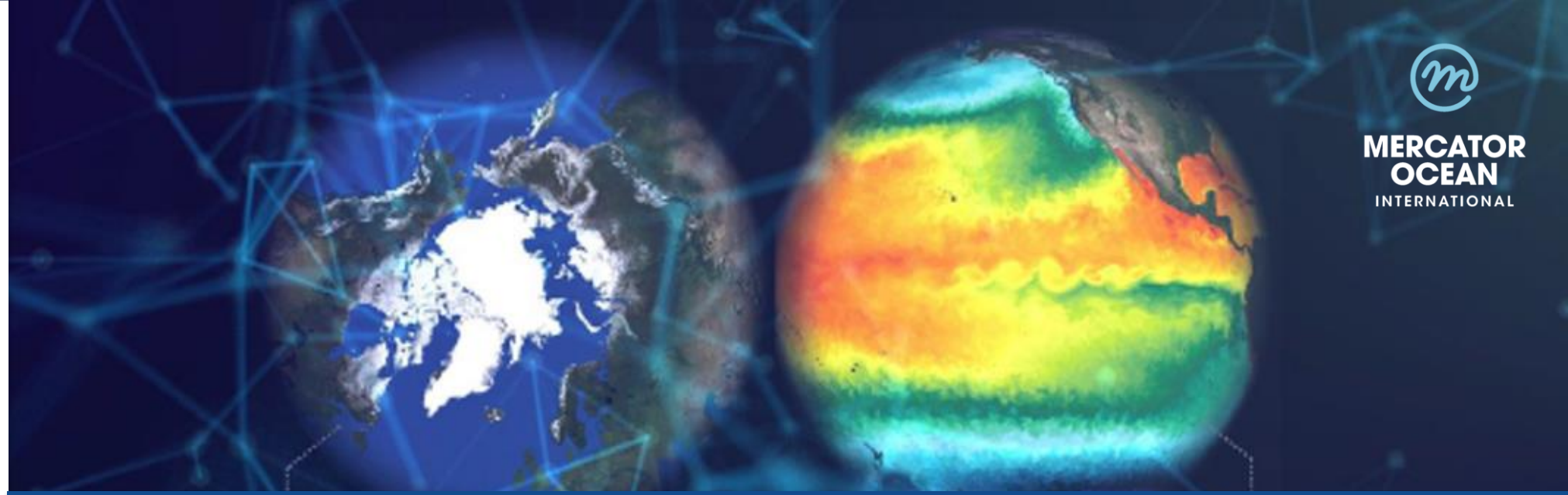
unesco
Intergovernmental Oceanographic Commission

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

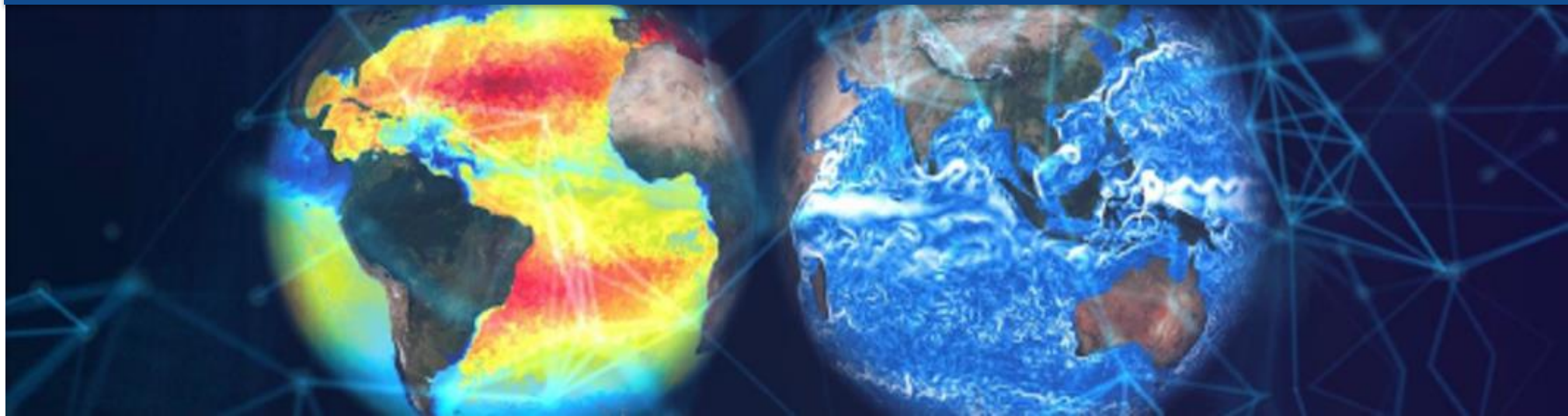
Ocean Prediction UN DECADE COLLABORATIVE CENTER



MERCATOR OCEAN INTERNATIONAL

OceanPrediction-DCC *on establishing a global operational oceanography architecture*

Connecting the world around Ocean forecasting



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The OceanPrediction DCC voyage

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

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2030: THE OCEAN FORECAST
WE WANT

- Connected community and services
- Many robust systems worldwide

Pillars (2/2): A technical joint global framework

THE OCEAN FORECASTING CO-DESGIN TEAM

PROBLEM

GAPS: SYSTEMS TECHNICALLY DISCONNECTED

During development: new systems require a development from scratch. "Core" services disconnected

During exploitation: No possibility to use common tools for OOFS validation, dissemination and exploitation

OPPORTUNITY

The decade as game changer: a new scenario for ocean forecasting will be possible by harnessing UN Decade and Digital Twin opportunities

TOWARDS A SOLUTION

An "Ocean Forecasting Co-design Team": will design a new architecture(standards, tools, best practices, etc.) in cooperation with related Decade programmes

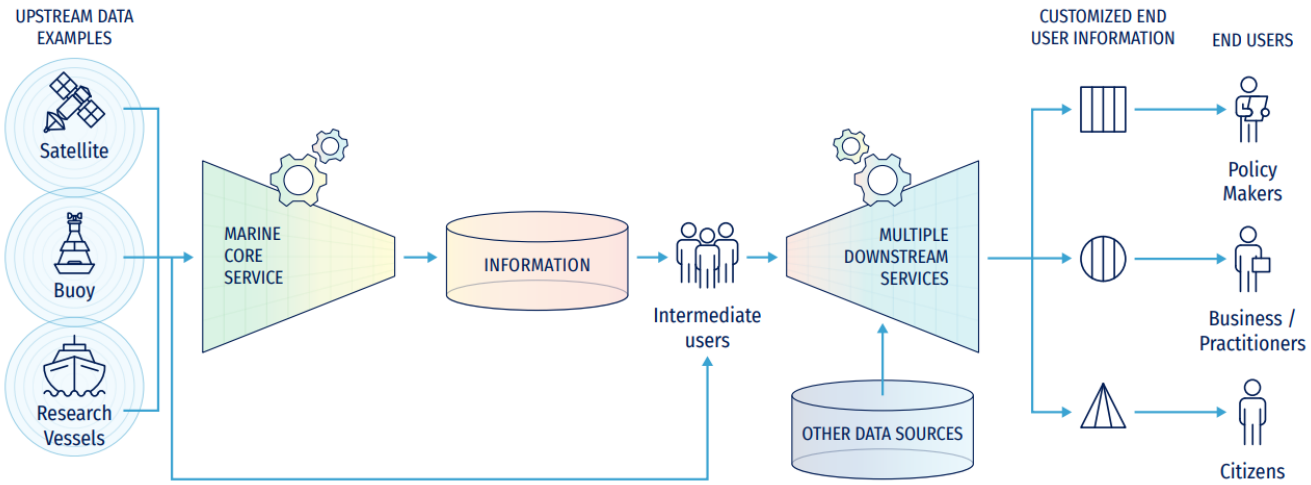
Results to inspire: Decade programmes development targets

Ocean Forecasting Co-design Team: Objectives and benefits

- Objectives:
  - **Design an ocean forecasting architecture to overcome the existing gaps**, allowing to deliver as one and taking benefit of the digital twining concept.
    - This architecture will include well-defined building blocks, that in our case will take the form of Standards, Tools, Best Practices and Operational Readiness Levels.
    - Decade actions or others could later build these “bricks” and contribute to implement this architecture
- Benefits:
  - This new scenario will benefit all the services but will have an especial impact on the capabilities at less technologically advanced institutions
  - We will increase worldwide our family, with new visions
  - This work will have a value by itself and, hopefully, will also benefit the programmes in their future search for funding due to the existence of a set of well-defined development targets

Ocean Forecasting Co-design Team: Composition

Team built to cover all aspects of value chain



Ocean Forecasting Co-Design Team experts			
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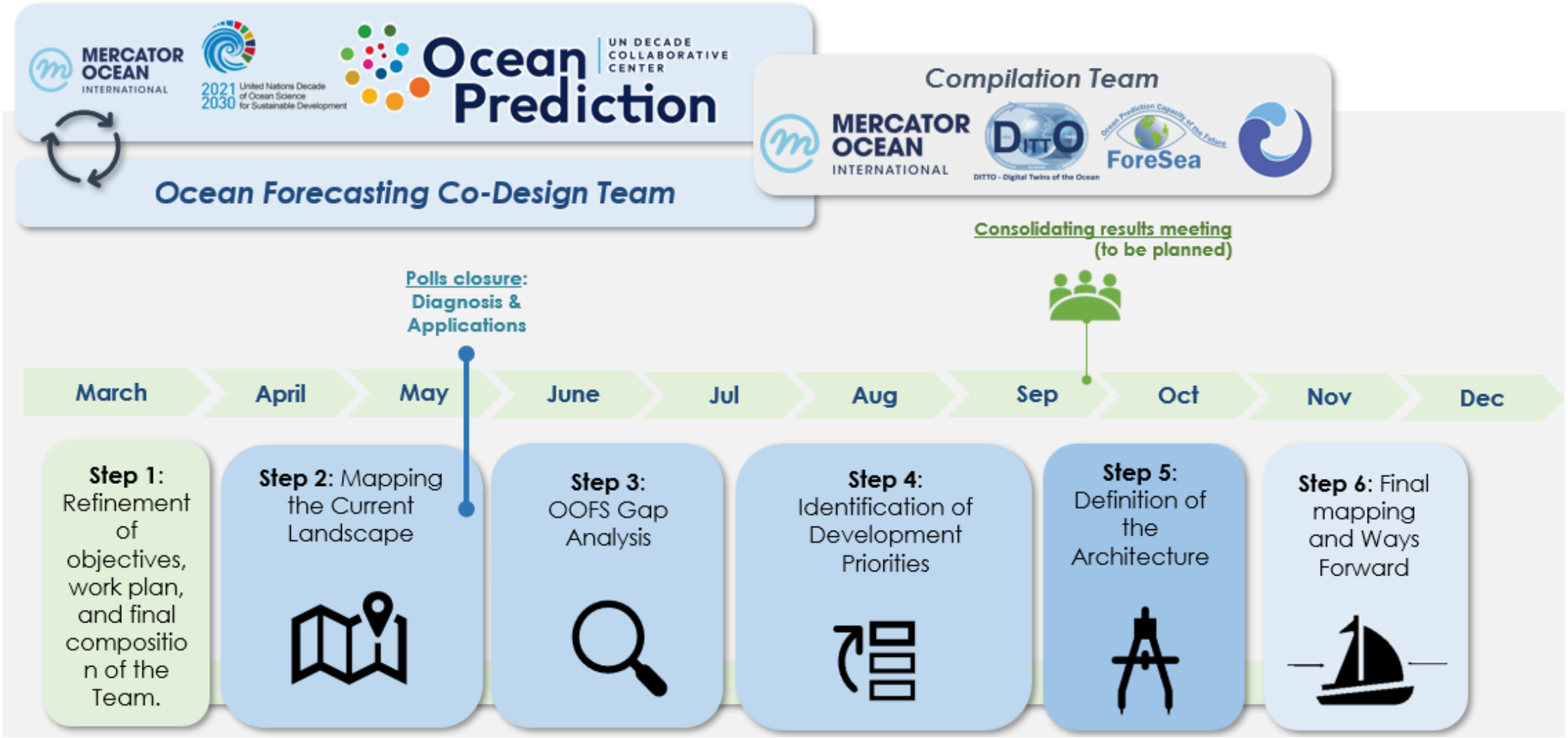
Work Plan for the OFCT



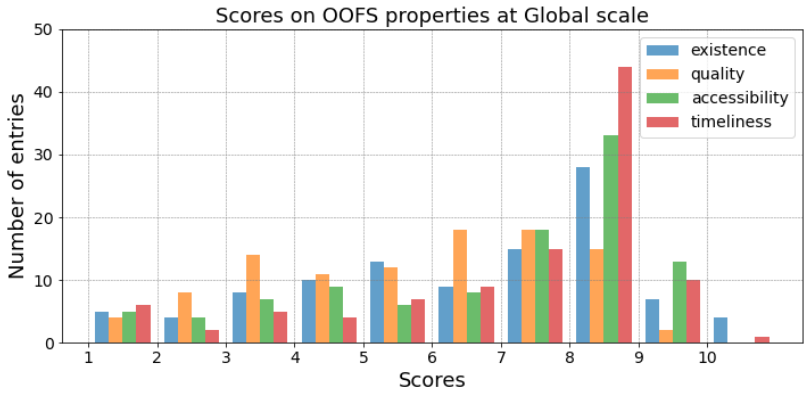
Experts Poll “Diagnosis”

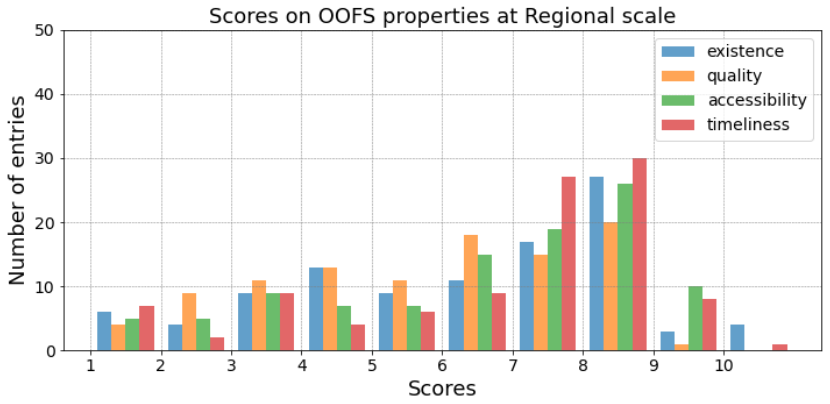
E	Existance
Q	Quality
AC	Accessibility
T	Timeliness

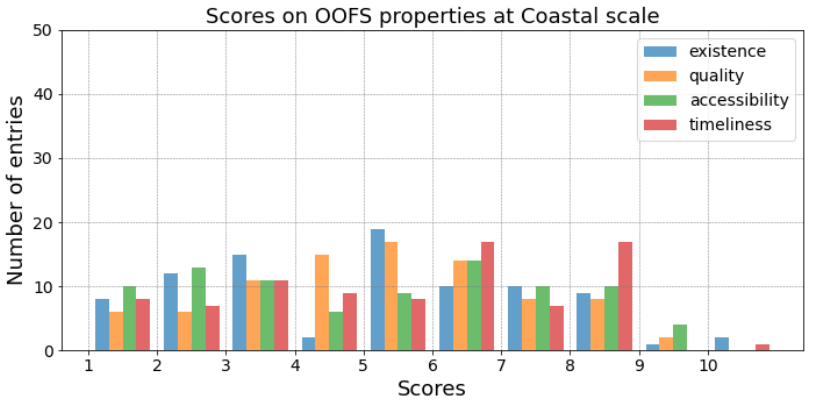
Rate our ability to provide a solution:

	Currents				Sea Level				Ice				Waves				Biochemistry				Biology			
	E	Q	Ac	T	E	Q	Ac	T	E	Q	Ac	T	E	Q	Ac	T	E	Q	Ac	T	E	Q	Ac	T
Global	7.1	5.0	7.2	7.4	7.1	6.8	7.6	7.5	6.5	5.5	6.7	7.1	7.5	7.1	7.3	7.9	4.7	3.8	5.6	5.8	2.6	2.6	2.8	3.2
Regional	6.6	5.3	6.7	7.0	6.6	6.7	6.8	7.0	6.5	5.3	6.8	6.8	7.2	7.2	7.0	7.5	4.9	4.2	5.5	5.5	2.7	2.5	2.9	3.2
Coastal	5.1	4.9	5.2	5.6	5.6	5.7	5.4	5.7	4.6	4.4	5.2	5.3	6.2	6.9	5.6	6.0	3.2	3.5	3.7	3.9	2.6	2.8	2.8	3.2

1 2 3 4 5 6 7 8 9 10

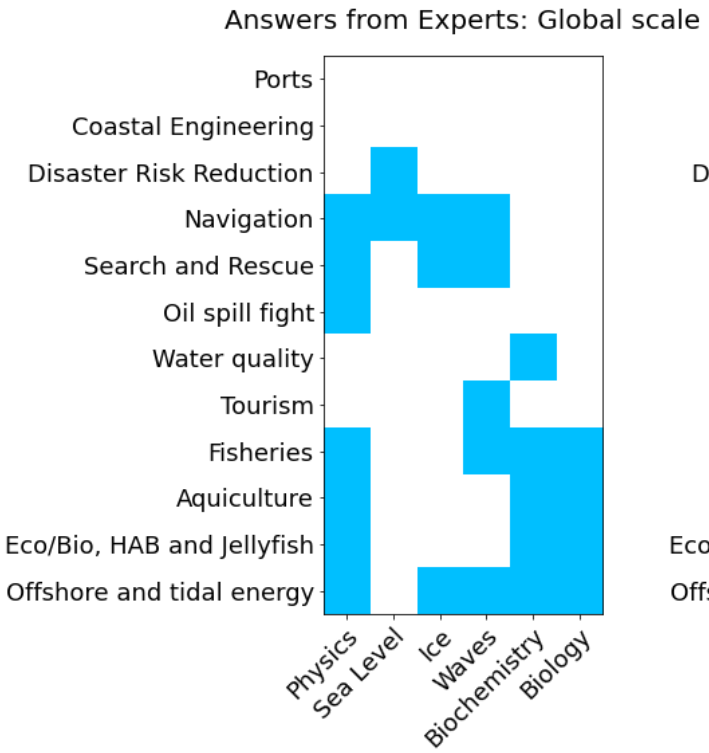


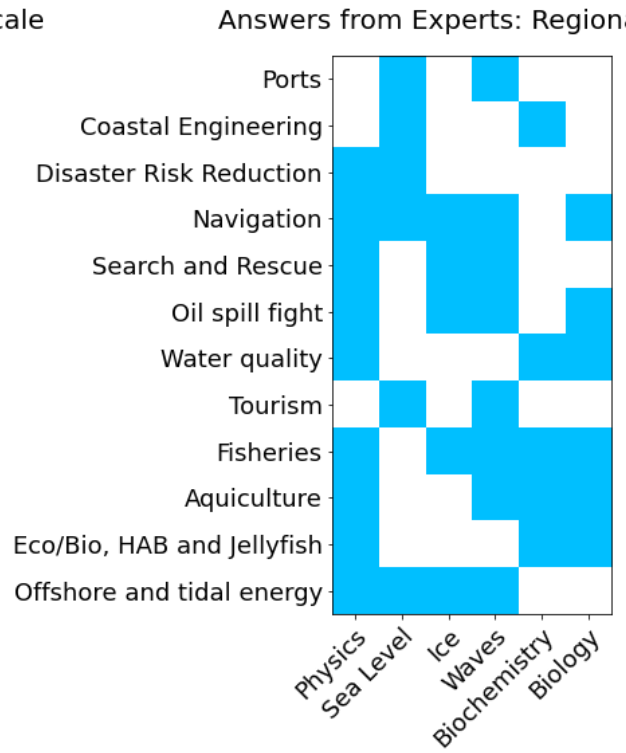


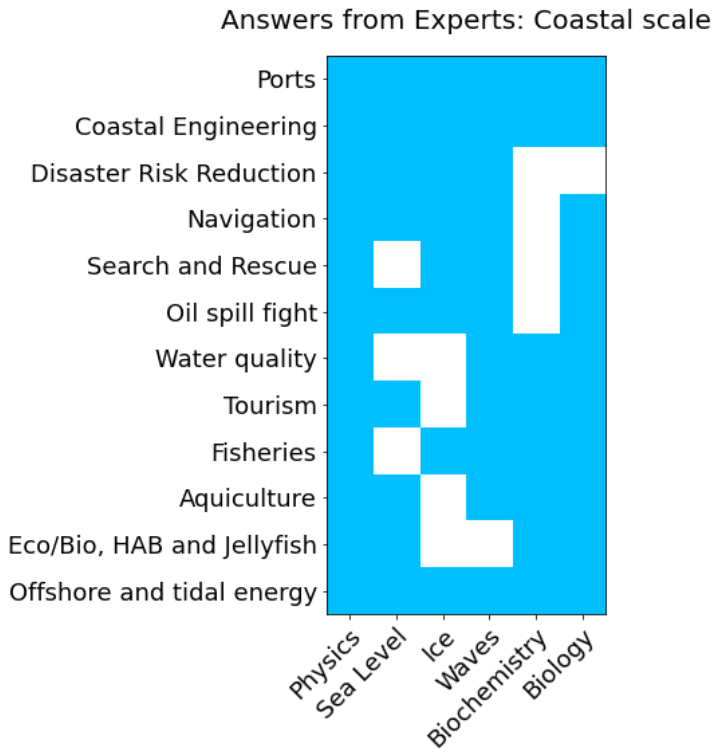


Where are our systems being used?

The view of the experts:

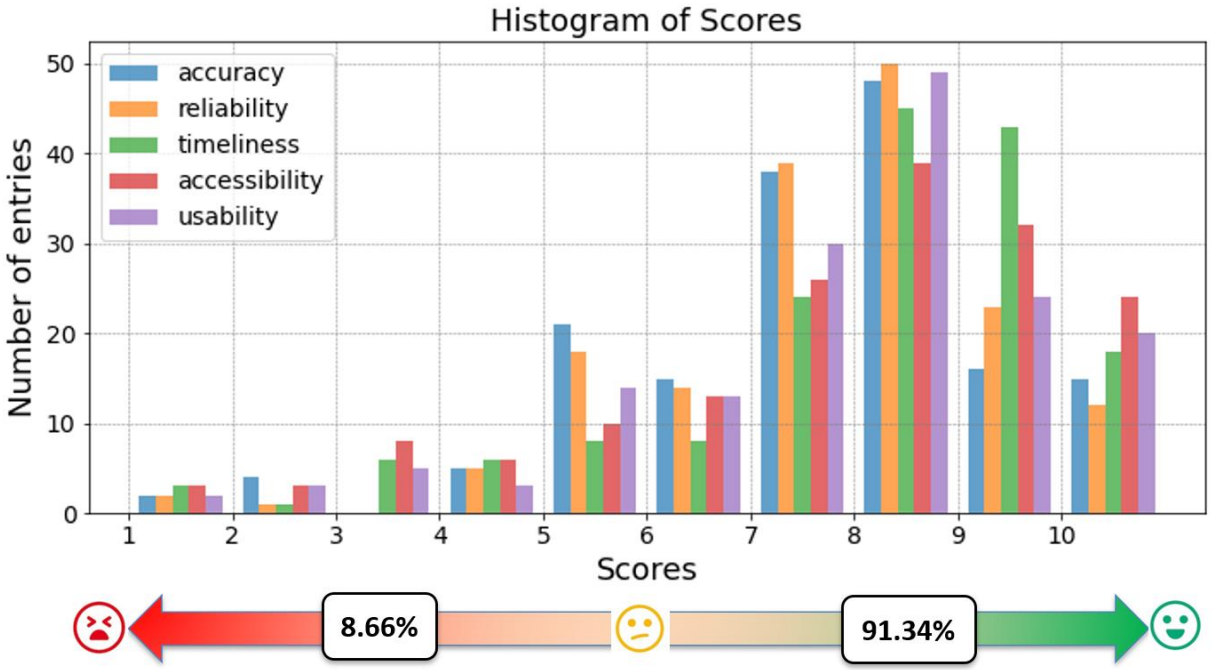


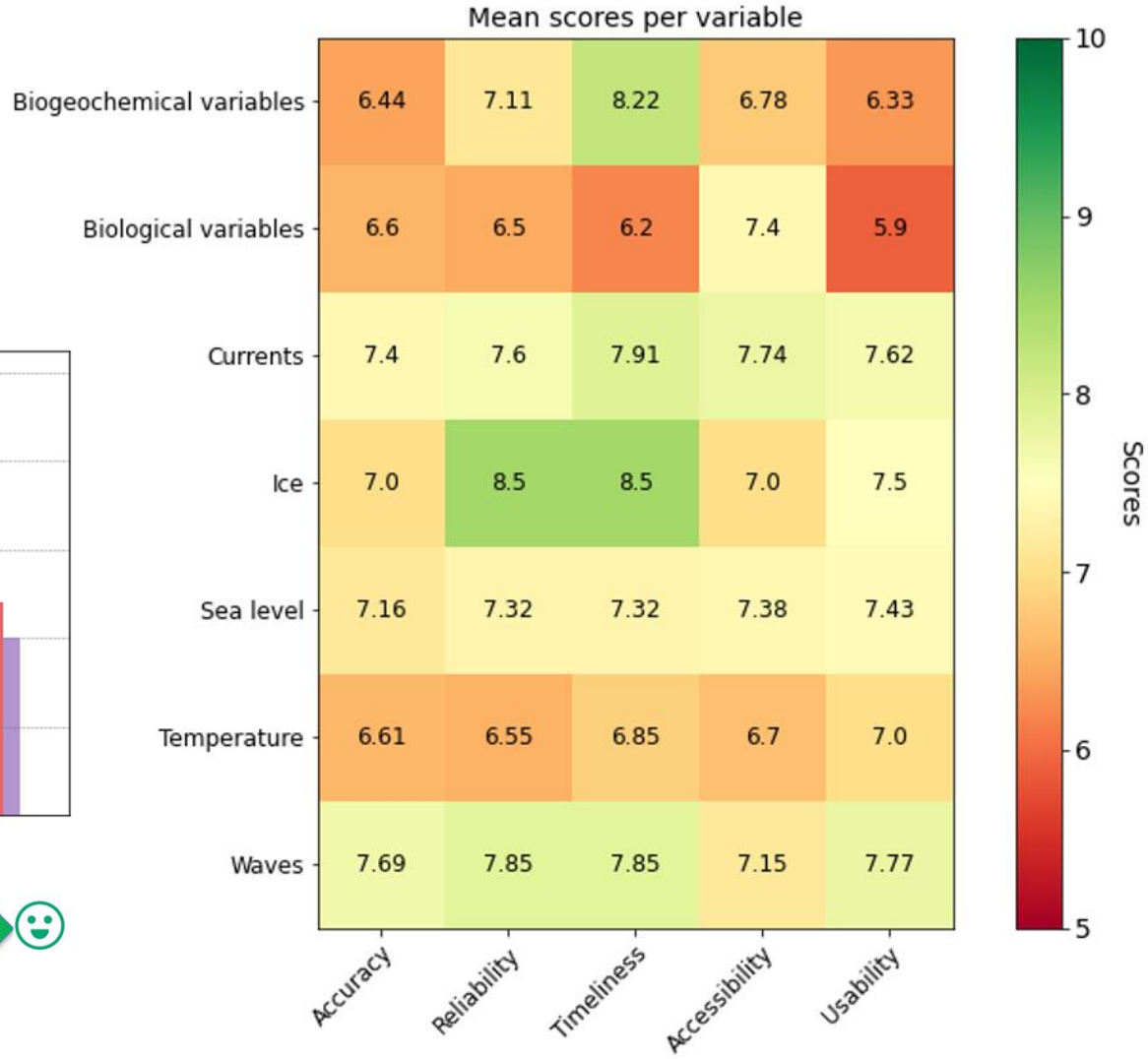




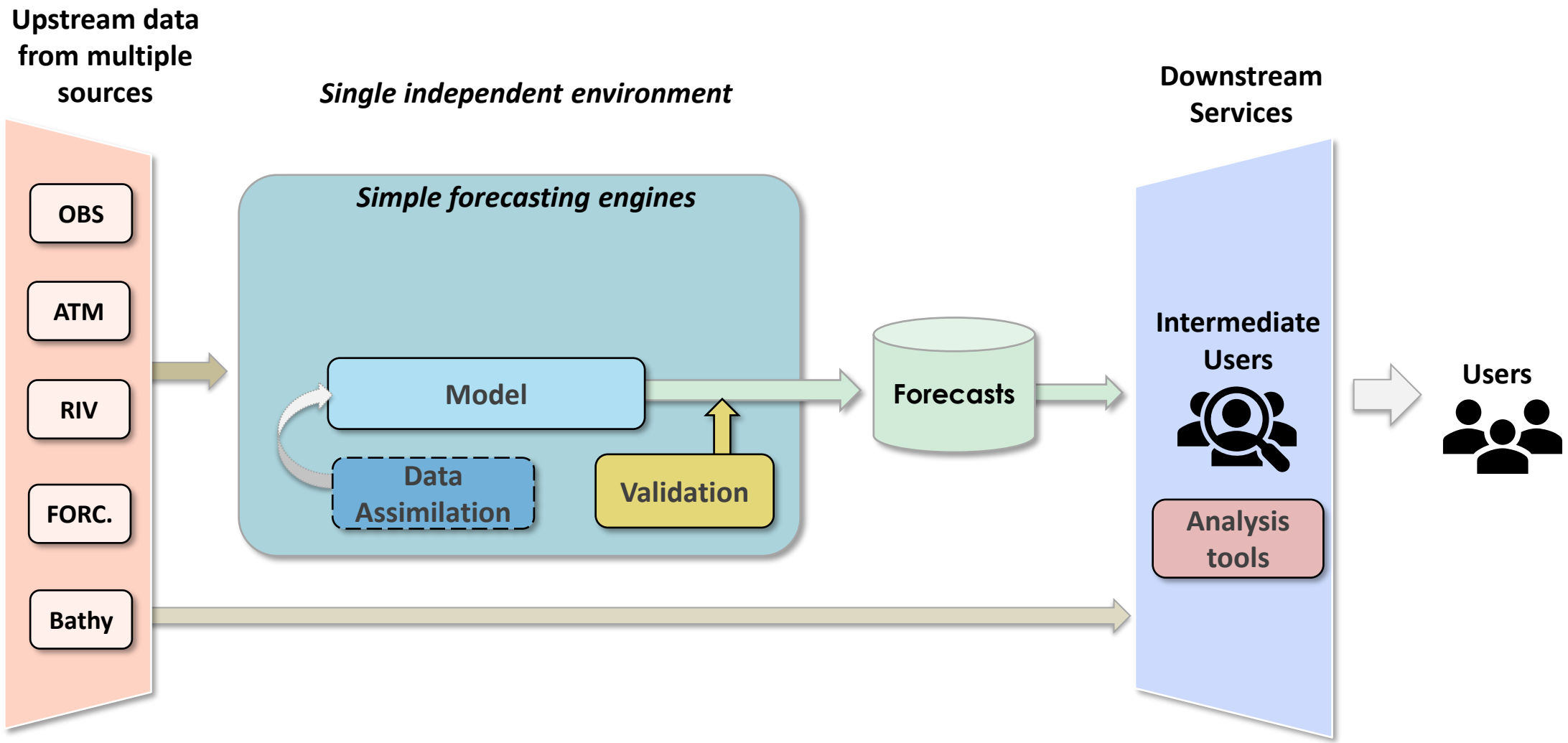
Users Poll “Diagnosis”: mean scores

Rate our ability to provide a solution:

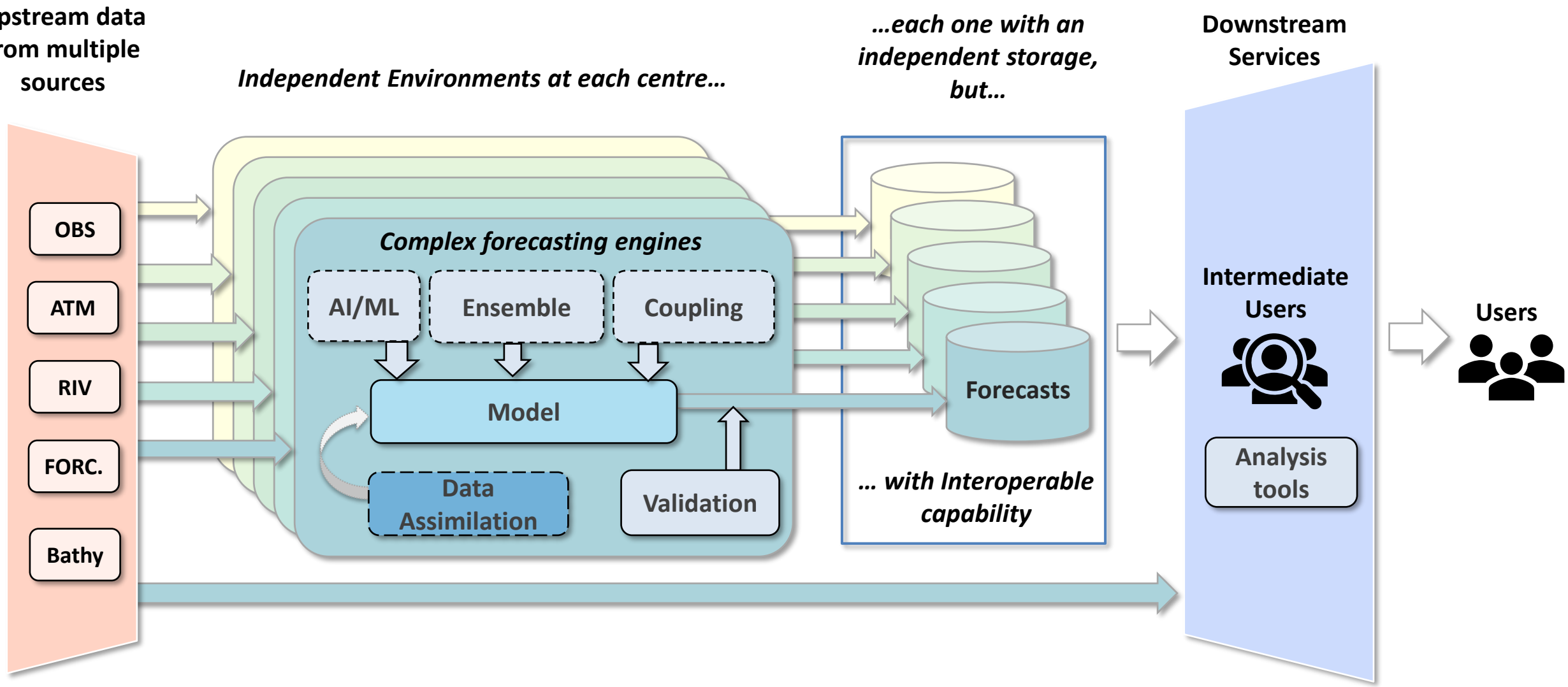




Today's most frequent architecture

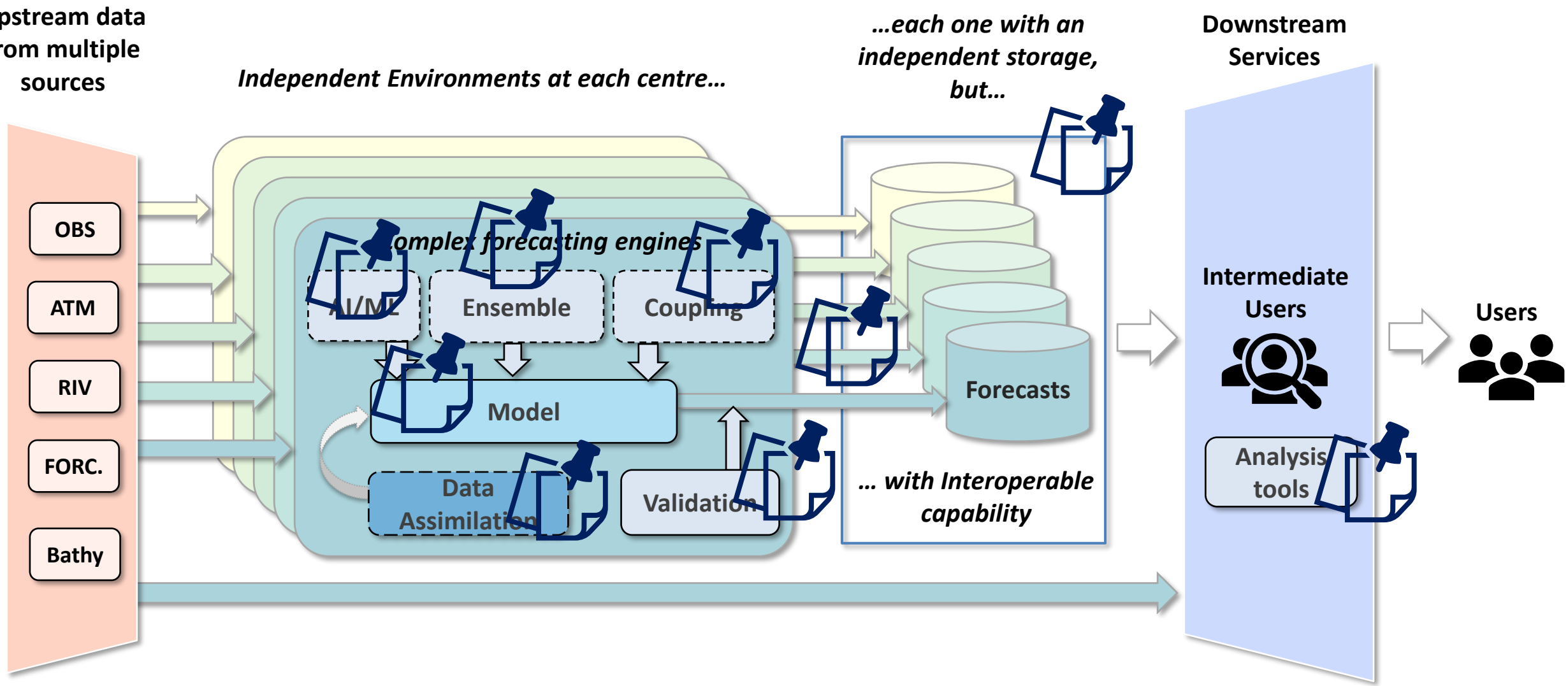


Future architectures: Type A (Independent-Complex-Interoperable)



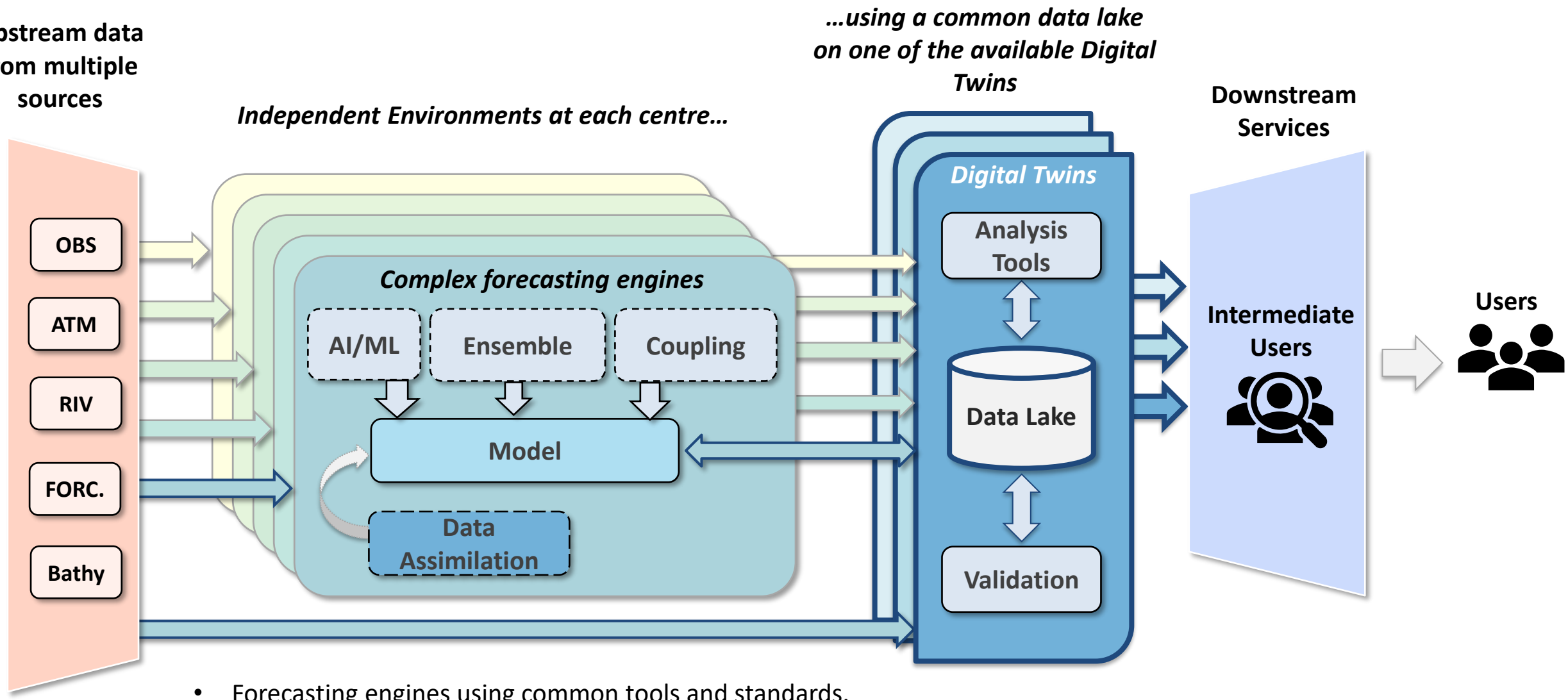
Forecasting engines and interoperable capabilities using common tools and standards

Future architectures: Type A (Independent-Complex-Interoperable)



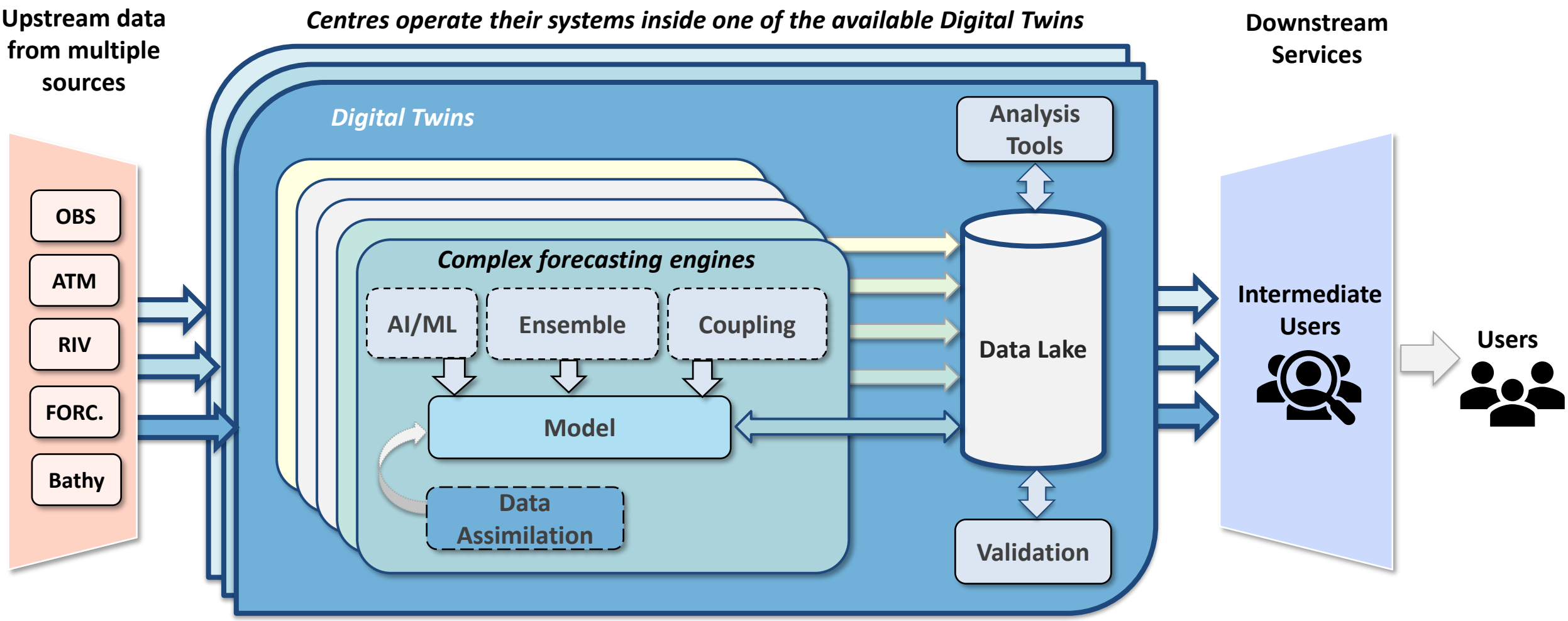
Forecasting engines and interoperable capabilities using common tools and standards

Future architectures: Type B (Independent-Complex-Digital Twin)



- Forecasting engines using common tools and standards.
- Extensive use of digital twin for validation (forecast providers) and analysis (intermediate users).
- Data could be transferred to the data lake, or accessible from the data lake.

Future architectures: Type C (Fully Integrated-Complex-Digital Twin)



- Similar forecasting engines for all systems, integrated into the DTO
- Extensive use of digital twin for validation (forecast providers) and analysis (intermediate users).
- Data lake act as a complete data hub (Data could be transferred to the data lake, or accessible to the data lake)

Endorsement of OOFS: Operational readiness levels (ORL)

Four independent digits to describe a system:

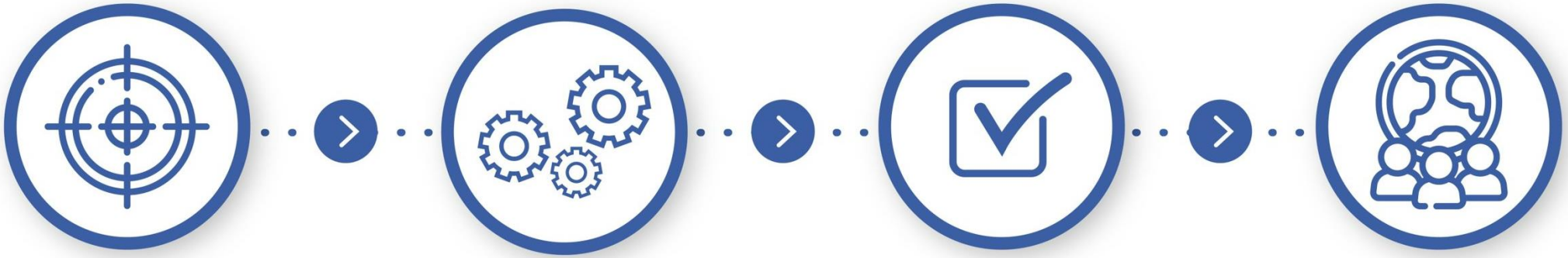
- First number for degree of operationality
- Second, to technical solution
- Third for degree of validation
- Fourth to output dissemination

Benefits of ORL:

- Promote the adoption of tools, standards and Best Practices
- A mechanism to endorse services to join common frameworks
- A way to guide and stimulate services development

The OceanPrediction DCC framework: role of ETOOFS

Example of one typical iteration:



1) OceanPrediction DCC, in collaboration with decade actions, **identifies** the need of a new standard or tool and coordinates the **co-design** of specifications

2) The Decade actions (e.g., Coastpredict, Foresea) **develop** the new component, aligned with OceanPrediction DCC

3) ETOOFS **endorse** the new development

4) OceanPrediction DCC and others (e.g., BestPractices) make sure the new developments are **distributed to the community**

Conclusions

- OceanPrediction DCC: a key element for the ocean prediction we need
  - Builds an active community of users, scientists and policymakers (with additional focus on developing countries) organized in regional teams
  - Harnesses the Decade framework and arrival of the Digital Twin of the Ocean, to join and deliver together worldwide with a shared architecture
- Substantial benefits expected from a shared architecture
  - A connected community
  - New and better OOFS
  - A technologically linked worldwide ocean forecasting framework
- Significant challenge!
  - Only possible through collaboration with Decade programmes and other relevant actors

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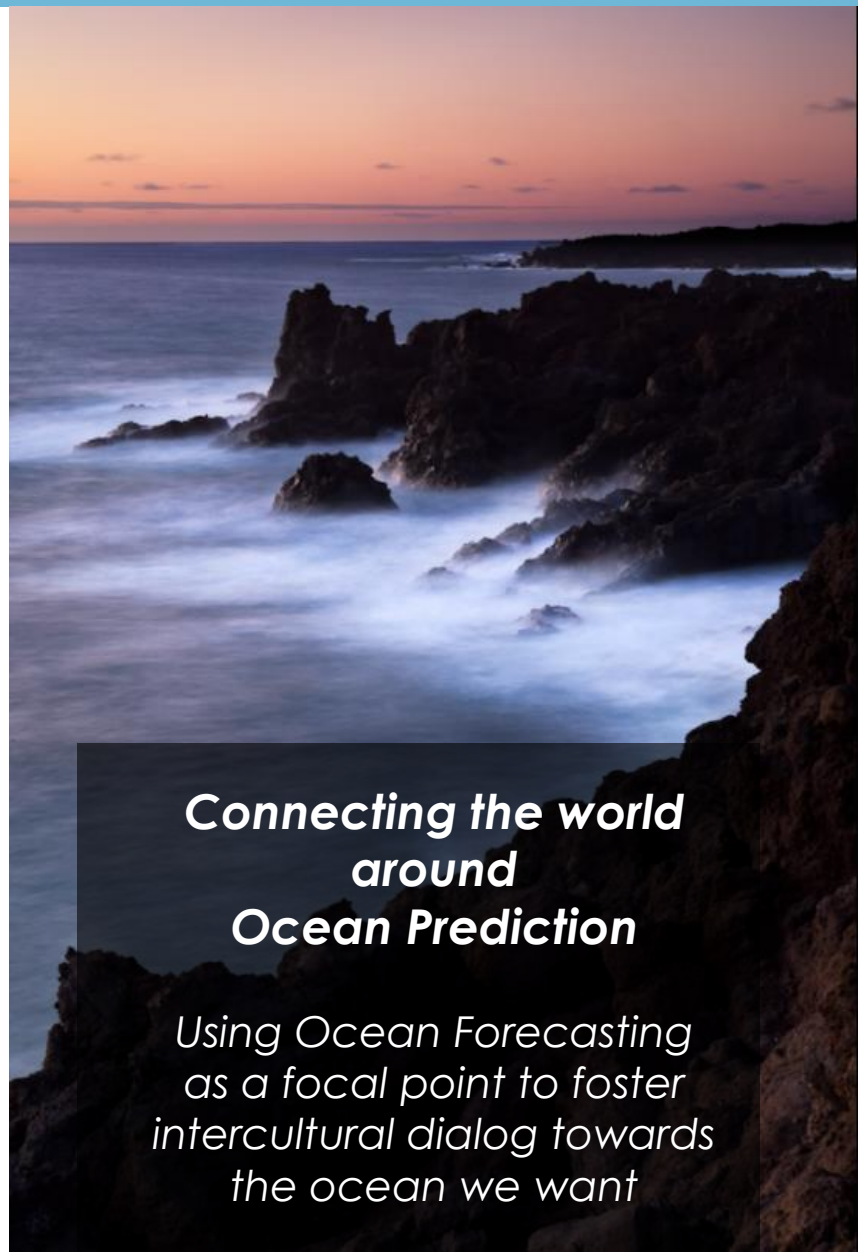

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Thank You.

Work in progress...

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