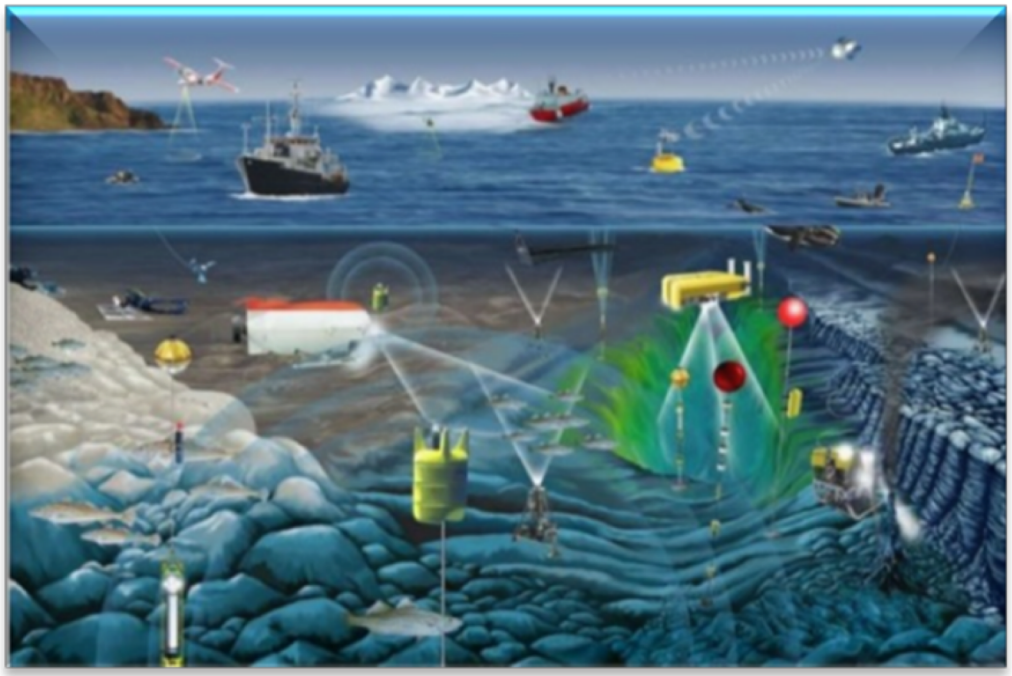
Canadian Integrated Ocean Observing System (CIOOS)



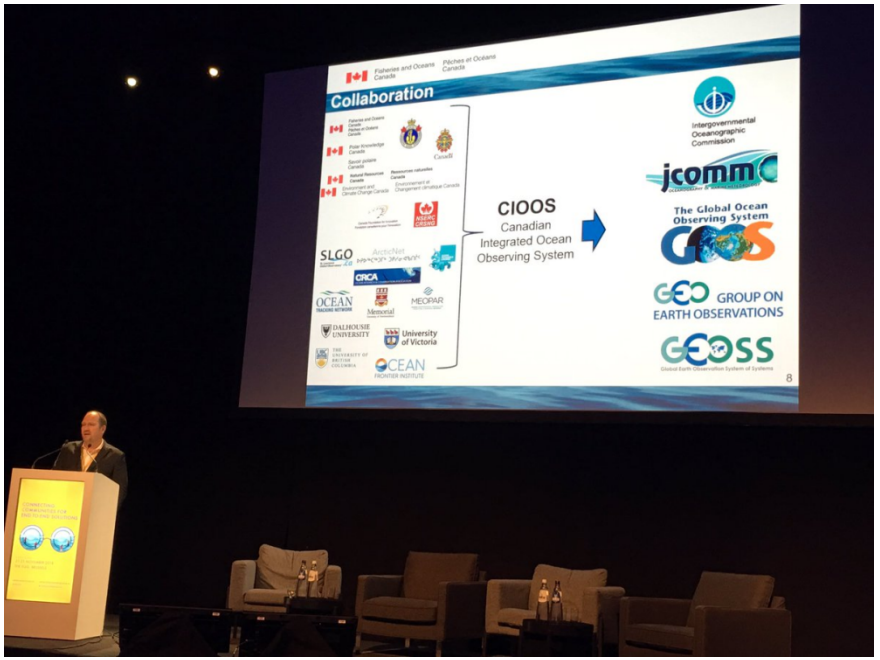
National Data Services Framework Summit 2019

24 January 2019

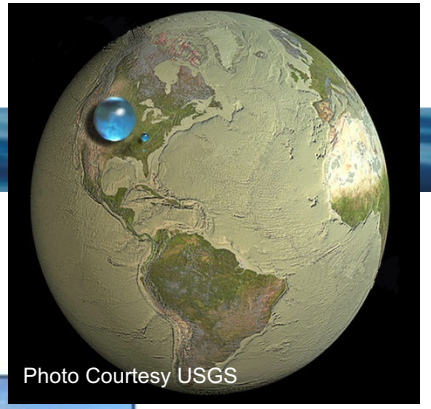
Keith Lennon

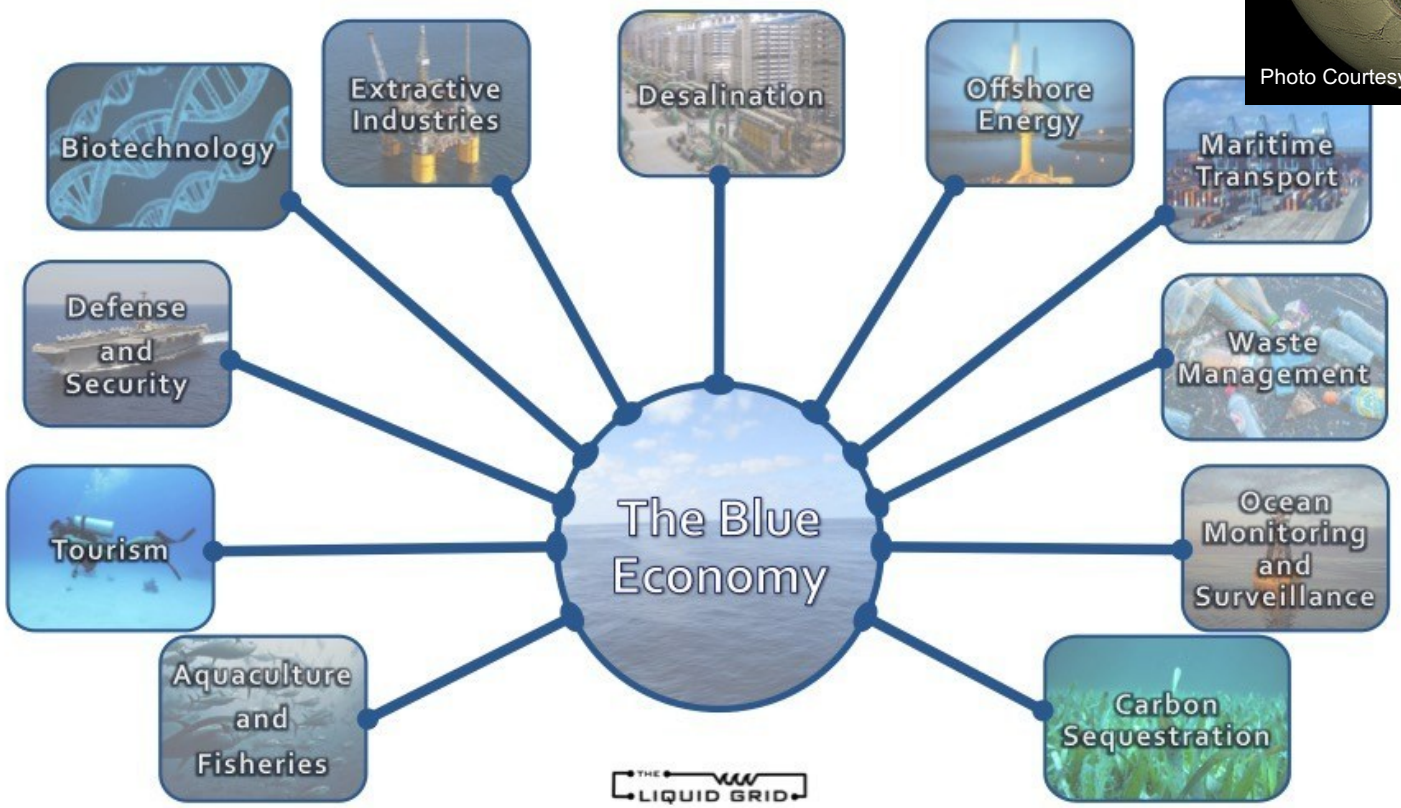
How do you develop an interoperable system for ocean data?

- Setting the scene
- Where are we going and how
- Challenges
- Lessons Learnt
- Next steps



The Ocean is Valuable





- 2010 - Ocean based industries generated $1.5T & 31M FTE
- 2030 Ocean industry projected to generate $3T & 40M FTE

Ocean Science in Canada – Coordination Gap

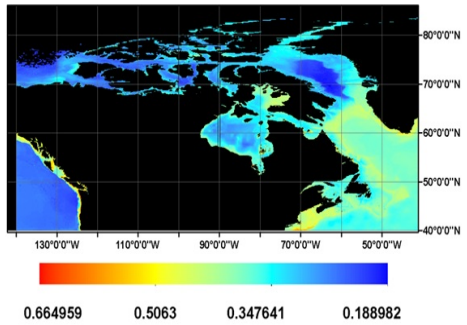
PEOPLE

Large variety of stakeholders

Highly dispersed geographically

Canada ranks among top countries in output and impact of ocean science papers

DATA



Held in diverse institutions in a variety of formats

Difficult to find or inaccessible to the public

No mechanism to easily integrate data from multiple sources

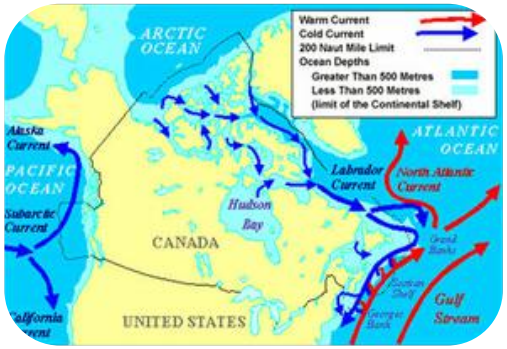
ASSETS

Different system standards, approaches, metrics

Lack of coordination to utilize assets

Costs in procuring new assets, human capacity to operate them, and analyzing and disseminating resulting data

GEOGRAPHY



Large, diverse geographic area

Dispersion of data, people, assets

Difficult to achieve coverage

Fragmented and isolated data

No comprehensive unified strategy or vision for ocean science in Canada

Where are we going? – the Vision

A Canadian integrated ocean observing system that brings together and leverages existing Canadian and International ocean observing programs (e.g. Chemical, Physical and Biological) and V and the data they collect, generating value-added products on a publicly accessible web platform that maximizes utility to end-users.

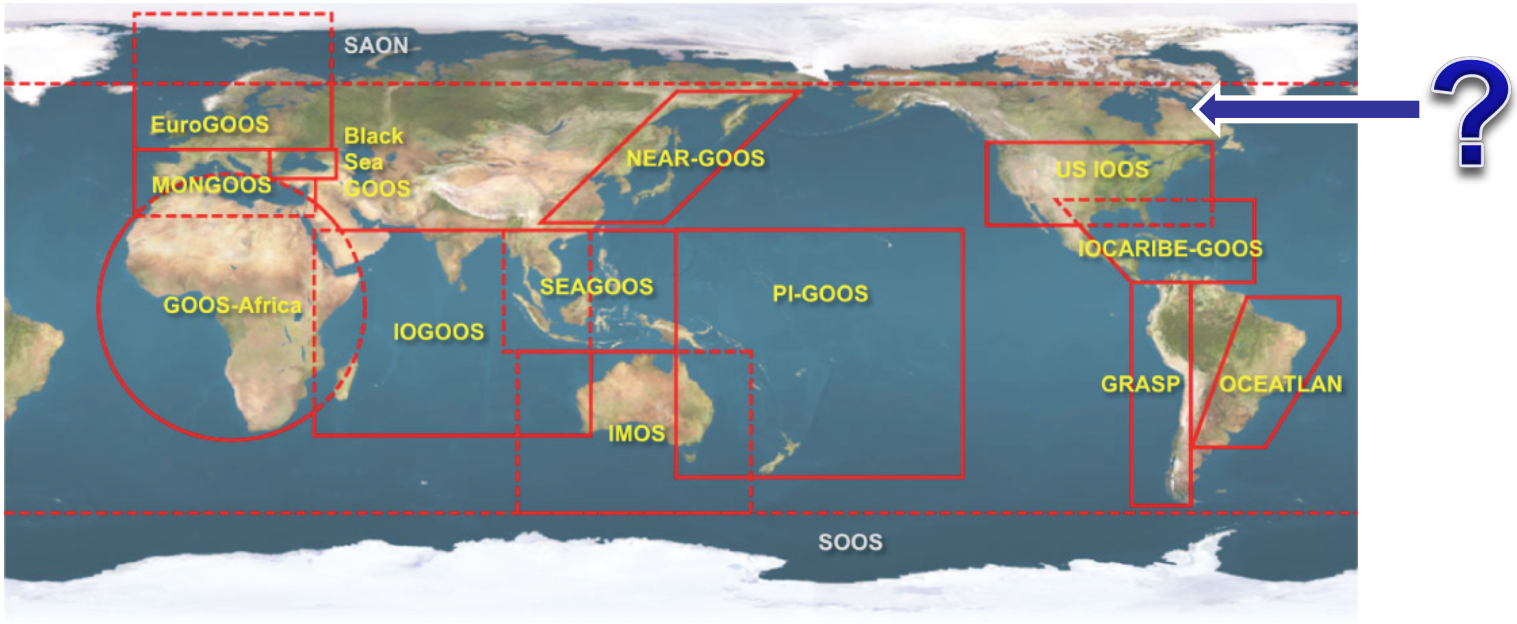
- Improve **coordination** & **collaboration** among diverse partners
- Enable **discovery** and **access** to data for decision making
- Provide **support** for a wide variety of research efforts to better understand, monitor, and manage activities in Canada's Oceans

In short: CIOOS will allow for Canada's ocean data to be **discoverable**, **accessible** and **interoperable**

International Landscape

Don't want to reinvent the wheel – already a lot going on internationally

- Framework for Ocean Observing: develops Essential Ocean Variables (EOVs)
- Intergovernmental Oceanographic Commission set up the International Oceanographic Data Exchange (IODE): develops standards and protocols
- Large number of global databases to leverage: OBIS, Argo
- Global Ocean Observing System (GOOS): coordinates regional efforts through Regional Alliances



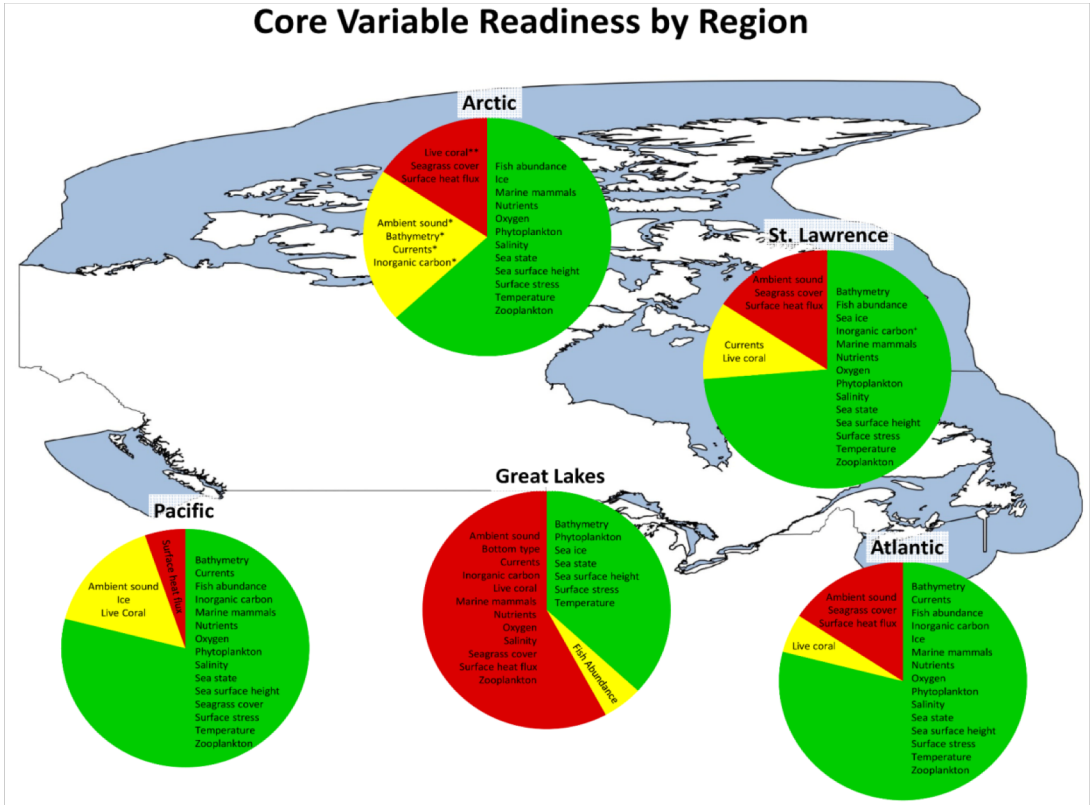
How? A brief history of CIOOS

- **Task Team** of federal and non-federal ocean observing experts formed (2016)
- **Investigative Evaluations (IEs)** to move CIOOS from the concept state to the design stage (2017)
  - Observation and Data, Cyber Infrastructure, and Visualization Tools and Platforms
  - IEs made recommendations on best practices, standards and protocols
- **2 year 'Pilot Phase'**, using a set number of requirements to test the system (ongoing)
  - Funded by DFO, MEOPAR, and in-kind support

Investigative Evaluations – Recommendations

Data and Observations:

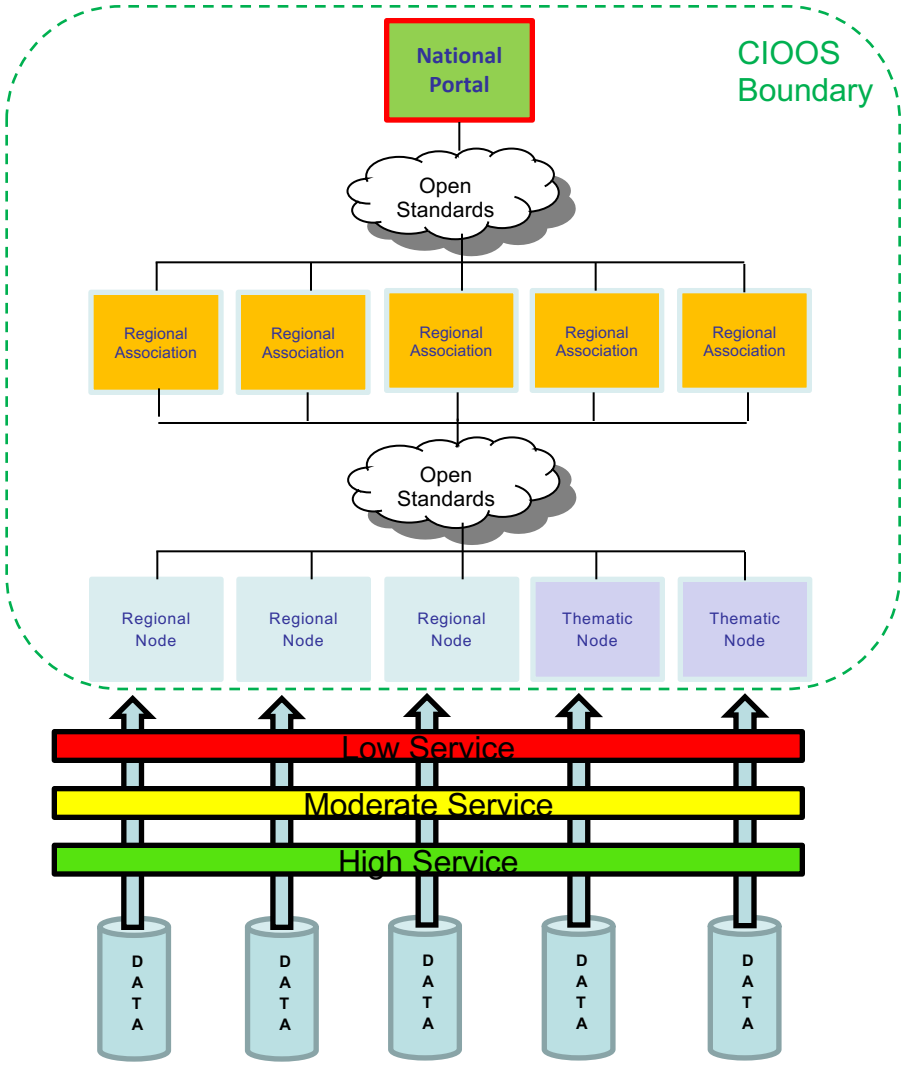
- ID'd 20 potential core variables
- Focus on the Pacific, Atlantic, and Gulf of St. Lawrence regions
- Early development of a data policy and data management plan
- Develop a process-orientated quality assurance model combined with a product-orientated data quality control model
- Develop detailed data and metadata standards



Investigative Evaluations – Recommendations

Cyberinfrastructure:

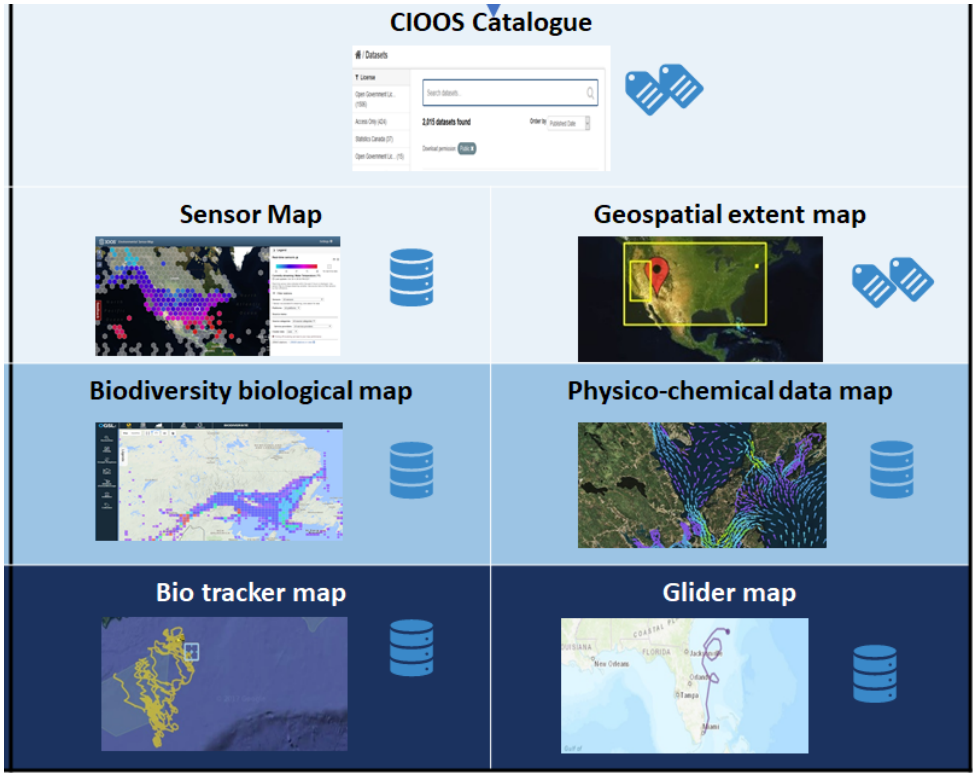
- Open standards be used instead of specific software when possible
  - E.g. Open GeoSpatial Consortium standard Catalogue Service for the Web is recommended for harvesting
- Compute Canada is the preferred hardware provider for CIOOS



The main difference between levels of service (based on funding) is the amount of support given to data providers for submission of their data to CIOOS.

Phase 1 of CIOOS: Pilot Phase

- A scalable, interoperable system for **data assembly, management, quality control and dissemination** for essential ocean variables (EOVs)
- **Cyberinfrastructure solutions** that are fit-for-purpose and scalable for future needs
- **Provide access** to interjurisdictional data collected by national, regional ad global observing systems
- **Integrate beyond data**; include best practices, technology and expertise;
- **Integrate with global efforts**
- **User engagement** plan
- Develop CIOOS' **national web-presence**, which will include a searchable metadata catalogue, and will develop the branding and "look-and-feel" for CIOOS



Pilot Phase Expectations

Regional Associations (RA)

- Pacific, Atlantic, and the Gulf of St. Lawrence
- Work cooperatively to demonstrate management, dissemination, interoperability and visualization for an initial subset of EOVs:
  - E.g. establishment of common metadata standards, development and adoption of open-source tools, aggregation of datasets, and asset maps with map layers

National web presence

- Core branding of CIOOS, including developing the common look and feel across the national site and Regional Associations.
- Develop the national visualization tools (interactive map on the front page linking EOVs and an asset map).
- Develop an aggregation tool and a metadata catalogue.

Challenges – and opportunities!

- Money
- People
- Technology
- Understanding

Understanding

Challenges:

- Selling the Vision – What is CIOOS?
  - A lot of similar initiatives led to confusion
  - What is the value added?

Solutions:

- Communicate early and often
  - Town Halls, conferences etc.
- Involve those initiatives (e.g. FGP, CHS)
  - Ensure we're building an interoperable system from the start
- Buy in early in value chain
  - Why is it important, what is the benefit to me/society

Money

Challenges:

- Long term sustainability
- Human resources
- Balancing small budget with being able to create a valuable product

Solutions:

- Picked a few key variables that have mature technology and high geographic coverage
- Leverage as much as possible
  - Build on existing efforts, both national and international
  - Open sourced programs
- Demonstrate value added

Technology

Challenges:

- Sharing data
  - Ownership, confidentiality, proprietary, timing
- How to pick starting point
  - EOVs, data type, instrument/platform type
- Source of data
  - Federal, research, NGOs, IK, citizen science, industry

Solutions:

- For Pilot Phase, will only be using fully public data
- Community WS to determine baselines
- Stakeholder engagement plans to reach out to new partners and data providers

People

Challenges:

- Diversity of stakeholders
  - Multiple stakeholders – no one lead
- Vested interests, opinions

Solutions:

- Request for Proposals were designed to make people work together
  - E.g. IEs needed a minimum of two co-leads
  - Builds partnerships
- Inclusive Task Team to bring partners to the table, with regular meetings

Lessons Learnt

3 C's: Communication, Collaboration, and Cash

How have achieved this?

- Build trust !!!!!!
- Work with national and international partners
  - Don't want to reinvent, but build upon what already exists
- Pilot Phase
  - Still lots of opportunity for input
  - Engagement strategies key part of RA work plan
  - Demonstrate value and generate success stories

Next Steps

Immediate:

- Operational meeting end of January
- Develop a Communication Plan
- Create Working Groups to tackle specific technical issues
  - EOVs
  - Metadata harvesting standards
  - Data access protocols
- Identify new stakeholders and partners

Future:

- Regional growth (Arctic, Great Lakes)
- Incorporate additional EOVs, data types and platforms
- Link with international initiatives – US glider, HF radar DAC etc.

Thank-you

Questions

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