastal services.

Coastal Floading & Erosion (New Sediment Model run on demand)



HAB forecasting Service (new User Interface + improvements)

Both Use Cases benefit of the daily e3HOPE H-R Coastal Forecast Service

The NOW Coastal Services

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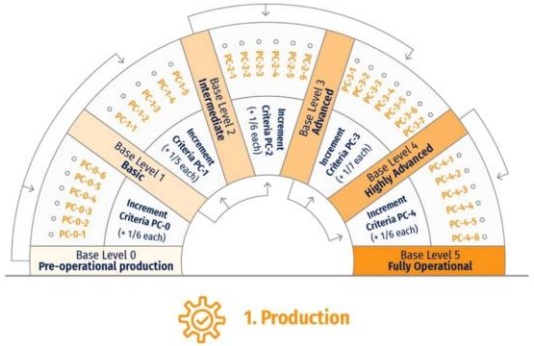

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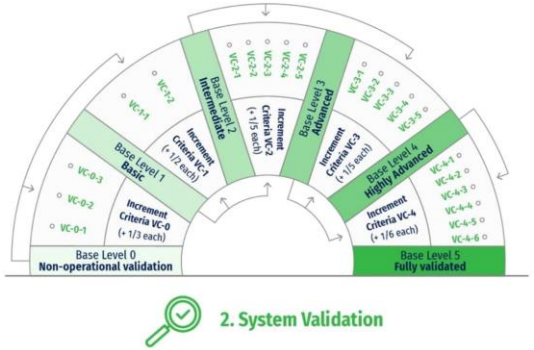

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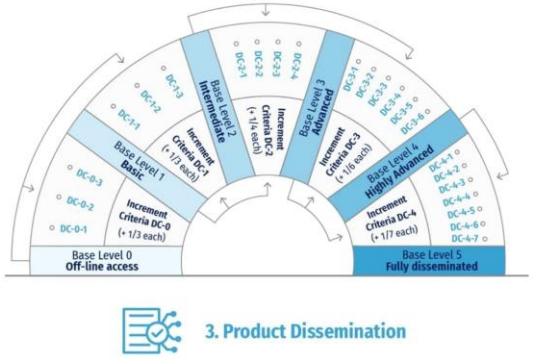

✓ From data to fit-for-purpose information

✓ **Co-designed User Applications**

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Service Providers, Scientists & Users: Different views of Coastal services?

Poll Diagnosis; Analisis of Experts Survey results.

E: Existance (E)
Q: Quality (Q)
Accesibility (Ac)
Timeliness (T)

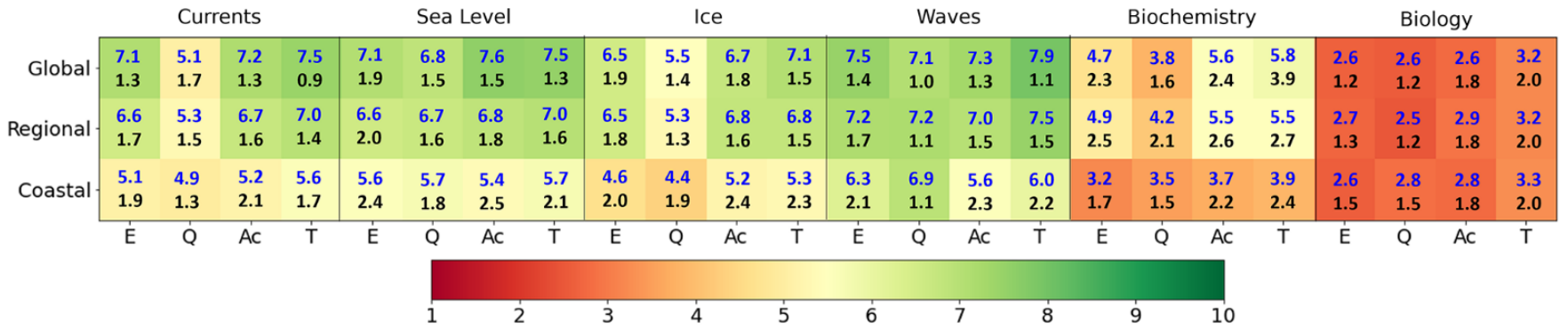
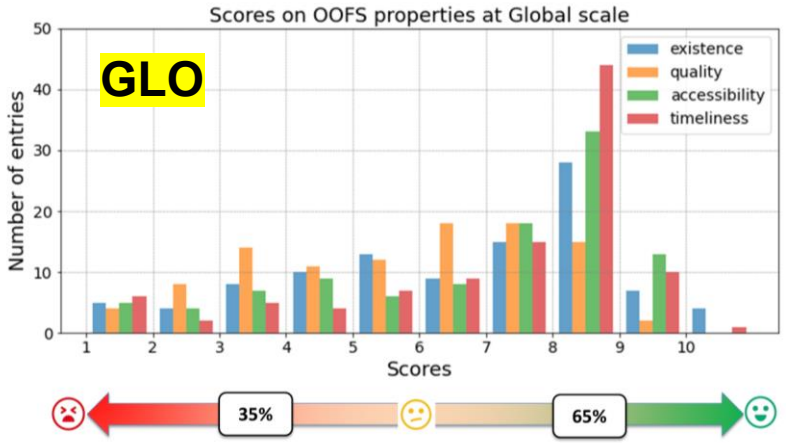
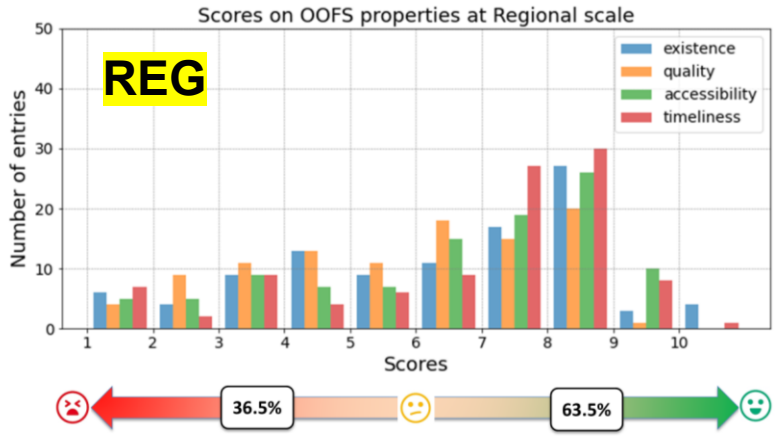
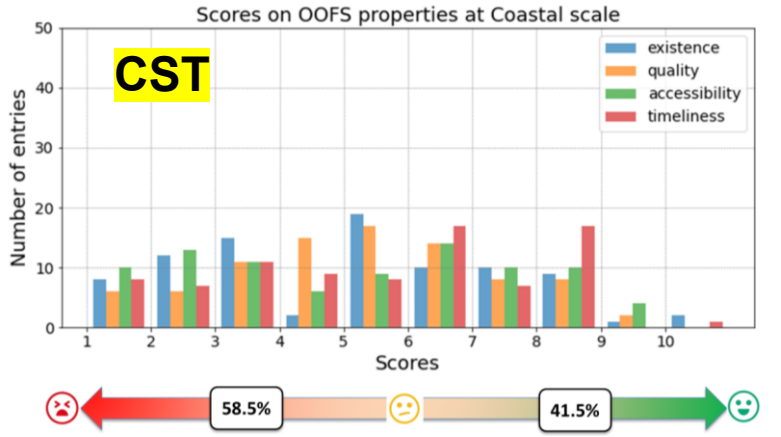


Figure 1. The experts' average rates (in blue) and standard deviations (in black) per OOFS property (E is for existence, Q is for quality, Ac is for accessibility, and T is for timeliness), considering a proposed list of EOVs (e.g., currents, sea level, ice, waves, biochemistry, and biology) at a given scale (e.g., global, regional, and coastal). The color scale corresponds to mean values.





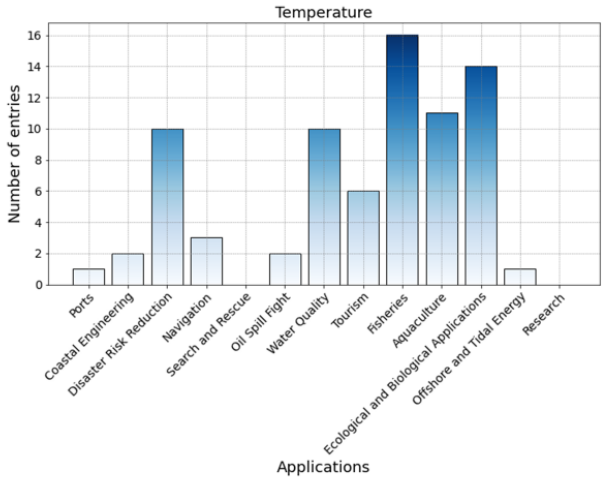


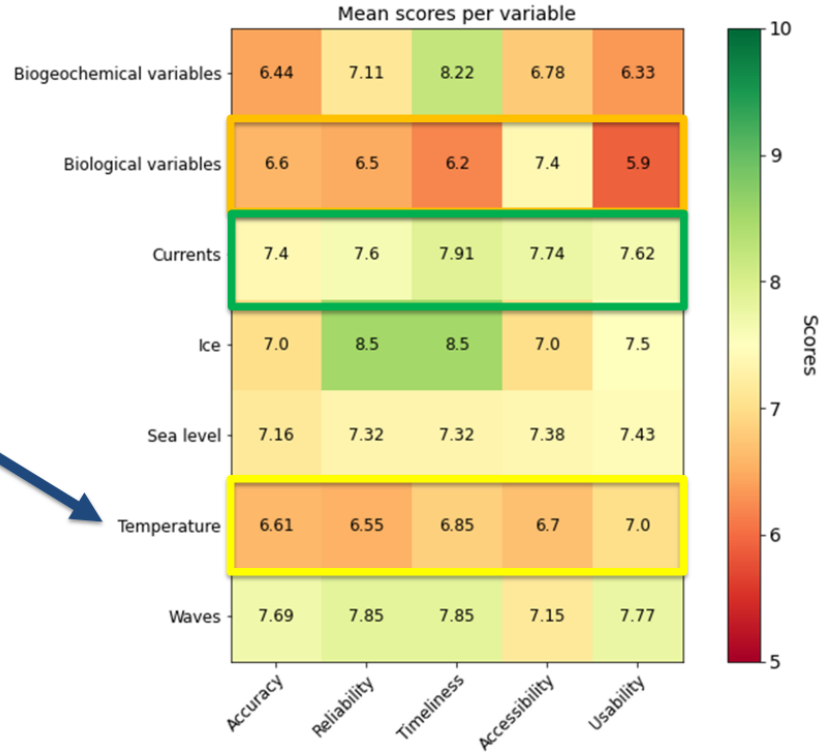
Service Providers, Scientists & Users: Different views of Coastal services?

End-Users Poll Diagnosis; Analisis of survey results

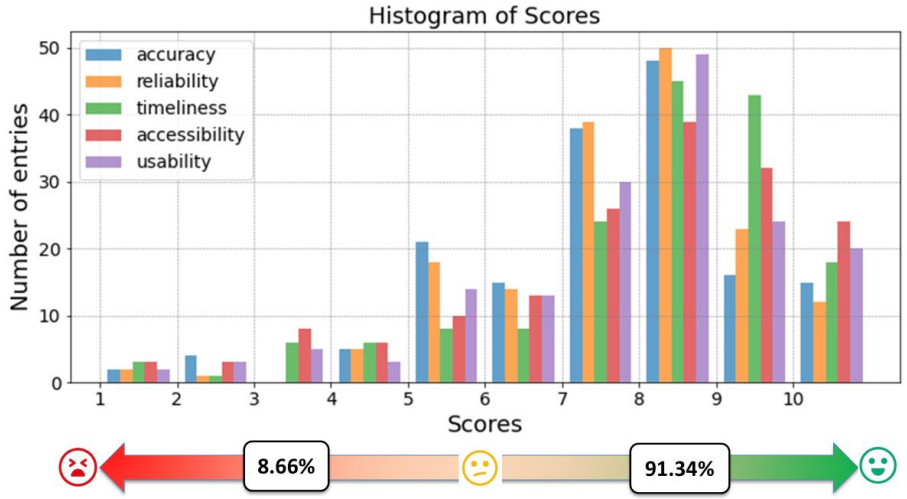
Average rating considering a list of representative EOVs that are evaluated with respect to OOFS properties

Total number of provided preferences of EOV per application (example: Temperature)





Total number of answers provided for evaluating OOFS properties rating



Do these views condition the co-build of Coastal Services? (**End-User Requirements**)
Happy users: do they ask us for more? (**Targeted improvements**)
Unhappy users: are they here? will they trust our services in the future? (**Demos**)