The Decade Collaborative Centre for Ocean Prediction

Summary Report from the First Open Community Dialogue Meeting

27 September 2021

INTRODUCTORY REMARKS AND INFORMATION SESSION

In May 2021, the Executive Secretary of the Intergovernmental Oceanographic Commission of UNESCO encouraged Mercator Ocean International to explore ways and means of establishing a Decade Collaborative Centre for Ocean Prediction with a view to providing the global coordination required for Decade and non-Decade programmes and organizations to work together to enable numerical ocean modelling and digital integration to meet the challenges of the Decade and to transition innovations into operational services.

On 27 September 2021, Mercator Ocean International hosted the first open community dialogue to discuss the scope and vision for such a Centre. The meeting brought together more than 60 participants from 18 countries representing 30 programmes and organizations.

Vladimir Ryabinin, Executive Secretary of the Intergovernmental Oceanographic Commission of UNESCO, provided opening remarks. He informed participants that the High-Level Panel for a Sustainable Ocean Economy, which brings together the heads of state of 14 countries, has committed to an ocean action agenda to sustainably manage 100% of the Ocean areas under their national jurisdiction, and that this management must be underpinned by predictive capacity that is authoritative and transparent. He stated that a key element in sustainable management of the ocean is strong and authoritative ocean prediction, including a digital representation of the ocean, noting that these provide objective means for managing the ocean, increasing the transparency of decisions and our ability to use the ocean in more sustainable ways. He further stated that this is one of the most important initiatives that we can have in the Decade, which will even spill over the timeframe of the Decade. He noted that a Collaborative Centre for Ocean Prediction would serve as an incubator and co-design mechanism for ocean and coastal data processing, forecasting and modelling, culminating in a digital twin of the ocean that would take ocean science beyond traditional institutional stakeholders. He thanked Mercator Ocean International, the Copernicus Marine Service, and the OceanPredict programme for moving the community forward towards the global system we need.

Craig McLean, co-lead of the Predicted Ocean Decade Outcome, addressed the participants, stating that the idea for a Collaborative Centre was a very good step forward that offered renewed direction for greater inclusion in ocean prediction for

the Decade. Based on results from the recent Predicted Ocean Laboratory meeting, he encouraged the Centre to reach beyond traditional communities to inform and engage new constituencies and stakeholders across Ocean economy sectors in the development of products and services to meet their needs.

Julian Barbiere and Alison Clausen of the Decade Coordination Unit provided an overview of Decade Collaborative Centres in the framework of the Decade. They noted that all parts of the Decade architecture and actions should be based on co-design, be solution oriented, adhere to open data principles, and be aligned with Decade actions. They described the Communities of Practice, which are voluntary, self-organized groups to achieve collective impact. They noted that these are loosely defined and will evolve over time, and that these different Communities will interact with each other through the Global Stakeholder Forums (with the next Forum to be launched in October 2021). They described the central role that Decade Collaborative Centres play in the coordinating process, acting as the major conduits of information between various Communities and the Decade Coordination Unit.

Julian outlined the basic functions of a Decade Collaborative Centre, such as stakeholder coordination, facilitation, and engagement; assisting the Coordination Unit to develop calls for action; assisting the community in mobilizing funds; monitoring and reporting on implementation progress of the Decade actions, and assisting the Coordination Unit to report to UN sponsors and governing bodies on a regular basis (including a State of the Decade Report to be published every 3 years).

Alison provided an update on the establishment of DCCs for the Decade, noting that there are currently 3 partners developing geographic centres and 3 partners focusing on thematic centres, all in a similar stage of development as the DCC for Ocean Prediction. They hoped that the proposals would be submitted soon so that the feasibility studies can be undertaken before the end of the year, with final approval and signature of agreements in the first months of 2022.

A DECADE COLLABORATIVE CENTRE FOR OCEAN PREDICTION – SCOPE, VISION, ORGANIZATIONAL STRUCTURE

Pierre Bahurel, Director-General of Mercator, provided an overview of operational ocean forecasting and highlighted the Decade objectives, challenges, and desired outcomes that rely on ocean prediction. He briefly reviewed several endorsed Decade programmes that have ocean prediction actions covering the open and coastal oceans, observing system design, ecosystems and fisheries, air-sea interactions, deep-sea environments, and development of digital twins of the ocean.

He emphasized that research and development in ocean prediction will be key during the Decade and will lead to innovations in our ability to integrate data from the 3 pillars of sustainable development – environment, economy and society. He informed participants that a strong motivation for the DCC-OP is to create a forum with comprehensive coverage in ocean prediction to facilitate the transfer of R&D innovations to operational services and to work with a broad range of user communities to enhance uptake and use with new communities.

He described the general scope of the DCC-OP as two-fold, serving both the Decade programmes as well as working with all ocean prediction partners to develop a global system as a legacy of the Decade; specifically:

- A global forum supporting the Decade implementation, working with and for Decade stakeholders, that serves as a communication and collaboration hub for ocean prediction to focus and optimize individual efforts on achieving the collective goals of the Decade, and

- A science-to-service approach for ocean prediction evolution - a global technical and organizational structure that builds on the innovations generated by Decade programmes and partners to foster ocean prediction services worldwide as a legacy of the Decade.

As Chair of the IOC-WMO Expert Team on Operational Ocean Forecasting, Pierre highlighted the importance of using the DCC-OP as a bridge to bring innovations and expertise to the intergovernmental normative groups such as ETOOFS and Ocean Best Practices System to establish international standards that will allow the community to 'deliver as one' in operational oceanography.

He further described the need for the community to come together through the DCC-OP to co-design the global architecture for ocean prediction, including elements such as a global network of Modelling and Forecasting Centres and Thematic Assembly Centres, and taking into account the new frontiers that will be presented by digital twins, the complex but essential coastal ocean, and the availability of new data types and forecasts from previously under-sampled areas (e.g., the deep ocean, ice-covered areas) and previously under-sampled variables (e.g., biological and ecosystem variables). He also emphasized the need for capacity development in operational ocean forecasting to be built into the architecture of the system from its inception.

Maria Hood, Action Coordinator for the EU4OceanObs Project at Mercator Ocean International, provided a brief overview of the application process for Decade Collaborative Centre, noting that this open community dialogue was being held to inform and shape the proposal to ensure that it meets the needs and expectations of both Decade and non-Decade partners.

She addressed the issue of organizational structure and how to get many programmes and organizations with different mandates, scopes, time scales, and governance structures - all with limited financial and human resources - to work together without over-burdening the community.

She explained that the DCC-OP would be a bottom-up collaborative framework that should allow Decade and non-Decade programmes to 'plug in' when a joint activity adds value. She pointed out that the framework should allow the community to share and mutualize common activities and that the Centre would provide staff support for communications and joint actions, leading to reduced costs. She reiterated the message of Julian and Alison that the Centre should help programmes to identify funding opportunities and leverage the weight of the community to emphasize the importance of ocean prediction development to meet Decade objectives.

She emphasized that one of the most important roles for the DCC-OP would be to serve as a global convener for the community to feed into and inform intergovernmental mechanisms and programmes such as GOOS, ETOOFS, IODE, and OBPS to reach agreements on terminology and standardization required to develop a global interoperable system from multiple geographic and thematic nodes. She suggested that the development of a community-wide ocean prediction 'catalogue' might also provide increased visibility and a broader audience for products and services, as well as populate UN ocean information systems such as IODE, GOOS, UNEP's Global Environmental Monitoring System-*Oceans* and its World Environment Situation Room.

She further noted that the DCC-OP is intended to serve as a pilot experiment for a global ocean modelling and forecasting system, and that this notion of 'permanency' may encourage funding agencies to invest for lasting impact.

Maria described the types of engagement that partner programmes may have with the DCC-OP depending on their needs and interests. She explained that a partner may choose a minimal engagement by simply providing a point of contact for shared news and information about ocean prediction activities and Decade progress. She also explained that there would be opportunities for higher levels of engagement in steering the development of the Centre and its actions, or that partners may choose to participate in Centre activities on a case-by-case basis depending on interest.

She further noted that the Centre could also be used by partners as a 'matchmaker service' to propose for others to join their ocean prediction activities or to find ocean prediction groups that can help carry out demonstrator projects or exemplars.

She finished the session by informing participants that the candidature of Mercator Ocean International to establish a DCC-OP is supported by the IOC National Focal Point of France, and that the DCC-OP proposal was recently approved by the Management Board of Mercator and its shareholders from France, Italy, Norway, Spain, and the UK. She informed the participants that Mercator Ocean International will provide human and financial resources for the proposal / start-up phase of the DCC-OP, and that further financial support would be sought during this phase to fully implement the DCC-OP.

OPEN DISCUSSION SESSIONS

Pierre Bahurel opened the meeting for discussions, which revolved around the following general categories:

1. Interest and Needs for a DCC-OP

Many participants, both at the meeting and in earlier bilateral discussions with the DCC-OP team, expressed their support, excitement, and interest in collaborating with the DCC-OP, stating that such a Centre with a community-built agenda will allow the ocean prediction community to harmonize and mutualize common activities, share costs, implement joint interdisciplinary workshops across the modelling / forecasting community, link to other parts of the value chain, co-design the architecture required to develop a global ocean prediction system, and standardize language and outputs.

Participants also suggested that the Centre could have a strong lobbying function, serving to unite the ocean prediction community to call for necessary developments in other parts of the observing system value chain such as increased engagement with new stakeholder communities and facilitated links between observation groups and the modelling community.

Specific comments:

> The community needs an organization like Mercator to take on board the coordination at a global level for how we structure our collective efforts in modelling, reanalysis, reconstructions, and agreements on standards. The work to advance coastal ocean forecasts will be co-designed within this global framework and we will build this together.
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> The digital twin ocean community will benefit from a strong ocean prediction community and *vice versa*. Digital twins will make new demands on prediction groups to meet the needs of new users, to enable new ways of handling 'what if' scenarios, and to improve interoperability and access to available models. The two communities will be driven by co-evolving capabilities, use the same infrastructure and will share many technical standards, so we must work closely together. DITTO will place emphasis on the demand / user side and partnering with a strong ocean prediction community. We are happy to hear that Mercator will take up this challenge.
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> The DCC-OP could serve as a valuable centre-of-gravity for developing operational predictive capability for 3D ocean physical, biogeochemical, ecosystem, and sea ice variables and applying climate prediction best practices.
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> The Ocean Best Practices System (OBPS) is missing strong connections to the modelling community to help with standards and best practices for operational purposes from physics to biological applications. OBPS receives submissions for best practices but lacks the links to the expert community to assess and validate these. The DCC-OP could provide the necessary link into the interdisciplinary ocean modelling and forecasting community.
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> A 10-year vision for the DCC-OP and the legacy system we want that should guide our scope would include: 1) an Ocean Global Data Processing and Forecasting System (akin to the WMO's) comprised of needed frameworks and standards, and 2) a Rolling Review capacity where the end users provide guidance of improvement in capacity they see, which feeds through to improvements in full value chain from observations to models to digital twins of the ocean.
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> We should make space in the DCC-OP scope to assess the knowledge gaps holding us back in our modelling / forecasting efforts for key components.
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> The DCC-OP has a role to play in expanding the inclusiveness and inter-disciplinarity for ocean forecasting and the Decade is a good opportunity to do this. We particularly need to lobby within our own community to develop a prediction system for living resources management and preserving biodiversity.

2. Identifying and Engaging User Communities

Many participants emphasized the critical need for the modelling / forecasting community to establish closer links to user communities, not only with traditional research and governmental policy-driven users but increasing the engagement with new constituencies and stakeholders in ocean economy sectors. Participants noted that there are two complementary activities to increase user engagement: 1) reaching out to new stakeholders to understand their needs and interests and to develop prediction products and services to meet those needs, and 2) demonstrating / communicating existing ocean prediction capabilities for specific stakeholder sectors via demonstrators or exemplars.

Participants further noted that there were several international groups specializing in stakeholder engagement (such as Geo Blue Planet, Future Earth Ocean Knowledge Action Network and SmartNet, the GOOS Observing Together Decade Programme) and suggested that the DCC-OP could work with these groups to establish a mechanism to bring together the ocean prediction community and ocean economy sectors via an established 'service' as well as use the DCC-OP to increase the visibility of demonstrators or exemplars carried out by the community.

Specific comments:

> The modelling and digital twinning communities work upstream on predictive capacity and innovation and work to match co-designed downstream demand from I-NGOs, science policy organizations, and down to the local and civil society sector levels. UNEP has a vital interest in this part of the value chain and is interested to work with the DCC-OP to make these links.
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> There are numerous initiatives dedicated to catalyzing co-design, each focused on different types of end-users and places. Some Decade programmes are working with organizations and programmes specialized in stakeholder engagement to assist with co-design. Ocean prediction is a sub-set of the needs of many of these programmes and users, and the DCC-OP would be a valuable partner in this.
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> In many cases, modelling tools are needed for co-design, but groups requiring these tools do not always have appropriate links to the modelling community to help tailor tools to their specific needs. The DCC-OP should help to broker these linkages.
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> We need a forum for engaging ecosystem modellers who can provide guidance on observing requirements. Many programmes are focused on collecting new types of data during the Decade but we need links to the modelling community to understand how to plan the observing strategies to address critical questions. The DCC-OP should provide a forum for observationalists and modellers to come together to make sure we are providing the right data.
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> The SynObs project aims to evaluate and design the ocean observing system from an ocean prediction perspective. Our biggest problem is how we connect

with observation communities, how we communicate and share our capabilities with the observing community, and how we get support and input from observing community. The DCC-OP will help to construct the communication channels required between these two communities.

We need to be able to evaluate the impact that ocean prediction products and services have on user groups, and "sell" the value of our observations and observing system infrastructure. Identifying, understanding, and mapping the regular and ad-hoc uses of different families of institutional and commercial users will be helpful.

We need more exercises like those carried out by ETOOFS and IODE where we have experts talking to potential local users to explain what can be delivered, what is available, and how to connect to these tools and experts who can provide training. The DCC-OP can help to broker more of these activities across a wider range of ocean prediction needs.

A global ocean prediction system will rely on the interoperability of marine data services (and with wider environmental data) and will need for global users to discover, access and use effectively the worldwide distributed capability of in situ, satellite-derived marine data to really serve the needs of models, forecasts for ocean prediction. The EU marine data service EMODnet welcomes this DCC for Ocean Prediction and looks forward to the ongoing collaboration with EU Copernicus Marine Service and other data services worldwide, together with IODE of UNESCO towards a truly open "global marine data space", and collaboration with GEO Blue Planet (EU/Global) and EU4OceanObs is also welcome to further mobilize users and publish existing use cases to show the benefits and demand for these data. We are happy to connect on marine data and data use case issues for the further development of this DCC and others.

3. Capacity Development

Participants agreed that capacity development is an issue where the DCC-OP has a strong role to play. This is a common issue that will be addressed through each Decade programme and could benefit from a collective approach, particularly through establishing close partnerships with / supporting leading groups like UNEP, IODE, POGO, and ETOOFS. Increasing global capacity to use ocean prediction tools and services for local sustainable development issues, and understanding stakeholder needs at these scales, should be part of the DCC-OP agenda.

Specific comments:

As part of the Decade, we need to make sure that we don't only support existing excellent structures from the northern hemisphere without ensuring that ocean prediction capacity is strengthened in the developing world, to ensure that we do not make the global divide in modelling capacity worse by this programme. The DCC-OP should encourage and enable modellers from the global south through its activities and the programmes that participate in the Centre.

The IOC and UNEP can offer their regional structures to help establish closer links between ocean prediction experts and the needs of developing countries. This is an important issue for the Decade and should be a role of the DCC-OP.

POGO can also help connect developing countries and capacity development activities to ocean observations and predictions.

4. Questions and Comments for Clarification

During the meeting, there were requests for clarification on several issues related to the organizational structure, engagement of partner programmes, and scope.

Q: Who can join the DCC-OP? There are many national and institutional activities that could contribute to the Decade and Decade programme activities but aren't "big" enough to form their own project/programme. Would the DCC provide a mechanism to engage these, or would this be more through the Communities of Practice?

A: The DCC-OP is a collaborative framework that will provide a way for Decade and non-Decade ocean prediction programmes, organizations, and individual experts to connect for collective impact around common interests. The DCC-OP will also engage with relevant Communities of Practice, who can 'plug in' to Centre activities of interest to them. The DCC-OP is intended to be both a 'community centre' that will allow groups and individuals to connect to each other around common interests, but also will carry out targeted activities to advance the development of a global ocean prediction system and translate innovations into operational services.

Q: How do we interact? What is the mechanism for us to communicate and how do we come together?

A: The first link is via DCC-OP communications channels – email lists, web site, social media. Each partner programme or organization will be invited to provide links to their communications focal points so that we can develop a centralized information portal for ocean prediction activities across the community. The virtual elements of the new Decade Global Stakeholder Forum platform (soft launch scheduled for mid-October) may also serve as a model for new ways to facilitate connections and exchange between groups. In general, the actions of the DCC-OP should be developed through the community and follow a 'collective impact' pathway beginning with 1) a common vision and agenda, 2) standardized methods, 3) mutually-reinforcing activities that cut across programmes, silos and value-chain elements, 4) open and continuous communications, and 5) a backbone coordinating structure to facilitate interactions and track progress towards agreed goals.

Q: How will the DCC-OP build on and complement existing ocean prediction groups like OceanPredict and ETOOFS? How will the DCC-OP keep focus on a well-defined mission while engaging with other parts of the value chain (e.g., observing networks and systems, data / information management systems, stakeholder engagement groups)?

A: The DCC-OP is a framework rather than a programme, and groups like OceanPredict and ETOOFS will continue to play leading roles in key areas of ocean prediction science and operational oceanography. The DCC-OP will support these

groups and their activities, rely on them and support them to lead new global activities of common interest for the Decade. In turn, the DCC-OP can provide a wider audience and increased visibility for these programmes. The DCC-OP will catalyze mutually-beneficial activities at the intersection of the value chain elements in partnership with existing groups, using DCC-OP resources where necessary to advance common interests. The DCC-OP will also engage with and support the work of other relevant Decade Collaborative Centres that will be developed over time. The activities supported by the DCC-OP will be considered in the context of the overall mission of the Centre to avoid mission-creep and incoherence.

Q: Can you provide examples of how a DCC-OP will improve predictive capabilities, serve the user community, or aid in capacity development? What is the benefit of engaging in the activities of the DCC-OP? How do we agree as a community which programmes should manage various coordination needs?

A: As discussed earlier in this meeting, the community has expressed several critical gaps in our ability to advance ocean prediction: lack of inclusiveness, lack of a mechanism to link to user communities and new constituencies, lack of links between observationalists and modellers, to name a few. Groups like OceanPredict who lead in advancing predictive capabilities, for example, have expressed keen interest in the DCC-OP to assist them with making connections to other parts of the value chain that they need to advance prediction capability and uptake, and to organize the broader community to reach international agreements on terminology, standards, and best practices. The DCC-OP can work with partners to convene the global research, operational, and standards-setting communities to develop joint activities and workshops, to map and monitor the links between existing programmes and needs, and to support activities of Decade programmes that can manage the coordination of significant parts of ocean prediction community needs beyond their own individual programme scope. Based on the feedback from this meeting, the DCC-OP will increase its emphasis on developing a mechanism to link the ocean prediction community to the user community in partnership with organizations and groups specializing in this area. Capacity Development represents a key user community / stakeholder group and should also be prioritized by the Centre. The DCC-OP will work with existing groups and networks to support and implement capacity development activities and will place a strong emphasis on outreach and communications to show potential users and funders what the community can offer.

CLOSING REMARKS

Vladimir Ryabinin closed the meeting by reminding participants that the Decade is about mobilizing the science we need to save and manage the ocean. He explained that the global oceanographic community is a complex ecosystem of international and intergovernmental organizations, programmes, projects, and other actors, and that the Decade Collaborative Centres are not intended to be 'top predators' in this ecosystem but rather provide structures for many different groups to coexist and work together. He stated that this DCC effort will not consume energy and resources of the programmes but will instead create value for ocean prediction work, products, services, and supporting infrastructure.

He thanked Mercator Ocean International for being willing to share its experience as a world leader in operational oceanography and to assist the global ocean prediction community to develop a global modelling and forecasting system as a legacy of the Decade.

To stay informed about the developments of the Decade Collaborative Centre for Ocean Prediction and to begin developing a global community channel for ocean prediction news and information, please join the DCC-OP email list at Mercator Ocean International.