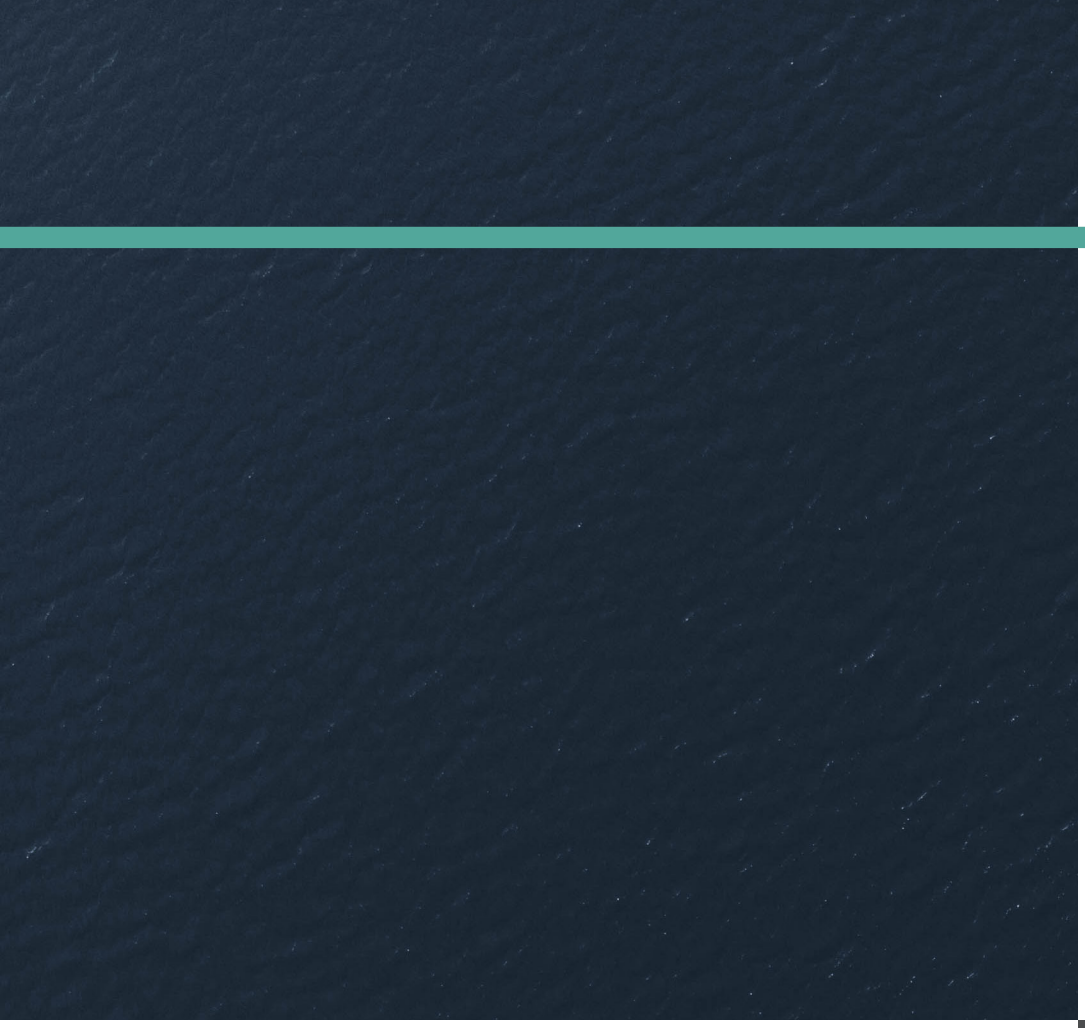
CIOOS
CANADIAN INTEGRATED
OCEAN OBSERVING SYSTEM



STRATEGIC PLAN

2021-2026

CANADIAN INTEGRATED OCEAN OBSERVING SYSTEM

OVERVIEW

Ocean observation is fundamental to Canada's ocean science community, providing invaluable information to scientists, innovators, coastal planners and policy makers. This allows for sound decisions that support the sustainability and economic value of our ever-changing ocean.

Without an integrated ocean observing system, Canada has lacked a national vision and strategy for coordinated ocean observations, resulting in overlaps and gaps in our observation activities from collection to sharing and interpreting data. Canada needs an integrated ocean observing system to efficiently and effectively observe the ocean and gain the greatest value from its efforts.

The Canadian Integrated Ocean Observing System (CIOOS) was established in 2019 out of a need to address siloed ocean data and the lack of a formal coordination and collaboration mechanism for the ocean observing community in Canada[1]. CIOOS works to address fragmented and isolated Canadian data by creating an open-access national system which facilitates discovery of previously inaccessible and undiscoverable data to end-users in industry, academia, government, Indigenous communities, coastal communities, and Non-Governmental Organizations.

An integrated ocean observing system will help coordinate the management of ocean data on a national scale and, critically, will be adaptable in the face of growing needs and a changing environment. Furthermore, the improved coordination of regional and national efforts within CIOOS will contribute to global ocean observing, maximizing the overall benefit of integrated observing.

As the nucleus for integrated ocean science and observing activities, CIOOS places Canada among the leaders of ocean observation. The benefits of integrated ocean observing systems are well-demonstrated in other countries, such as the US Integrated Ocean Observing System (IOOS) and the Integrated Marine Observing System (IMOS) in Australia, as well as globally, the Global Ocean Observing System (GOOS).

Additionally, CIOOS is well-positioned to support Canada's commitment to the United Nations Decade of Ocean Science for Sustainable Development (2021-2030) by contributing to the UN Decade societal goals, including efforts to create a predictable and transparent ocean for generations to come.

By aligning with the existing best practices and standards developed by GOOS, CIOOS can take advantage of existing frameworks and international recognition.

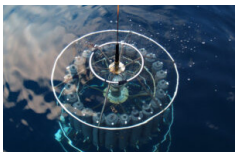
1. CCA (Canadian Council of Academies) 2012. 40 priority questions for ocean science in Canada; Ottawa, ON; CCA. The Core Group on Ocean Science in Canada.

CIOOS
CANADIAN INTEGRATED OCEAN OBSERVING SYSTEM

SIOOC
SYSTÈME INTÉGRÉ D'OBSERVATION DES OCÉANS DU CANADA

CIOOS has the benefits of a national infrastructure but draws its strength by being regionally specific. Currently composed of 3 Regional Associations, CIOOS has the national identity to be present in global ocean observing but is still able to recognize regional needs and develop place-based solutions for a diverse country.

BACKGROUND



2014

The Marine Environmental Observation Prediction and Response Network (MEOPAR) sponsored a workshop to develop best practices and a shared vision for nationally coordinated ocean data management in Canada. An Ocean Data Management Community of Practice (ODM CoP) was established with representatives from academia, NGOs and government.

2015

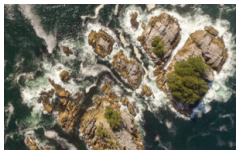
A MEOPAR-hosted expert forum on ocean data management was held bringing together over fifty participants from government, academia and industry to offer perspectives and best practices. The forum produced a report outlining the vision for a Canadian Integrated Ocean Observing System.

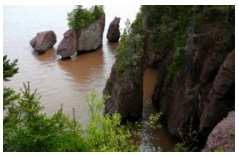
2017

Three investigative evaluations focused on cyberinfrastructure, observations and data, and visualizations were developed for the Canadian Integrated Ocean Observing System by the ODM CoP. These reports provided recommendations for moving the initiative from theory into practice.

2018

Three regional associations from the Pacific, the St. Lawrence, and the Atlantic were jointly funded by Fisheries and Oceans Canada (DFO) and MEOPAR.





2019

DFO and MEOPAR announced the launch of the pilot phase of the Canadian Integrated Ocean Observing System.

DFO, MEOPAR, and the Hakai Institute announced the funding of an extended pilot phase for CIOOS, for an additional two years.

2020

2021

CIOOS continues to develop its ocean data management system in accordance with international standards and is working to increase communication and collaboration with partners across all ocean sectors.

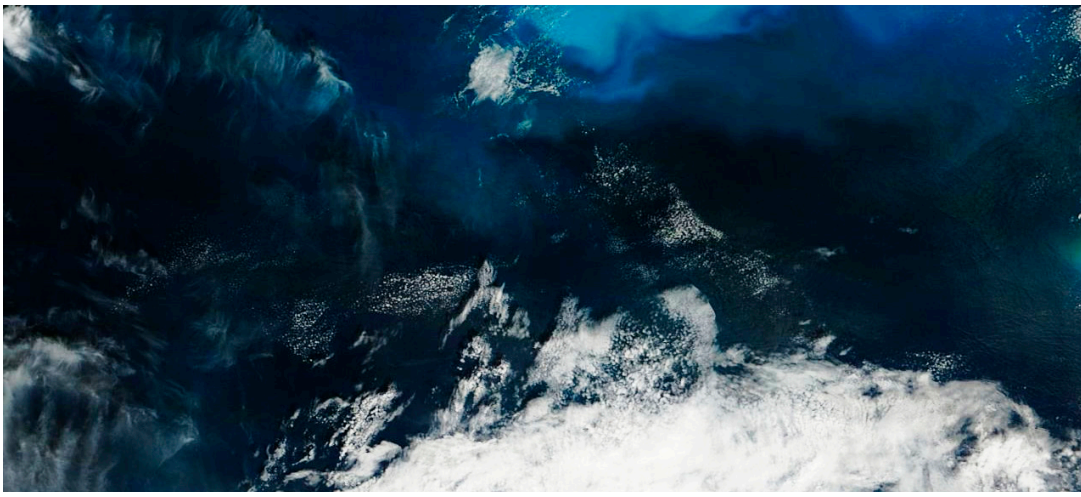
VISION & MISSION

VISION

As Canada's nucleus for ocean observing, CIOOS makes connections for a sustainable ocean future.

MISSION

To foster partnerships and grow a powerful online platform that generates information, knowledge, and place-based solutions to advance our understanding of the ocean.



GUIDING PRINCIPLES

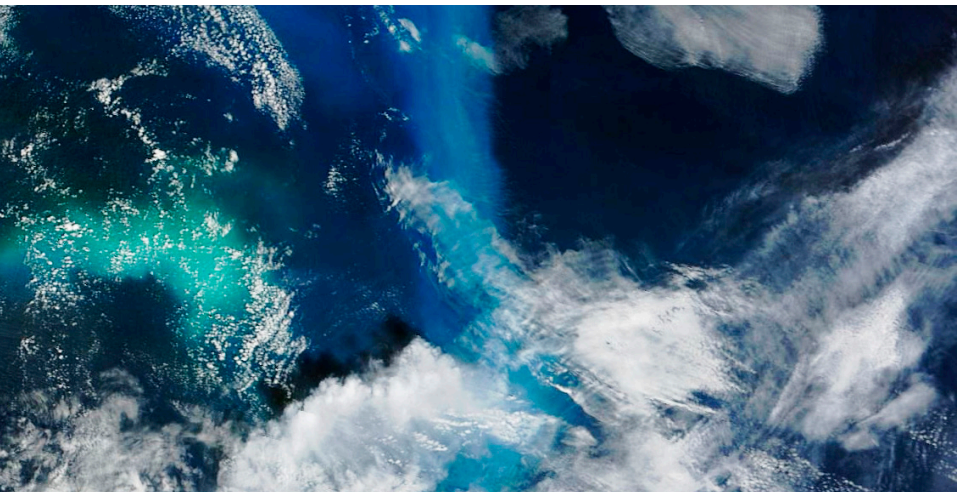
Build on existing strengths

Remain science-based and policy neutral

Cultivate productive, respectful partnerships

Serve the needs of multiple sectors through flexibility, adaptability and innovation

Provide reliable and high quality data across Canada based on the FAIR* principles



*** The FAIR Principles ensure data is:**

- Findable
- Accessible
- Interoperable
- Reusable

VALUE PROPOSITION

IMPROVE ACCESS AND VISIBILITY TO HIGH QUALITY OBSERVATIONAL AND MODEL OCEAN DATA AND INFORMATION

- Strengthen the ability to detect and understand changes in ocean conditions
- Facilitate an improved ability to detect, avoid and/or mitigate threats and disasters
- Contribute to increase in safety and efficiency of marine industry operations

INCREASE COLLABORATION AND COORDINATION IN THE OCEAN OBSERVING COMMUNITY

- Provide a national framework for new data sources
- Act as the nucleus for ocean observation in Canada, both nationally and internationally
- Reduce overlap, ensure data interoperability and enable research gaps in the ocean observing community to be addressed

INCREASE NATIONAL COORDINATION WHILE REMAINING REGIONALLY FOCUSED

- Cultivate brand of reliability to Canadian ocean data
- Maintain adaptability to protect and serve regional interests
- Connect regional leaders to fuel innovation

CONTRIBUTE TO EVIDENCE-BASED DECISION MAKING IN THE OCEAN DOMAIN

- Support resource management and environmental assessment decision-making
- Advance Government of Canada commitments to Open Data/Open Science
- Provide data context for informed use of the ocean

AREAS OF SOCIETAL IMPACT

SUPPORT INCLUSIVITY WITHIN CANADIAN OCEAN SCIENCE AND RESEARCH

- Encourage equity, diversity and inclusion in the ocean observing space
- Respect Indigenous ocean knowledge and data, including Traditional Ecological Knowledge, while protecting Indigenous data sovereignty
- Elevate the ocean data needs of coastal communities, recognizing that coastal communities are usually most

PROMOTE HEALTHY OCEAN-HUMAN INTERACTIONS

- Reduce risk to coastal communities
- Contribute to the prediction and understanding of future trends in a changing ocean
- Support ocean conservation, including the preservation of coastal ecosystems and Marine Protected Areas

PROMOTE A SUSTAINABLE BLUE ECONOMY

- Enable local industries to thrive by providing regional ocean information and knowledge required for optimal decision-making and innovation
- Connect government, Indigenous groups, academia and the private sector to align research priorities and enable data sharing, including international initiatives such as the UN Decade of Ocean Science for Sustainable Development
- Empower Canada to take a global lead in the blue economy by strengthening ties with global partners

REPRESENT CANADA IN GLOBAL OCEAN OBSERVATIONS

- Facilitate ocean leadership and enhance global recognition of ocean observations in Canada
- Add to the growing collection of national and international ocean observation systems such as GOOS, IOOS and IMOS, to promote the importance of understanding the ocean in an interconnected world
- Advance Canada's commitment to the UN Decade of Ocean Science by furthering two of the identified societal needs; a predicted ocean and a transparent ocean[2]

2. About. The Decade of Ocean Science for Sustainable Development. (n.d.). https://www.oceandecade.org/about.

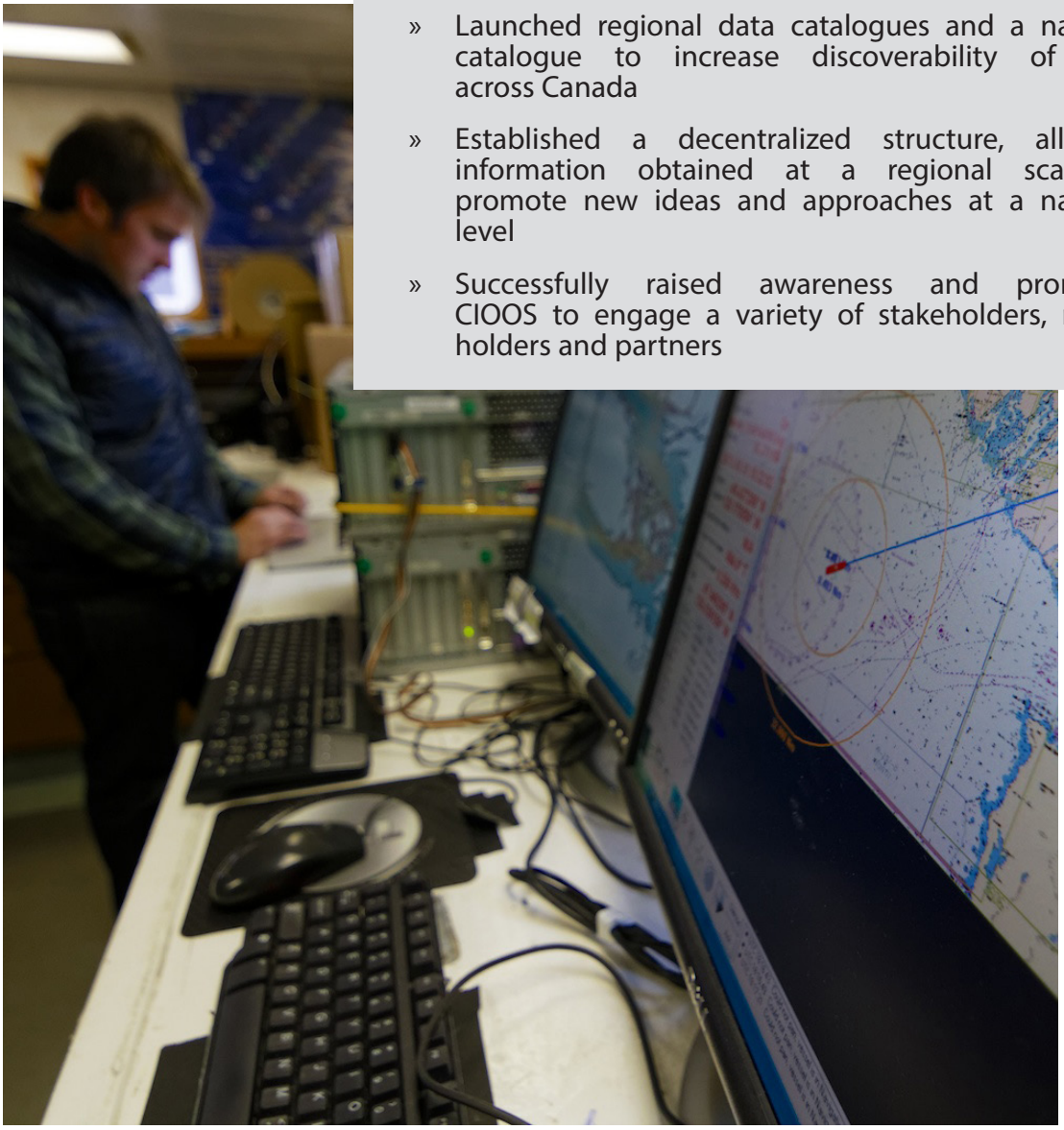
SETTING A PATH FORWARD

1

PHASE I - PROOF OF CONCEPT

CIOOS has:

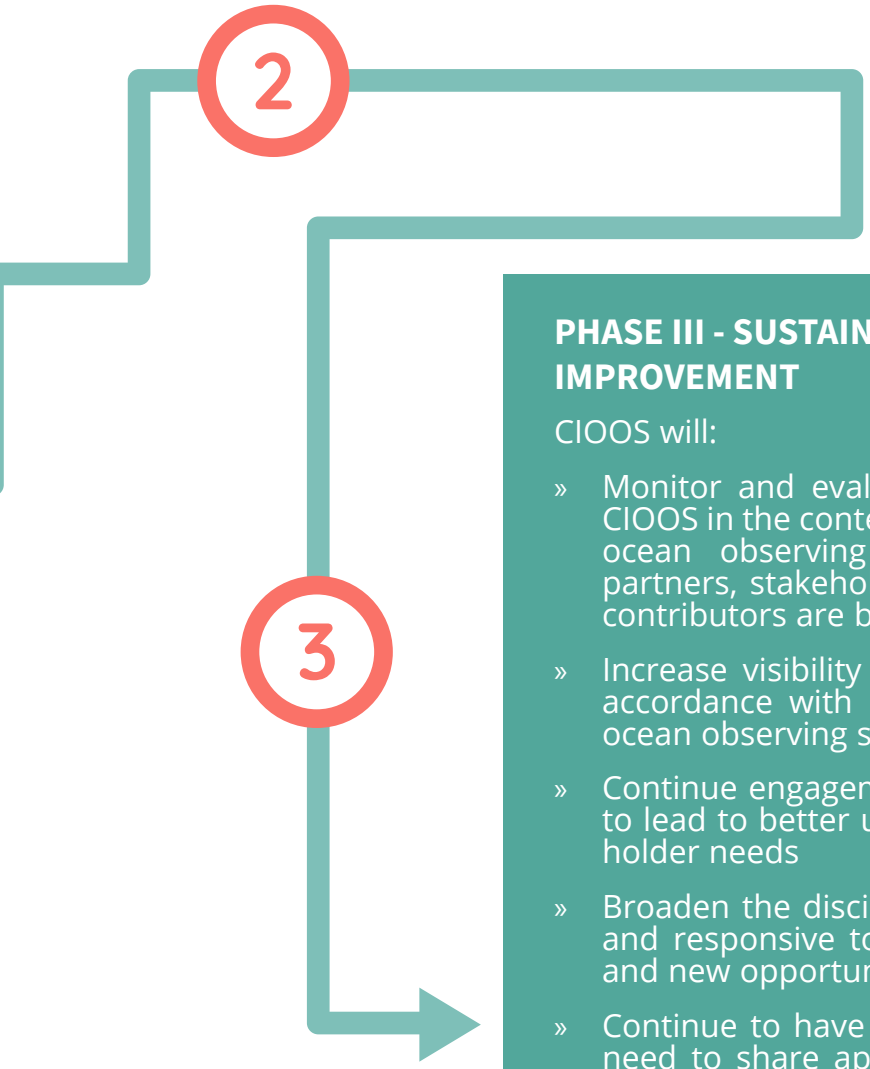
- Demonstrated the feasibility of making ocean observation data from various sources accessible on an open-access web based in FAIR compliance
- Advanced the demonstration of the utility of CIOOS
- Launched regional data catalogues and a national catalogue to increase discoverability of data across Canada
- Established a decentralized structure, allowing information obtained at a regional scale to promote new ideas and approaches at a national level
- Successfully raised awareness and promoted CIOOS to engage a variety of stakeholders, rights-holders and partners



PHASE II - DEVELOPMENTAL AND OPERATIONAL

CIOOS will:

- Continue to address the main national challenges to furthering the development of a made-in-Canada ocean observing system
- Work to ensure long-term sustainability of CIOOS by continuing to convey the value of CIOOS to appropriate federal and provincial government agencies and partner organizations
- Develop strategy for engaging potential partner organizations in the Arctic and Inuit Nunangat and the Great Lakes, and initiate discussions around the creation of additional Regional Associations
- Continue to engage with Indigenous and coastal communities to explore best practices for sharing and preserving ocean information collected through both western science practices and Traditional Ecological Knowledge
- Capitalize on national and international linkages by aligning with the societal goals of the UN Decade of Ocean Science for Sustainable Development



PHASE III - SUSTAINABILITY AND CONTINUOUS IMPROVEMENT

CIOOS will:

- Monitor and evaluate the progress and performance of CIOOS in the context of regional, national and international ocean observing communities and ensure needs of partners, stakeholders and rights-holders, data users and contributors are being met
- Increase visibility of CIOOS on the international stage in accordance with GOOS, and by collaborating with other ocean observing systems
- Continue engagement and communication with end-users to lead to better understanding of stakeholder and rights-holder needs
- Broaden the disciplinary scope of CIOOS, remaining open and responsive to additional disciplines, emerging needs and new opportunities
- Continue to have a bottom-up approach balanced by the need to share approaches and harmonize best practices efficiently at a national level

THEME 1

Strengthen partnerships for improved ocean observations and service delivery

» Goal 1.1. Regional Partnerships: Strengthen engagement with new and existing regional partners to increase and diversify data holdings, promote usability and provide products and services

» Goal 1.2. National Partnerships: Promote the work of CIOOS' community of partners at the national level to increase collaboration within CIOOS and across Canadian initiatives

» Goal 1.3. International Partnerships: Represent Canadian ocean observing on a world stage through increasing visibility and expanding international collaborations and partnerships

» Goal 1.4. Indigenous Partnerships: Continue ongoing engagement and dialogue with Indigenous governments, organizations and communities to explore best practices for sharing and preserving Indigenous ocean knowledge and data in ways that support Indigenous data sovereignty

THEME 2

Improve the discoverability, accessibility and interoperability of Canadian oceanographic data

- Goal 2.1. Expand data sets available to increase discoverability and accessibility
- Goal 2.2. Increase real and near real time data sharing to improve forcasting capabilities
- Goal 2.3. Develop standardized, reliable methodology for ocean data in Canada which is categorized and developed to improve interoperability
- Goal 2.4. Leverage Regional Associations as national data assembly centres to capitalize on regional expertise

THEME 3

Convert ocean data into information and knowledge through the development and use of tools, products and applications

- Goal 3.1. Create, adapt and catalogue tools that enable efficient ingestion and processing of ocean data
- Goal 3.2. Develop tools to increase the usability and accessibility of the CIOOS user interface
- Goal 3.3. Develop tools, products and applications that are purpose-made for specific end-user groups
- Goal 3.4. Showcase and share tools, products and applications developed by end-users to create a valuable knowledge base within CIOOS that builds on itself

THEME 4

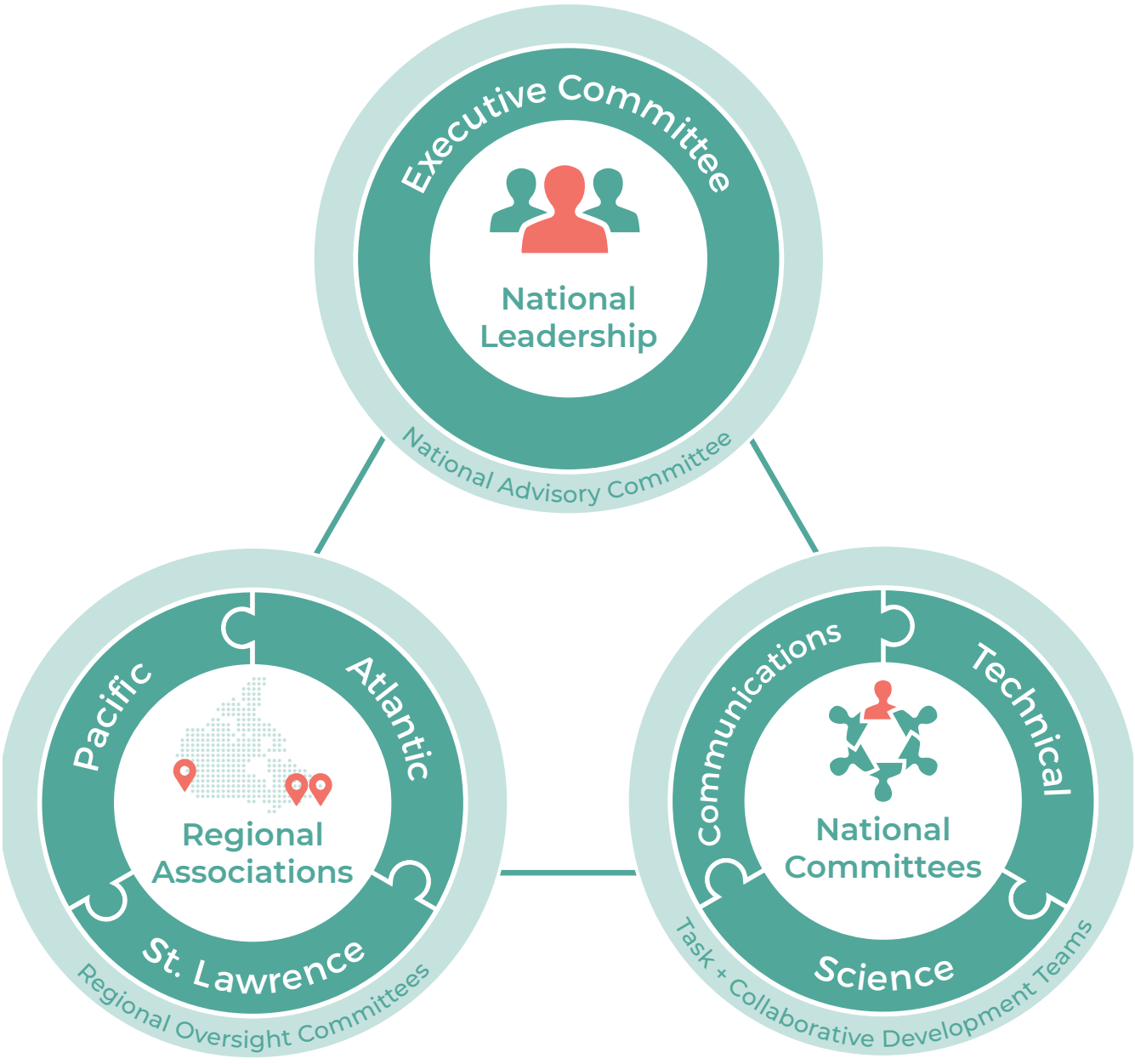
Increase the ability to understand current states and predict future states of Canada's ocean spaces by supporting modelling efforts and sharing ocean model results

- Goal 4.1. Catalogue models and model standards available regionally and nationally to increase overall use of model data and support reusability
- Goal 4.2. Develop CIOOS model metadata standards in order to more efficiently ingest model output data
- Goal 4.3. Connect modellers with ocean observational data to enable the development, assimilation and validation of models
- Goal 4.4. Enable CIOOS partners to develop data products and applications to address model user requirements

GOVERNANCE

Strong governance and oversight is crucial to ensure the success of a cross-Canada and multi-partner initiative.

Currently consisting of three distinct Regional Associations, national leadership and coordination of CIOOS is found through the Executive Committee, which is also responsible for strategic planning and decision-making for CIOOS according to its vision and mission. The National Advisory Committee provides external guidance and helps CIOOS maintain its relevance in the national and international ocean observing space. Finally, the national committees have representation from all Regional Associations, ensuring a consistent national approach and opportunity for sharing of best practices.



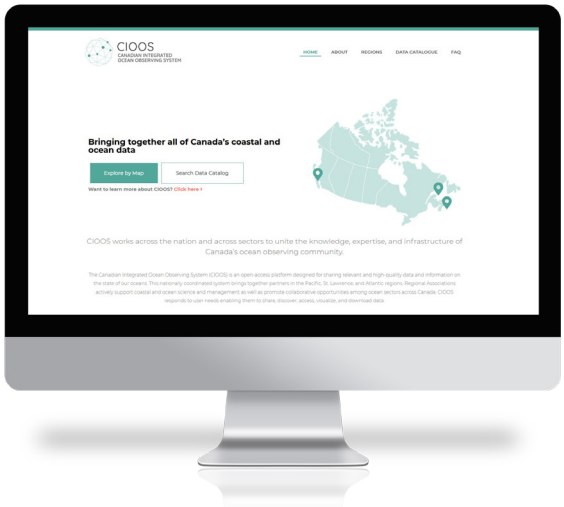
OCEAN DATA FOR OUR OCEAN FUTURE

Through our local engagement, regional connections, and national coordination, CIOOS is elevating Canada's ocean monitoring to the global stage. CIOOS will help coastal communities, industry, and government prepare for Canada's future.

We will navigate these vast waters together, and better manage the true potential of our ocean, coasts and waterways. For our, and future generations.

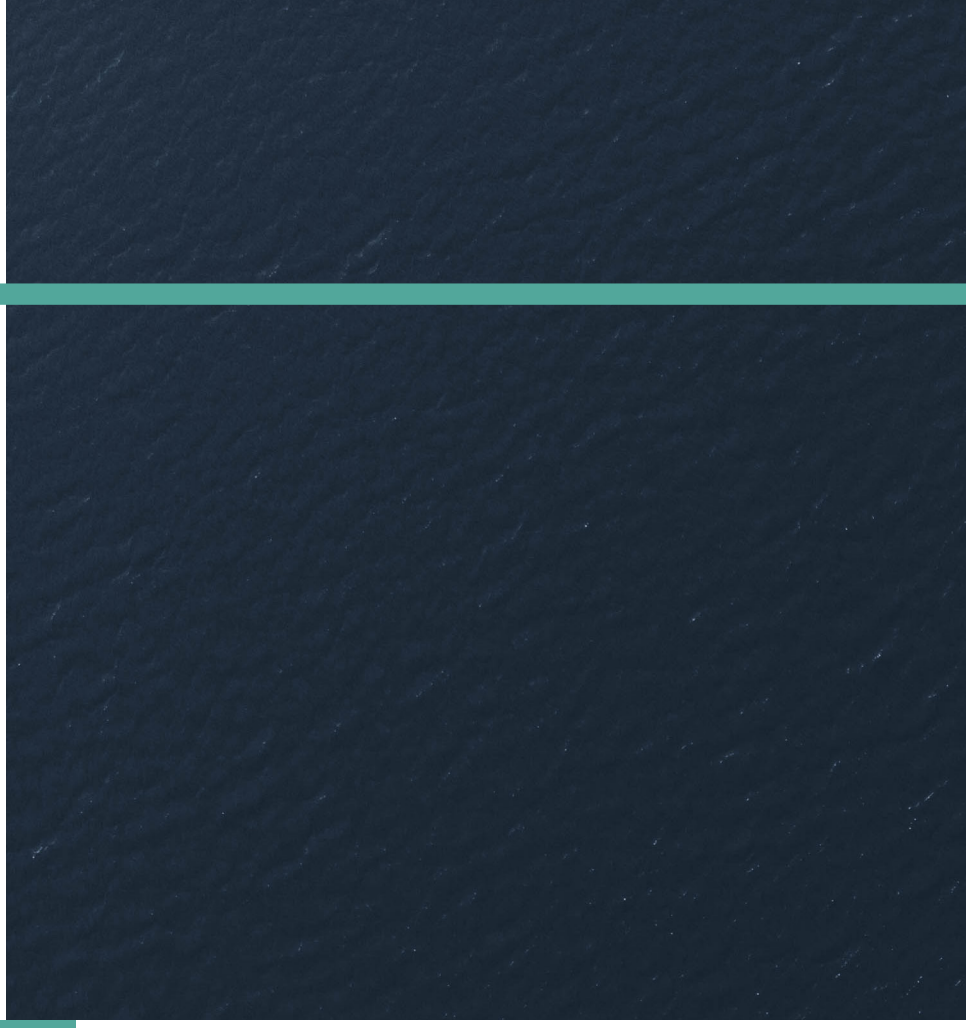
What discoveries can be made if we just connect the dots?

CIOOS
CANADIAN INTEGRATED OCEAN OBSERVING SYSTEM



WWW.CIOOS.CA

CIOOS
CANADIAN INTEGRATED
OCEAN OBSERVING SYSTEM



Canadian Integrated Ocean Observing System
(CIOOS)
info@cioos.ca
cioos.ca

Regional websites
cioospacific.ca
slgo.ca
cioosatlantic.ca