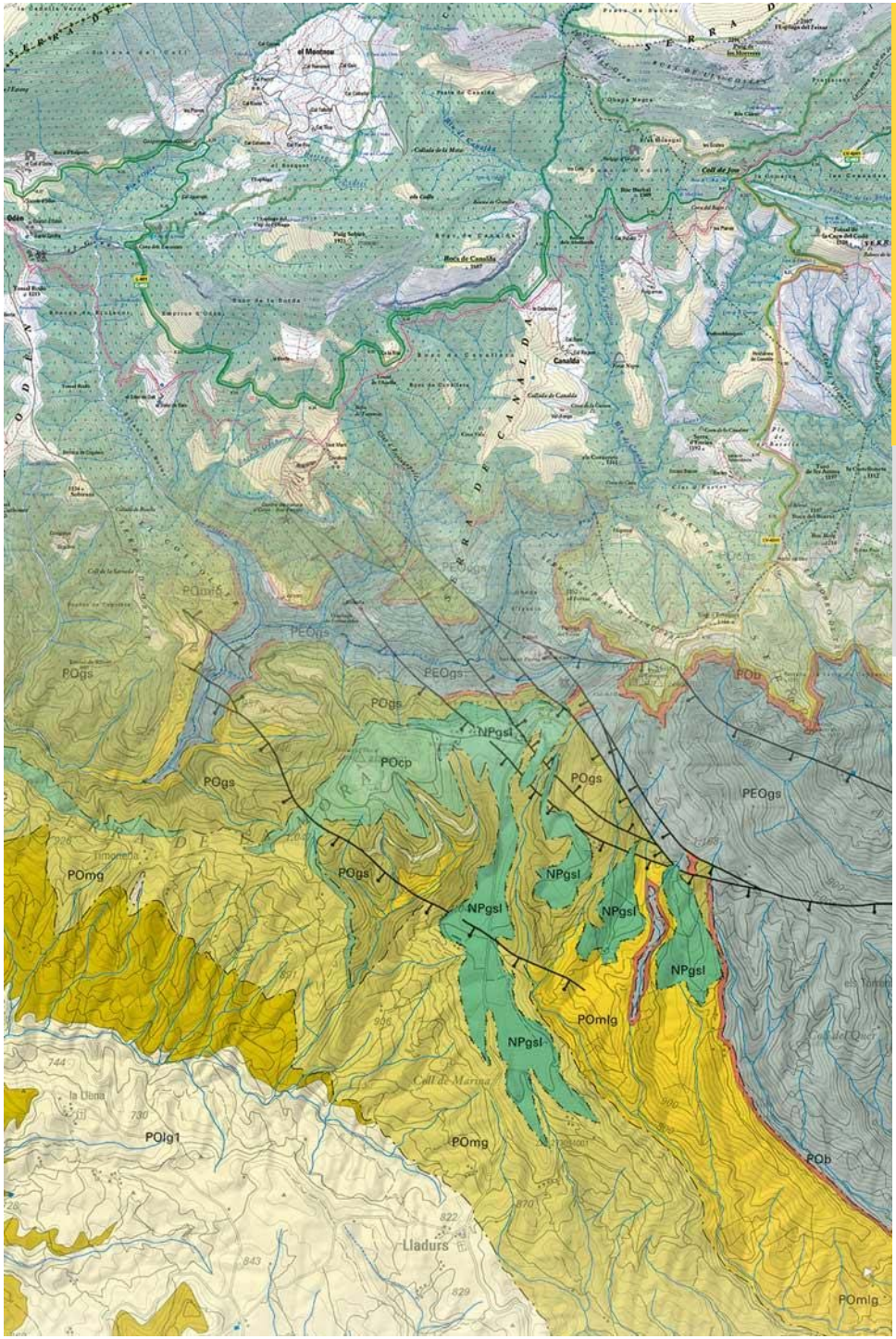


INTEROPERABILITY OF GEOLOGICAL DATA:

First ICGC INSPIRE Geological Data Model.

Dolores Boquera, Carme Puig, Xavier Berástegui and Jordi Escriu

ICGC
Institut
Cartogràfic i Geològic
de Catalunya

Generalitat
de Catalunya

INDEX

Next 15 minutes:

- **ICGC**
- **OUR CHALLENGE**
- **WHY INSPIRE?**
- **BEFORE MODELLING…**
- **WORKFLOW**
- **FACED PROBLEMS AND ADOPTED SOLUTIONS.**
- **RESULTS**
- **LESSON LEARNED**
- **WHAT IS THE NEXT….**

Introducing the ICGC
Origins & mission

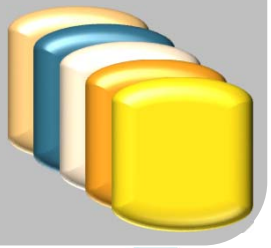
- Institute Cartographic and Geologic de Catalunya is the official Catalan mapping & geological agency, belonging to the Catalan Government and aiming to deliver to users valued geographic and geological information and services.
  - Founded in 1982 (ICC).
  - Institutional and commercial activities.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

OUR CHALLENGE…….Why INSPIRE?

Today

Multiple representation models portrayal oriented.

Data models for cartographical production (CAD)



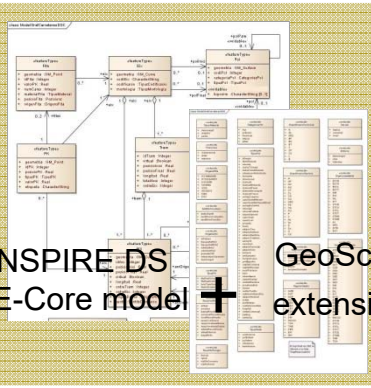
Printed geological maps series

WMS

ICGC Geoportal

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

Tomorrow



INSPIRE DS GE-Core model + GeoSciML extensions

INSPIRE compliant geological data model

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.

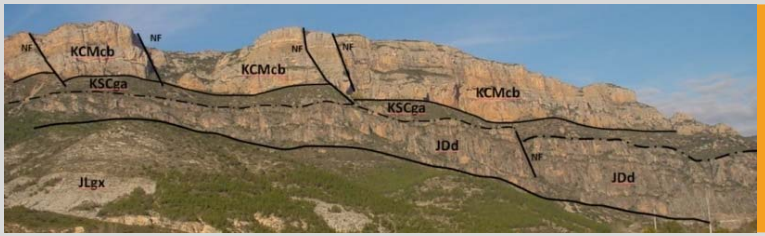
INSPIRE represents an excellent opportunity to fill the gap between multiple representation models to a single geological object oriented data model

Before start modelling…

We assume that:

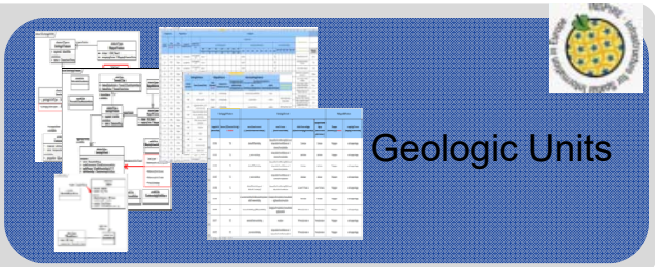
- Regional Geology knowledge and field mapping experience are required to build a geological data model.

Natural landscape



Geologic features

Geological map units



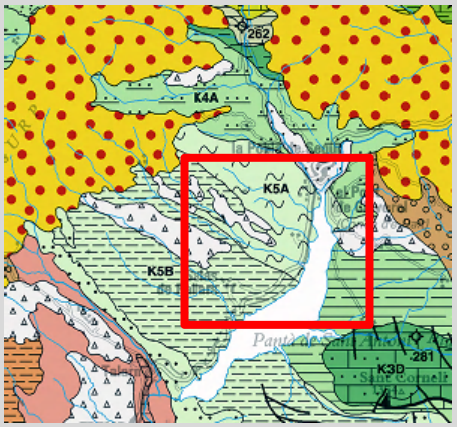
Geologic Units

Before start modelling…

We assume that:

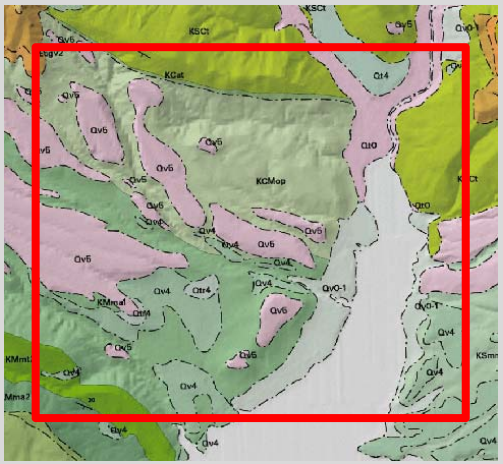
- Regional geology knowledge and field experience are required to build a geological model.
- The geological information resolution is related with the graphical scale so we consider as a Geological Collection each published geological maps series.

For a given area…



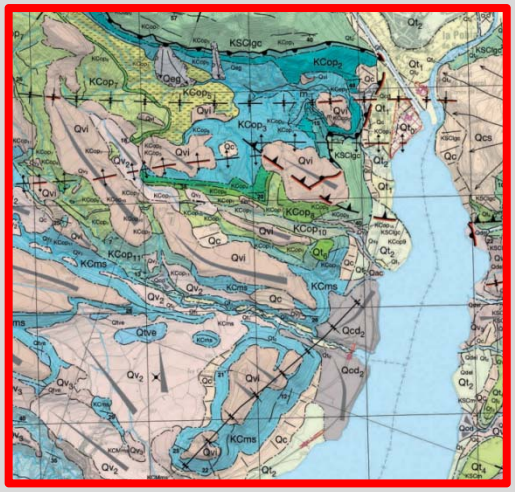
Geological map at 1:250 000

- 6 geological units



Geological map at 1:50 000

- 12 geological units



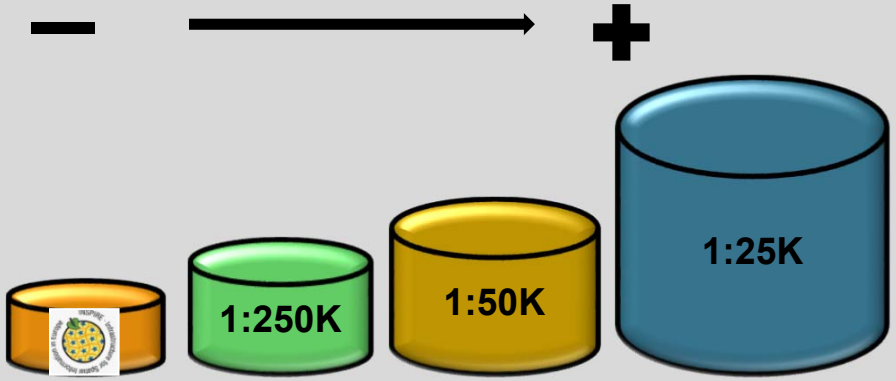
Geological map at 1:25 000

- 31 geological units

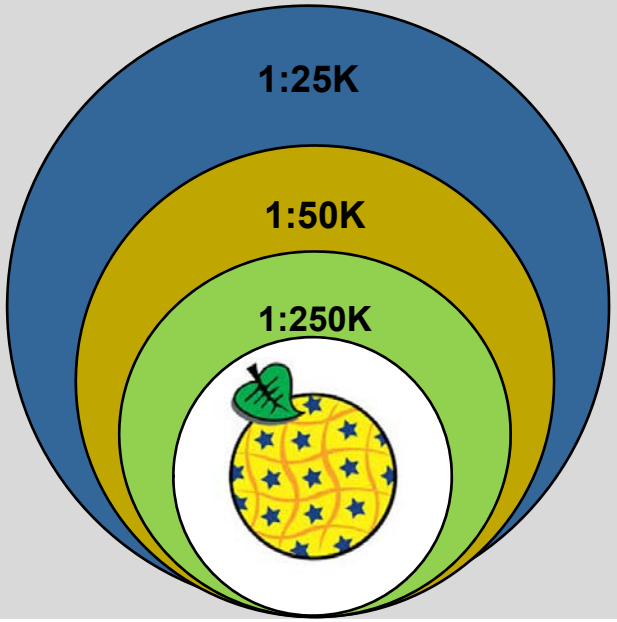
Before start modelling…

We assume that:

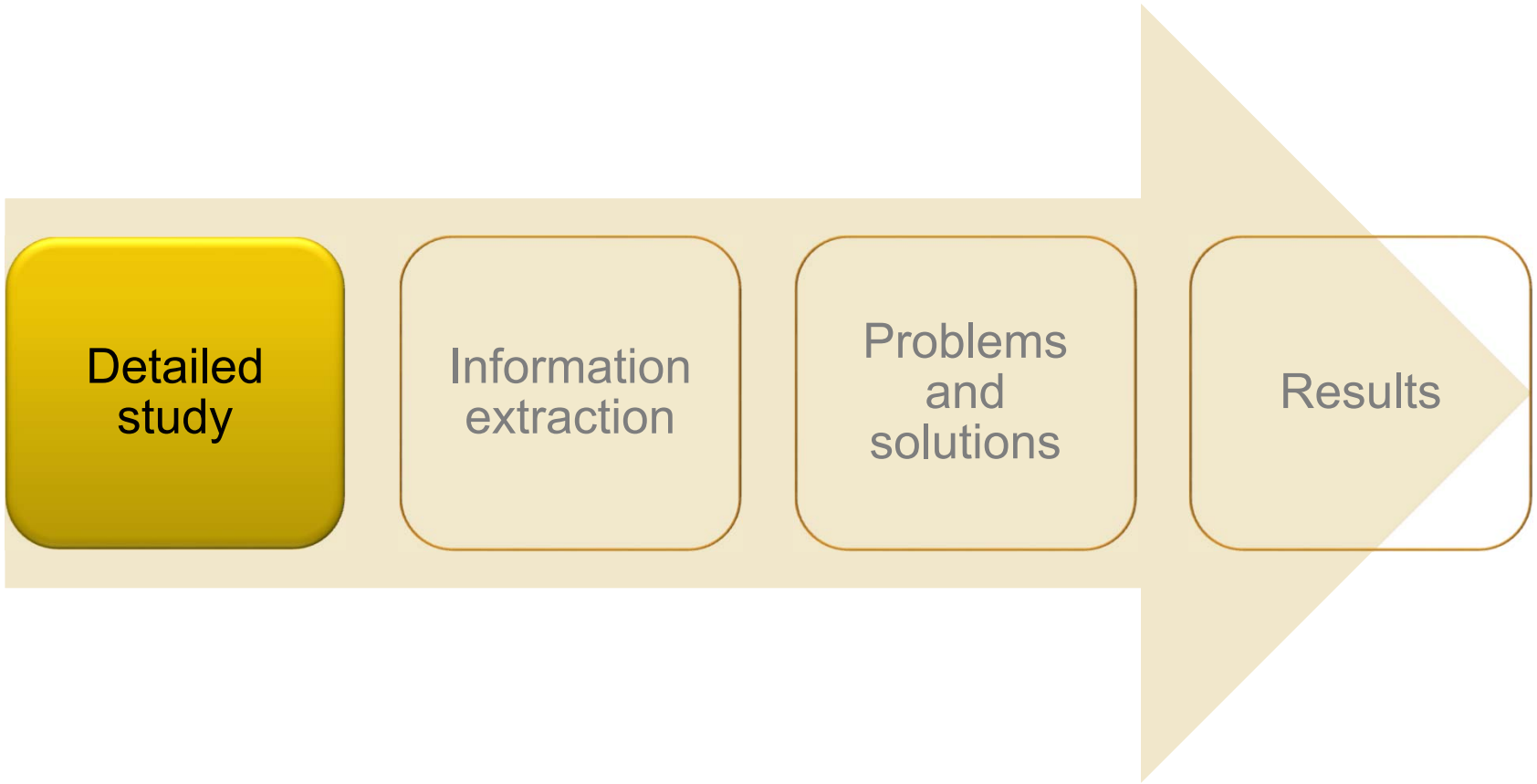
- Regional geology knowledge and field experience are required to build a geological model.
- Regarding geological information resolution, we consider as a Geological collection each published geological paper maps series.
- We start modelling geologic maps at scale 1:250.000 and we will continue with bigger scales, 1:50.000 and 1:25.000.



Geological collections' data models



Workflow


Detailed study
Information extraction
Problems and solutions
Results

Workflow. Detailed study.

INSPIRE Data Specification on Geology

INSPIRE
Infrastructure for Spatial Information in Europe

D2.8.II.4 Data Specification on *Geology* – Technical Guidelines

FeatureCatalogue
INSPIRE UML class diagrams

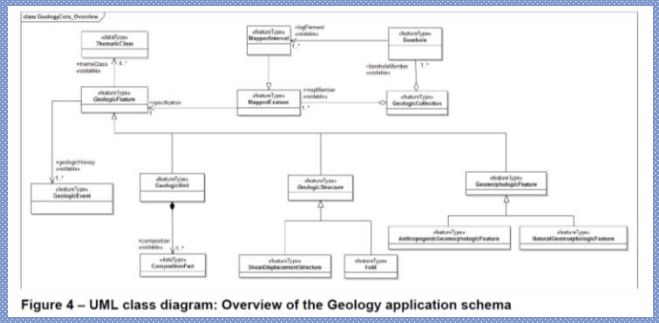


Figure 4 – UML class diagram: Overview of the Geology application schema

Annex C
CodeLists

INSPIRE		Reference: D2.8.II.4_v3.0	
TWG-GE	Data Specification on Geology	2013-12-10	Page 173

Annex C
(normative)
Code list values

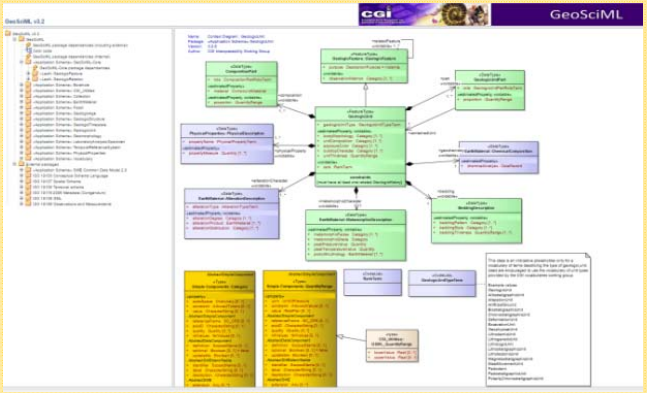
INSPIRE Application Schema 'Geology'

Annex D
Data model extensions

GeoSciML 3.2 Encoding Cookbook for INSPIRE WFS services

GeoSciML models v3.2 (last version 4.0)

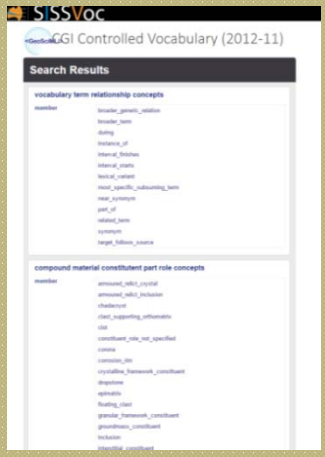
Analysis application schemas on the web



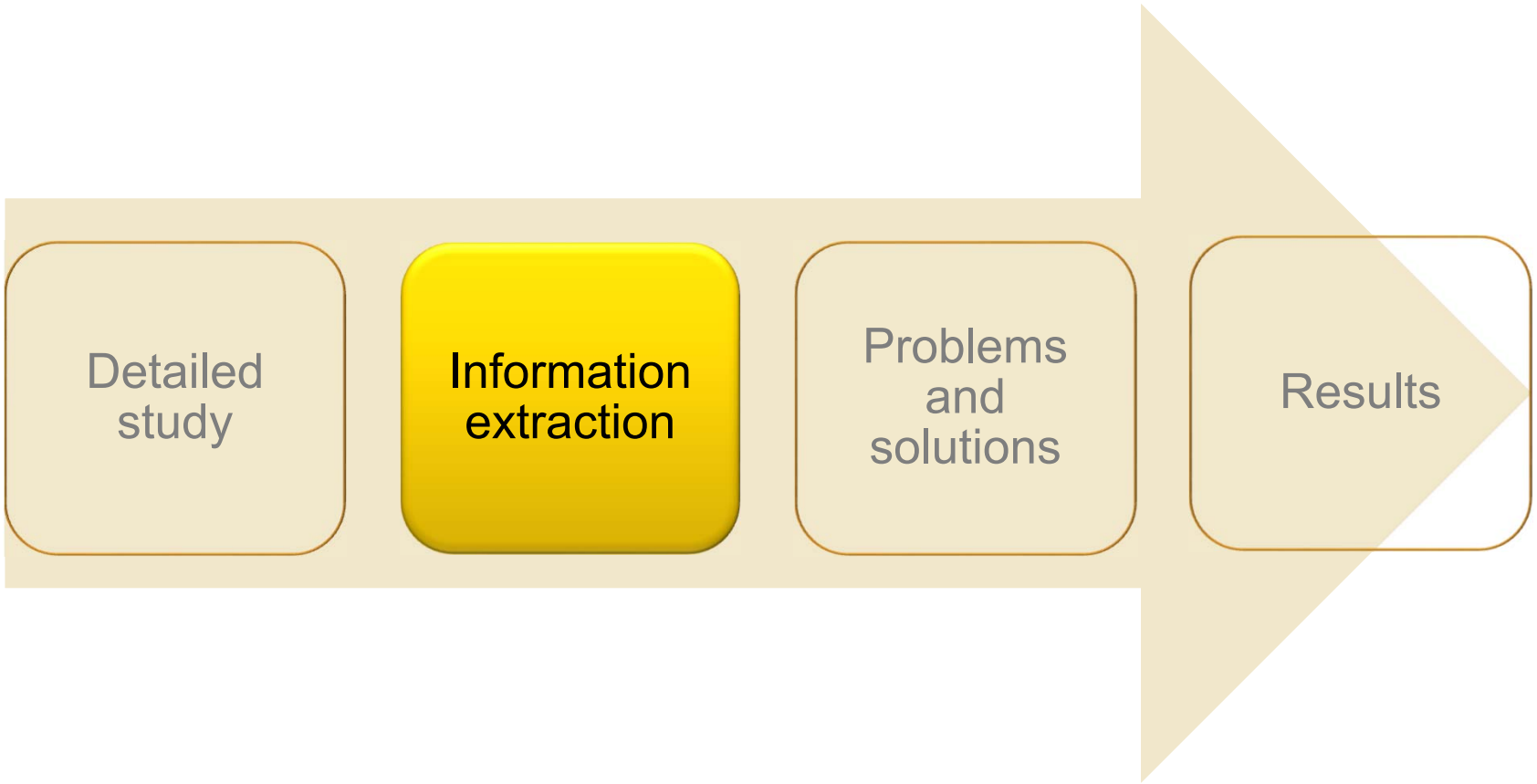
CGI Geoscience vocabularies service

Vocabularies used in GeoSciML from CGI

(*commission for the management and Application of GeoScience Information*).



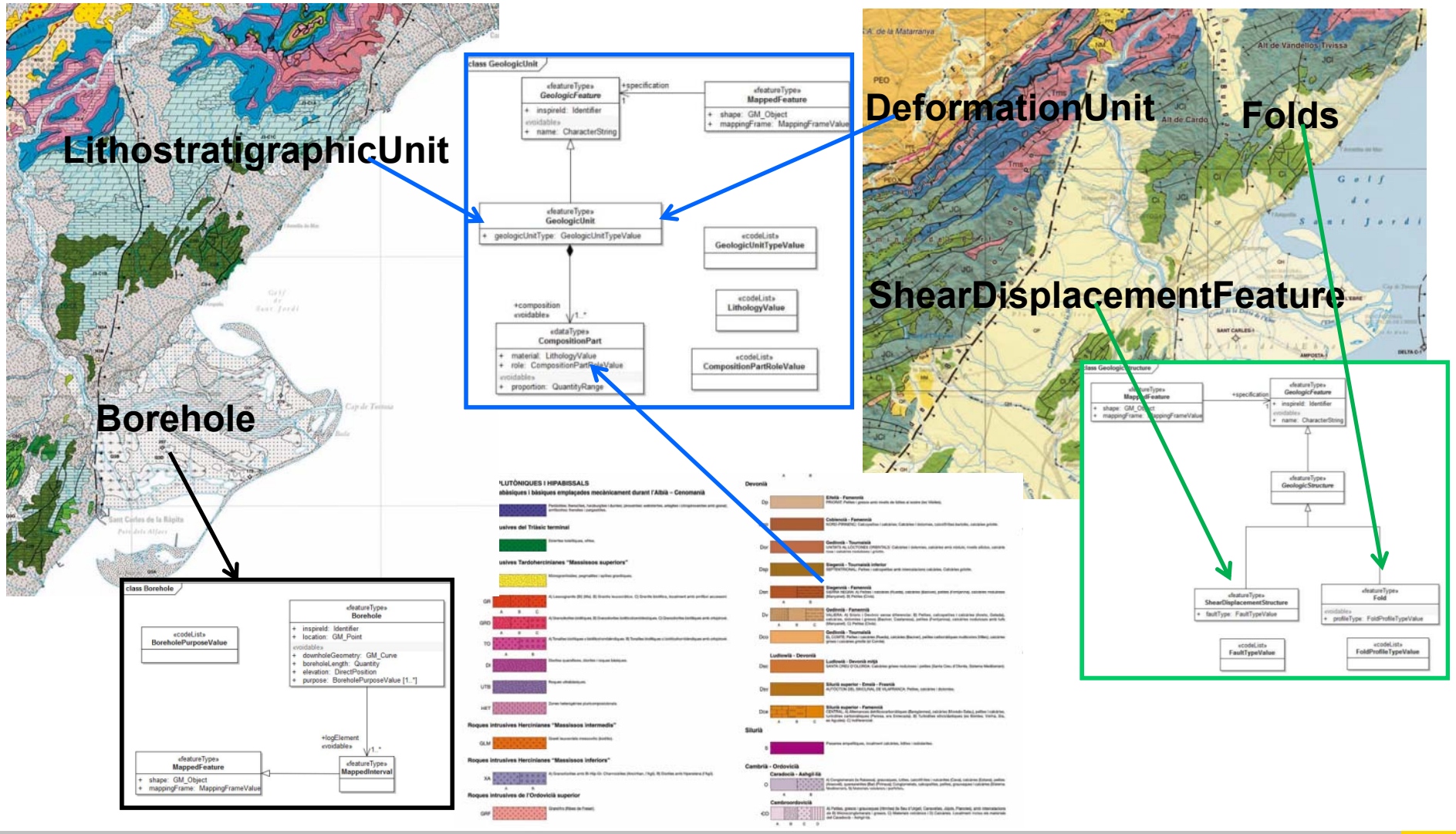
Workflow


Detailed study
Information extraction
Problems and solutions
Results

Workflow. Information extraction from geological published maps at 1:250 000 scale.

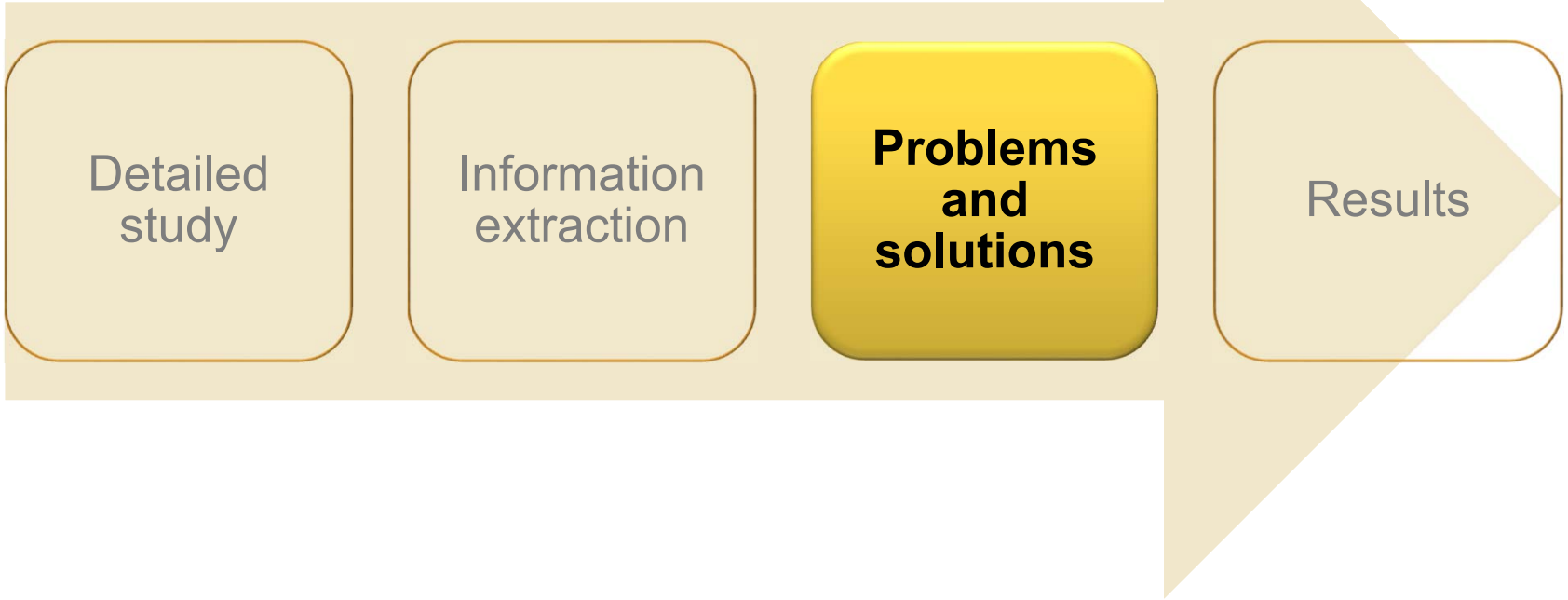
Geologic Map of Catalunya 1:250.000 (pub. 1989)

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



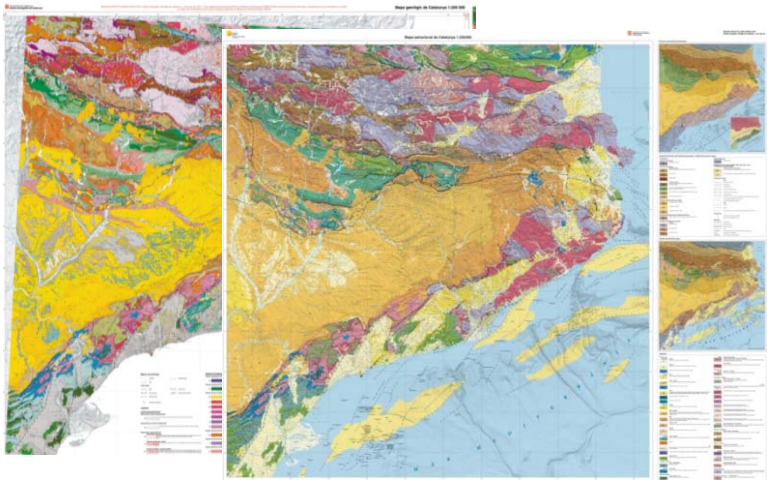
Workflow

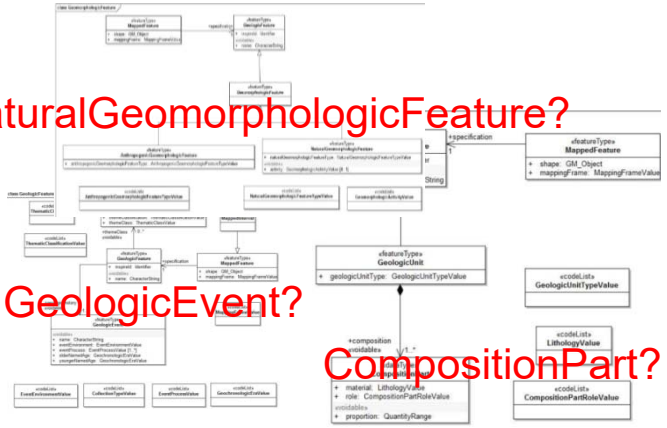
1. Implicit geological information
2. To avoid information loss
3. Terms equivalences
4. Stratigraphic time scale correlation



Workflow. Problems faced. *Implicit Information.*

Some geological information required by INSPIRE_IR are not always evident in published maps.



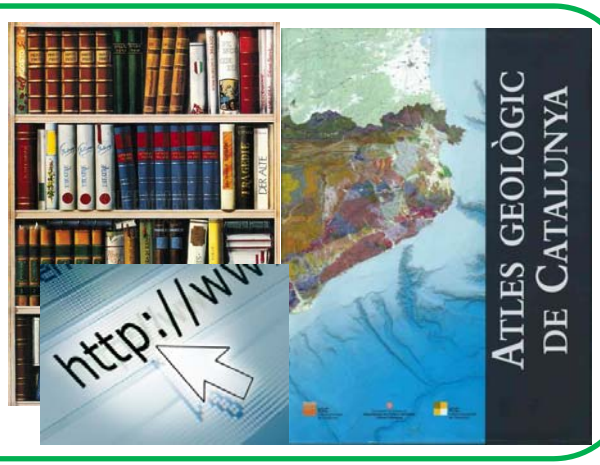


How do we proceed?

Applying expert geologic criteria.

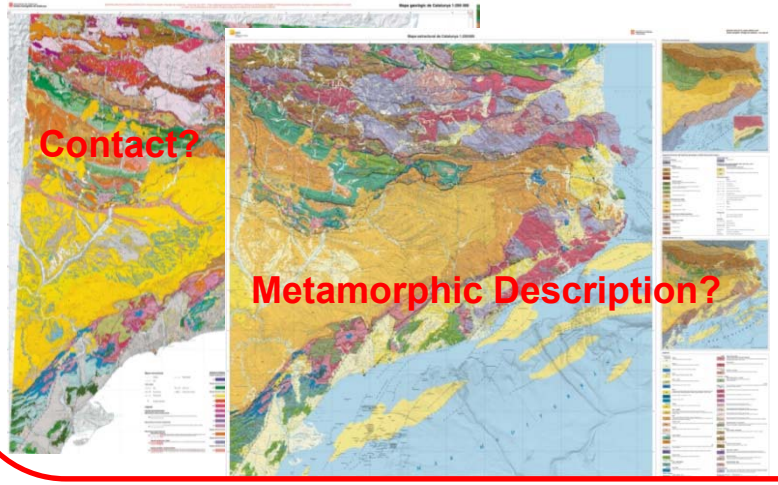
Other information sources: regional studies and bibliography.

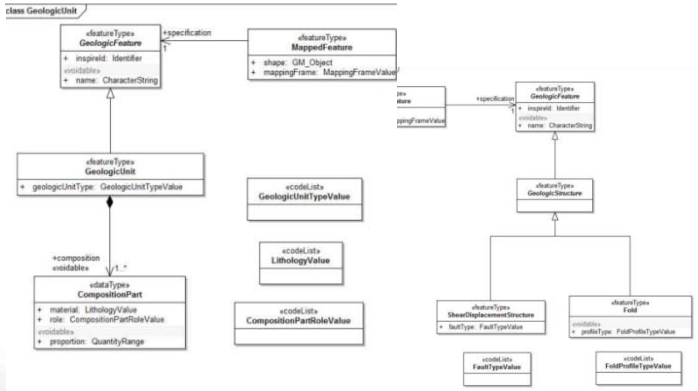
Regional geological knowledge is again required.



Workflow. Problems faced. *To avoid information loss.*

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

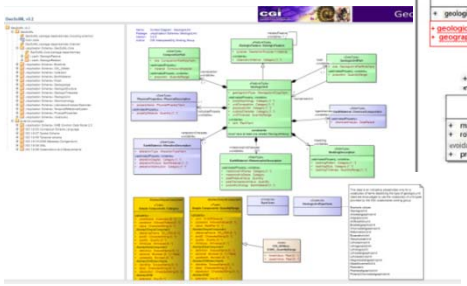


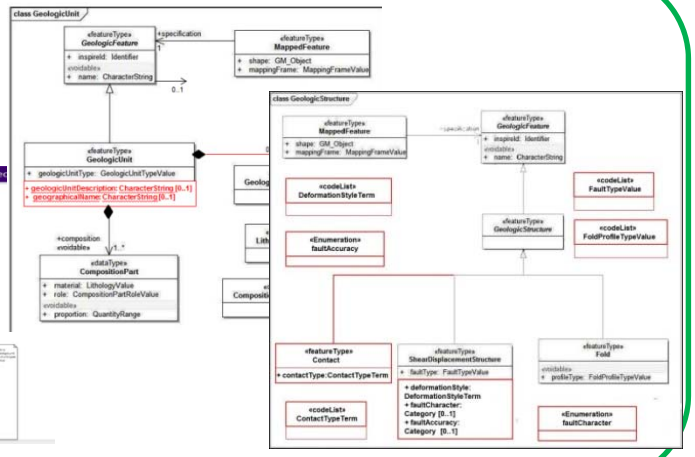


How do we proceed to avoid losses information ?

Using public data model extensions
GeoSciML & CGI Vocabularies

GeoSciML 3.2 Encoding Cookbook for INSPIRE WFS services





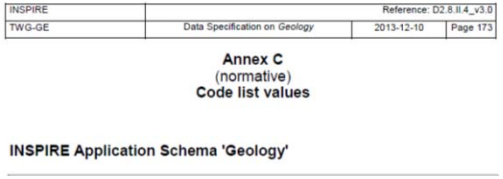
Workflow. Problems faced. *Equivalences of geological terms.*

ICGC geologic terminology not always fits with INSPIRE proposed terms .

Terme MGC250M	Equivalència INSPIRE_DataSpecification_GE_v3.0rc3_CodeList LithologyValueTerm
Calcarenita	grainstone
Margues	*carbonate sediment/ Impure carbonate sediment* (per els termes més moderns Quaternari i Terciari superior)
Margues	Impure *carbonate sedimentary rock* (per els termes més antics a partir del Paleogen)
Margocalcàries	carbonate sedimentary rock
Calcaries micrítiques	No s'ha trobat equivalència. Proposem nou terme.
Lutites sense consolidar	Mud Sediment
Lutites consolidada	Mudstone
- Pelita	lutita= Generic Mudstone
Metapelita	Shale (also schist ...?)
Arkosa	Sandstone

ICGC geologic terms

Annex C Data Specification CodeLists



INSPIRE			Reference: D2.8.II.4_v3.0
TWG-GE	Data Specification on *Geology*	2013-12-10	Page 173

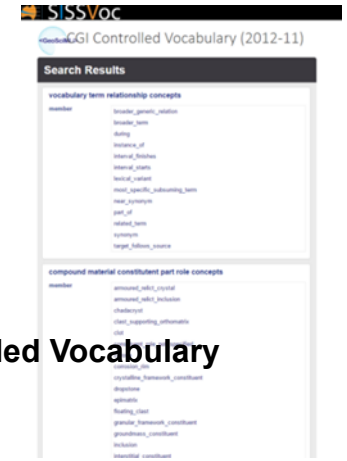
Annex C
(normative)
Code list values

INSPIRE Application Schema 'Geology'

How do we proceed?

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

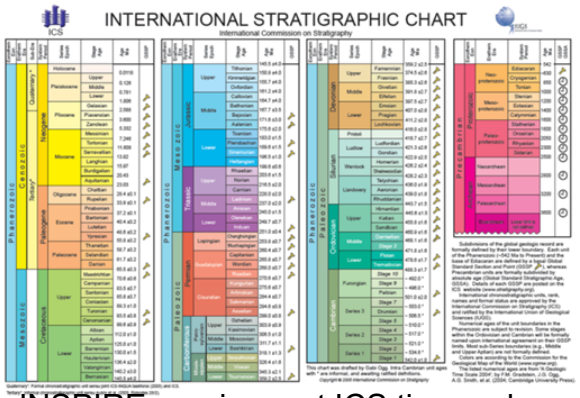
If any equivalence can be stablished: Proposing a new term to be added to the INSPIRE code lists.



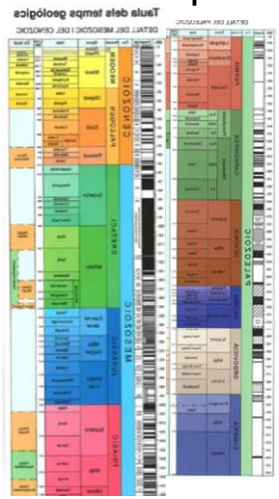
CGI Controlled Vocabulary

Workflow. Problems faced. *Correlation geological timescales*.

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



INSPIRE requirement ICS timescale.

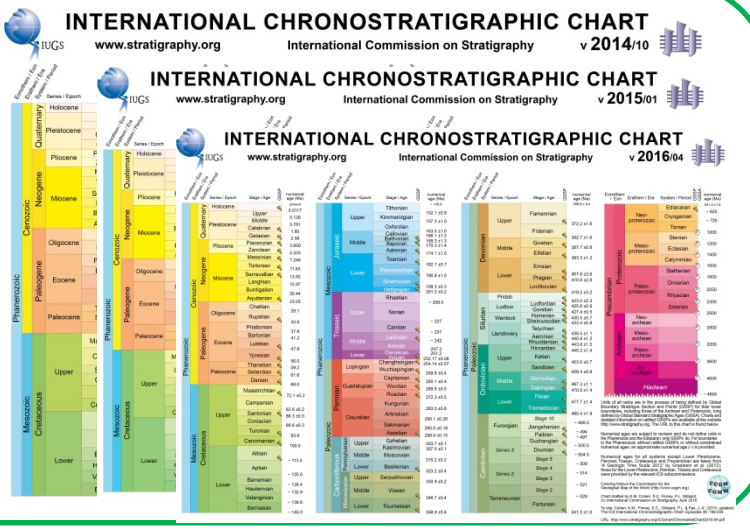


How do we proceed?

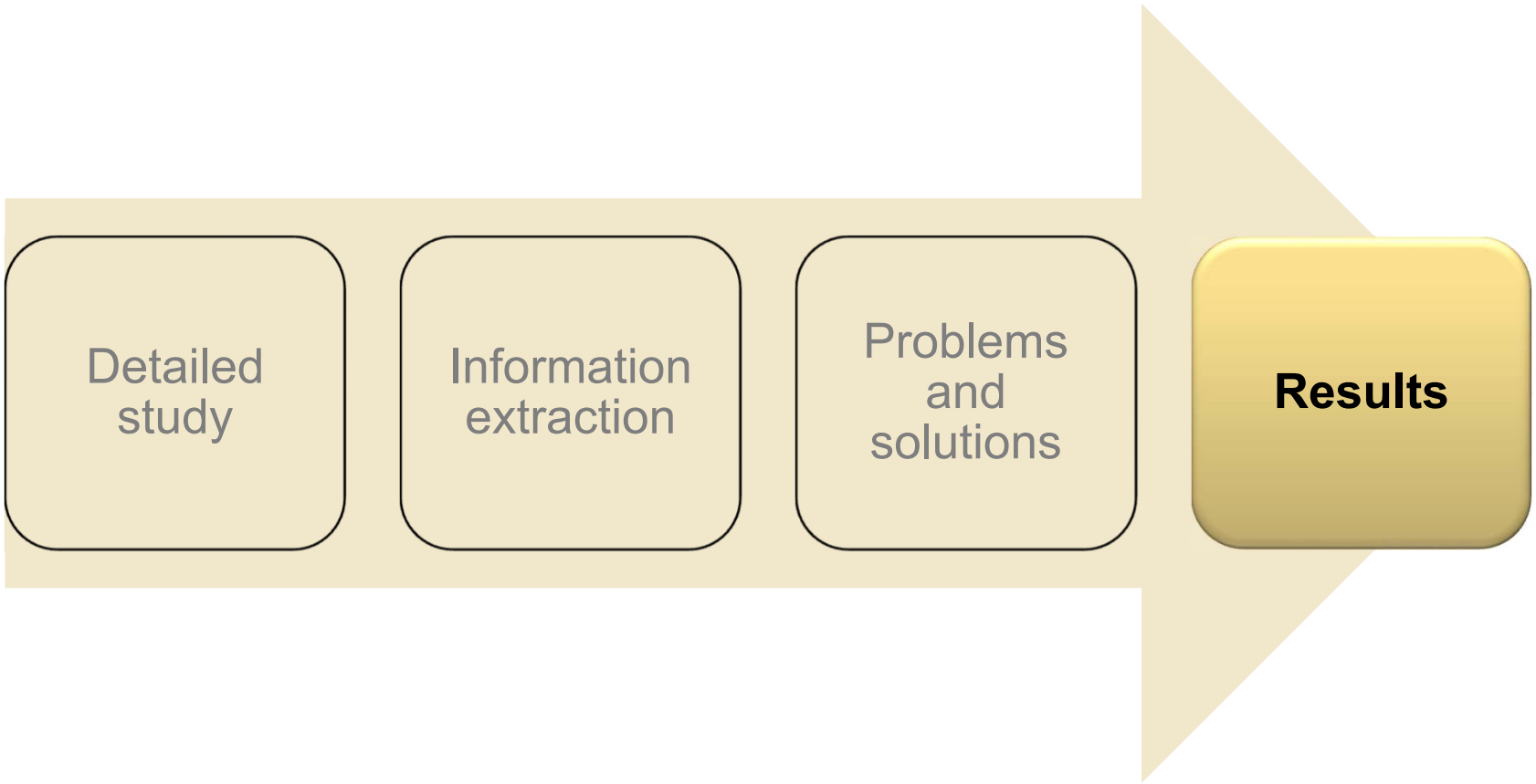
Taking the name of the era instead of that of the stage leads to a loss of information.

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

The geologic time-scales are not static!

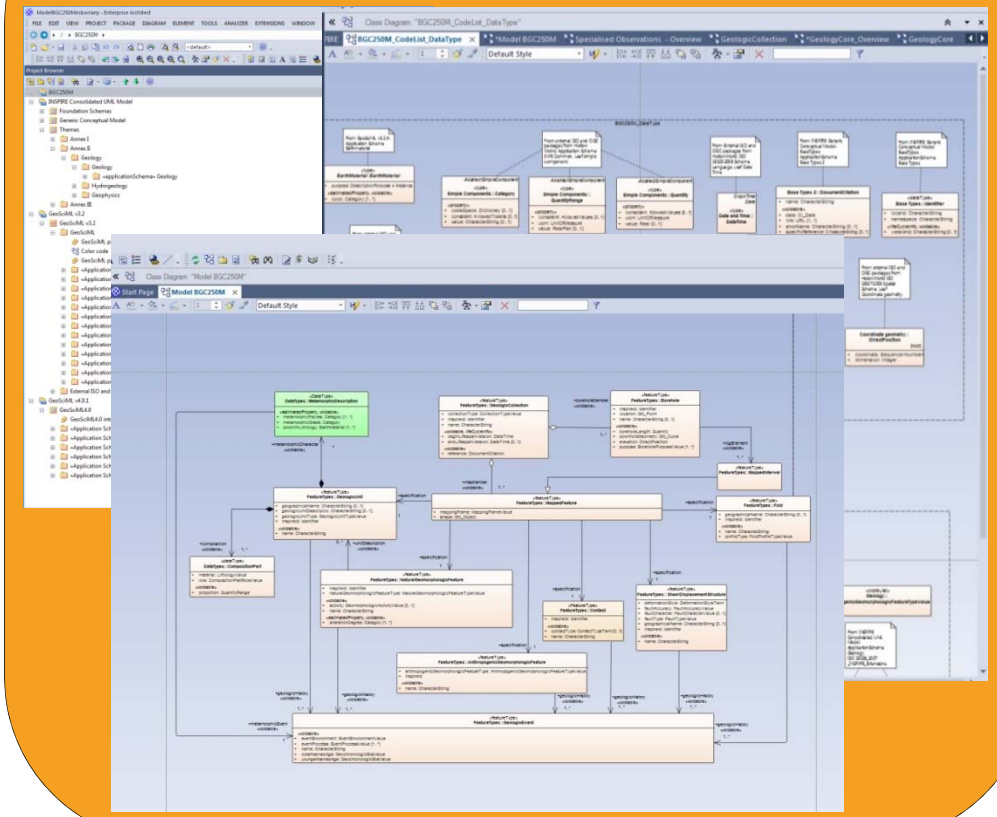


Workflow


Detailed study
Information extraction
Problems and solutions
Results

Results

Application schema in Enterprise Architect



ICGC Geological Collection 250K Data Specifications

Lessons learned

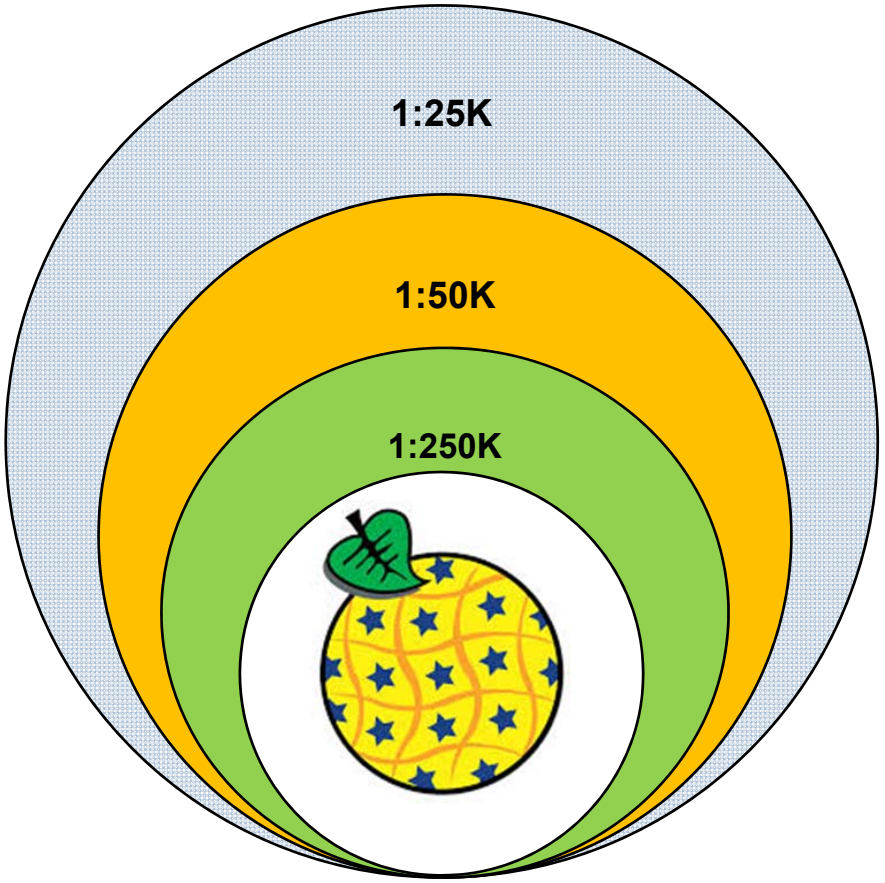
Implementing INSPIRE is an excellent opportunity to fill the gap between multiple representation models to a single geological object oriented data model

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

Institut Cartogràfic i Geològic de Catalunya

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