

# Interoperability at Laval University

Standards are part of the life of every geomatics engineer and scientist. Standards make the pieces fit together for geospatial information, Web services, modelling languages, etc. Each student of geomatics entering today's market must understand what standards exist and how they are best used. They must understand utility, appropriate scenarios for use, and the challenges not yet solved. Universities have the responsibility to teach such concepts, along with practical applications. In addition, it lies within the mandate of universities to influence standards.

## Teaching Standards

Laval University covers extensively the main concepts related to Open Geospatial Consortium (OGC) and ISO/TC211 standards. It does so in an undergraduate course about publishing geospatial data on the Web, e.g. OpenGIS Simple Features Specification (SFS), OpenGIS Web Feature Service Specification (WFS), OpenGIS Web Map Server Specification (WMS), OpenGIS Web Coverage Server Specification (WCS) and Geographic Markup Language (GML). A similar course at graduate level is also offered to candidates not having an undergraduate degree in Geomatics Engineering. We also cover standards in a Geospatial Database Design course offered at both levels. For this course we use Perceptory, a CASE tool that facilitates interoperability by supporting multi-lingualism in a common repository and dedicated registries, as well as three standard vocabularies based on Object Management Group (OMG) and ISO/TC 211 standards. We also offer short, on-demand continuing-education sessions lasting one to two days for different aspects of ISO and OGC standards, and held in French or English. There are also longer sessions, such as the three-week session offered to Natural Resources Canada, Ocean and Fisheries Canada, National Defense of Canada, Quebec Centre for the Development of Geomatics and GEOIDE Network of Centers of Excellence.

## Research Projects

Several research activities benefit from standards. We are revisiting the repository of the Perceptory CASE tool in order to offer Web services that further facilitate interoperability and the integration of several technologies. These include Unified Modeling Language (UML) modelling for transactional and multidimensional databases design, code generation for GIS, DBMS and spatial online transaction processing (SOLAP) technologies, defining spatio-temporal integrity constraints for databases and datacubes, managing ontologies etc. Standards are also part of our research projects related to georeferenced digital libraries and the assessment of spatial data quality. The latest version of our innovative Map-On-Demand prototype, UMapIt, was built using OGC standards and open-source software. Future work will tackle problems related to spatial datacubes for decision-support (where standards are lacking), and mobile SOLAP using Web services. Finally, one of our associate professors from Geomatics Canada contributes to the ISO/TC211 committee.