DIALOGUES WITH INDUSTRY

Report out from Dialogue 3

User-Driven Ocean Information: Downstream Services and Growing the Market through Impact and Increasing the Demand

January 17, 2023

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Dialogue 3 Description

The third Dialogue brought together eighteen (18) participants representing key stakeholders from industry, government, and academia (see list of the participants in Appendix 1) to discuss the multi-sectoral ocean architecture, i.e., the integration of new observing networks and business models into the existing ocean observing the environment. In preparation, the participants were provided the Industry Dialog Background Paper and the Use Case paper (Appendix 2).

The Dialogue was moderated by Chris Ostrander, Executive Director Marine Technology Society (MTS). The Use Case was divided into two sections: (1) Downstream service delivery and; (2) Challenges/opportunities to grow the market. Each section included a set of questions to help participants prepare for the dialogue, which acted as a base for the discussions. The participants provided feedback from an operational, technical, or policy perspective. The event was held on a non-attribution basis and this synthesis document is delivered correspondingly.

In addition, there were approximately sixty-three (63) observers. Both participants and observers were able to engage in the dialogue. The first two hours were a facilitated discussion among participants with the observers providing input through the Q&A functionality of the video conference tool that was brought into discussion by the facilitator. The last thirty minutes were an open question and answer session among participants and observers.

This was the third of four dialogues. The key takeaways and potential paths forward provide a foundation for subsequent dialogues.

Key Takeaways from the Dialogue

- **Intermediaries play a key role in promoting and sustaining ocean observations and, above all, adding value to the new blue economy.**

Intermediaries - whether public or privately owned - are the vehicle for improved data accessibility; diversification of market demand; optimizing equitable knowledge generation; enhancing collaboration and workforce

recruitment. While we have identified room for additional public and private investment in the downstream service delivery market, there are challenges that include end-users accepting that ocean services must be paid for and will not always be available at no-cost from the public sector. Potential investors may not yet realize the returns possible, given the need for better valuation of intermediary products and services based on current ocean observation infrastructure.

- **The blurred lines between the roles of public, private ocean observation sectors is a good thing but can create an impedance for the private sector.**

Service provision responsibilities will inevitably overlap between public and private efforts, given the public duty to deliver actionable products and services dealing with parameters not necessarily representing the economically most interesting market, which private enterprises might focus on, and the limited public budget to deliver the most innovative solutions for every need and to the requested extent. This blurring is a challenge, but it also creates the constant need (and therefore market) for solutions that improve the access to and utility of ocean data.

However, there must be an ongoing dialogue between the intermediary- and public sectors to ensure opportunity for both to thrive: for example, public sector sharing plans for deriving data products (which may impact private service providers) and private sector specifying public data that are most needed/useful for their services. This dialogue will provide intermediaries a sense of the opportunities, threats, and sustainability of their offerings, including the timescales for product evolution. It is incumbent on both the public and private sector to facilitate such exchanges, but professional societies and intergovernmental entities can promote such dialogs as well.

- **The space for intermediary intervention is largely a function of the efforts taken by data providers - whether public or private - to enhance access to ocean data so that they can add value to the data and create a commercially (private sector) viable product or service.**

It is the role of all in the new blue economy space to make every effort, wherever possible, to share ocean data with others. Intermediaries are in the sweet spot to reinforce this necessity across the value chain.

- **Standards and Quality Assurance/Quality Control protocols are necessary and setting, publishing and enforcing these standards/protocols is an important role for the public and intergovernmental sectors.**

The need for standards and protocols has been discussed in all four of the dialogues as a key responsibility of the public and intergovernmental sectors. Further lack of standards within commercial data also hinders the adoption by the public (government) sector.

- **Both the private sector and the public sector desire strong public-private partnerships and "co-designing services" but they can be labor intensive and require deep trust and understanding.**

The participants recognize the importance of working together and this can be achieved through broad community discussions. A primary objective of co-design requires you to center on the stakeholder, the user and their needs.

- **Successful growth in the new blue economy market hinges on the availability of human capital; workforce training must be a priority for public and private efforts.**

Without experts to fulfill the myriad and urgent needs of startups, the success of the intermediary will be limited. This juggernaut can only be addressed with concerted effort – across the public and private sector – to attract good minds to this new blue economy sector. There must be a more overt effort to convince students to recognize that ocean observation services are a challenge worth pursuing, and that a career in this sector can be fulfilling for both personal, professional and altruistic reasons.

Dialogue Purpose

MTS, GOOS, NOAA, and industry partners have identified a significant need to improve and expand communication if we are to collectively face the demand for a resilient, and responsive global ocean observing, forecasting, and information delivery system.

To date, the ocean observing enterprise has been a largely research-focused effort driven by government investments, which has created a highly fragmented value chain. Increasing societal demands for ocean data for

climate adaptation and mitigation, to sustainably manage ocean resources and improve the forecast of extreme events to reduce loss of life and property, require a more rapid expansion of the ocean observing enterprise. However, the immaturity of the market significantly inhibits the speed and efficiency of system development. New commercial ocean observing services are finding opportunities to exploit, yet it remains unclear as to how these will interact with the established global and national observing operations, as coordinated under the GOOS. The observing system will continue to need new technology, but there remains no established way to fast-track promising technology candidates into existing systems.

GOOS, MTS, and NOAA, together with industry have co-designed these fora for compact and meaningful dialogues with new and established companies, academia, and government to dismantle barriers and highlight opportunities towards achieving a mature and vibrant Ocean Observing Enterprise, through a thriving mix of the public and private technologies and players. Working together will solve problems …faster.

Discussion Synthesis

Section 1: Downstream service delivery

Underpinning this session is the reality that the growth in ocean observing data being produced globally does not seamlessly translate to the creation of value-added products and services by downstream service providers at the spatial scale, timeliness, and accessibility levels needed by all decision-makers in the market.

The Role of the Private Sector/Industry Intermediary

There is a growing number of consultancies that facilitate the production of environmental data services by acting - as the term of art suggests - as an intermediary between data providers and information product developers. As discussed in this and prior Dialogues, intermediaries can take many forms – academic, public, private or a combination thereof. This intermediary function is a growing market, and this trend will continue, commensurate with increasing public awareness that environmental information products inform sustainable business practices and thereby mitigate economic risk.

Intermediaries can and must play a significant role in promoting the democratization of data access, including data generated for internal R&D use and external clients. However, it is crucial for the intermediary to be sensitive to proprietary information or different industry tolerances for sharing data. (For example, a small boutique fisherperson may be less tolerant versus a large commercial entity or vice versa.)

We know today that there is a constant need for products that add efficiencies to data ingest, given the ever-growing volume of observation data and the clear impact of that volume on computational systems. Clearly, industry has a role to play in innovative solutions that reduce the costs of such systems as well as observation platforms, sensors and products, including decision support tools that can underpin economies and enhance sustainable practices. Intermediaries can serve to target these needs, and hone in on the solutions that are necessary to get products to market more efficiently.

Intermediaries are most successful when they can access public and private data efficiently and then create a value added derivative product (for example ocean forecasting, deriving operating criteria for marine engineering projects, including outer continental shelf (OCS) and port activities, climate resilience assessments; content delivery systems, also as data providers (on behalf of clients, on behalf of own interest), systems for VMS, fish finders, etc.). There are national, international and intergovernmental programs that are making data accessible through portals; however, there are still examples where data is not being shared. This can be both a technical and cultural issue that will require a persistent effort. A specific example of bathymetry was raised, and access to this information is a key component of Seabed 2030. It was recognized that making more data available in standard formats with proper quality control and quality assurance protocols will create the opportunity for scalability, co-design and public-private partnerships.

Mechanics of Serving as an Intermediary

The end-user defines the problem but often may not understand how ocean data/products and services can support their needs. The intermediaries work with the end-user to identify solutions and to the problems and roles and responsibilities of entities (whether public sector and/or private sector) to resolve the problem. In some instances, this can be fostered through routine meetings of curated user advisory groups representing “values communities” - inputs from these groups help define what can/should be

done next. Surveys that are used to solicit feedback to enhance the utility of a solution set might occur through established regional nodes. It is crucial that the diversity of inputs is a feature of the feedback structures used.

The Role of the Public Sector as Intermediary and in Creating Space for Private Enterprise

The public sector conducts cross-sectoral outreach as a form of ground truthing for the next generation of public products. These exercises also create opportunities for future public-private partnerships, given that the feedback collected will inform public notices of opportunities, grantmaking, etc. Some examples for successful co-design initiatives were discussed: such as publicly initiated listening sessions to understand gaps in existing data, products and services; fora to prompt industry to help define what services are possible and needed and make these needs known to technological developers; projects that motivate collaborations on future public systems.

Beyond stimulating market demand, the public sector must actively communicate evolving standards and requirements for measurements and data sharing and seek industry feedback on the implementation of such standards. The public sector also must also communicate efforts to improve its data derived products and services. With more frequent communication on these matters, the private sector will be better positioned to anticipate opportunities for the delivery of new technologies, products and services.

The Role of the Public Sector in Addressing Barriers to Intermediaries

Delayed or even cumbersome access to public data is a detriment to building the new blue economy sector. The public sector must optimize conditions to allow for machine-to-machine data protocols through the preparation of adequate API's that allow users and businesses to find, enhance, and add value to public data. Public data portals not only must be accessible, but dependable such that private sector dependencies aren't compromised, or necessitate additional redundancies. By realizing clear interfaces to public databases and by giving the private sector "space" to add value, the ocean observing enterprise could benefit from private sector innovation and the data would generate the impact required to secure additional funding. Efforts to make more public data available (including especially historical datasets) should be well communicated, and building awareness/capacity for utilization of public resources should likewise be prioritized. More frequent public competitions, hackathons, etc. can lead to

competition and thus better - and ideally sustainable - solutions. Further, these vehicles are typically a product of co-design between public and private institutions.

What presents a challenge is keeping pace with changes – data volume, resolution, frequency; moving to cloud, tech fluidity (computing, processing), etc. Data managers must maintain stability in the midst of all this change. The public sector can be solution brokers of this dynamic - helping with continuous education, improvement, adjacent discipline sources; encouraging data sharing (parsing out data that does not need to be proprietary), and identifying efficiencies of scale (finding ways to monetize in more affordable ways for broader use).

Given growing public concerns with climate resilience, there might be increased support for public sector efforts to provoke blue economy markets, particularly taking into consideration the need to resolve mixed use ocean spaces (for instance, an example was provided with regards to small fisher interests in protecting fishing areas from wind farm development, but lacked the data to defend their case). The public sector is able to secure products and services useful for broader social use, even if such investment is not very appealing (revenue-generating) for private industry. However, public infrastructure is subject to the whims of public funding processes, and thus the public sector must do more to defend its foundational value and keep the basic databases public and not let them become privatized.

Understanding the Value of the Intermediary

In order to understand the utility of a product/services/ portals, accurate measurements of such returns are often difficult to obtain in a statistically significant manner. Regardless, taxpayers expect high quality, reliable products and services, and it is crucial that the public sector is able to exhibit proof of enhancements as resources are applied. Part of that process improvement includes staying abreast of where industry is going, namely what technologies are applicable to the development of public services, so as to determine the best use of public funds. Professional society meetings and newsletters are one vehicle, but more can and should be done to ensure the flow of information between the public and private sectors. Intermediaries can address this need.

According to KPI.org, “Key Performance Indicators (KPIs) are the critical (key) quantifiable indicators of progress toward an intended result”, and it was acknowledged that public sector KPIs are less revenue centered, given

the public-service mission.KPIs differ between the public and private sector, and this difference can affect the comparison of relative impact between public and private initiatives. Perhaps “social license” should be the next KPI adopted by both public and private entities – tying governmental performance to societal impacts rather than observational metrics.[1]

Efforts to measure the economic activity associated with the marine economy seek to identify the industries responsible for producing relevant goods and services and measure their output, value added, compensation, and employment associated with that production. There are also efforts to incorporate a measurement of changes in the economic value that natural assets provide to society. This is a timely evolution: OECD anticipates that biodiversity loss will impact the ocean economy more than originally expected, and it has been considering marine data value chains, recognizing public data to find a way into commercial products (and thus spur employment, revenue). Tracking such metrics is another market opportunity for industry/intermediaries who stand to benefit from additional investment in (and revenues from) such products and services.

NOAA has worked with the United States Department of Commerce, Bureau of Economic Analysis, to release the Marine Economic Satellite Account, that accounts for revenue by marine sector. Another way to capture benefits is through Natural Capital Accounting. The Group on Earth Observations has an initiative called the Earth Observations for Ecosystem Accounting, which the Ocean Enterprise can become involved in.

Section 2: Challenges/opportunities to grow the market

Data and information availability and usability are key to driving value and achieving the greatest return on investment. Through co-design concepts, the Ocean Enterprise can address the growing demands for ocean information more efficiently and with a genuine understanding of user/intermediary needs. Recognizing which services can be commercially viable will depend in part on being able to articulate their impact. The increased services will translate to an increase in the use of data.

[1] The social license to operate (SLO), or simply social license, refers to the ongoing acceptance of a company or industry's standard business practices and operating procedures by its employees, stakeholders, and the general public. The concept of social license is closely related to the concept of sustainability and the triple bottom line (profit, social, environmental). (https://www.investopedia.com/).

Creating Enabling Environment to Grow the Intermediary Market to its Projected Size

Members of both the public and private sector have a role to play in creating the enabling environment for increased market demand. The public sector must recognize that the private sector ocean intermediaries are a small but growing percent of the companies reported by the United States, Canada and United Kingdom Ocean Enterprise studies. For the intermediaries to grow, the public sector will need to foster the growth and allow for these intermediaries to provide added value and commercialize a product/service. This will likely require the public sector to shift its thinking from providing the service itself to one of first seeking whether there is a viable commercial entity that can provide that service. If there is no space for the intermediaries to add value, there will be no intermediaries.

Public and private entities must recognize the value of co-existence as well as the inevitable return-on-investment of information and best practice sharing, such as that nurtured by accelerator programs. Additional private and public support for clusters/accelerators could spur rapid market growth.

In the United Sates, federal investment in grants like DARPA/ARPA-E is also crucial to realizing the projected new blue economy. Such investments provide non-dilutive funding (agencies do not take an equity stake in the companies they fund) and a vehicle for addressing the longer R&D lead time typical of innovative startups. Venture capitalists are normally reluctant to fund R&D on such longer time horizons. Investment in commercialization support, such as what occurs through NOAA's Small Business Innovation Research Program (SBIR) program or facilitating introductions into new markets, such as what occurs through foreign commercial services, supports market growth. In Europe, the European Commission is also crucial with various initiatives such as the Cassini Space Entrepreneurship initiative. The European Investment Bank also stimulate and catalyze private capital through investment in equity and funds.

One of the most significant obstacles to market growth is the availability of a suitable workforce.It will take an earnest, sustained investment in workforce development initiatives by both the public and private sectors, identifying and communicating the needed capabilities to academia. This should include active recruitment of experts from adjacent industries to join the new blue economy sector; and that recruitment must emphasize that the ocean presents a variety of business opportunities where the results of your

efforts can have a significant impact on the triple bottom line. Further explore whether existing relevant technology can be applied to the Blue Economy. The burgeoning study of Public Interest Technology has the potential to supply SME to private intermediaries and ensure that public intermediaries are likewise capable of providing direction and oversight of resources to address solutions with multi-disciplinary expertise.

The ocean has intriguing challenges that we are trying to solve – and recruitment efforts should relay the context of these challenges – from the aspirational, SDG-goal based context, to the practical, discrete technology issues that - once solved - would transform our capabilities in the ocean. Selling this potentiality is a major part of recruiting the next workforce.

The Role of Blue Tech Clusters, Incubators, Accelerators

Blue tech clusters, incubators, accelerators provide exposures and inroads to entities that may not be accessible without an explicit Notice of Funding Opportunity (NOFO). Some examples were provided where contacts made lead to Cooperative Research and Development Agreements (CRADA) and co-development of products; co-marketing for both public and private markets that fostered both sales and feedback for product improvements. These clusters are ready made networking vehicles that reinforce horizon scanning and workforce development.

There are a number of types of Clusters and Accelerators, and their value varies by how the entity is lead (public, private), type of services and type of company. A question was raised as to whether the Blue Tech Cluster, incubator, accelerator facilitate market growth or are they more limited to creating and growing competition. The panelists responded yes to both. Competition is good for innovation and good for government procurement; OECD has considered "ocean innovation network" models,[2] and in general they improve cross-sector synergies, enable members to have better access to facilities, specialized knowledge from universities, incubation (bringing better products to market). Clusters seem to have the greatest short-term impact on large, scalable industries. For smaller businesses, engaging in clusters may compromise from normal business operations unless engagement is treated as a long-term business development investment. Given that clusters are a relatively new concept in the blue tech sector, their long-term impact is still to be determined. One possible measure might be a cluster's effect on equity value, since a growth in equity value can expedite products moving to market.

[2] www.1000oceanstartups.org/navigator; see also www.investableoceans.com

Positive points made regarding incubators and accelerators included: networking, workforce development, pulling in software engineers and system architects from adjacent industries, developing solutions with other companies and keeping abreast of advancements in technology. A point was made that within the academic sector there is often “coffee talk time” that brings together the best researchers in the world to talk about collaboration but these conversations do not focus on commercialization or investment, but these types of conversations are happening in other sectors. Blue Tech accelerators can help create this awareness in the Ocean Enterprise.

Some clusters are dependent on public investment to function. (See "The Blue Wave": Investing in Blue Tech Clusters to Maintain Leadership and Promote Economic Growth and Job Creation - https://oceanfdn.org/the-blue-wave.) A cluster’s value can be limited to its local ecosystem, so it is crucial that clusters seek connections with other clusters in different regions of the world, especially those in areas most vulnerable. Information sharing between clusters is also important to discourage doubling up of efforts. There are some networks/memberships that are being set up but there is no comprehensive list that identifies all the clusters around the world- work is needed to map this out. The Ocean Decade activity, 1000 Ocean Startups, is an active collection of international blue accelerators and has developed the Ocean Impact Navigator to track positive ocean outcomes.

There are Propeller and Creative Destruction Labs that help to support massively scalable ocean innovations. One such Creative Destruction Lab, located in Halifax Canada, over the last two years has helped their companies create $500 million dollars of equity value. Within India, a recent Initiative called I-Connect - Industry Connect - helps the government to connect with industry to better understand their capabilities.

Assessing the Impact of Public Investments in Market Growth

The act of measuring the impact of public investment in market growth is not a straightforward task, however necessary. In the realm of the new blue economy, we might consider a variety of investments (infrastructure, human resources, modeling expertise, etc.) that yield improved market growth, which also could take many forms, such as industrial operations, defense postures, and sustainable practices for example, given that the “revenue-generated” KPI is not typically applied to public services. Methods for measuring market growth as a function of public investments (or data

sharing) have not yet been established, so there is room for solutions to be suggested. There have been a few recent efforts to assess the benefits of ocean observing systems: for example, NOAA is seeking to measure the impact of its SBIR Program relative to revenue, job creation, innovation exports, and other metrics. NOAA/IOOS have published the Ocean Enterprise to track revenue and job creation of companies within the sector.

This challenge was perhaps best captured in a report funded by IMOS that suggested: "*Knowledge of the ocean is a public good, the immediate value of which to humanity is not always obvious or possible to quantify in dollar terms.*" Regardless of this challenge of creating a practical metric, such statistics are crucial for justifying public investments, given that - in many cases - public systems receive less than what is necessary to even sustain basic life cycle and replacement costs. IMOS commissioned a study on the return on investment for IMOS based on based on our contributions to weather forecasting, industry operations particularly, making decisions based on ocean conditions and forecasting for the ability of oil and gas and others to operate our contributions to defense capability, improved policy responses in managing our marine resources, and things like disaster and extreme weather preparedness. The study resulted in a benefit-to-cost ratio of 12:1 with at least $5AUS of benefit for every dollar that IMOS and its partners contributed to the program.

Within India, they engaged an agency called the National Center for Applied Economic Research to look at impacts of services that are often intangible. One example is in marine fisheries. Advisors to fishermen added 0.58% to the marine fisheries GDP. While difficult we need to continue to do these types of studies to try to quantify the benefits of the ocean services to ensure funding is sustained.

Equally important are the pitches for increased public investment from local, private end users who can make a clear and concise case as to how that public investment is crucial to realizing and sustaining private returns. Research like the one the Economist is commissioning will help inform on the important role ocean data plays in growing the blue economy and how it can solve climate challenges Thus, intermediaries must seek to understand and identify the end user to supply that vocal support for sustained public investment. It's crucial that the blue tech market shows clear ties to other sectors and associated industries that are managing billion dollars of assets. Some organizations are working to help businesses and investors make the connection between economic vitality, climate resiliency and ocean data.

Potential Pathways Forward

This Dialogue builds on the first and second Dialogues. The final Dialogue with Industry will refine and develop the issues and ideas across the value chain from ocean observation to service delivery. The results from all Dialogues will be synthesized in a final summary paper for the series and a concise set of practical and implementable recommendations will result from the process. Below is an initial take on the key issues and potential pathways forward drawn from the third Dialogue.

- **Professional societies, like the Marine Technology Society, as well as national programs like IOOS and IMOS and intergovernmental programs like GOOS can be catalysts for focusing public and private attention on issues and opportunities in the new blue economy.**

Just as the American Meteorological Society recently "promoted" an ad hoc committee on the Blue Economy to a permanent committee, we can encourage other societies to establish similar communities of practice to encourage broader (than Ocean) sector thinking about ocean data informed products and services. MTS-like organizations, IOOS, IMOS, GOOS could create opportunities to encourage the cross-fertilization of blue tech clusters, and the establishment of cluster organizations in areas where capacity is limited or in communities most vulnerable to ocean issues. This effort could occur in partnership with relevant government agencies that have interest in commercial market growth.

- **Governments, working independently, bilaterally or through multilateral organizations, like the Intergovernmental Oceanographic Commission of UNESCO, can influence the speed with which the blue economy intermediaries market can grow.**

Clearly articulated policies that set expectations of full and open data policies are not enough.Governments must work to fund the infrastructure and develop regulations that mitigate boundaries that limit access to public - and wherever possible - private data. As noted previously, the more accessible data available, the more opportunity for intermediaries to identify and develop ocean data-based solutions. Multilateral organizations could play a more direct role in facilitating blue economy market growth, perhaps starting with joint efforts to determine the value of the intermediary market or in promoting blue tech clusters across the globe.

It is crucial that owners of public databases routinely interact with users not only to ensure optimal utilization of the data, but also to benefit from the technical innovations available in the private sector. Also, this interaction is necessary to ensure the maximum return on investment in the systems that support ocean observations. Activities that encourage this interface between public and private efforts are needed to spur innovative, impactful solutions by intermediaries/service providers.

- **Entrepreneurs, governments and professional societies should seek to participate in and foster the further development of blue tech clusters, which serve the interests of their membership in expediting access to information resources, mentorship, and funding opportunities.**

The public and private sectors have mutual responsibility to exchange best practices, given that all participants can benefit. Commercialization of "coffeehouses" can have similar value. Although collaboration is typically discussed in these settings, commercialization and investment are rarely the topic of conversation. Professional societies should seek to promote academic mentorship in this area, as this effort could also serve as workforce recruitment. As noted by one participant, such private-sector mentorship is crucial to provide an academic the corporate sense of the possible.

- **Continued impact studies are needed.**

A repository of impact studies could collectively raise the awareness globally of the importance of sustained ocean observing. Standardized methods would enable comparison of similar studies.

Appendix 1: Participants

Sector	Affiliation	Name
Public/USA	National Oceanic and Atmospheric Administration (NOAA)/U.S. IOOS	Derrick Snowden
Public/USA	NOAA – Chief Economist Office	Joseph Conran
Public/USA	Naval Research Laboratory, United States Navy	Christopher Hickey
Intergovernmental	Indian National Centre for Ocean Information Services INCOIS	Srinivasa Kumar
Intergovernmental	Integrated Marine Observing System (IMOS) - Australia	Michelle Heupel
Academia	Rutgers University	Serpil Guran
Industry	COROA	Julie Pullen
Industry	The Economist	Tatiana Der Avedissian
Industry	Kongsberg Maritime	Leif Edvard Bildoy
Industry	Norinco pvt Ltd India	Nikhil Mathew
Industry	OceanWise	Caroline Levey
Industry	Oceans for Creative Destruction Lab	Eric Siegel
Industry	RPS Environmental Services	Kelly Knee
Industry	Terradepth	Ken Childress
Industry	Woods Hole Group	Rob Smith
NGO	US Integrated Ocean Observing System -Great Lakes Ocean Observing System (GLOS)	Kelli Paige
NGO	Mercator Ocean International	Laurence Crosnier
NGO	Organization for Economic Co-operation and Development (OECD)	Claire Jolly

Appendix 2: Use Case

Dialogue 3 | User-Driven Ocean Information: Downstream Services and Growing the Market through Impact and increasing the Demand

Introduction

It is with worldwide recognition that healthy and safe oceans are fundamental for thriving ecosystems and resilient global and international economies. Efforts to advance robust and innovative ocean data collection and dissemination practices, and wide-reaching collaborative data sharing and analysis efforts, demand engagement, and partnerships between the public and private sectors.

The Global Ocean Observing System (GOOS) programme and the Marine Technology Society (MTS) cooperate with the National Oceanic and Atmospheric Administration (NOAA) to present Dialogues with Industry.[3] These four separately-scheduled dialogues convene experts from the public and private sectors to encourage stakeholder conversations that help all parties to share and understand barriers at each step of the ocean information value chain; from data collection instruments and techniques to data products and service delivery. The aim is to consider the current state of the market and to look toward the future and the opportunities it holds.

This paper will outline the scope, format, and proposed discussion topics for the third Dialogue with Industry.

Background and Scope

There are a growing number of companies conducting and overseeing ocean observations and furnishing associated products and services. To meet increasing demands from multiple user communities who need a wide range of services/decision tools, we need more robust engagement across sectors. Making well-informed decisions will require sophisticated data products and services from information and collaboration by the public, private and academic sectors. Minimizing friction between contributors in

[3] Please see the Background Paper for a detailed explanation of background, concepts and objectives.

the ocean observing value chain[4] can provide more streamlined opportunities for increased access to ocean information and the development of more tailored and actionable products and services.

For this dialogue, we are focused on (1) the landscape and drivers for downstream services[5] and (2) challenges/opportunities to grow the market of/for such services.

The United States and Canada Ocean Enterprise studies identify *downstream services* as "Intermediaries." Intermediaries make use of the ocean, coastal, and lake measurements, observations, and model data, as inputs to create value-added information products for end-users. The Ocean Enterprise studies, along with work from the OECD, indicate Blue Economy growth in areas where new information-based services are emerging. The current global ocean observing system was built primarily for the needs of scientific and operational services (e.g., climate, weather and hazard warnings, aquaculture health etc.), however, to meet new demands for expanded ocean information services, in an increased focus on the needs of new service-providers needs to be considered.

A fundamental concept to successfully shifting to a user/intermediary-focused system is co-design. Co-design involves close coordination and collaboration among stakeholder groups, including downstream service providers, to bridge gaps between system design, product and service delivery, and data consumption. The aim is to create a more integrated and agile observing system that directly responds to user and service provider needs.

The Ocean Enterprise studies indicate that there are relatively few businesses in this space, yet many opportunities to include, such as commercial consultancy services that provide services in modeling and analyzing observations to answer specific questions for private companies, for example in the oil, gas, renewable energy, port, desalination, and nuclear sectors. Other companies offer prediction and observation aggregation services to specific sectors, for example, routing services for shipping, and

[4] Adapted from the economics concept, to describe a framework for organizing the ocean observing system into a series of subsystems each adding value with inputs, transformation procedures, and outputs, in a continual and iterative process.

[5] Where downstream/Intermediaries are value added ocean information services supporting societal and economic benefits

situation room services to maritime search and rescue services. However, in general, this sector has relatively few commercial operators providing ocean data services to specific user sectors, given the range of potential users and the availability of data. Presently, the public sector is playing a large role in this service space, for example, national and regional ocean observing systems offer value-added data services. IOOS US, IMOS Australia, SOCIB in Spain, and many countries have national ocean data centers that offer data services, for example, INCOIS in India, BODC in the UK, and Europe CMEMS (EU funded).

There is a significant opportunity to deliver more targeted ocean information data and services to societal sectors that will need these products and services. The data is increasingly well organized and available, and the private sector has expertise in customer development, AI, big data, etc. This dialogue will look at the barriers and opportunities to the growth of a thriving ocean information service sector.

Result

This dialogue will result in practical recommendations to be acted upon by those engaged in the ocean observing enterprise, both public and private. The recommendations could target funders and developers of the ocean information systems that these private-sector intermediaries will ultimately use as well as for government/national agencies and international coordination bodies.

Format of the Dialogue

The dialogue will be divided into two sections (see below). Each section will explore distinct issues associated with maturing the ocean observing market through an enhanced multi-sectoral ocean architecture, which integrates new downstream services and the challenges/opportunities to grow the market by connecting to users and understanding impact. The moderator will review each section and then ask the participants questions associated with each section. The purpose of the questions is to draw out the different perspectives of the participants. The moderator will ask follow-up questions as needed to flesh out the discussion in more detail.

Section I - Downstream Service Delivery

As demand for the ocean observing products and services used by decision makers increases, there is an opportunity for growth in the areas of downstream service delivery. It is not abundantly clear that ocean observing

data is currently being maximized by or meeting the practical needs of end users in terms of accessibility, timeliness, and even content. When all sectors gain a better understanding of the role that industry can play in downstream service delivery and address the existing barriers to the expansion of that role, the ocean observing sector will see greater success.

Discussion Topics

- What role does and should industry play in developing and spreading decision making tools?
- What are the current leading-edge best-of-breed examples of downstream services, and what can we learn from these?
    - Thinking about the idea of system co-design, how do our public observing partners like IMOS, India, and IOOS approach co-design of systems with industry – how do they ensure freedom to operate for industry in delivering products and services?
    - Do we know if these examples include an element of public/private co-design and what mechanisms are used to tailor them to customer/stakeholder needs? Can we assess the impact of these services?
- What barriers exist to developing information services, and is there anything that the public sector can do to lower these?
- What are the right and relevant feedback mechanisms that the public and private sector use to ensure alignment between who does what, but also to support the sustained public investment of infrastructure that the private sector needs to work from?
    - How do folks feel about adopting public sector success metrics tied to generating industry success and growth?
- Beyond technical solutions like APIs, interoperability, and cloud management, and cultural changes to support more open data access, what other tools or services are necessary for service providers to do an even better job at utilizing data to develop and deliver information products?

- What market research activities and tools are currently being used by industry to drive the development of downstream services?

- How can the public sector enhance the role industry plays in creating and marketing decision making tools and services? How can the public sector best support this activity? Are there lessons from other sectors (e.g. medical, aviation, water, and space sectors)?

Section II - Challenges/Opportunities to Grow the Market

Data and information availability and usability are key to driving value and achieving the greatest return on investment. Through co-design concepts, the Ocean Enterprise can address the growing demands for ocean information more efficiently and with a genuine understanding of user/intermediary needs. Recognizing which services can be commercially viable will depend in part on being able to articulate their impact. The increased services will translate to an increase in the use of data. It follows that this will provide a better return on investment and value will accrue if the data is used multiple times. Is this recognition of better ROI for ocean data being realized/recognized in the Blue Economy? Noted is in developing the market share, understanding the problem that needs to be solved and how to solve that in a way that is fit for purpose while at the same time realizing a profit is the vexing question facing the Ocean Enterprise.

Discussion Topics

- How do we better catalyze research and innovation to advance market opportunities? Are there specific approaches that are most helpful in creating these enabling conditions for growth?

- Are blue-tech clusters, incubators and accelerators a good way to facilitate market growth, or is their impact more limited to creating and growing competition? What are the most successful examples - and what is making them the most successful?

- Thinking about targeted public investment like SBIR, DARPA, ARPA-E, and similar funding in other nations; but also public observing systems like IMOS and IOOS, how do we best assess the return and impact of public investments in both delivering public value and creating opportunities in the ocean observing market?

- Do people understand the term “Ocean Observation” to represent the whole marine space?
    - Context – if public/private sectors does not understand that Ocean refers to all of the marine space and not only off shore they may naturally exclude themselves on the grounds they don’t deal in “Oceans”.
- Do the current ocean observing systems produce all the specific kinds of data needed to enable some new, potentially emerging commercial opportunities? If not, what are the new types of data or measurements that may be necessary?
    - How could a system or mechanism be created that responds to these gaps/needs?
    - Is there a need for more training or tutorials on available data to spur innovation?
- What are the opportunities for a more harmonized way of communicating end user-delivery needs and new services? Is there a need for greater standardization and/or specificity in observing requirements across services?
- If we are successful, a large percentage of data in the future will be commercially delivered. Under that scenario, what might we need to keep or create to ensure those science users (vital for knowledge creation) are still considered important in observing system needs?
- How can government agencies better catalyze research and innovation to drive market opportunities? Are there specific approaches that are most helpful in creating these enabling conditions?
- Ocean data (observations and models) is increasingly available, but it is not being fully exploited by those within and outside of the ocean sector. What can be done to further develop ocean information services and thus data use? How could data utilization be better exploited and the exploitation made more transparent? Is the uptake of data by service providers understood?

Appendix 3: Planning Team

Sector	Affiliation	Name
Public - Australia	Bureau of Meteorology	Boris Kelly-Gerreyn
Public - United States	NOAA	Brittany Croll
Public - United States	NOAA	Kelly Spalding
Public – United States	NOAA	Liz Tirpak
Intergovernmental	GOOS	Emma Heslop
Intergovernmental	GOOS	Laura Stukonyte
Industry	Kongsberg Maritime	Peer Fietzek
Industry/NGO	L3 Harris/MTS	Donna Kocak
Industry	South Seas Science Consulting	Sebastien Boulay
NGO	IMOS	Michael Heupel
NGO	MTS – India	R. Venkatasen
NGO	MTS	Chris Ostrander
NGO	MTS	Monica Ostrander
NGO	MTS	Zdenka Willis
NGO	Society for Underwater Technology (SUT)	Ralph Rayner

The Global Ocean Observing System

marine technology SOCIETY

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

DIALOGUES WITH INDUSTRY

Report out from Dialogue 3

Report authors: Liz Tirpak (National Oceanic and Atmospheric Administration), Emma Heslop (Global Ocean Observing System / IOC-UNESCO), Peer Fietzek (Kongsberg Discovery), Donna M. Kocak (L3Harris / Marine Technology Society)

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