

by The Global Ocean Observing System

Day 1: Context and focus

January 14th , 2025

Core Team Ocean Observing Co-Design Meeting



2021 United Nations Decade of Ocean Science 2030 for Sustainable Develop

This programme is endorsed by the UN Decade of Ocean Science



— Meeting objectives

- Evaluate and update the **programme's objectives**, ensuring alignment with its mission and vision and identifying strategic goals for the next two years.
- Create a **comprehensive work plan**, an outline of activities for 2025 and a work plan for 2026-2027 to guide programme implementation, integrating actions informed by insights and lessons learned over the past years.
- Revisit the **governance structure** for the Co-Design Programme, including its partnerships, projects, exemplars, and key champions.
- Refine the Programme's **direction** based on lessons learned and evolving priorities and redefine the Programme's intended **legacy**.
- Identify methods to evaluate Programme progress, ensuring transparency and accountability across all components.
- Identify any questions and input required from the GOOS Steering Committee in February 2025.





- A defined work plan for the next year.
- An initial draft for the work plan of 2026-2027.
- An agreed governance structure for the Co-Design Programme
- A refined Programme's legacy.
- Identified methods to evaluate Programme progress.



— Session 1:

Status of Co-Design 'where are we at the start of 2025'

Lead :Emma Heslop and Cristina Miño



— Proposal - High level objectives

1. Integrate observing and modelling to support a sustainable ocean and society in ways that are measurably better

2. Make ocean observing and information appreciably more impactful through transformative co-design with the modelling community and key user stakeholders

3. Establish the international capacity and modular infrastructure to co-design and regularly evaluate the observing system

4. Entrain new observing and information technology across all elements of the Programme.



— Proposal - Programme Design and Implementation

An overview of the proposal includes:

- 1. Anticipated Outcomes
- 2. Proposal Implementation Phases
- 3. Updated Exemplars and Programme implementation (Workshop 2022)
- 4. Benchmark Where are we now Programme and Exemplars
- 5. Co-design Assessment and Evaluation tools
- 6. Governance
- 7. Partnerships
- 8. Funding



— (1) Anticipated Outcomes in Proposal

- 1. Responsive Data Delivery: Test the system against exemplars for actionable data supporting digital ocean simulation and stakeholder access.
- 2. Dynamic Observing System: Rapidly adapt to evolving needs, technologies, and spatial scales.
- 3. Transparent Processes: Synthesize diverse stakeholder needs into open, inclusive assessment frameworks.
- 4. Gap Identification: Reports and diagnostics to prioritize system gaps.
- 5. Integrated Community: Co-design observing and forecasting systems to enhance model utility and forecasting capabilities.
- 6. Enhanced Investments: Engage sponsors to maximize returns and sustain essential elements.
- 7. Rapid Integration: Incorporate new components into the global framework seamlessly.
- 8. Sustained Infrastructure: Use advanced technologies and targeted projects to address observing gaps.
- 9. Implementation Support: Modular tools and processes for global, regional, and national decisions.
- 10.Inclusive Workforce: Build capacity for designing, implementing, and evolving the observing system.

11.Improved Governance: Strengthen system maturity through partnerships and co-design processes.



(2) Proposal - Programme Implementation phases

Phase 1	Phase 2	Phase 3	
(short term 1-3 years)	(mid term 4 - 7 years)	(long term 7 - 10 years)	
 Focus on initial exemplars and integration of key ocean variables. Develop tools for system assessment and reporting. Collaborate with existing systems and integrate new technologies. 	 Expand to biology, coasts, and human pressures exemplars. Build scalable, modular infrastructure for system design. Engage diverse communities and grow the ocean observing workforce. 	Finalize comprehensive reports and long-term outlooks. Integrate modeling and observing systems. Review and guide future programme development.	



(3) Updated - Exemplar & Programme Implementation Phases

Phase 1

Phase 2

Phase 3

ENGAGEMENT & DESIGN

Engaging with user communities to inform pilot activity



PILOT ACTIVITY	
Fill observing system gaps an	d
evaluate solutions	

Refine delivery of ocean information **IMPLEMENTATION** Maximize Return On

Investment

Embed across global observing systems

Tools for tracking and reporting of success

Continuous engagement and feedback from user communities

Develop standards and processes





- Submission of NSF proposal for the <u>AccelNet Implementation</u>.
- The hiring of a dedicated Programme Support Officer
- The Boundary Currents (BC) Workshop was successfully conducted, fostering valuable discussions and collaborations.
- The Caribbean Tropical Cyclone Forecasting Center has shown sustained interest in working collaboratively with TC Exemplar.
- The Marine Carbon Exemplar has been noted as the 3rd pillar of GOOS Ocean Carbon Plan.
- Attraction of support from DCC for Ocean-Climate Nexus, including the support for ECOPs to attend events relevant to Co-Design Exemplars
- Initiation of messaging work with mentorship of external experts in the Ocean Decade Strategic Communications Group (SCG).



Exemplar	Phase 1 Engagement and Design	Phase 2 Pilot Activity	Phase 3 Implementation	Comments
Tropical Cyclones	Completed in TAC Ongoing in NPOMS, SWIO, Bay of Bengal, PI	Ongoing (TAC, NPOMS, SWIO) Starting (Bay of Bengal and PI)	Knowledge transfer between TAC and NPOMS and SWOI	
Boundary Currents	Partially completed (Agulhas Current)	Ongoing: Agulhas Current (Interest to expand to Benguela Current)	Not yet	
Marine Heat Waves	Revival ongoing but community is ready and needs direction	Identified potential Pilot areas	Not yet	
Storm Surge	Unknown	Unknown	Unknown	
Marine Life	MBON (Unknown)	Unknown	Unknown	
Marine Carbon	Partially completed	Identified: NACO	Not yet	

Understand and Define Requirements: Input from user case areas, including indigenous and smaller communities (SIDS?)

Objective Evaluation Methods: OSE, OSSE, costbenefit analysis, Al-enhanced analyses

Testing and Optimization: Optimal combination of in situ and satellite platforms

Scalable Framework Development: Global and regional assessment, adaptive to evolving technologies

Key Tools & Methods

Solution System Experiments (OSE)

Observing SystemSimulation Experiments(OSSE)

W Artificial Intelligence (AI) Integration ?

聾 Cost-Benefit Analysis

Partnerships & Inclusion

💛 Collaboration with:

- ForSea
- CoastPredict
- Digital Twins of the Ocean (DITTO)

• Emphasizing smaller and indigenous community involvement:

- Representing their needs and expertise
- Partnering for knowledge sharing and capacity building



— (6) Proposal (Further discussion	- Governance in Session 5)	Industry Stakeholders Group	 Technology providers and endusers. Annual meetings to assess progress and provide commercial sector perspectives. Aims for broad industry representation.
Co-Design Programme	Co-Chairs: Led by GOOS SC members Advisory Board: Diverse stakeholders, GOOS representatives, and experts	Programme Management	 Leads of implementation partners, GOOS elements, and a project manager. Main coordination unit Ensures cross-GOOS and partner planning, reporting to the GOOS SC. Integrates feedback from the Advisory Board and Industry Group.
		Action team	 Executes programme tasks and coordinates project delivery. Led by PM Linked through projects and frameworks, part of GOOS Office.
			GRIS Ocean Observing Co-Design

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Strategic Partners

OceanPredict

- Fraser Davidson (Fisheries and Oceans Canada)
- Elisabeth Remy (Mercator Ocean International, France)
- Yosuke Fujii (Japan Meteorological Agency, Japan) World Meteorological Organization (WMO)
- Anthony Rea (WMO INFCOM, Switzerland) World Climate Research Programme (WCRP)
- Lisa Beal (CLIVAR SSG, US)

Regional Observing Systems

Integrated Marine Observing System (IMOS)

• Michelle Heupel (Australia)

Balearic Islands Coastal Observing and Forecasting System (SOCIB)

• Joaquín Tintoré (Spain)

Integrated Ocean Observing System (IOOS)

• Carl Goldman (NOAA, USA)

Data & Biodiversity Networks

International Oceanographic Data and Information Exchange (IODE)

• Taco de Bruin, Ward Appeltans (Belgium)

Marine Biodiversity Observation Network (MBON)

- Frank Muller-Karger (US), Emmet Duffy (US) **UNEP-WCMC**
- Lauren V. Weatherdon (UK)

Ocean Decade Programmes

- CoastPredict Nadia Pinardi (Italy), Joaquín Tintoré (Spain)
- Marine Life 2030 Frank Muller-Karger (US)
- ForeSea Fraser Davidson (Canada), Yosuke Fujii (Japan)
- DITTO Martin Visbeck (Germany)
- OASIS Meghan Cronin (NOAA, US)
- OneArgo Megan Scanderbeg (US)



(4) Where are we - Programme Development (2022 - today)



(8) Proposal – Funding (Further discussion in Session 16

Core Programme: Includes management, infrastructure, tools, and processes

Project and Exemplars: Funding for 15 exemplar and co-projects to develop tools, processes, and infrastructure, costing \$1– 2M each.

Observing and Modelling: Observing and modelling system projects addressing identified gaps, with 15 projects at \$10M each, including data/metadata funding

Potential types of Project/Co-Projects

- Exemplars assessing requirements
- Multi-system OSSE or multi-system evaluation
- System analysis
- Impact studies
- Economic evaluation work
- Infrastructure and tools
 development

Summary

- \$25M for 10 years of programme support, core infrastructure, analysis and reporting
- \$30M for projects developing processes and modular tools
- \$150M for large scale projects targeting priority observing and modelling gaps.

Programme Total: \$ 205M





What working?

What missing or issues?

Key questions/challenges ahead....

Where in maturity/implementation are the exemplars?

Resources do we have in hand?

What would we change about our objectives from the proposal?



— Session 2:

Revisit Co-Design Process

Lead : Ann-Christine Zinkann



— Alignment with Ocean Decade

White Paper Challenge 7

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 Considerations from the Co-Design Programme workshop in 2022 are aligned to the White Paper Challenge 7 Recommendations

UN Ocean Decade definition of Co-Design

Most of the actions that bring Co Design to life according to the Decade,
 we are covering a majority of them.

4. CONSIDERATIONS FOR SUCCESSFUL CO-DESIGN

- 4.1 BUILD ON AND LEVERAGE EXISTING SUCCESSES IN CO-DESIGN
- 4.2 TIME AND FUNDING: AS ESSENTIAL TO BUILDING END-USER RELATIONSHIPS
- 4.3 THE IMPORTANCE AND COMPLEXITY OF ENGAGEMENT WITH USERS
- 4.4 INTEGRATING COMMUNITY STAKEHOLDERS AND INDIGENOUS KNOWLEDGE
- 4.5 DEVELOPMENT OF COLLABORATION ALONG THE VALUE CHAIN
- 4.6 THE IMPORTANCE OF ENSURING ACCESS TO DATA



— Summary Progress Report on Exemplars

- Exemplars are now moving forward with phase 1, entering phase 2 in some areas and considering elements for phase 3
- Outlined in the report as:
 - Phase 3: TC and BC advancing towards it
 - Phase 2: TC, BC, MC, ML? with pilot's identified and (some) implementing
 - Phase 1: TC, BC, MC, MHW, ML? work around stakeholder and engaging with relevant communities (Connections could improve in modelling)

Question: Is this how we collectively see exemplar evolution functioning now? Do we need to add from Ocean Decade (other sources)? Can we 'track' it?

— Draft - Co-Design Process and Evaluation (Based on 1-2 exemplars)



Services and products:Information delivery (Value chain assessment?)

Session 3:

Programme SWOT Analysis

Lead : Emma Heslop



Showing results (Exemplars moving forward), appreciation in the process. Stakeholder positive answer Avoiding duplication (we are doing something new within our ecosystem) People are using our outputs (Marine debris -GEO BLUE Planet) Creating links with stakeholders and bring new stakeholders to GOOS Deepening our connections at wider level (WMO) - Uncover new funding Re-creating new partnerships and alignment to new ambitions Position of the programme with GOOS - access, connections (GOOS does not have visibility outside small core community) Looking at the value of the new co-systems/new observations - only place this is happening that we know of

Weaknesses

Aligned government structure required and lack of transparency (clearer roles and responsibilities) We do not have a lot of outputs - not enough dissemination We are not know outside (including GOOS and beyond) - Visibility Struggle to tap into set of funding resources for co-design part of our work Stagnation progress in exemplars How to measure progress Resources (funding and staff) GOOS community not sufficiently connected to pilot regions (RA, NFP) Broader global and balanced representation with the Exemplars (Advisory groups can reflect better representation - Global South?) Test of new technologies (against our objectives) of interest to funding agencies. Lack of KPIs for exemplars/programme for tracking progress Not communicating sufficiently on programmes success to our key stakeholders

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— Opportunities

Improve visibility of the programme Co-Design is a coalition of people for ocean impacts Increased and diverse funding outcomes Integration along the value chain and better articulation of the value / recognition More effort to fund under-resources regions/places/groups Use new technology, motivate improving models (BGC for example), pull new technology into system Can AI -smart models help us? - How AI can improve the observations that we need?

— Threats

Capacities? in less developed regions - career pathways in a new area (retention of knowledge) people have this as a role and sustained positions Competition from other programmes in some regions (Decade and GOOS)



- Session 4:

Re-visit Co-Design Programme big aims and legacy - setting objectives and goals

Lead : David Legler



High level objectives (original Programme proposal)

1. Integrate observing and modelling to support a sustainable ocean and society in ways that are measurably better

Combining knowledge of multiple experts and stakeholders...joint design

2. Make ocean observing and information appreciably more impactful through transformative co-design with the modelling community and key user stakeholders *Emphasis on fit-for-purpose*

3. Establish the international capacity and **modular (??)** infrastructure to co-design and regularly evaluate the observing system *An integrated ocean obs system integrates across geography, disciplines, and across the value chain to end users*

4. Entrain new observing and information technology across all elements of the Programme.



- Session 5:

Governance Structure of the Programme

Lead : Cristina Miño





- Proposal - Partnerships

Strategic Partners

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