The benefits, challenges and gaps for implementing Ocean Best Practices

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EuroSea/OceanPredict Workshop#2

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The Bottom Line

- Trust
- Interoperability
- Ease of Use
- Broad engagement

All of these rely on creating and using best practices

"Building a framework with standards and best practices for the full operational oceanography value chain will enable further harnessing of prediction systems in supporting a healthy ocean at the same time of a blue economic growth for all countries."

ETOOFS Manual

Data Assimilation (DA)

The development and application of DA serves fundamental Earth science goals to:

- (1) fill gaps between sparse measurements to form a complete picture of the Earth system,
- (2) utilize the observing network to initialize forecast models,
- (3) characterize errors in the modeling and observing systems, and
- (4) identify areas of high uncertainty where observations can illuminate poorly understood phenomena, help target observing campaigns, and improve numerical models and forecasts.

Stephen Penny, et al [doi: 10.3389/fmars.2019.00391]

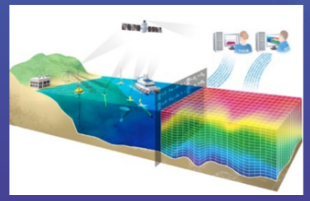
Value Chain

Societal Requirements

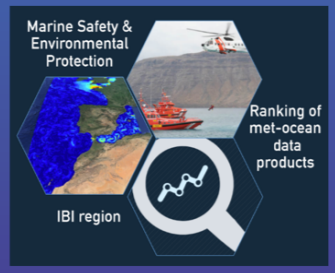
Scientific Approach

Data Acquisition

Data Management Services

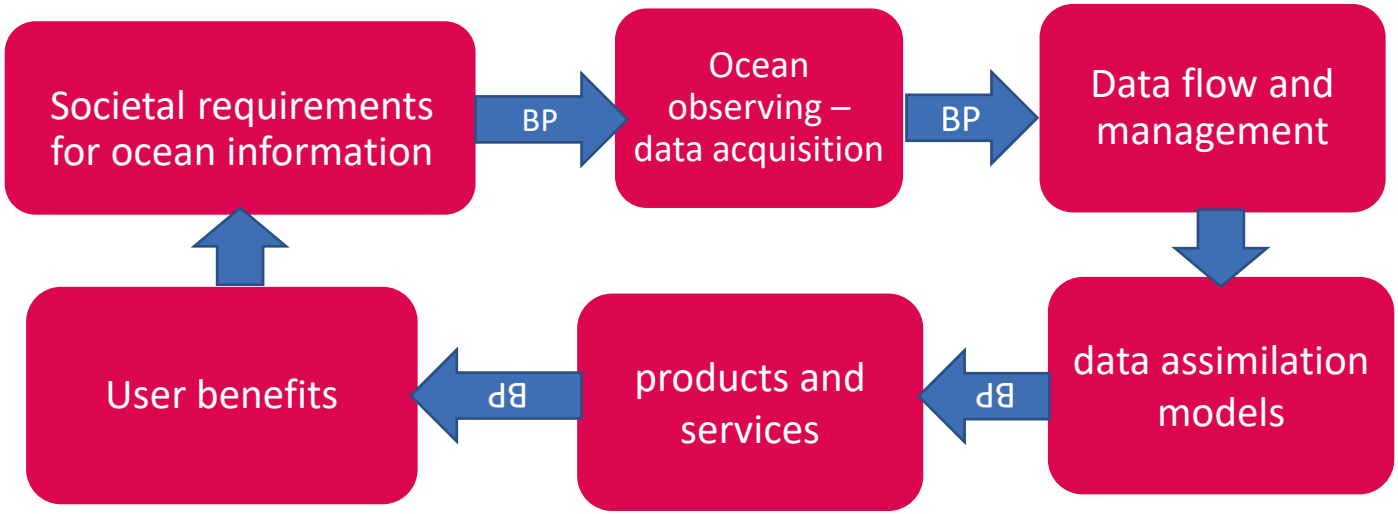


Products and Services

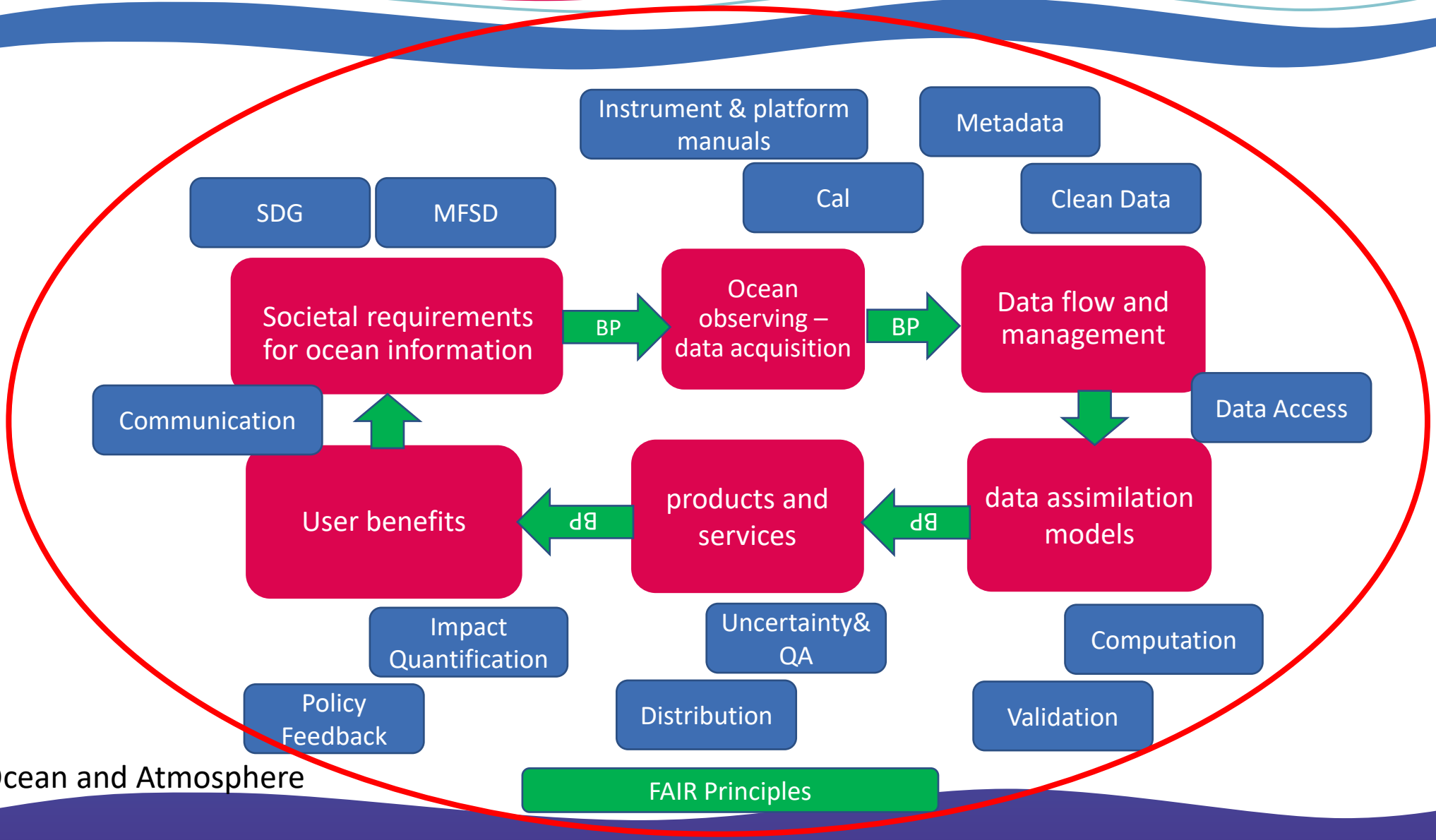


Societal Benefits

Value Chain

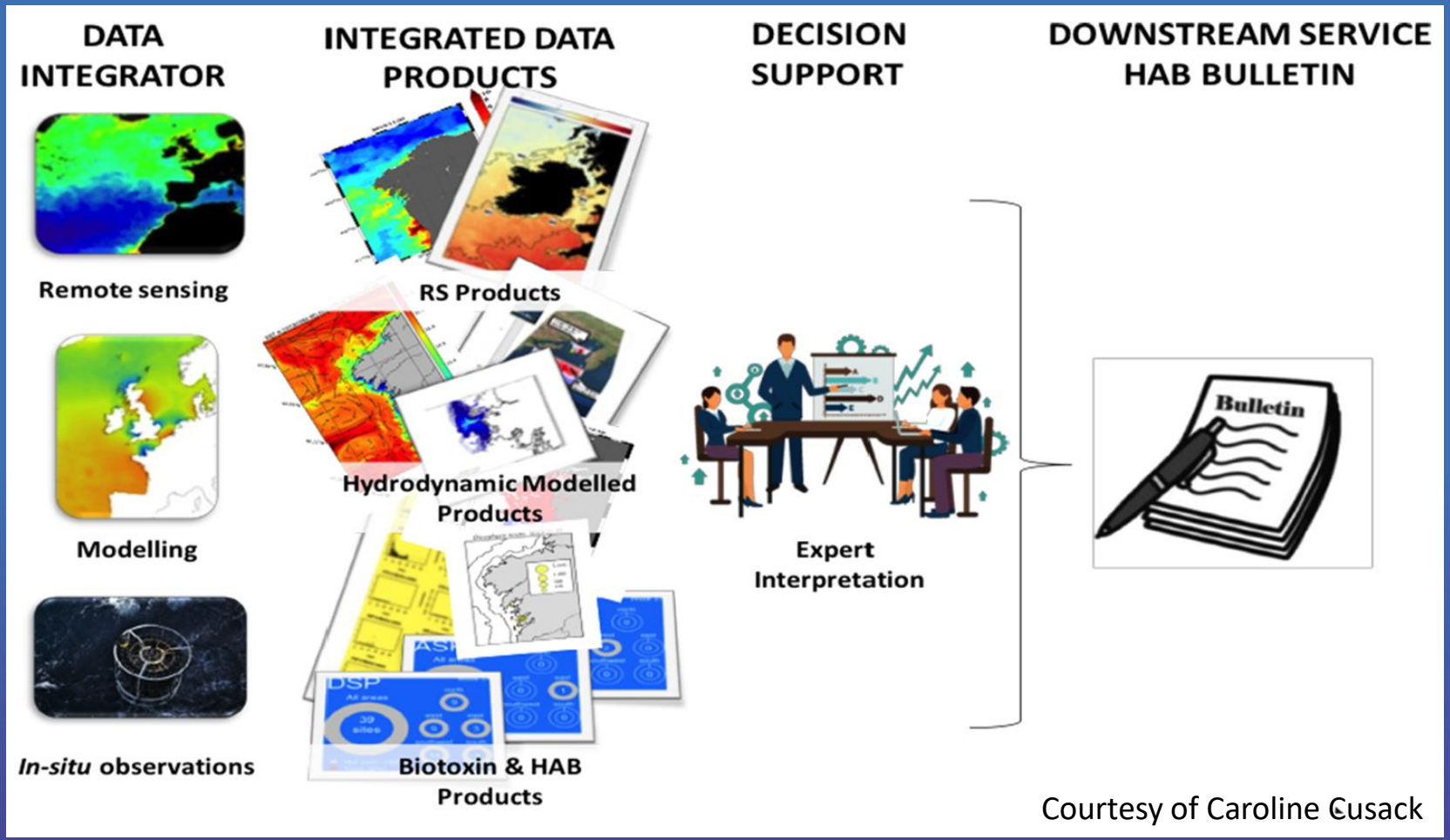

Societal requirements for ocean information
BP
Ocean observing – data acquisition
BP
Data flow and management
data assimilation models
BP
products and services
BP
User benefits

The Many Value Chains



Ocean and Atmosphere

Use Case - Harmful Algal Blooms (HAB)

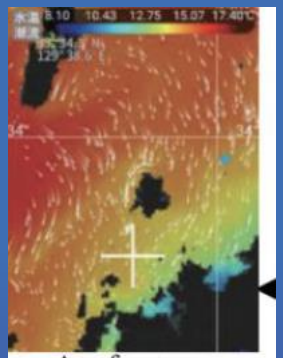


Courtesy of Caroline Cusack

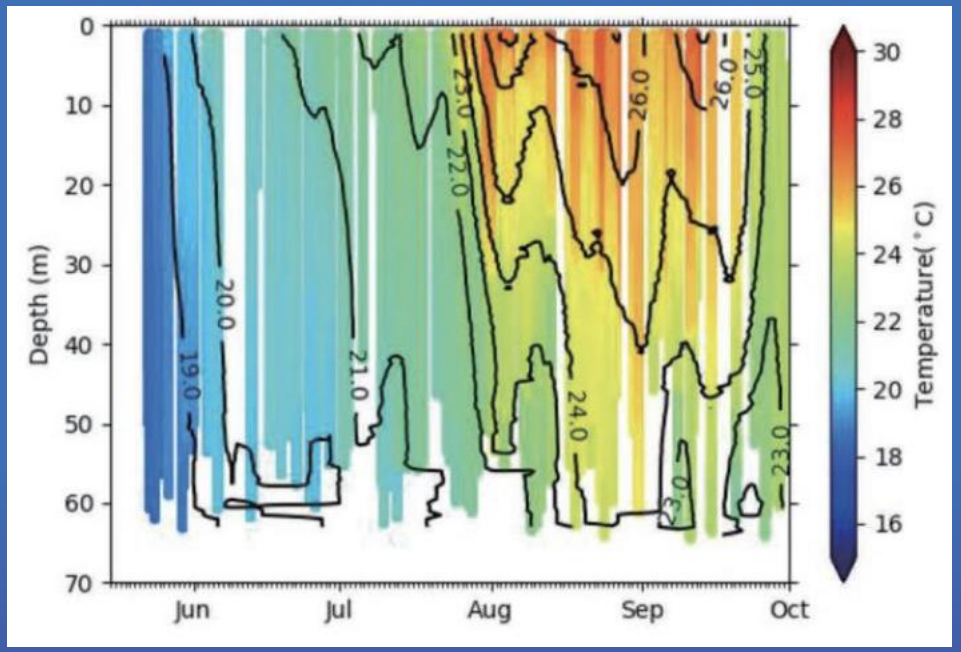
Use Case 2 – Fishermen in coastal Japan

CTD observation

Photo image of new CTD sensor "S-CTD" This CTD
/s Bluetooth communication with Android



App for ocean
prediction model



Some of the cooperating fishermen use sea forecasts to reduce the amount of fuel used and operating hours, thereby improving the efficiency of their operations.

Provided by Yasu Miyazawa

Addressing Best Practices and Standards

Best Practices help ensure the quality and reliability of the forecasts, interoperability between different sources, reproducibility, and a more efficient and consistent monitoring. They are essential to share experience and results from the different ocean prediction centers and improve our capabilities. Common approaches will be required to advance faster. Common vocabulary, standards in data format and in production components together increase the benefit of building on the existing knowledge.

Following best practices, moreover, helps understanding the value of our products and services: for example reporting errors in products is a good practice that enables understanding the significance and reliability of a product, avoiding misuse. Trust is essential.

For Hardware: A standard that is supported by multiple hardware/software vendors means that a model that makes use of it can be built and run on a variety of machines. This is particularly important for complex, long-lived software such as ocean models as machines come and go relatively rapidly.

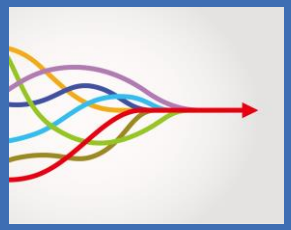
GAPS

- Availability of standardized quality checked observational data (to be ingested by modeling systems)
- Coastal monitoring –*There has been a lack of common standards and integration in coastal observations: most in-situ observations are still done at national level. JERICO is addressing this*
- More Best practices are needed in operational production of forecasts
- Ocean forecast services should include standard QA/QC protocols, modified according to scale of model and availability of datasets. The results of this should be translated into some kind of 'uncertainty score' for the end user of any downstream service/application.

GAPS

- Delivery of products to users does not have clear standards and best practices across the different operational centers.
- There are gaps at the user end of the ‘value-chain’ – for example, engaging all stakeholders in the development of downstream services, including how to improve interaction, uptake and co-design. This may be quite regionally specific.
- Further practices are needed on how to measure impacts.

Why are there many BPs on the same topic?
Convergence & Endorsement



- **Convergence**: process where existing, but fragmented, knowledge is synthesized/converged to create a comprehensive document – that may then qualify as “Best Practice”

- **Endorsement**: process where organizations/coordination groups (e.g. GOOS panels and OCG) approve documents as the current standard for their operations. Can this be done with Ocean Prediction?

Maturity of Best Practices

Level			Description
5		Mature	Practices are endorsed by multi-institutional expert panels. Practices have formal diagnostic tools supporting continuous improvement and associated methods for training and sustainability.
4		Broadly Adopted	Practices are widely adopted by multiple institutions, have standardized formats and are in a sustained repository. Practices can be replicated with no prior experience in the process.
3		Defined and Documented	Practices are formally defined and documented with metadata, are openly available, and can be replicated by independent practitioners with prior knowledge

At the higher level

- Get everyone involved
- A new ocean governance structure should be considered based upon the public need for achieving the SDGs and the Blue economy. This should be driven by a public-private partnership that develop standards and best practices for all the value chain components.
- There needs to be a cultural change toward “best practices” – documentation and use – with significant credit towards creators and adopters. Expert engagement for endorsement.
- Globalization of best practices should accommodate regional capabilities
- Prioritize

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Thank You

and thanks to all the colleagues that contributed their thoughts to this presentation