



EGIDA Project

National Use Cases Workshop

Rome, Italy – April, 18-19, 2011



An interoperable and harmonized architecture to deliver the geological dataset

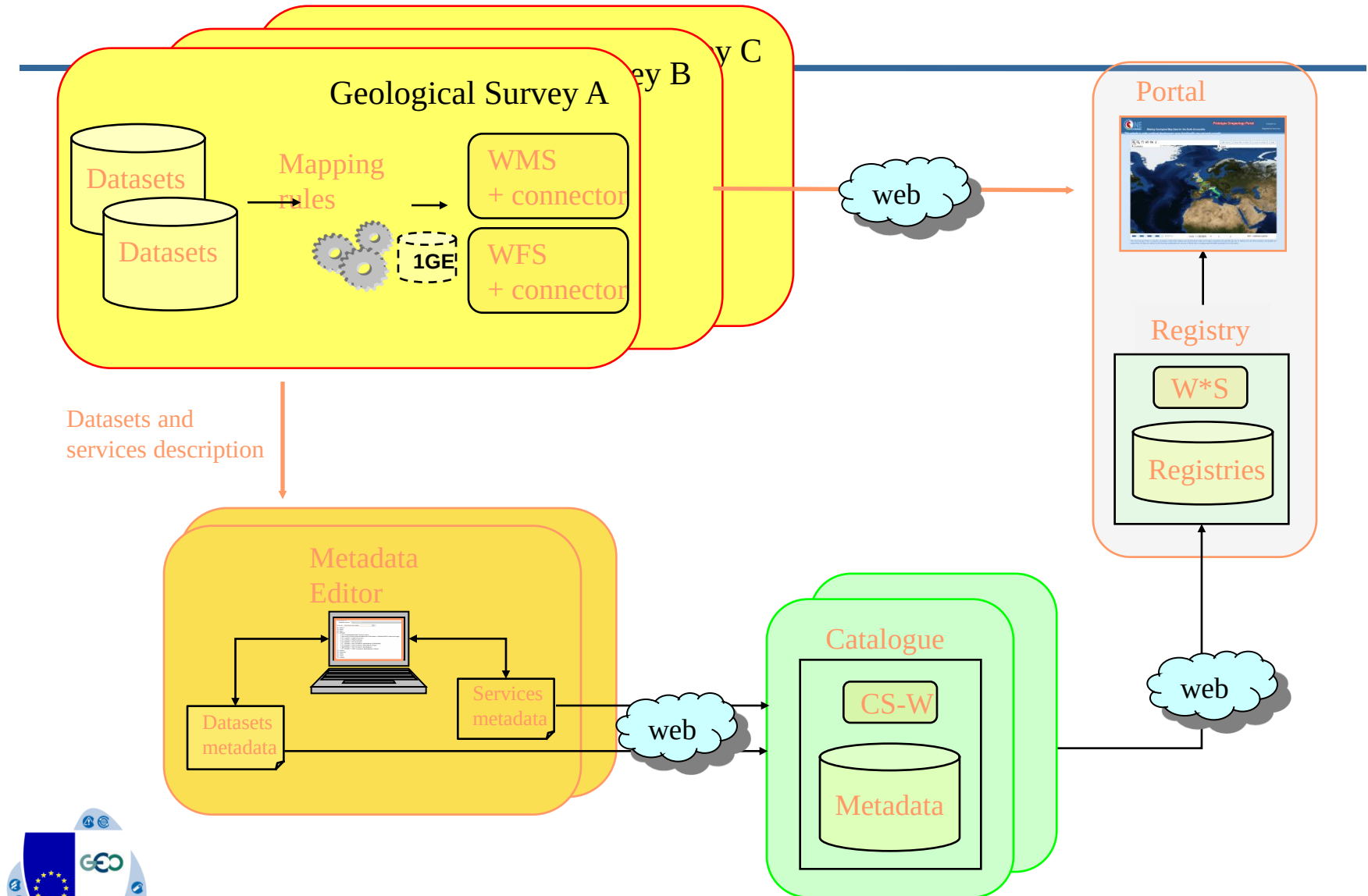
Carlo Cipolloni

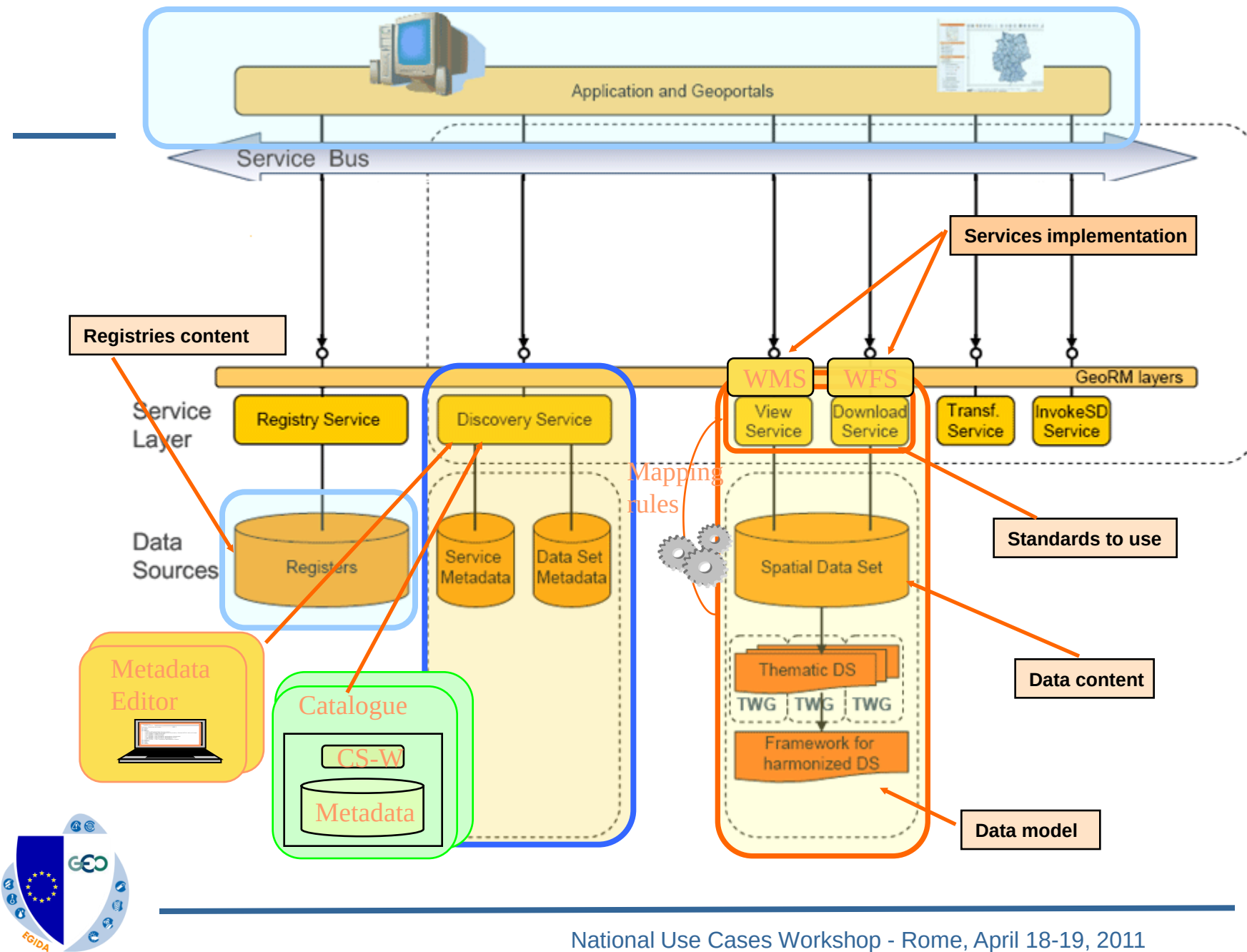
as co-leadear of WP5 and as member of WP4 and WP6

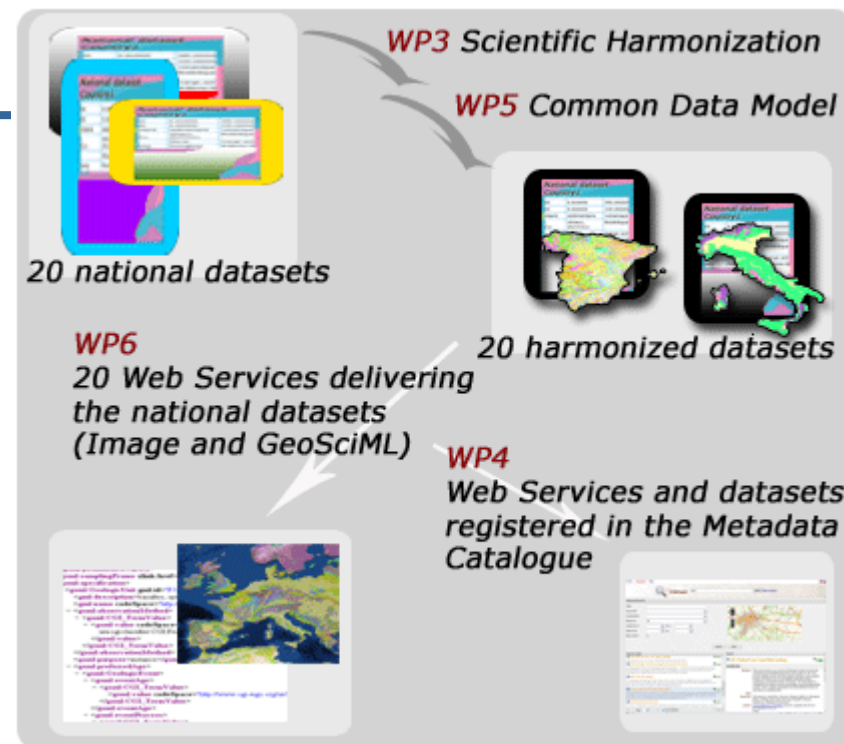
Geological Survey of Italy (ISPRA)

Rome, Italy – April, 18-19, 2011

Architecture





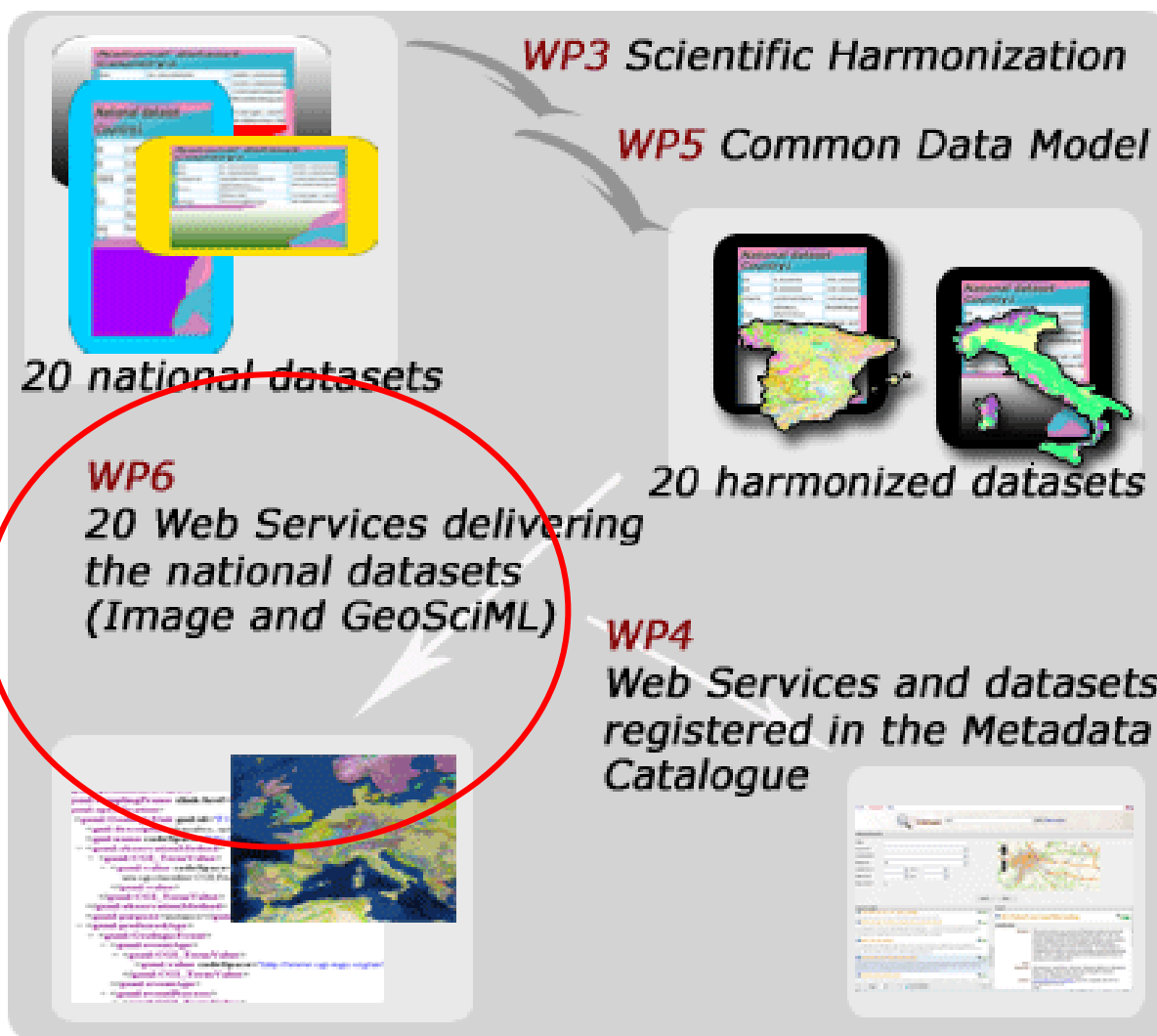


Functionalities based on the interoperability of the services implemented by the 20+ countries involved in the project

“web-accessible, interoperable geological spatial dataset for the whole of Europe at 1:1 million scale”

“harmonised specification for basic geological map data”





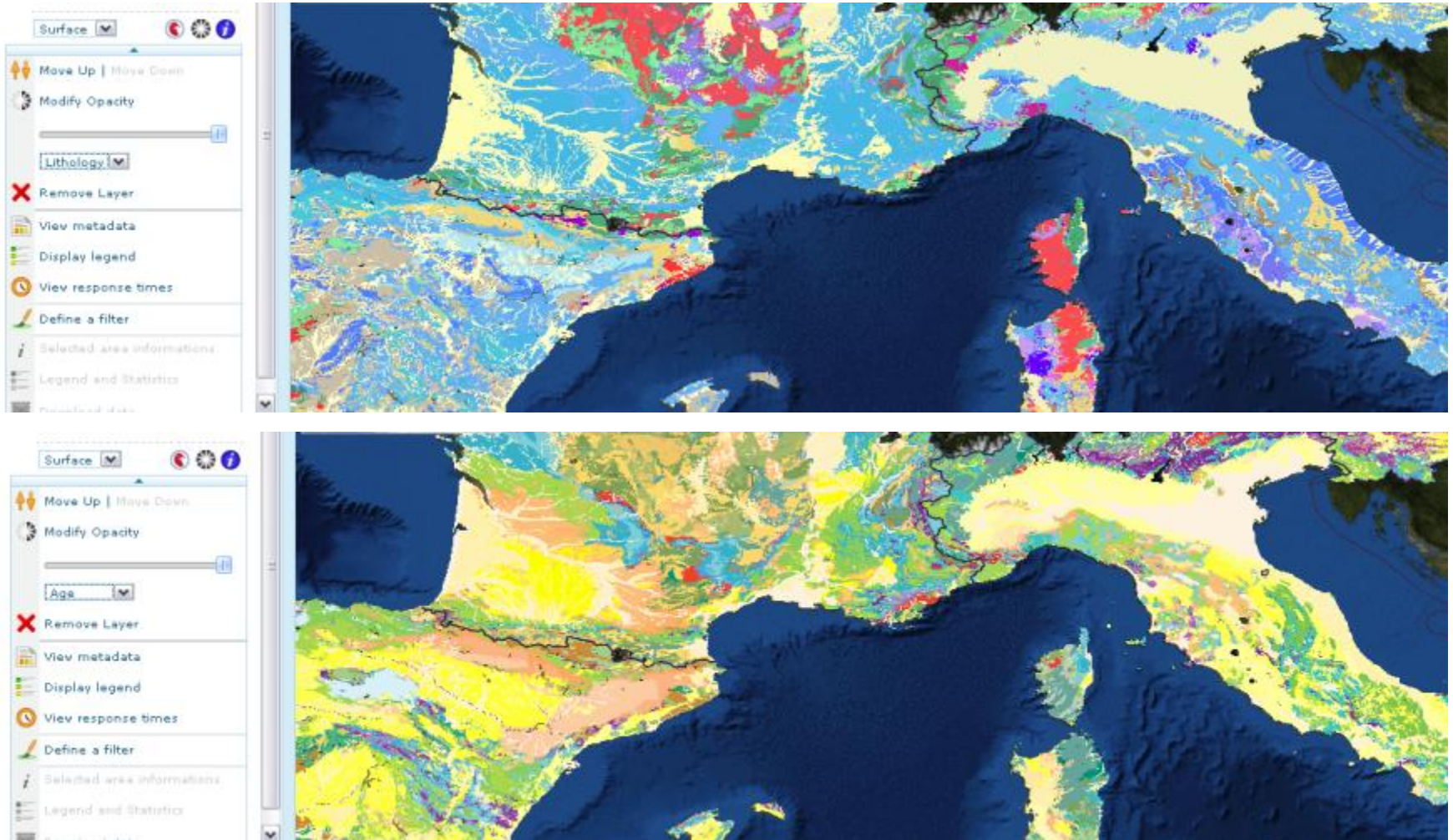
Interoperability

View Service (implementation: OGC WMS):

- ✓ Get Map: *Provides a map (image spatially referenced) containing information coming from the datasets.*
 - ✓ Styles harmonized (portrayal rules).
 - Two styles, defined by the project, must be provided to present the data with two different set of portrayal rules.
 - ✓ Use of user-defined SLDs to provide function “query then display”
 - ✓ SLD with filter expressed according to the
Harmonized data model / GeoSciML
- ✓ Get Feature Information:
 - *Provides information about features at a selected point:*
Harmonized data model / GeoSciML



Use of view service in the portal



**4 harmonized WMS (*Spain, France, Italy, Slovenia*)
displayed using two different styles, defined by the project (*lithology, age*)**

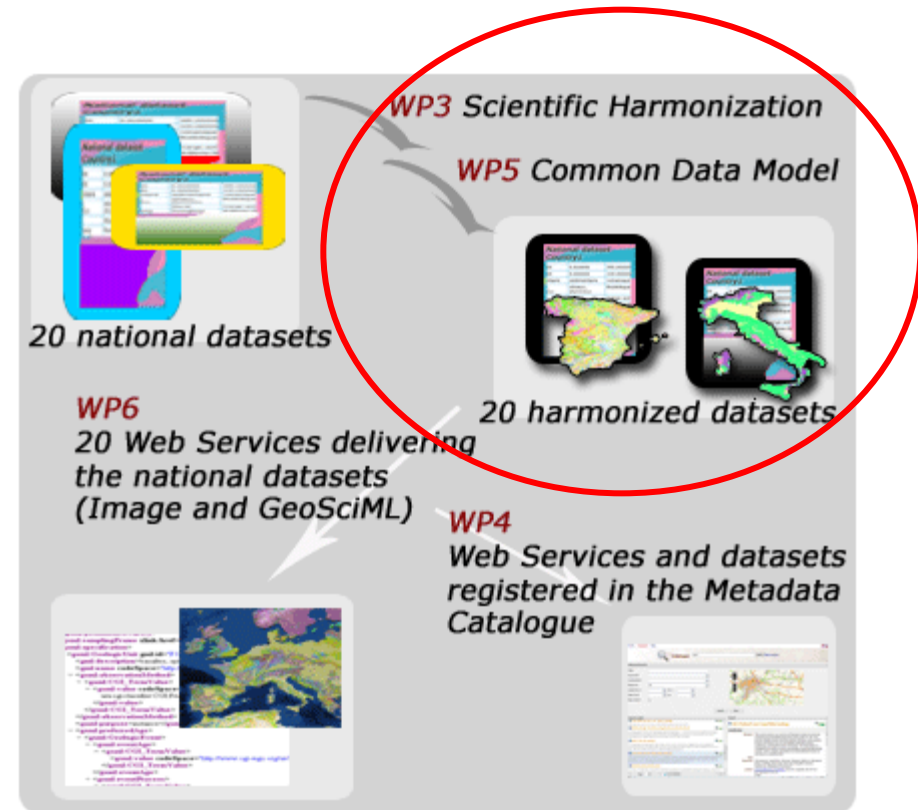


A common data model

Harmonization: the
OneGeology-Europe project
defines the common data
Specification

⇒ Controlled Vocabularies,

⇒ Data model (GeoSciML)



GeoSciML data model

Example: XML encoding

```
<gsml:preferredAge>
  <gsml:GeologicEvent>
    <gsml:eventAge>
      <gsml:CGI_TermRange>
        <gsml:lower>
          <gsml:CGI_TermValue>
            <gsml:value codeSpace="http://www.cgi-iugs.org/uri">
              urn:cgi:classifier:ICS:StratChart:200908:Ediacaran
            </gsml:value>
          </gsml:CGI_TermValue>
        </gsml:lower>
        <gsml:upper>
          <gsml:CGI_TermValue>
            <gsml:value codeSpace="http://www.cgi-iugs.org/uri">
              urn:cgi:classifier:ICS:StratChart:200908:Ediacaran
            </gsml:value>
          </gsml:CGI_TermValue>
        </gsml:upper>
      </gsml:CGI_TermRange>
    </gsml:eventAge>
  </gsml:GeologicEvent>
</gsml:preferredAge>
```

Semantic harmonization:

- Use of controlled vocabularies, with urn that identify the concepts :
urn:cgi:classifier:ICS:StratChart:200908:Ediacaran
- They are translated **Multilingualism of the datasets**



Common vocabularies



GeoSciML / CGI vocabularies client for 1G-E WP3 vocabularies

Browse vocabulary, or search by term. View its parents, definition and properties. Translations will be available soon.

Client and [web services](#) developed and hosted by BRGM - 2010

Navigation & Search

Available vocabularies Search

Search by keyword

granit

- Aplite
- granite
- granitoid**
- Monzogranite
- Pegmatite
- Syenogranite
- Tonalite

Search by properties

Select a vocabulary...

Concept

granitoid

- Broader terms
 - Phaneritic igneous rock
- Narrower terms
 - Granite
 - Granodiorite
 - Tonalite

Concept properties

urn: cgi: classifier: CGI: SimpleLithology: 201001: granitoid

Property	Value
prefLabel (bg)	Гранитоид
prefLabel (cs)	granitoid
prefLabel (da)	Granitisk
prefLabel (de)	Granitoid
notation	1.1.2.1.03
altLabel	Granitic rock
historyNote	LeMaitre et al. 2002.
prefLabel (es)	Granitoides
prefLabel (et)	Granitoid
prefLabel (fi)	granitoidi
prefLabel (fr)	Granitoïde
prefLabel (hu)	granitoid
prefLabel (it)	granitoide
prefLabel (lt)	Granitoidas
prefLabel (no)	Granittiod

Definition

Phaneritic crystalline igneous rock consisting of quartz, alkali feldspar and/or plagioclase. Includes rocks defined modally in QAPF fields 2, 3, 4 and 5 as alkali feldspar granite, granite, granodiorite or tonalite.

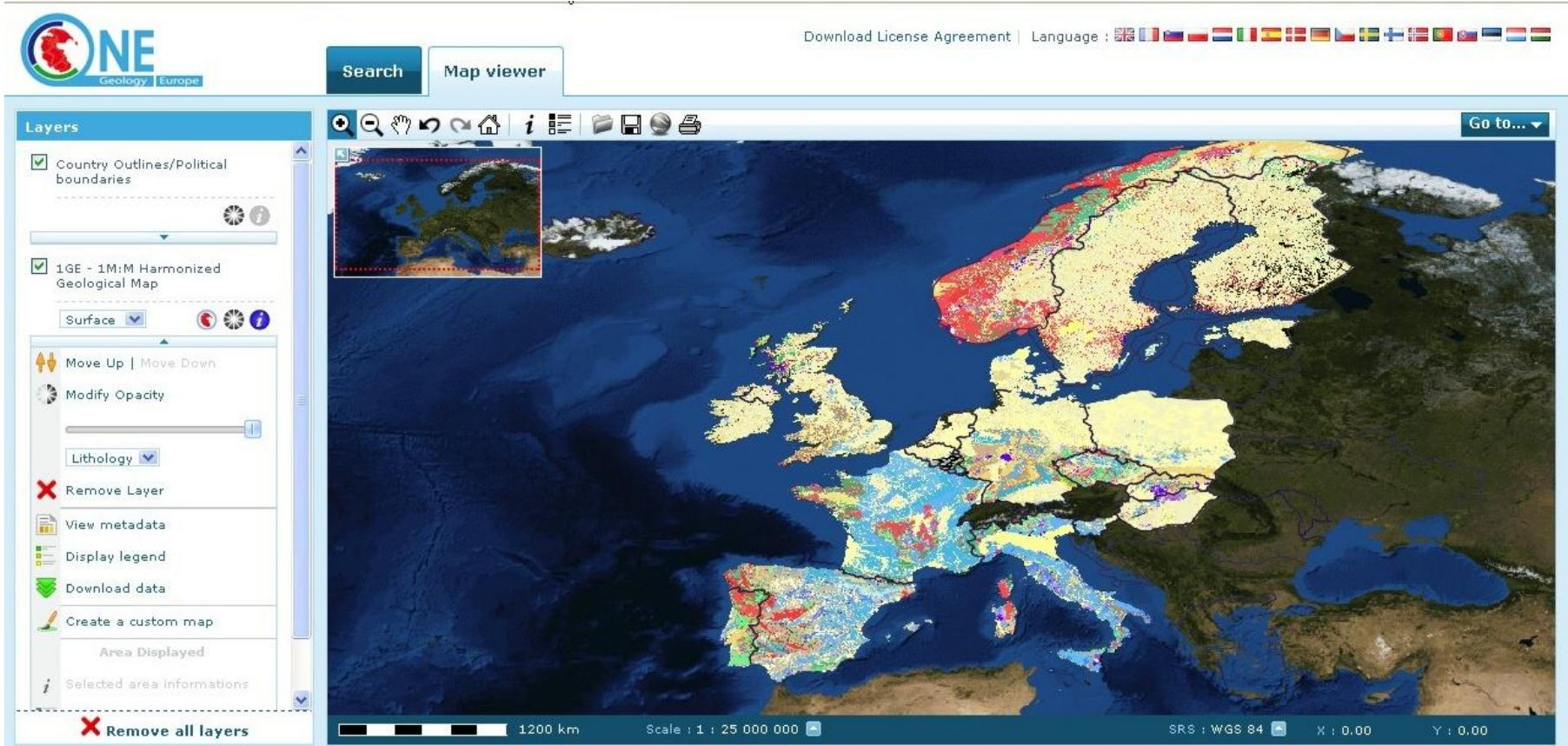
- 15 vocabularies defined with CGI
- A web client to display the terms
- Web services to use them



```

<skos:narrower rdf:resource="urn:cgi:classifier:ICS:StratChart:200908:Pennsylvanian"/>
</skos:Concept>
<!-- urn:cgi:classifier:ICS:StratChart:200908:Carnian -->
- <skos:Concept rdf:about="urn:cgi:classifier:ICS:StratChart:200908:Carnian">
  <geosciml:to_Ma xml:lang="en">216.5 +/-2</geosciml:to_Ma>
  <geosciml:from_Ma xml:lang="en">228.7</geosciml:from_Ma>
  <skos:prefLabel xml:lang="en">Carnian</skos:prefLabel>
  <skos:notation xml:lang="en">a1.1.2.3.1.3</skos:notation>
  <skos:broader rdf:resource="urn:cgi:classifier:ICS:StratChart:200908:UpperTriassic"/>
</skos:Concept>
  
```

The portal

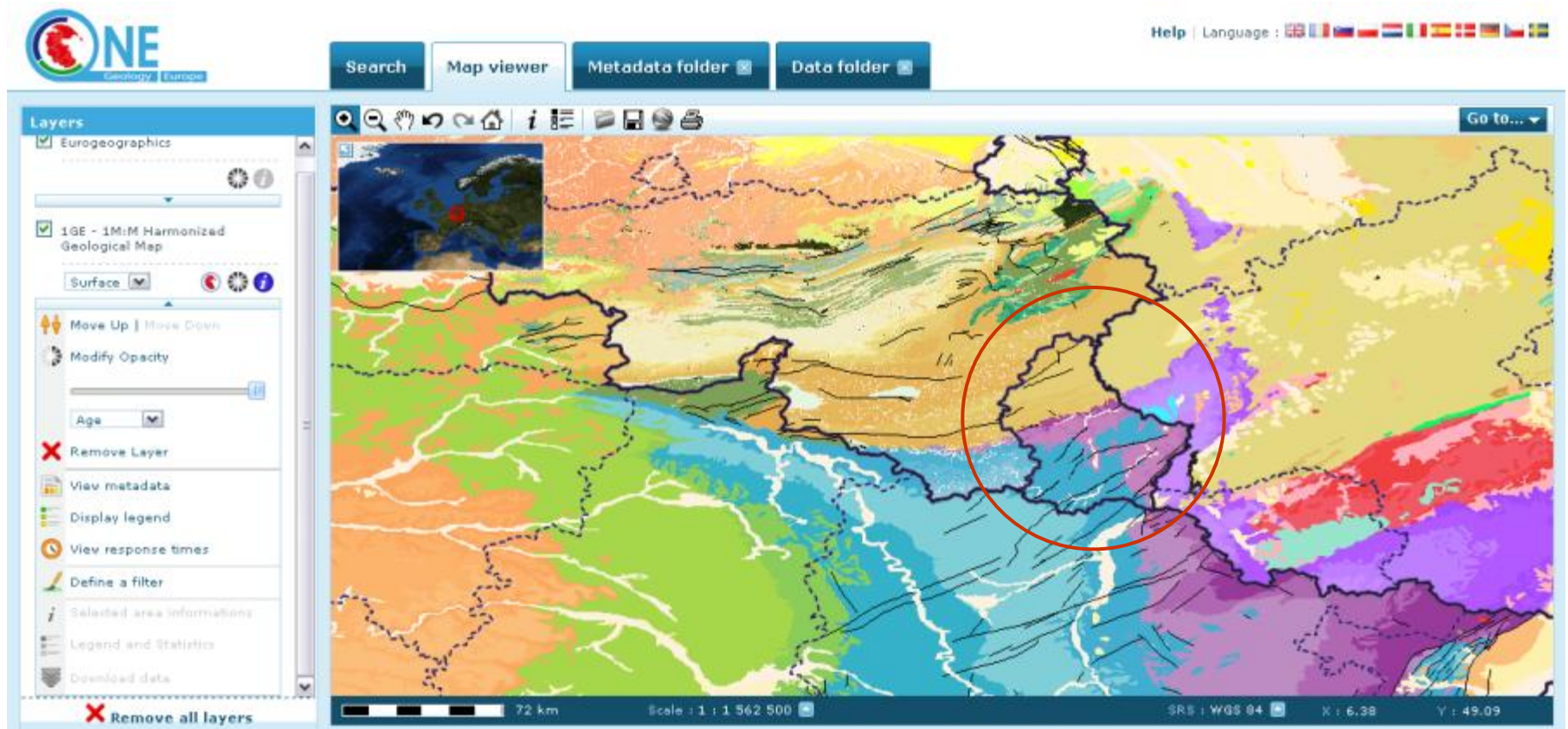


1st Objective: “to bring together a *web-accessible, interoperable* geological spatial dataset for the whole of Europe at 1:1 million scale”



The multilingual portal uses this interoperability to provide advanced functions.

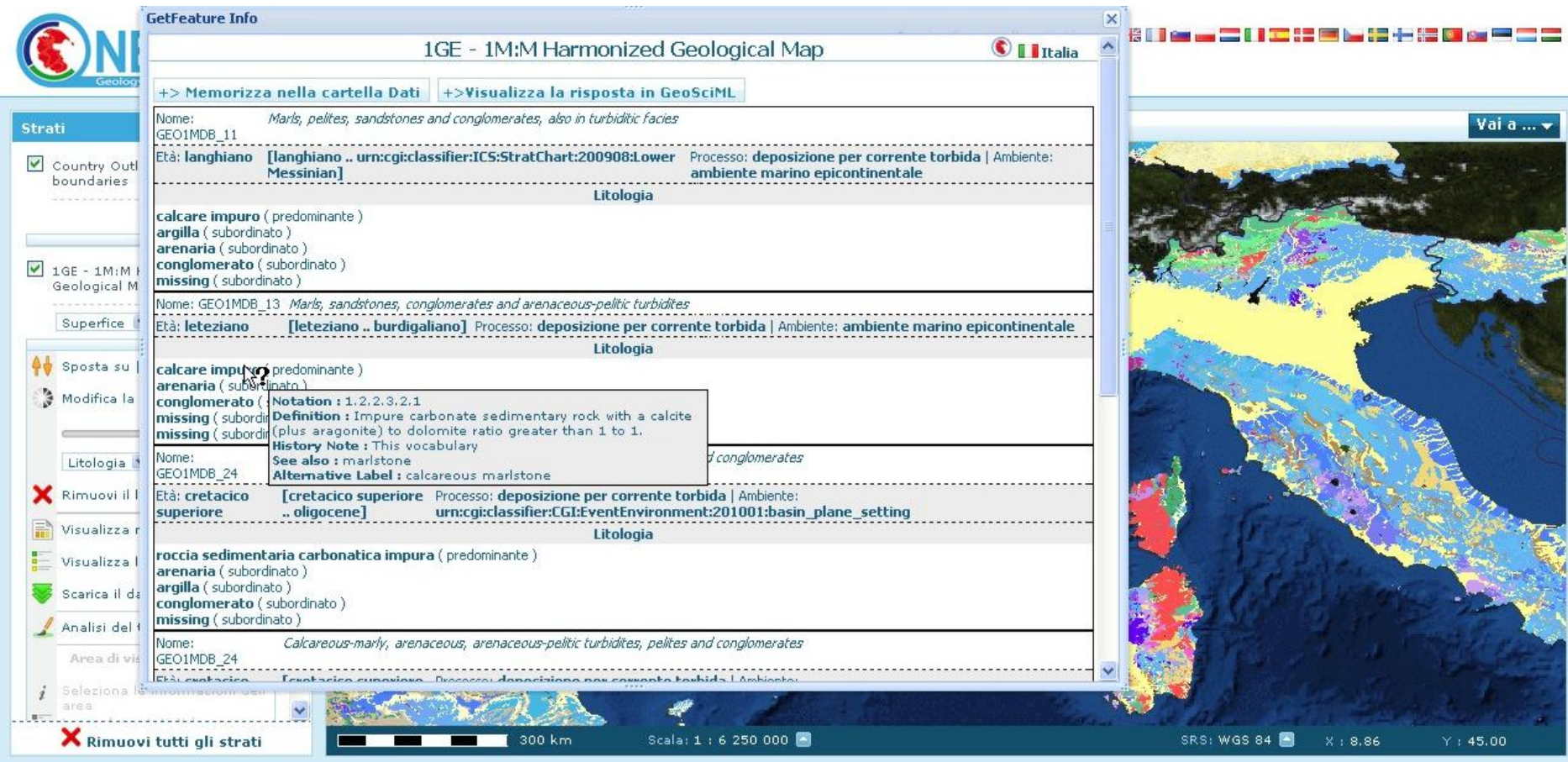
The portal



4 WMS – harmonized according to the 1G-E data model- are displayed in that screen shot, for 4 countries (France, Luxembourg, Belgium, Germany)



Use of view service in the portal



GetFeature Info

1GE - 1M:M Harmonized Geological Map

+> Memorizza nella cartella Dati +> Visualizza la risposta in GeoSciML

Nome: GEO1MDB_11	Marls, pelites, sandstones and conglomerates, also in turbiditic facies		
Età: langhiano	[langhiano .. urn:cgi:classifer:ICS:StratChart:200908:Lower Messinian]	Processo: deposizione per corrente torbida	Ambiente: ambiente marino epicontinentale
Litologia			
calcare impuro (predominante)			
argilla (subordinato)			
arenaria (subordinato)			
conglomerato (subordinato)			
missing (subordinato)			
Nome: GEO1MDB_13	Marls, sandstones, conglomerates and arenaceous-pelitic turbidites		
Età: letezziano	[letezziano .. burdigaliano]	Processo: deposizione per corrente torbida	Ambiente: ambiente marino epicontinentale
Litologia			
calcare impuro (predominante)			
arenaria (subordinato)			
conglomerato (subordinato)			
missing (subordinato)			
Notation: 1.2.2.3.2.1 Definition: Impure carbonate sedimentary rock with a calcite (plus aragonite) to dolomite ratio greater than 1 to 1. History Note: This vocabulary See also: marlstone Alternative Label: calcareous marlstone			
Nome: GEO1MDB_24	Marls, sandstones, conglomerates and arenaceous-pelitic turbidites		
Età: cretaceo superiore	[cretaceo superiore .. oligocene]	Processo: deposizione per corrente torbida	Ambiente: ambiente marino epicontinentale
Litologia			
roccia sedimentaria carbonatica impura (predominante)			
arenaria (subordinato)			
argilla (subordinato)			
conglomerato (subordinato)			
missing (subordinato)			
Nome: GEO1MDB_24	Calcareous-marly, arenaceous, arenaceous-pelitic turbidites, pelites and conglomerates		
Età: cretaceo superiore	[cretaceo superiore .. oligocene]	Processo: deposizione per corrente torbida	Ambiente: ambiente marino epicontinentale

Strati

☒ Country Out boundaries

☒ 1GE - 1M:M Harmonized Geological Map

Superficie

Sposta su

Modifica la

Litologia

☒ Rimuovi il

Visualizza r

Visualizza l

Scarica il d

Analisi del t

Area di vis

Seleziona l

☒ Rimuovi tutti gli strati

300 km

Scala: 1 : 6 250 000

SRS: WGS 84

X : 8.86

Y : 45.00

All the 20 WMS are queryable and the information are available in different languages, the interaction with the vocabularies allows us to show the details description of the geologic content



Use of view service in the portal

All the 20 WMS are requested with a user-defined SLD, containing a filter, that allows us to query then display the dataset



Use of view service in the portal



Download License Agreement | Language : 

Search

Map viewer

Layers

☒ Country Outlines/Political boundaries

☒ 1GE - 1M:M Harmonized Geological Map

Surface

Move Up | Move Down

Modify Opacity

Lithology

Remove Layer

View metadata

Display legend

Download data

Create a custom map

Area Displayed

Selected area informations

Remove all layers



All the 20 WMS are requested with a user-defined SLD, containing a filter, that allows us to query then display the dataset



Download service

Download Service (Query & Access service):

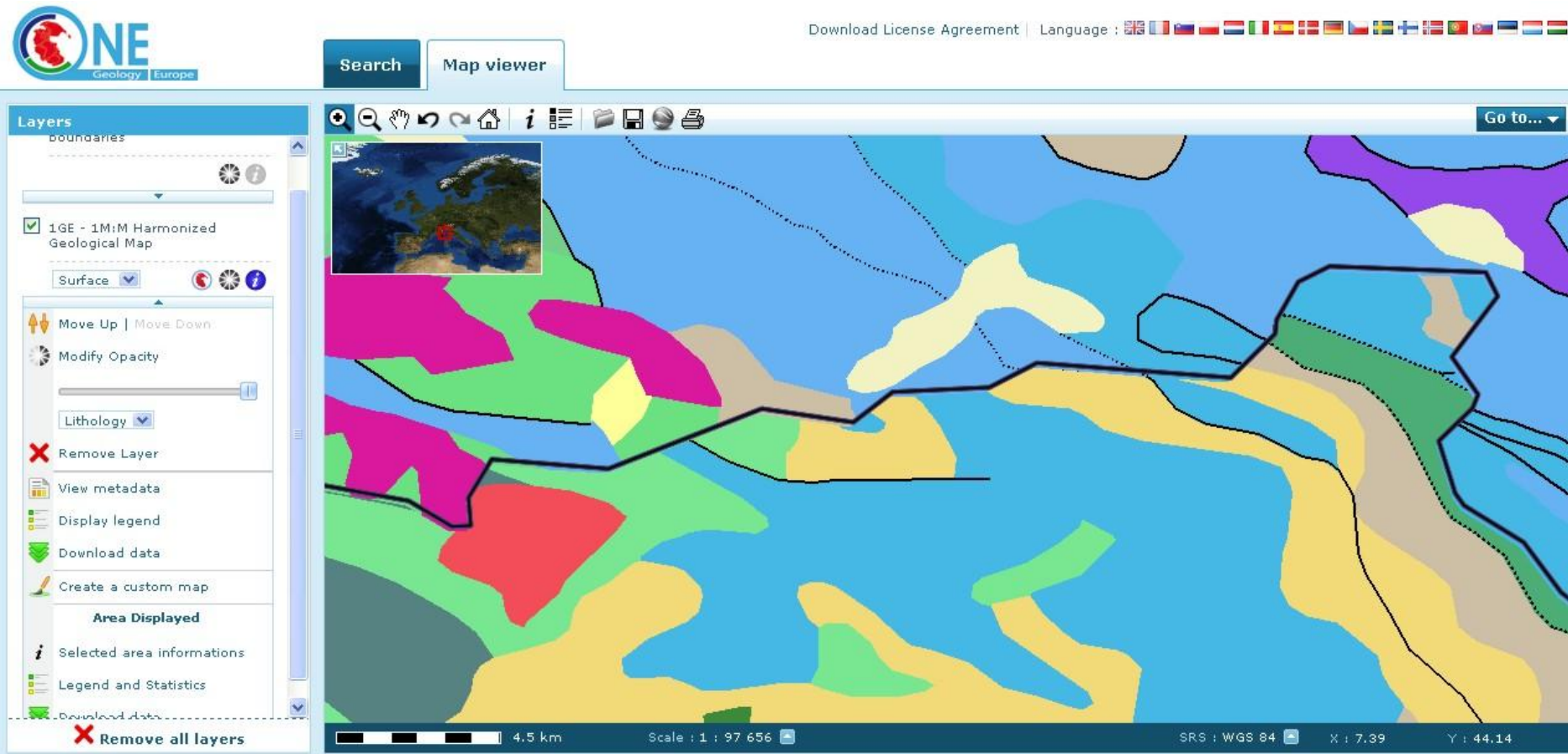
- Functions:
 - ✓ Get Service Metadata: *Provides information about the service*
 - ✓ Get Spatial Objects: *Provides data in [GeoSciML](#) format (Harmonized Data Model)*
- Service used to access data:
 - ✓ By applications,
 - ✓ Not necessarily for downloading

Implementation:

- OGC Web Feature Service (WFS) / ISO 19142
- OGC Filter Encoding (FE) / ISO 19143



Use of download service in the portal



Zooming to a small cross-border area, 2 WFS are requested to build this window that presents a synthesis of the content of the datasets in that area



Use of download service in the portal

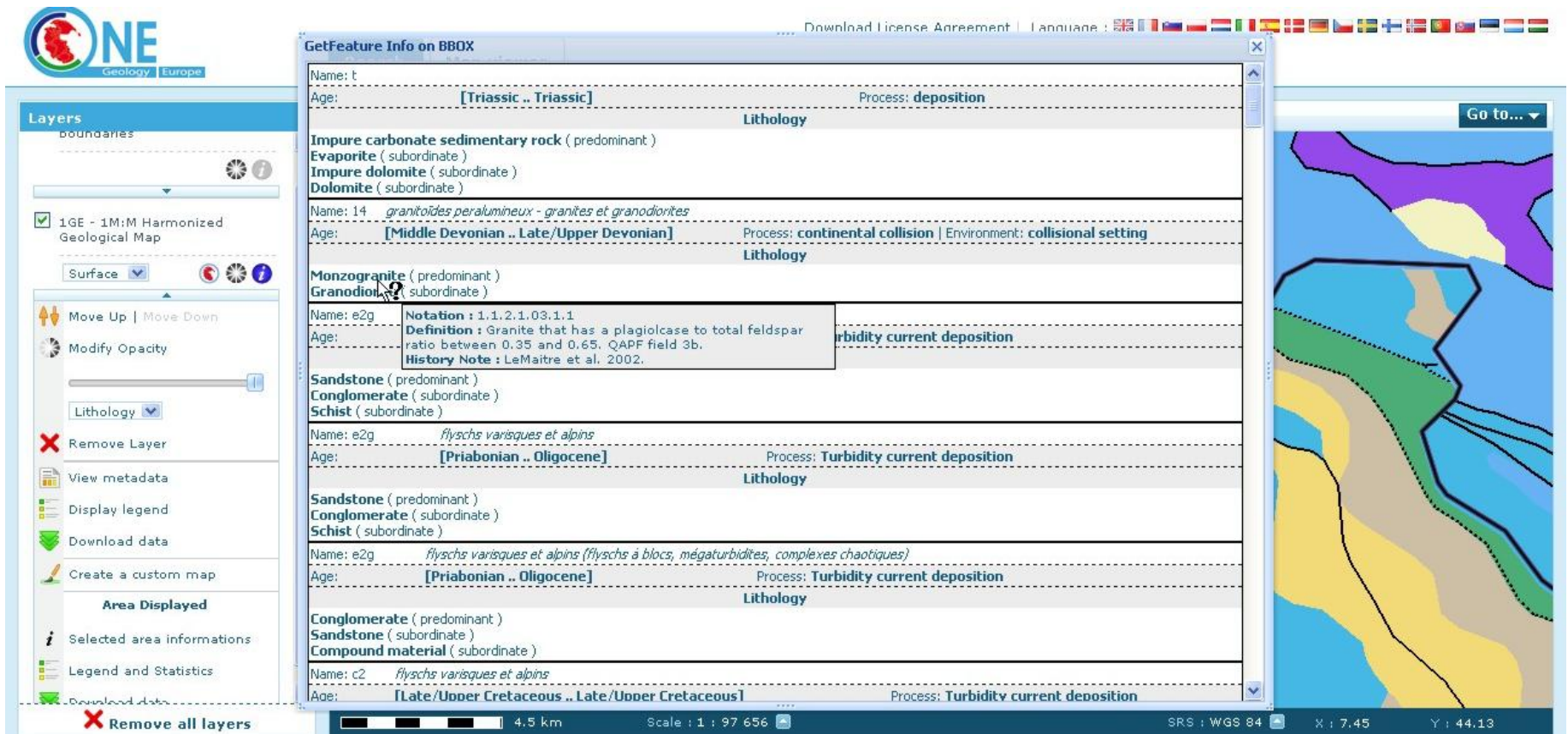
The screenshot displays the ONE Geology Europe portal. On the left, the 'Layers' panel shows a list of layers, including '1GE - 1M:M Harmonized Geological Map'. The main map area shows a geological map with various colored regions. A 'Legend and statistics on BBOX' window is open, displaying a table of geological features and their counts. The table has columns for 'Symbol', 'Name', and 'Count'. A dropdown menu is open, showing options like 'Upper Age', 'Lower Age', 'Description', 'Event Environment', 'Name', and 'Composition Part'. The 'Area Displayed' section shows the selected area information, including 'Selected area informations', 'Legend and Statistics', and 'Download data'. The bottom status bar shows the scale (1:97 656), SRS (WGS 84), and coordinates (X: 7.53, Y: 44.16).

Symbol	Name	Count
	Pleistocene	3
	urn:cgi:classifer:ICS:StratChart:200908:Lower Devonian	1
	Jurassic	3
	Late/Upper Jurassic	8
	Early/Lower Cretaceous	2
	urn:cgi:classifer:ICS:StratChart:200908:Lower Cretaceous	1
	Paleocene	3
	urn:cgi:classifer:ICS:StratChart:200908:Oligocene (Lower Miocene)	1
	urn:cgi:classifer:ICS:StratChart:200908:Middle Triassic	2
	Oligocene	4
	Priabonian	2
	Triassic	4
	Middle Ordovician	6
	Late/Upper Devonian	1
	Ordovician	1
	Permian	6
	urn:cgi:classifer:ICS:StratChart:200908:Lower Jurassic	2
	Late/Upper Cretaceous	2
	Holocene	1
	Paleogene	3

Zooming to a small cross-border area, 2 WFS are requested to build this window that presents a synthesis of the content of the datasets in that area



Use of download service in the portal



The screenshot displays the ONE Geology Europe portal. On the left, a 'Layers' panel shows the '1GE - 1M:M Harmonized Geological Map' selected. The main window, titled 'GetFeature Info on BBOX', lists geological features with their names, ages, processes, and lithologies. A tooltip for 'Granodiorite' is visible, providing a definition and history note. On the right, a map view shows a geological map with various colored regions. The bottom status bar indicates a scale of 1:97,656 and coordinates X: 7.45, Y: 44.13.

Name	Age	Process	Lithology
Impure carbonate sedimentary rock (predominant) Evaporite (subordinate) Impure dolomite (subordinate) Dolomite (subordinate)	[Triassic .. Triassic]	deposition	
Name: 14 <i>granitoides peralumineux - granites et granodiorites</i> Granodiorite (predominant) Granodiorite (subordinate)	[Middle Devonian .. Late/Upper Devonian]	continental collision Environment: collisional setting	
Name: e2g Notation: 1.1.2.1.03.1.1 Definition: Granite that has a plagioclase to total feldspar ratio between 0.35 and 0.65. QAPF field 3b. History Note: LeMaitre et al. 2002.			turbidity current deposition
Sandstone (predominant) Conglomerate (subordinate) Schist (subordinate)			
Name: e2g <i>flyschs varisques et alpins</i> Age: [Priabonian .. Oligocene]		Turbidity current deposition	
Sandstone (predominant) Conglomerate (subordinate) Schist (subordinate)			
Name: e2g <i>flyschs varisques et alpins (flyschs à blocs, mégaturbidites, complexes chaotiques)</i> Age: [Priabonian .. Oligocene]		Turbidity current deposition	
Conglomerate (predominant) Sandstone (subordinate) Compound material (subordinate)			
Name: c2 <i>flyschs varisques et alpins</i> Age: [Late/Upper Cretaceous .. Late/Upper Cretaceous]		Turbidity current deposition	

The 2 WFS are requested to build this window that presents the detail of the content of the datasets in that area. This content is available in multiple languages



download in the portal: license

The screenshot displays the OneGeology-Europe web portal interface. On the left, the 'Layers' panel shows the '1GE - 1M:1M Harmonized Geological Map' selected, with 'Surface' as the layer type and 'Lithology' as the display mode. The main map area shows a geological map of Europe. A 'Download data' dialog box is open in the center, titled 'Download License Agreement'. It contains the following text:

Download License Agreement

You must agree to the following terms to proceed :

OneGeology-Europe

Conditions for downloading of ~1:1 million scale surface and bedrock geological map data

Allowed use

The ~1:1 million scale data is available for download in GeoSciML and ESRI ShapeFile formats from the OneGeology-Europe portal free of charge, without any restrictions, for any legitimate use, including public, private and commercial use.

IPR

Any and all Intellectual Property Rights in the ~1:1 million scale geological data provided by the rightholders through the OneGeology-Europe portal are and shall remain the exclusive property of their respective rightholder (which will normally be the national geological

☒ Accept

Format choice

☒ GeoSciML ☐ Shapefile

Download data

The dialog also includes a 'Go to...' button in the top right corner. The portal's top navigation bar includes 'Search', 'Map viewer', and 'Download License Agreement' links, along with a language selection menu showing various European flags.

The download is available (after you agree the licenses) in shapefile or in GeoSciML format. This content is available in multiple languages



download in the portal

http://sgi1.isprambiente.it/1GEconnector/?LAYERS=OGE_1M_surface_GeologicUnit,OGE_1M_Surface_GeologicStructure&TRANSPARENT=TRUE&STYLE5=8&SERVICE=WMS&VERSION=1.1.1&REQUEST=GetFeatureInfo&EXCEPTIONS=application/vnd.ogc

```
</gsml:observationMethod>
- <gsml:positionalAccuracy>
  - <gsml:CGI_NumericValue>
    <gsml:principalValue uom="urn:ogc:def:uom:UCUM:m">500</gsml:principalValue>
    </gsml:CGI_NumericValue>
  </gsml:positionalAccuracy>
  <gsml:samplingFrame xlink:href="urn:cgi:feature:CGI:EarthNaturalSurface"/>
- <gsml:specification>
  - <gsml:GeologicUnit gml:id="1">
    <gml:name>GEO1MDB_1</gml:name>
    - <gml:description>
      Deltaic, alluvial and coastal plain deposits; aeolian deposits
    </gml:description>
    <gsml:geologicUnitType xlink:href="urn:cgi:classifer:CGI:GeologicUnitType:200811:lithostratigraphic_unit"/>
  - <gsml:observationMethod>
    - <gsml:CGI_TermValue>
      <gsml:value codeSpace="http://www.cgi-iugs.org/uri">synthesis_of_multiple_published_descriptions</gsml:value>
    </gsml:CGI_TermValue>
    </gsml:observationMethod>
    <gsml:purpose>typicalNorm</gsml:purpose>
  - <gsml:preferredAge>
    - <gsml:GeologicEvent>
      - <gsml:name>
        - <gsml:CGI_TermValue>
          <gsml:value codeSpace="http://www.cgi-iugs.org/uri">urn:cgi:classifer:ICS:StratChart:200908:Holocene</gsml:value>
        </gsml:CGI_TermValue>
        </gsml:name>
      - <gsml:eventAge>
        - <gsml:CGI_TermRange>
          - <gsml:lower>
            - <gsml:CGI_TermValue>
              <gsml:value codeSpace="http://www.cgi-iugs.org/uri">urn:cgi:classifer:ICS:StratChart:200908:Holocene</gsml:value>
            </gsml:CGI_TermValue>
          </gsml:lower>
```

The download is available (after you agree the licenses) in shapefile or in GeoSciML format. This content is available in multiple languages



Web Services

OneGeology-Europe services:

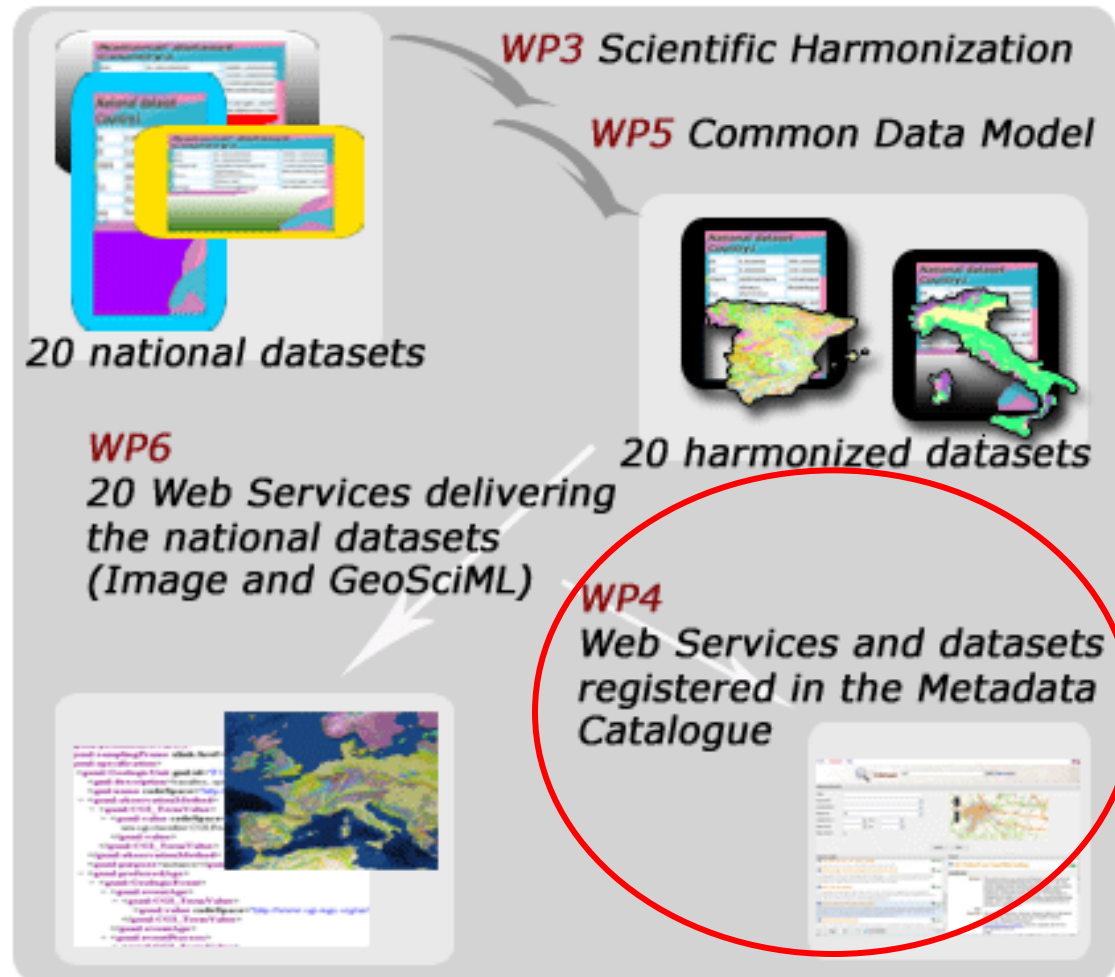
- Multilingualism (INSPIRE requirement)
 - => *“Language” parameter*
 - Of the metadata (GetCapabilities)
 - Of the content (use of controlled vocabularies and urn)
 - GetFeatureInfo in HTML is translated
- Common data model (GeoSciML based)

The implementation requires a specific component on top of each OGC/ISO service that:

- Adds a language parameter
- Transforms GML (provided by WMS / WFS) into GeoSciML
- Translates the queries (ogc:filter) expressed with GeoSciML xpath in such a way that the OGC web service understands



Metadata Registry



Metadata and Catalogue



Metadata catalogue

Language :

Quick search

Text:

Keywords:

Resource type:

Navigation:

- [Metadata search](#)
- [Metadata editor](#)
- [Map Viewer](#)
- [1-GE official site](#)

contact: [1g-e.metadata\(at\)geology.cz](mailto:1g-e.metadata(at)geology.cz)

Welcome to the European Geological Metadata Catalogue

The Geological Metadata Catalogue, developed within the framework of the OneGeology-Europe eContent plus project, provides the means for searching (Metadata Search) national geological and applied geological map data ranging from the scale of 1:10,000 to 1:1 million. The Catalogue also offers a SW tool, fully multilingual, for creation and/or editing metadata records (Metadata Editor). The national geological map data, maintained and provided by 21 national geological survey organizations, are presented in this Metadata Catalogue in a form of datasets, dataset series or where available as on-line services.

In order to harmonise descriptions of national geological and applied geological maps or map series a new Geological Metadata Profile (GMP) was developed and utilised when collecting the metadata records. The GMP is fully based on the EN ISO 19115 (for datasets, series) and EN ISO 19119 (for services) international standards. The GMP is also compliant with the INSPIRE Metadata Regulation (Nr. 1205/2008).

In order to directly display a metadata record (geological or applied geological map) for which an on-line map service is available, the Metadata Catalogue is integrated into the OneGeology-Europe Portal. Both the OneGeology-Europe Portal and the Metadata Catalogue build together a unique multilingual system for discovery, view and use of geological data across Europe.



Metadata and Catalogue

Metadata Catalogue:

- ✓ Digital national geological and applied geological maps or map series at all scales (103 dataset more than 40 services)

Multilingual Metadata profile:

- ✓ Starts with INSPIRE rules (~ 30 metadata elements)
- ✓ Profile has been extended by adding more quality information (ISO19113/19131)
- ✓ Use of ISO19115 / ISO19119 (with ISO19139 encoding)

Deliverable of the project:

“A new ISO based multilingual geological metadata profile, plus metadata complying with this for all data provided to the project”.



Metadata and Catalogue

Catalogue Service:

➤ Implementation

- **OGC Catalogue Service for the Web**. *According to requirements from INSPIRE Metadata IR, the proposal is to use the ISO 19115/19119 Information Model for the catalogue:*
 - => OGC CSW 2.0.2 AP ISO 1.0
- Query language: **OGC Filter Encoding**
 - Criteria defined in a “query model” (keywords, list of metadata elements for searching and list operators)

➤ Multilingualism

- ✓ Part of the Metadata translated in 8(+) languages.
- ✓ The catalogue itself (search and editing interface) translated in 8(+) languages
- ✓ Geological keywords dictionary with links to GEMET



Conclusion

- ✓ **Search engine**
 - Catalogue interface based on CS-W requests
- ✓ **Map Viewer**
 - Zoom in, out, drag, go to, scale...
 - See the legend, ...
- ✓ **And specific options**
 - Use of the **multilingualism** of the services
 - **Translation** of the content of the datasets
 - (GetFeatureInfo, GetFeature), and display of the terms definitions
 - **Thematic analysis**
 - **Ogc:filter expressed according to the the common data model**
 - Query then view (WMS + SLD)
 - Query then download (WFS)
 - Query then present a synthesis of the information (WFS)



Conclusion

OneGeology-Europe and INSPIRE:

One objective is “to contribute to INSPIRE”

- Metadata:
 - *with ISO 19115/19119 metadata*
 - a test bed of the already published Metadata Implementing Rules (Regulations)
- Data Specification: *with GeoSciML data model*
- Services: *for discovery, view and download services*
- Data sharing: *analysis of practices across European Geological Surveys*
- Monitoring: *to monitor web services*
- Portal and Registry



General rule: to try using INSPIRE Implementing Rules as much as possible



Help | Language :

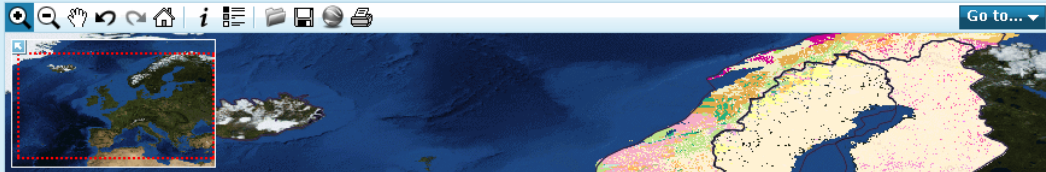
Search

Map viewer

Layers

☒ Eurogeographics

☒ 1GE - 1M:M Harmonized Geological Map



Go to...

Web site
<http://www.onegeology-europe.eu>
Geoportal
<http://geoportal.onegeology-europe.eu/geoportal>

Thank you for your attention



EGIDA Project

