

The geoscience standards factory : the successful experience of IUGS/CGI and OGC

Standards are compulsory to develop data sharing in for research communities as well as in the production of reference data for public or commercial use.

The development of standards that will serve the users and have the possibility to evolve according to the evolution of technologies and users needs is a mission that requires a very professional process to guarantee the involvement of the stakeholders (final users, developers, scientists, technology experts...). Moreover it is of utmost importance not to reinvent the wheel and well evaluate the current landscape of existing standards.

In the geoscience domain, important developments and achievements have been realized in the last two decades, in particular through the IUGS/CGI working groups and the OGC.

The development of standards requires processes that have been developed and regularly updated and developed in the OGC, and have demonstrated their ability to capture the interoperability requirements, validate the solutions through interoperability experiments, certify the efficiency of the new standards through open source and commercial implementations, and follow common practices the maintenance of the standards.

OGC and IUGS/CGI have created a joint working group named “Geoscience Domain Working Group”, whose mission is to facilitate the collection of requirements, evaluate the existing standards (and possibly the lack of standards) and propose the update or development of standards.

The CGI (Commission for the Management And Application of Geoscience Information) is the IUGS Commission whose mission is to foster the interoperability and exchange of geoscience information, by active community leadership, collaboration, education, and the development and promotion of geoscience information standards and best practice.

CGI is currently running four working groups:

- GeoSciML working group : a collaborative OGC-CGI working group for the GeoSciML geological data standard,
- EarthResourceML Working Group : developing a data standard for mineral resources and mining information,
- Geoscience Terminology Working Group (GTWG) : developing multi-lingual vocabularies for geoscience data,
- OGC-CGI Geoscience Domain Working Group: co-chaired by OGC and CGI. It aims to connect people to develop, improve and promote technologies for geoscience data description and sharing.

The OGC (Open Geospatial Consortium) is an international organization committed to develop and promote open standards for global community. OGC membership includes more than 500 organizations that come from across government, commercial organizations, NGOs, academic and research institutes. OGC activities address both semantic and technological standardization in a wide variety of domains including geosciences and environment, smart cities, OiT and Sensor Webs, mobile tech, 3D & built environment, Emergency Response & Disaster Management, Energy and Utilities, and many more.

As for the geoscience topic, three major groups and standards can be mentioned:

- the GeoScience Domain Working Group (DWG) is a forum to discuss, organize and harmonize geoscience related standards. In this context, Geoscience encompasses several scientific domains which all aim to provide a better understanding and representation of the Earth: Geology, Geomechanics, Geophysics, Geotechnics, Hydrogeology, Mineralogy, Seismology or Volcanology.
- GeoScience Markup Language (GeoSciML) is a data model and data transfer standard for geological data. It formalizes the description of geological features commonly portrayed in geological maps, cross sections, geological reports and databases. It provides geological surveys, and other geoscience data providers, a common vocabulary for the electronic dissemination of geoscientific information.
- GroundWater Markup Language 2 (GroundWaterML 2 or GWML2) is a data exchange standard for the groundwater domain. As part of the WaterML 2.0 standard and linked to GeoSciML, it introduces some concepts such as hydrogeological units, fluid bodies, voids, flow and well.

Recent or current work of the geoscience community concern both harmonization between existing standards and/or proposing alternative encodings for them, especially two on-going Interoperability Experiments (IE): The Borehole IE that targets a common conceptual model for borehole which are currently defined inconsistently in more than one OGC standard. The Environmental Linked Features IE that test existing OGC and W3C standards with the goal of establishing a best practice for exposing linked data with modern web search technology.