Rodolphe Devillers

Who am I? / Qu'est-ce que je mange en hiver?

Department of Geography
Memorial University of Newfoundland

Réseau Convergence "Who's who"

MEMORIAL UNIVERSITY

Based in Newfoundland / Chez les newfies

MEMORIAL UNIVERSITY

St. John's, NL

Academic background

- BSc in Earth Sciences (U. Lyon 1, France)
- MSc in Earth Sciences (University of Quebec in Montreal)
- MSc in Geomatics (U. Laval) - 2001
- PhD in Geomatics (U. Laval) - 2004
- Post-doc at the Centre for Topographic Information of Sherbrooke (NRCan) - 2005

Multidisciplinary research/lab

Geography (MUN)
- GISciences/ Spatial Analysis
- Geovisualization

Biology (Laval)
- Marine ecology
- Fisheries
- Conservation Biology

Geomatics (Laval)
- GIS/Engineering
- Hydrography

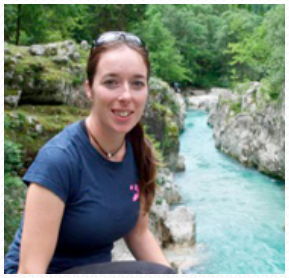
Marine Geomatics Lab

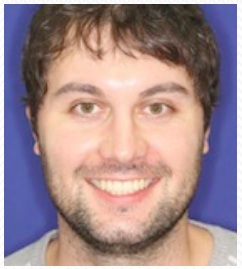
Computer Science (MUN)
- Information Visualization
- Artificial Intelligence

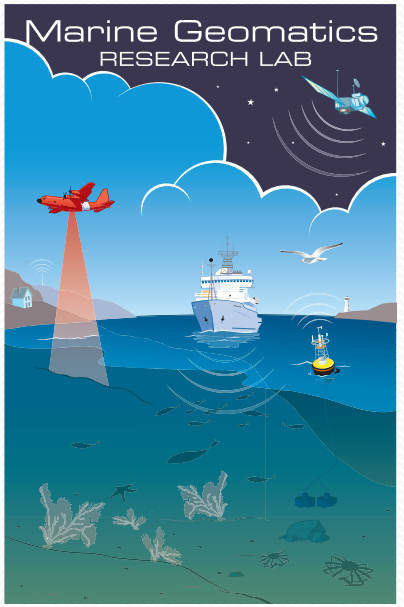
Geology (MUN)
- Marine geology
- Marine acoustics

Engineering
- Ocean technologies

Marine Geomatics Lab

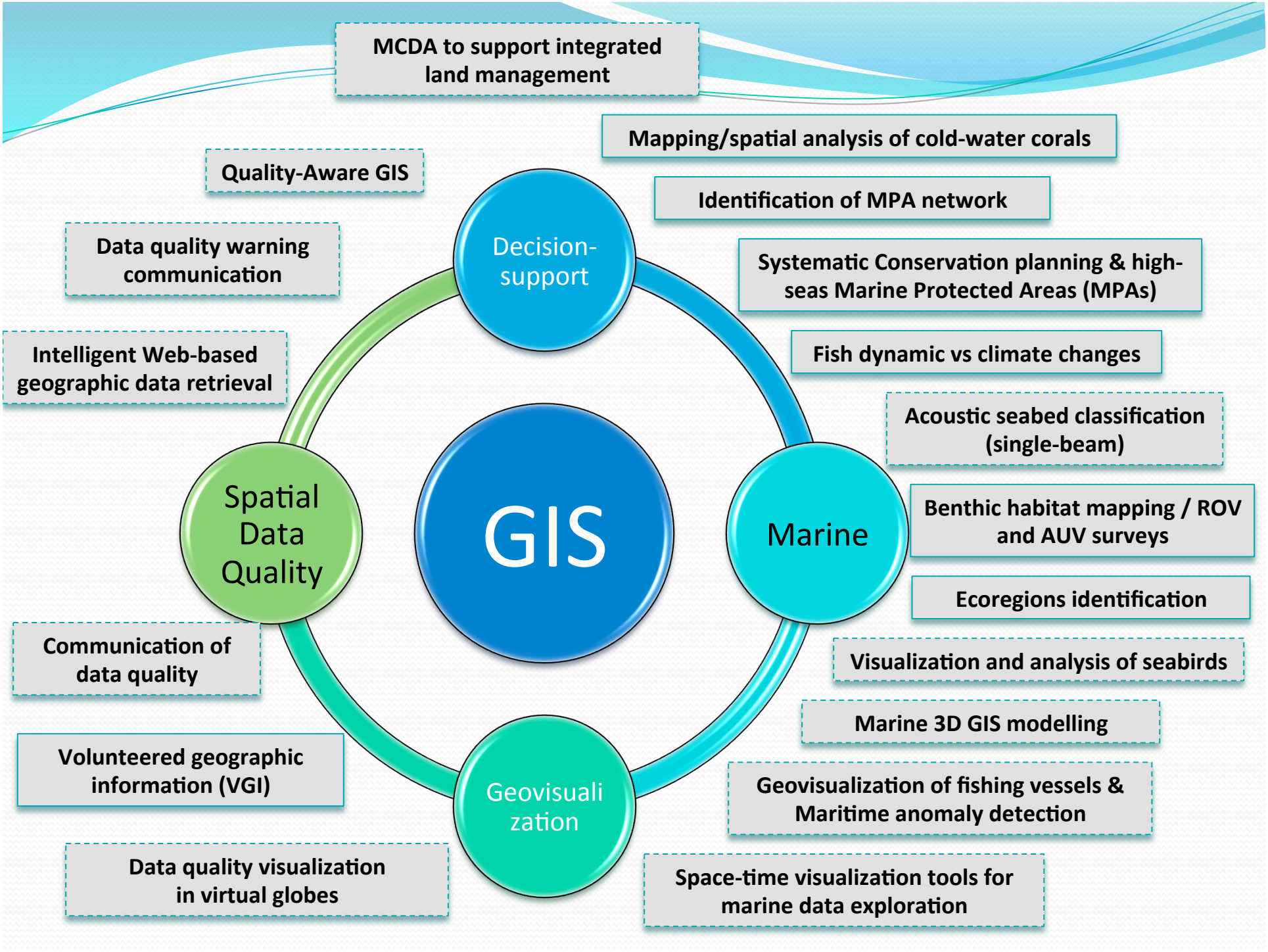


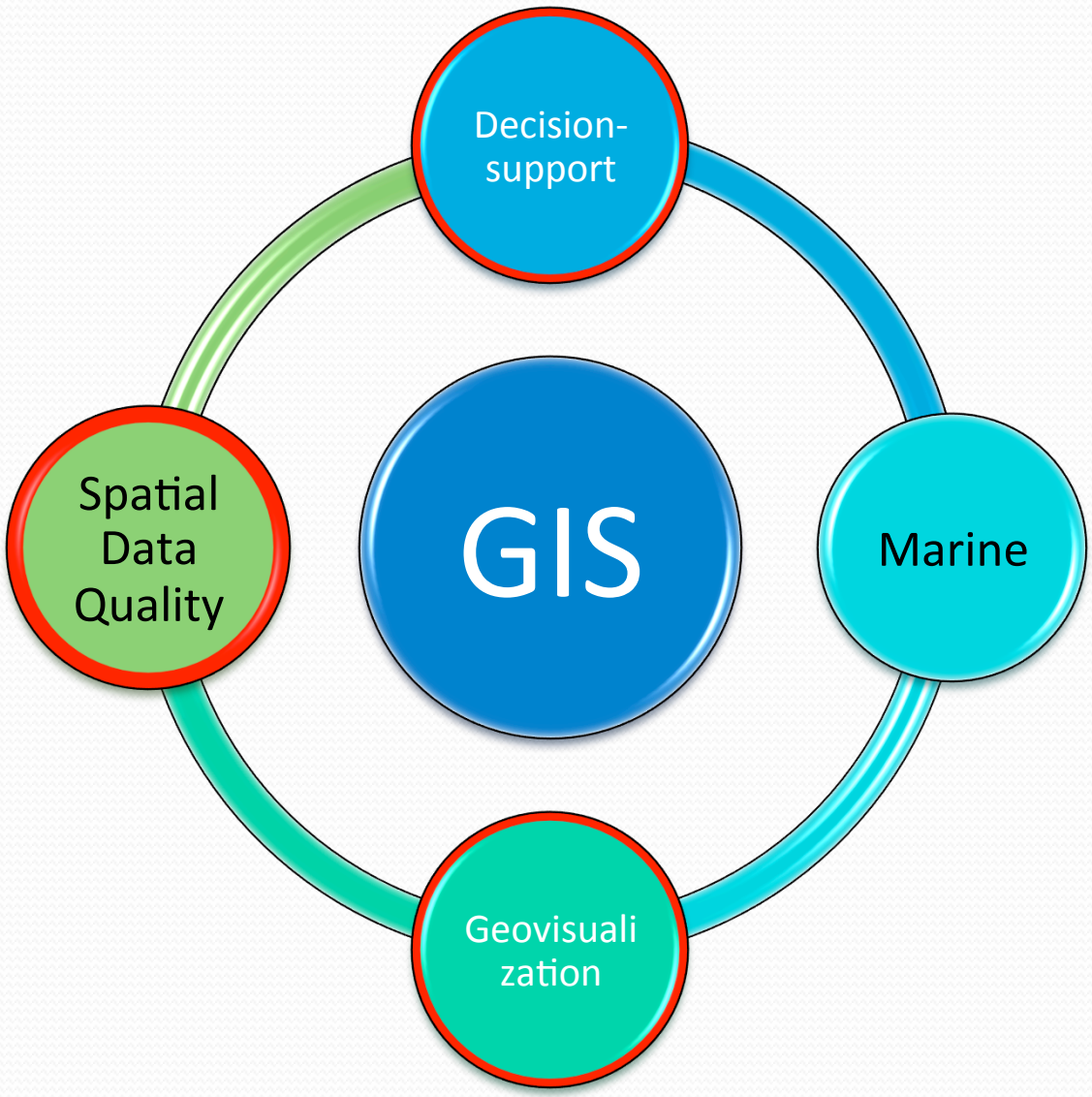




http://www.marinegis.com

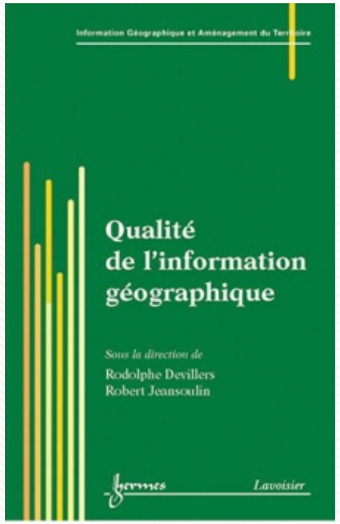
- Members:
  - 1 post-doc
  - 1 research professional
  - 7 PhD students
  - 6 MSc students

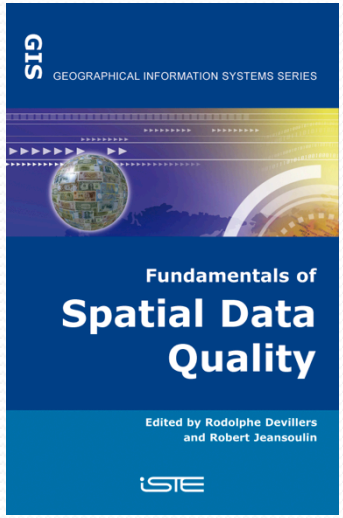

MCDA to support integrated land management
Mapping/spatial analysis of cold-water corals
Quality-Aware GIS
Identification of MPA network
Data quality warning communication
Decision-support
Systematic Conservation planning & high-seas Marine Protected Areas (MPAs)
Fish dynamic vs climate changes
Intelligent Web-based geographic data retrieval
Acoustic seabed classification (single-beam)
Spatial Data Quality
GIS
Marine
Benthic habitat mapping / ROV and AUV surveys
Ecoregions identification
Communication of data quality
Visualization and analysis of seabirds
Marine 3D GIS modelling
Volunteered geographic information (VGI)
Geovisualization
Geovisualization of fishing vessels & Maritime anomaly detection
Data quality visualization in virtual globes
Space-time visualization tools for marine data exploration

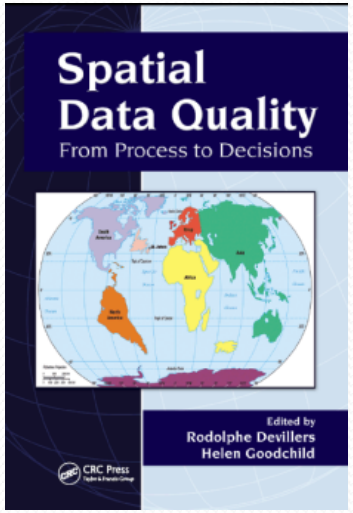

Decision-support
Spatial Data Quality
GIS
Marine
Geovisualization

Spatial data quality

- Visualization/Communication of spatial data quality information
- Management of quality information, standards, metadata







- Documenting the quality from the data collection

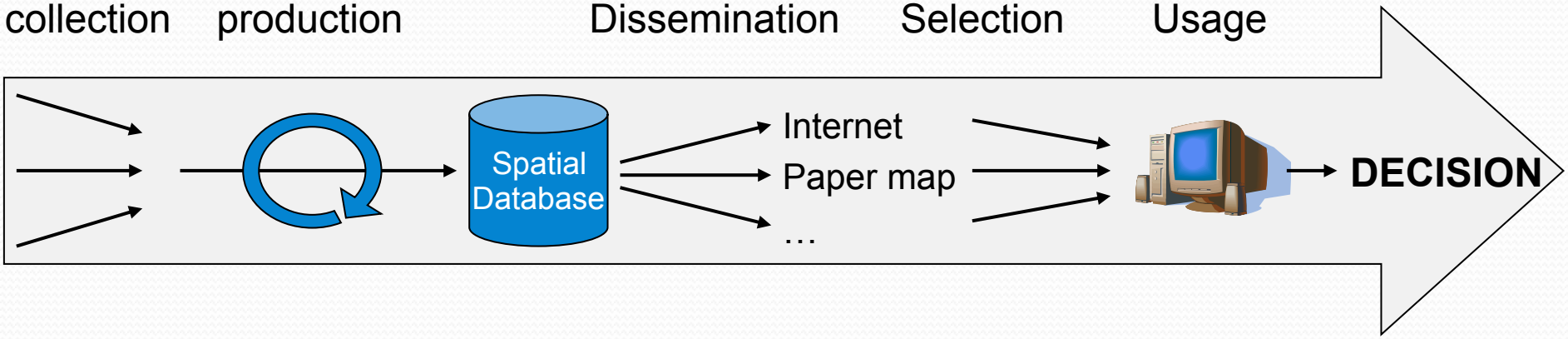
- Quality control/assurance
- Quality measurement
- Documenting data quality

- Communicating data quality (metadata and others)

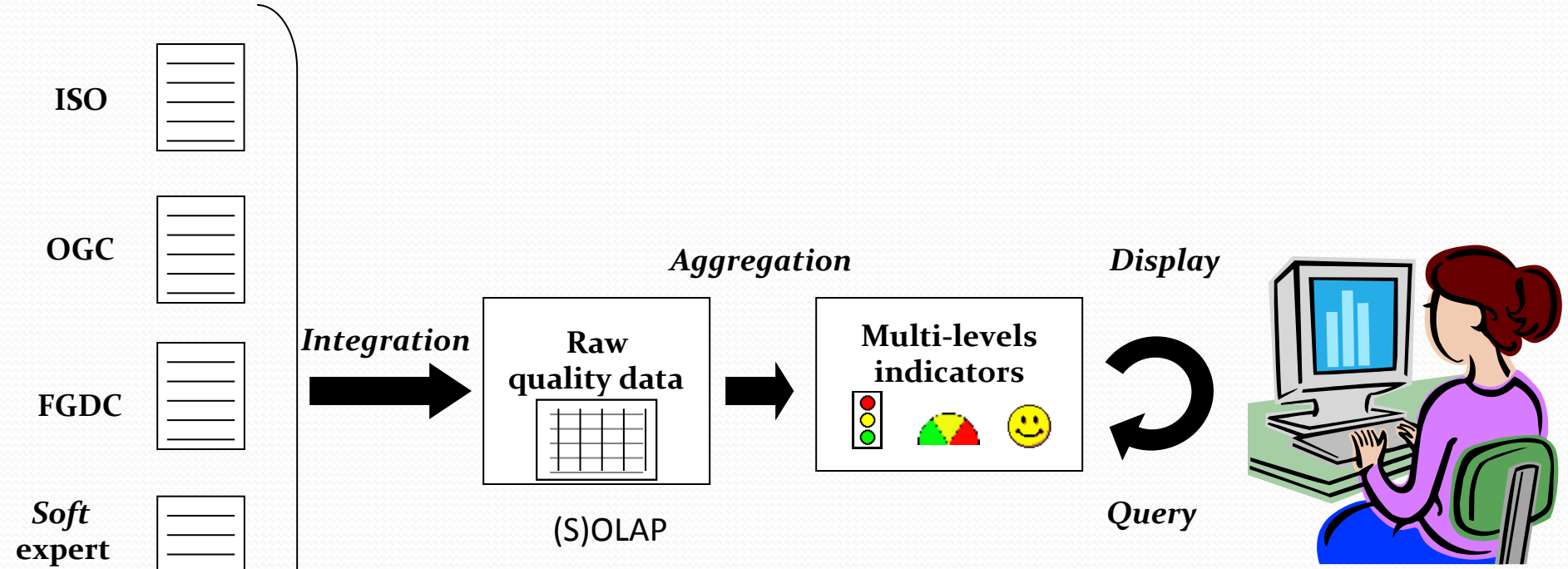
- Help users select data

- Quality-aware GIS
- Warnings users
- Legal aspects (liability, etc.)

Data collection | Data production | Data Dissemination | Data Selection | Data Usage

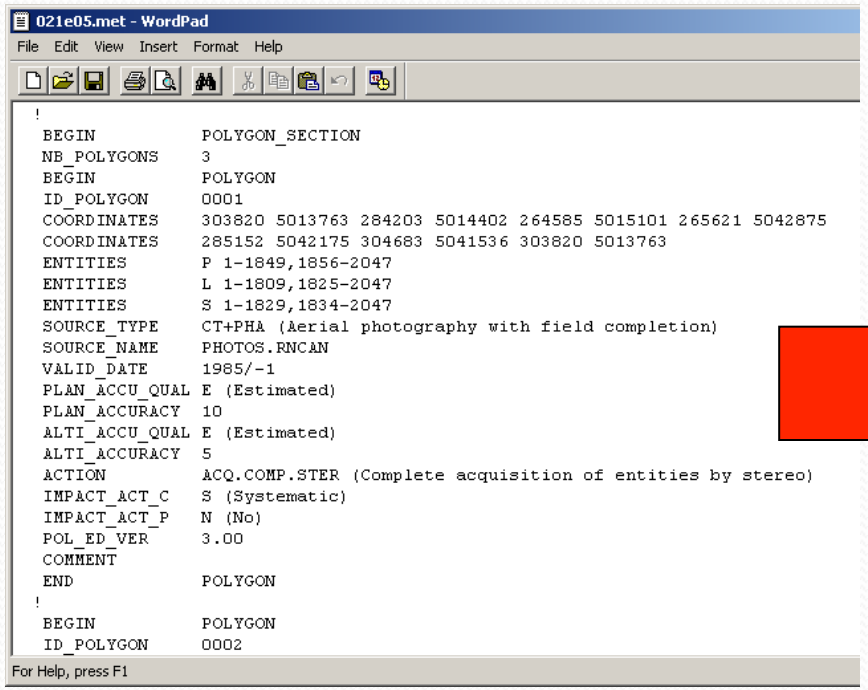


Better communication of SDQ

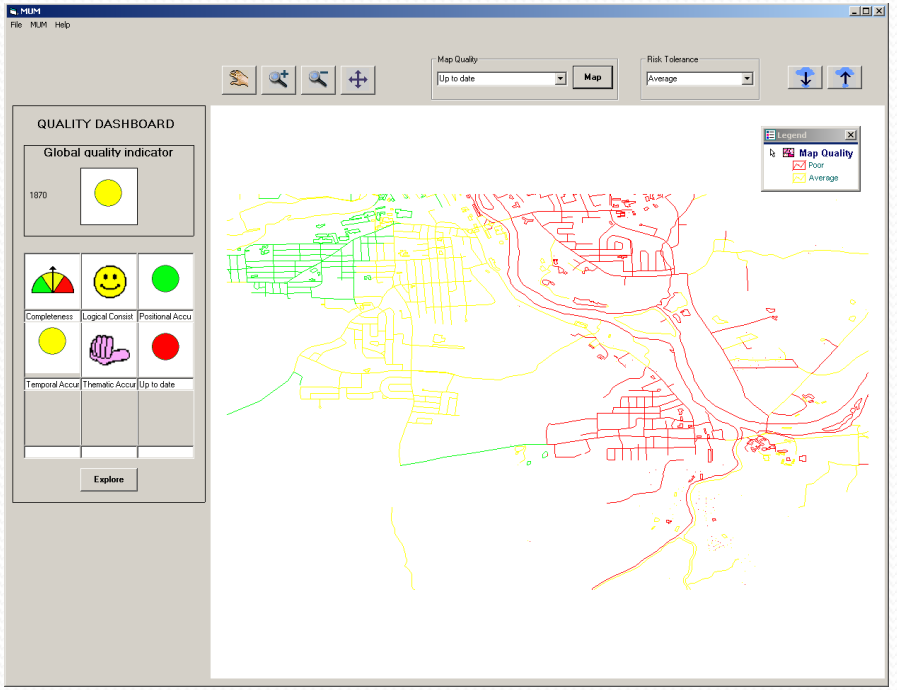


Back to the PhD…

Better communication of SDQ



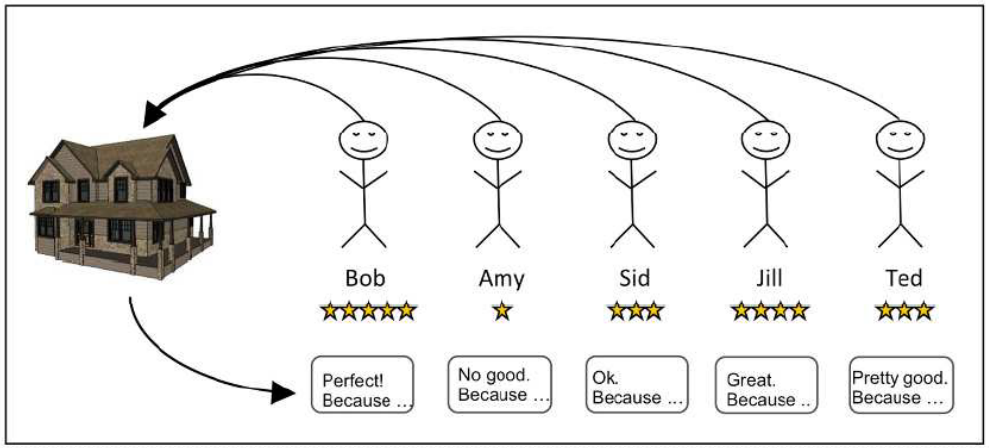
Metadata

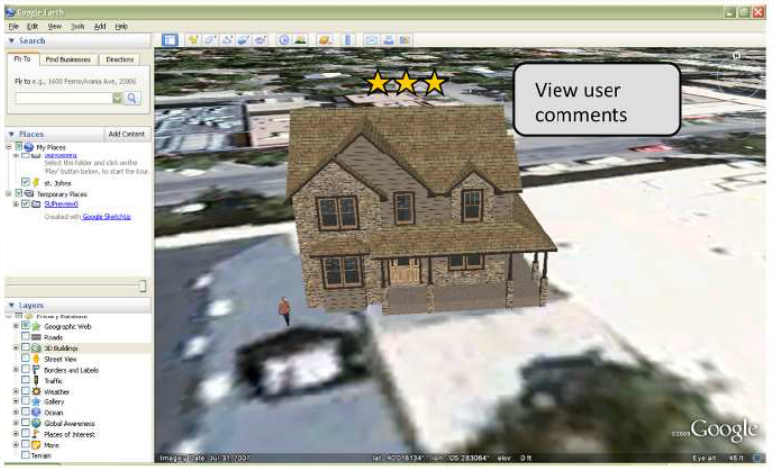


Spatial Data Quality Information System

Quality visualization in Virtual Globes

- Recommender system for 3D objects based on five-star visualization





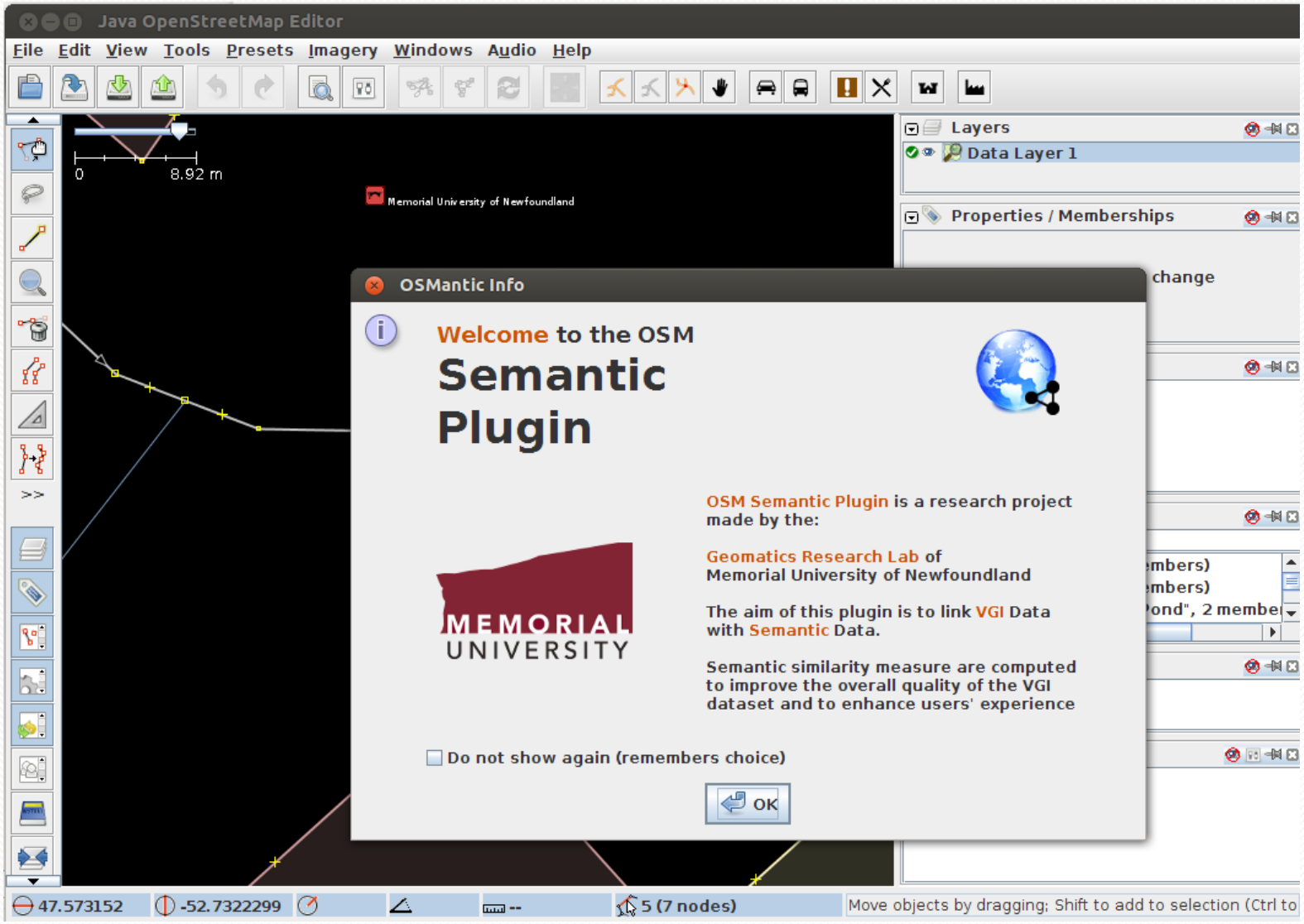
- Jones, K., Devillers, R., Bédard, Y. and Schroth, O. 2013. **Visualizing perceived spatial data quality of 3D objects within virtual globes**. *International Journal of Digital Earth*.

Quality of Volunteered Geographic Information (VGI)

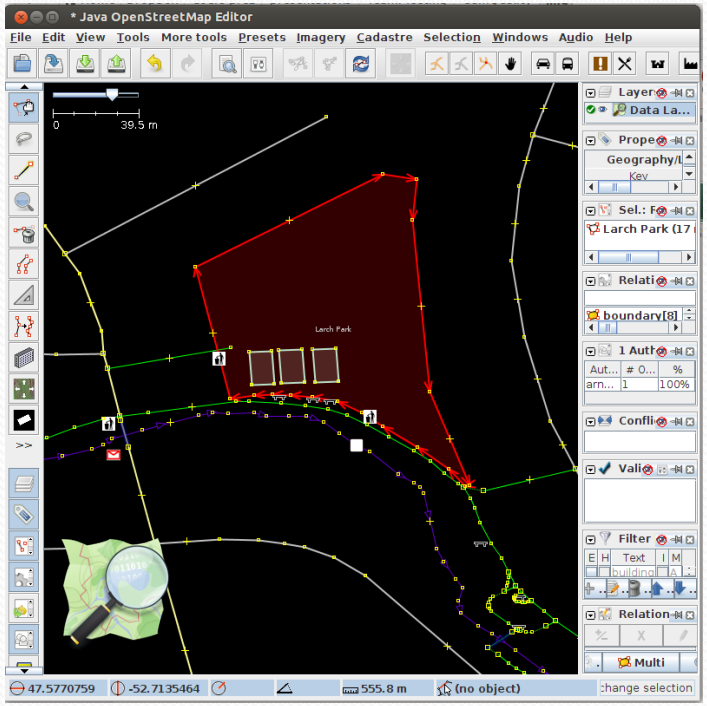
- Contributors reliability
- Integration of authoritative and VGI data
- Quality of semantics

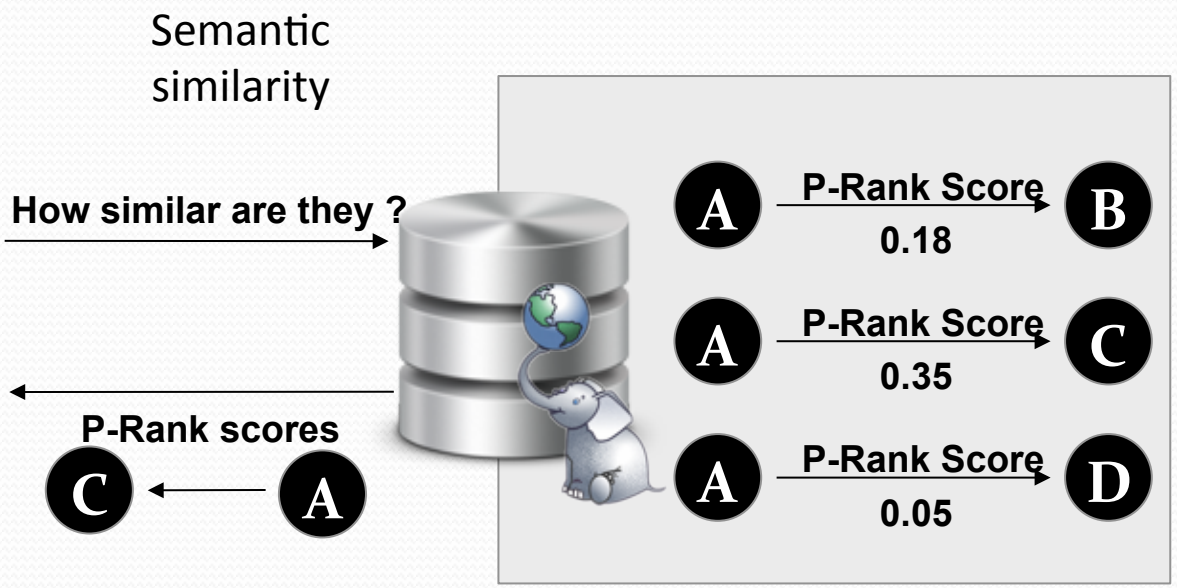
- Co-organized a **workshop on VGI and quality** at the 2012 GISciences conference (USA) with Budhu Bhaduri, Michael Goodchild and Muki Haklay
- Bégin, D., Devillers, R. and Roche, S. 2013. **Assessing volunteered geographic information (VGI) quality based on contributors' mapping behaviours**. *Proceedings of the 8th International Symposium on Spatial Data Quality (ISSDQ)*, Hong Kong, May 30-June 1.
- Martinez Ramos, R., Vandecasteele, A. and R., Devillers, R. 2013. **Semantic integration of authoritative and volunteered geographic information (VGI) using ontologies**. *Proceedings of the 16th AGILE conference on Geographic Information Science*, Leuven. Belgium, May 14-17th.

OSMantic Plugin – improving VGI semantic



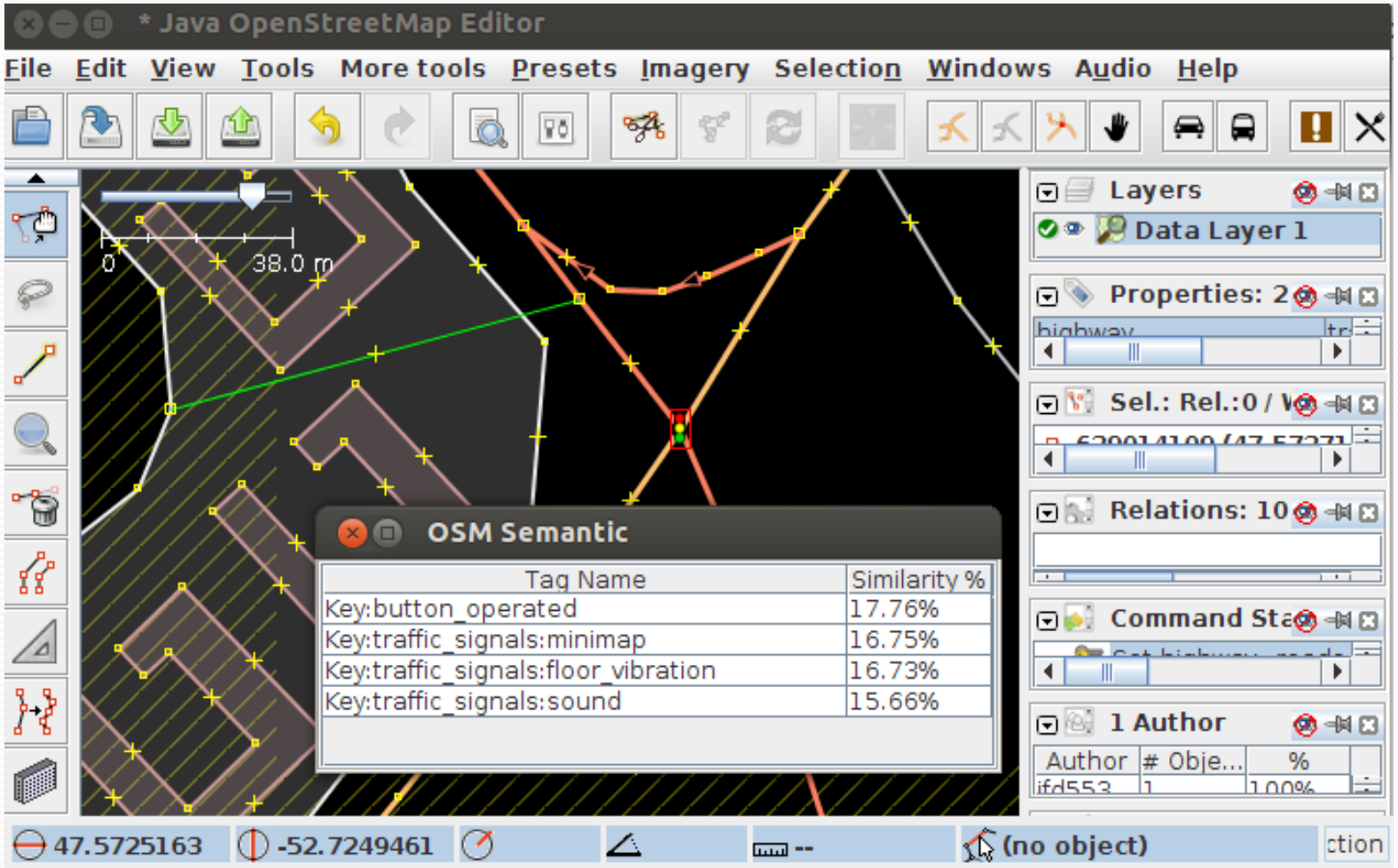
OSMantic Plugin





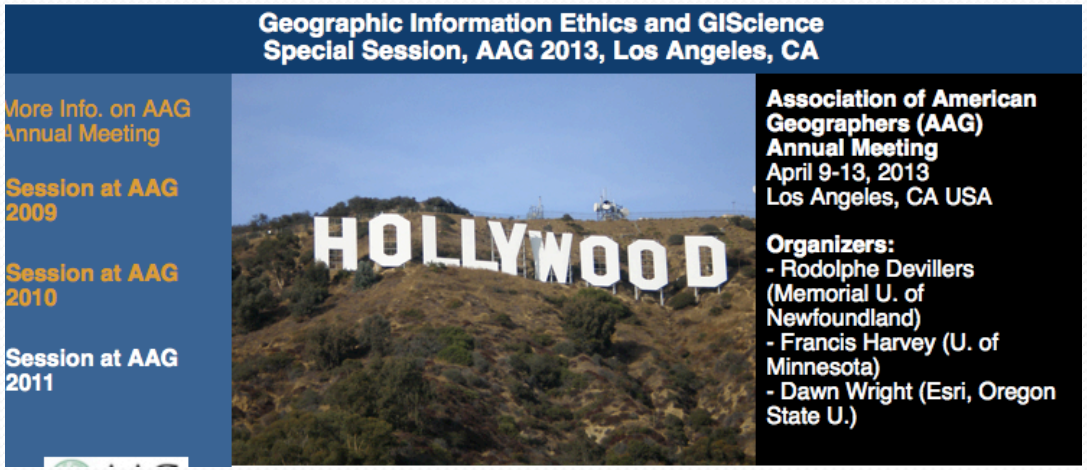
- Vandecasteele, A. and Devillers, R. 2013. **Improving volunteered geographic data quality using semantic similarity measurements**. *Proceedings of the 8th International Symposium on Spatial Data Quality (ISSDQ)*, Hong Kong, May 30-June 1.

OSMantic Plugin

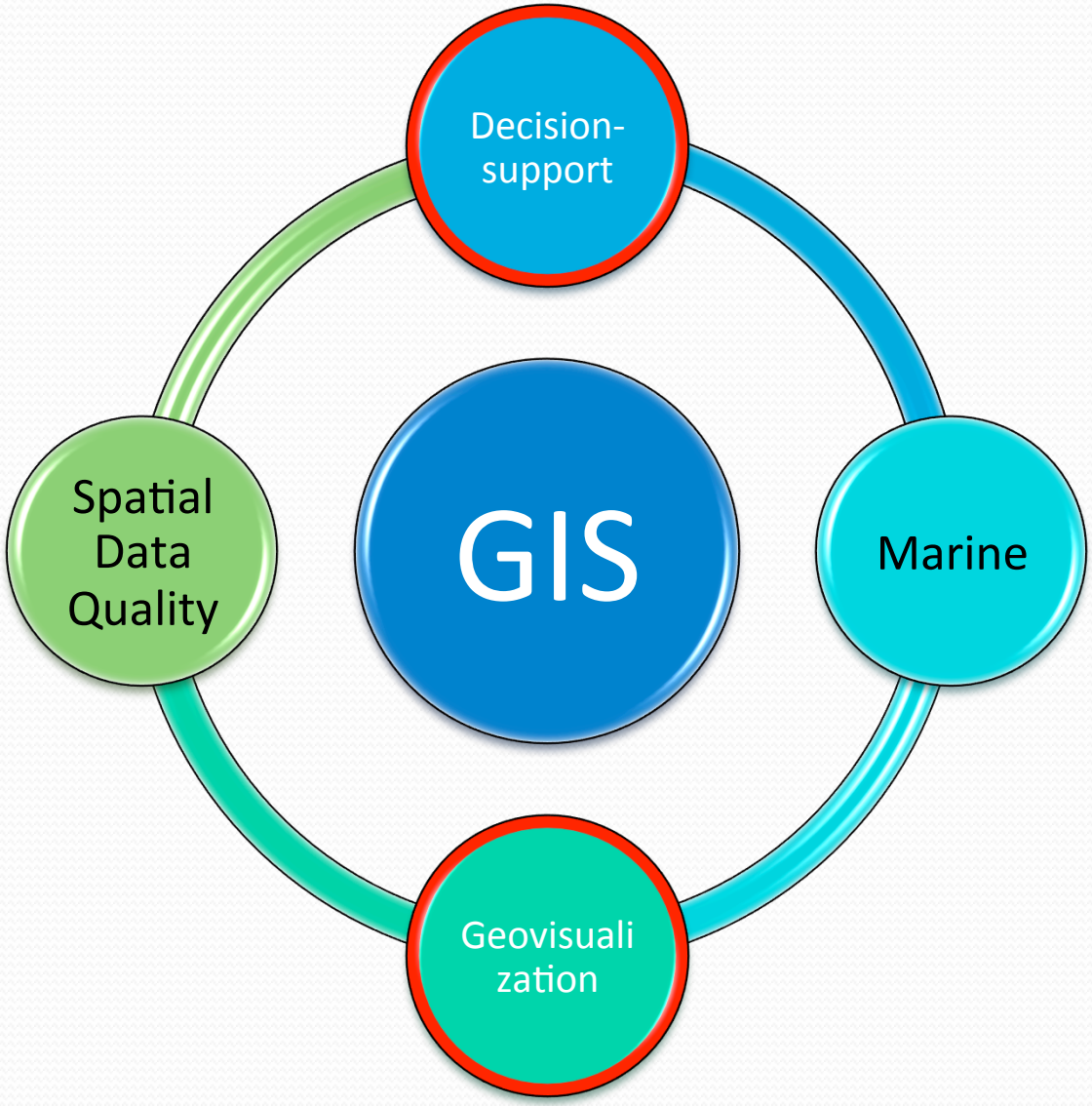


Spatial data quality vs professional ethics

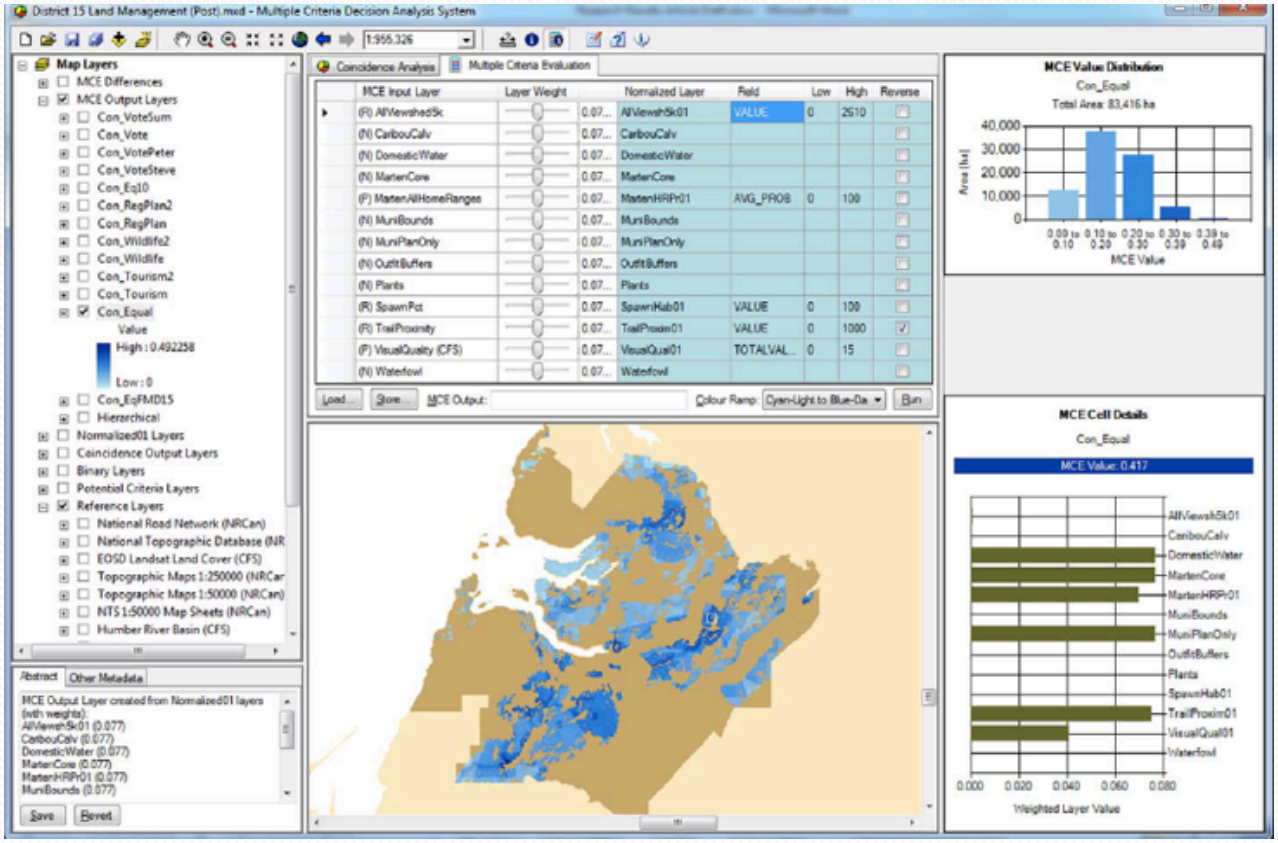
- Responsibilities of GIS professionals
- Ethical dissemination of geospatial data



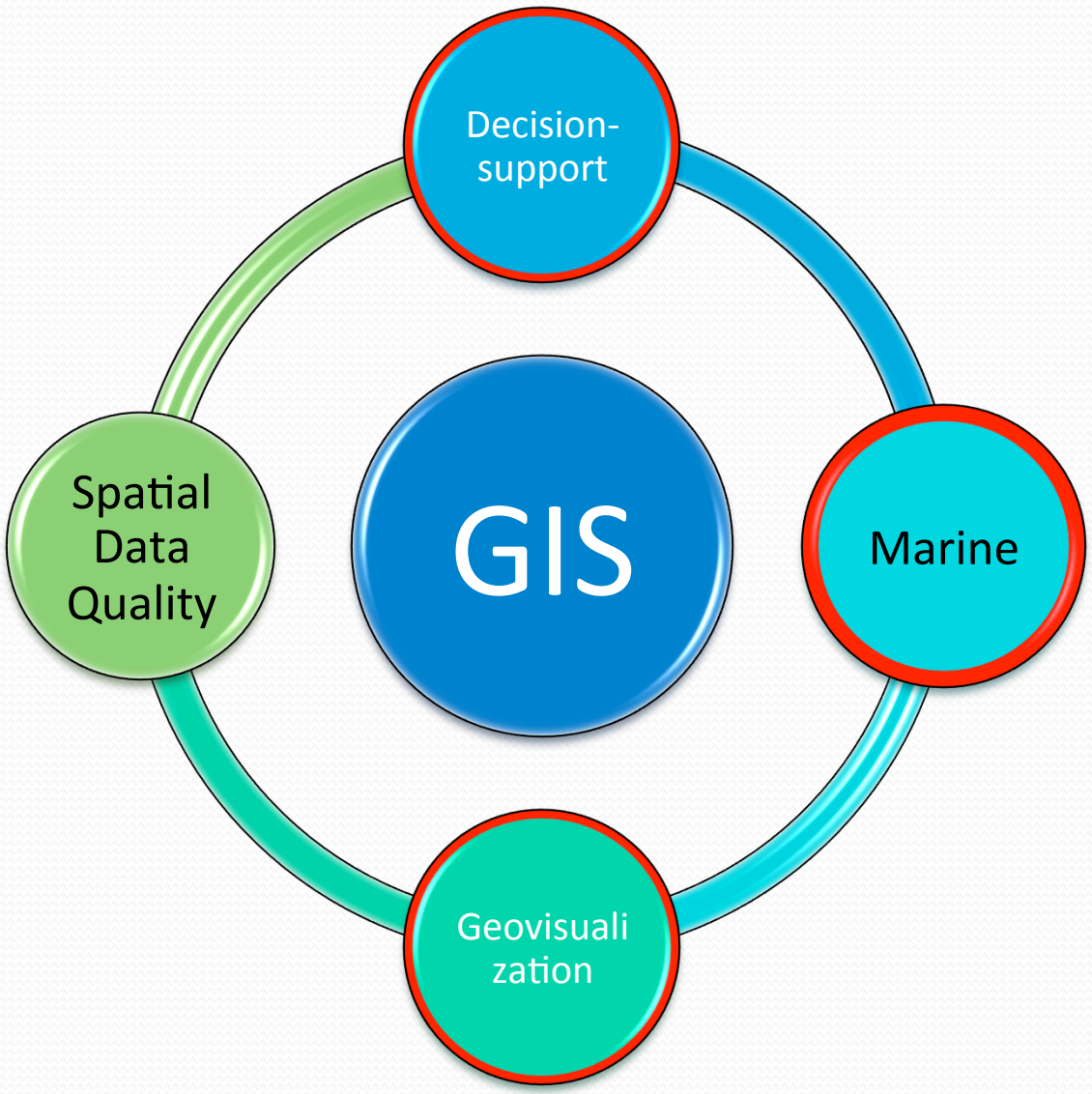
- Devillers, R., Gervais, M., Bédard, Y., Chandler, J., Coleman, D., Judge, E., Pouliot, J. and Scassa, T. 2012. **Sharing data is good, but are we concerned enough about public protection and ethical data dissemination?** *Proceedings of the GSDI 13 World Conference*, May 2012, Quebec City, Canada.
- Devillers, R., Gervais, M., Bédard, Y., Chandler, J., Coleman, D., Judge, E., Pouliot, J. and Scassa, T. 2012. **Responsible data sharing**. *SDI Magazine*, March 2012.
- Devillers, R. and Bédard, Y. 2010. **Responsible use of geospatial data - Have you thought recently of your responsibility for the consequences of your actions**? *GEOconnexions International Magazine*, June 2010, 30-32.
- Bédard, Y., Chandler, J., Devillers, R. and Gervais, M. 2009. **Professional Ethics, System Design Methods and Geospatial Data Quality**. *Geographic Information Ethics and GISciences Workshop. American Association of Geographers (AAG) annual meeting*, Las Vegas, USA, March 24th.


Decision-support
Spatial Data Quality
GIS
Marine
Geovisualization

Combining geovisualization and multi-criteria decision analysis

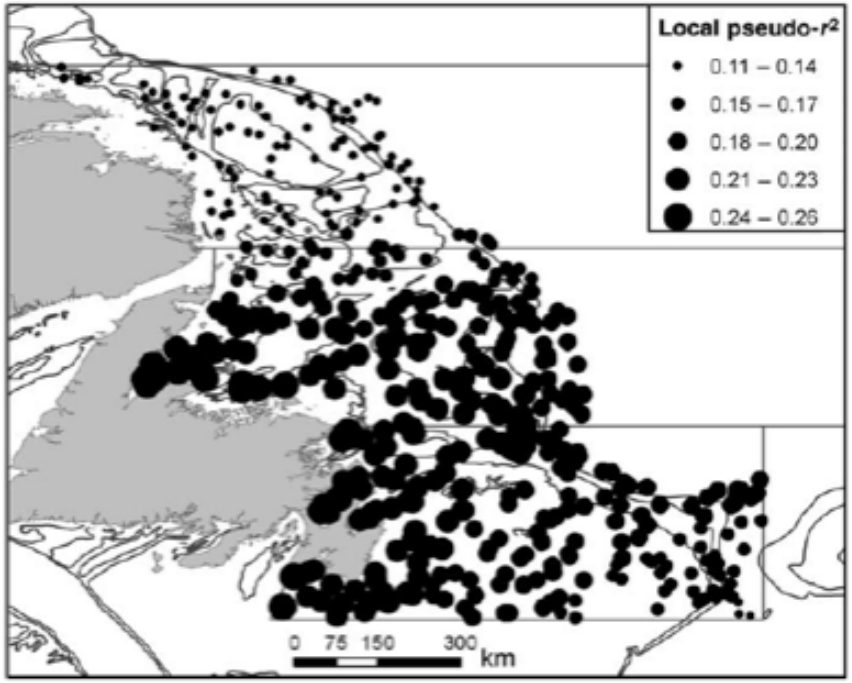


- Greene, R., , Devillers, R., Luther, J. and Eddy, B. 2011. **GIS-based multiple-criteria decision analysis**. *Geography Compass* 5/6: 412-432.
- Greene, R., Luther, J., Devillers, R. and Eddy, B. 2010. **An approach to GIS-based multiple criteria decision analysis that integrates exploration and evaluation phases: Case study in a forest-dominated landscape**. *Forest Ecology and Management*, 260: 2102-2114.


Decision-support
Spatial Data Quality
GIS
Marine
Geovisualization

Exploring new methods to study marine environments

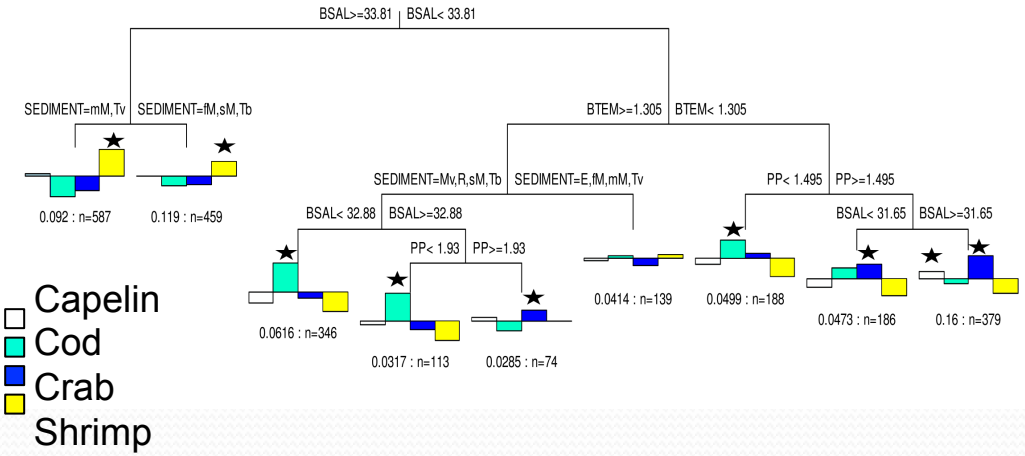
- Analysis of fisheries data in Eastern Canada vs environmental parameters using **Geographically Weighted Regressions (GWR)**

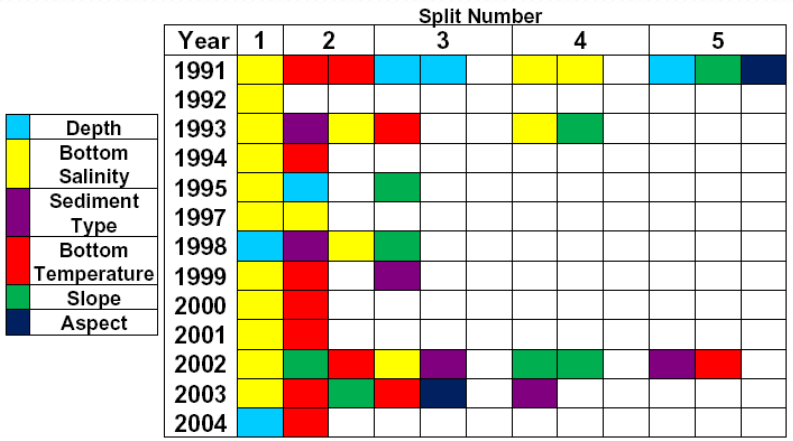


- Windle, M., Rose, G., Devillers, R. and Fortin, M.-J. 2012. **Spatio-temporal variations of invertebrate-cod-temperature relationships on the Newfoundland Shelf**, 1995-2009. *Marine Ecology Progress Series.* 469: 263-278.
- Windle, M., Rose, G., Devillers, R. and Fortin, M.-J. 2010. **Exploring spatial non-stationarity of fisheries survey data using geographically weighted regression (GWR): an example from the Northwest Atlantic**. *ICES Journal of Marine Science*, 67(1): 145-154.

Exploring new methods to study marine data

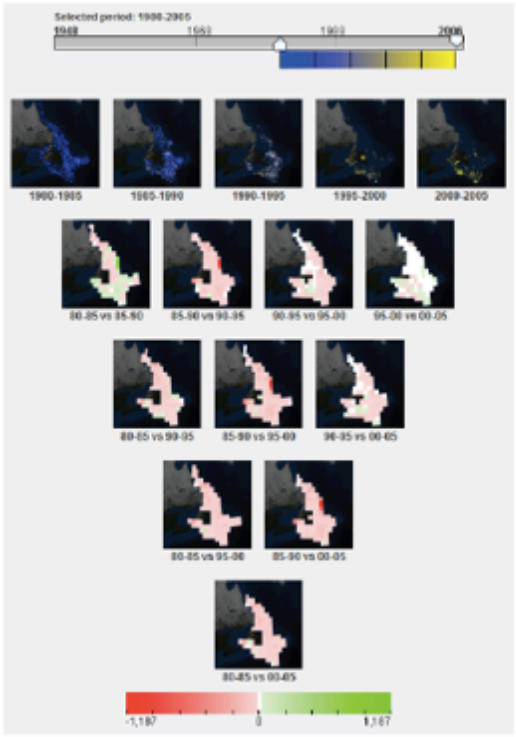
- Analysis of fish communities in Eastern Canada vs environmental parameters using **data mining** (Classification And Regression Trees – CART)

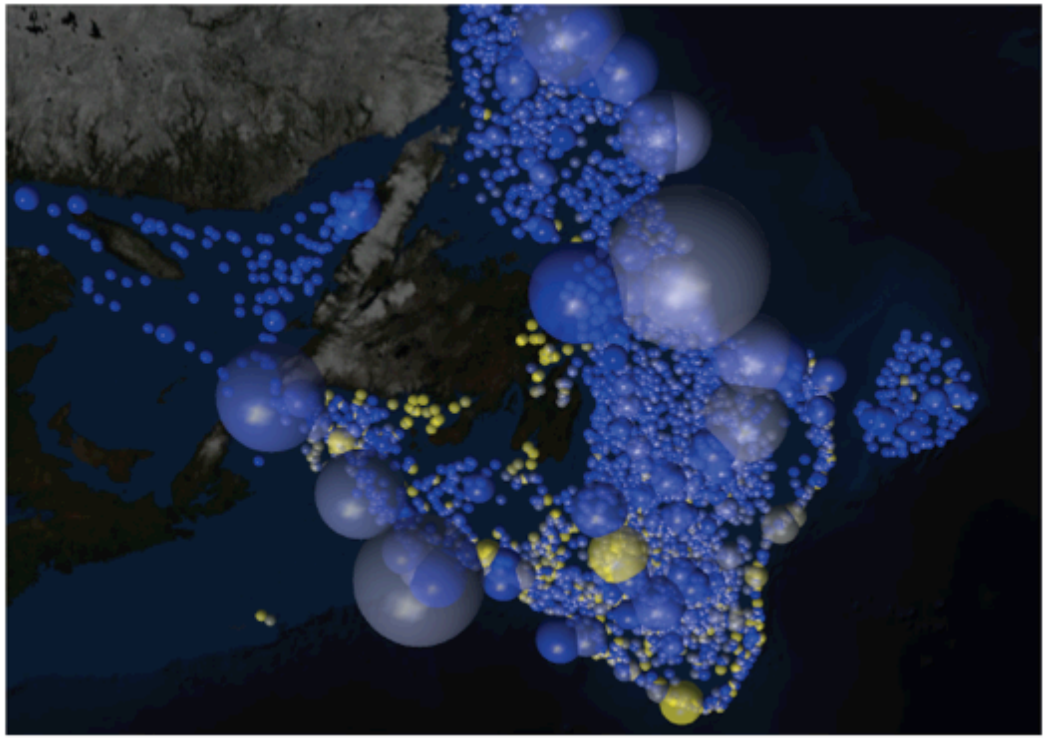




- Ruppert, J., Fortin, M.-J., Rose, G. and Devillers, R. 2010. **Environmental mediation of Atlantic cod on fish community composition: an application of MRT to fisheries ecosystems**. *Marine Ecology Progress Series*, 411: 189-201.
- Ruppert, J., Fortin, M.-J., Rose, G. and Devillers, R. 2009. **Atlantic cod distribution response to environmental variability in the Northern Gulf of St. Lawrence**. *Canadian Journal of Fisheries and Aquatic Sciences*, 66(6): 909-918.

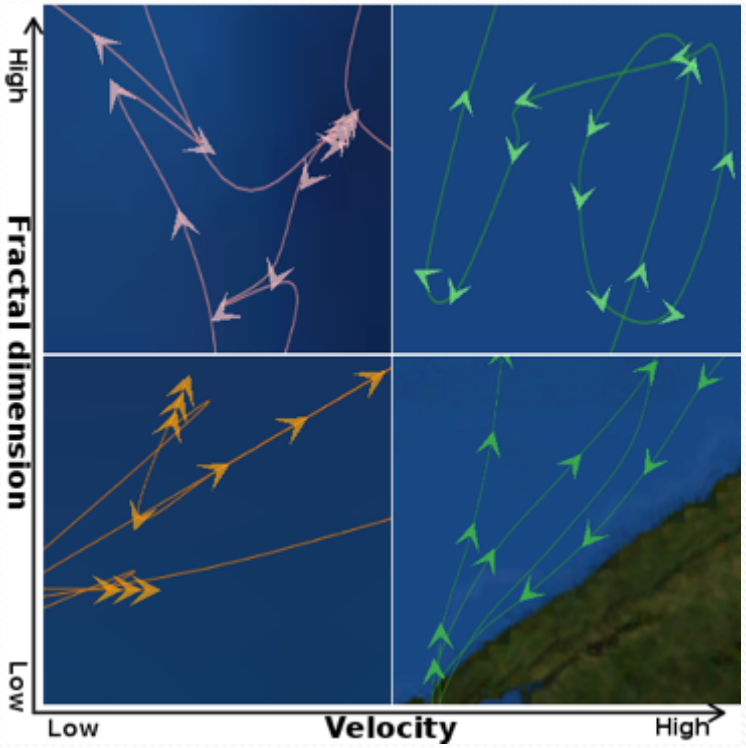
Fisheries geovisualization

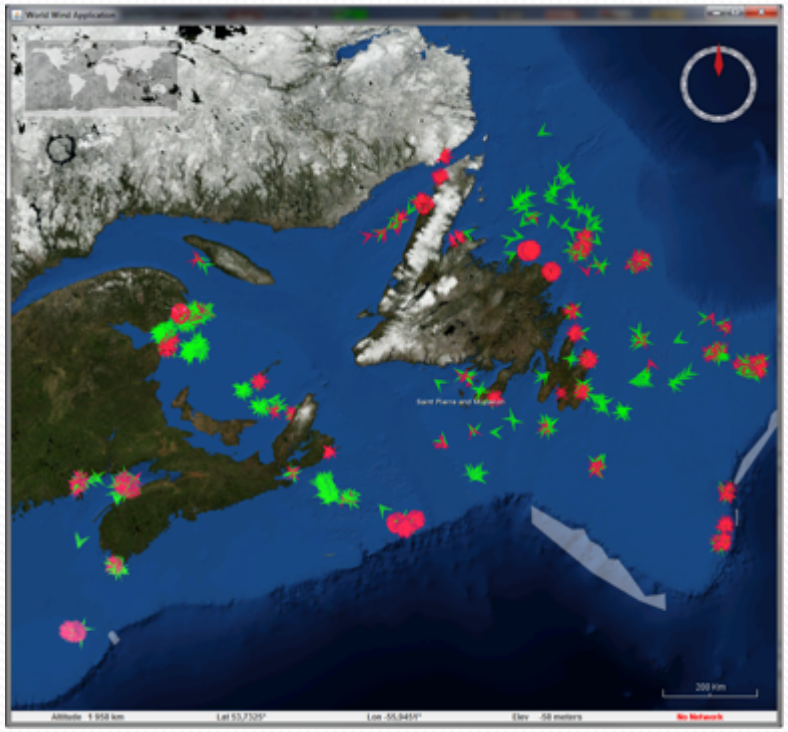




- Hoeber, O., Wilson, G., Harding, S., Enguehard, R. and Devillers, R. 2011. **Exploring geo-temporal differences using GTDiff**. PacificViz Conference 2011, Hong Kong, March 1-4.
- Hoeber, O., Wilson, G., Harding, S., Enguehard, R. and Devillers, R. 2010. **Visually representing geo-temporal differences**. *IEEE Conference on Visual Analytics Science and Technology*, Salt Lake City, USA, October 2010.

Extracting knowledge from movement data – fishing vessels movement

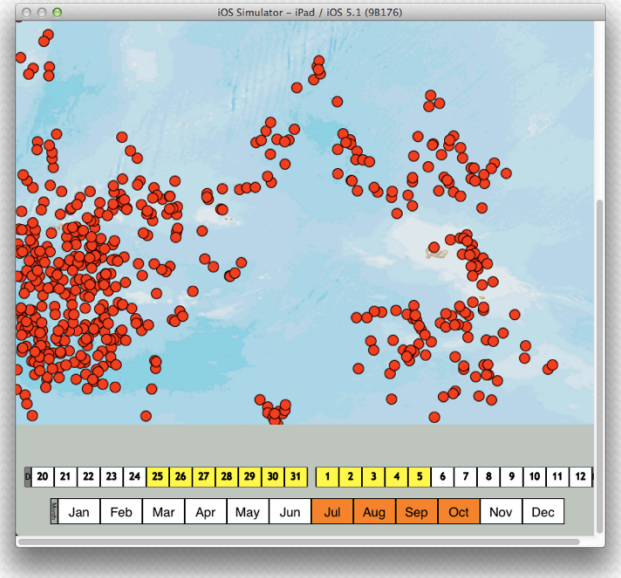


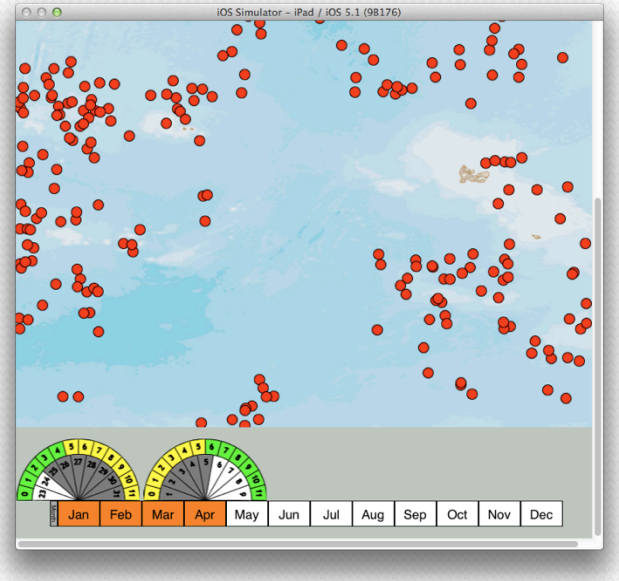


- Journal papers: Enguehard *et al.* 2012 (*Information Visualization*), Enguehard *et al*. 2012 (*Journal of Coastal Conservation*) & Enguehard *et al*. (*in prep*)
- Conference papers: Enguehard et al. 2011 (*GeoViz'11 and MAD'11*), 2012 (*AGILE conference*)

Designing navigation tools to better explore spatio-temporal data

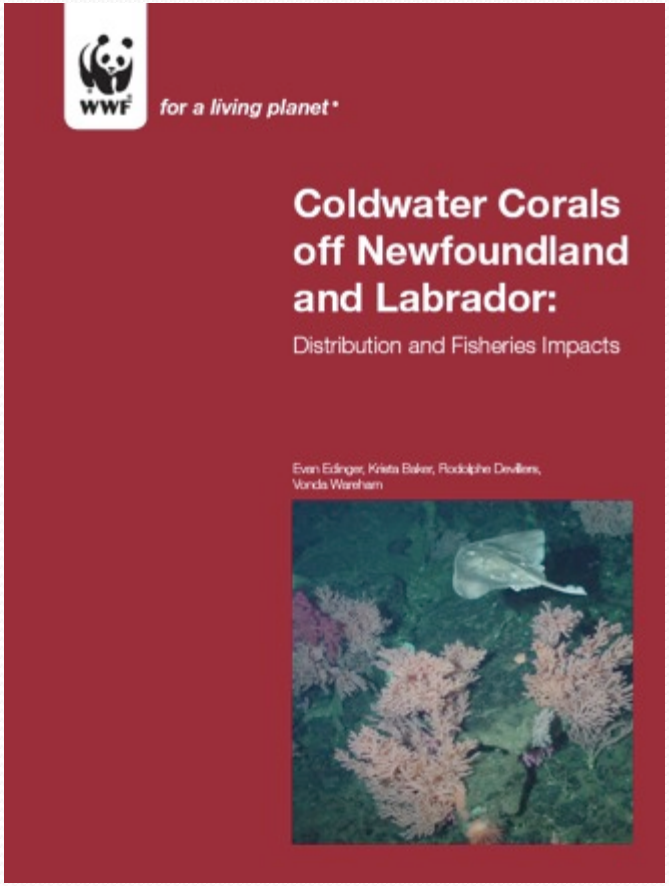
- Temporal zoom/pan tools for multi-touch environments

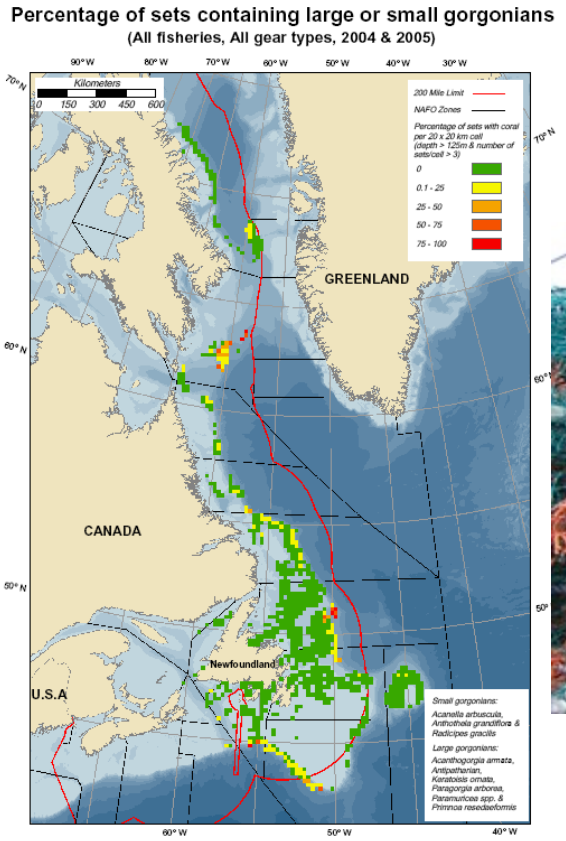




- Lee, C., Devillers, R. and Hoeber, O. (2014). **Navigating spatio-temporal data with temporal zoom and pan in a multi-touch environment**. *International Journal of Geographical Information Science*.
- Lee, C., Devillers, R. and Hoeber, O. 2012. **Interactive temporal zoom and pan within a multi-touch geo-visual analytics environment**. *GIScience'12 workshop "Geovisual analytics - Time to focus on time"*, Columbus, OH, USA, September 18, 2012.

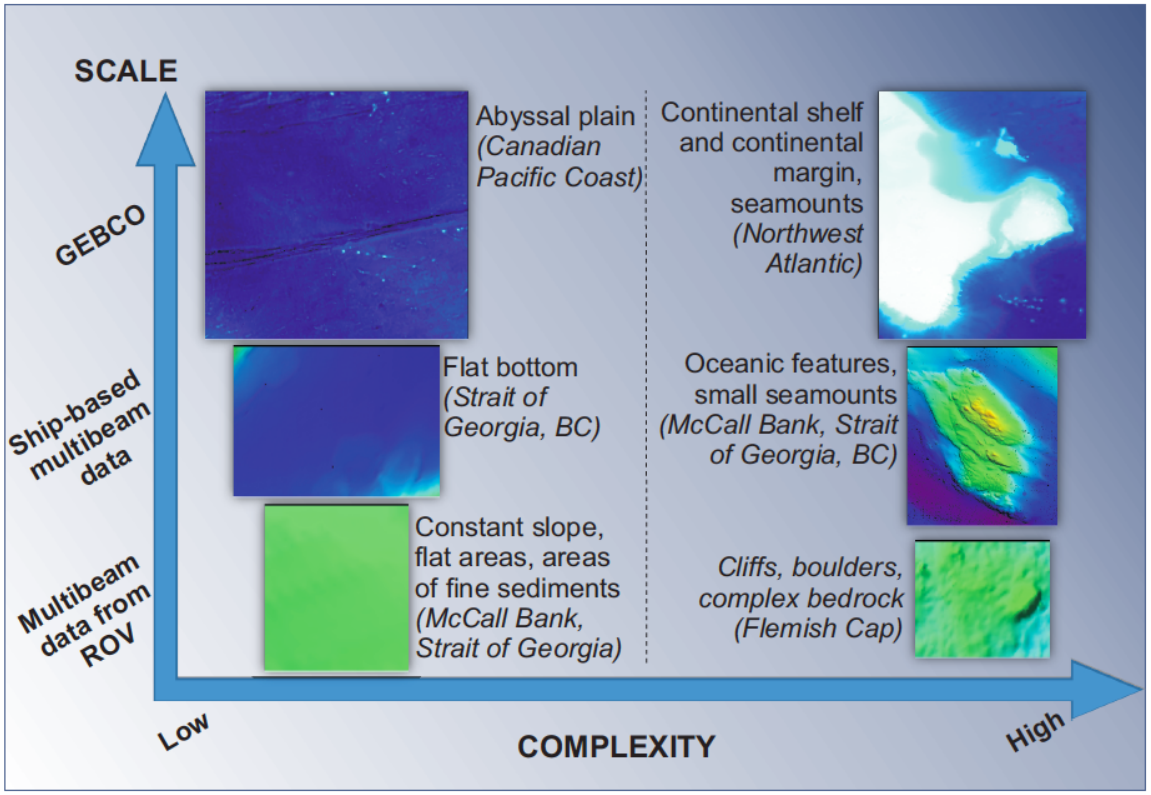
Using GIS to study cold-water corals





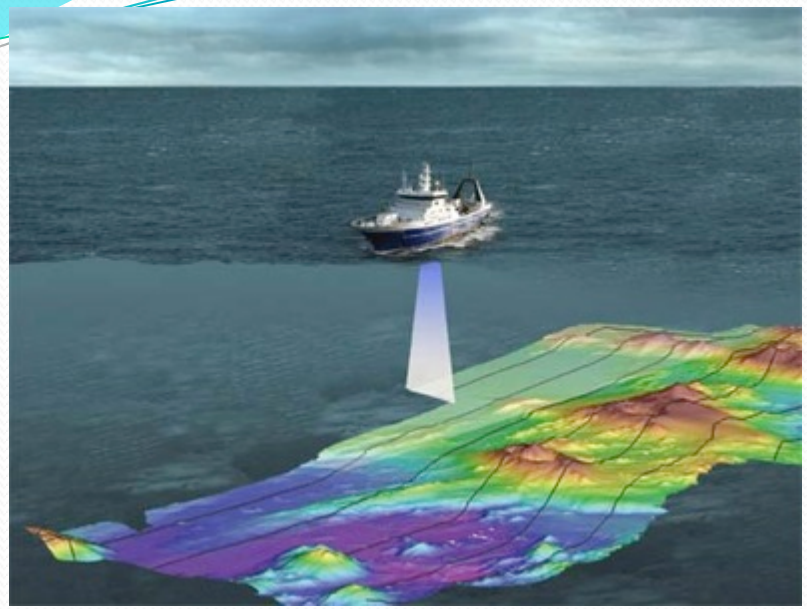
- Edinger, E., Baker, K., Devillers, R. and Wareham, V. 2007. **Coldwater corals off Newfoundland and Labrador - Distribution and fisheries impacts**. World Wildlife Fund (WWF) report, 41p.

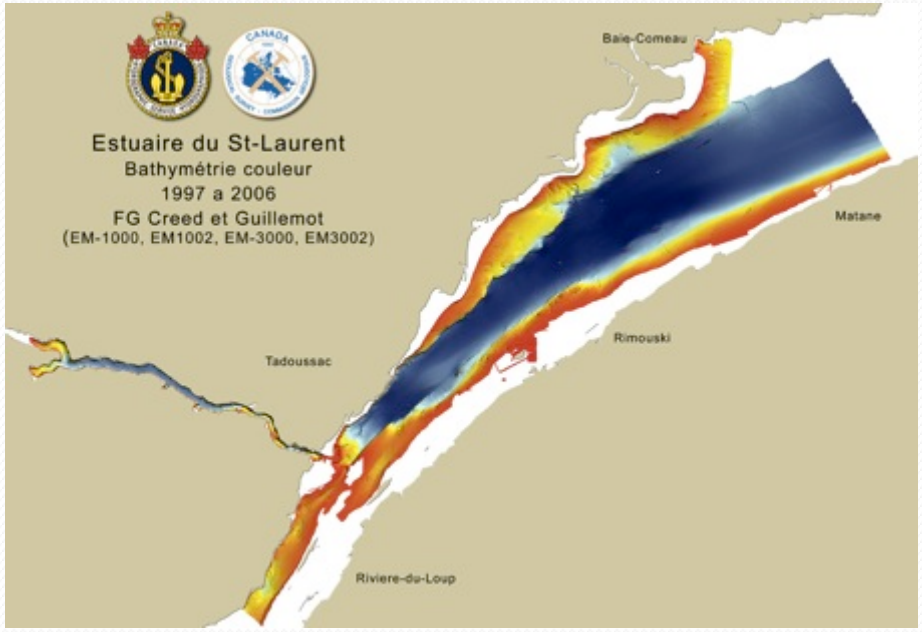
Marine geomorphometry: Cold-water corals vs seabed



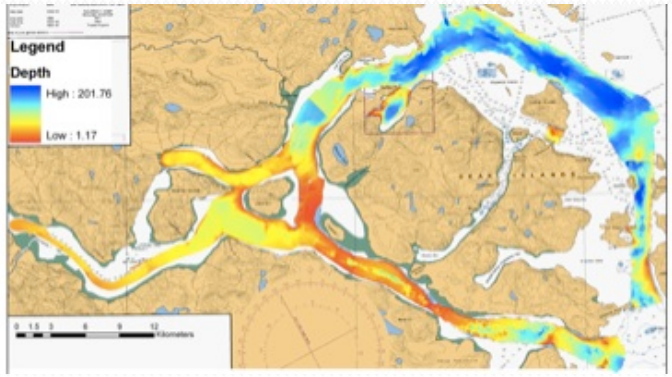
- Devillers, R., Edinger, E., Lecours, V. and Jones, K. 2012. **The role of scale in understanding cold-water corals habitats**. *12th International Coral Reef Symposium (ICRS'12)*, Cairns, Australia, 9-13 July.

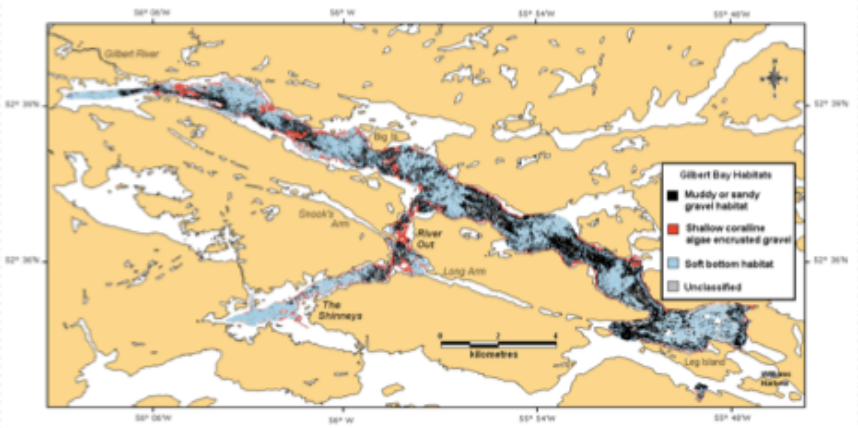
Mapping the seabed – acoustic remote sensing and hydrography

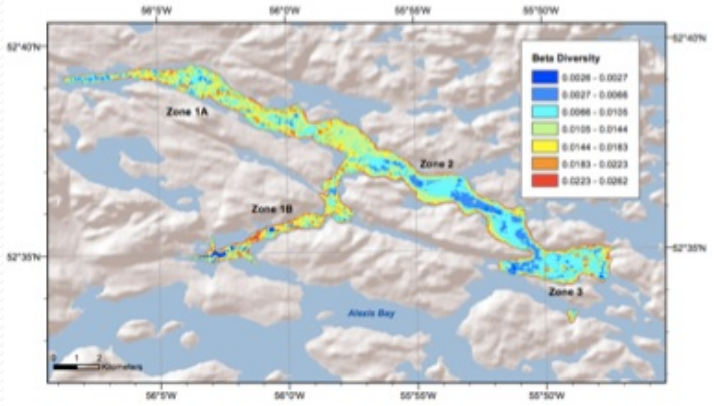




Mapping Benthic Habitats







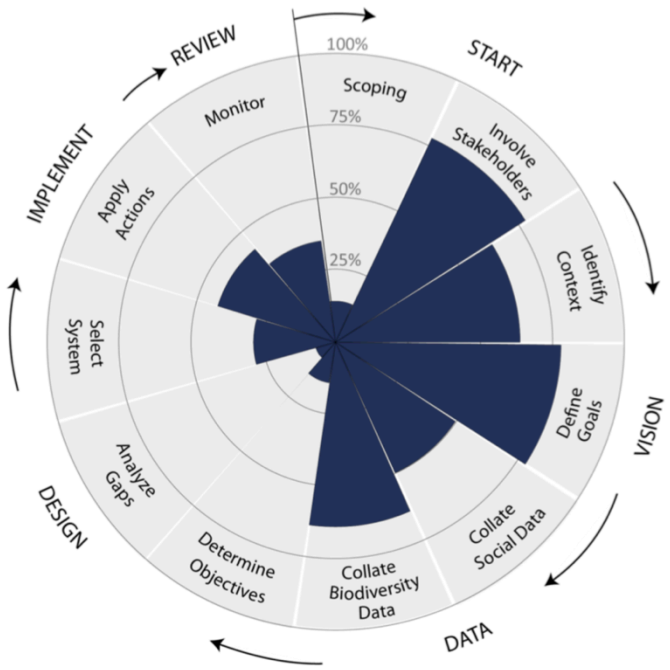
- Copeland, A., Edinger, E., Devillers, R., Bell, T., LeBlanc, P., Wroblewski, J. 2013. **Marine habitat mapping in support of Marine Protected Area management in a subarctic fjord: Gilbert Bay, Labrador, Canada**. *Journal of Coastal Conservation: Planning and Management*.
- Copeland, A., Edinger, E., Bell, T., LeBlanc, P., Wroblewski, J. and Devillers, R. 2012. **Geomorphic features and benthic habitats of a sub-arctic fjord: Gilbert Bay, Southern Labrador, Canada**. In: *GeoHAB Atlas of Seafloor Geomorphic Features and Benthic Habitats* (P.T. Harris & E.K. Baker, eds), pp. 309-328.

Mapping Benthic Habitats

- Habitat mapping from ROV and AUV platforms

Geospatial tools for better Marine Protected Areas design

- Encouraging the use of Systematic Conservation Planning in high-seas

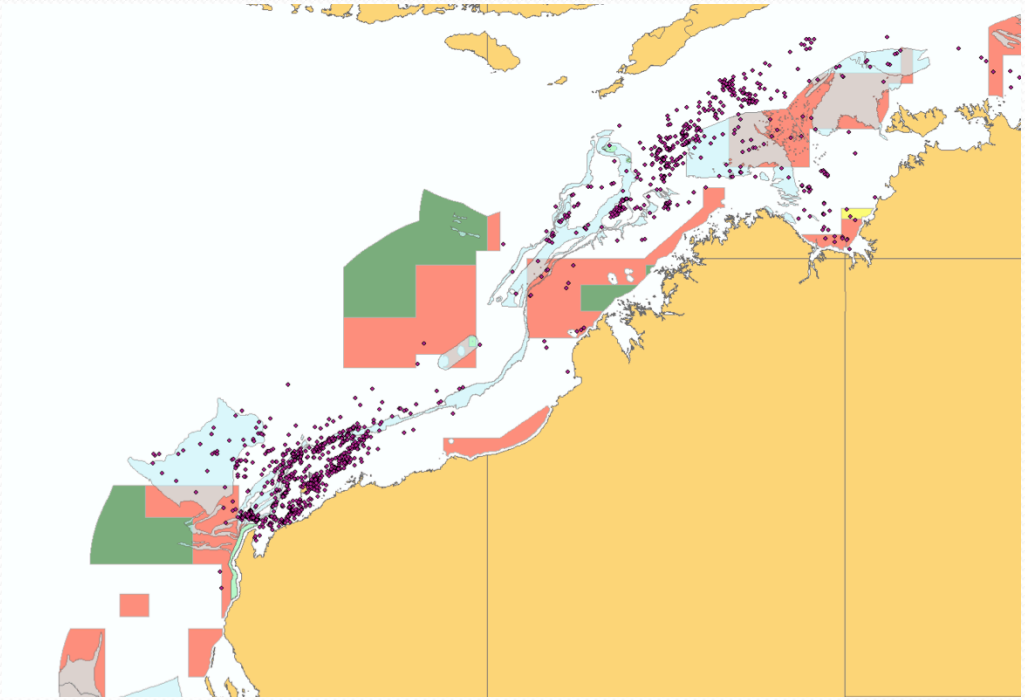


Credit: CSIRO

- Ban, N.C., Maxwell, S.M., Dunn, D.C., Hobday, A.J., Bax, N.J., Ardron, J.A., Gjerde, K.M., Game, E.T., Devillers, R., Kaplan, D.M., Dunstan, P.K., Halpin, P.N., and Pressey, R.L. (in press) **Better integration of sectoral planning and management approaches for the interlinked ecology of the open oceans**. *Marine Policy*.
- Ban, N.C., Bax, N.J., Gjerde, K.M., Devillers, R., Dunn, D.C., Dunstan, P.K., Hobday, A.J., Maxwell, S.M., Kaplan, D.M., Pressey, R.L., Ardron, J.A., Game, E.T. and Halpin, P.A. (in press) **Systematic Conservation Planning: a better recipe for managing the high seas for biodiversity conservation and sustainable use**. *Conservation Letters*.

Geospatial tools for better Marine Protected Areas design

Studying global MPA distribution vs human extractive activities



Proposed MPAs in NW Australia

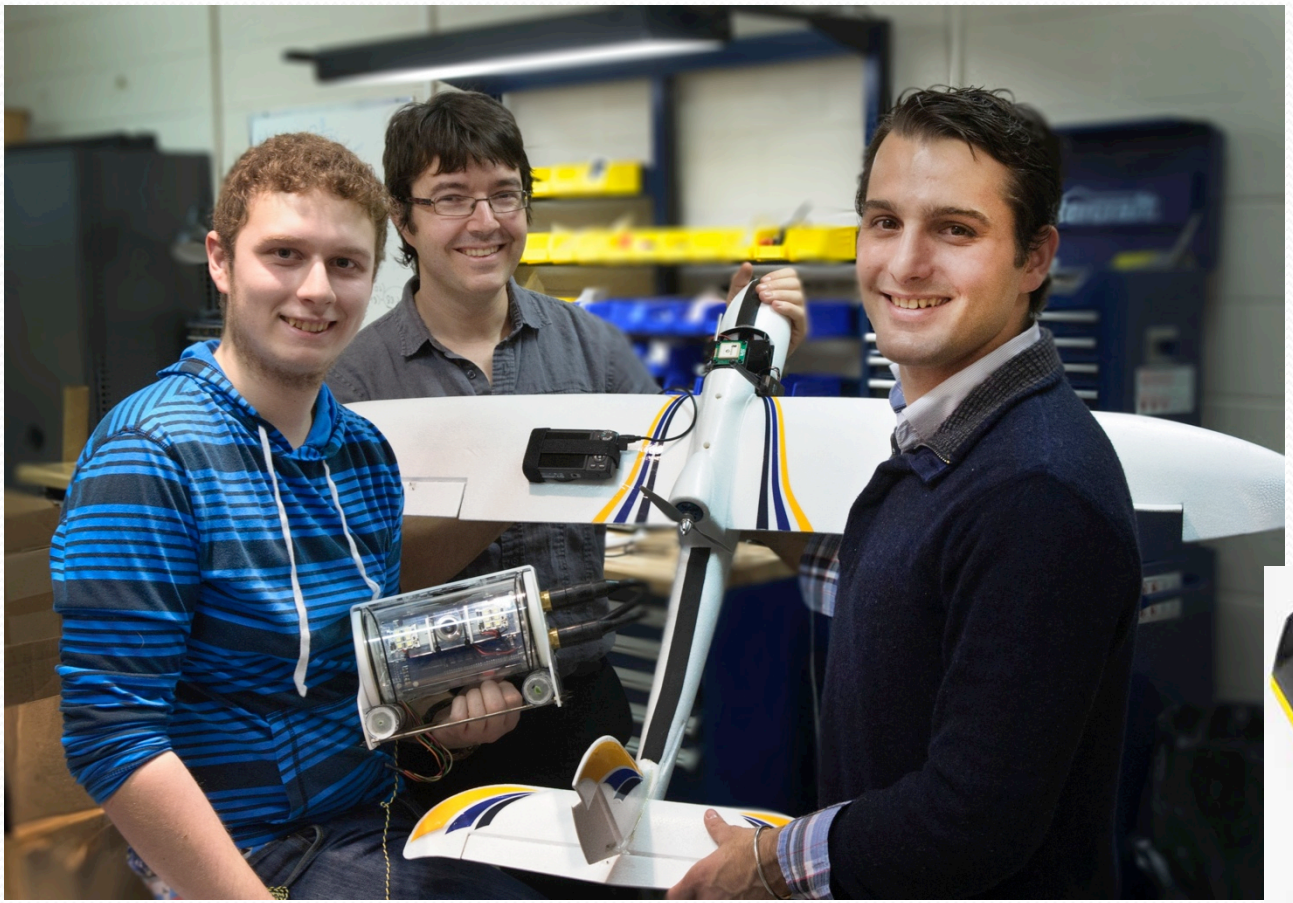
- Devillers, R., Pressey, B., Grech, A., Kittinger, J., Graham, E., Ward, T. and Watson, R. (in press). **Reinventing residual reserves in the sea: are we favouring ease of establishment over need for protection?** *Aquatic Conservation: Marine and Freshwater Ecosystems*.

Even helping social scientists!

- Information System on Small-scale fisheries (ISSF)

- Chuenpagdee, R., Davis, R., Korneski, K. and Devillers, R. 2011. **Reconceptualizing Ecosystem Complexity: A New Emphasis**. *MARE 2011 Conference - People and the Sea VI: Bridging Science and Policy for Sustainable Coasts and Seas*. Amsterdam, The Netherlands, July 6-9th.

Coming next:
Crowdsourcing imagery using UAVs/ROVs



Merci / Thank you

rdeville@mun.ca

More information:
http://www.marinegis.com