INTEROPERABILITY OF GEOLOGICAL DATA:

First ICGC INSPIRE Geological Data Model.

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Introducing the ICGC  
Origins & mission  

- Institute Cartographic and Geologic de Catalunya is the official Catalan mapping & geological agency, belonging to the Catalan Government and aiming to deliver to users valued geographic and geological information and services.  
  - Founded in 1982 (ICC).  
  - Institutional and commercial activities.  
  - Multidisciplinary aspects on Geomatics & Geology.
OUR CHALLENGE…….Why INSPIRE?

Today

- Multiple representation models portrayal oriented.
- Data models for cartographical production (CAD)
- Printed geological maps series
- WMS
- ICGC Geoportal

- Each geological map series has a specific portrayal-oriented data model (CAD).
- Geological data are not interoperable.

Tomorrow

- INSPIRE compliant geological data model
- INSPIRE DS GE-Core model + GeoSciML extensions
- Cartographic production
- - ICGC Geoportal
- - Maps “On demand”
- Open Data Services
  - WMS, WFS, WCS

- Single geological data model and repository for data storage and management.
- Ready to build geological maps “on demand” and other geological information services and products.
- Interoperable databases derived from UML models and schemas.

INSPIRE represents an excellent opportunity to fill the gap between multiple representation models to a single geological object oriented data model.
Before start modelling…

We assume that:

- Regional Geology knowledge and field mapping experience are required to build a geological data model.
Before start modelling...

We assume that:

- Regional geology knowledge and field experience are required to build a geological model.
- The geological information resolution is related with the graphical scale so we consider as a Geological Collection each published geological maps series.

For a given area...

Geological map at 1:250 000
- 6 geological units

Geological map at 1:50 000
- 12 geological units

Geological map at 1:25 000
- 31 geological units
Before start modelling…

We assume that:

- Regional geology knowledge and field experience are required to build a geological model.

- Regarding geological information resolution, we consider as a Geological collection each published geological paper maps series.

- We start modelling geologic maps at scale 1:250.000 and we will continue with bigger scales, 1:50.000 and 1:25.000.

Geological collections’ data models

1:25K

1:50K

1:250K
Workflow

- Detailed study
- Information extraction
- Problems and solutions
- Results
Workflow. Detailed study.

INSPIRE Data Specification on Geology

FeatureCatalogue
INSPIRE UML class diagrams

Figure 4 – UML class diagram: Overview of the Geology application schema

GeoSciML models v3.2 (last version 4.0)
Analysis application schemas on the web

CGI Geoscience vocabularies service
Vocabularies used in GeoSciML from CGI
(commission for the management and Application of GeoScience Information).

Annex C
CodeLists

Annex D
Data model extensions

GeoSciML 3.2 Encoding Cookbook for INSPIRE WFS services

Workflow

- Detailed study
- Information extraction
- Problems and solutions
- Results
Workflow. Information extraction from geological published maps at 1:250 000 scale.

Geologic Map of Catalunya 1:250.000 (pub. 1989)  
Structural Map of Catalunya 1:250.000 (pub. 2014)
Workflow

1. Implicit geological information
2. To avoid information loss
3. Terms equivalences
4. Stratigraphic time scale correlation
Some geological information required by INSPIRE_IR are not always evident in published maps.

Workflow. Problems faced. *Implicit Information.*

How do we proceed?
Applying expert geologic criteria.
Other information sources: regional studies and bibliography.

Regional geological knowledge is again required.
Workflow. Problems faced. To avoid information loss.

Some geological information in published maps are not required in INSPIRE Data Specification.

How do we proceed to avoid losses information?

Using public data model extensions GeoSciML & CGI Vocabularies

GeoSciML 3.2 Encoding Cookbook for INSPIRE

WFS services
ICGC geologic terminology not always fits with INSPIRE proposed terms.

### How do we proceed?

Looking for the best possible equivalence between ICGC terms and INSPIRE code lists CGI vocabularies.

**If any equivalence can be established:** Proposing a new term to be added to the INSPIRE code lists.

Geologic timescale used in published geological maps is not the same version required by INSPIRE_DS, so some correlations are needed.

How do we proceed?

Taking the name of the era instead of that of the stage leads to a loss of information.

It will be improved when we model bigger scale geological collections.

The geologic time-scales are not static!
Workflow

- Detailed study
- Information extraction
- Problems and solutions
- Results
Results

Application schema in Enterprise Architect

ICGC Geological Collection
250K Data Specifications
Lessons learned

Implementing INSPIRE is an excellent opportunity to fill the gap between multiple representation models to a single geological object oriented data model.

To avoid information losses is essential to focus on data concepts not only in technology.

The benefits of close cooperation between experts in different field (basically geologist, data modelers,..) with similarities to the work of INSPIRE Thematic Working groups for Data Specification.
What’s the next…

We are going to model the geologic collection 50K taking as a core the geologic collection 250K UML model.
Thank you for your attention

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