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Technical-semantic interoperability reference

Piotr Zaborowski, Rob Atkinson, Nils Hempelmann, and Marie-Francoise Voidrot

Open Geospatial Consortium, Innovation Program, Belgium (pzaborowski@ogc.org)

The FAIR data principles form the core OGC mission that renders in the open geospatial standards and the open-data initiatives that use them. Although OGC is best known for the technical interoperability, the domain modelling and semantic level play an inevitable role in the standards definition and the exploitation. On the one hand, we have a growing number of specialised profiles and implementations that selectively use the OGC modular specification model components. On the other hand, various domain ontologies exist already, enabling a better understanding of the data. As there could be multiple semantic representations, common data models support cross ontology traverses. Defining the service in the technical-semantic space requires fixing some flexibility points, including optional and mandatory elements, additional constraints and rules, and content including normalised vocabularies to be used.

The proposed solution of the OGC Definition Server is a multi-purpose application built around the triple store database engine integrated with the ingestion, validation, and entailment tools and exposing customized end-points. The models are available in the human-readable format and machine-2-machine aimed encodings. For manual processes, it enables understanding the technical and semantic definitions/relationships between entities. Programmatic solutions benefit from a precise referential system, validations, and entailment.

Currently, OGC Definition Server is hosting several types of definitions covering:

- Register of OGC bodies, assets, and its modules
- Ontological common semantic models (e.g., for Agriculture)
- Dictionaries of subject domains (e.g., PipelineML Codelists)

In practice, that is a step forward in defining the bridge between conceptual and logical models. The concepts can be expressed as instances of various ontological classes and interpreted within multiple contexts, with the definition translated into entities, relationships, and properties. In the future, it is linking the data to the reference model and external ontologies that may be even more significant. Doing so can greatly improve the quality of the knowledge produced based on the collected data. Ability to verify the research outcomes and explainable AI are just two examples where a precise log of inferences and unambiguous semantic compatibility of the data will play a key role.