

OceanPrediction DCC: connecting the world around ocean forecasting

Enrique Alvarez Fanjul



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2021 United Nations Decade
2030 of Ocean Science
for Sustainable Development

Connecting the world around Ocean Prediction: *A vision for the Decade and Beyond*

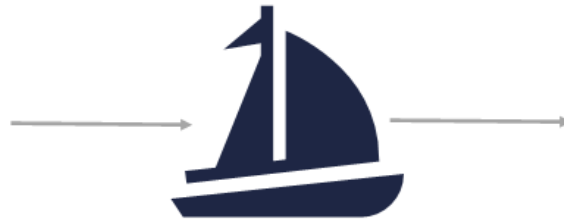
2020: THE OCEAN FORECAST WE HAVE



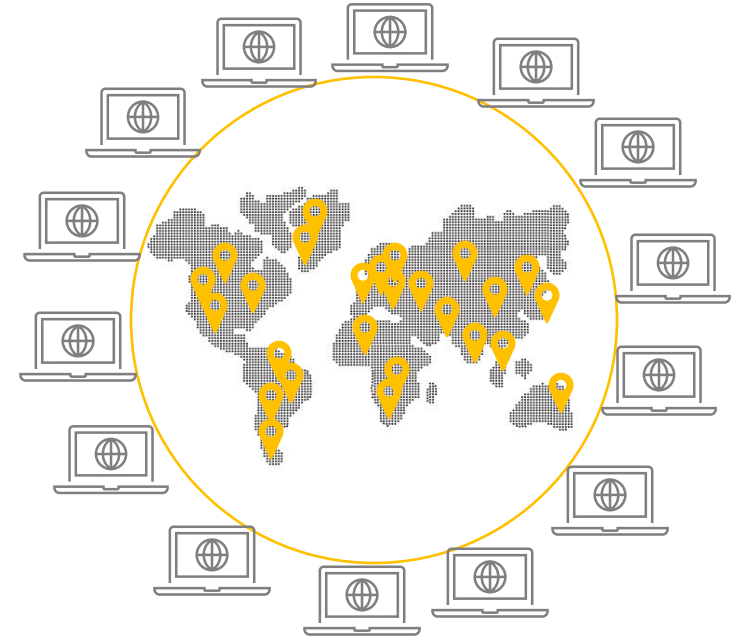
- Useful but partially disconnected services
- Poor presence in developing countries

OceanPrediction DCC VESSEL

Captain: UN Ocean Decade
Chief engineer: Decade actions and DTO
Crew: OceanPrediction DCC community
Navigator: OceanPrediction DCC



2030: THE OCEAN FORECAST WE WANT



- Connected community and services
- Many robust systems worldwide

OceanPrediction DCC: Mission and Vision

- A predicted ocean based on a shared and coordinated global effort in the framework of the UN Ocean Decade
- To galvanize and coordinate efforts towards the co-development and integration of worldwide ocean prediction activities, serving Decade objectives and in close collaboration with the Decade endorsed actions and other stakeholders



OceanPrediction DCC Objectives

To promote Ocean forecasting and its applications by:

- Creating a community around Ocean Forecasting, supporting the Decade implementation, and centered on:
 - Connection of the users with the science community
 - Promotion of OOFs as a key tool for Blue Economy
 - Capacity development
- Building a global technical and organizational structure focused on:
 - Co-design of architectures to deliver as one
 - Development of Tools, standards, and Best Practices
 - Interoperability and integration, towards the creation of Digital Twins
- Alignment of related Decade actions



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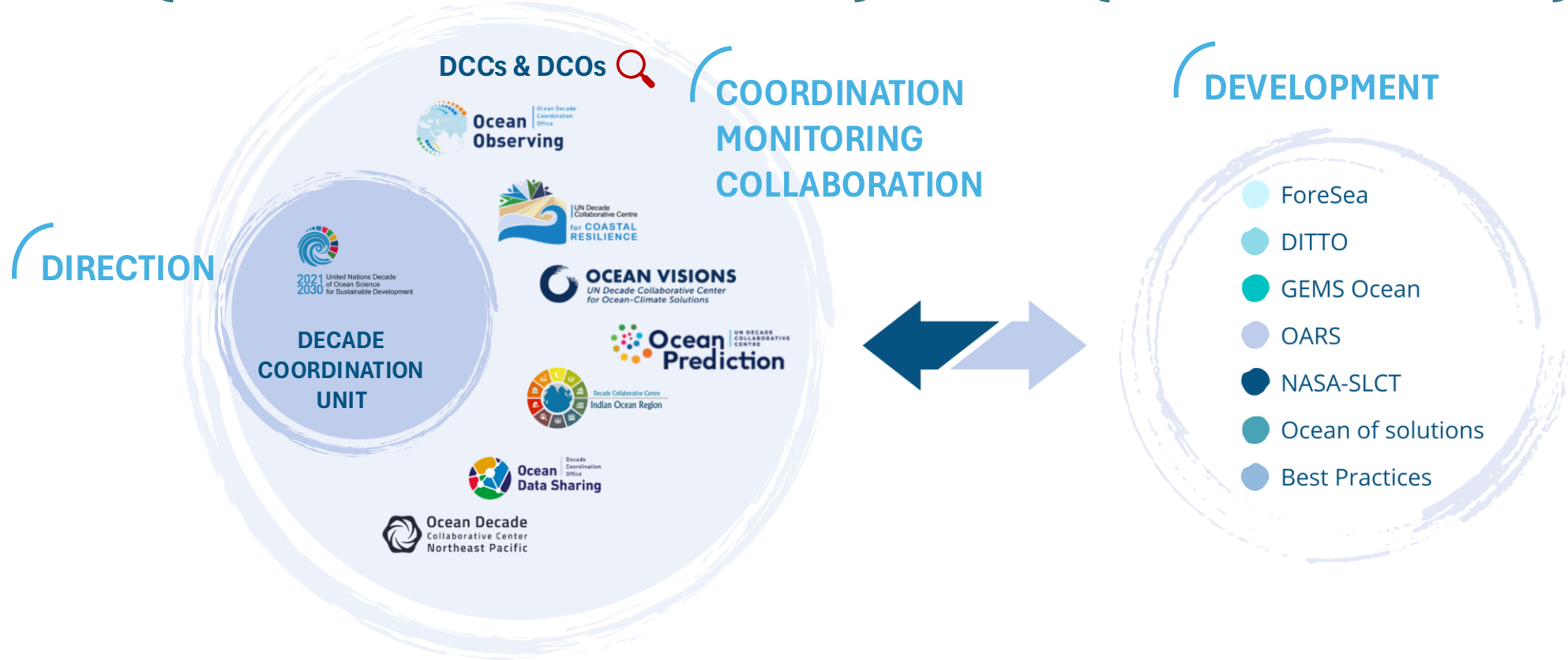
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OceanPrediction DCC in the framework of the Decade

GOVERNANCE & COORDINATION FRAMEWORK

PRIMARY ENDORSED PROGRAMMES





A collaborative network of UN Ocean Decade DCCs


THEMATIC DCCs


REGIONAL DCCs

















Connecting
People and Ocean
DCO



The two pillars of OceanPrediction DCC

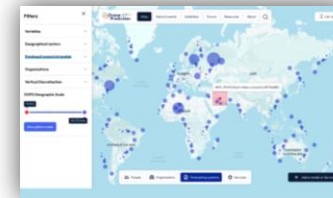
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A community organized in Regional teams....

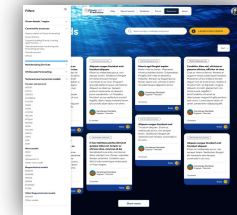
<https://www.unoceanprediction.org/en>



The Atlas



The Forum



2

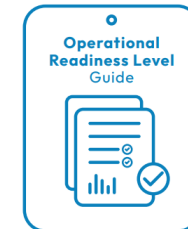
... devoted to create the best possible ocean forecasting services!



Shared knowledge



Building robust services



Operating and improving



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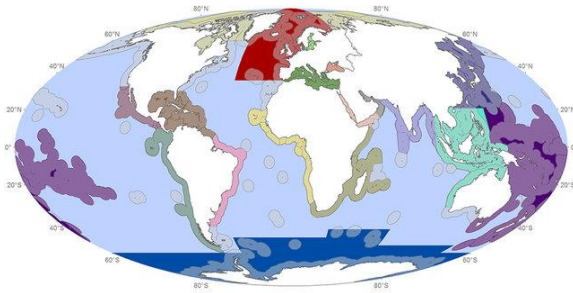


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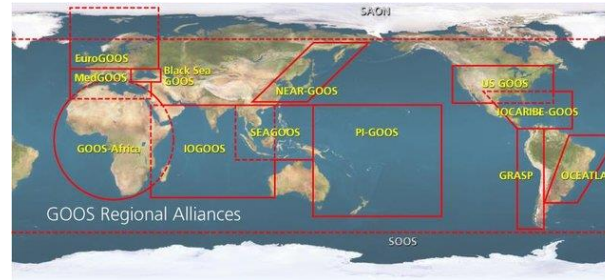
Pillars (1/2): A global and transversal community

Oceanprediction DCC **Regional Teams**: Promoting the implementation and use of ocean forecasting systems worldwide

UNEP regional seas



GOOS regional alliances



- Region 1: West Pacific and MSEA
- Region 2: Indian seas
- Region 3: African seas
- Region 4: Mediterranean and Black Sea
- Region 5: North-East Atlantic
- Region 6: South and central America
- Region 7: North America
- Region 8: Arctic
- Region 9: Antarctic

“Boots on the ground” work:

- Support decade actions related to ocean forecasting
- Identify gaps and ways forward
- Capacity building
- Advocate for the implementation of Best Practices, Standards, and Tools
- ...



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4. OceanPrediction community: 9 regional teams



OceanPrediction ARCTIC



OceanPrediction NORTHEAST ATLANTIC



OceanPrediction NORTH AMERICA



OceanPrediction AFRICAN SEAS



OceanPrediction MED & BLACK SEA



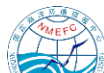
OceanPrediction ANTARCTIC



OceanPrediction WEST PACIFIC & MARGINAL SEAS OF SOUTHEAST ASIA



OceanPrediction INDIAN SEAS INCOIS



Pillars (2/2): The ocean forecasting co-design team



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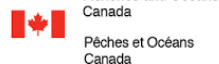
OceanPrediction technical collaboration

40 experts to develop a new scenario for Ocean forecasting:

- Common architecture
- Agreed standards & best-practices
- Operational Readiness Level



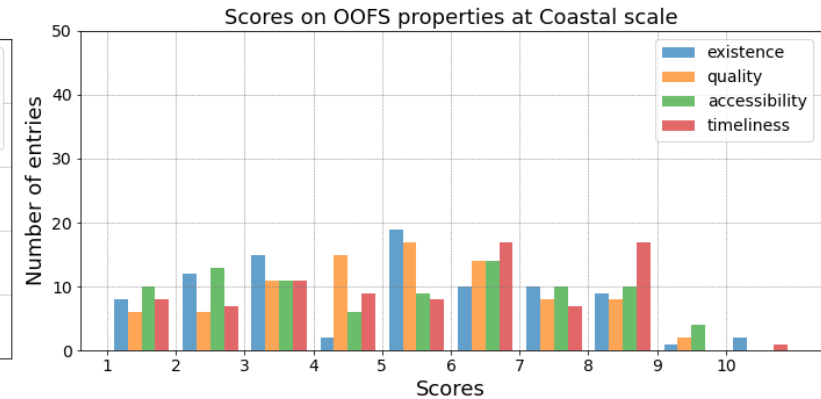
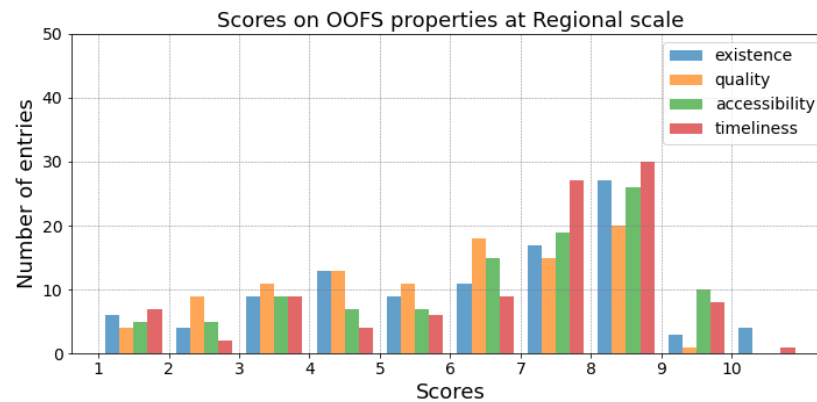
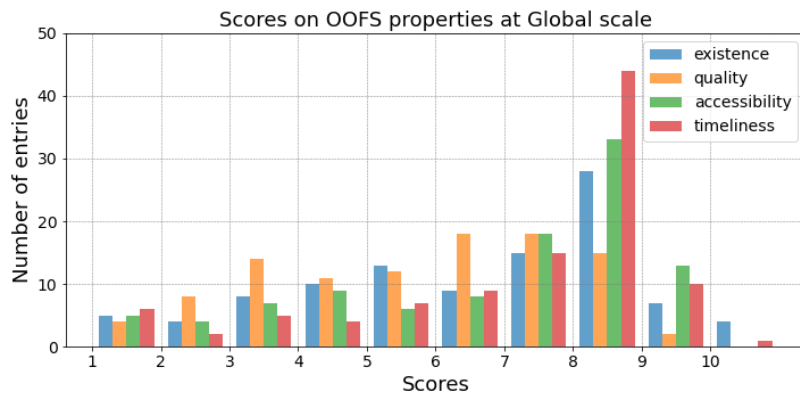
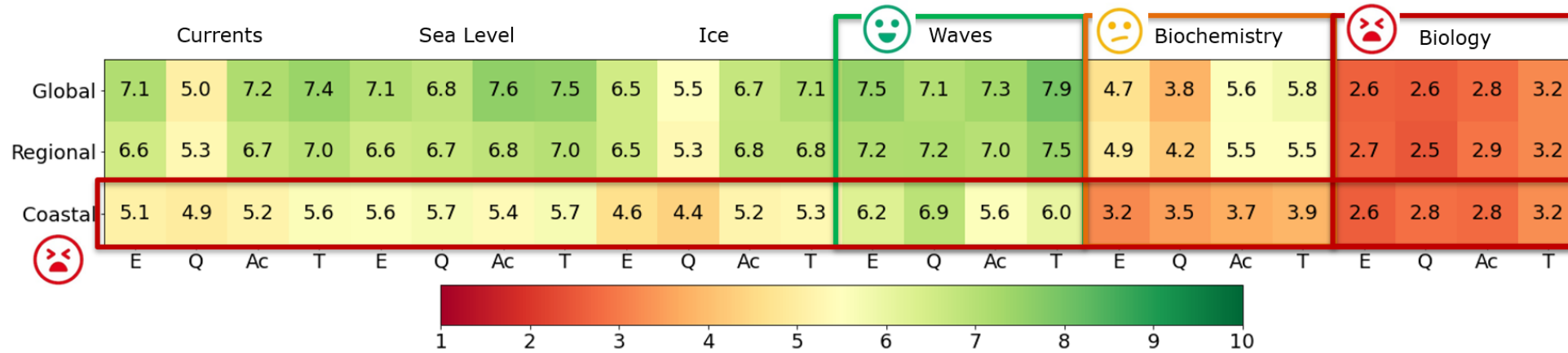
THE OCEAN FORECASTING CO-DESIGN TEAM



Experts Poll “Diagnosis”

Rate our ability to provide a solution:

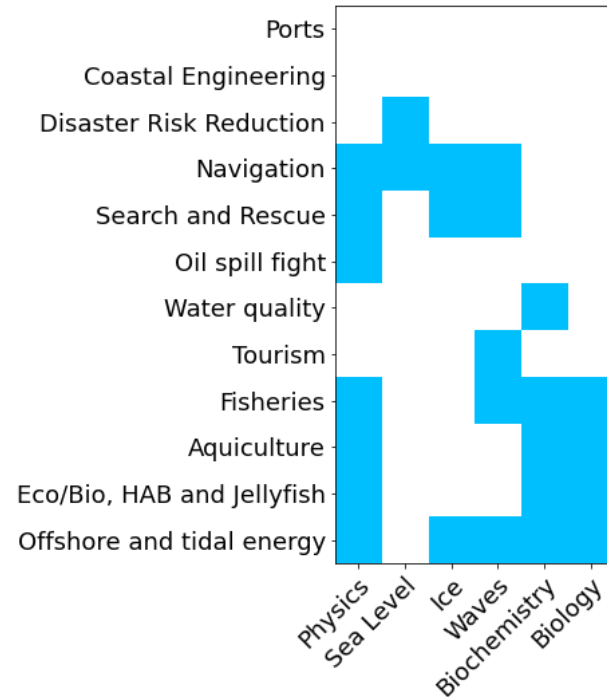
E	Existence
Q	Quality
AC	Accessibility
T	Timeliness



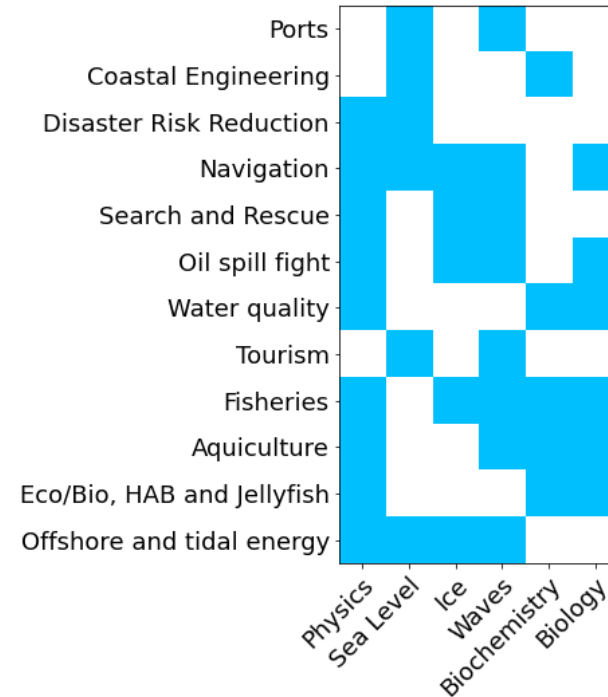
Where are our systems being used?

The view of the experts:

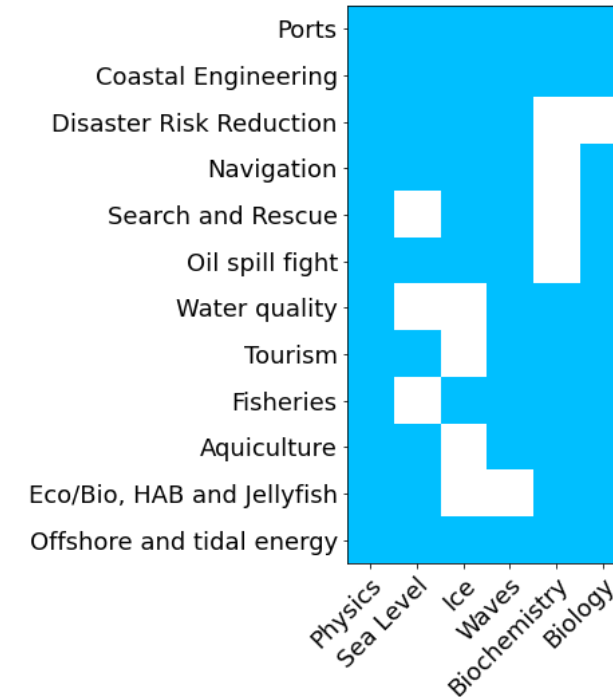
Answers from Experts: Global scale



Answers from Experts: Regional scale

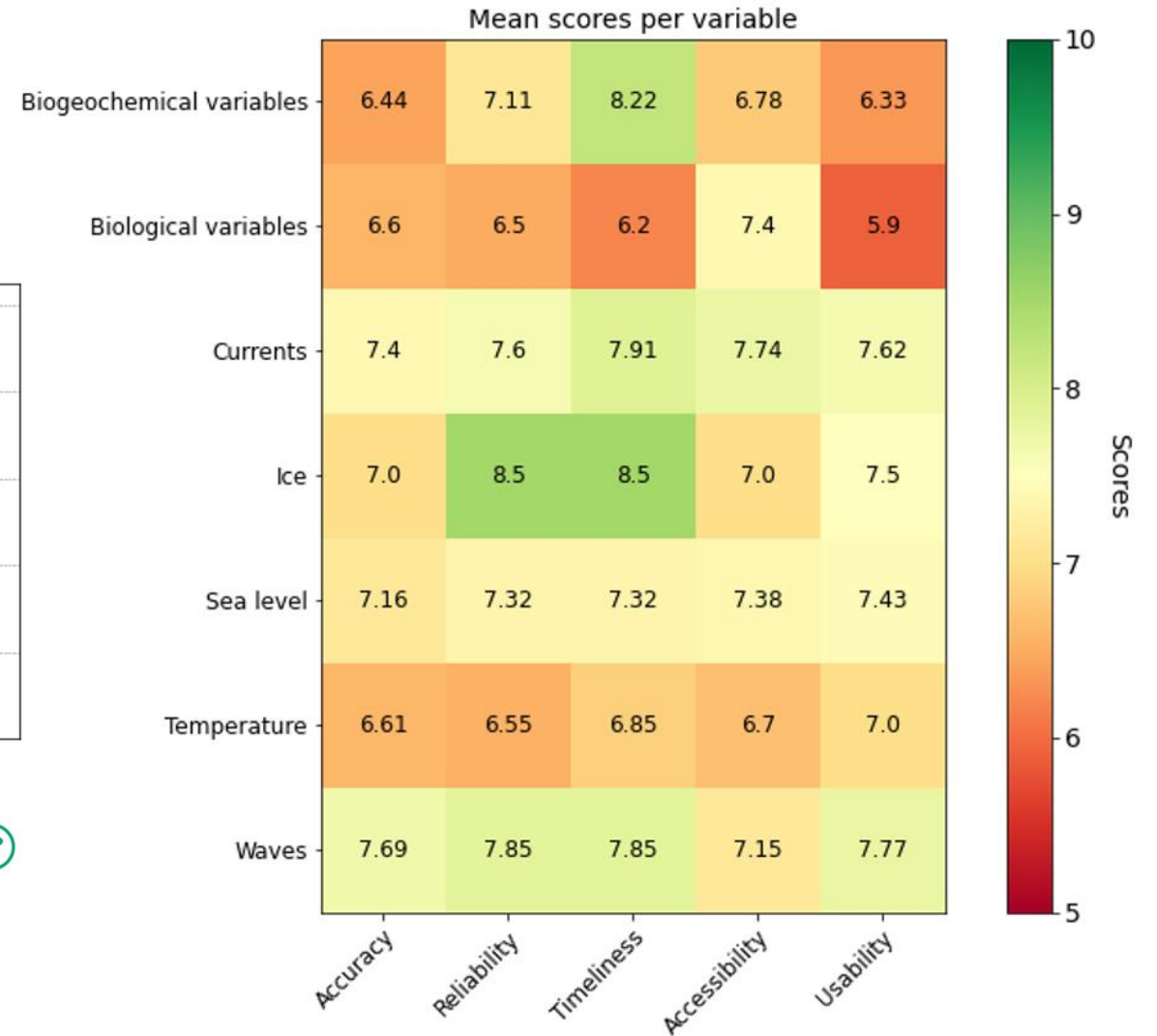
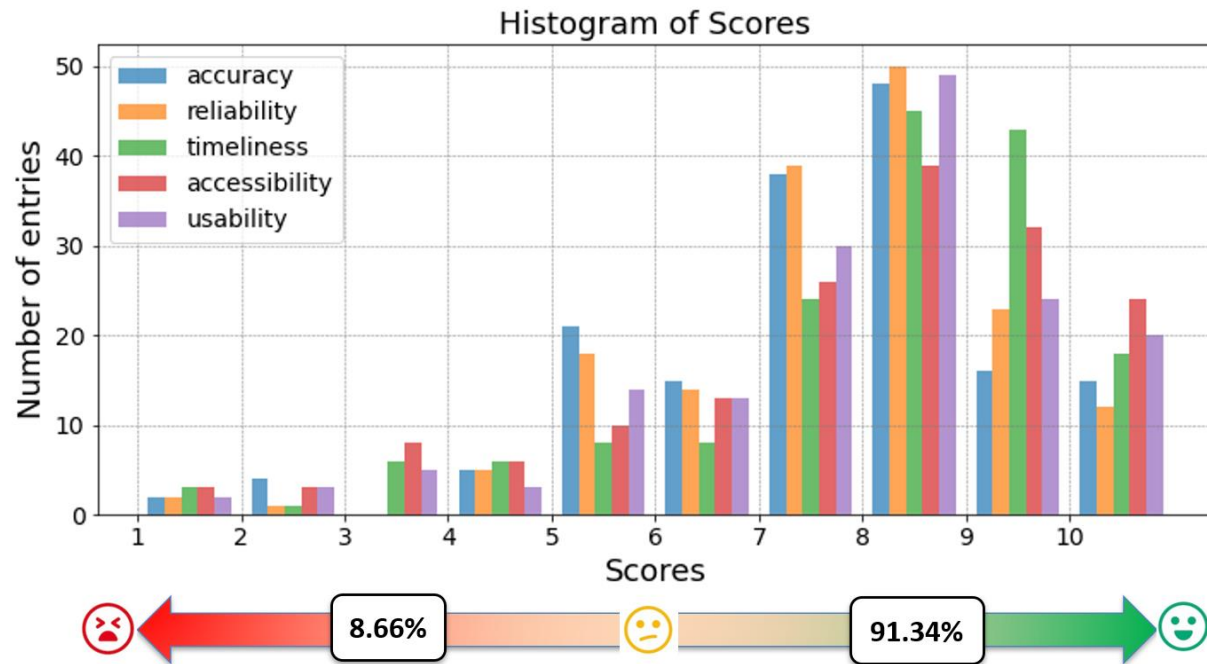


Answers from Experts: Coastal scale



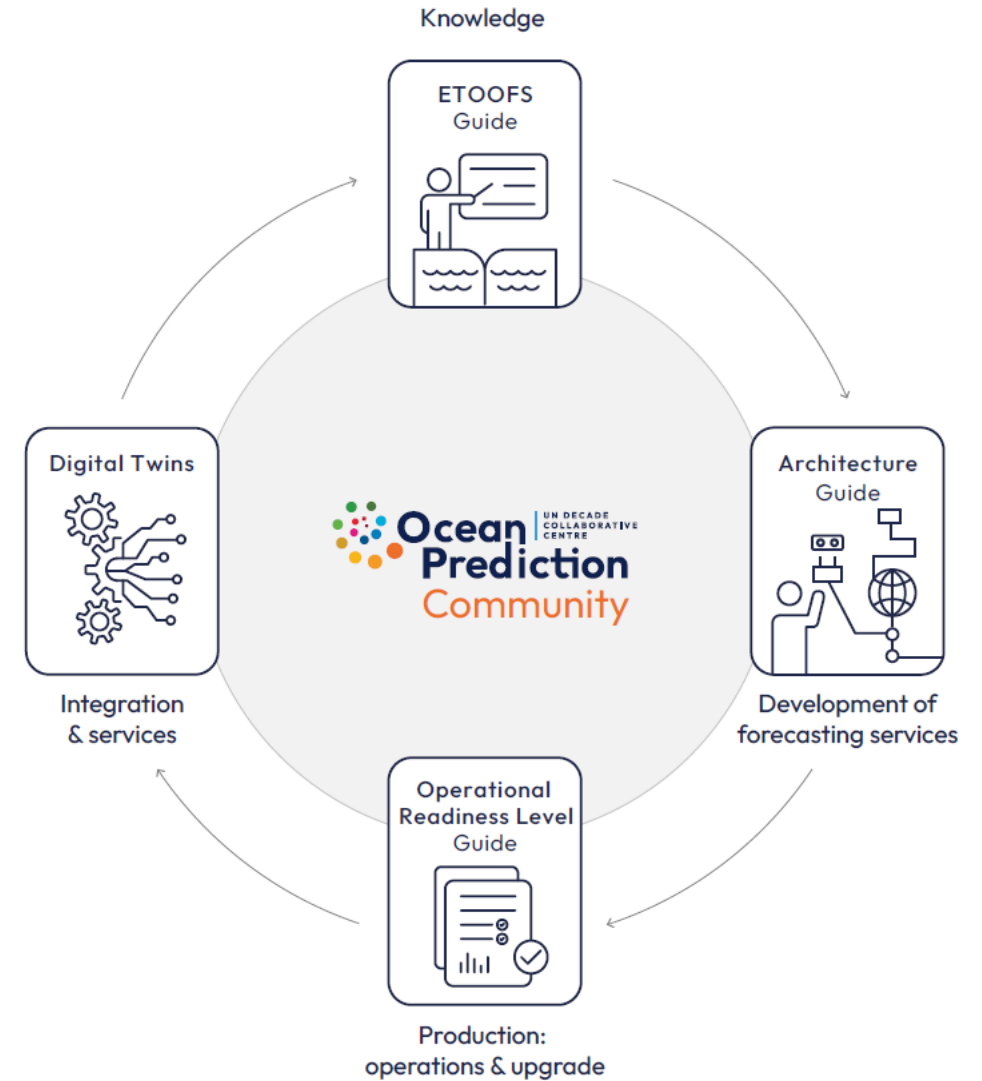
Users Poll “Diagnosis”: mean scores

Rate our ability to provide a solution:



The ocean forecasting we need

- OceanPrediction DCC is promoting collaboration towards the ocean forecasting we need.
- A virtuous loop implemented by our community
- OceanPrediction DCC is building the assets to make it possible



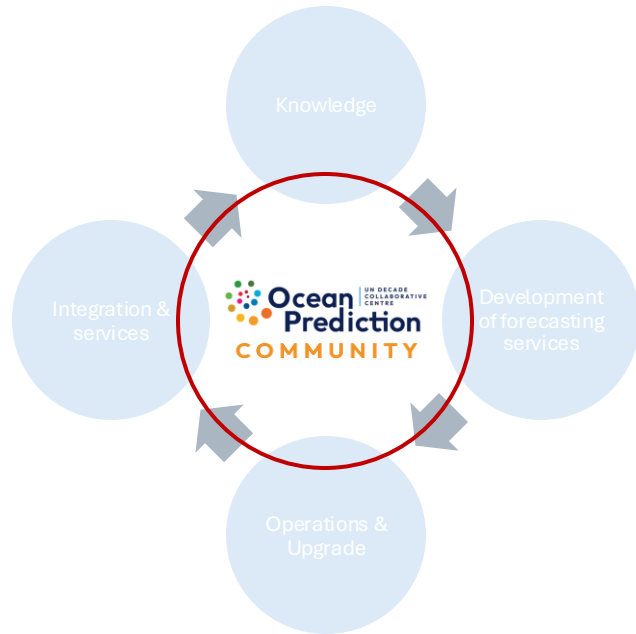
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Building a community with our Regional Teams



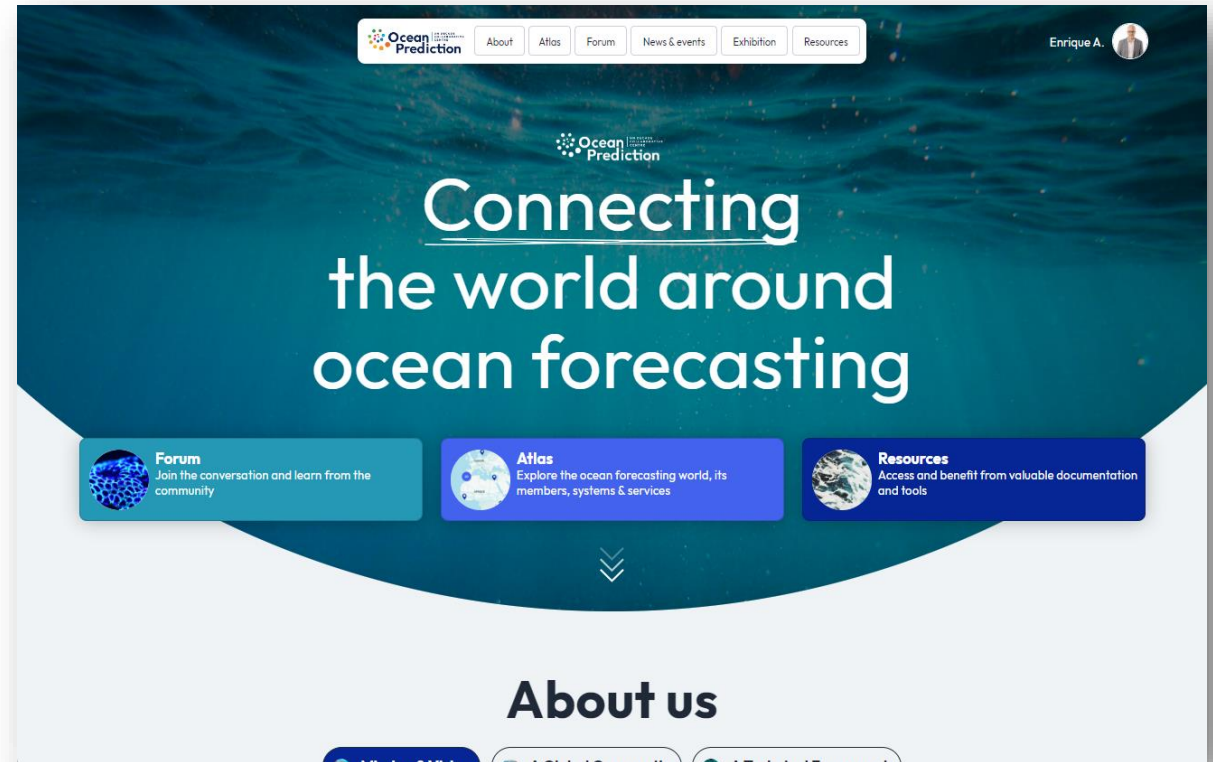
The web



The Forum



The Atlas



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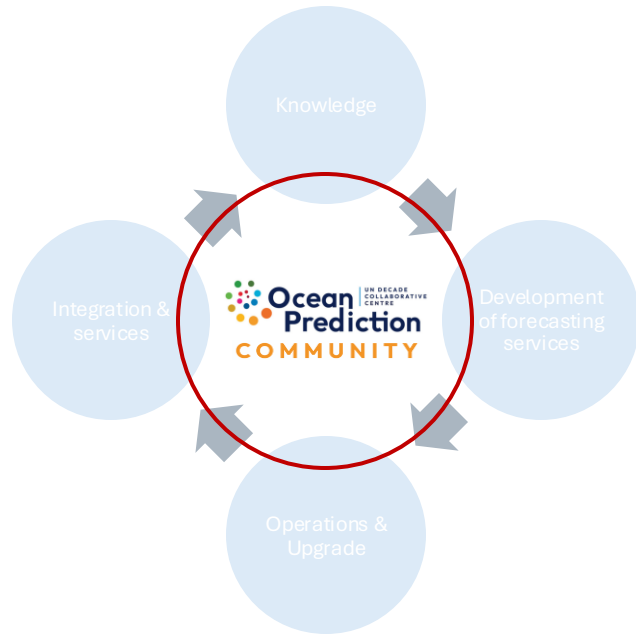
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Building a community with our Regional Teams



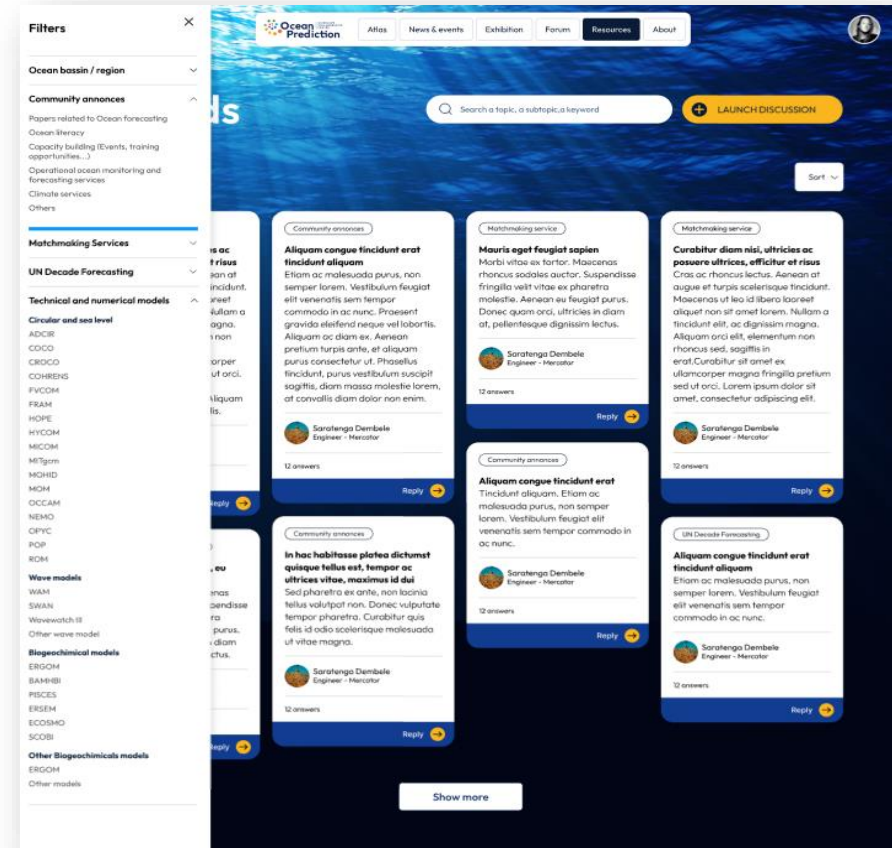
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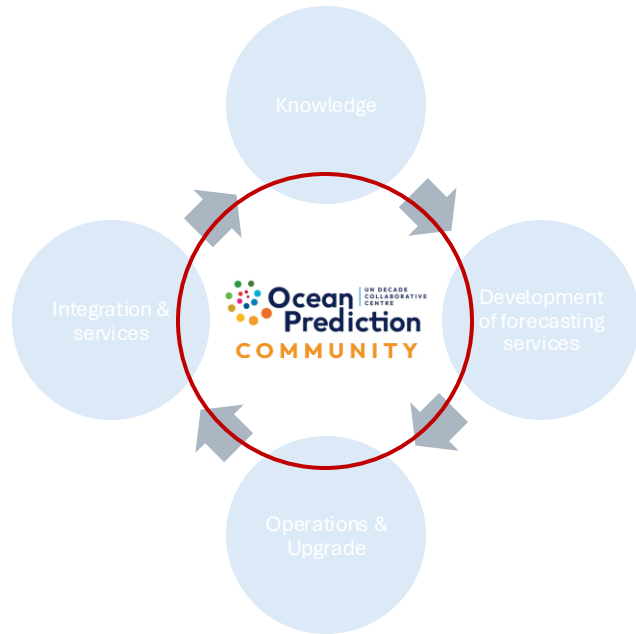
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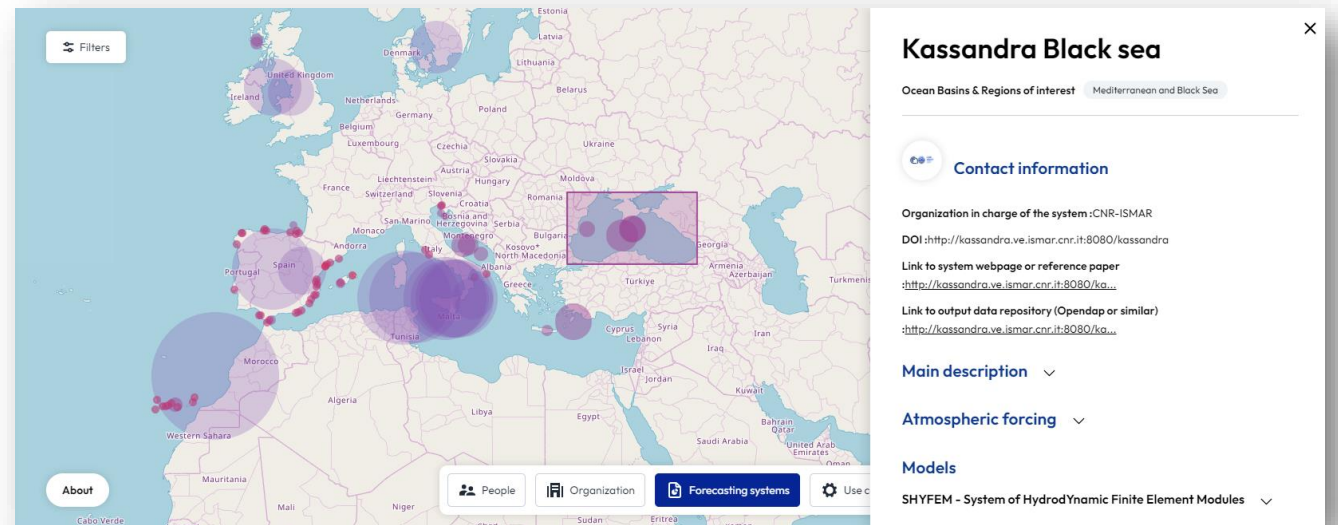
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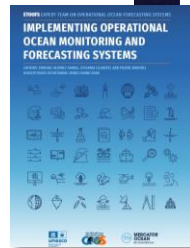
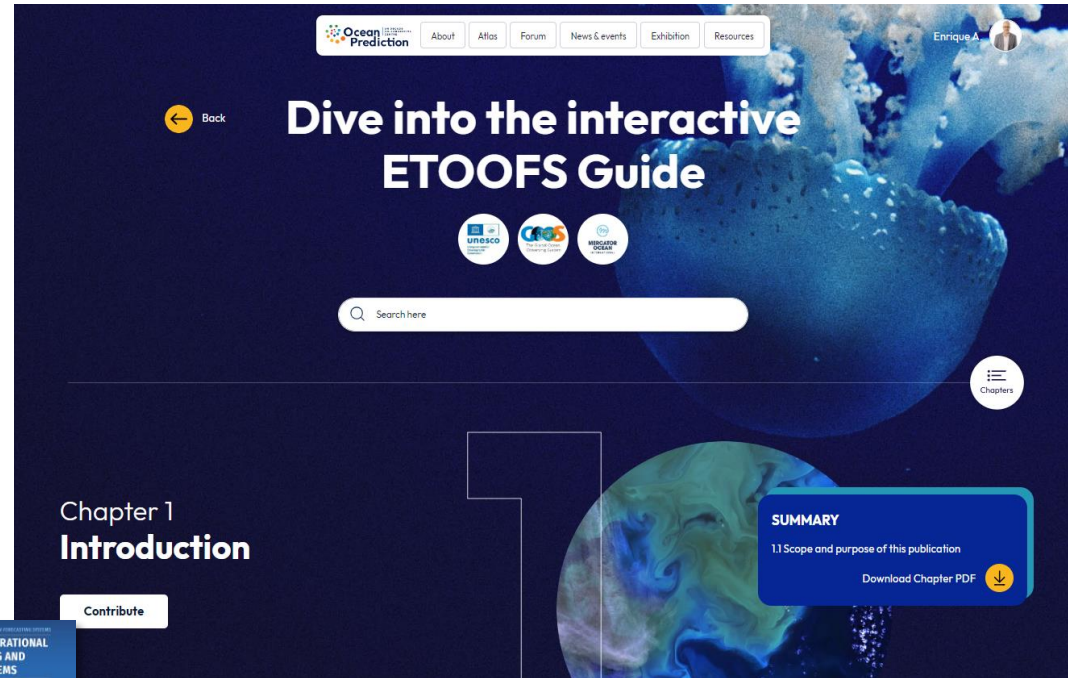
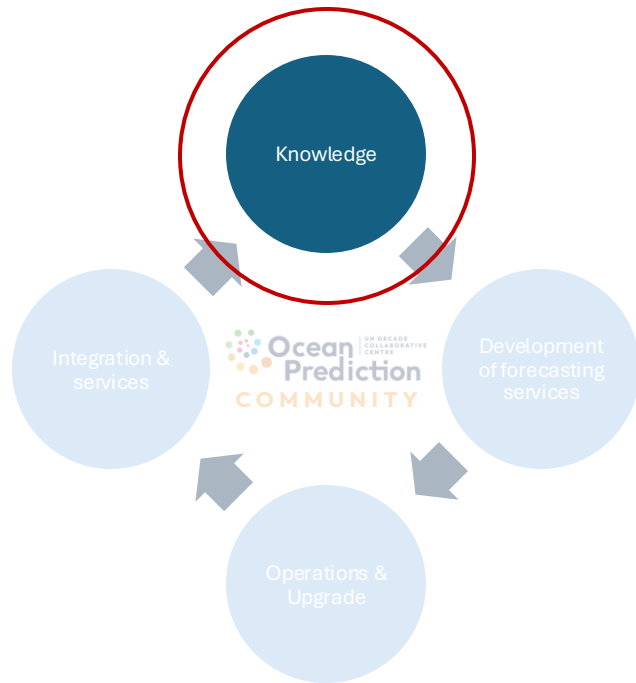
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Building our shared knowledge



- A community compilation of our shared knowledge
- Now available on wiki format



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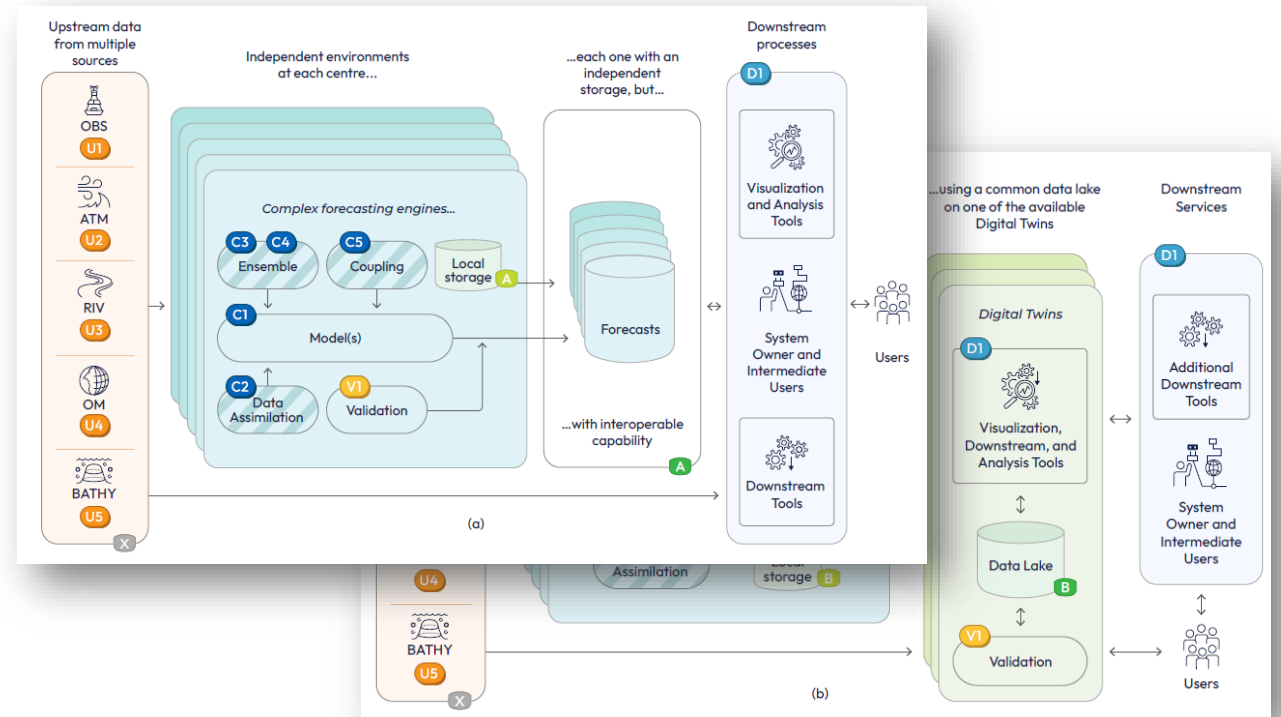
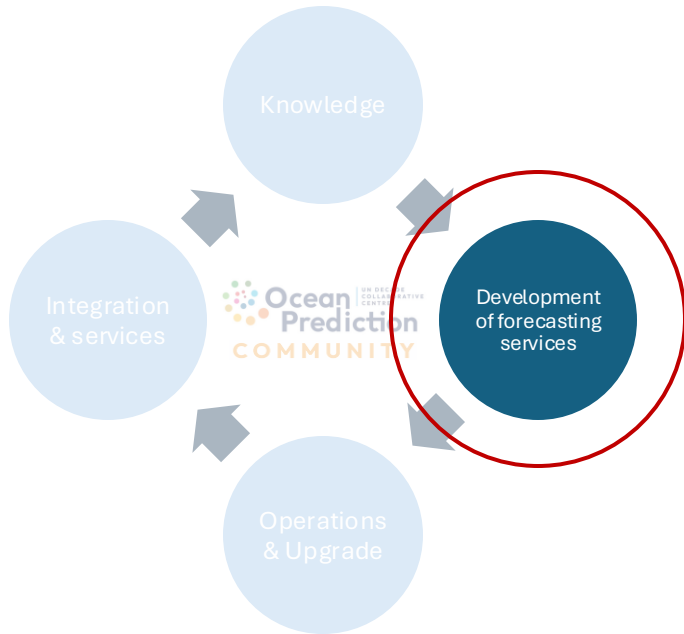
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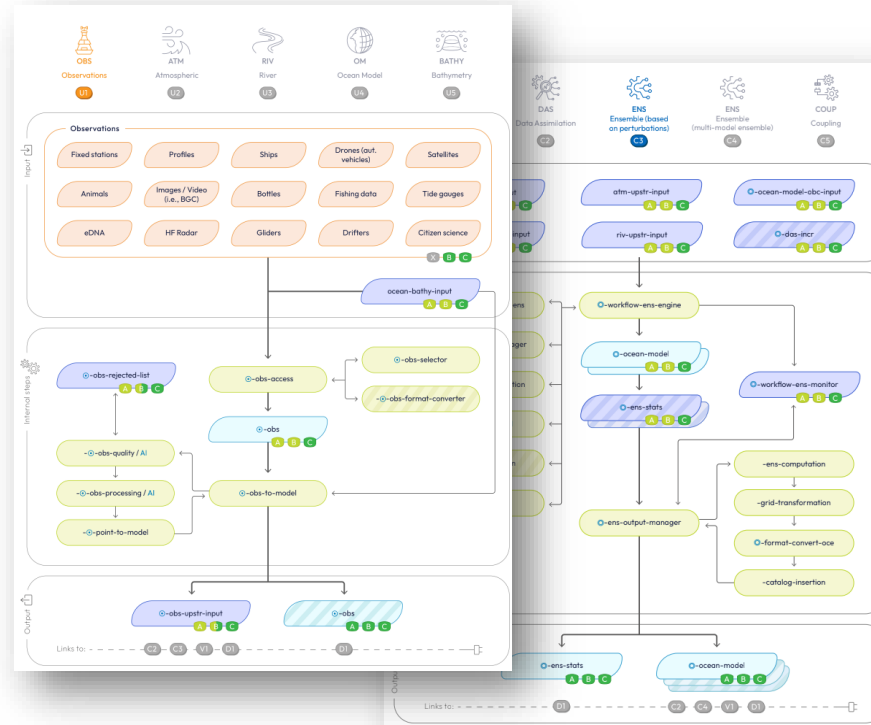
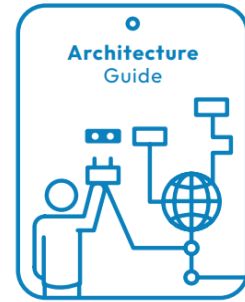
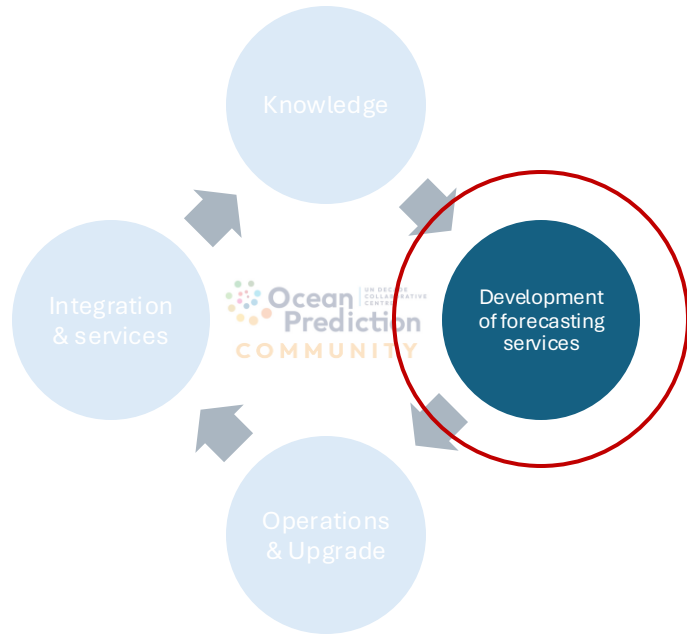
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Building robust Ocean forecasting services



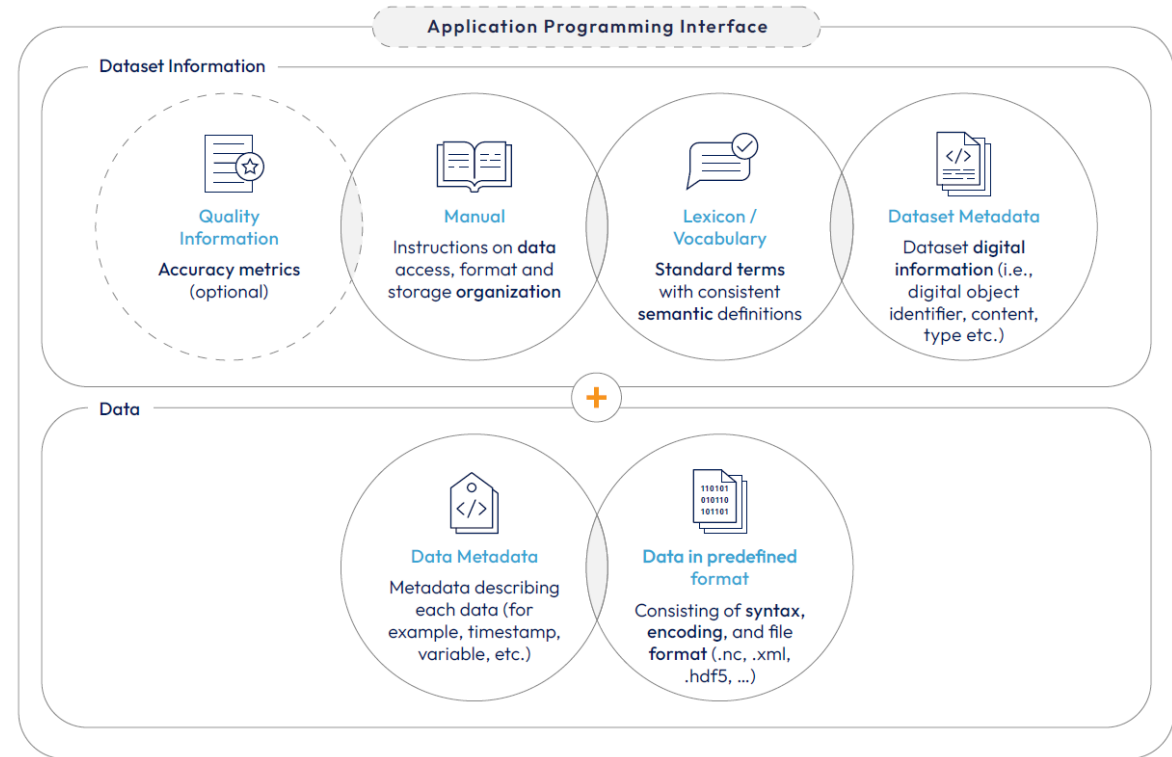
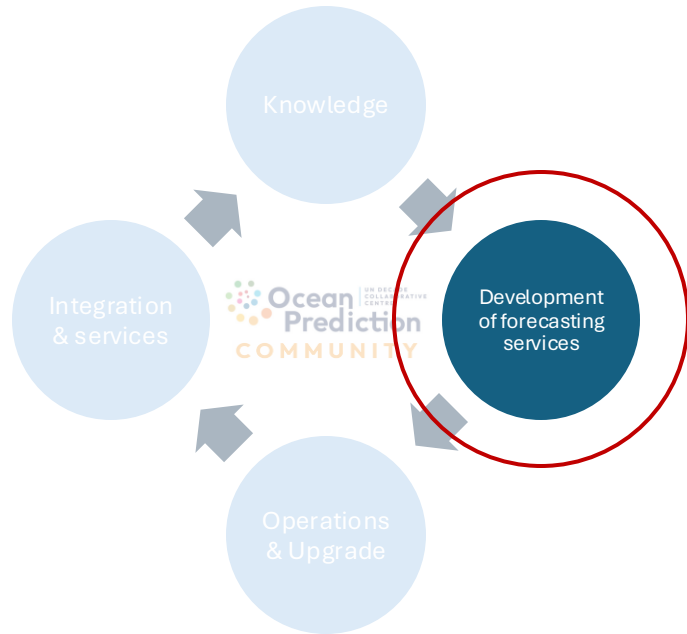
- A community product to be delivered soon by OceanPrediction DCC
- A practical Guide on how to “wire” a Forecasting System
- A definition of the tools and data standards to be developed during the Decade

Building robust Ocean forecasting services



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Building robust Ocean forecasting services



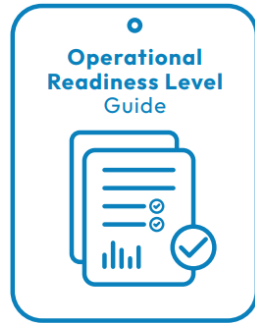
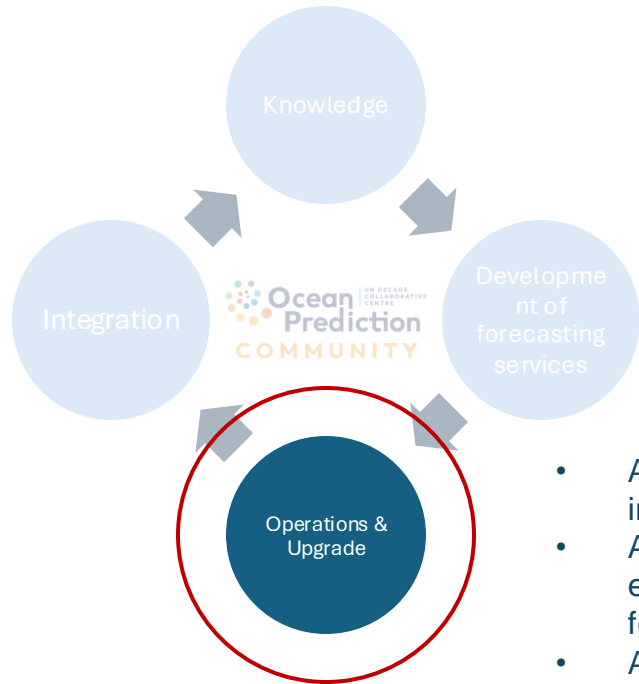
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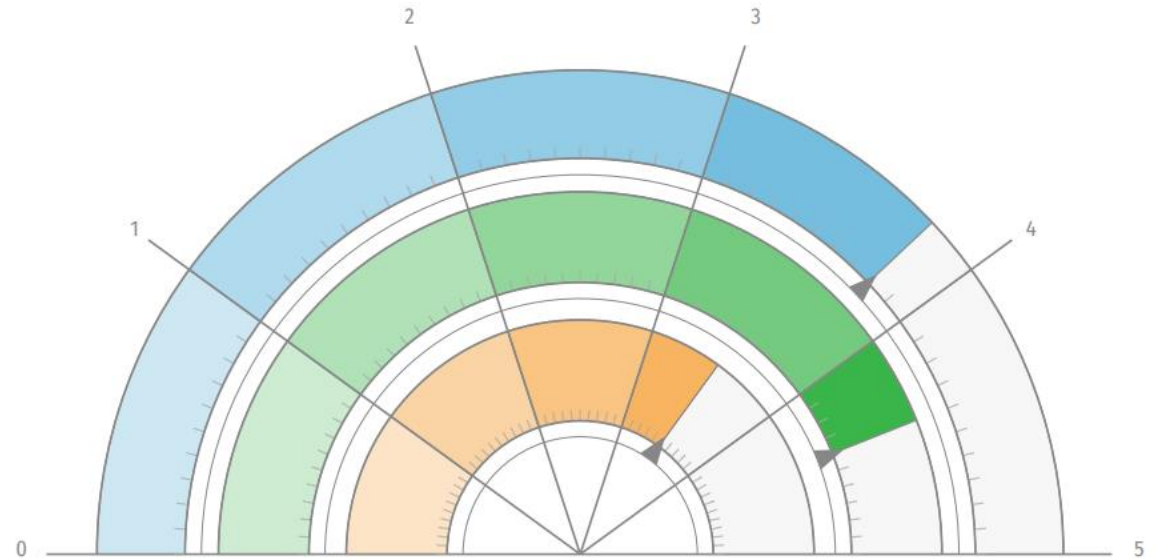


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Operating and improving Ocean forecasting services



- A mechanism to introduce Best Practices
- A way to promote the evolution of Ocean forecasting
- A mechanism to endorse services to join common frameworks



1. Production

The first digit
reflects the reliability of the service, focusing on operational aspects rather than product quality.



2. System Validation

The second digit
monitors the level of validation for the service.



3. Product Dissemination

The third digit
assesses the various degrees of product dissemination achievable by the system.



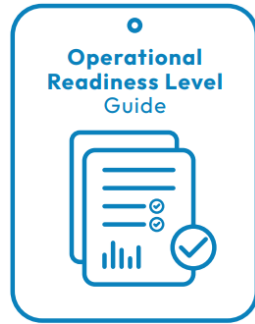
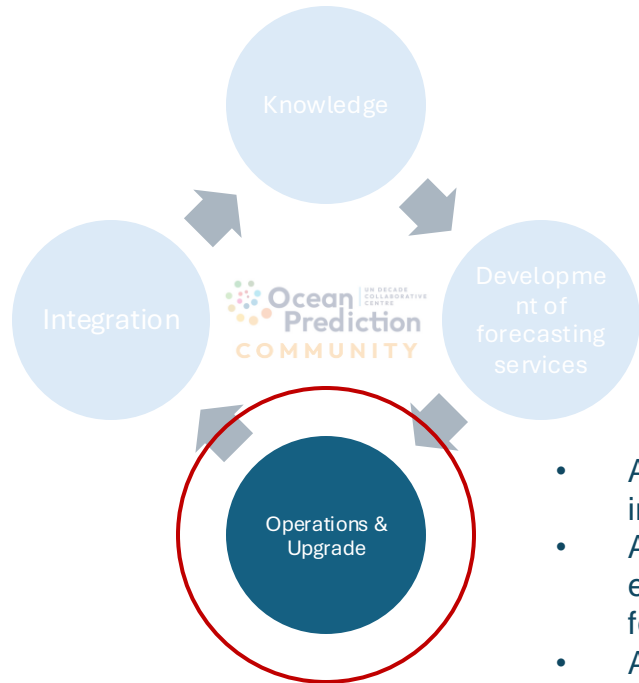
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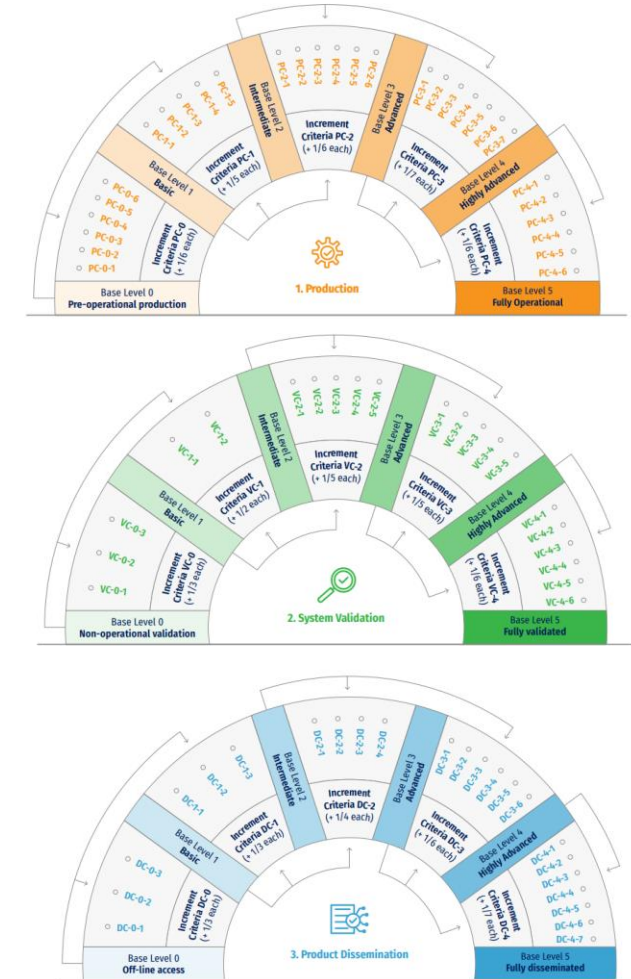
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1. PRODUCTION	
Base Level 0: Pre-operational production	
PC-0-1	Sufficient and reliable computational resources are secured for the operation of the system.
PC-0-2	The system is launched automatically by a processing chain that verifies the existence of all the required forcings and other upstream data, runs the model or AI, and archives the output.
A basic log file is created on each forecasting cycle informing on the start and correct (or incorrect) ending of	
1/6 points to the level score.	
2. VALIDATION	
Base Level 0: Non-operational validation	
VC-0-1	An offline system validation covering a period long enough to assess the quality of the solution concerning the main phenomena to be forecasted is done during the service's setup and/or pre-operational phase.
1/3 points to the level score.	
3. PRODUCT DISSEMINATION	
Base Level 0: Off-line access	
DC-0-1	Data produced by the system is stored and available to the developers for offline purposes, such as pre-operational evaluation.
DC-0-2	Historical and last forecast data can be provided to third parties under conditions (distribution rights, crediting instructions, ...) established by the data producer.
DC-0-3	Data is stored in a well-described data format, so the users can use the data easily.
Each fulfilled criteria adds 1/3 points to the level score.	
Base Level 1: Basic	
DC-1-1	The latest forecast product is distributed to users and developers in graphical format (for example via plots of time series or 2D fields in a web page).
DC-1-2	Numerical data is distributed to external users under request and using internationally agreed data standard formats (that will be considered in the future OceanPrediction DCC recommendations).
DC-1-3	A help desk operating in working hours (8 hours - 5 days per week) is available to support users.
Each fulfilled criteria adds 1/3 points to the level score.	
Base Level 2: Intermediate	
DC-2-1	Data from the last cycle (in numerical format following an internationally agreed Data Standard) can be accessed routinely by the user without the need for a specific request. This could be done, for example, via FTP



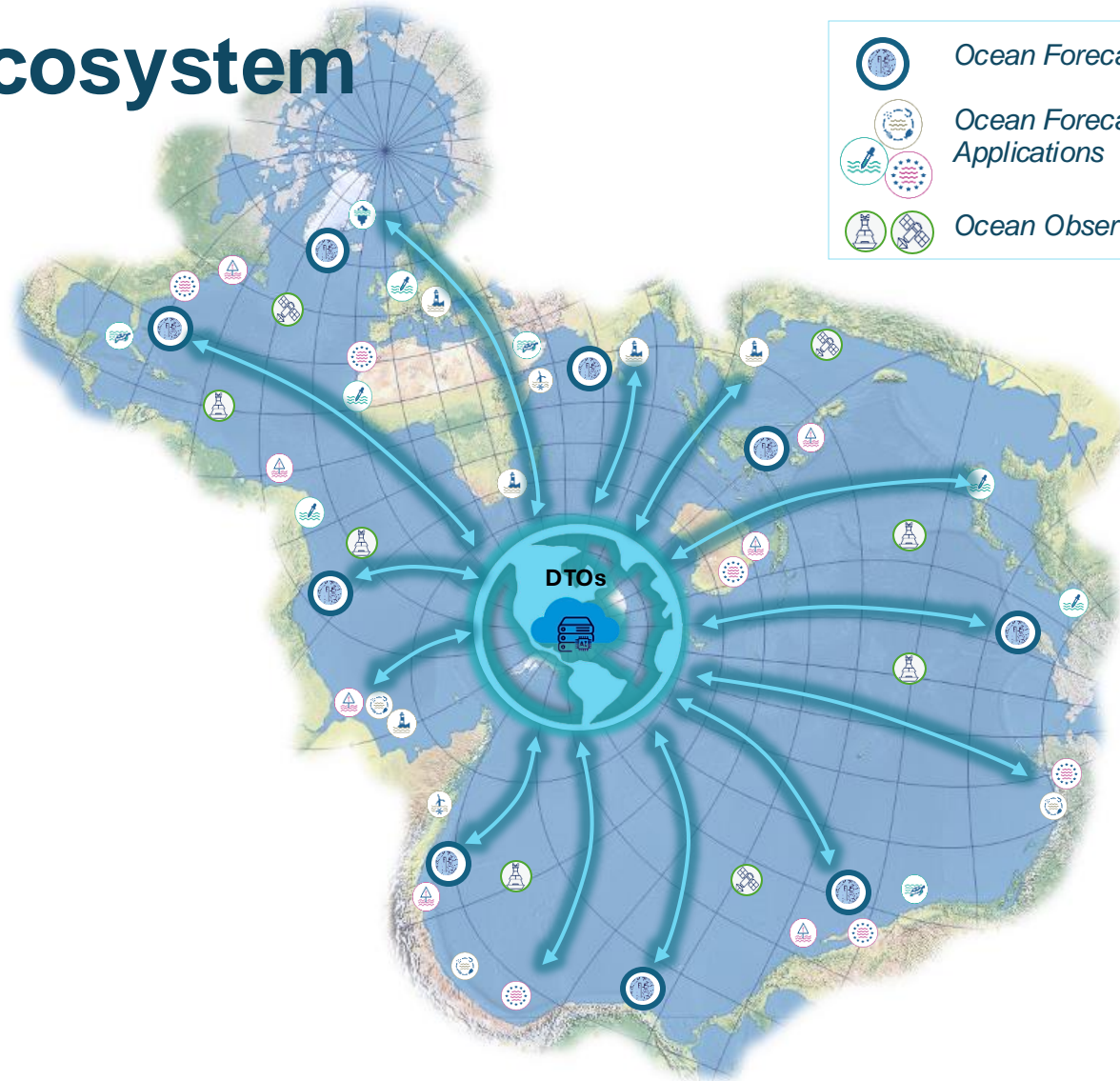
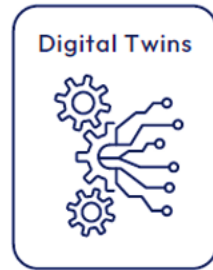
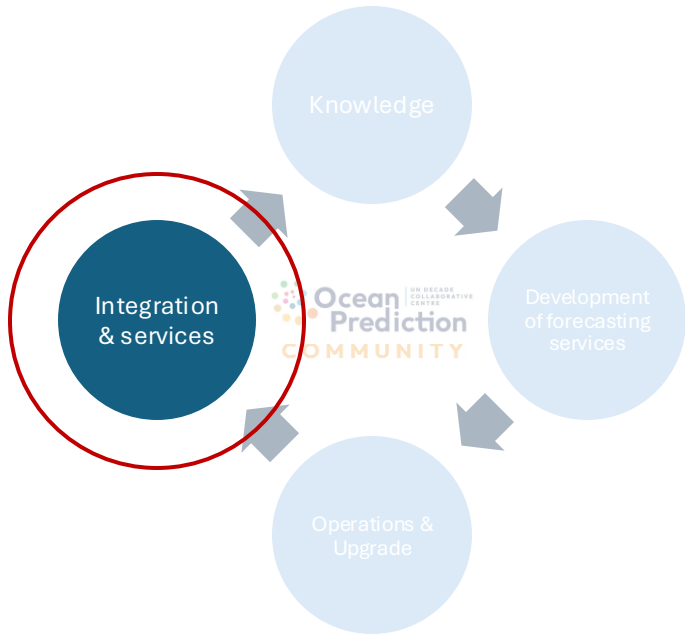
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One ocean, one digital ecosystem



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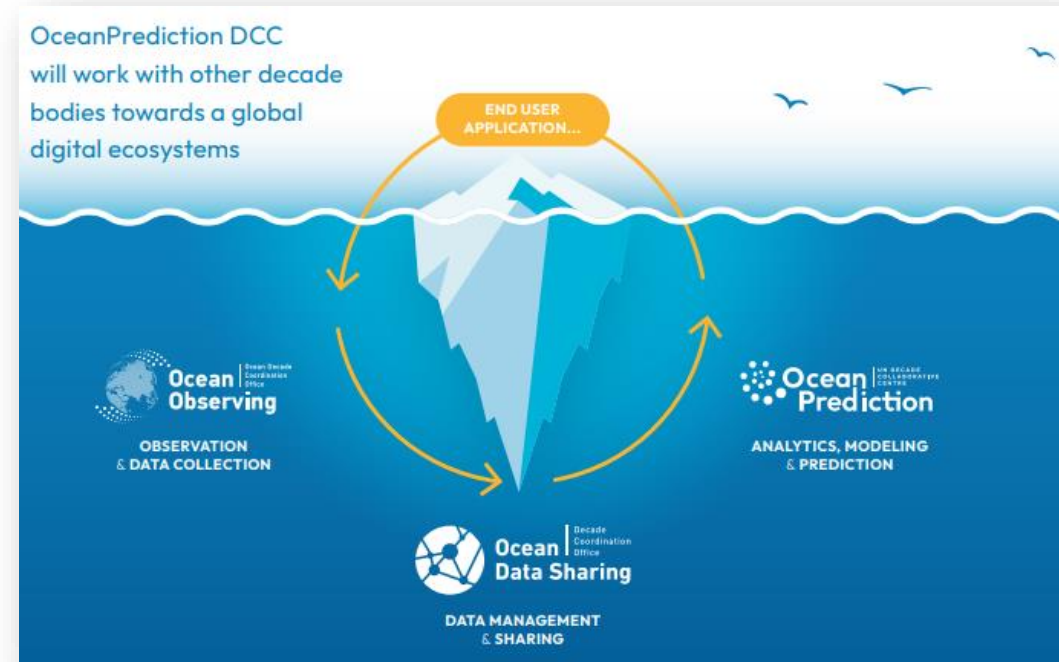
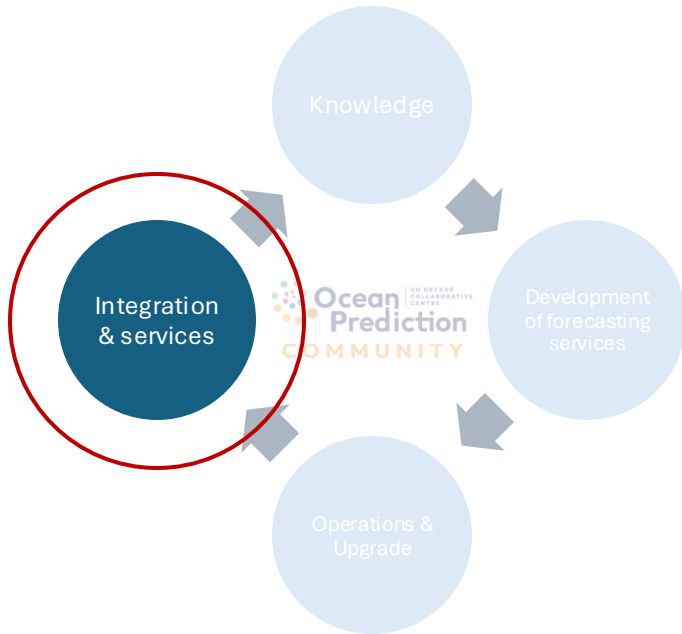
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One ocean, one digital ecosystem



Ocean Prediction Capacity of the Future
ForeSea

DITTO
Digital Twins of the Ocean

Ocean best practices

CoastPredict
with The Global Ocean Observing System

GEMS OCEAN

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Conclusions

- OceanPrediction DCC will work in close collaboration with Decade partners to promote Ocean Forecasting and its applications during the Decade
- A community is organized around the Regional Teams
- The first results of this effort are visible:
 - Architecture
 - ORL
 - Atlas
 - Forum
 - ... more to come
- Register at <https://www.unoceanprediction.org/en>



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