Ocean Observing Co-Design

by The Global Ocean Observing System

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Realizing the Benefits of Ocean Knowledge through Ocean Observing Co-Design

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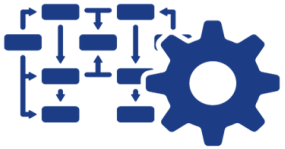
The Programme will evolve the ocean observing system so that it is co-designed with end-users and responds to their needs

OUTCOMES



Link along **value chain and users**

Blueprint for services if they don't exist

Design for observing and forecasting

Ongoing **tracking** of implementation

Economic value assessment

HOW DO WE BEGIN?

Ocean Carbon Cycle

Tropical Cyclones

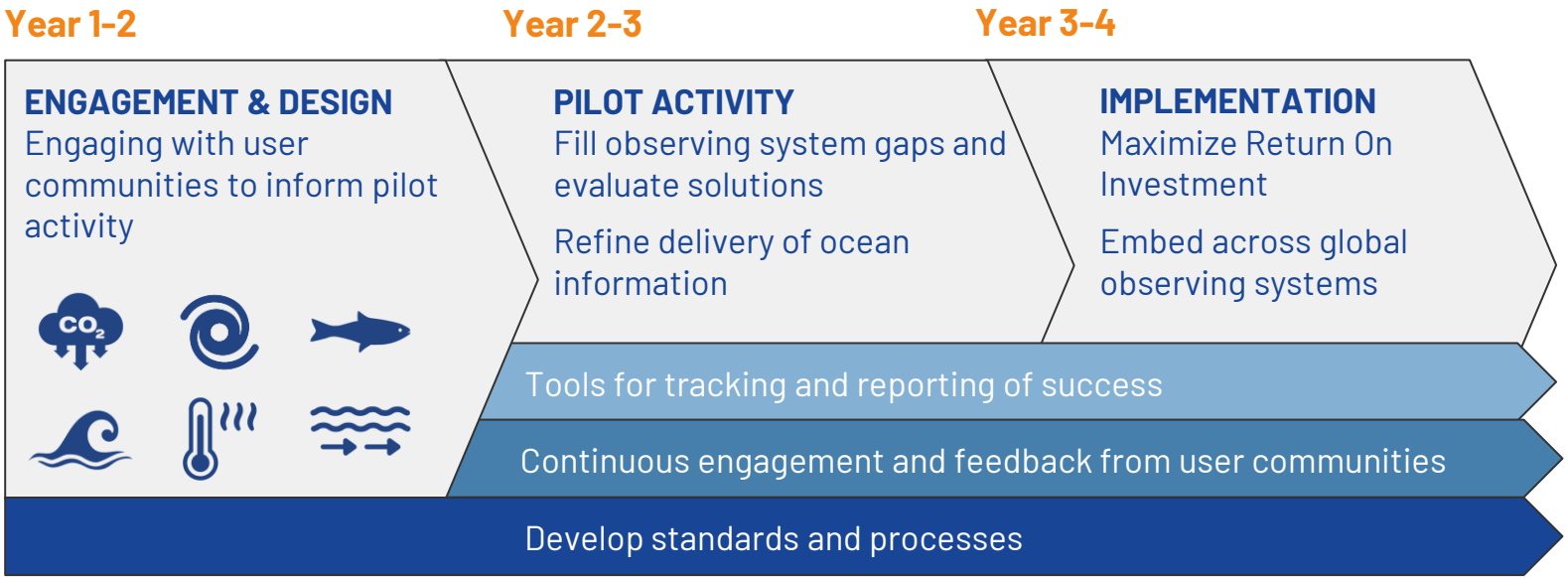
Marine LIfe

Marine Heatwaves

Boundary Current

Storm Surge

CO-DESIGN to bring about a STEP CHANGE



Impacts of ocean current structures on climate phenomena

BOUNDARY CURRENTS

Users:
Weather services; Regional fisheries; Ocean Industries, e.g. shipping; Marine resource management, Other Exemplar Projects [Carbon, Cyclones, Heatwaves]

Pilot Region: Agulhas Current, Gulf Stream and Kuroshio

Boundary current variability and prediction is **critical** to short-term and seasonal **weather forecasts**, climate **adaptation**, regional **fisheries**, food **security** and **blue economies**.

Co-design to enhance regional operational ocean modelling using a multi-platform approach:

- Product and services for ocean industries (i.e., shipping)
- Integrated boundary current observing system strategy
- Report on economic value of a boundary current monitoring system

CURRENT STATUS

Co-Design Workshop, June 2022

- Lessons learned from co-design across GOOS and other sectors and shaping the outline of co-design 'exemplar' projects.
- Report finalized and published on GOOS website

Supporters Forums

- Interactive session with co-design partners, observing networks, prediction groups, GOOS, UN Decade, national funders

SynObs participation through Exemplar teams

Future Activities

Exemplar meetings

- **June 2023:** Boundary Currents
- **September 2023:** Launch of the UN Decade Collaborative Center on Ocean-Climate Nexus (DCC-OCN) - Qingdao
    - Boundary Currents and Cyclones regional planning

Co-Design Workshop September 2023 (EuroSea High level conference)

- Lessons learned from EuroSea projects transferable to Co-Design
- Advance Co-Design Exemplar projects
- Value-chain enhancements
- Develop Co-Design work plans

Proposed Plans for New Co-Design Initiative

- Create and mature interfaces for processes leading to multi-disciplinary and multi-platform observing system design
- Integration of in situ and satellite system requirements are met and delivered to the science and prediction communities
- 3 major workshops focusing on (in-situ, satellite, modeling) roles

Questions:

- How did UN Decade programmes and projects benefit from the EuroSea project?

  Focus of the September workshop

- What are the impacts of the EuroSea project contributing to the ocean information value-chain?

  Emma’s Talk

The Global Ocean Observing System

THANK YOU

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unesco Intergovernmental Oceanographic Commission

WORLD METEOROLOGICAL ORGANIZATION

UN environment programme

International Science Council

ADDITIONAL EXEMPLAR INFORMATION

EXEMPLAR PROJECT PILOT AREAS

OCEAN CARBON

Users:
Government policy, Carbon Dioxide Removal industry and regulators, UNFCCC, Nature-based solutions, Fisheries

Pilot Region: North Atlantic

We cannot know what 'net zero' is without ocean carbon. Leverage leading edge projects towards defining what societal users need.

- How will Carbon Dioxide Removal (CDR) activities collectively affect the Ocean Carbon Cycle and net ocean carbon?
- 'If we do this amount of CDR and this amount of fishing in this area' then what will happen to the Ocean Carbon Cycle?

A cohesive global system:

- Support climate targets, adaptation and management strategies
- Inform Carbon Dioxide Removal targets and policy
- Predict coastal and ecosystem impacts

MARINE LIFE

Users:
Small scale fishers;
National and regional governments; industry;
International conventions and treaties, Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)

Pilot Region: Costa Rica; Malaysia, N. Atlantic, global (for 30x30 MPAs designation needs)

Sustainably manage ocean resources

This exemplar will identify needs for scientific information about **marine life** at local, regional and global scales in an integrated way, to **sustainably manage** ocean **resources** and improve the **livelihood** of coastal communities.

Co-design to improve predictive capabilities for ocean resource management:

- A framework for observations at different scales and the intersection of development, conservation, science, and policy
- Global ecosystem assessments with national participation
- Stakeholder driven planning for 30x30 and sustainable development

Improving forecasting lead-time and accuracy to save livelihoods

STORM SURGE

This exemplar will develop **observing** and **forecasting capabilities** to better serve **vulnerable communities**.

Co-design regionally distributed ocean observing and forecasting systems at local pilot sites in the global coastal ocean.

- Relocatable integrated observing and prediction for storm surge
- Development of impact forecasting systems
- Storm surge hazard and warning systems, end-to-end demonstration

Users:
National weather & ocean forecast centres; First & second responders; Resiliency planners; Aquaculture, ports, tourism, insurance industries

Pilot Region: Shelf and slope regions in global coastal ocean

MARINE HEATWAVES

Users:
Climate change adaptation; Aquaculture; Commercial, artisanal & Industrial fisheries; Operational forecast centers; MPA & coral reef management

Pilot Region: Mediterranean Sea, Caribbean Sea, West Africa

Co-design a sustainable monitoring system of marine heatwaves

This exemplar will develop a sustainable **monitoring system** to better advice **management** to ensure **food security** through **transformative science**.

Co-design of operational forecast models for marine heatwaves:

- Real-time in-situ information for validation and corrections of operational forecast models
- Early warning systems for end-users
- Sustainable monitoring systems of marine heatwaves and their impacts on marine ecosystems co-designed with stakeholders

TROPICAL CYCLONES

Users:
Cyclone Forecasting Centres, Emergency Response, Blue economy

Pilot Region: Tropical Atlantic/Caribbean Sea, North Pacific and Marginal Seas, Indian Ocean/Bay of Bengal

Disproportionate impacts in Less Developed Countries and Small Island Developing States

Impacts are being amplified by warming ocean, rising sea levels, growing coastal populations - how do we improve forecasts to **save lives and property in the future?**

What is the best system design to support **equity and resilience for all coastal regions?**

Co-designed regional systems will:

- Test new responsive observing technologies
- Improve early-warning systems
- Enhance forecasting capacity in critical regions (e.g. LDCs, SIDS)

QUESTIONS | OPPORTUNITIES

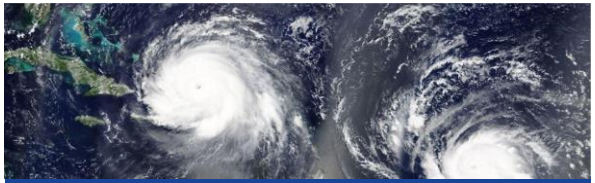
- How does the programme relate and engage with the other components of GOOS to **evolve** the ocean observing **infrastructure** together?
- How do we build **processes** *[Observation, Requirement setting, assessment tools, stakeholder engagement best practices]* and ensure the **implementation** of these in the GOOS components?
- Forward movement in the exemplar project areas and increased collaboration with the **SynObs** community that is gaining a lot of momentum.
- Co-Design Legacy workshop planned for Fall 2023.

EXPERT TEAM LEADS [some groups have already formed international steering teams]

BOUNDARY CURRENTS
- Tamaryn Morris, South African Weather Service , SAF
- Ann-Christine Zinkann, NOAA, USA

MARINE LIFE
- Frank Muller-Karger, U. South Florida, USA
- Jake Kritzer, G. Canonico, IOOS, USA

OCEAN CARBON
- Richard Sanders, NORCE / ICOS, NOR
- Anya Waite, Ocean Frontier Institute, CAN



TROPICAL CYCLONES
- Scott Glenn, Rutgers University, USA
- Cheyenne Stienbarger, NOAA, USA

MARINE HEATWAVES
- Alban Lazar, SU-LOCEAN , FR
- Diana Ruiz Pino, SU-LOCEAN, FR
- Juan Carlos Herguera, CIGOM-CICESE, MEX

STORM SURGE
- Giovanni Coppini, CMCC, IT