

**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

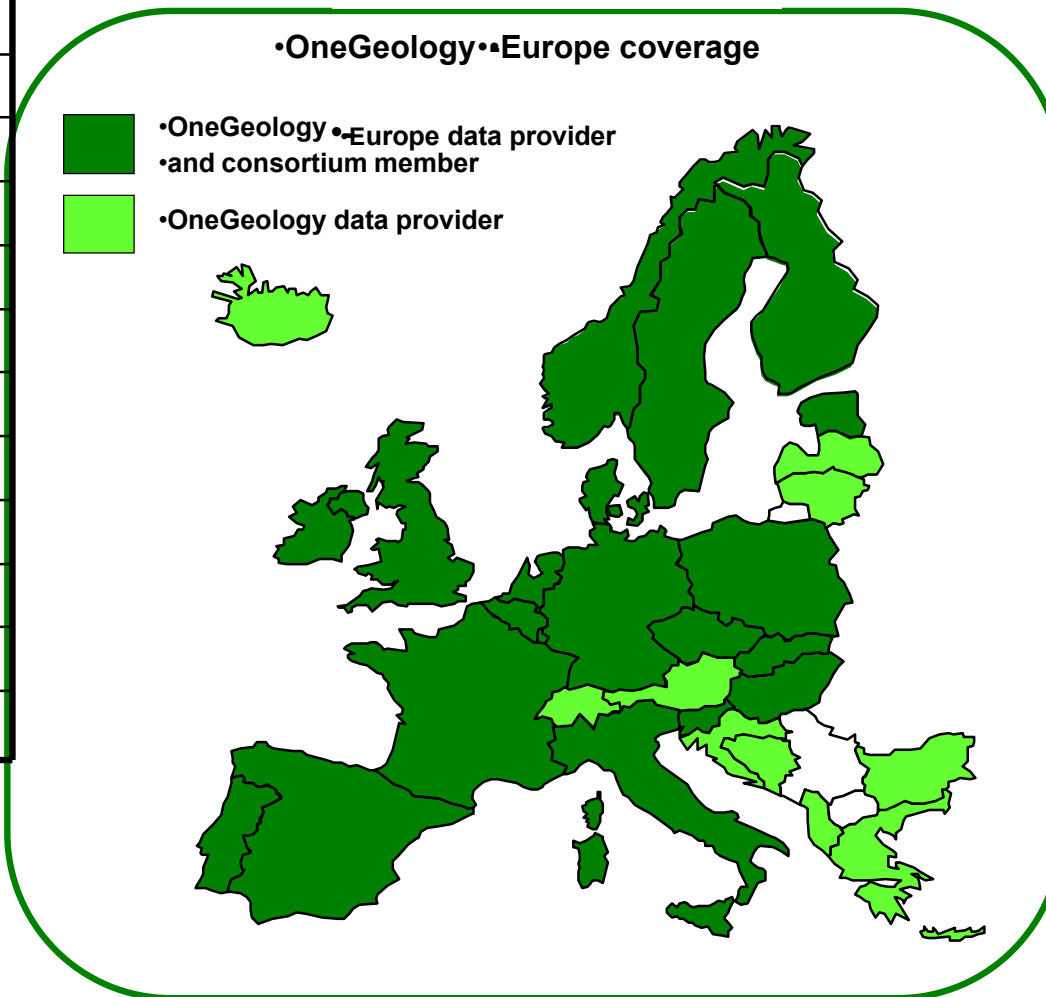
1	GB	BGS
2	DE	BGR
3	CZ	CGS
4	FR	BRGM
5	NL	TNO
6	IT	APAT
7	BE	KUL
8	DE	RuP
9	SE	SGU
10	SI	GeoZS
11	BE	GSB
12	FI	GTK
13	ES	IGME
14	NO	NGU
15	PL	PGI

•Participants

•OneGeology-Europe data provider
•and consortium member

•OneGeology ••Europe coverage

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



16	DN	GEUS
17	IE	GSI
18	PT	INETI
19	SK	SGUDS
20	EE	EGK
21	BE	Euromines
22	CZ	CENIA
23	GB	Landmark
24	-	EGS
25	SI	ARSO
26	GB	Lighthill
27	HU	MAFI
28	LU	SGL
29	IE	UCD

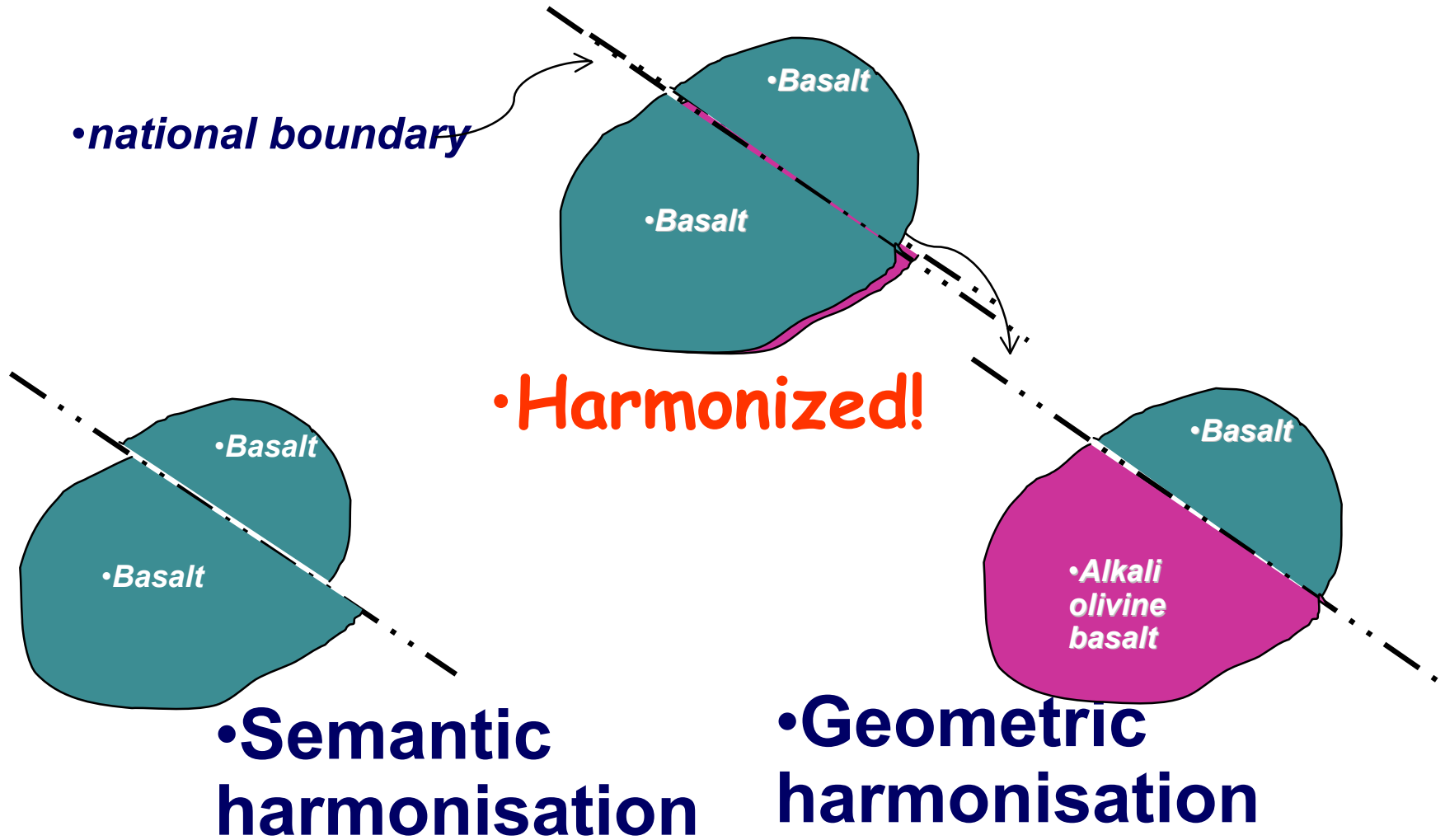


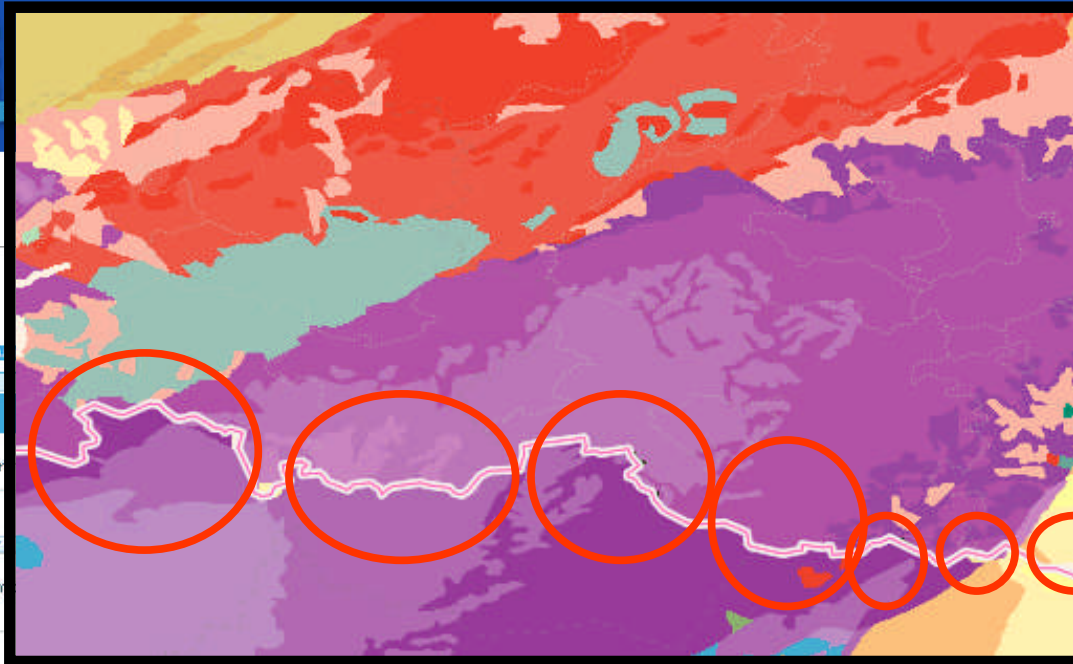
Project deliverables

- 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

- **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





Language :

Layers

Europe Administr

1GE - 1M:M Harro
Map

Move Up | Move Down

Modify Opacity

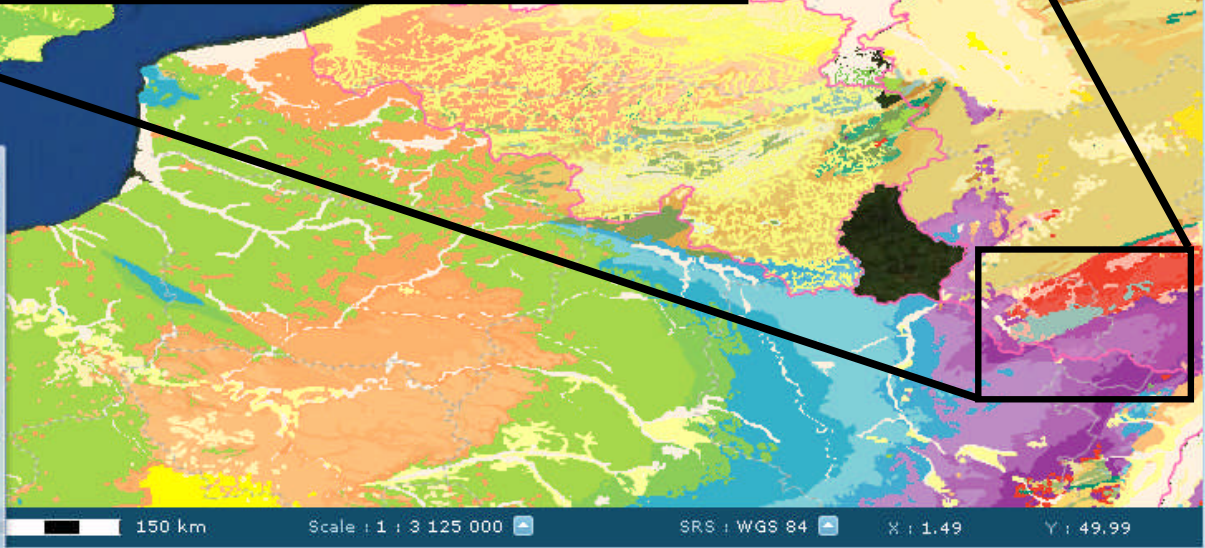
Remove Layer

Thematic analysis

View response time

Legends

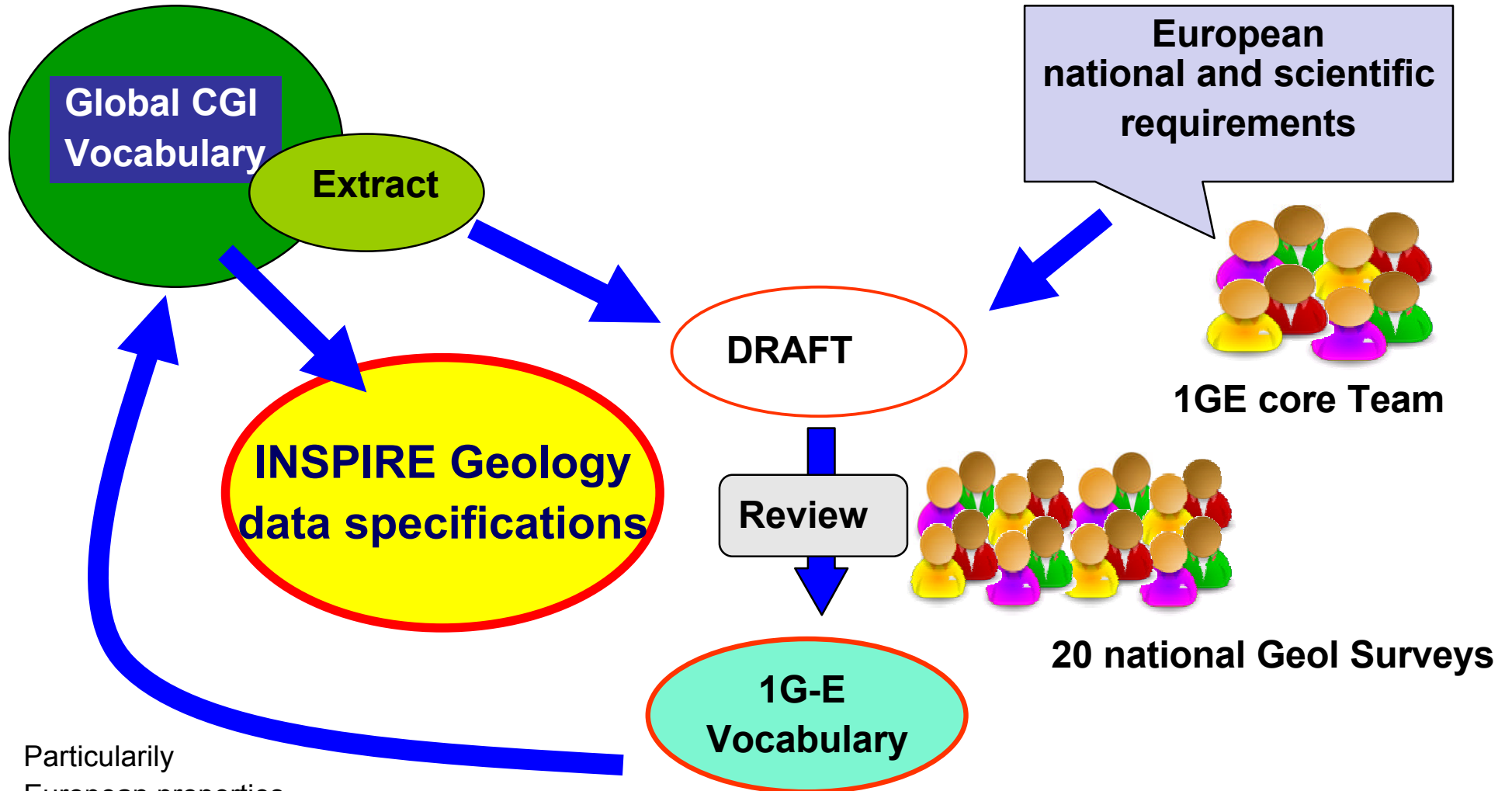
- Aeronian Age
- Albian Age
- Anisian Age
- Aptian Age
- Aquitanian Age
- Archean Eon
- Artinskian Age
- Asselian Age
- Bajocian Age
- Barrenian Age
- Bartonian Age



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 ...

OneGeology-Europe: WP3 Portrayal

Age: RGB Colour Code

Colours according to the Geological Time Scale 2009, International Commission of Stratigraphy, with the addition of 27 newly defined colours for the proposed new European Proterozoic Epochs

Period	Epoch	Age	Color
Phanerozoic	Quaternary	Holocene	Yellow
		Upper Pleistocene	Light Yellow
		Lower Pleistocene	Light Orange
		Calabrian	Orange
		Gravel	Dark Orange
		Preborean	Red-Orange
		Zanclean	Red
		Messinian	Dark Red
		Upper Messinian	Dark Purple
		Lower Messinian	Purple
Phanerozoic	Cenozoic	Neogene	Light Green
		Quaternary	Green
		Upper Miocene	Light Green
		Lower Miocene	Green
		Upper Pliocene	Light Green
		Lower Pliocene	Green
		Upper Pleistocene	Light Green
		Lower Pleistocene	Green
		Upper Pleistocene	Light Green
		Lower Pleistocene	Green
Phanerozoic	Palaeozoic	Upper Permian	Light Purple
		Lower Permian	Purple
		Upper Carboniferous	Light Purple
		Lower Carboniferous	Purple
		Upper Devonian	Light Purple
		Lower Devonian	Purple
		Upper Silurian	Light Purple
		Lower Silurian	Purple
		Upper Ordovician	Light Purple
		Lower Ordovician	Purple
Phanerozoic	Proterozoic	Upper Proterozoic	Light Blue
		Lower Proterozoic	Blue
		Upper Proterozoic	Light Blue
		Lower Proterozoic	Blue
		Upper Proterozoic	Light Blue
		Lower Proterozoic	Blue
		Upper Proterozoic	Light Blue
		Lower Proterozoic	Blue
		Upper Proterozoic	Light Blue
		Lower Proterozoic	Blue

OneGeology-Europe - Portrayal of Contacts and Structures

1. Contact Type

Table 1: The OneGeology-Europe contact type terms (mainly after CGI/GeoSAIL)

Contact Type	Geological Term	Geological Boundary	Geological Boundary, Internal	Symbol	A	B	C
01	Contact	Geological boundary	Geological boundary, internal		156	156	156
01.1.1	Volcanic subsidence zone boundary	Example			200	0	0
01.1.2	Head structure boundary	Tricks on the usage of the structure (For cartographers: The line should be drawn so that the labels are to the right in the drawing direction)			0	0	0
01.2	Oxalic structure line				204	204	204

OneGeology-Europe: WP3 Portrayal

Lithology: RGB Colour Code

Material Type	Material Name	Color
Igneous material	Andesite	Light Purple
	Basalt	Purple
	Basaltic andesite	Light Purple
	Basaltic gabbro	Purple
	Basaltic trachyte	Light Purple
	Basaltic tuff	Purple
	Basaltic tuffite	Light Purple
	Basaltic tuffite	Purple
	Basaltic tuffite	Light Purple
	Basaltic tuffite	Purple
Sedimentary Material	Sandstone	Light Yellow
	Siltstone	Yellow
	Shale	Light Orange
	Claystone	Orange
	Limestone	Light Green
	Dolomite	Green
	Marl	Light Green
	Mudstone	Green
	Siltstone	Light Green
	Siltstone	Green
Metamorphic Rock	Quartzite	Light Purple
	Schist	Purple
	Gneiss	Light Purple
	Amphibolite	Purple
	Amphibolite	Light Purple
	Amphibolite	Purple
	Amphibolite	Light Purple
	Amphibolite	Purple
	Amphibolite	Light Purple
	Amphibolite	Purple

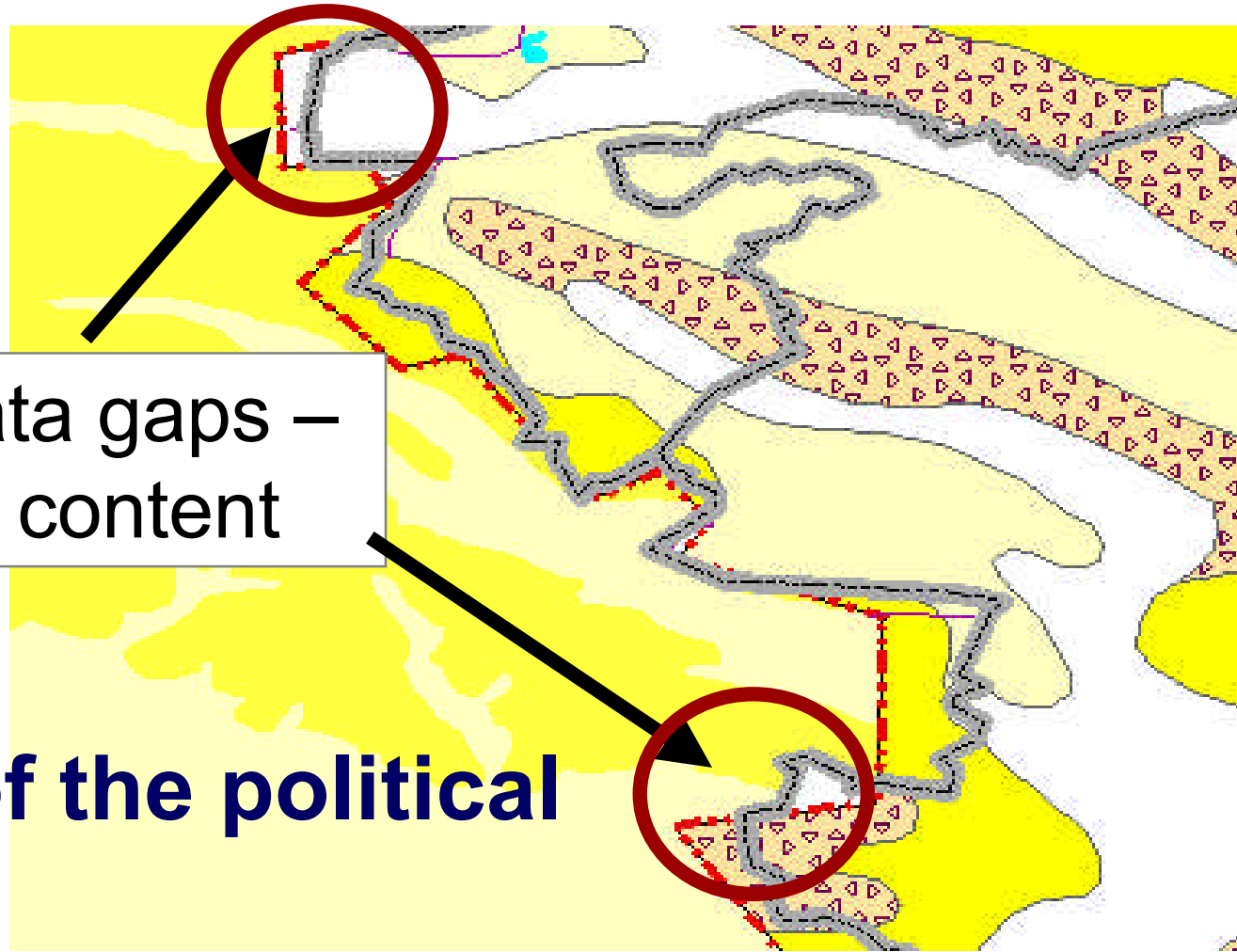


Boundary country A



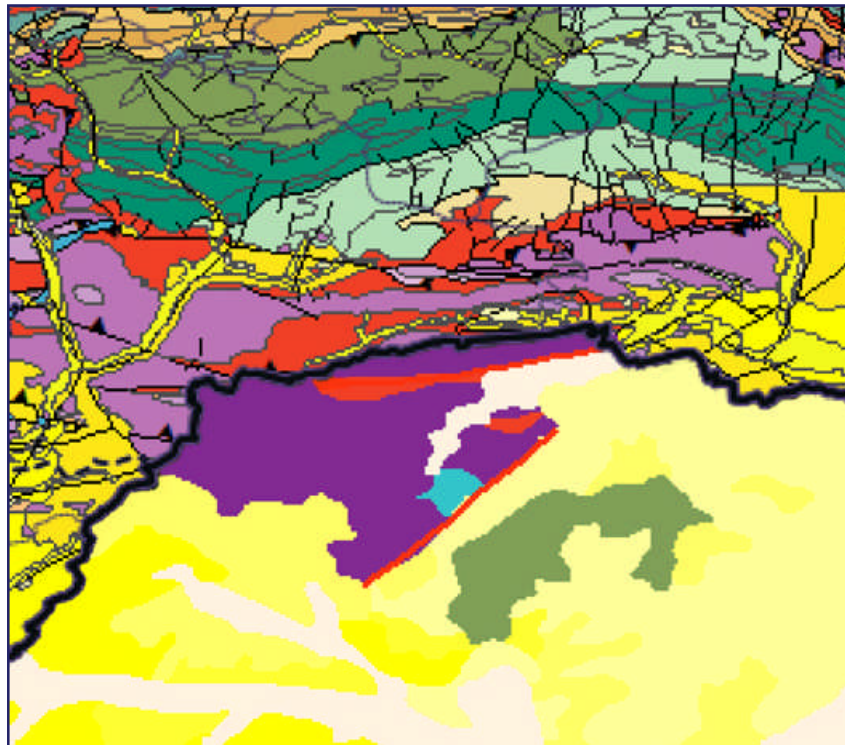
Boundary country B

Data gaps – no content

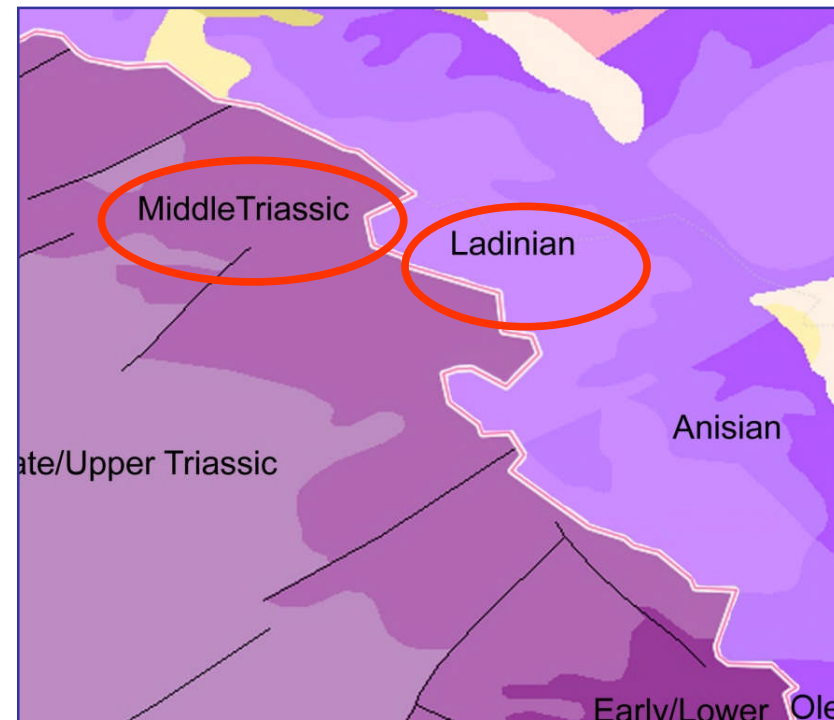


Definition of the political boundary

Differing scales of the original source data

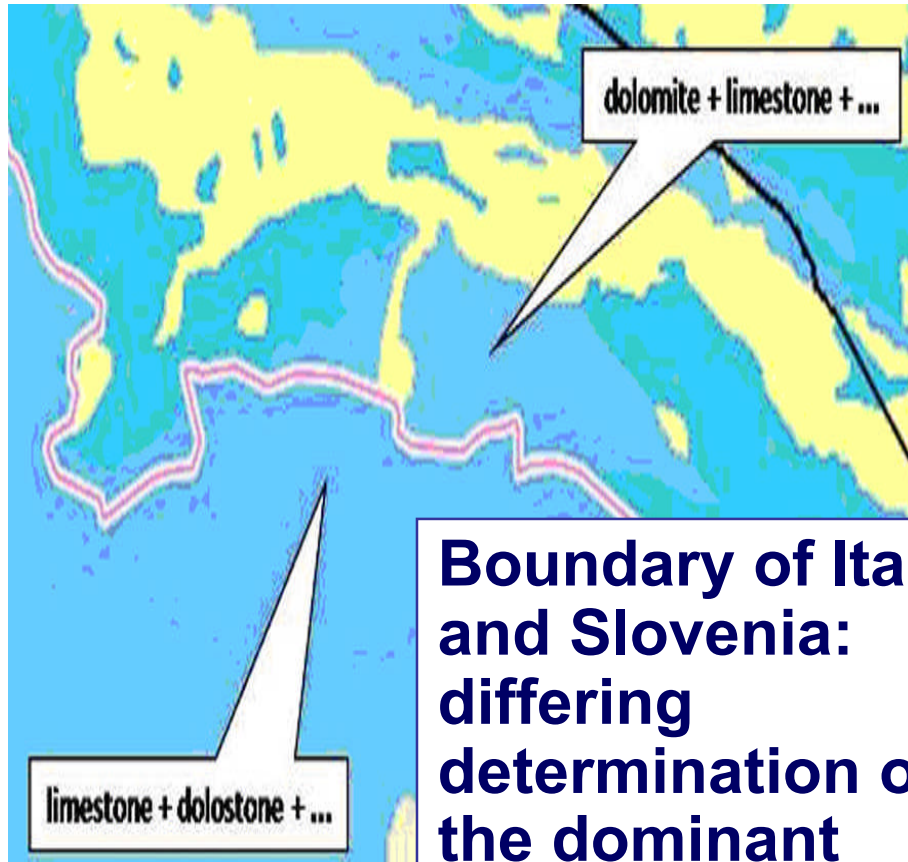


Different levels of detail in the description of the geologic unit (here: age).

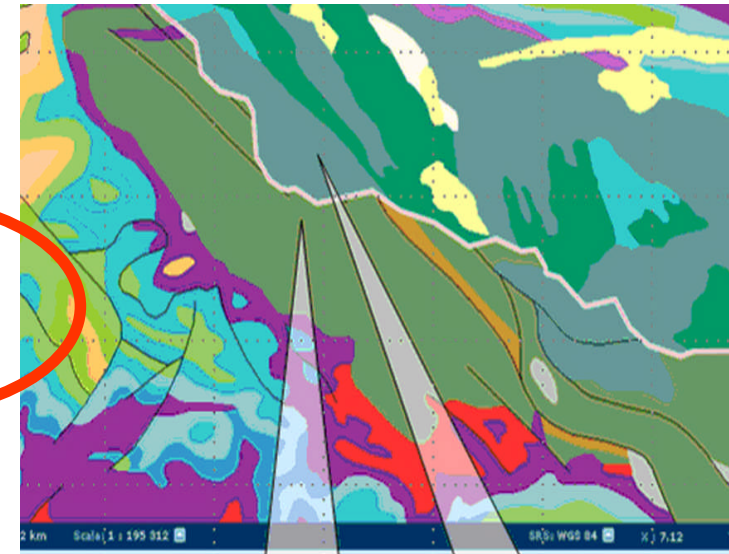


Different semantic description of the same geologic unit

ion



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



Cambrian

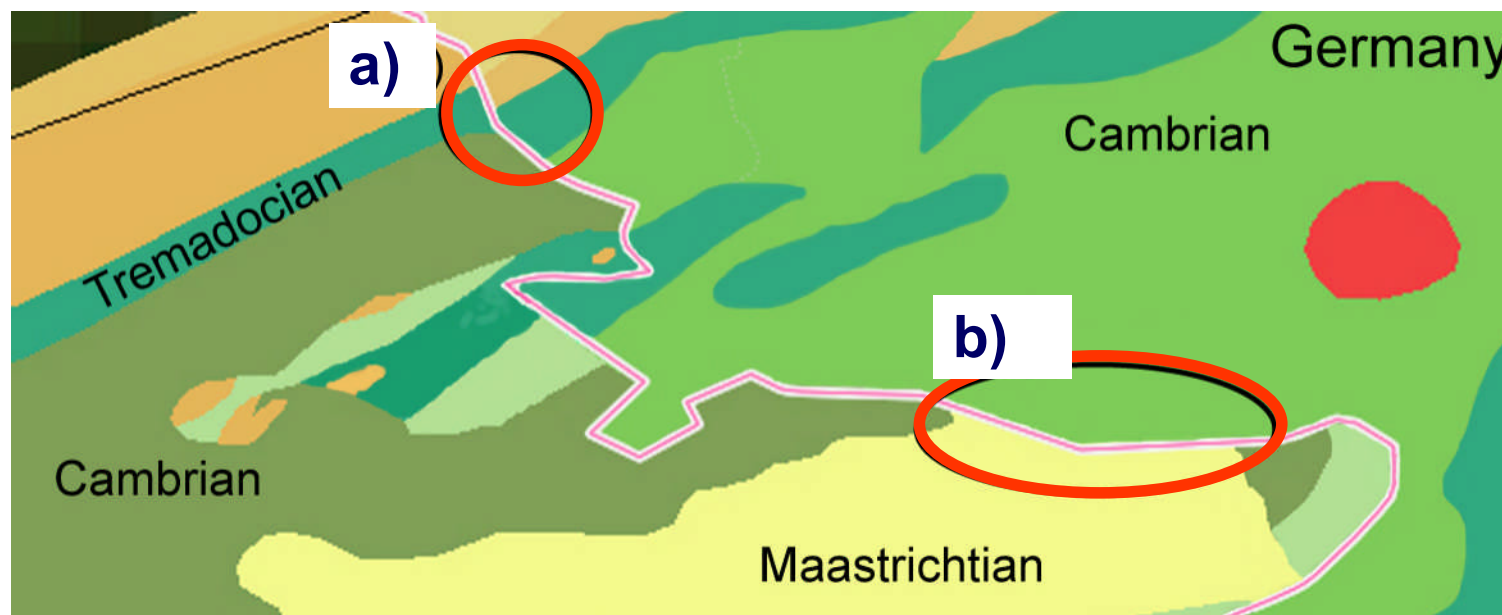
Carboniferous

**Italy/France: same
geologic unit "age"
described Cambrian /
Carboniferous
respectively**

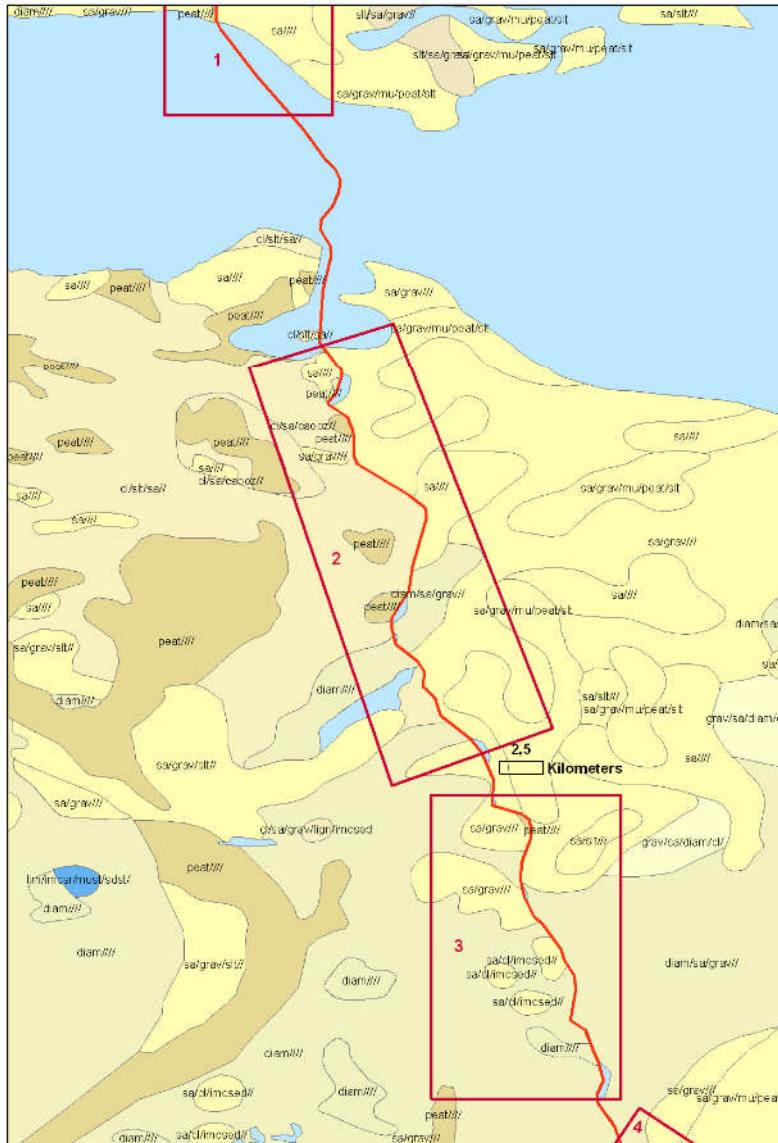
Discontinuity of geologic units and structures

nion

- **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
BGR / PGI

No. Stripmap	Region	BGR [FID]	PGI [FID]	topographic issue	geometric issue	litho_1 (portrayal)	litho_2	litho_3	litho_4	litho_5	Petrographic order
1	Swinemünde / Świnoujście	909	87	o	o	id	id	id	id	id	n
		985	87	n	n	cc	cc	cc	cc	cc	n
2	Neuwarper See / Jezioro Nowowarpieńskie	1250	78	o	o	sc	sc	sc	ne	ne	d
		1250	77	o	o	sc	sc	sc	ne	ne	d
		1348	78	o	o	id	ne	ne	ne	ne	d
		1364	- (78)	o	o	sc	ne	ne	ne	ne	d
		1411	78	o	o	sc	ne	ne	ne	ne	d
		1411	8	o	o	sc	sc	sc	ne	ne	d
		1411	75	o	o	sc	sc	sc	ne	ne	d
		1637	75	o	o	id	ne	ne	ne	ne	n
		1637	77	o	o	sc	ne	ne	ne	ne	n
1781	77	o	o	sc	ne	ne	ne	ne	d		
1793	77	o	o	id	id	id	id	id	n		

- 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

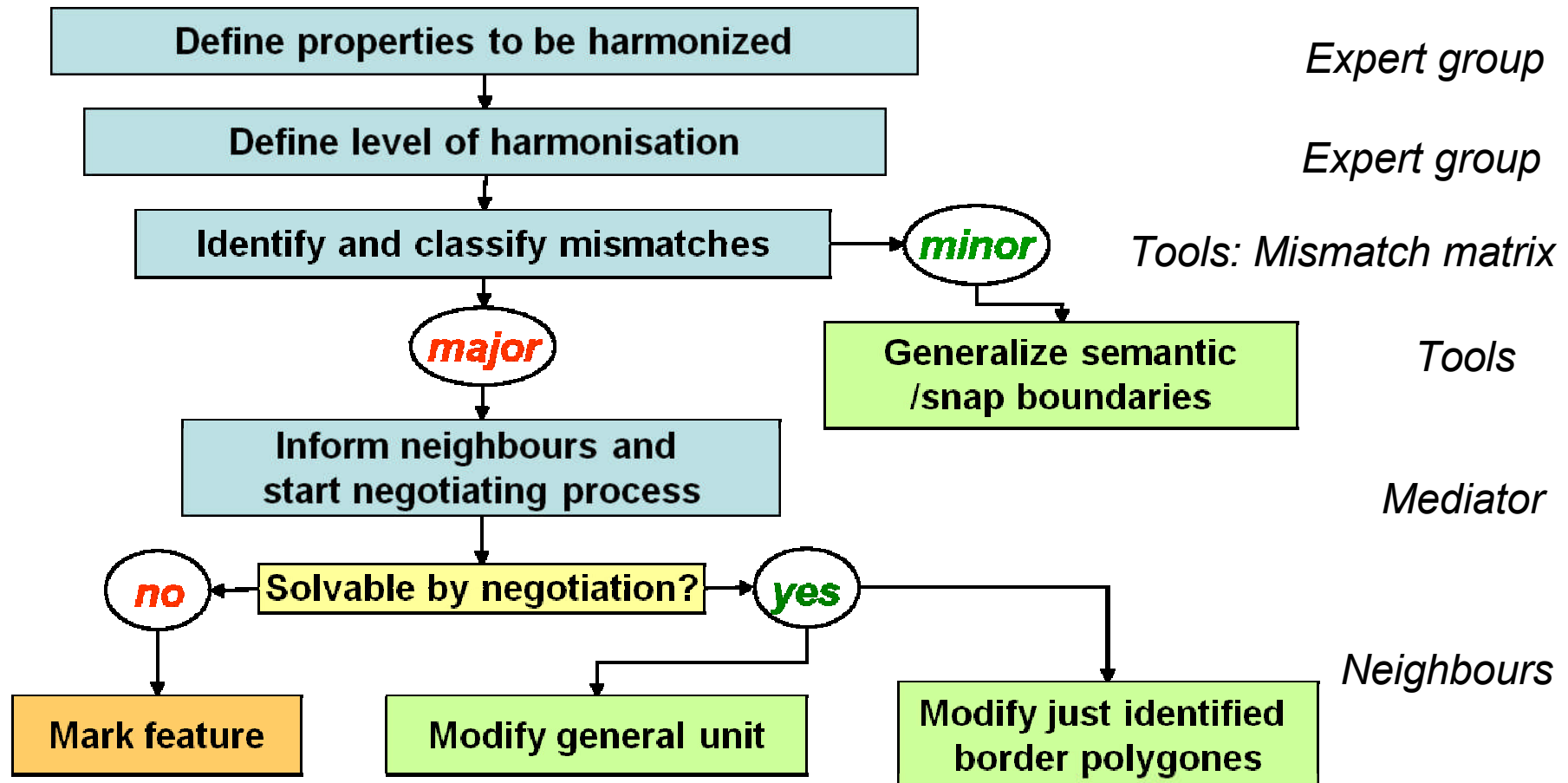
- d** different petrographical order
- o** open issue, dissenting topographical accuracy
- n** no issue, ok, perfect fit



- **> 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**

...

Required: parties use same conceptual model and vocabulary



Sometimes unconventional measures could not be avoided



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

AAAAARGH!

- **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**

- *Ian Jackson*
- *Steve Richard, CGI*
- *Garry Baker*
- *Robert Tomas*
- *Jean-Jacques Serrano*
- *Agnès Tellez-Arenas*
- *Marco Klicker*
- *Horst Troppenhagen*
- *Dominique Janjou*
- *Mikko Nironen*
- *Urzula Stepien*
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- *Pjotr Czupek*
- *Pavla Guertlerova*
- *Carlo Cipoloni*
- *and many more of the 1G-E Team ...*



The 1G-E Harmonisation Team