ORCA

Oceans Research in Canada Alliance

Ocean Innovation & Technology Workshop

Summary Report

JUNE 6 2019 | HALIFAX NOVA SCOTIA

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June 6, 2019 | Halifax, Nova Scotia

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Executive Summary

The Oceans Research in Canada Alliance (ORCA) hosted the Ocean Innovation and Technology Workshop on the margins of the H_2O: Home to Overseas Conference on June 6th, 2019 in Halifax Nova Scotia. The goal of this workshop was to advance our collective efforts in ORCA Challenge Area 4 – Encourage Innovation and the Commercialization of Knowledge and Technology.

In order to promote information sharing and networking, the workshop began with a brief showcase of some key collaborative initiatives being led by community members on ocean innovation and technology:

- For the identification of key players in the sector, the Ocean Technology Alliance of Canada's work on the Canadian Ocean Industry Asset Map and Database
- For academic drivers for innovation, the Ocean Frontier Institute
- For the management of big ocean data, the Canadian Integrated Ocean Observing System.

Building upon previous ORCA community discussions, the workshop participants then discussed the preferred future for ocean innovation and technology in Canada, and barriers that prevent us from attaining that future. The preferred future included the following areas:

- Advances in Science
- Commercialization of Knowledge
- Innovation
- Building Resilience
- Enhancing Communications

Paths forward and tangible actions were articulated for each area, with the view that the community may undertake these steps to encourage innovation and the commercialization of knowledge and technology. Final directions proposed by participants for the community's work in this challenge area included:

- Assemble a cross-sectoral working group to plan future discussions on Challenge Area 4
- Draw up a Canadian Ocean Technology Roadmap to lay out the major initiatives, players and assets.
- Create a National Ocean Technology Strategy to articulate common goals, priority areas and improve alignment.

Introduction

The Oceans Research in Canada Alliance (ORCA) hosted the Ocean Innovation and Technology Workshop on the margins of the H_2O: Home to Overseas Conference on June 6th, 2019 in Halifax Nova Scotia. The workshop was moderated by Scott McLean, ORCA Council member and Chair of the Ocean Technology Alliance of Canada. The workshop had thirty-eight participants (Annex 1). The goal of the workshop was to advance our collective efforts in ORCA Challenge Area 4 – Encourage Innovation and the Commercialization of Knowledge and Technology.

The Workshop was divided into 3 parts:

- Introduction and background on ORCA and Challenge Area 4
- Presentations of collaborative initiatives in the Canadian ocean technology sector
- Participant engagement portion, where participants discussed several questions and provided potential solutions

Background

The Oceans Research in Canada Alliance is a community of Canadian experts working together to advance the coordination of ocean science and technology (S&T).

The community came together in 2017 to build an organization that would address the challenges facing Canadian ocean S&T, namely the vision gap, coordination gap and information gap identified by the Canadian Council of Academies. The community set into motion the creation of ORCA based on a set of foundational principles (Figure 1), set out the proposed structure for ORCA (Figure 2), and identified six key Challenge Areas (Figure 3). For each of these Challenge Areas, the community identified the "preferred future" and provided insight on pathways to achieve these goals.

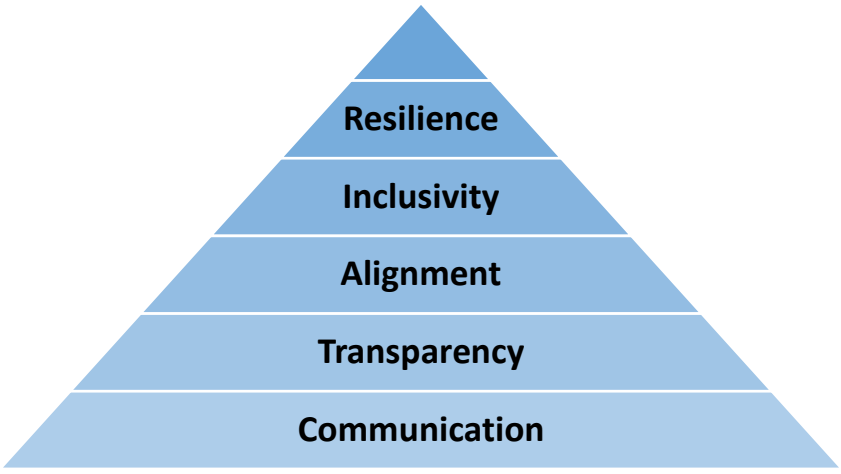

Figure 1. The foundational principles of ORCA drive all of the collaborative work that we do.

Figure 2. The structure of the Oceans Research in Canada Alliance.

Figure 3. The six Challenge Areas that ORCA will address as a community.

ORCA is now a community of practice with over 450 members from 150 organizations, from coast to coast to coast. All sectors and disciplines related to the oceans are represented in its membership. It provides a national forum for important ocean research-related discussions, to improve information sharing, coordination and networking.

In 2018, members met to take part in community building activities and to identify and refine key collaborative initiatives that the community should undertake to advance coordination in Canadian ocean S&T. Over the last year, progress has begun on key community-led initiatives in all Challenge Areas.

Challenge Area 4 – Encourage Innovation and the Commercialization of Knowledge and Technology

The ORCA Ocean Innovation and technology Workshop focusses on Challenge Area 4 – Encourage Innovation and the Commercialization of Technology. In 2017, the community identified the following elements as being critical to an ideal future in ocean innovation and technology:

- Advances in Science: New technologies deliver advances in science, and create global opportunities for Canadian ocean technology
- Commercialization of knowledge: Industry connects more quickly to researchers with the ability to create knowledge that can be commercialized.
- Innovation: Key players in the commercialization of knowledge and technology find creative ways to increase market potential

- Building Resilience: The engagement and involvement of communities and users of ocean S&T have brought resilience to the system. A more resilient ocean science innovation system has also brought new investments. Commercialization to larger markets cycles back to support research and technology in a positive feedback loop
- Enhancing communications: Enhanced communications and integrated networks that link government departments, provinces, Indigenous organizations, and SMEs across the country bring attention to national challenges, make better use of existing experts, and also create new career opportunities in ocean S&T

Since then, many new collaborative initiatives have begun to help address challenges in this area and lead us towards this end state.

Collaborative Initiatives in Canadian the Ocean Technology Sector

Ocean Technology Alliance of Canada – Scott McLean, ORCA Council member and Chair of the Ocean Technology Alliance of Canada

The Ocean Technology Alliance Canada (OTAC) was established as an industry led organization to facilitate the growth of Canada's ocean technology sector. OTAC was initially created in 2012 by the regional ocean technology associations at the time which included the Aerospace and Defence Industries Association of Nova Scotia (ADIANS), Oceans Advance, Technopole maritime du Quebec (TMQ), Ocean Initiatives British Columbia (OIBC) and Ocean Networks Canada (ONC) as a national ocean technology industry support organization through the Ocean Networks Canada Innovation Centre. OTAC led many trade missions, promoting the ocean technology sector internationally, developing a national pavilion and a Canada brand for the sector. In 2016 OTAC was formally incorporated as a national association representing the ocean technology sector with leadership from the regional ocean technology associations: the Ocean Technology Council of Nova Scotia, Oceans Advance, Technopole maritime du Québec, the Association of British Columbia Marine Industries (ABCMI) and Ocean Networks Canada. OTAC has a mandate to facilitate the growth of Canada's ocean technology sector, promote Canadian ocean technologies, create a Canada brand and common voice for the sector.

Canadian Ocean Industry Asset Map and Database – Cathy Hogan, OceansAdvance

The data-driven Canadian Ocean Industry Asset Map and associated on-line portal will provide a centralized platform to better inform, connect, promote and create opportunities within Canada's comprehensive ocean industry. The project will facilitate and foster new partnerships locally, provincially, regionally and nationally within and between industry, post-secondary institutions, government, and other partners (e.g. indigenous communities) to accelerate ocean-related innovation and commercialization and to drive increased sustainable economic growth. The Asset Map is being developed as a collaborative initiative between the Ocean Technology Alliance of Canada (OTAC), delivery partner Oceans Advance, and Canada's recently established Ocean Supercluster (OSC) with funding provided by the Atlantic Canada Opportunities Agency (ACOA).

OTAC has contracted Triware Technologies Inc. to lead the research, validation and categorization of stakeholders in key ocean sectors including, but not limited to, oil and gas, fisheries, aquaculture, ocean sensing, ocean mapping, underwater acoustics, and supply and service. The result will be a searchable database of Canada's private, public and non-government ocean ecosystem, which will be accessible on the websites of both OTAC and Canada's Ocean Supercluster.

Canadian ocean stakeholders are encouraged to participate in the creation of this asset map to ensure the final product is an inclusive, comprehensive database of Canada's ocean partners, capabilities, capacity and contacts.

Ocean Frontier Institute – Anya Waite, ORCA Council member, Ocean Frontier Institute Scientific Director & Dalhousie University Associate Vice-President Research (Oceans)

The Ocean Frontier Institute (OFI) is focused on understanding key aspects of ocean and ecosystem change and developing strategic and effective solutions that can be applied both locally and globally. OFI's aim is to conduct research that advances policy decisions and advances the development of a blue — and sustainable — economy. OFI is a transnational hub for marine research, exploring the ecosystems of the North Atlantic and Canadian Arctic Gateway to discover innovative solutions that strengthen the economy and protect the environment. Through education, training, and communication — and by sharing talent, resources, and information — OFI generates ocean knowledge and opportunity.

OFI supports innovative projects that have the potential to advance research, commercial or social concepts relating to the ocean. By encouraging collaboration and sharing resources — data management, ship time, tools and technology — OFI supports time sensitive, once in a life time opportunities to leverage complementary research and advance our collective understanding of the ocean. Large Research projects link ocean innovation across engineering, social and natural sciences. Open ocean data provides an opportunity for innovation and collaboration for the ocean science and technology sector.

Capacity building and training are critical to the future of ocean technology. OFI Atlantic Ocean Graduate Program focuses on applied ocean science and technology. This program includes partnerships with industry, multiple post-secondary institutions across the Atlantic provinces and internationally.

Canadian Integrated Ocean Observing System (CIOOS) – Mike Smit, Associate Professor, School of Information Management, Dalhousie University

CIOOS will integrate Canadian oceanographic data from multiple sources to make them accessible to end-users, from researchers, to the general public, to policy makers through a nationally integrated portal. CIOOS will be a fully integrated, sustained ocean observing system that maximizes access to data and advances generation of ocean information products for the benefit of all Canadians.

Three initial regional associations (RAs) will be established: Pacific, St. Lawrence, and Atlantic. The RAs will collaborate with regional data providers and users to adopt international standards and tools to ensure interoperable data management and dissemination. A national web platform (cioos.ca) will be developed as a central access point to all Canadian oceanographic data, where visualisation tools will allow data discovery as well as redirection to regional portals.

The regional associations will be responsible for outreach and engagement linking regional data producers with regional data users through continuous communication and collaboration.

The CIOOS will be built on the principle of open data. Open data is critical to building relationships and will facilitate growth in the ocean sector to develop and provide new commercial products and services in addition to advancing innovative research.

Participant Engagement – Solutions to Ocean Technology Challenges

The participants were provided a series of four overarching points relating to the preferred future articulated for Challenge Area 4, and asked a series of questions in order to arrive at proposed solutions. Below is a summary of their discussions.

1. New technologies deliver advances in science, and create global opportunities for Canadian ocean technology

How can industry connect better with government and academia in Canada to accelerate the commercialization of new technologies?

Communication and transparency are key. Conversations, information sharing, face-to-face meetings and one-on-one discussions amongst the three sectors are essential to build the relationships that will facilitate collaboration.

The responsibility for connecting and building these relationships is shared between the three sectors, and not the responsibility of just one.

Relationship building between the sectors could be facilitated by working through student programming. Student programs often have more flexibility in terms of collaboration.

Accessing these programs to promote intersectoral dialogue would support relationship building over the long term, increase networking potential in the future and support capacity building.

What barriers may exist to creating these connections? How can we help mitigate them?

One barrier is differing timescales among sectors: ocean technology programs and regulatory processes within government operate on lengthy timescales, which are longer than the processes within industry and academia. A clear understanding of the longer term goals may enable creation shorter term achievements that can satisfy academic and industry objectives.

Another barrier identified is the lack of accessibility of government to academia and industry. Additionally, the administrative processes within government have been a barrier to fulsome engagement with industry – for example preventing engagement with industry leading up to calls for innovation. Workshops like these provide an excellent venue to promote the necessary connections and information sharing which can mitigate these issues.

Within industry, some groups such as fish harvesters are not part of an industry association, therefore they do not have a venue to present new research. This can be mitigated by creating opportunities for academics to engage with industry during the early stages of research and development, and there should be more industry associations and accountability of very small producers, to facilitate their engagement.

The most significant barrier is likely the lack of common goals among these sectors (government policy, commercial, social, academic, etc.). Why should these sectors connect? What is important to each sector? What are the priority areas?

What should our next steps be?

While the preferred future for ocean technology has been articulated by the community the greatest barrier is the lack of an overall ocean technology strategy in Canada. A strategy with a common goal and with identified priority areas, could help to align research and technology development across the sectors.

More face-to-face workshops with representatives from industry, academia and government would allow open discussions on opportunities and issues. Participants agreed that it was helpful to have workshops like this one within the context of a larger meeting (like the H_2O Conference) to bring the parties together and allow for more networking opportunities.

2. Industry connects more quickly to researchers with the ability to create knowledge that can be commercialized. Knowledge mobilization plans and strategies are now required by all organizations receiving funding from any of the tri-council agencies

- How can academia communicate technological advances made in research that may have commercial application?

  It is difficult to facilitate this communication. Partnership style programs are helpful (i.e., Natural Sciences and Engineering Research Council (NSERC), Collaborative Research and Development Grants, Idea to Innovation Grants), but they should be developed and implemented hand in hand with industry, so that the research coming out of an academic setting is can be commercialized quickly.

  Academic institutions are not necessarily well set up for commercializing technology, as it is not their primary purpose. There is a need to develop an effective hand off process so that products can be passed on to those who are best placed for commercialization. Academic institutions typically have an industry liaison office that has the role of facilitating the commercialization of technology but often lack the domain specific contacts to readily transfer technology.

  For NSERC grants, scoring high on the evaluation criteria requires demonstrating that the proposal is "extremely original and innovative and is likely to have impact by leading to ground breaking advances in the area and/or leading to a technology or policy". This is a good incentive for researchers to reach out to industry to help demonstrate relevance of outcome. If researchers are unsure of which specific companies to reach out to, the local regional ocean technology association may be of help.

- What forums exist (or should exist) to facilitate this?

  More forums are necessary to facilitate these discussions. Conferences, especially the more scientific ones (i.e., Ocean Sciences, American Geophysical Union), are good venues for companies to see what research is being done that might be relevant to their business area.

  Regional associations can help with periodic meetings and workshops.

  Bringing researchers and industry together on specific topics may be something that ORCA could facilitate.

  The local Industrial Research Assistance Program (IRAP) Industrial Technology Advisors (ITA) can also help facilitate these connections, depending on the stage of the technology various funding programs are available.

3. Enhanced communications and integrated networks that link government departments, academia, Indigenous organizations, and small and medium enterprises (SMEs) across the country bring attention to national challenges, make better use of existing experts, and also create new career opportunities in ocean science and technology. The National Ocean Industry Asset Map will help with this.

What else can we do?

ORCA's Community of Practice is the answer – ORCA is a national, cross-sectoral network. Information can be funneled through ORCA as a "one stop shop" for ocean science and technology information.

It is also important to share more information about our own government services and programs. Oceans Outlook Day, with its presentations from government departments, was a good start.

Intimidation of young people in getting into the community can be hard to overcome, but relationship building is important. Promoting students and young people is worthwhile.

IRAP ITAs can help connect to national experts.

How can we best facilitate these connections nationally?

ORCA's Community of Practice concept is good, but structuring discussions around specific themes is key – assembling interested parties to discuss specific topics in targeted workshops. Sessions like these are very helpful and productive, and also promote relationship building. Such targeted workshops should move to different meeting locations across the country, including to locations outside of main centres to increase engagement.

ORCA will also be launching a new website in 2019 that will be more agile, responsive and accessible. There will be opportunities for feedback into the site's development.

Promote effective communications by:

- Sharing information on only the most important pieces to avoid information and consultation fatigue,
- Ensuring the language of the information is accessible and appropriate to the audience, and
- Sharing information within our own organizations.

The National Ocean Industry Asset Map from OTAC might consider including:

- information on government initiatives relating to ocean technology and the relationships between these initiatives
- A national equipment inventory (currently being undertaken as part of the Ship-Time Application initiative under ORCA Challenge Area 2)

4. Canada remains a world leader in collecting ocean data. Data is made public in real time; and people are trained to use ocean science data. Open data helps to tackle the commercialization issue, by helping to nurture private enterprises that want to conduct research and generate commercial activity in the sector

How can industry work with groups like the CIOOS to have access to ocean science data sets to develop new products and services?

CIOOS is a new program and part of the mandates of the regional associations will be to engage with industry, both as data suppliers and data users.

What barriers may exist? How can we help mitigate them?

Industry, academia and government have a lot of data and there are many barriers to sharing it openly, such as:

- Accessibly of older data and associated metadata issues
- Corporate culture and processes of academia and government
- Intellectual property issues
- Data management issues
- Lack of capacity to curate data

CIOOS must create a model that incentivizes open data sharing and must present this data in a format that is easily accessible to all.

What should our next steps be?

Many of the community's next steps on ocean data relate to the further development of CIOOS, to which several questions were directed. Many of these questions also apply more broadly to the larger challenges around data management:

- How do data providers become engaged with CIOOS to provide data?
- Is CIOOS just a data portal? Will it have capacity and funding to collect and manage data?
- How will CIOOS attract data providers and data users? What is the long term plan for funding and managing data?
- What is the incentive for data providers to participate?
- Will there be user fees?
- Will some data be confidential or have use restrictions?
- Data management: how can ocean sector learn from other open data and open forums?
- How do you convince larger companies to share/release data?

Proposed Direction for the Community

In addition to the next steps articulated in the sections above, below is an overall proposed direction for the community, seeking to advance progress under Challenge Area 4: Encourage Innovation and the Commercialization of Knowledge in ocean science and technology:

- Assemble a cross-sectoral working group to plan future discussions on Challenge Area 4

- Draw up a Canadian ocean technology roadmap

  As a first step, list all of the related collaborative initiatives and programs (i.e., OTAC National Ocean Industry Asset Map. Ocean Supercluster, etc.), implicated players, related timelines and milestones.

- Create a national strategy for ocean technology

  A national strategy could identify common goals and priorities, improve alignment and direct our collaborative work. Ideally development of this strategy would involve multiple sectors, including government departments with ocean related activities (DFO, NRCan, DND, ISED, etc.), academia, industry, NGO's and Indigenous organizations. ORCA and OTAC could be key players in developing this strategy.

  The scope of this strategy may vary, depending on the level of engagement. The regional ocean technology associations could work with IRAP ITAs and coordinate students working with industry under IRAP projects and/or through the NSERC CRD program.

Participants list

Name	Organization
Abigail Fyfe	Transport Canada
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Anya Waite	Ocean Frontier Institute/Dalhousie University
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Carlos Levy	National Research Council
Catherine Kerr	DRDC-IDEas
Cathy Hogan	OceansAdvance
Christina MacDonald	CIOOS-Atlantic
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Fred Whoriskey	Ocean Tracking Network
Guy Earle	Iobio inc
Jacqueline Nichols	Cellula Robotics
Jamey Smith	Huntsman Marine Science Centre
Jeff Stockhausen	NRC-IRAP
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