OneGeology-Europe: Data Harmonization across Europe
Challenges and recommendations -

Kristine Asch
and 1G-E Workpackage 3
• „Talented little sister“ of the global OneGeology initiative
• Funded by EC DG Information Society and Media with 2,7 Million € (total budget: 3,25 Million €)
• for 2 years
• 10 Work Packages
• 29 partners in 20 participating countries,
• Start: September 2008
### Participants

**OneGeology-Europe data provider and consortium member**

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Project deliverables

• Interoperable on-shore geology spatial dataset with "progress towards harmonisation"

• Geological vocabulary and data specifications for Europe

• Use case studies
• Multilingual metadata for discovery
• View services
• Forerunner and "guinea pig" for the implementation of INSPIRE Directive
Main aims

• Building a Geological spatial data infrastructure for Europe
• That includes: making geological information of Europe available for everyone,
• at a 1 : 1 Million scale,
• web accessible,
• interoperable,
• with „progress towards harmonisation“
• Interoperability – agreeing the data model/structure and the properties to describe its parts (what GeoSciML does)
  – E.g. agreeing a data model will have the feature of “GeologicUnit” with properties of “age” and “lithology”

• Semantic harmonisation – agreeing the use of the same definitions and classifications to describe a concept/term
  – E.g. ‘clay’. The same concept can be labelled with several terms (“argilla” in Italian, “Ton” in German), but needs to have the same definition, in this case: > 50% particles < 0,004 mm (Wentworth grade scale).

• Geometric harmonisation – coping with mismatches at national boundaries
- National boundary

- Basalt

- Semantic harmonisation

- Geometric harmonisation

- Harmonized!
A Common Vocabulary

OneGeology-Europe scientific geological vocabulary reviewed and completed (February 2010)

- Essential base for semantic harmonisation across political boundaries
- Enables comparability of the information
- Basis for cross-boundary planning

- 532 review comments from project partners, CGMW and CGI
- 516 agreed defined terms and definitions on:
  - Lithology (sedimentary, magmatic, metamorphic)
  - Geological age
  - Genesis (environmental process, event)
  - Faults
- > 100 new terms and definitions fed into the global CGI vocabulary
Particularly European properties (e.g. orogenies)
WP 3 Portrayal Rules
visualizing the content –
and its status of harmonisation …
Definition of the political boundary

Differing geographical reference:

Data gaps – no content

Boundary country A

Boundary country B
Differing scales of the original source data

Different levels of detail in the description of the geologic unit (here: age).
Different semantic description of the same geologic unit

Boundary of Italy and Slovenia: differing determination of the dominant lithology.

Italy/France: same geologic unit “age” described Cambrian / Carboniferous respectively
Discontinuity of geologic units and structures

- Border between Belgium and Germany (near Aachen)
  a) Displacement of a geologic unit at the national border,
  b) Artificial termination of a geologic unit at the border.
### Mismatch Matrix:

**Identification and classification of mismatches**

**NE Germany/NW Poland**

#### IDENTIFICATION MATRIX FOR OneGeology-Europe HARMONISATION

<table>
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<tr>
<th>No. Shipmap</th>
<th>Region</th>
<th>BGR (FID)</th>
<th>PGI (FID)</th>
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<th>geometric issue</th>
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- **id**: identical concept
- **dn**: directly node (direct broader or narrower concept)
- **sc**: similar concept (general similar petrography)
- **cc**: contrary concept (concept in parallel hierarchical node)
- **ne**: no entry, at least in one polygon
- **d**: different petrographical order
- **o**: open issue, dissenting topographical accuracy
- **n**: no issue, ok, perfect fit

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[Map and data visualization of NE Germany/NW Poland mismatch matrix]

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Challenges

• > 9000 Km political boundaries within 1G-E participants
• Hardly any country harmonises voluntarily its data with its neighbour‘s boundaries
• Distributed data: no central editing (as at Geol Map of Europe - IGME 5000)
• Agreement: 10 individual country representatives defining terms and definitions
• 20 national representatives reviewing
• The (English) project Language – a neverending source for misunderstanding
• -> target scale 1/1000.000
  Data delivered in 1/250.000, 1/300.000, 1/400.000, 1/500 000, 1/625 000, 1/1 000 000
• Communication between the geologists and informatics specialists

…
Geological harmonisation: Draft of a general workflow process

Required: parties use same conceptual model and vocabulary

Define properties to be harmonized

Define level of harmonisation

Identify and classify mismatches

Inform neighbours and start negotiating process

Solvable by negotiation?

Mark feature

Modify general unit

Modify just identified border polygones

Expert group

Tools: Mismatch matrix

Mediator

Generalize semantic /snap boundaries

Neighbours

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Bundesanstalt für Geowissenschaften und Rohstoffe and Natural Resources

Co-funded by the European Union

Federal Institute for Geosciences and Natural Resources
Sometimes unconventional measures could not be avoided ….

I will do anything, I will even HARMONIZE !!!

AAAAARGH!
Summary and Conclusions

• Solid base vocabulary to describe the geology of Europe
• OneG-E data vocabulary improved the global CGI vocabulary
• The 1G-E/CGI vocabulary: base for the INSPIRE Geology code lists of lithology, Genetic environment, process, faults, age, …
• Reviewed and agreed by 20+4 countries
• Harmonisation takes time: within 1G-E WP3 impossible to solve ALL harmonisation issues
• “progress-towards-harmonisation” report: guidance for future cross-border consistency and harmonisation
• A technical harmonisation tool would have helped considerably
• Astounding: complexity of the harmonisation issues, often further field work needed!
• Negotiation processes often needed
Thanks to:

- Ian Jackson
- Steve Richard, CGI
- Garry Baker
- Robert Tomas
- Jean-Jacques Serrano
- Agnès Tellez-Arenas
- Marco Klicker
- Horst Troppenhagen
- Dominique Janjou
- Mikko Nironen
- Urzula Stepień
- François Robida
- Milos Bavec
- Luca DeMicheli
- Claudia Delfini
- Aleksandra Kuczerawy
- Stephan Gruijters
- Mary Carter
- Marco Pantaloni
- Fernando Cerdan Perez
- Stefan Bergman
- Stefan Kacer
- Pierre-Yves Declerq
- John Laxton
- Jolanta Cylene
- Chris Schubert
- Sybille Hennings
- Kathryn Bull
- Alan Smith
- Pjotr Czupek
- Pavla Guertlerova
- Carlo Cipoloni
- and many more of the 1G-E Team ...