Benoît Pirenne, Assoc. Dir., NEPTUNE Canada

NEPTUNE Canada's Oceans 2.0

What are VENUS and NEPTUNE?

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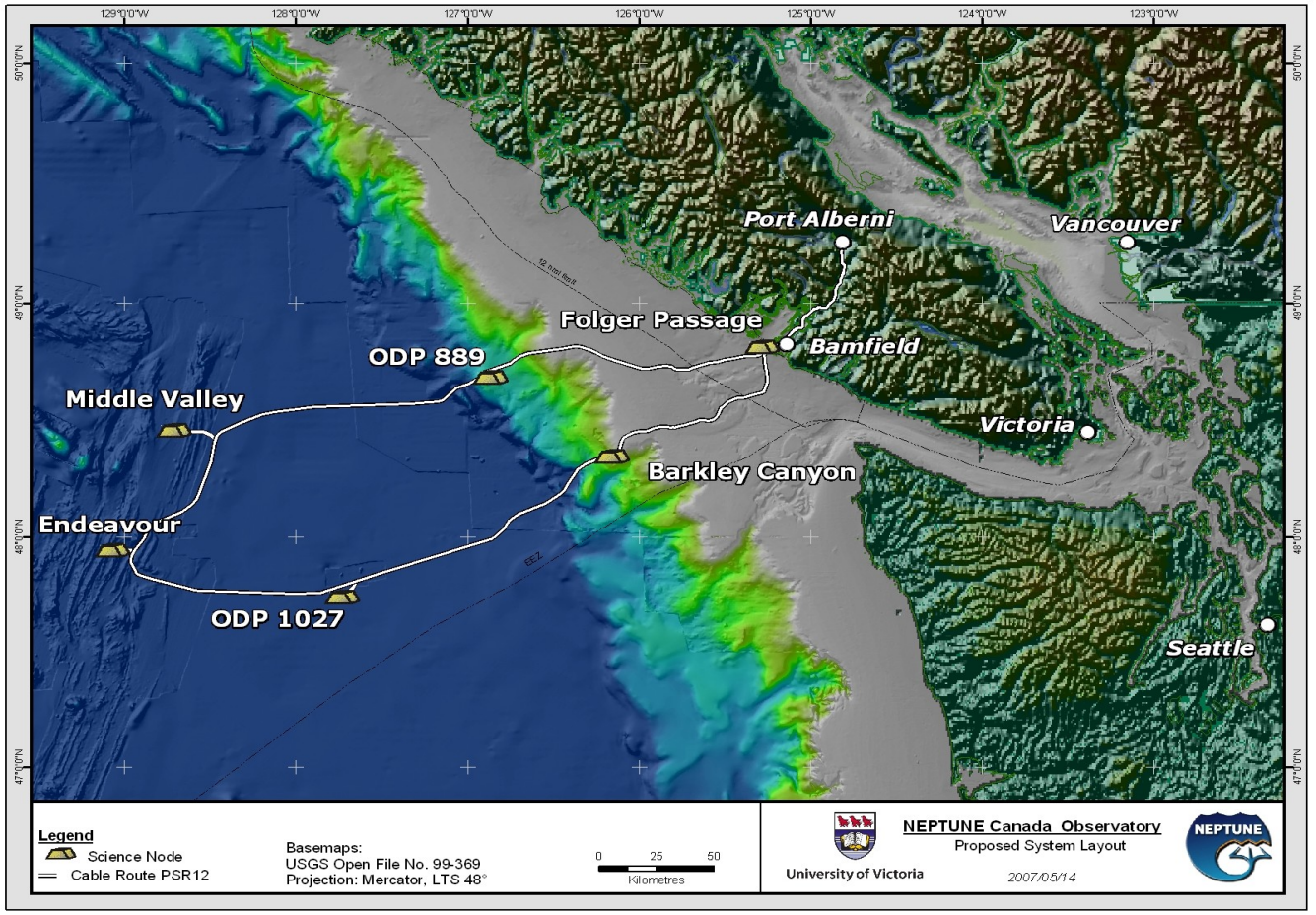
- **NEPTUNE Canada (and VENUS) are Ocean Observatory on the country's West Coast**



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What are VENUS and NEPTUNE?

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- **VENUS:**
  - 3 km + 40 km, 3 nodes, ~20 instruments (~100 sensors) in Saanich Inlet and Strait of Georgia
  - Two shore station, data centre at UVic
  - ~$10M infrastructure (on-line since Feb. 2006)
- **NEPTUNE Canada:**
  - 800km cable loop, 5 nodes, ~120 instruments (~600 sensors) off Vancouver Island.
  - One shore station, CANARIE backhaul @ 10Gbps, data centre at UVic
  - ~$100M infrastructure (on-line summer 2009)

What are VENUS and NEPTUNE?

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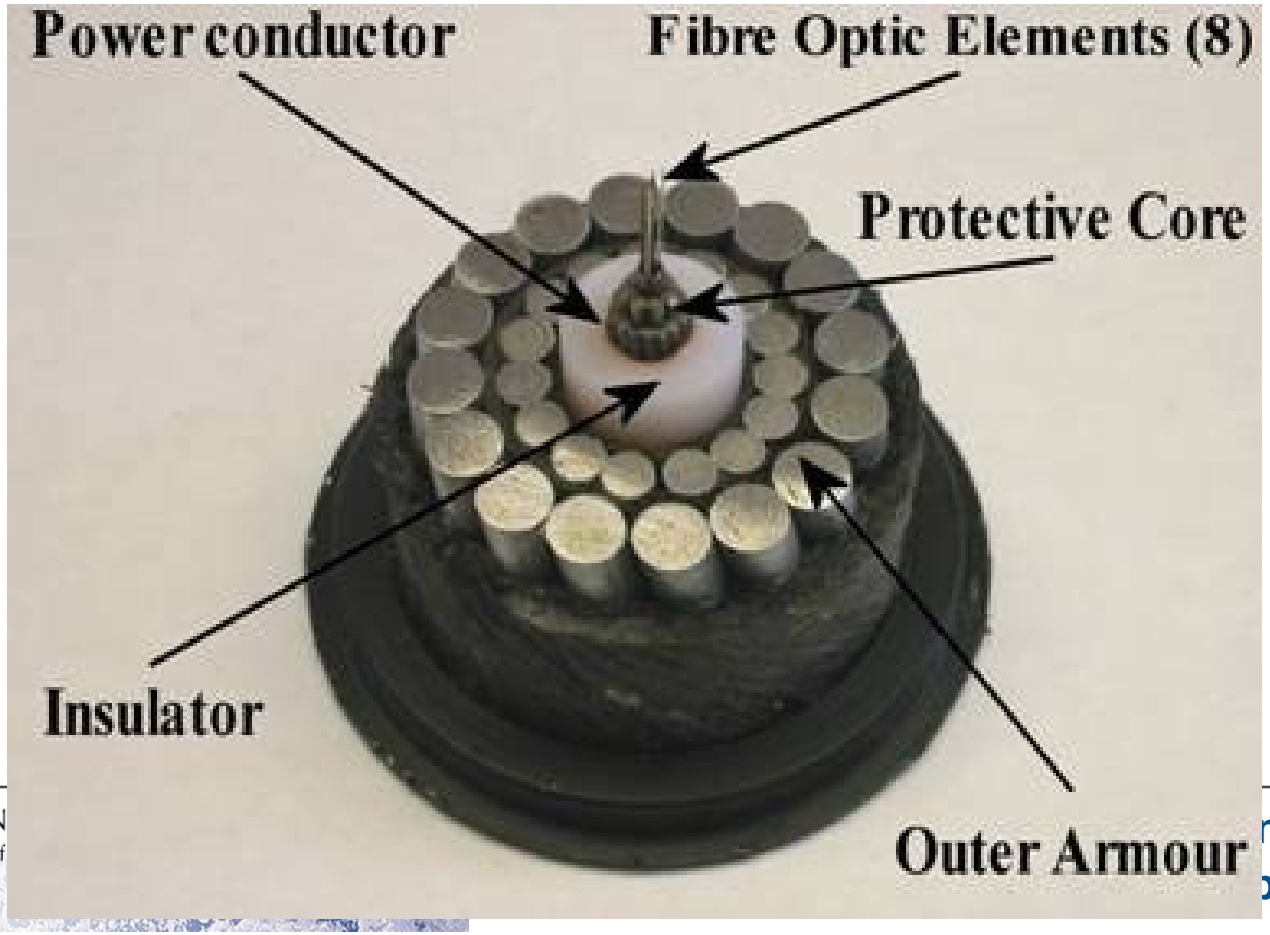
- **Use undersea telecom cable to provide power and communication media to the seabed**



What are VENUS and NEPTUNE?

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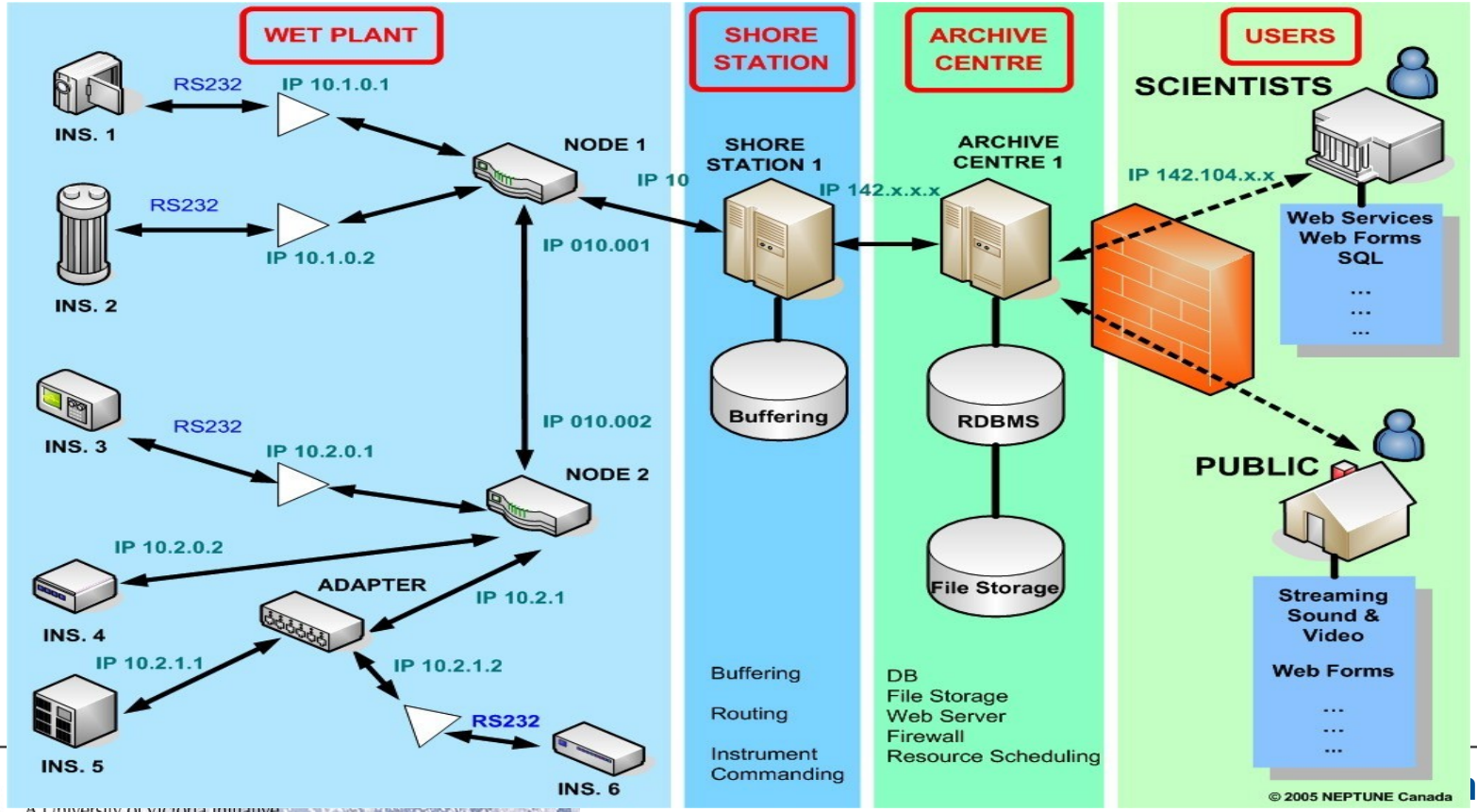
- **Represent the extension of the Internet under the Ocean**



Data Management & Archiving System (DMAS)

Benoît Pirenne, Assoc. Dir., NEPTUNE Canada

- **Provide data acquisition, interactive access to instruments, data archival, real-time data subscription and event detection/reaction capabilities**

A short history of DMAS

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- Started in '04 with feasibility studies and small prototype (C, Sybase RDMS, Solaris OS)
- In 2005-06, Interim system to support early VENUS deployment based on prototype
- In 2006 CANARIE CIIP support allowed for a dramatic shift in technology and architecture (-> SOA, Java, ESB). Focus on data acquisition framework.
- In 2007-08 Support of VENUS expansion with support for new instruments.
- In 2007: applied for CANARIE NEP with project “Oceans 2.0” to tackle our “last frontier”...

DMAS' current approach to data access

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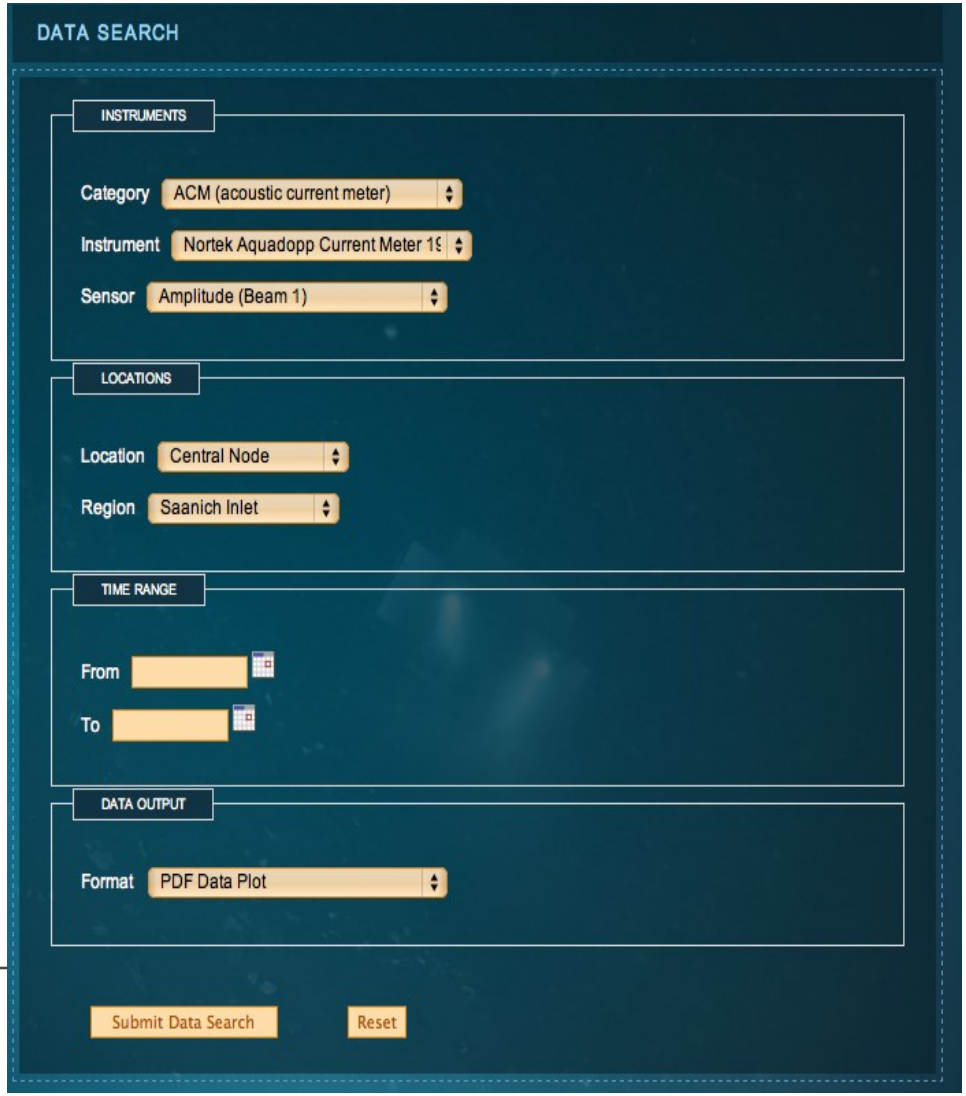
- **Current Approach is Web 1.0:**
  - Query forms, data search and download, static pages.
  - http://www.neptunecanada.ca/data-collaboration/search/



Why Oceans 2.0?

Benoît Pirenne, Assoc. Dir., NEPTUNE Canada

- ***Nature*, Sep. 3, 2008:**
  - "Researchers need to adapt their institutions and practices in response to *torrents of new data* — and need to complement smart science with *smart searching*."
  - "Taking full advantage of electronic data will require a great deal of additional infrastructure, both technical and *cultural*"
  - "All credit, then, to those in the vanguard of *interoperability*"

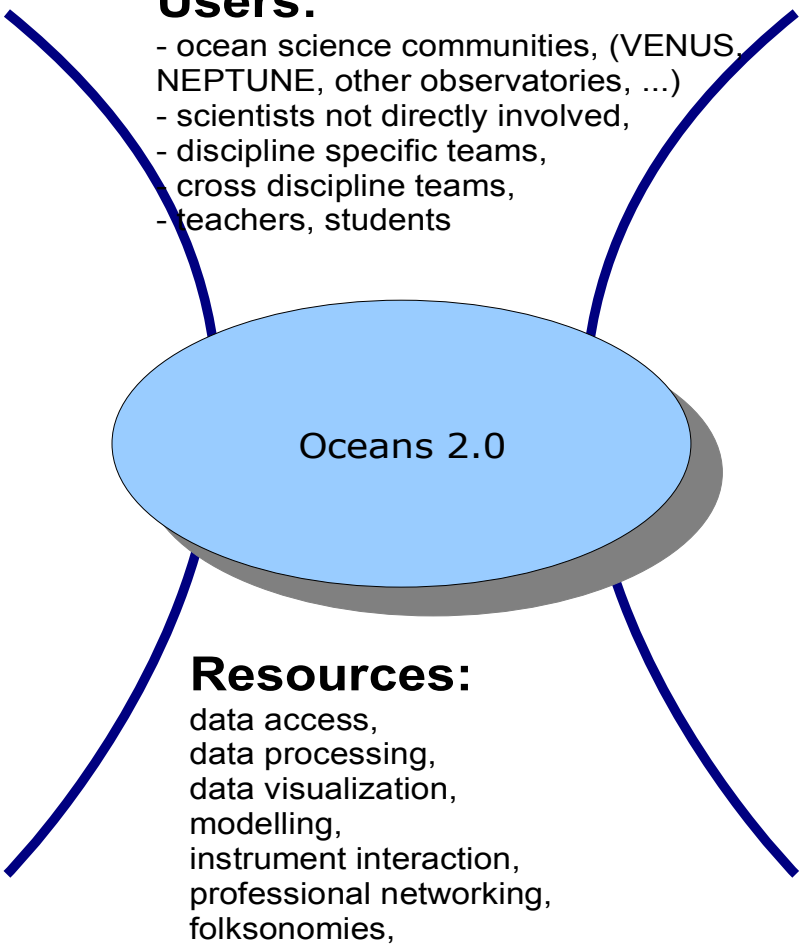
Why Oceans 2.0?

Benoît Pirenne, Assoc. Dir., NEPTUNE Canada

- **Observatories represent the convergence of data and users**
  - Sensor data, Instruments <--> users interactions

Virtual Organization

Virtual Observatory



Why Oceans 2.0?

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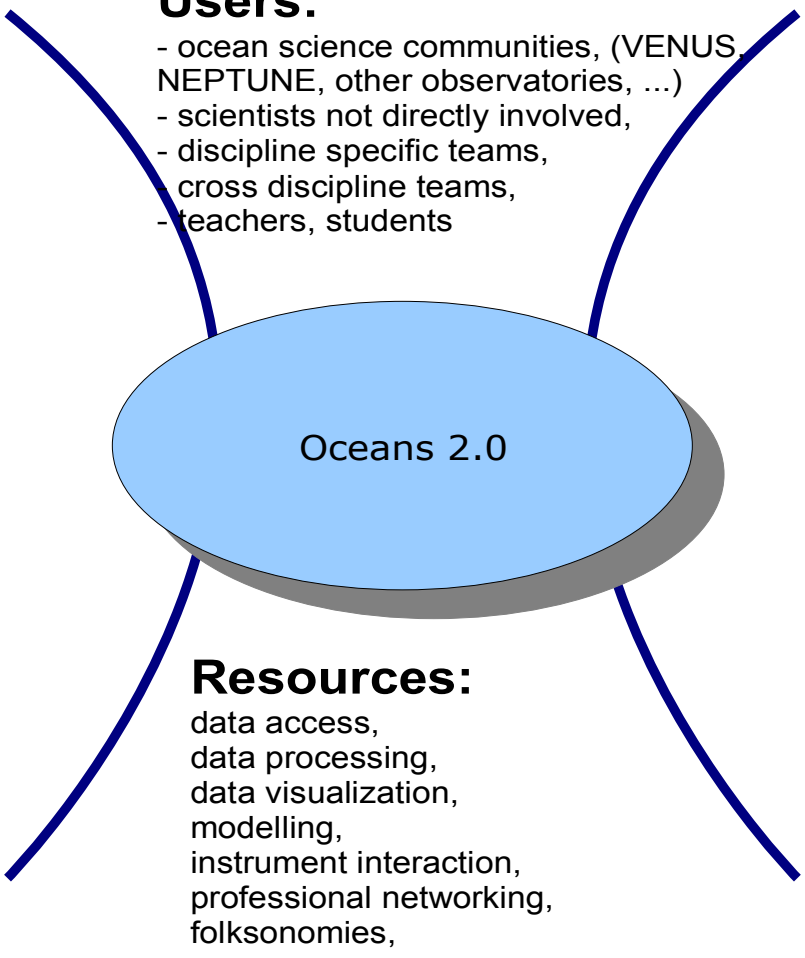
- **Observatories are Network platforms:**
  - Sensor networks <--> user networks
  - Allow exchange of data, information, knowledge

Virtual Organization

Virtual Observatory



Cultural Shift

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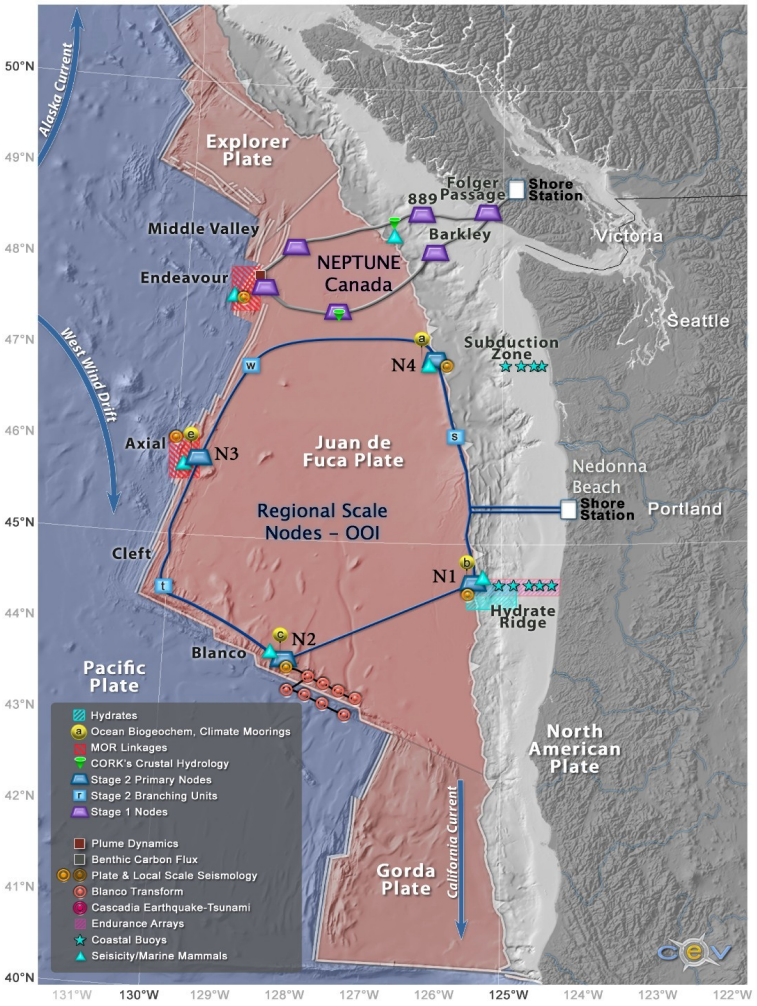
- **Science Community on Board**
  - NEPTUNE and VENUS, CHONe science communities engaged
- **Users realize they are mostly unprepared to deal with large data volumes, in particular *continuously streaming data***
- **Need to allow for *teams with diverse expertise to assemble and work* on a given problem**
- **Need to provide easy access to a growing number of data resources transparently (*interoperability*)**

NEP project: three aspects

Benoît Pirenne, Assoc. Dir., NEPTUNE Canada

- **Interoperability**
  - with the US' OOI regional scale observatory
  - with other data centres having data of relevance to offer to our users
  - with other data providers who would have users interested in our data



Current Conceptual Network Designs for the US-lead OOI RSN and NEPTUNE Canada.

- **Underwater HDTV Camera hard- and middleware**
  - With McGill, develop middleware to interface underwater cameras
  - Integrate efficient, low-latency HD video compression technology
  - Integrate web-based interactive user interface
  - Web-based interaction with other devices

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NEP project: three aspects

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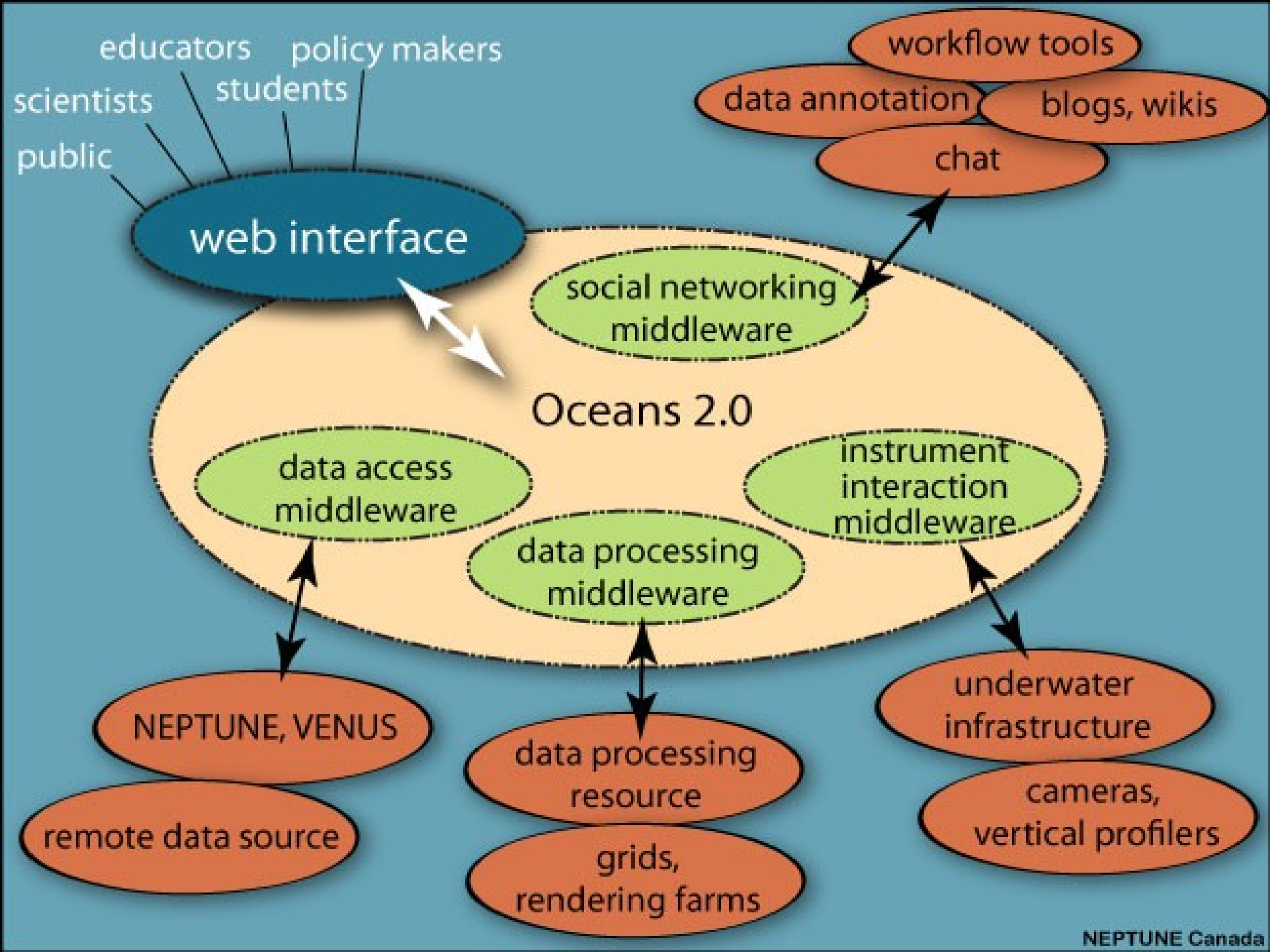
- **A Web 2.0 Environment where users will:**
  - form and disband **groups**
  - **work as a team** on science/education questions, with local and remote data and models, **using social networking tools**
  - search, **process and visualize** data **on-line**
  - **publish** and **share** data processing recipes, data annotations
- **Oceans 2.0 will introduce an architecture of participation to Ocean sciences, education and the public at large**


educators
policy makers
students
scientists
public
web interface
workflow tools
data annotation
blogs, wikis
chat
social networking middleware
Oceans 2.0
data access middleware
instrument interaction middleware
data processing middleware
NEPTUNE, VENUS
remote data source
data processing resource
grids, rendering farms
underwater infrastructure
cameras, vertical profilers
NEPTUNE Canada

Conclusion

Benoît Pirenne, Assoc. Dir., NEPTUNE Canada

- Ocean science is being **revolutionized** by a new generation of data providers (the ocean observatories)
- The science community realizes the incoming **data firehose** and is ready to welcome **new ways to deal with it**.
- We believe Web 2.0 technologies will positively contribute to the **acceleration of the scientific process**