THE IMPACT OF THE INSPIRE DIRECTIVE ON GEOLOGIC DATA MODELS OF GEOLOGICAL SURVEYS. THE IGME (SPAIN) CASE

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1

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y Minero de España

Who are we?

The Instituto Geológico y Minero de España (Geological Survey of Spain)

– Senior (founded 1849) public research autonomous institution attached to the Ministry of Science and Innovation

– Main Earth Sciences Research Centre of Spain. Total 447employees, 341graduated

– Specialized in various fields of activity such as geology, environment, hydrogeology, mineral resources, natural hazards and land use planning

– IGME facilities, including its headquarters, project offices in several places around the country, laboratories, warehouses, drill core repository , library and museum, are equipped with advanced technology and technical resources

– IGME is the national centre for the creation of knowledge infrastructure, information and R&D in Earth Sciences

INSPIRE THEMES AND THE IGME

Geology

Natural risk zones

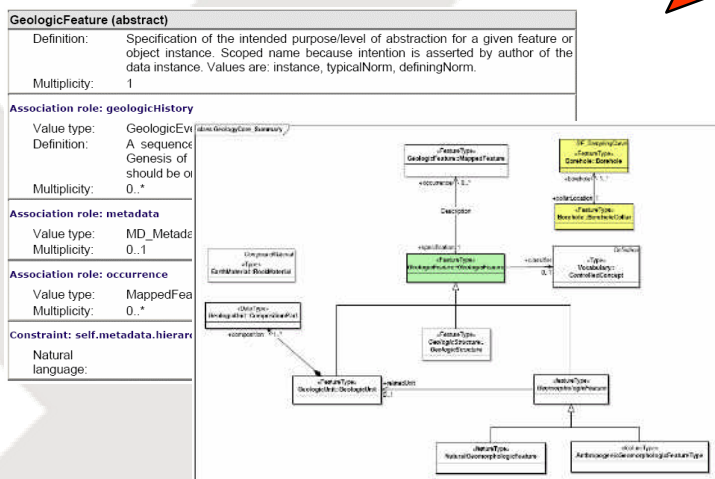Mineral resources

Soils

Energy resources

Protected sites

Geological Surveys are involved in several of these themes. Some of them are closely related with the activities and responsabilities of Geological Surveys.

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3

INSPIRE REQUIERES

Metadata

Interoperability of spatial datasets

Network services

Data model

Terminology

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4

IGME'S GEOLOGIC MAPS (I)

National Geologic Map at 1:50.000 scale – MAGNA (1970-2003) - 1.135 sheets

- Sheets are independent, don't match on borders.
- Different topographic references, geology doesn't fit with latest ones.
+ Explanatory report.
+ Complementary information: samples, chemical analysis, …

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5

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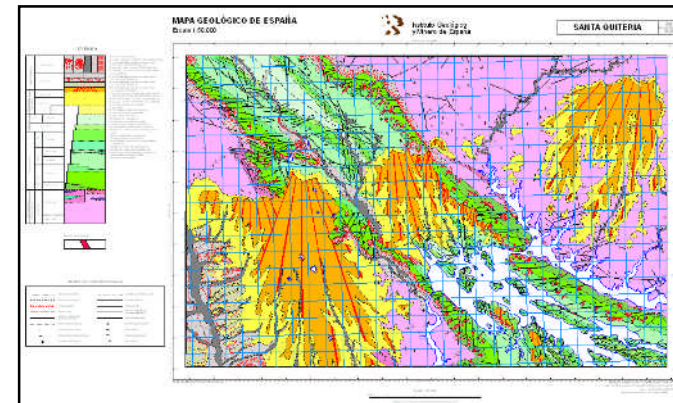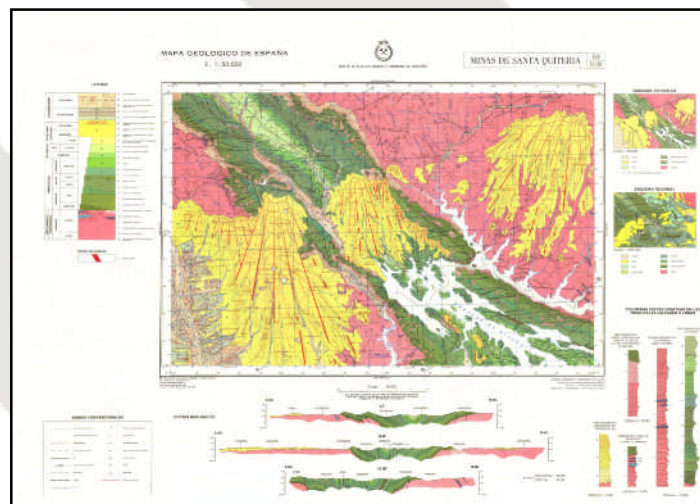
IGME'S GEOLOGIC MAPS (II)

Continuous Geoloigc Digital Map at 1:50.000 scale – GEODE (2006-2013)

20 continental zones and 10 insular zones – Source: MAGNA maps

+ Seamless map.

+ Fits with the current topographic maps.

+ 100% digital.

- Without explanatory report.

- Without complementary information.

- Ocassional generalization.

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6
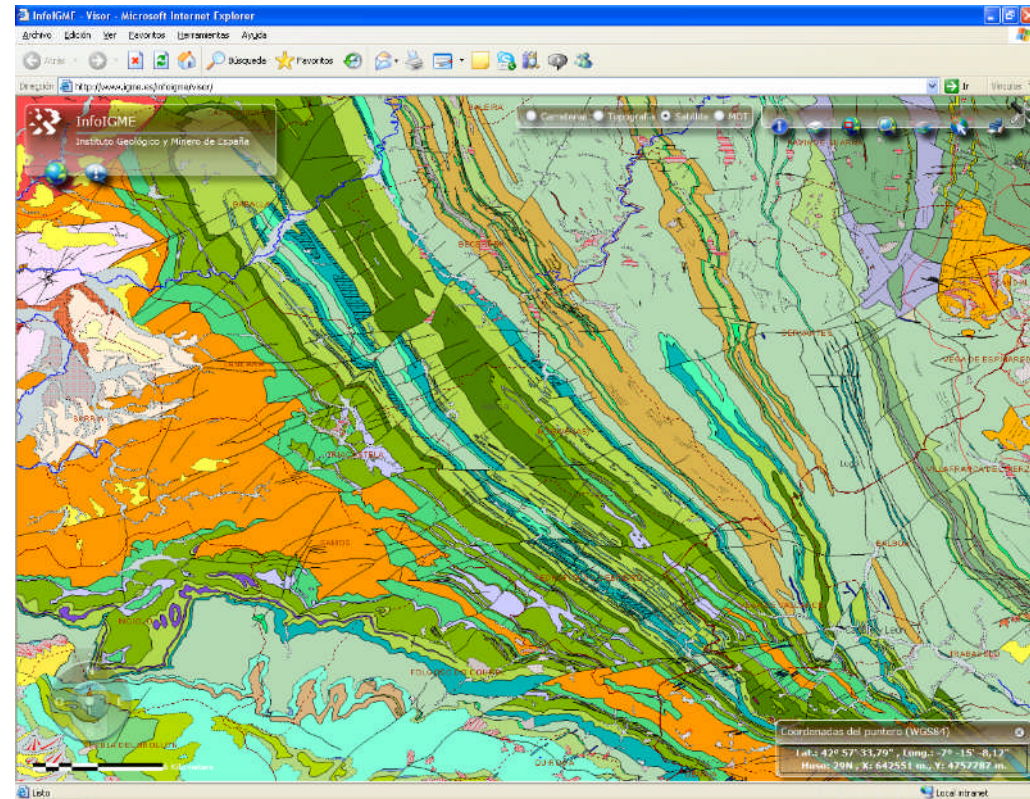
IGME'S GEOLOGIC MAPS (III)

Digital National Geologic Map at 1:50.000 scale – (2008- ?)

+ MAGNA

+ GEODE

Pdf maps

Application

- Only 10 sheets available.

- Uncertain future.

Raw digital data

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7
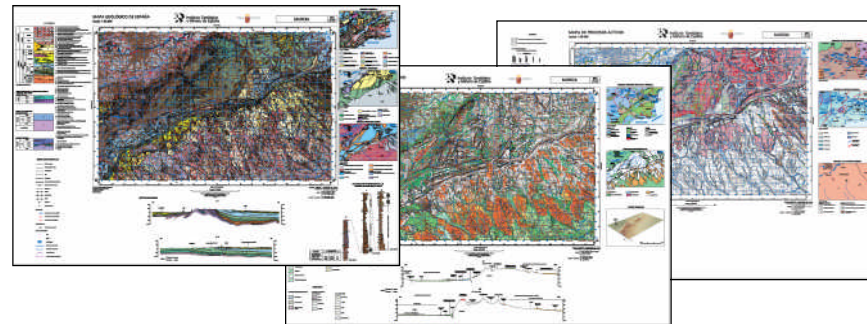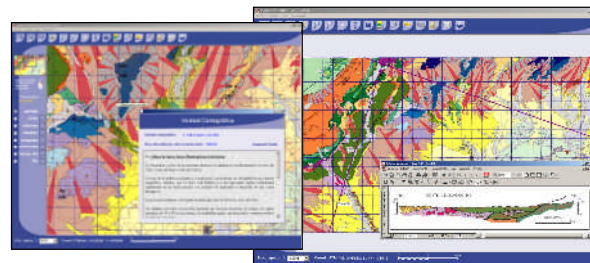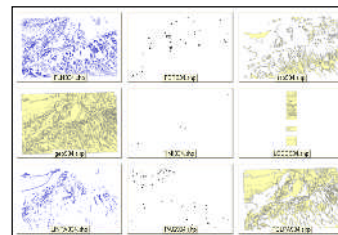
IGME's GEOLOGIC DATA MODELS
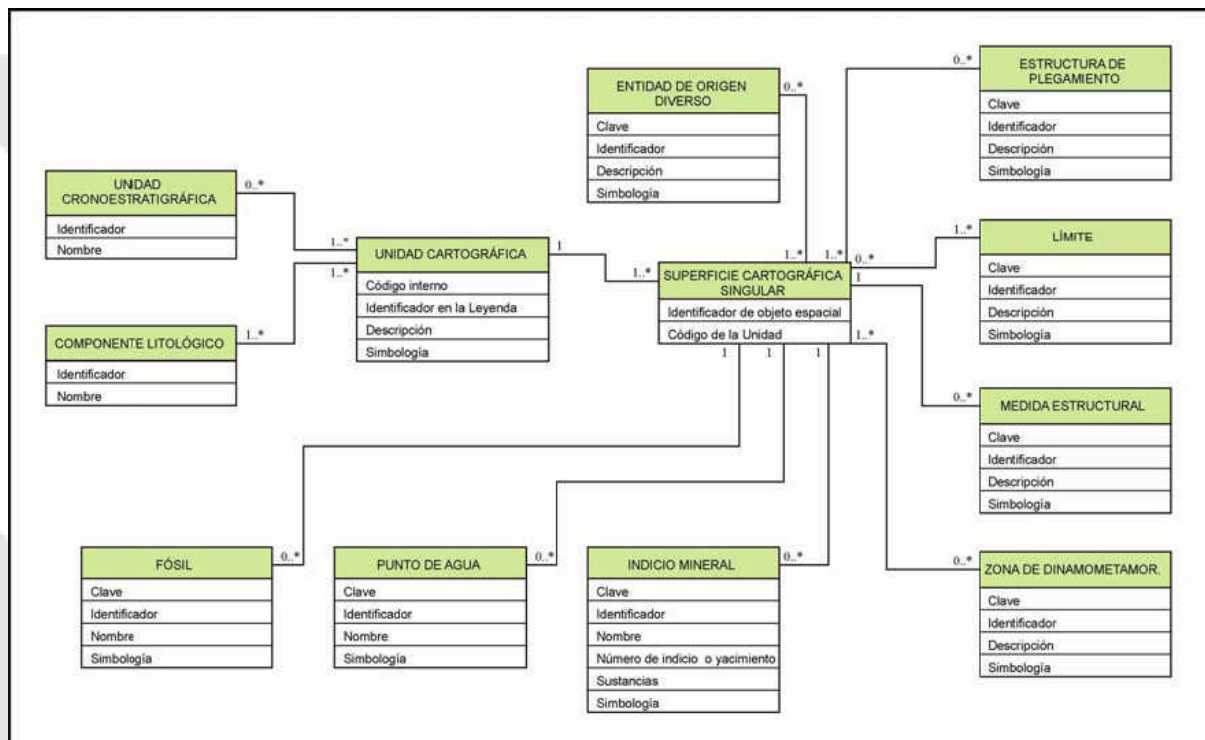
FEATURES

Fold

GeologicUnit

GeologicContact

MappedGeoloigcUnit

Other geologic structures

MetamorphicProcess

MineralOccurrence

LandForm

WaterPoint

Fossil

PROPERTIES

Age   Author's description   Fold Type

Lithology   Fault Type   Commodity

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INSPIRE GEOLOGIC DATA MODEL (V 2.9)

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9
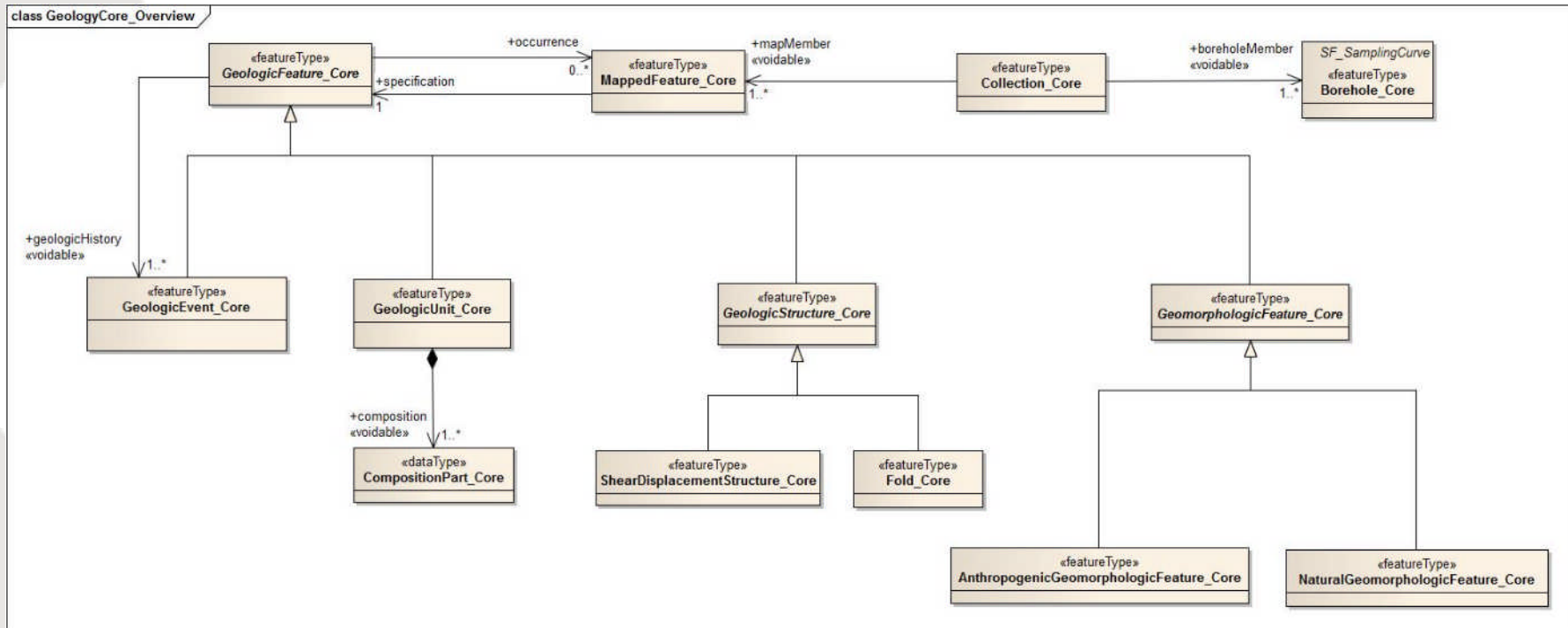
GEOLOGIC DATA MODEL COMPARASION
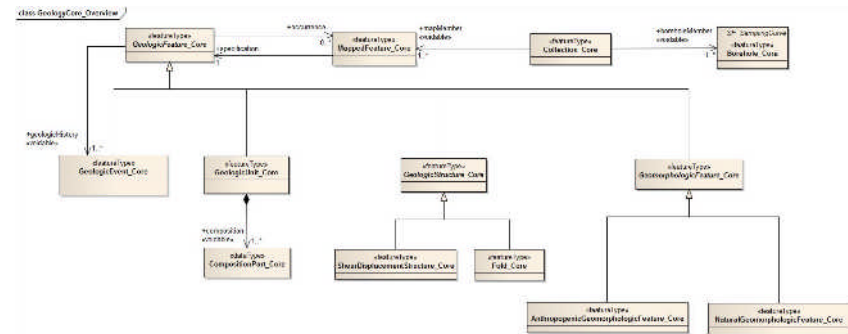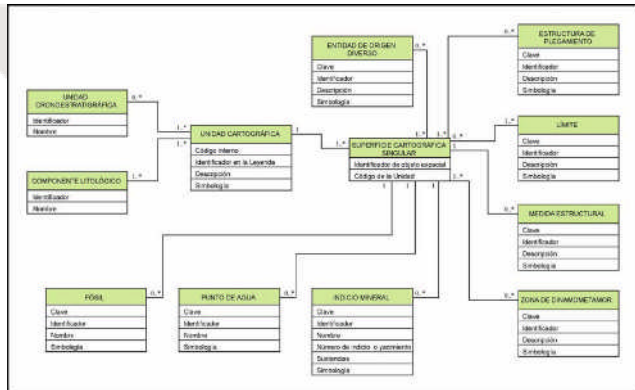
+ Geologic structures

<> Lithology and age terms

+ Survey points

+ Water points ⟶ Hidrogeology subdomain

+ Mineral occurrences ⟶ Mineral resources theme

+ GeoloigcEvent

+ CompositionPart

+ Vocabularies

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10

GEOLOGIC DATA MODEL CHOICE (I)

Option 1: INSPIRE model becomes IGME model
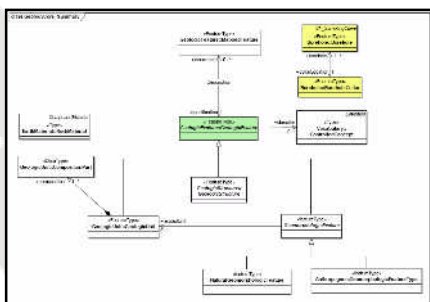
Information is lost.

Option 2: IGME model remains, INSPIRE model is added, both models existing side by side

IA
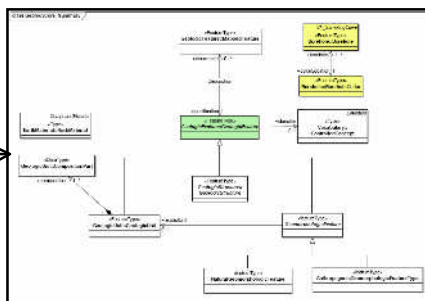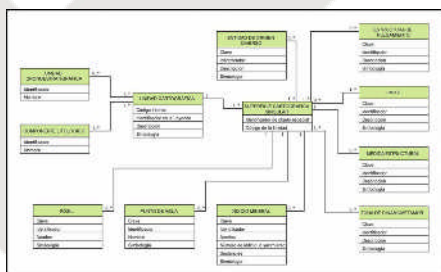
Interchange is needed

Data inconsistency

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11

GEOLOGIC DATA MODEL CHOICE (II)

Option 3: New data model: INSPIRE + IGME

New IGME Data Model
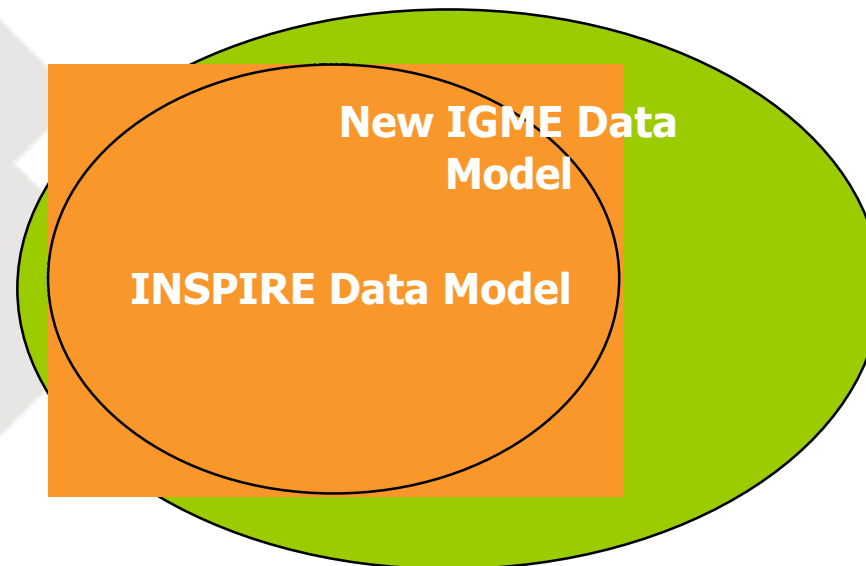
INSPIRE Data Model

But … just the INSPIRE core data model or the INPSIRE full data model?

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12

GEOLOGIC DATA MODEL CHOICE (III)

The answer may be found out looking at the information involved in the process

Geological Information, priority I (December 2015): GEODE

In the testing and consultation period (June-October 2011) the effort requiered to the adoption of INSPIRE data model (v. 2.0) was evaluated on GEODE maps.

INSPIRE Full model   INSPIRE Core model

1,3 units/day   7 units/day

5.800 geological units

20 men/year   4 men/year

GEOLOGIC DATA MODEL CHOICE (IV)

New IGME data model: INSPIRE core + IGME data model

New IGME Data Model

INSPIRE Data Model Core
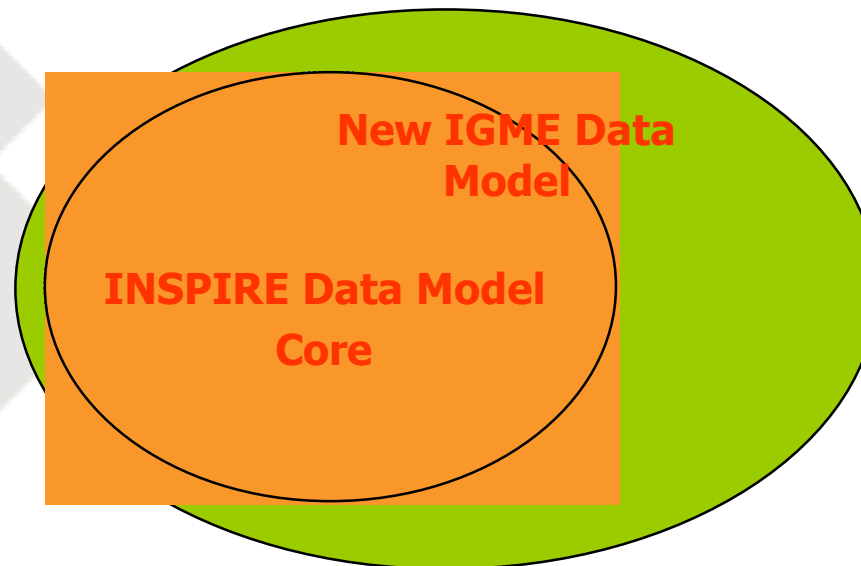
It's the feasible choice

But … what are we going to do with new collected data?

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GEOLOGIC DATA MODEL CHOICE (IV)

Forthcoming geologic information might be collected taking into account the full data model, but this doesn't supposes a new IGME's data model.

New IGME Data Model

INSPIRE Data Model Core

INSPIRE Data Model Full
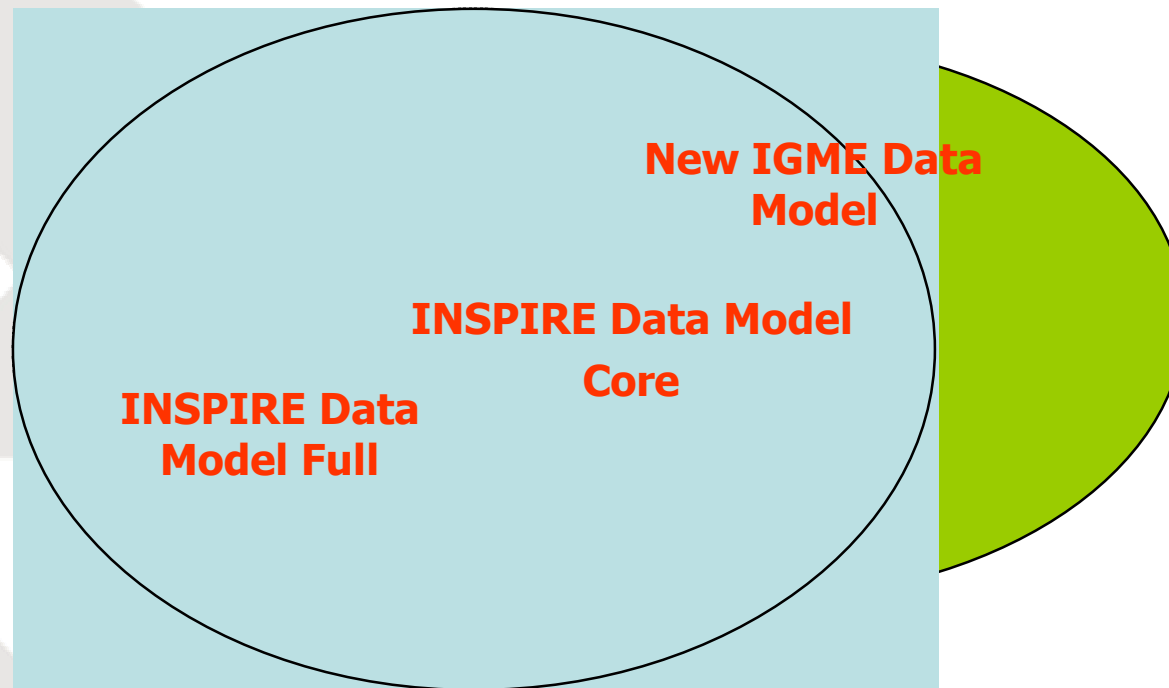
In any case, geologists should be involved in the INSPIRE implementation process.

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VOCABULARIES - ROCKS

Different cases, different solutions

An IGME term and an INSPIRE term are synonymous

IGME term = INSPIRE term

An IGME term and an INSPIRE term are similar or equivalent

IGME term = INSPIRE term

An IGME term is in a lower level of the INSPIRE classification

Broader INSPIRE term will be used

An IGME term includes some INSPIRE terms

INSPIRE narrower terms will be used

An IGME term doesn't match because of different rock classification

Further analys must be done

IGME's vocabulary and INSPIRE's vocabulary should be linked tightly

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16

VOCABULARIES – AGE (I)

IGME_ID	IGMETerm	INSPIRETerm	INSPIRE_ID
33320101	Holoceno Inferior		
33320000	Holoceno	Holocene	a1.1.1.1.1
33313000	Pleistoceno	Late/Upper	a1.1.1.1.2.1
33312000	Pleistoceno Medio		
33311201	Ioniense	Ionian	a1.1.1.1.2.2
33311101	Calabriense	Calabrian	a1.1.1.1.2.3
33311000	Pleistoceno Inferior		
33310000	Pleistoceno	Pleistocene	a1.1.1.1.2
33300000	Cuaternario	Quaternary	a1.1.1.1
33222301	Gelasiense	Gelasian	a1.1.1.1.2.4
33222201	Piacenziense	Piacenzian	a1.1.1.2.1.1
33222112	Villafranquiense		
33222000	Plioceno Superior		
33221112	Rusciniense		
33221101	Zanclayense	Zanclean	a1.1.1.2.1.2
33221000	Plioceno Inferior		
33220000	Plioceno	Pliocene	a1.1.1.2.1
33213601	Messiniense	Messinian	a1.1.1.2.2.1
33213501	Tortoniense	Tortonian	a1.1.1.2.2.2
33213122	Turoliense		
33213112	Vallesiense		
33213000	Mioceno Superior		
33212401	Serravalliense	Serravallian	a1.1.1.2.2.3
33212301	Langhiense	Langhian	a1.1.1.2.2.4
33212000	Mioceno Medio		
33211244	Aragoniense		
33211234	Aragoniense Medio		
33211224	Aragoniense Inferior		
33211212	Aragoniense		
33211201	Burdigaliense	Burdigalian	a1.1.1.2.2.5
33211112	Rambliense		
33211101	Aquitaniense	Aquitanian	a1.1.1.2.2.6
33211000	Mioceno Inferior		
33210000	Mioceno	Miocene	a1.1.1.2.2
33200000	Neógeno	Neogene	a1.1.1.2

IGME_ID	IGMETerm	INSPIRETerm	INSPIRE_ID
33320101	Holoceno Inferior	Holocene	a1.1.1.1.1
33320000	Holoceno	Holocene	a1.1.1.1.1
33313000	Pleistoceno	Late/Upper	a1.1.1.1.2.1
33312000	Pleistoceno Medio	Ionian	a1.1.1.1.2.2
33311201	Ioniense	Ionian	a1.1.1.1.2.2
33311101	Calabriense	Calabrian	a1.1.1.1.2.3
33311000	Pleistoceno Inferior	Calabrian	a1.1.1.1.2.3
33310000	Pleistoceno	Pleistocene	a1.1.1.1.2
33300000	Cuaternario	Quaternary	a1.1.1.1
33222301	Gelasiense	Gelasian	a1.1.1.1.2.4
33222201	Piacenziense	Piacenzian	a1.1.1.2.1.1
33222112	Villafranquiense	Piacenzian	a1.1.1.2.1.1
33222000	Plioceno Superior	Piacenzian	a1.1.1.2.1.1
33221112	Rusciniense	Zanclean	a1.1.1.2.1.2
33221101	Zanclayense	Zanclean	a1.1.1.2.1.2
33221000	Plioceno Inferior	Zanclean	a1.1.1.2.1.2
33220000	Plioceno	Pliocene	a1.1.1.2.1
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33213501	Tortoniense	Tortonian	a1.1.1.2.2.2
33213122	Turoliense	Messinian	a1.1.1.2.2.1
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33212301	Langhiense	Langhian	a1.1.1.2.2.4
33212000	Mioceno Medio		
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33211212	Aragoniense		
33211201	Burdigaliense	Burdigalian	a1.1.1.2.2.5
33211112	Rambliense		
33211101	Aquitaniense	Aquitanian	a1.1.1.2.2.6
33211000	Mioceno Inferior		
33210000	Mioceno	Miocene	a1.1.1.2.2
33200000	Neógeno	Neogene	a1.1.1.2

All IGME terms have to be matched with the INSPIRE terms

VOCABULARIES – AGE (II)

IGME_ID	IGMETerm	INSPIRETerm	INSPIRE_ID	LowerInspireAge	UpperInspireAge
33320101	Holoceno Inferior	Holocene	a1.1.1.1.1		
33320000	Holoceno	Holocene	a1.1.1.1.1		
33313000	Pleistoceno Superior	Late/Upper	a1.1.1.1.2.1		
33312000	Pleistoceno Medio	Ionian	a1.1.1.1.2.2		
33311201	Ioniense	Ionian	a1.1.1.1.2.2		
33311101	Calabriense	Calabrian	a1.1.1.1.2.3		
33311000	Pleistoceno Inferior	Calabrian	a1.1.1.1.2.3		
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33222112	Villafranquiense	Piacenzian	a1.1.1.2.1.1		
33222000	Plioceno Superior	Piacenzian	a1.1.1.2.1.1		
33221112	Rusciniense	Zanclean	a1.1.1.2.1.2		
33221101	Zanclayense	Zanclean	a1.1.1.2.1.2		
33221000	Plioceno Inferior	Zanclean	a1.1.1.2.1.2		
33220000	Plioceno	Pliocene	a1.1.1.2.1		
33213601	Messiniense	Messinian	a1.1.1.2.2.1		
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33213000	Mioceno Superior			Tortonian	Messinian
33212401	Serravalliense	Serravallian	a1.1.1.2.2.3		
33212301	Langhiense	Langhian	a1.1.1.2.2.4		
33212000	Mioceno Medio			Langhian	Serravallian
33211244	Aragoniense Superior			Serravalliense	Tortonian
33211234	Aragoniense Medio			Langhian	Serravalliense
33211224	Aragoniense Inferior			Burdigalian	Langhian
33211212	Aragoniense			Burdigalian	Tortonian
33211201	Burdigaliense	Burdigalian	a1.1.1.2.2.5		
33211112	Rambliense			Aquitanian	Burdigalian
33211101	Aquitaniense	Aquitanian	a1.1.1.2.2.6		
33211000	Mioceno Inferior			Aquitanian	Burdigalian
33210000	Mioceno	Miocene	a1.1.1.2.2		
33200000	Neógeno	Neogene	a1.1.1.2		

In case of not direct correlation, the lower and the upper INSPIRE terms will be used

CONCLUSIONS

The establishment of the subdomain "geology" in the theme "Geology" of the INSPIRE Directive, makes it compulsory to merge IGME's model and INSPIRE's core model , in order not to lose existing information.

The INSPIRE full model might be used for the new collected data.

All IGME's terms shall be matched with INSPIRE's terms.

INSPIRE doesn't only concern IS (Information Systems) staff, field geologists and researches should also involved.

An extensive training program about INSPIRE metadata, data specifications and services must be undertaken, that should implicate all staff carrying out the compiling and treatment of the spatial geological data.

INSPIRE will only be successfully implemented in Spain on time if it's clearly supported by IGME's management.

THANKS FOR YOUR ATTENTION

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20