



Ocean Observing Co-Design

by The Global Ocean Observing System



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Exemplar Explainer Document



CO-DESIGN EXEMPLAR PROJECTS - what, why, and how

Please note that this Co-Design Exemplar Project explainer is a work in progress, under the Ocean Observing Co-Design Programme (see below for more information). The concepts presented here will be evolved through the Co-Design Workshop and will develop towards a consistent process and Best Practice in Ocean Observing Co Design.

What do we mean by co-design?

In the Ocean Observing Co-Design Programme proposal the following definition was proposed:

An ocean observing **co-design** process provides a fit-for-purpose and responsive observing system that interconnects **experts and stakeholders** to ensure **sharing of knowledge** across disciplines, integration along the value chain, **co-construction of solutions** and **innovative concepts**, and the targeted production of **products and services** useful to stakeholders. Here **co-design is understood as a continuous process, a collaborative and iterative effort among all stakeholders.**

Co-Design in Ocean Observing

Within GOOS, and the ocean observing and modeling communities, the know-how to assess observing design of specific elements exists; however, connecting these knowledge bases, and evolving to a co-design process with modeling/assessment communities, and with the intended users of the ocean information, is a vital component that needs to be developed. Co-Design is a process that the ocean observing (in-situ and satellite), modeling, services and assessment communities will need to learn to undertake together, in order to efficiently and consistently meet the needs of governments, industry and other stakeholders for ocean information.

What is an 'Exemplar' project?

The Ocean Observing Co-Design Programme has developed the concept of co-design 'exemplar' projects (exemplars for short) as the first step to developing a co-design process, and identifying the infrastructure and tools needed to support co-design, and the communications, advocacy and tracking required to implement the co-design outcomes.

In the context of the Ocean Observing Co-Design Programme an 'exemplar' is a use area around which we pilot and refine the ocean observing co-design processes. Exemplar projects will involve the key stakeholders - users, observing system implementers and modeling/assessment, and/or service providers. The expected outcome is the delivery of guidelines to stakeholders on what to implement for fit-for-purpose observing for the exemplar

use area, including information on the value of the information, recommendations for ocean observing and forecasting improvements, and recommendations for any missing data delivery services.

Through working on a range of societally relevant user area ‘exemplars’ we will provide firstly, the information needed on the value, design, and investment required to meet the needs of the identified users, and secondly develop across the exemplars the process, tools and infrastructure required to regularly make such assessments. An analogy would be developing the methods and tools a business or a venture capital firm utilises to analyze investment in new products or areas. Identifying objective procedures for qualifying the best approaches in terms of cost versus benefits.

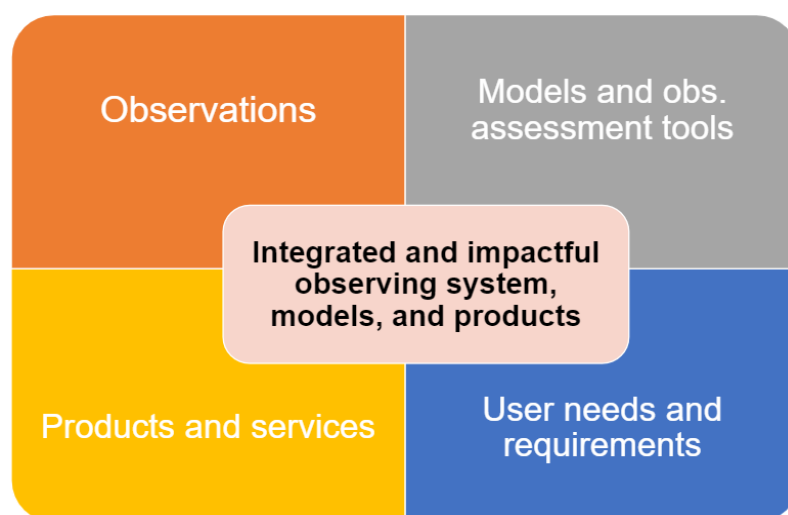


Figure 1: Structure of the framework of an integrated and impactful observing system linking observations, models and observing assessment tools, products and services and user needs and requirements.

An exemplar project will:

- Identify key user stakeholders and reach out to understand their needs;
- Look across observing and modeling/assessment advancements, and assess the pathway/s to co-design and to deliver solutions;
- Look at how to leverage/enhance existing infrastructure to best meet the aims, work on what can be achieved through alignment and incremental investment, and where new investment is required to advance the design;
- Test the observing system designs to estimate the impact of integrated observations on predictions and/or other requirements;
- Assess the gaps in the underlying infrastructure for co-design including, implementation, data flow, best practice and quality control. Ensuring data reaches an endpoint accessible to users.

- Assess the value to the users/society of the proposed solution including the use of models to estimate the impact of observing system options by means of Observing System Experiments (OSE), Observing System Simulation Experiments (OSSE), and other methods, to identify an optimal combination of in-situ platforms and satellite data.
- Be integrative and ensure connection across and between existing efforts.

How do we get started?

The first **Ocean Observing Co-Design Workshop [June 2022]** is intended to kick-start the development of co-design processes and act as a forum to shape some initial exemplar projects. It will consider co-design best practice in the community, as well as examples from outside ocean observing.

We will hear lessons learnt from co-design across GOOS and other sectors, and teams will work on the development of co-design 'exemplar' projects, that identify key stakeholders, projects, needs in the underlying infrastructure, and ways that groups across modeling, observing and end users can interact and co-design an integrated and responsive ocean observing system

During the workshop we will hear lessons learnt from co-design across GOOS and other sectors and teams will work towards the development of co-design exemplar projects, **leading to proposals for specific exemplar projects**. At the same time this work will help refine ideas around the co-design process in practice and lead to the development of a first draft co-design best practice.

The Ocean Observing Co-Design Programme proposes that a number of **priority exemplars** be identified for initial development, across delivery areas and stages of maturity of infrastructure [see table on the next page].

Initial exemplars include:

Exemplar	End-users
Carbon budgets	National policy makers and those assessing carbon storage, IPCC
Coastal inundation and storm surge	Local coastal managers, planners, industries and communities
Marine heatwaves	Aquaculture, fisheries, national and local resource managers
Hurricanes & tropical storms	National forecasting systems

Biodiversity at local, regional and global scales	Looking at what will constitute useful information for local fisheries, regional management and global assessment, how to integrated system for biodiversity of plankton
Boundary currents	IPCC / marine transportation, fisheries, weather and ocean forecasters, sea safety, oil spill/bilge monitoring, , marine spatial planning, mining and oil and gas industry

The Workshop will discuss some of the following questions:

- How to dialogue with users about needs - tools, methods, best practice.
- What defines a successful exemplar project - output, impact.
- Efficiency, the process needs to be useful, inclusive, but not perfect - that will adjust and be adapted through implementation anyway - what is our minimum viable product from an exemplar process.
- Assessing where to invest across the value chain - how do we evaluate investment in modeling, in-situ, satellite observations.
- What tools might we need to report on progress / track multi sponsor investment
- How could we adapt agile methodologies to fast track solutions?

Co-Design Exemplar Projects, GOOS and the FOO

The Framework for Ocean Observing (FOO, linked [here](#)) guides the implementation of an integrated and sustained ocean observing system to deliver maximum impact for the user base and society. The FOO envisioned a process from requirements setting through implementation, through data management, modeling, assessment, to information products and services that support decision making by users. A feedback loop was envisioned between the requirements setting process and the users, this has however been weakly implemented. The co-design concept suggests that this is not a feedback loop but that users and other value chain stakeholders work together in a co-design process. The Ocean Observing Co-Design Programme is aiming to expand, amplify and ultimately implement this final part of the FOO, through best practice, and supporting infrastructure, tools and process.

The Ocean Observing Co-Design Programme

The **Ocean Observing Co-Design** Programme, endorsed by the UN Ocean Decade of Ocean Science for Sustainable Development, aims to transform the ocean observing system assessment and design process, creating a new framework for **co-design** with observing, modeling, and key user stakeholders. The programme will work with existing and new observing networks, and closely couple with the modeling community across assessment, assimilation and prediction, to support the development of an integrated and agile ocean observing system with linked prediction capabilities. The Ocean Observing Co-Design Programme recognises the

need to create a support structure for Ocean Decade projects, networks and their projects and the exemplar areas of this programme and will work towards an integrative process across these to ensure strategic alignment.

The legacy of the Programme will be to provide processes, infrastructure, tools for analytics, testing, reporting and guidance, prioritisation, and best practices to continuously assess the ocean observing system. This will allow for the system to be responsive and adaptive to the growing and changing needs of global, regional and local stakeholders. This fit-for-purpose observing and forecasting system will better and more efficiently serve the expanding range of societal needs for ocean information across early warning and forecasts, climate, and ocean health, and it will also increase the value of this ocean knowledge to stakeholders.

High level objectives of the Programme:

1. Offer national government funders the information needed to target investment globally, regionally and locally and establish which ocean observing system design will have the greatest impact. Governments will be able to track if implementation is delivering the benefits identified, justify costs and increase ROI.
2. Make ocean observing and information appreciably more accessible and impactful through transformative co-design, working with the modeling community and key user stakeholders to achieve tangible integration and interoperability.
3. Develop system diagnostics, tools and reporting capability to better assess fit-for-purpose across evolving requirements and use-inspired needs, including digital scenario tools that work backwards from intended impact to give us a priority plan for observing.
4. Establish the international capacity and modular infrastructure to co-design and regularly evaluate the observing system at different scales. For example, using a toolkit of software and user engagement/co-design methods that we can apply from global problems to local challenges.