From printed geological maps to web-based service oriented data products – strategies, foundations & problems

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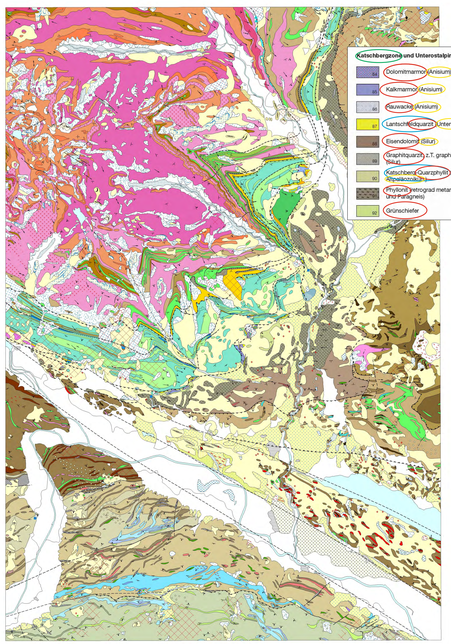
Introduction

The Geological Survey of Austria is legally obligated by the INSPIRE directive to provide data that fall under this directive (geology, mineral resources and natural risk zones) to the European commission in a semantically harmonized and technically interoperable way. Until recently the focus was entirely on the publication of high quality printed cartographic products. These have a complex (carto-) graphic data-model, which allows visualizing several thematic aspects, such as lithology, stratigraphy, tectonics, geologic age, mineral resources, mass movements, geomorphology etc. in a single planar map/product. Nonetheless these graphic data-models do not allow retrieving individual thematic aspects since these were coded in a complex portrayal scheme. Automatic information retrieval is thus impossible; and domain knowledge is necessary to interpret these "encrypted datasets". With INSPIRE becoming effective and a variety of conceptual models (e.g. GeoSciML), built around a semantic framework (i.e. controlled vocabularies), being available it is necessary to develop a strategy and workflow for semantic harmonization of such datasets.

Traditional geologic maps

as encrypted data source for digital data products. These products encode several thematic aspects in a complex portrayal sheme. There is usually no standardised description for the legend items (variations within and between map sheets).



GÖK 1:50.000 Spital an der Drau (2006)

1) extract concepts from maps

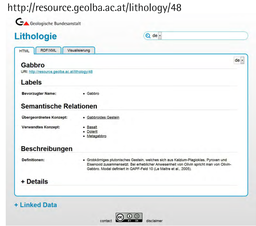
- lithology
- geologic unit
- tectonic
- time scale

2) develop structure to store data

Foundations I – Controlled Vocabulary

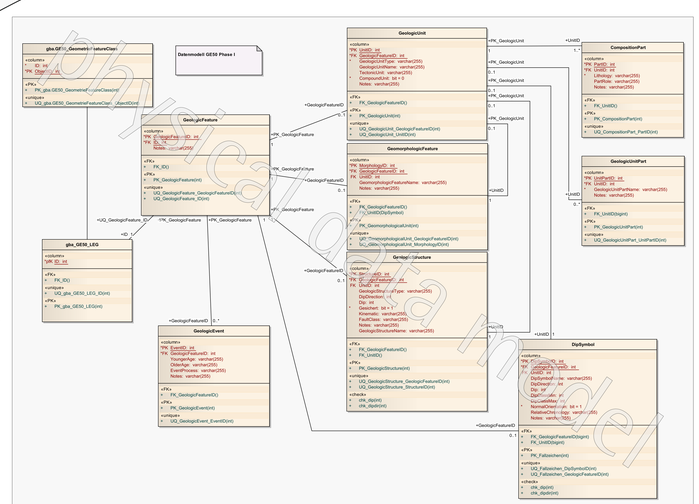
In a first step we analysed our map data and developed thematic controlled vocabularies for Lithology, Geologic Units, Tectonic Units, Geologic Time Scale & Structure. The corporate thesauri of the Austrian Geological Survey are exposed via a web-service that is conformant with the linked data principles. This web-service gives access to a (1) RDF/HTML representation of the resources via a simple, robust and thus persistent http URIs (2) a download of the complete vocabularies in RDF-format (3) a full-fledged SPARQL-Endpoint to query the thesaurus.

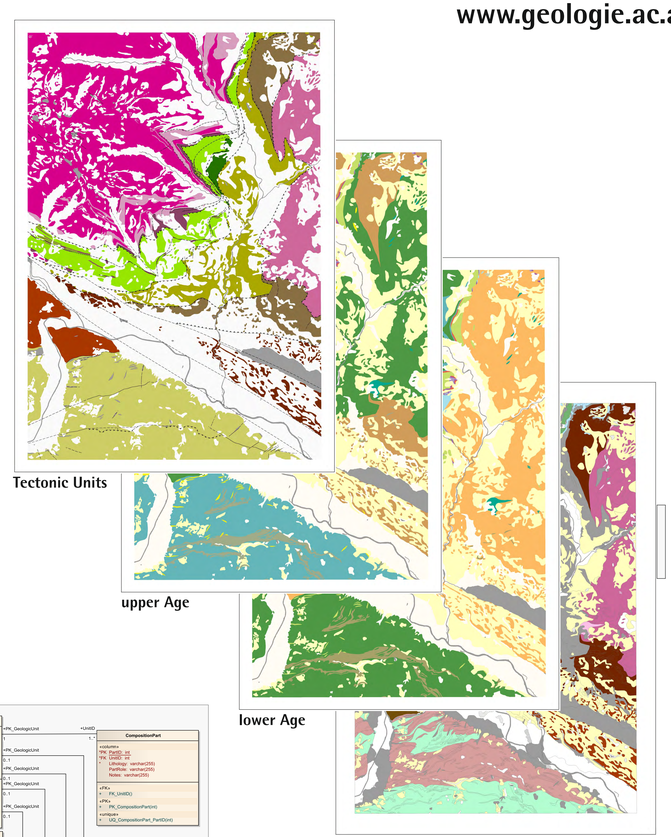
http://resource.geolba.ac.at/lithology/48



http://resource.geolba.ac.at/lithology/48.rdf

data harmonisation



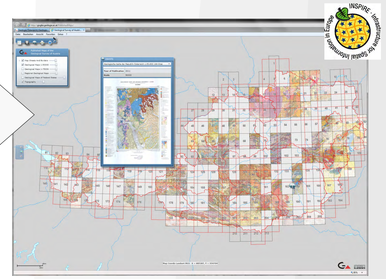


Foundations II – data model

In a second step a physical data model was developed, which is used to attribute our spatial data with thematic information from our controlled vocabularies to form core thematic data sets. This physical data model is geared towards use on an organizational level but builds upon existing standards (INSPIRE, GeoSciML) to allow transformation to international standards. In a final step we will develop a standardized mapping scheme to publish INSPIRE conformant services from our core datasets.

Outlook and future work

(1) Mapping of the data model and the controlled vocabulary to international standards.
(2) Development of portrayal shemes for visualisation of harmonised thematic aspects.
(3) Publication of the data in form of web-services (wms, wfs), semantically enriched applications and download services (xml/gml).



Outlook – mapping to international standards & publications of services/applications

Summary & Conclusions

We are convinced that it is necessary for Geological Surveys to provide harmonised data which can be mapped to international standards:

(1) A physical data model & controlled vocabularies (in form of ontologies) are the foundations for our harmonisation approach.
(2) Data model and controlled vocabularies should be designed for use on an intitutional level but can be derived from international standards (to facilitate mapping).
(3) The use of ontologies instead of flat lists as controlled vocabularies allow semantically enriched applications and services <u>without</u> complex data models.

Geological Survey of Austria