Community recommendations on marine technology and ocean observing gaps and requirements

EC Ocean observation: sharing responsibility virtual event on 18 June 2021

European Commission

This document presents Community Recommendations, as an extract from a EC report.

All citations should reference the full report, EC ocean Observation :sharing responsibility Report and Community Recommendations from the event on 18 June 2021, compiled and edited by Kate Larkin, Nathalie Tonné and Jan-Bart Calewaert (EMODnet); Àngel Muñiz-Piniella, Britt Alexander and Sheila JJ Heymans (EMB).

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Further information on the EC Ocean Observation Initiative – sharing responsibility can be found at:
https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12539-Ocean-observation-sharing-responsibility_en

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Introduction

In 2020 the European Commission (EC) Directorate-General for Maritime Affairs and Fisheries (DG MARE) launched an EC Ocean Observation initiative titled EC Ocean Observation – sharing responsibility[1] with a public consultation which gathered feedback from over 150 stakeholders, including perspectives on the needs, requirements and opportunities for strengthened coordination at national level across marine and coastal data collection efforts. The consultation culminated in February 2021 with an online event[2] hosted by the European Parliament Intergroup on Seas, Rivers, Islands and Coastal Areas (SEARICA), in cooperation with the Directorate General for Maritime Affairs and Fisheries of the European Commission and the Conference of Peripheral Maritime Regions. In parallel, between 2019-2020 the EC commissioned a study on Marine Technology[3], specifically on the state of the development of sensors and platforms in ocean observation.

In the context of these EC and wider European community activities, the European Commission Directorate-General for Maritime Affairs and Fisheries (DG MARE), unit A1 Maritime Innovation, Marine Knowledge and Investment, convened an EC Ocean Observation: Sharing Responsibility event on 18 June 2021. The event was co-organised by the Secretariats of EMODnet[4], European Marine Board (EMB),[5] EuroGOOS[6] and Copernicus Marine Service[7] and brought together over 90 experts from the wider European and International community spanning ocean observing, marine monitoring and user communities. The event included showcase presentations, breakout discussions and a plenary panel dialogue, focusing on two key topics related to ocean observation, namely: (i) Ocean Observing technology: optimising European capability; and (ii) Ocean Observing gaps and requirements.

In the first session on Ocean observing technology, showcase presentations were followed by breakout discussions on ocean observing technology, facilitated and rapporteured by representatives from the EMODnet, EMB and EuroGOOS Secretariats and Marine Research Infrastructures EMBRC-ERIC[8], EMSO-ERIC[9] and LifeWatch-ERIC[10]. Expert perspectives and recommendations were gathered in three key areas of marine technology with a focus on the EU market: (1) Technological Research and Innovation; (2) Market pull; and (3) Finance. The second session focused on ocean observing gaps and requirements. Showcase presentations were followed by a plenary panel consisting of experts from the European community. This session aimed to collectively assess the European capability and existing methodologies for assessing gaps and requirements in marine observation, and provided recommendations on how such efforts could evolve in the future, in the context of the EU Green Deal and global initiatives.

1. https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12539-Ocean-observation-sharing-responsibility_en
2. http://www.searica.eu/2020-2024/events-2019-2024/searica-event-on-ocean-observation
3. https://cinea.ec.europa.eu/news/state-development-sensors-and-platforms-ocean-observation-2021-07-02_en
4. emodnet.ec.europa.eu/en
5. https://www.marineboard.eu/
6. https://eurogoos.eu/
7. https://marine.copernicus.eu/
8. https://www.embrc.eu/
9. http://emso.eu/
10. https://www.lifewatch.eu/

This document presents the Community Recommendations extracted from the EC Ocean Observation event on 18 June 2021 full report. Recommendations are based on presentations, stakeholder discussions and dialogues at the event. These Recommendations aim to inform policy makers and wider stakeholders of further ways to strengthen coordination across the marine knowledge value chain, particularly in terms of marine technology and ocean observation gaps and requirements, and in the context of the EC initiative on Ocean Observation: Sharing responsibility.

The EC Ocean Observation event took place back-to-back with the EMODnet Open Conference 2021[11] and the related EMODnet partnership Jamboree. This promoted further connection across stakeholder communities including academia/research, the Blue Economy, policy and civil society, involving key actors from the public and private sectors. It also promoted the alignment between the core EMODnet community (marine data managers, infrastructures, services and users) with data producers (ocean observation, monitoring data acquisition), and users. This in turn enabled discussions on connecting the marine knowledge value chain through feedback loops, reporting on data and information uptake, usage and adequacy, to inform on the value and impact of open marine data and priority gaps and requirements. The full report, including summaries of Plenary, Panel and Breakout discussions, together with the graphic recordings of the EC Ocean Observation event are available in the full report, published on the EC Maritime Forum[12].

11. https://emodnet.ec.europa.eu/en/conference2021

12. https://webgate.ec.europa.eu/maritimeforum/en/node/6188

Community recommendations

Community recommendations taken from the EC Ocean observation event on 18 June 2021 are presented below, with a focus on optimising European capability in the context of international efforts.

Ocean Observing Technology

Research and Innovation

- **Research, Development (R&D) and Innovation remain crucial for Europe** to evolve its world-leading capability role in ocean observing technology, platforms and infrastructure;

- **Future ocean observing technology user requirements should be identified across the marine knowledge value chain,** to include solutions for collecting high quality marine data related to the EU Green Deal and in the context of global needs e.g. of microplastics, wider pollutants, and biological parameters. These observations can connect to the wider environmental and human activities data to assess ocean biodiversity, ecosystem functioning and human impact. The observations offer information on the behaviour and migration of marine organisms to better populate ecosystem models through holistic assessment over space and time, technology fit for extreme environments and observation strategies for complex sea basins, such as the Arctic Ocean (environments across borders);

- **Build on existing mechanisms to further connect ocean observing and marine monitoring technology developers, ocean observation operators and user communities across the public and private sectors and – where appropriate – across domains,** to:

  a. Foster dialogue, exchange and innovation between technology developers, suppliers and users (e.g. the EOOS Technology Forum in Europe) and international initiatives (e.g. NOAAs U.S. Ocean Observing Enterprise, Global Ocean Observing System (GOOS), etc.);
  b. Promote new technology and innovation by ocean observing technology manufacturers (within Europe) across public and private sectors, to expand the range of existing variables, and to develop capability for sensors to monitor emerging parameters e.g. for biological variables;
  c. Connect to a broader range of users to ensure marine technology is developed for multiple applications, "design (marine technology) once, apply many times";

- **Promote scalable ocean observing technology solutions (whilst preserving data quality), with direct involvement of the user community**, through:

  a. Promoting cost-effective solutions where sensors can be produced cheaply, and for larger-scale production and use;
  b. Supporting miniaturisation of technology, towards micro-sensors e.g. 'lab-on-a-chip' – omics and e-DNA sensors, and/or cost effective sensors, samplers and platforms that are fit for the transition from open ocean to coastal environments, and technology that can more easily adapt to 'plug in' new emerging sensors and data transmission requirements. This requires working with users for sensor testing and co-maintenance etc.;

- **Connect and operationalise marine data integration towards a more streamlined pipeline and 'data ecosystem', spanning all ocean observing and marine monitoring technology and data collection with interoperable data services and users.** Future sensors should be enabled with the capability for minimum and standardised metadata setting – in addition to near real-time data quality control and standardisation. This would move beyond the current capability where met-ocean data from a few limited parameters are streamed in near real-time for operational services, and could revolutionise the timely availability of marine data for use in web-based open science, ocean (and wider environmental) digital services (e.g., digital twins), high-performance modelling with predictive capability, to inform future scenarios, and in Machine Learning and wider Artificial Intelligence applications;

- **Incentivise international dialogue and best practice in marine technology development, including for scalability and for capacity development** to ensure ocean observation operators have the know-how and tools for marine technology, infrastructure and platform deployment, maintenance and operation, following international best practice to maximise the high quality, standardisation and interoperability of the resulting marine data, for all.

Market Pull

- **Increase market demand by developing lasting partnerships across the marine knowledge value chain e.g. from supplier to user, and between public and private stakeholders,** through:

  a. Strengthening coordination of ocean observation technology development at national (e.g. national authorities), regional (e.g. Regional Sea Conventions), pan-European (e.g. Marine Research Infrastructures), and global (e.g. Global Ocean Observing System (GOOS)) scales by working as a collective with an 'enterprise' mind-set to enhance a user-driven approach and to provide a reliable framework for companies to invest in new technology development, driving market demand after the initial development phase;
  b. Operationalising dialogue and feedback connecting the science 'push' and commercial 'pull';
  c. Identifying and communicating the societal and economic benefits and value of ocean observing activities and technologies to policymakers, industry, and broader society.

- **Create a European facilities pool for ocean observation technologies**, similar to International examples (e.g. NOAA in the U.S.), to widen the market pull for existing 'niche' applications and thereby extending the reach and diversity of users of ocean observing technology in terms of geographical, platform and domain demand;

- **Promote cooperation across the ocean observing technology community to increase the purchasing power for operators to buy ocean observing technologies "in bulk", thus increasing the market demand.** This could be done in cooperation with Marine Research infrastructures and wider EOOS;

- **Strengthen international cooperation in ocean observation technology development** to ensure EU ocean observation technology is useable beyond the EU market, to diversify and expand the market beyond Europe.

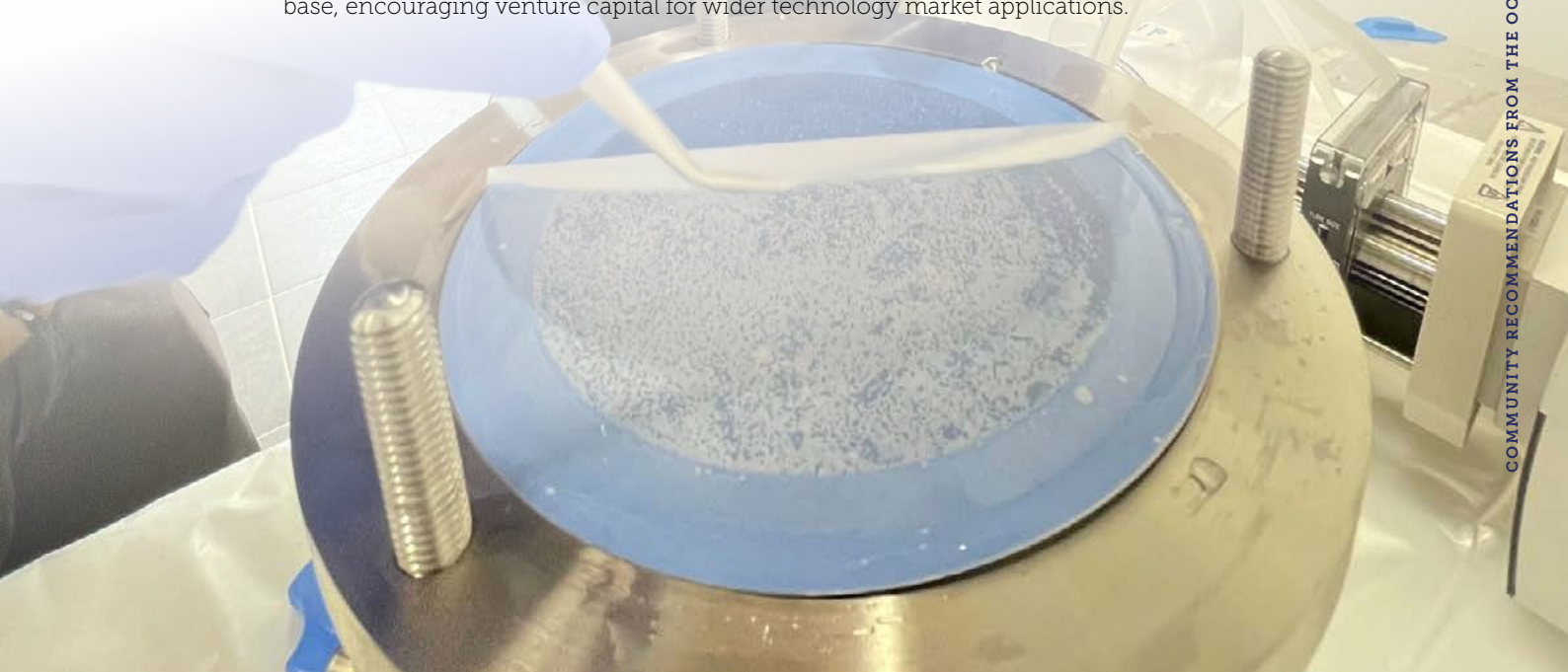
Finance

- **Extend and innovate funding cycles towards less volatile, longer-term planning and sustainable financing of ocean observing technology,** through:

  a. Simplifying EU funding mechanisms for technology development and purchasing, adding incentives for the private sector – in particular Small and Medium-sized Enterprises (SMEs) – to reduce geographical or sector-specific silos, and to promote public-private investment;
  b. Assessing and implementing a more optimal time-span for ocean observing technology R&D project funding, to provide the necessary support to turn R&D prototypes into significant European market capabilities, with a high Technology Readiness Level (TRL);
  c. Enabling mechanisms to make new sensors in test/pilot phases accessible for intermediate and/or end-users to deploy, test and feedback to manufactures, to fast-track the route to market, whilst minimising investment and/or risks;
  d. End-to-end financing of marine technology to include sensor hardware and software, data collection, technology maintenance, data and metadata standardisation, transmission and integration, including timely delivery of data into EMODnet and Copernicus Marine Service;
  e. Considering a funding feedback loop whereby profits from mature technologies can be used to further invest in new emerging technologies.

- **Connect accelerator programmes with ocean experts, finance and business experts, and wider mentors**, to help scale-up new ventures in the growing market for ocean observing technology, driven by - and meeting the needs of - the users;

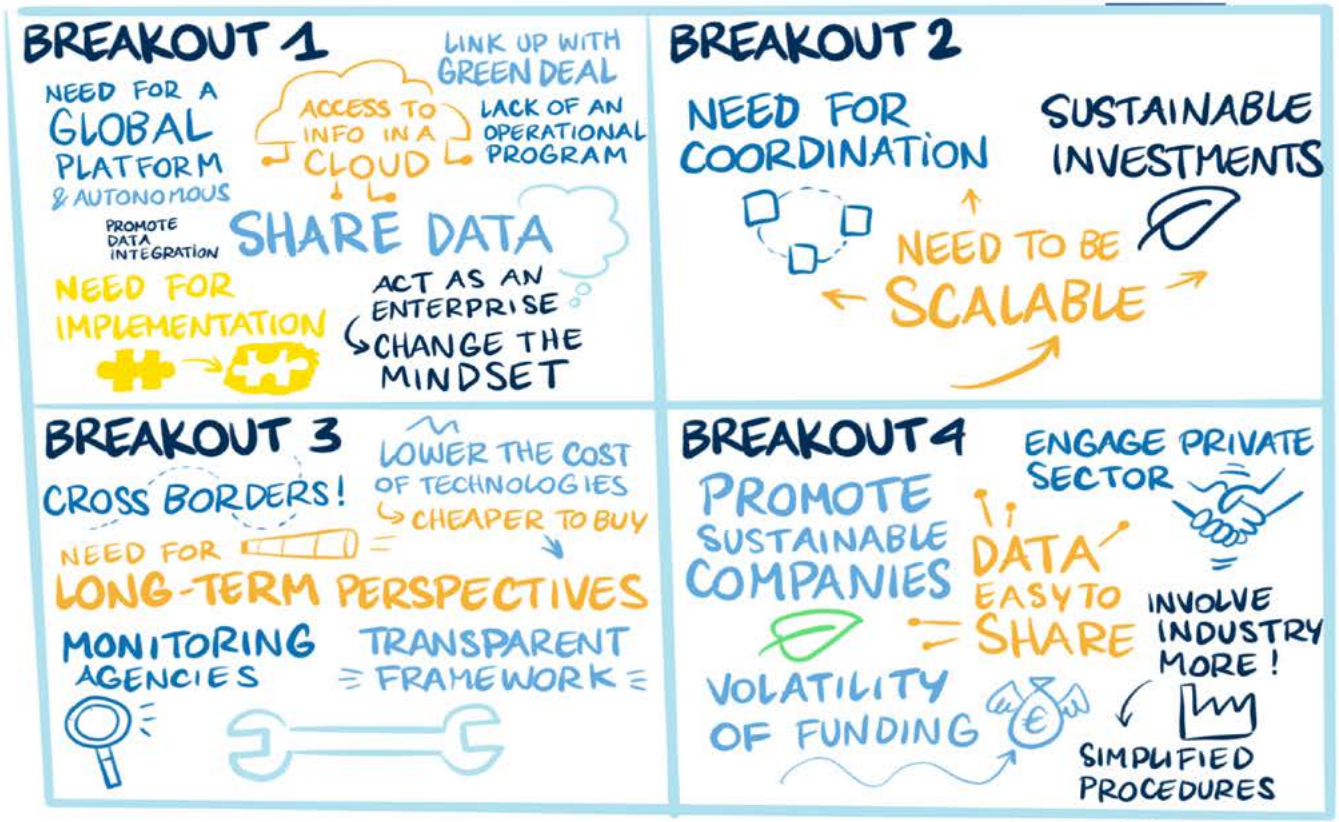
- **Diversify financial mechanisms to promote co-funding for ocean observing technology across domains and disciplines**, to transform 'niche' marine technology designed for a specific marine/ maritime use, to meet more diverse applications and thereby broaden the user base, encouraging venture capital for wider technology market applications.



OCEAN OBSERVING TECHNOLOGY

OPTIMISING EUROPEAN CAPABILITY

SUPPORTED BY THE European Commission

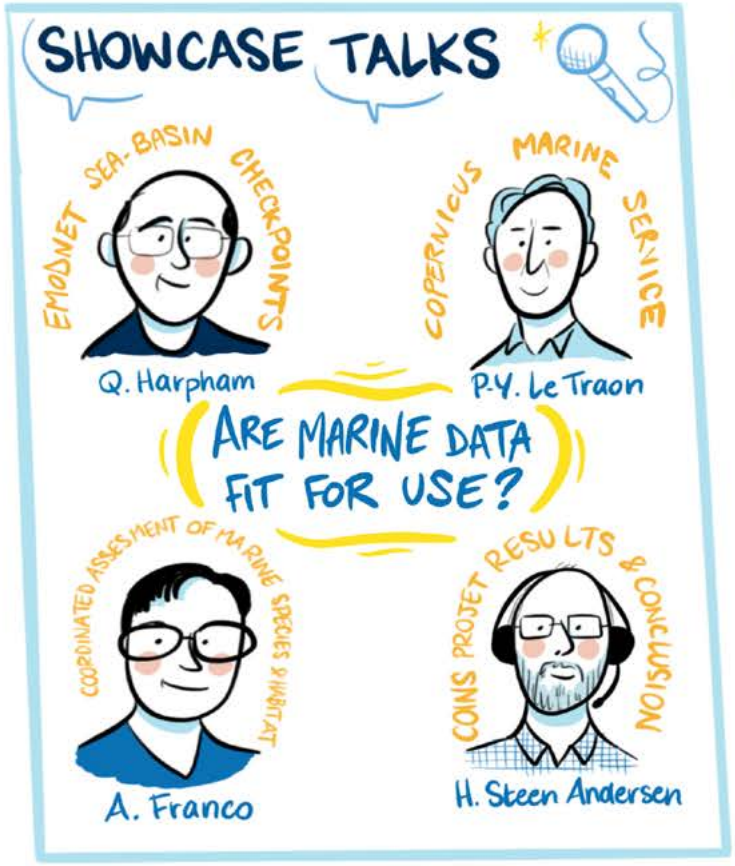


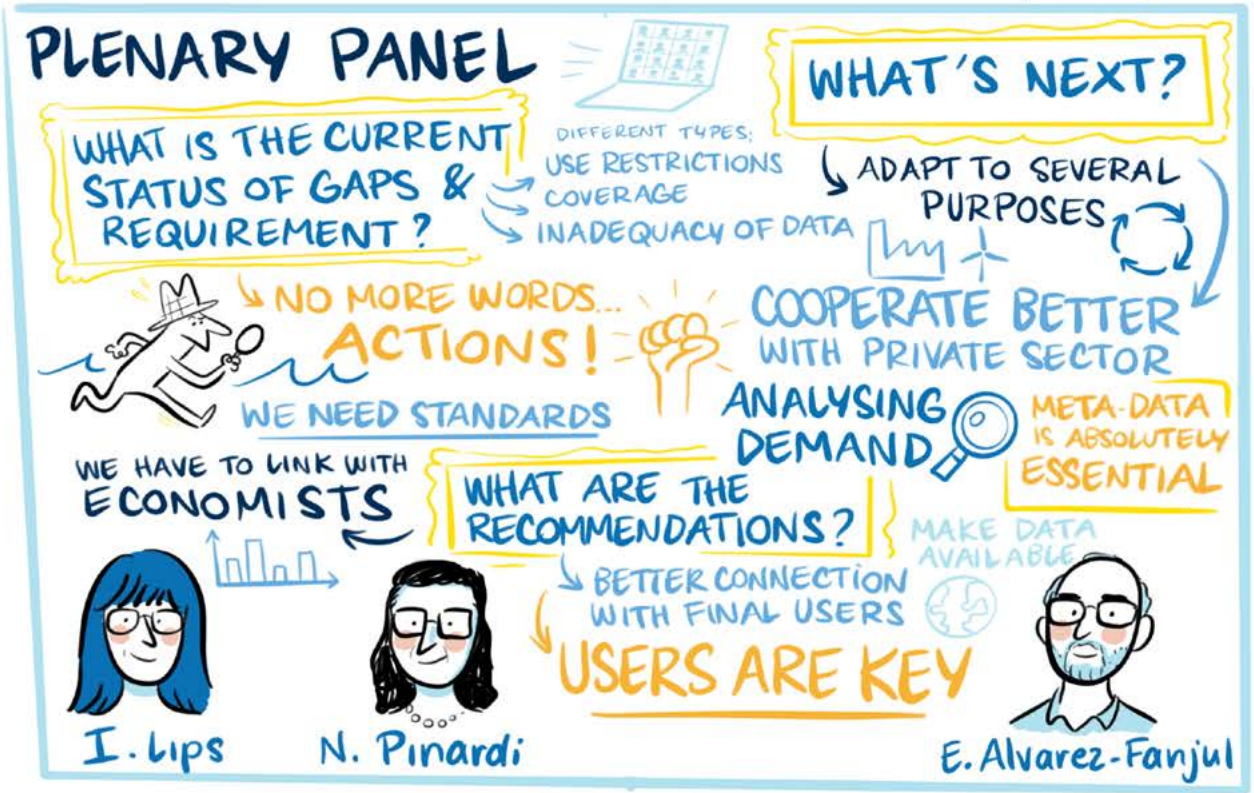
EuroGOOS European Global Ocean Observing System · European MARINE BOARD Advancing Seas & Ocean Science · EMODnet European Marine Observation and Data Network · Copernicus Marine Service · Copernicus · MERCATOR OCEAN INTERNATIONAL

OCEAN OBSERVING GAPS & REQUIREMENTS

CONNECTING AND EVOLVING EUROPEAN EFFORTS

SUPPORTED BY THE European Commission





EuroGOOS European Global Ocean Observing System
European MARINE BOARD Advancing Seas & Ocean Science
EMODnet European Marine Observation and Data Network
Copernicus Marine Service
Copernicus
MERCATOR OCEAN INTERNATIONAL

Ocean observing gaps and requirements

- **Create mechanisms – building on existing methodologies - to regularly conduct community efforts evaluating ocean observing gaps and requirements and to synthesise across sectors, repeating these activities at regular intervals.** There is a strong European ocean observing capability, but these are currently spread over multiple communities and lags behind the coordinated knowledge of gaps in remote (satellite-derived) observations;

- **Comprehensively assess data adequacy, data accessibility and data gap**s to fully identify if a gap may be a result of inadequacy or inaccessibility of the available data available, or if true gaps remain in the current ocean observing activities, through:

  a. **Promoting the benefits and mechanisms for data sharing (e.g. with EMODnet and Copernicus Marine Service), to ocean observing coordination efforts of Member States, associated countries and regions (e.g. through Regional Sea Conventions) and at EU level** to further reduce duplication of effort, integrate existing data and reduce costs of future data collection;
  b. **Strengthening cooperation for ocean observation and marine data collection and sharing within the EU and with non-EU countries** (e.g. through EOOS Operations Committee and GOOS National Focal Points) to increase the availability of national and regional *in situ* marine data through EU marine data services EMODnet and Copernicus Marine Service;
  c. **Improving the integration and data sharing across ocean observing and marine monitoring assessments for legislative purposes (e.g. the EU Birds and Habitats and EU Marine Strategy Framework Directives);**
  d. **When funding future projects – both public and private – ensure that contracts include a requirement to explicitly mention EMODnet and Copernicus Marine Service as the EU services where data producers should submit or make available their marine data for long-term integration,** thereby expanding the data provision in these integrated, standardised and harmonised data sets, to further enable assessments of ocean observing gaps and requirements;
  e. **Strengthening partnerships between *in situ*, satellite (remote sensing) and modelling communities to enable more holistic ocean observation and marine data integration, leading to easier identification of real gaps, and the opportunity to fill these gaps;**
  f. **Actively promoting cooperation, co-design and data sharing from the private sector, civil society and wider citizens,** to fully bring in the diversity of user needs and requirements, and to further integrate data from diverse sources e.g. citizen science, in existing open data sharing platforms for re-use, including in data adequacy assessments;
  g. **Expanding data adequacy assessments beyond European seas to include full Ocean basin scale assessments** (e.g. for the Atlantic Ocean and Arctic Ocean).

- **Build on, integrate and innovate existing methodologies to assess ocean observation gaps and requirements (e.g. the EMODnet Sea-basin Checkpoints, Copernicus Marine Service, EuroGOOS, European Environment Agency (EEA)) to:**

  a. Shift from science-driven to user-driven approaches to identify ocean observation gaps and requirements and to move towards fully integrated, holistic assessments across data analysis and modelling communities, and to connect *in situ* with satellite-derived data;
  b. Move from single user requirements to multiple, inter-connected, cross-border requirement identification, including cross-sectoral needs;

c. Facilitate active and operational feedback loops to connect the marine knowledge value chain as a "data ecosystem" with regular feedback on user requirements to inform future ocean observing technology and system design;
d. Design future ocean observing gaps and requirements assessments to evaluate current monitoring systems and data collection frameworks around user requirements.

- **Further identify the different kinds of user requirements** (e.g. data quality, coverage, resolution, sustainability, integration) and the (multiple and evolving) purpose(s) for the use of the data, in order to identify gaps and requirements relevant for the user;

- **Enhance current capability and community application of metadata standards, and current exchanges on best practice** (e.g. EMODnet, Copernicus Marine Service, the International Oceanographic Data and Information Exchange (IODE) of the Intergovernmental Oceanographic Commission (IOC) of UNESCO Ocean Best Practices System (OBPS) initiative), to have simplified, user-friendly standards that will be a game-changer for data interoperability and re-use, and to aid the private and public sector in working together in a more coherent way towards "Create good metadata once, and be thanked many times.";

- **Promote collaboration across the marine knowledge value chain between marine data services, users, ocean observing and marine monitoring operators and implementers,** ensure more exchange on societal value and benefits of ocean observing and user gaps and requirements to inform ocean observing system design;

- **Diversify and expand the expertise involved in ocean observing gaps and requirements setting and design to enable cost-benefit analyses to be integrated into existing assessments,** e.g. through collaboration with economists, socio-economists, human activities at sea, etc.;

- **Incentivise observing of Essential Ocean Variables (EOVs) and Essential Biodiversity Variables (EBVs)**, towards more systematic approach to address major gaps in ocean variables - particularly biogeochemical and biological;

- **Encourage Member States to take a proactive approach to further connect existing national assets in ocean observation, coordinating this with marine data and information services to optimise the assessment of ocean observational gaps, efforts and data availability.** Additional coordination is also recommended at EU level, to ensure interoperability. These actions will further enable the principles of measure once and using many times, to promote efficient and integrated assessments and sharing monitoring best practice across EU Member States;

- **Encourage the private sector to collect and share more data, e.g. from Blue Economy operations including windfarms, aquaculture, etc.** The win-win benefits (e.g., offered by EMODnet and Copernicus Marine Service) for providing access to free, integrated data, data products and services, could be further communicated by these marine data services to show the value of cooperation;

- **Coordinate EU contribution to global initiatives:** The UN Decade of Ocean Science for Sustainable Development provides an opportunity to collectively contribute EU expertise, capability and results on ocean observing gaps and requirements and ocean observing system design to international efforts, such as GOOS, the G7 and the UN 2030 Agenda, enabled through GOOS National Focal Points and EU initiatives e.g. EOOS, EMODnet, Copernicus Marine Service, GEO Blue Planet EU Office and the EU4OceanObs project.