Designing and implementing a Quality Broker: the GeoViQua experience

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GeoViQua (QUAlity aware VIsualisation for the Global Earth Observation System of Systems) is an FP7 project aiming at complementing the Global Earth Observation System of Systems (GEOSS) with rigorous data quality specifications and quality-aware capabilities, in order to improve reliability in scientific studies and policy decision-making.

GeoViQua main scientific and technical objective is to enhance the GEOSS Common Infrastructure (GCI) providing the user community with innovative quality-aware search and visualization tools, which will be integrated in the GEOPortal, as well as made available to other end-user interfaces.

To this end, GeoViQua will promote the extension of the current standard metadata for geographic information with accurate and expressive quality indicators. Employing and extending several ISO standards such as 19115, 19157 and 19139, a common set of data quality indicators has been selected to be used within the project. The resulting work, in the form of a data model, is expressed in XML Schema Language and encoded in XML. Quality information can be stated both by data producers and by data users, actually resulting in two conceptually distinct data models, the Producer Quality model and the User Quality model (or User Feedback model).

GeoViQua architecture is built on the brokering approach successfully experimented within the EuroGEOSS project and realized by the GEO DAB (Discovery and Access Broker) which is part of the GCI. The GEO DAB allows for harmonization and distribution in a transparent way for both users and data providers.
This way, GeoViQua can effectively complement and extend the GEO DAB obtaining a Quality augmentation Broker (DAB-Q) which plays a central role in ensuring the consistency of the Producer and User quality models.

The GeoViQua architecture also includes a Feedback Catalog, a particular service brokered by the DAB-Q which is dedicated to the storage and discovery of user feedbacks. A very important issue concerns the association between the user feedbacks and the affected products that are target of the report. This association is usually achieved by means of a Product Identifier (PID), but actually just a few products are annotated with their PID; recent studies show that on a total of more than 100000 Clearinghouse products, only some tens have the Product Identifier. Furthermore the association should be persistent within the GeoViQua scope.

This work is focused on the typical use case in which the GeoViQua Broker performs data discovery from different data providers, and then integrates in the Quality Information Model the producer quality report with the feedback given by users. In particular, this work highlights the problems faced by the GeoViQua Broker and the techniques adopted to ensure consistency and persistency also for quality reports whose target products are not annotated with a PID.