

FIRST EOOS TECHNOLOGY FORUM

13 October 2020, virtual event hosted by SeaTechWeek 2020

Co-chaired by



Hosted by



FIRST EOOS TECHNOLOGY FORUM

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On 13 October 2020, the 1st EOOS Technology Forum was organized by EuroGOOS through its Technology Plan Working Group and hosted by SeaTechWeek as a virtual event.

The Forum brought together **77 participants** representing instrument manufacturers, technicians, technologists, and scientists across the public and private sectors from **11 European countries, the United States, Canada, and Argentina**.

Participants discussed the technological and operational aspects of ocean observing, exchanged knowledge and best practices, and explored new opportunities for collaboration.

The event was divided into two 2-hour sessions which included key presentations and two interactive workshops.

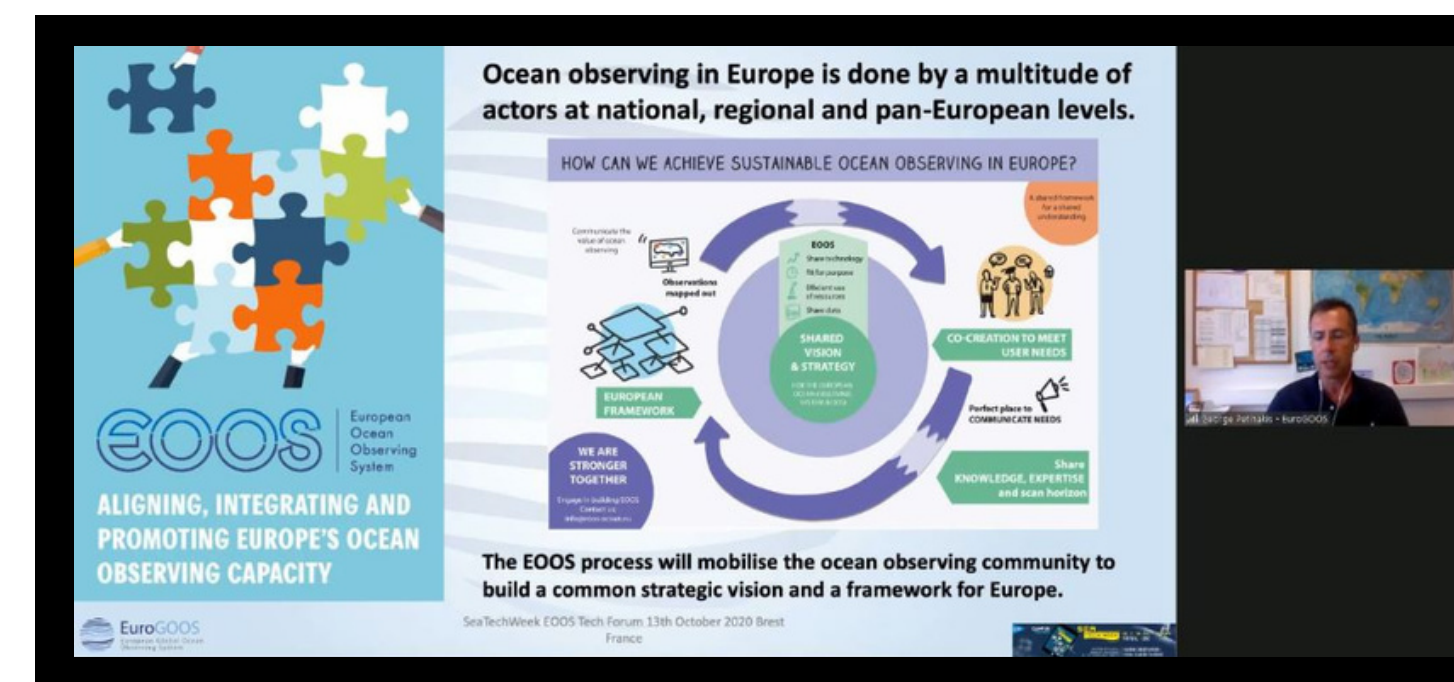


SESSION 1: SETTING THE SCENE, RATIONALE AND CONTEXT

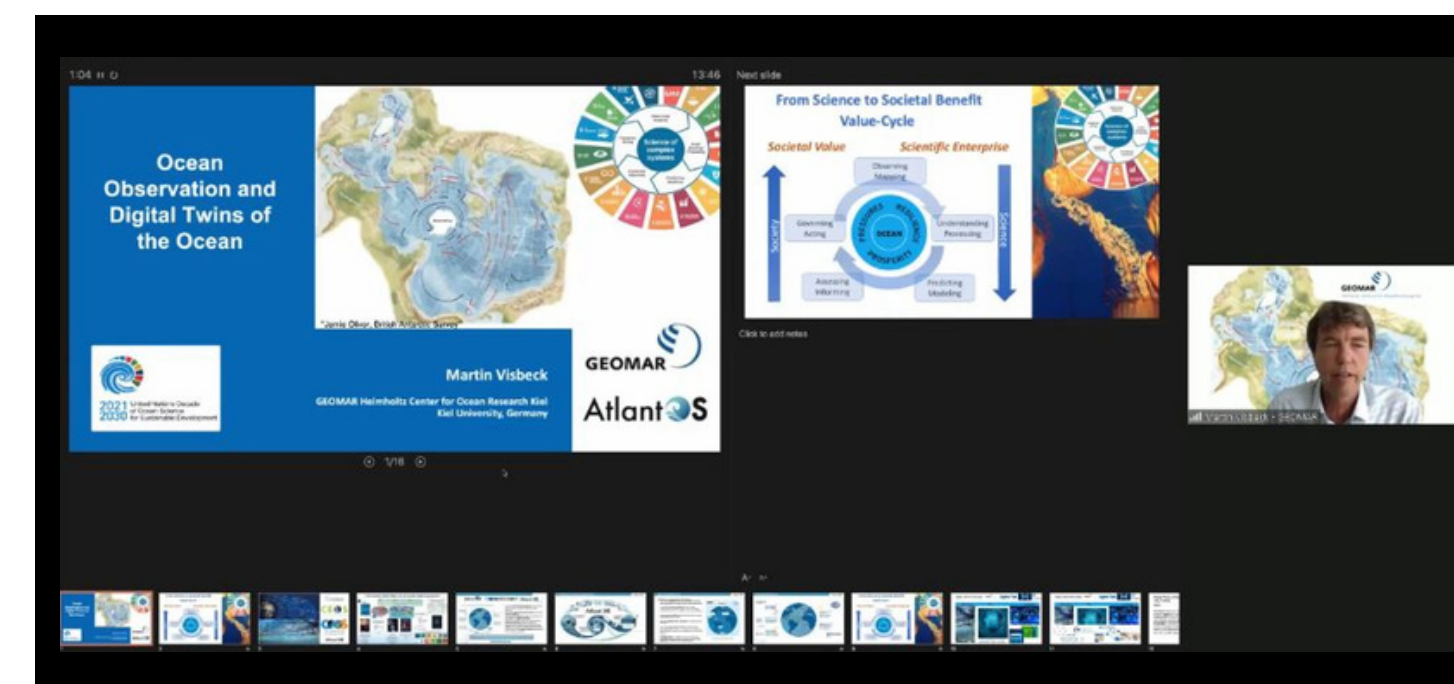
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Rajesh Nair, Istituto Nazionale d'Oceanografia e di Geofisica Sperimentale (OGS), Italy, and **Laurent Delauney**, Institut Français de Recherche pour l'Exploitation de la Mer (Ifremer), France, co-chairs of the EuroGOOS Technology Plan Working Group, introduced the Forum's [first session](#). Presentations covered the event's main objectives, provided an overview of the current state of ocean observing strategies in Europe, and discussed new critical, enhancing, and transformative technologies.

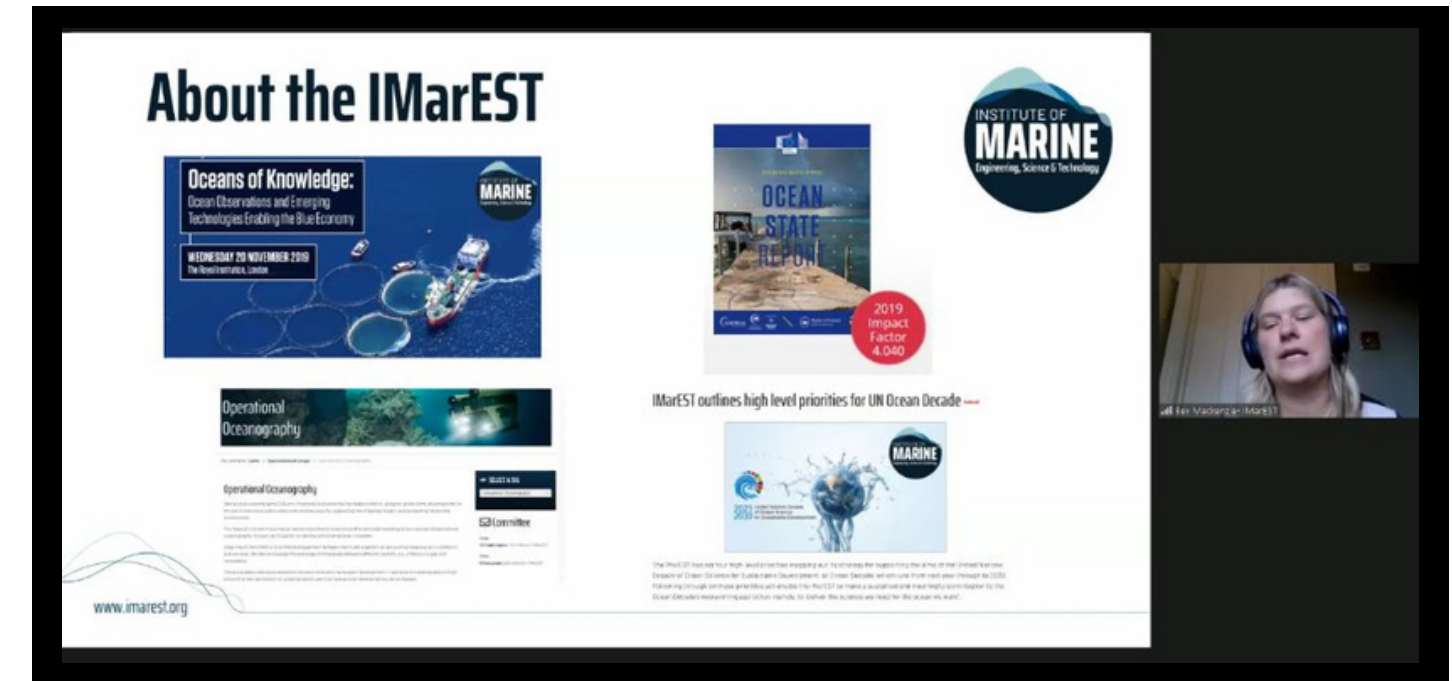
George Petihakis, chair of EuroGOOS and member of the EOOS Steering Group, kick-started the session with an overview of the ocean observing landscape in Europe. Most of the ocean observing activities are conducted and funded at the national level, and cooperation at the pan-European level is critical to remedy fragmentation and duplication of efforts. Operating within the EOOS framework, EuroGOOS plays a key role in coordinating national and regional operational oceanographic activities and fostering partnerships. George Petihakis stressed that since the establishment of EuroGOOS in 1994, a lot has been achieved in generating the ocean observing data in Europe and aggregating these data into oceanographic services for society. Yet, gaps still exist in the routinely collection of some Essential Ocean Variables (EOVs). He explained that EuroGOOS is promoting a sustained and responsive European Ocean Observing System framework mobilizing the ocean observing community around a shared vision for Europe.



Martin Visbeck, Head of Research Unit at GEOMAR and Professor at Kiel University, Germany, further explained how ocean observations can be translated into societal benefits. The presentation highlighted the contributions of the EU Horizon 2020 [AtlantOS project](#) and [AtlantOS program](#) to a sustainable, efficient, and fit-for-purpose integrated ocean observing system in the Atlantic. [EuroGOOS](#) was actively involved in the AtlantOS project as a partner, member of the steering group, and part of the Atlantic Blue Print team. Martin Visbeck also emphasized the [Digital Twin of the Ocean](#) concept, which aims to integrate all European assets related to seas and oceans with digital technologies to develop a comprehensive digital representation of the ocean. The initiative will help transform data into knowledge and connect experts, governments, industries, and citizens.



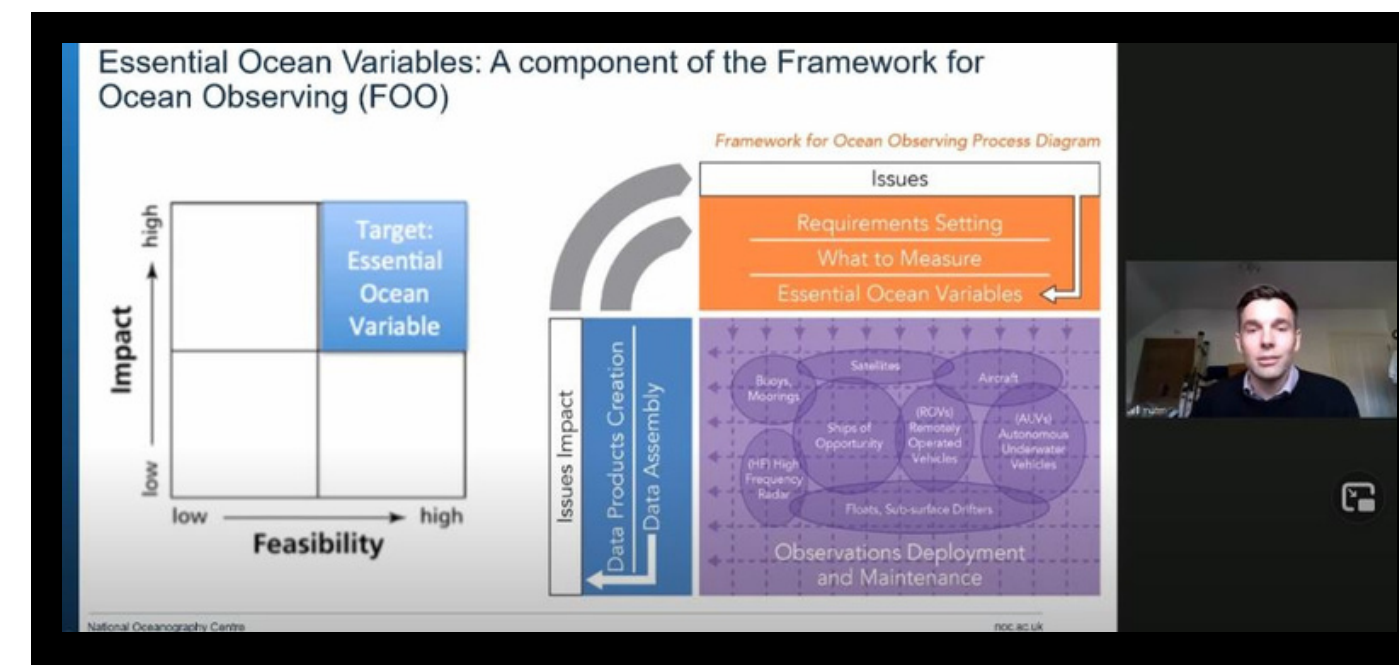
Bev Mackenzie, Director of Policy at The Institute of Marine Engineering, Science and Technology (IMarEST), UK, presented a societal and policy perspective on new partnership opportunities in the ocean observations field. Building inclusive and sustainable partnerships requires a thorough understanding of the complex end-user landscape. As these end-users have different needs, the mutual recognition of priorities is key to successful cooperation. Informed dialogue and collaboration between policy makers and the oceanographic community is crucial. Bev MacKenzie also stressed that engagement across the ocean observing value chain should be representative of all sectors of society, addressing the issues of inequality and accessibility. She called for partnerships with traditional knowledge holders generating a wealth of new insights and information, and promoting inclusivity and broader societal engagement in ocean observing. She added that ocean literacy can help convey the societal benefits of ocean observing and craft a collective narrative of the ocean.



Eric Delory, Head of Observatory at the Oceanic Platform of the Canary Islands (PLOCAN), provided an introduction to the critical technologies which are needed to meet observing requirements and support long-term technological developments. Near-term technological priorities should take into account global needs (biogeochemical and biological observations, multiplatform integration and connectivity), but also the Blue Economy priorities and relevant EU legislation (e.g. Marine Strategy Framework Directive). Important elements such as size, power consumption reduction, and sensor and data interoperability across domains and platforms were also emphasized. Additionally, critical technologies should exploit the potential of autonomous systems and vehicles.



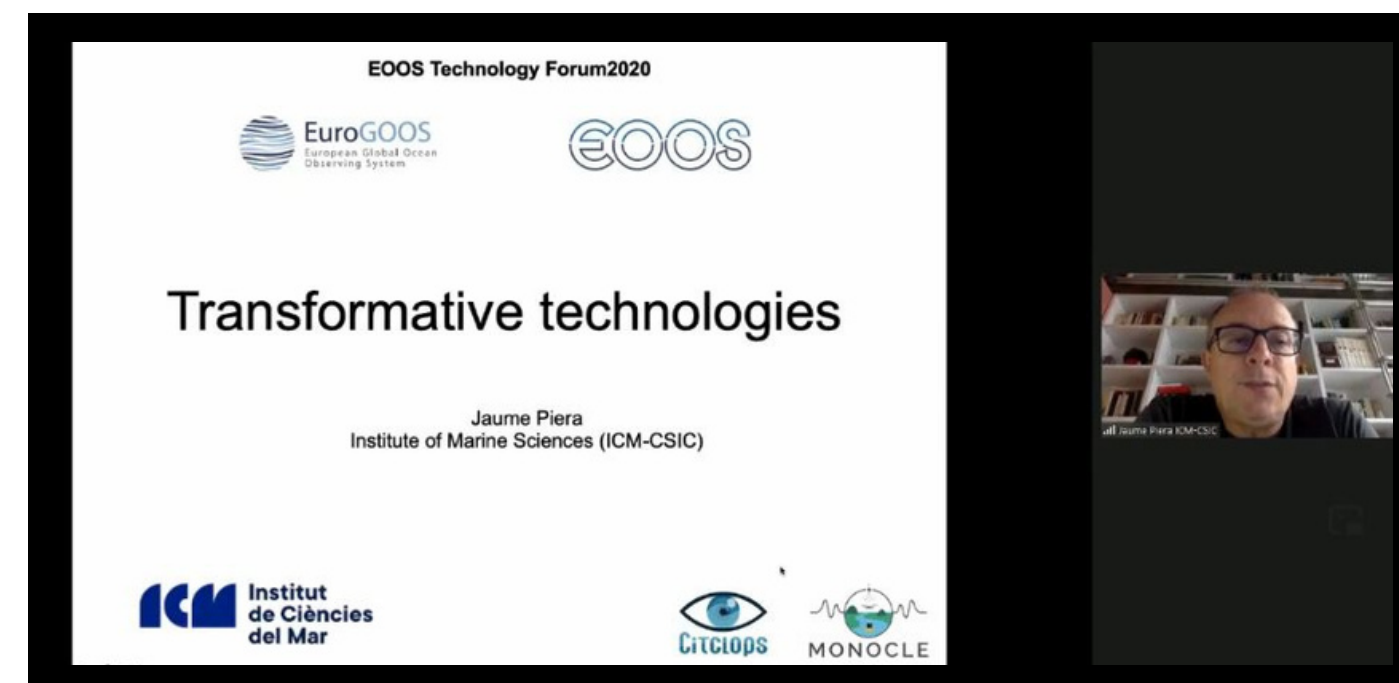
Matthew Mowlem, Principal Investigator at the National Oceanography Centre (NOC), UK, focused on enhancing observation technologies. The presentation emphasized the importance of addressing the gaps in biogeochemical and biological EOVs, where efforts are currently being made to develop robust and low-cost sensors. Impressive examples of new, highly-accurate miniature sensors were presented. The talk also discussed the commercialization of the new sensors, and highlighted the importance of prioritizing key data and technological gaps, engaging different stakeholders through co-design, and securing long-term funding.



The presentation of **Jaume Piera**, Researcher at the Institute of Marine Sciences (ICM-CSIC), Spain, provided insights into transformative technologies. These technologies combine traditional, accurate oceanographic sensors with low-cost sensors that can be deployed by citizens to obtain optimal observational products and address observational challenges in coastal areas. The example of a do-it-yourself (DIY) buoy to measure water transparency was presented. A possible future where a dense network of DIY marine sensors is connected to the Internet of Things (IoT) is envisaged.

Rajesh Nair opened the **first interactive workshop** with a presentation of the results of the pre-event survey on technologies. Respondents expressed high interest in technology interoperability enablers, crowd-based extra-institutional network development solutions, DIY sensors (participative science), and connectivity to IoT.

During the **Q&A session**, discussions focused on the need to align and integrate Europe's ocean observing capacity under EOOS, the digital twin of the ocean paradigm, the challenges of sharing data while protecting privacy in citizen science, as well as the role of EOVs as drivers for technology developments. The environmental challenges associated with cheap and easy to deploy sensors were also discussed.



SESSION 2: STRENGTHENING THE EUROPEAN OCEAN OBSERVING CAPABILITY & FOSTERING SYNERGIES

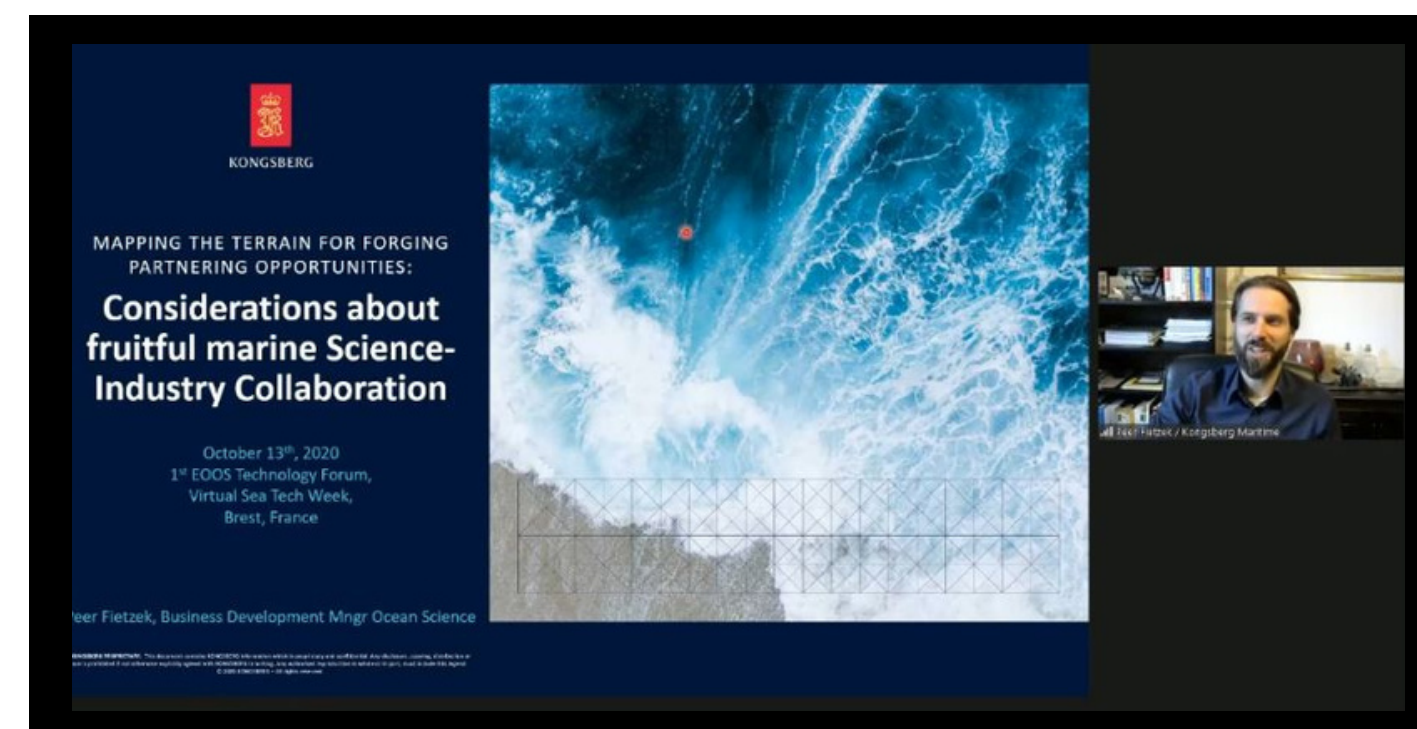
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Rajesh Nair introduced the **second session** on strengthening the European ocean observing capability and fostering synergies between science and industry. The Forum marks an important step towards this goal by bringing together a wide variety of stakeholders around the ambitious mission of creating a comprehensive, sustained, and integrated ocean observing system in Europe.

Ralph Rayner, Society for Underwater Technology, London School of Economics, UK, and National Oceanic and Atmospheric Administration (NOAA), USA, explained how stakeholders from industry, academia, and government can work together to foster innovation and deliver benefits to ocean observing end-users. Several mechanisms for connecting the tech industry with the ocean observing community were outlined, including industry events and conferences, competitions, building collaboration with related learned societies and professional bodies (e.g. Marine Technology Society, Society for Underwater Technology, IEEE Oceanic Engineering Society, Oceanography Society, IMarEST), as well as linking with trade associations. The ocean observing community and the technology sector have to work together to achieve the vast economic potential of the ocean while ensuring the protection of its resources and ecosystems.



Peer Fietzek, Business Development Manager at Kongsberg Maritime, Germany, noted that ocean observations data are becoming increasingly important as the global Blue Economy is rapidly expanding. Closer science-industry cooperation is needed to establish ocean observations as an efficient and mature market sector within the Blue Economy. Such partnerships would result in tailored, cost-effective, reliable, and user-friendly products with multiple benefits for the ocean observing community, industry, policy, and society as a whole. Peer Fietzek highlighted the work of the EU Horizon 2020 EuroSea project in delivering user-focused ocean observing innovations and optimizations through of science-industry collaboration. EuroGOOS is co-leading two work packages in this successful project ongoing since November 2019.



The following four presentations from private companies focused on concrete examples of successful research-industry partnerships in technological innovation and development in Europe.

Maik Grunwald, Divisional Director 'Marine Technologis' 4H-JENA, Germany, presented concrete examples of collaboration in the FerryBox and underwater nodes technologies. He also explained the importance of close cooperation between manufacturers and users, and formulated a number of recommendations for an effective science-industry collaboration. These include organizing regular meetings and workshops to discuss scientific requirements and technical feasibility aspects, setting up online platforms for discussion, as well as creating a database of industry partners profiles.



Nathan Lawrence, CEO ANB Sensors, UK, presented an example of how public-private collaboration within the framework of EU projects increased the technology readiness level of a pH sensor from the research phase to commercialization. He stressed the key importance of collaboration across various sectors and stakeholders to secure funding, develop new products, and gain access to valuable market information.



Cooper Van Vranken, Founder and Director of Berring Data Collective, US/Belgium, focused on the collaboration between fisheries and operational oceanography around the concept of ‘fishing for data’: installing sensors on fishing nets to collect data in under-sampled coastal and shelf areas. This partnership is mutually advantageous and illustrates the crucial importance of interdisciplinary collaboration: while the fisheries community benefits from improved data accuracy in vital operational areas, oceanographers can obtain more data to supplement the existing, more conventional ocean observations platforms and programmes. Three key pillars for successful collaboration were highlighted: knowing what is technically possible, understanding the motivations of different actors and adjusting communications accordingly, and balancing the stakeholder needs.



Yves Degres, Delegate Director, NKE Instrumentation, France, shared the success story of NKE as one of the main Argo profiling float technology providers. Various partnerships with different research institutes and private companies were highlighted.



During the [second interactive workshop](#), **Rajesh Nair** shared the pre-event survey results on partnering opportunities, completed by the Forum participants. Respondents were mainly interested in collaborative projects in the areas of sensor development, shared R&D, product improvement, development of services (e.g. calibration), and product testing. Several obstacles to fruitful collaboration were identified, including, among others, insufficient funding, poor networking, and technical barriers.

The EOOS Technology Forum can help overcome fragmentation and facilitate collaboration by providing a **permanent European platform for information exchange, building synergies, and creating a channel for enhanced visibility and accessibility**. Launching a series of training sessions on ocean observing technologies under the aegis of EuroGOOS with the support of manufacturers was also suggested.

Participants discussed possible ways and tools to improve the science-industry collaboration and outlined a number of [key points](#) on how the EOOS Technology Forum can help:

- [Identify current and future trends in technology](#), that will allow compliance with present and future ocean observational needs and requirements;
- [Facilitate synergies between science and industry sectors in the field of marine observing in Europe](#) by promoting adequate instruments, e.g. an online tool enabling stakeholders to exchange information and identify matchmaking opportunities;
- [Foster continuous dialogue and exchange](#) between different stakeholders in the public and private sectors within the framework of a regularly held event;
- [Develop shared strategies to jointly promote the value of ocean observing activities and technologies](#) to policymakers, industry, and broader society.

The co-chairs of the EuroGOOS Technology Plan Working Group concluded the meeting with a call for closer cooperation between public and private actors, as well as between academia and industry representatives to respond to complex societal challenges, and deliver high-quality and efficient ocean observing services to a wide range of users.

Event's agenda, presentations and video recordings are available [here](#).