Semantic Mediation via Access Broker: the OWS-9 experiment

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Even with the use of common data models standards to publish and share geospatial data, users may still face semantic inconsistencies when they use Spatial Data Infrastructures – especially in multidisciplinary contexts. Several semantic mediation solutions exist to address this issue; they span from simple XSLT documents to transform from one data model schema to another, to more complex services based on the use of ontologies.

This work presents the activity done in the context of the OGC Web Services Phase 9 (OWS-9) Cross Community Interoperability to develop a semantic mediation solution by enhancing the GEOSS Discovery and Access Broker (DAB). This is a middleware component that provides harmonized access to geospatial datasets according to client applications preferred service interface (Nativi et al. 2012, Vaccari et al. 2012).

Given a set of remote feature data encoded in different feature schemas, the objective of the activity was to use the DAB to enable client applications to transparently access the feature data according to one single schema. Due to the flexible architecture of the Access Broker, it was possible to introduce a new transformation type in the configured chain of transformations. In fact, the Access Broker already provided the following transformations: Coordinate Reference System (CRS), spatial resolution, spatial extent (e.g., a subset of a data set), and data encoding format. A new software module was developed to invoke the needed external semantic mediation service and harmonize the accessed features. In OWS-9 the Access Broker invokes a SPARQL WPS to retrieve mapping rules for the OWS-9 schemas: USGS, and NGA schema.

The solution implemented to address this problem shows the flexibility and extensibility of the brokering framework underpinning the GEO DAB: new services can be added to augment the number of supported schemas without the need to modify other components and/or software modules. Moreover, all other transformations (CRS, format, etc.) are available for client applications in a transparent way.

Notwithstanding the encouraging results of this experiment, some issues (e.g. the automatic discovery of semantic mediation services to be invoked) still need to be solved. Future work will consider new semantic mediation services to broker, and compliance tests with the INSPIRE transformation service.

References:

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