



European
Ocean
Observing
System

***Draft* EOOS Implementation Plan 2018-2022**

24 April 2018

Draft - for consultation

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Introduction

The European Ocean Observing System (EOOS) is a coordinating framework designed to align and integrate Europe's ocean observing capacity in the long-term; to promote a systematic and collaborative approach to collecting sustained information on the state and variability of our seas; and to underpin sustainable management of the marine environment and its resources.

EOOS is being developed to achieve a truly integrated and sustained pan-European framework for ocean observation, applying the international Framework for Ocean Observing (OceanObs Conference 2009) and considering specific European requirements and needs.

This document provides an outline implementation plan for EOOS based on the draft EOOS strategy. The plan covers the period from 2018-2022 with emphasis on the 2018-2020 period. This plan is subject to revision during its lifetime to allow for evolution of the EOOS landscape. This includes a stakeholder consultation period between 25 April and 15 June 2018 providing the wider EOOS stakeholder community an opportunity to co-design and contribute to early implementation actions 2018-2022.

The implementation plan focuses on six thematic areas: mapping and stakeholder engagement, policy context and foresight, implementation, funding, communications, and governance. EOOS is a community-driven initiative and stakeholder input and contribution is encouraged across all themes and activities.

For each thematic area the plan includes **tasks** outlining concrete activities for the implementation of EOOS. For some tasks, potential lead partners are defined. For others, lead contributors have not yet been identified. Stakeholders can indicate their intention to contribute in the online stakeholder consultation.

The plan also includes **pilot projects**. These are early actions where tasks have already been taken on board by the community and action is ongoing or imminent. The pilot projects are not ring-fenced and in some cases they are only partially allocated, therefore anyone who would like to participate should make their intentions known to the EOOS steering group.

Activity 1. EOOS mapping and stakeholder engagement

Engagement of the wide range of stakeholders in a European Ocean Observing System (EOOS) is vital to the success of this initiative. Stakeholders comprise the funders, implementers and users of EOOS alongside the international networks such as GOOS, MBON, JCOMM etc. to ensure compatibility of EOOS at the regional and global scale. Several actions are proposed to identify and engage stakeholders.

Task 1.1 Mapping EOOS components, the stakeholder community and linkages to relevant initiatives

To ensure an open, inclusive approach to EOOS, it is important to map and identify the broad and diverse EOOS stakeholder community, infrastructures and platforms. This will be done on an ongoing basis and as a joint effort across key stakeholder secretariats. In addition to stakeholder events, EOOS will promote open and structured dialogue across the ocean observing community. This will include dialogue with related communities crucial to EOOS. This includes the satellite-based earth observations, weather and climate communities. Strong interaction with the major aggregators of European ocean data including EMODnet, Copernicus and SeaDataNet will also be promoted and implemented. The main users of EOOS need to be mapped as part of this process including scientific and non-scientific users, private industry, policymakers and citizens. An international context may be appropriate as EOOS conducts this work, particularly with respect to GOOS and regional observing systems including the Integrated Ocean Observing System (IOOS) in the US and the Integrated Marine Observing System (IMOS) in Australia. EOOS will utilize these linkages in developing the community and business case for European ocean observing. The entire value chain should be considered from observation to information and assessment including the complementary role of satellite and in situ observations and the fundamental role of modelling and data assimilation (e.g. Copernicus Marine Service).

Pilot project 1.1 Mapping existing infrastructures and capabilities

Time-line: This activity will be initiated in May 2018 for delivery by January 2019 by EuroGOOS and EurOcean



A wide range of capability currently exists in European ocean observing yet this is not mapped and documented in a systematic way. In this pilot project the key operators of ocean observing infrastructure will be identified and mapped. Industries that make a significant contribution to European ocean observing will also be mapped in this context. The aggregators of ocean data from these and other operators will be documented in this task. An initial review of the products that are currently produced by operators, aggregators and industry services will be conducted for comparison to the requirements gathered in Pilot Project 1.2. This will allow assessing the current fitness for purpose of the system and the associated products and services from a user perspective.

Task 1.2 Overview of EC and national research project outcomes

A host of valuable project outcomes emanate from European Commission funded projects through initiatives including Horizon 2020 and Interreg, as well as activities at national level, have the potential to guide developments within EOOS. These include new sensor and platform developments, advances in Information and Communication Technologies and services developed within such projects that have the potential for wider adoption. A dedicated activity is required to track and report the outcomes of key relevant projects in cooperation with the EC funders and national representatives. This activity could be led by the European Commission building on the progress made in the H2020 COLUMBUS project or possibly networks such as EurOcean including work supported by JPI Oceans on infrastructure mapping.

Task 1.3 Requirements gathering

Critical to the design of EOOS is an accurate statement/database of user requirements from a very wide range of stakeholders. The fora and events (see below) will provide some of the feedback needed for this process and this information will be augmented through other dedicated meetings and interactions with stakeholders to validate and understand requirements. These requirements will be archived and revisited periodically to ensure that EOOS evolves in a fit for purpose manner.

Consideration of the results from EMODnet sea-basin checkpoints and observing system simulation experiments will be included here. **A gap analysis will be performed periodically to make sure that EOOS addresses the needs of stakeholders.** Among the stakeholders from whom requirements will be sought are the regional sea conventions, e.g. OSPAR and HELCOM, international fisheries organisations, e.g. ICES, and industry users and collectors of ocean data. **The weather and climate community, e.g. ECMWF, GCOS and the hydrographic community (EC-IHO), will also be involved in this process.** The Copernicus services (primarily marine) will also be involved in this consultation on requirements.

Pilot project 1.2. Requirements gathering for EOOS

Time-line: This activity will be initiated in May 2018 for delivery by July 2019 by EuroGOOS

The first requirements gathering exercise will take into account outputs of the EOOS forum (8 March 2018) and results from the EMODnet sea-basin checkpoints (ending summer 2018) and Copernicus Marine Service (building on previously elaborated requirements for future satellite observations) and outputs of observing system simulation experiments and other project outputs, e.g. AtlantOS, INTAROS, ODYSSEA, PERSEUS, Blue Med. These will be further discussed with stakeholder input at the EOOS conference (21-23 November 2018).

Task 1.4 Sustainability studies

Building on national plans and research infrastructure feedback gathered during the fora, events and direct additional interaction with system operators and funders, an assessment will be made of the sustainability of the observing system elements on a cyclical basis. The cycle will be repeated two-yearly and will be reported to the wider community outlining gaps, strengths and challenges within/facing the community.

Task 1.5 EOOS Forum

A forum will be organized to gather EOOS stakeholder views on a regular basis. **The aim is to have a common understanding of EOOS among funders, implementers and users of the observing system, as well as to broaden and strengthen stakeholder engagement.** The first EOOS forum took place on 8 March 2018 and outcomes were used to inform the EOOS strategy and implementation plan.

Task 1.6 EOOS events

EOOS is a community-driven initiative and in addition to the regular EOOS forum, other events (conferences, workshops, exhibitions, webinars) will be organized to address or promote the variety of EOOS aspects and areas.

Pilot project 1.3. EOOS conference 2018

Time-line: This activity was initiated in September 2017 for delivery in November 2018 by EMODnet, EMB and EuroGOOS

An EOOS conference will take place on 21-23 November 2018 organized by EMODnet, EMB and EuroGOOS, with the financial support of the European Commission (DG MARE), to address the breadth of implementation challenges and opportunities in building EOOS. The conference will follow on from the EOOS forum held on 8 March 2018. At the forum the communities' views on the EOOS critical questions were collected and brought into the EOOS strategy and implementation plan. After an open stakeholder consultation on those documents, the strategy and implementation plan will be officially adopted at the 2018 conference.

Pilot project 1.4 Stakeholder co-design of strategy and implementation plan 2018-2022

Time-line: This activity was initiated in November 2017 for delivery in November 2018 by EMB and EuroGOOS

The strategy for EOOS and an implementation plan (this document) will be presented and approved by stakeholders following a period of consultation with throughout 2018. The EOOS steering group will have the opportunity to periodically refine these documents as necessary in the evolution of EOOS.

Activity 2. Policy context and foresight

Having a continuous look at likely innovations, technical developments and societal drivers for EOOS is critical to ensure that EOOS adopts and utilizes new technologies and is aware of the evolving policy context within which EOOS operates. A suite of foresight activities is planned in the coming years to ensure this forward look is incorporated into EOOS thinking and subsequent system design and evolution.

Task 2.1 Foresight activities

Scientific and technical foresight for key EOOS elements is vital to track emerging scientific and technological developments. Among ongoing activities, the EMB published a foresight paper on the role of citizen science in ocean observing and wider marine research (May 2017) and have ongoing working groups to examine biological ocean observations feasibility, marine ecosystem modelling state-of-the-art, and the European research vessel fleet status and evolution¹. Each working group will work towards the production of reports in the 2018 to 2019 timeframe. Foresight activities could also include an examination of other scientific domains, e.g. medicine and space to anticipate cross-sectoral opportunities for EOOS.

Pilot project 2.1 Future science brief on biological observations

Time-line: This activity was initiated in 2017 with delivery by September 2018 by EMB

An EMB working group, in collaboration with EuroGOOS, is undertaking a foresight analysis on Europe's capability in biological ocean observing. This study takes stock of current state-of-the-art in marine biodiversity and ecosystems research and related biological ocean observation infrastructure. This is set in the context of global developments such as the identification of biological and ecological essential ocean and biodiversity variables. It also presents emerging scientific and technological advancements that will revolutionize biological sensors and sampling capability into the future. The study will recommend gaps and priorities for enhancing the current biological ocean observing capacity as a component of the wider EOOS that is fit-for-purpose in the context of user needs and societal benefits.

Task 2.2 Review of policy context and drivers

Regularly assessing the European and international policy context is vital to ensure EOOS can develop and evolve to maximize its relevance for societal wellbeing, benefit and wider environmental sustainability. The EOOS steering group will regularly review the policy landscape.

Pilot project 2.2 EOOS policy landscape

Time-line: This activity was initiated in March 2018 with delivery in September 2018 by EMB

A report on the policy drivers and landscape to advise the EOOS steering group and wider stakeholders will be produced.

Activity 3. Implementation of EOOS observing system elements

Several tasks are proposed below in terms of practical steps to implement aspects of EOOS. More ambitious pilot projects requiring significant resources for implementation in the long term could include: increasing the number of glider transects in the European EEZ, implementing real-time transmission of data from research vessels in Europe, developing biogeochemical and Deep Argo capabilities, systematically collecting new biological variables, and high-resolution bathymetric mapping of areas of key European interest. EOOS should establish funding mechanisms for such projects in the 2018-2022 time frame.

¹ <http://www.marineboard.eu>

Task 3.1 National Statements of Intent

To streamline the delivery of EOOS, assess vulnerabilities in the system, and encourage collaboration statements of intent from European countries involved in ocean observing activities are needed. It is hoped that inputs will be collated at national level, possibly built upon existing reporting requirements that countries have, e.g. GCOS and MSFD, and then consolidated within EOOS so that an annual status and likely new developments in observing system roll-out could be documented and shared. This will ensure that requirements are being met and that national investment in ocean observing is targeted appropriately. The EOOS forum will provide an opportunity for statements of intent to be discussed and agreed among countries. Significant additional contact with national operators will also be required in this task, particularly where there are several operators within a country.

Task 3.2 System design tools

A suite of tools will be developed to allow the community to better design and implement EOOS. These could include EMODnet checkpoint-type analysis, Observing System Simulation Experiments (OSSE) and other tools that aid and guide the community in optimizing the overall EOOS system. The initial step is to produce an inventory of the design tools in use both within the ocean observing community and more widely, e.g. meteorology, and to develop performance metrics to assess the progress in implementing EOOS based on international best practice. This activity should build on European H2020 project outcomes (e.g. AtlantOS), Copernicus Marine Service and GODAE OceanView experiences.

Task 3.3 Research Infrastructures planning

All relevant EU Research Infrastructures will be consulted regularly to ensure that such pan-European activity, e.g. ESFRI and other key infrastructures and platforms, is consistent with wider national efforts in ocean observing. As many research infrastructures are funded by European states this reporting will be cross-checked with task 3.1.

Task 3.4 Technologies mapping

EOOS needs to be capable of incorporating new technologies into the observing system as they progress sufficiently through the technology readiness levels. The community lacks the ability to systematically measure many of the Essential Ocean Variables for Biology and Ecosystems proposed by the Global Ocean Observing System (GOOS). **This is a task that needs some concerted effort by the community to address these gaps. In addition to these variables, bathymetry and all physical components should be taken into account.**

Pilot project 3.1 EOOS Technologies Forum

Time-line: This activity will be initiated in 2018 for delivery in 2019 by EuroGOOS

A technologies forum will be established as part of EOOS to enable new and old observing technologies be compared, to share data from these new technologies, and to provide guidance to technology developers to ensure a strong understanding of the user requirements for such technologies.

Task 3.5 Hosting EOOS best practice documentation

EOOS will work towards systematic defragmentation of ocean observing in Europe. Key to this is an adherence to international best practice and standards in collecting, processing, archiving and sharing ocean observations. EOOS will contribute to the central repository of best practice materials hosted through existing Ocean Best Practice initiatives, e.g. IODE.

Activity 4. EOOS Funding

Funding for both coordination and implementation of EOOS as it develops is a considerable challenge. The community is likely to see an evolution towards the systematic collection of biogeochemical and biological data to complement the mainly physical data that are currently available in real or near-real time with some exceptions. This will require significant organisation and commitment at both national level and at EC level where a clear EOOS added value is demonstrated. Several funding activities are proposed to consolidate EOOS. Dedicated resources through a secretariat, or distributed secretariats, will provide stability as EOOS develops. Individual European states are also key to funding ongoing EOOS activity and the business case for such investments at national level must be well elaborated and clear to funders.

Pilot project 4.1 EOOS cost-benefit analysis

Time-line: This activity will be initiated in 2018 by EuroGOOS and will need additional stakeholder help

To document the extent to which EOOS will result in defragmentation and efficiencies in European ocean observing and to emphasize the value and unique nature of EOOS, a cost-benefit analysis will be conducted. This will involve socio-economic experts to quantify the monetary and non-monetary value of EOOS. These experts will work closely with the ocean observing community to collect and analyse pertinent information for the study. The work will build upon the recent activities of OECD and other relevant projects.

Task 4.1 EC support for coordination and cross-cutting aspects of EOOS

While the majority of EOOS funding will continue to come from national funding, EC support will be sought for elements that demonstrate an added value at the European level. EOOS provides opportunities to align and integrate key elements of Europe's ocean observing capability. EOOS also has potential to enhance training and capacity development within and adjacent to Europe and in the European overseas territories. EOOS has the potential to demonstrate European leadership in ocean observing at the global scale through novel sensors, systems and services to users that are unavailable or under-utilized in other regions. To that end, EOOS will continuously liaise with the EC to explore opportunities to co-fund EOOS development where European value-added is obviously demonstrated. EOOS will engage with relevant EC Directorates General, e.g. MARE, GROW, R&I among others, to ensure that EOOS is visible and supported.

Task 4.2 Joint programming funding

Joint programming initiatives (JPIs) have already demonstrated the benefits of countries combining resources to address common societal issues of concern, e.g. JPI Oceans/Horizon 2020 ERANET co-fund on Marine and Maritime Technologies (MartERA) and JPI Climate/Horizon 2020 ERANET co-fund on Climate Services. JPIs have also demonstrated the ability to mobilize their member country funds to jointly address common questions on a relatively short timescale, e.g. JPI Oceans marine microplastics research projects and the developing action towards a European marine sensors calibration network. The JPI Oceans Strategic Research and Innovation Agenda recognizes the importance of establishing EOOS. EOOS will retain a dialogue with relevant JPIs to explore possibilities to co-fund relevant and pertinent initiatives through regular meetings and updates and through JPI Oceans representation on the EOOS steering group.

Task 4.3 Engaging national funders

Given that much of the investment in European ocean observing is undertaken by European countries it is important to have a mechanism to engage the national funders in the long term. EOOS should ensure that national funders are aware of EOOS and that there is sufficient background information to support the business case made at national level for ocean observing. An early action will include presenting and communicating the EOOS strategy, implementation plan and call for action following the EOOS conference in November 2018.

Activity 5. Communications and outreach

Engaging the existing and wider ocean observing stakeholders in EOOS is a critical need as this framework develops. There is some awareness of requirements, technical feasibility and challenges among system implementers, but this does not typically pervade funders and users. A concerted EOOS communication strategy will be developed by EuroGOOS with input from EMB and approved by the EOOS steering group to optimize engagement of key EOOS stakeholders with strong alignment to the fora and events planned through Activity 1.

Task 5.1 Develop overall communication strategy for EOOS

The EOOS communication strategy will examine the EOOS objectives and users, based on the stakeholder feedback, and distil the main EOOS messages and communication targets, as well as sketch out the expected communication impact. Among the initial EOOS targets are funders of ocean observations at national and regional level, citizen science organisations, European institutions, regional conventions, and international organisations. EOOS communication outputs will range from printed and digital dissemination materials to presentations at events, and exhibition showcases.

Pilot project 5.1 EOOS communication strategy

Time-line: This activity will be initiated in 2018 for delivery by November 2018 by EuroGOOS

EuroGOOS will deliver a draft EOOS communication strategy along the principles outlined in task 5.1. The implementation of the strategy will build on the already ongoing efforts in stakeholder engagement and outreach.

Pilot project 5.2 Maintain and evolve EOOS web presence

Time-line: This activity was initiated in 2016 and is maintained by EuroGOOS

High-quality pertinent internet-based information providing the background and rationale for EOOS is critical. A website was developed and is maintained by EuroGOOS to enable stakeholder access to relevant EOOS information. This will evolve to reflect stakeholder feedback in the coming years.

Task 5.3 Coordinate communication activities and link with relevant stakeholders

EOOS is an open and transparent framework developed for and by stakeholders – this will be the key principle in EOOS communications. EOOS will map the ongoing and new stakeholder initiatives and liaise on the communication strategies and activities. EOOS will continue to be presented and explained in the local, pan-European and global context at a variety of events.

Task 5.4 Monitor communication impact

To track the effectiveness of EOOS communications outlined in the communication strategy the EuroGOOS secretariat will periodically report to the EOOS steering group providing a critical review of communication efforts.

Activity 6. Governance

Most of the feedback from the EOOS consultation (Dec. 2016-Jan. 2017) indicated a preference for a bottom-up governance model with strong nations' involvement and control at least in the initial development period for EOOS. The continued work of the EOOS steering group and the evolution of the EOOS governance model in due course are considered under this activity.

Task 6.1 Hosting and facilitating the work of the EOOS steering group

The EOOS steering group was initiated in 2016 and has met multiple times since then. The steering group has developed the EOOS consultation document and provided guidance on the EOOS strategy, implementation plan and stakeholder consultations. The steering group will continue its work as the main committee giving the strategic direction to EOOS.

Task 6.2 EOOS advisory committee

Representatives from regional conventions, policy, industry, non-scientific users, and advocates of ocean literacy and citizen science will be approached to provide a wider perspective to the EOOS steering group. An advisory committee has been formed to support the planning for the EOOS forum and conference in 2018. **This advisory committee may be established on a more permanent basis through agreement among the steering group members.** The advisory committee membership may evolve over time as other relevant communities are identified.

Pilot project 6.1 Evolution of EOOS governance

Time-line: This activity was initiated in March 2018 for delivery by September 2018 by EuroGOOS and EMB

The EOOS steering group will consider the timing and mechanisms by which the EOOS governance should evolve in consultation with stakeholders using the fora, events, and other mechanisms to secure stakeholder buy-in to the evolution of EOOS governance structure. The EMB and EuroGOOS steering group co-chairs have been tasked with exploring an optimal future governance model for EOOS including the mechanism to involve European countries and coordinate national monitoring activity. This could involve the establishment of an EOOS project office/secretariat to steer EOOS tasks and foster communication among stakeholders in due course subject to resourcing considerations.

Gantt Diagram

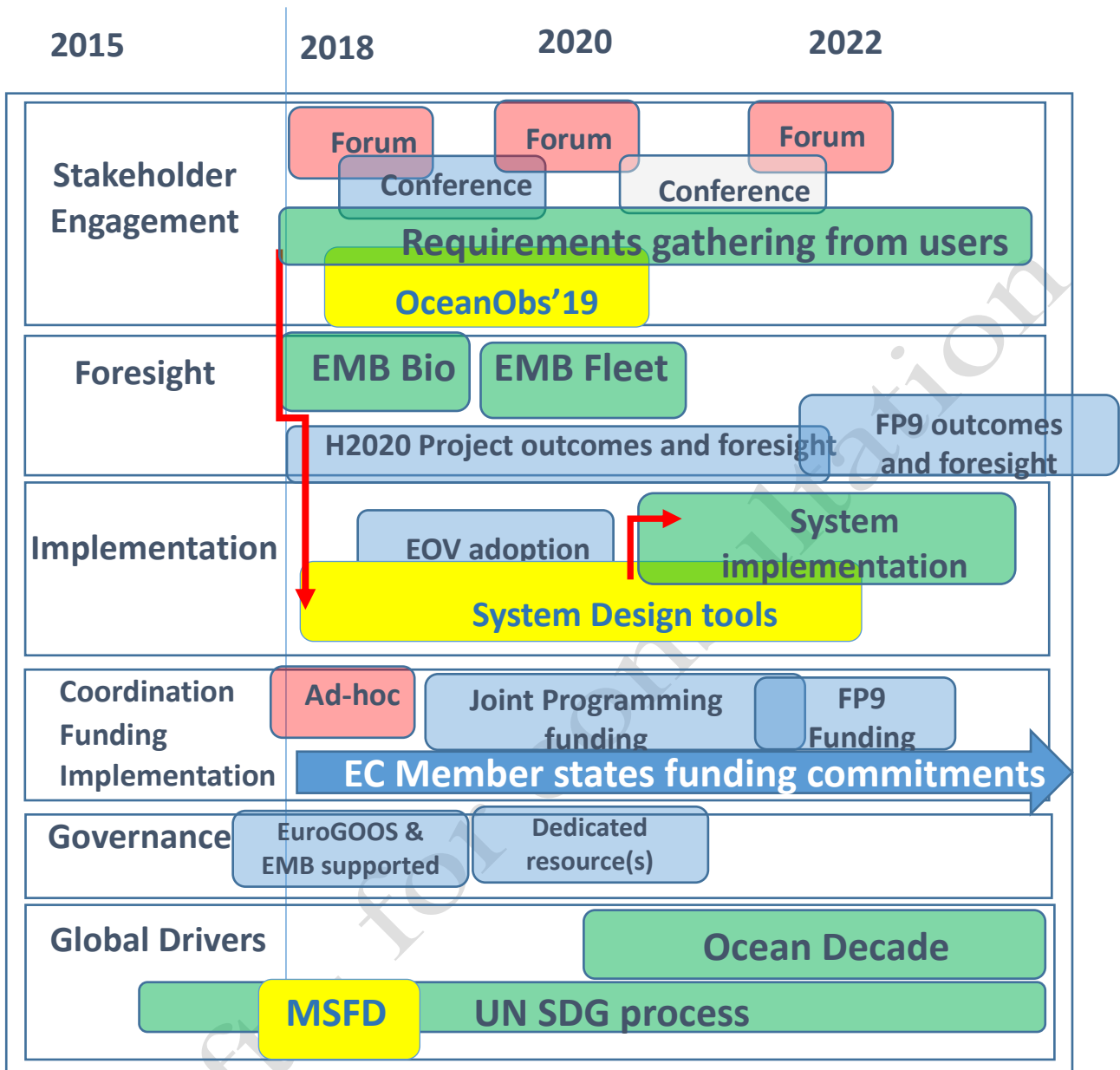


Table 1. EOOS Pilot Projects

Activity	Pilot title	Indicative timeline and task leader(s)
Activity 1. EOOS mapping and stakeholder engagement	Pilot project 1.1 Mapping existing infrastructures and capabilities	May 2018-January 2019, EuroGOOS and EurOcean
	Pilot project 1.2 Requirements gathering for EOOS	May 2018-July 2019, EuroGOOS
	Pilot project 1.3 EOOS conference 2018	Sept.2017-Nov.2018, EMODnet, EMB and EuroGOOS
	Pilot project 1.4 Stakeholder co-design of strategy and implementation plan 2018-2022	Nov.2017-Nov.2018, EMB and EuroGOOS
Activity 2. Policy context and foresight	Pilot project 2.1 Future science brief on biological observations	2017-Sept.2018, EMB
	Pilot project 2.2 EOOS policy landscape	March -Sept. 2018, EMB
Activity 3. Implementation of EOOS observing system elements	Pilot project 3.1 EOOS Technologies Forum	2018-July 2019, EuroGOOS
Activity 4. EOOS Funding	Pilot project 4.1 EOOS cost-benefit analysis	From 2018, EuroGOOS with additional stakeholder help
Activity 5. Communications and outreach	Pilot project 5.1 EOOS communication strategy	By Nov.2018, EuroGOOS
	Pilot project 5.2 Maintain and evolve EOOS web presence	From 2016, EuroGOOS
Activity 6. Governance	Pilot project 6.1 Evolution of EOOS governance	March-Sept. 2018, EuroGOOS and EMB EOOS steering group co-chairs