EGDI-Scope - Scoping Study for a pan-European Geological Data Infrastructure

Final report of user needs and Functional requirements

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1. Introduction

This deliverable is the last report of WP2 and synthesises the overall results of this work package. Stakeholder input was gathered during the three first tasks of WP2 through workshops, interviews and questionnaires. The results of these activities were reported in deliverables D2.1, D2.2 and D2.3, the last of which also contains a number of descriptive use cases (referred to as case studies below).

The present deliverable (D2.4) is divided into two; a section **use cases** for a number of prioritised thematic areas (Chapter 3) and a **requirement specification (**Chapter 4). The requirement specification lists a number of functional and non-functional requirements, and is intended to be of direct use for the design of the EGDI (D4.3 – report on infrastructure needs and D4.4 – report on recommendations for implementation of EGDI) as well as the implementation plan for datasets (D3.3) and is based on a) the requirements from D2.2 and D2.3, b) stakeholder feedback from the second stakeholder workshop in September 2013 and c) a number of tentative use cases, which are presented in this document, and d) a series of workshop sessions where a number of European data portals have been evaluated.

2. Terminology

Term	**Definition**
Geological Service	A functional part of EuroGeosurveys aimed at being able to provide answers to questions posed by European decision makers.
EGDI	The technical information platform of the *Geological Service* . EGDI in the context used within the current document covers the EGDI database (see below), the *EGDI discovery portal*, the *EGDI-derived thematic portal* (disregarding the fact that they may officially be named after other projects) as well as the associated maintenance and governance structures.
EGDI database	More than a traditional database, and should be understood as the "container" of all data that are part of *EGDI*, which will most likely be one or more central databases as well as a system of distributed web services made available for EGDI by the individual data providing geological survey organisations. All these elements being defined in a set of coherent and linked INSPIRE based data models.
EGDI metadata catalogue	A central metadata database where metadata records from individual data providers are harvested and made available for the EGDI discovery portal. The EGDI metadata catalogue most likely will also be storing *Top-Level metadata* relating to the general data layers of EGDI to which each of the distributed services belong.

Term	Definition
EGDI discovery portal	A web portal through which the entire content of the *EGDI metadata catalogue* can be searched and the discovered datasets can be viewed.
EGDI-derived thematic portal	EGDI will cover many thematic, geoscientific areas. It still needs to be decided whether data relating to all areas will be accessible through one single EGDI portal, but no matter what, there will also be a need for certain projects (such as Minerals4EU) to build a dedicated portal. The geological content of such portals, however, should come from EGDI and make use of the underlying services. A portal like that is referred to as an EGDI-derived thematic portal in this document.
Thematic area	A logical division of the broad spectrum of disciplines using geological data. The areas are in most cases reflected by a corresponding EuroGeosurveys Expert Group (e.g. “Mineral Resources”, “Water Resources”) etc. As an exception can be mentioned “Environment” which is covered by at least the “Water Resources”, “Superficial Deposits” and “Geochemistry” expert groups.
Case Study	Corresponds to “Use Case” in the meaning of D2.3. However, to avoid confusion a more strict use of terms is used here. Case Study is the in-depth analysis of a small part of a *Thematic area*. As an example can be mentioned the study on “access to information relating to the occurrence of rare earth element in the European Union”, which is a part of the “Mineral Resources” thematic area. A case study will analyse (together with relevant stakeholders) the user groups of information and the requirements of each user group. Furthermore, it will investigate the availability of existing data, the relationship to past or ongoing projects and legal aspects relating to the data. One Case study will feed in to many *Use Cases*. One use case relating to the rare earth element example could for example target the decision maker’s need for European REE information, another one to the needs of “normal citizens” to the same kind of information. Furthermore, use case relating to provisioning and quality control of the same data will also be relevant for the considerations leading to the design of EGDI.
Use Case	A use case is born from a *Case Study* and describes with Unified Modelling Language (UML) diagrams and event flow charts, the

Term	Definition
	steps that should be undertaken to fulfil the need of a specific type of user. One use case can for example describe in detail the steps undertaken by a geological expert who will **use** EGDI to find data and information in support of a report that has been requested by a policy maker.
High-level end user	Users such as policy makers that will not need direct access to the EGDI, but who depend on the ability for experts to have access to up-to-date, reliable, pan-European data in order to respond quickly to requests for information. EGDI-Scope stakeholders belonging to this category includes DG ENTR – Raw Materials, DG JRC – INSPIRE, DG ENV – INSPIRE and ETP-SMR.
System end user	Users that will access the EGDI directly in order to find data and information of use to their line of business. Stakeholders belonging to this category include the end users of all the systems that are under consideration by the EGDI-Scope project as being suitable for conversion into the future sustainable data infrastructure (EGDI) such as OneGeologyEurope, Promine, Eurogeosource, EURare, Minerals4EU, PanGeo, Subcoast, Terrafirma, EMODnet-geology and GeoSeas. In EGDI-Scope these are represented by coordinators or core team members of these projects who have insight into the user needs related to the data covered by each project. More specifically, a number of EGDI-Stakeholders also belong to the category of system end users. These are EEA, EFG, Insurance Europe as well as geological experts from different domains. In the EGDI-Scope stakeholder forum, the interests of geological experts from the National Geological Survey Organisations are represented by the chairs of the EGS Expert Groups. Since the geological experts should in the future be able to use EGDI as an operational platform in the process of delivering answers to the high level end users (i.e. policy-makers), these are considered of high importance when analysing requirements for data and functionality.
Data Provider	These are stakeholders that will feed data into a future EGDI, and since the EGDI should be a sustainable platform serving data and services from the National Geological Survey Organisations,

Term	Definition
	representatives of all EuroGeoSurveys members are involved in the project and can be considered belonging to this category.
Stakeholder	Organisations that have an interest in EGDI-Scope to ensure integration to other projects and programmes (on a political or technical level). Stakeholders in this category include (please note that some overlap with above-mentioned categories exists) DG Connect, DG RTD, DG ENTR – GMES, EEA, DG JRC – INSPIRE, ESFRI, REA, ESA, EuroGeographics, GSAF, OAGS, Minerals and Metals Group, GEO Secretariat, UNECE, UNESCO as well as a number of past and ongoing European projects (OneGeologyEurope, EPOS, Promine, Eurogeosource, EURare, Minerals4EU, PanGeo, Subcoast, Terrafirma, EMODnet-geology, GeoSeas and COOPEUS).
Top-Level metadata	Traditionally in distributed systems, each dataset contributing to an aggregated product (as for example OneGeologyEurope) has associated metadata. The aggregated product itself, however, also needs to be described with metadata. Such metadata are referred to as top-level metadata within this document.

3. Thematic areas and use cases

Based on the preliminary results of EGDI-Scope (reference to WP2 and WP3 deliverables), a tentative prioritisation of thematic areas was discussed at the full consortium meeting on 9th of September 2013 in Malta by representatives of 20 participating geological surveys. The discussions were focussed around a) political importance, b) scientific importance and c) feasibility according to the current data situation.

The consortium unanimously acknowledged that **geology** (both onshore and offshore) is the most important theme for EGDI since many other data can only be properly understood if the underlying geology is known.

Furthermore, the following thematic areas were chosen as being of relevance for the first phase of EGDI, and consequently for the work to be carried out by the EGDI-Scope team towards the development of the final implementation plan:

1. **Mineral Resources** – A highly important topic for the EU at present. Furthermore the close relationship to especially the recently initiated Minerals4EU project makes this theme very relevant already from the first phase of EGDI.
2. **Water Resources** – An area with a high societal impact. Furthermore it is highly relevant to consider in relationship to the obligations of the EU Member States towards e.g. the Groundwater Directive.

3. **Geohazards** – A very important topic for many European geological surveys and an area that affects many European citizens. Basically this thematic area can be subdivided into subthemes like subsidence, flooding, earthquakes and landslides, but it was not possible for the group to prioritise between these. However, one of the EGDI-Scope use cases is built up around subsidence datasets.
4. **Soil** – Relates to environmental issues such as ecosystem mapping and -assessment for the long-time preservation and improvement of biodiversity.
5. **Land use** – Agreed to be very important on a European level for planning purposes. It may, however, not necessarily have to be considered as a separate thematic area since many datasets from the above mentioned categories will indirectly provide valuable information for land use administrators.

The four case studies presented in D2.3 covers on- and offshore geology, mineral resources, geohazards (subsidence), soil and indirectly land use. In the following section, use cases will be elaborated from each of these case studies and requirements will be defined to cover each of the above mentioned themes. Water resources were not covered by the initial case studies, and will hence be included in this report in order to cover that thematic area as well.

3.1 Geology

Knowledge about the geological composition of the earth is fundamental for the understanding of many other geoscience disciplines, and is therefore a natural part to be considered by a geological data infrastructure. Geology as such, is not a thematic area *sensu strictu*, but is merely to be considered the "basic layer" of EGDI. However, in the current section, geology (onshore and offshore) covers various types of geological maps.

3.1.1 Onshore

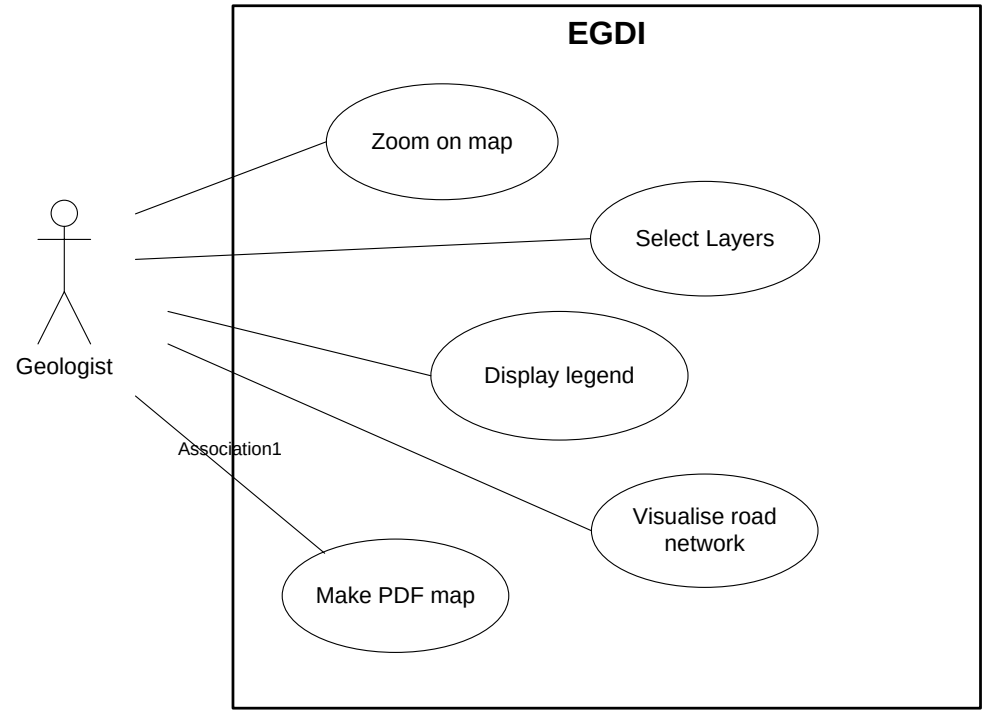
From 2008 to 2010, 20 European geological surveys joined efforts in the OneGeologyEurope project to make a dynamic geological map for Europe in scale 1: 1 million by harmonising and making interoperable surface geological maps from each of the participating countries. Since then, a number of EuroGeosurveys members have been active in filling in the geographical gaps through the OneGeologyEurope-Plus project.

All pieces of the European geological map are put together on the OneGeologyEurope portal where dynamic map facilities allow users to do normal GIS-type operations such as panning and zooming. The map can be symbolised according to age or lithology and a "thematic analysis" tool allows users to perform queries on e.g. "sandstone" which will render a European map with only the occurrence of sandstones displayed.

Analysing the map a little closer reveals some limitations. Cross-border discrepancies exist and the map does not represent the same thing in different countries. In Sweden for example, the map literally represents the surface and shows a mixture of outcropping basement and superficial deposits, whereas in Norway the map represents only the bedrock (disregarding the fact that this may in areas be covered by superficial deposits). Furthermore, legend and click-info information does not necessarily match (at least not for lithology) making it difficult to know what a polygon on the map exactly represents. Two tentative use cases are sketched out below to highlight the requirements for improvement to make the map suitable for some concrete use scenario.

Tentative Use Case 1: A geologist is planning an excursion and wants to prepare an overview geological map of the Alps showing the distribution of the main lithological units and the location of the major faults and thrusts and with the road network displayed on top.

Use Case Diagram

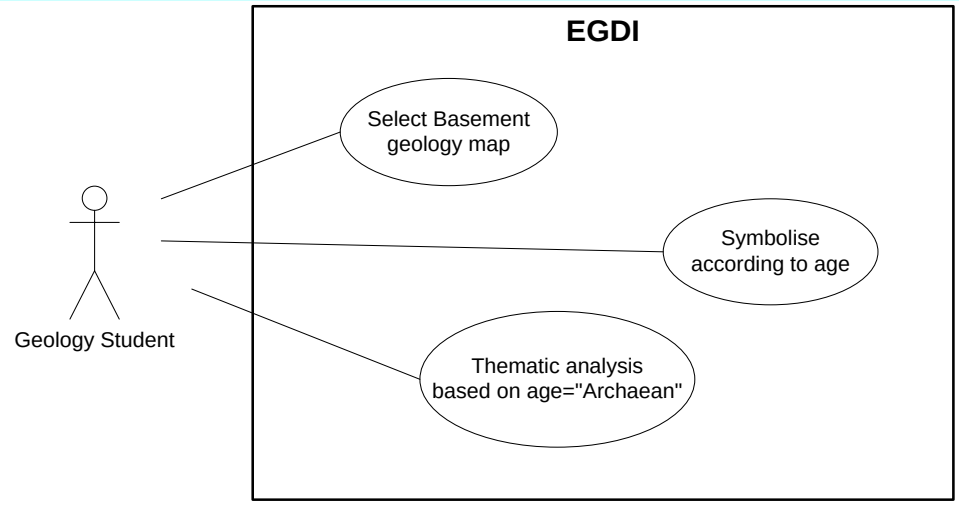


Flow of Events

1. The geologist searches google for “geological map Alps” and get a link to EGDI
2. The geologist clicks the link and is presented with a geological map of Europe
3. The geologist zooms to the area of relevance
4. The geologist selects “lithology” in order to symbolise the map according to the rock types
5. The geologist searches for, finds and turns on the “faults, thrusts and lineaments” layer
6. The geologist selects “legend” and is presented with a legend representing the polygons and lineament types within the zoom-area. The legend entities for polygons are sorted/categorised according to age.
7. The geologist searches for, finds and turns on the road network (EGDI-linked service)
8. The geologist selects “make map” and a PDF-file is generated on the fly containing the map and the legend.

Tentative Use Case 2: A geology student is writing an exercise about Archaean rocks in Europe and wants to include a distribution map

Use Case Diagram



Flow of Events

1. The student searches the Internet for “Archaean geology Europe” and finds a link to EGDI
2. The student clicks the link and is presented with a geological map of Europe
3. The student turns on the “basement geological map”
4. The student chooses “age” in order to symbolise the map according to age
5. The student chooses “thematic analysis” and selects Archaean to display a map of Europe with Archaean rocks highlighted.
6. The student selects “make map” and a PDF-file is generated on the fly containing the map and the legend.

Requirements from use case

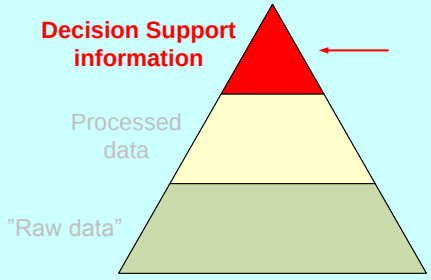
Requirements for EGDI datasets

- Harmonised, geological, full-coverage basement map of Europe containing

Requirements for functionality

- Interactive map
- Symbolisation according to age
- Thematic analysis tool (only show e.g. Archaean rocks)
- Map generation and print

Placement in information pyramid



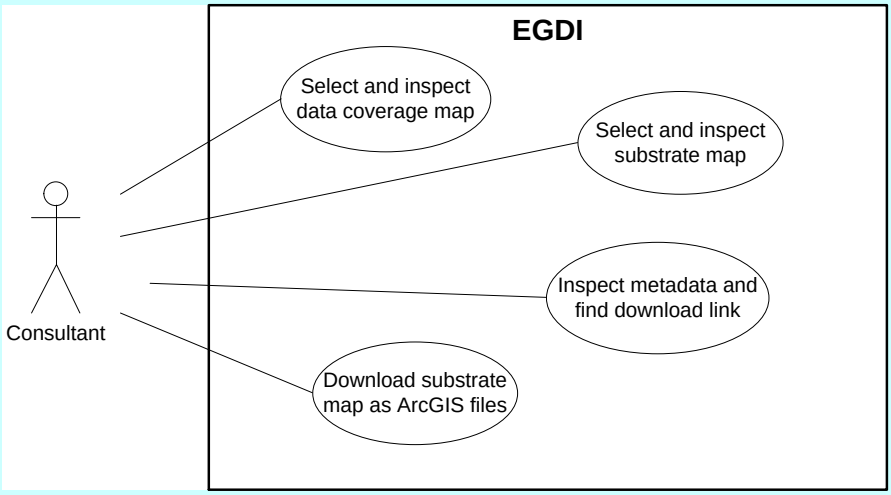
3.1.2 Offshore

Offshore geology is basically covered by the EMODnet-geology project, which is the geological part of the European Marine Observation and Data Network (EMODnet) the aim of which is to improve access to marine data. A number of preparatory actions were conducted from 2008 to 2010 within the domains of biology, chemistry, geology, hydrography and physical habitats to test the general approach. The geological part was run by a consortium comprising 14 geological survey organisations. The main data deliverable was a harmonised 1:1 million seamless, marine substrate map covering the Baltic Sea, the Greater North Sea and the Celtic Sea. This map was compiled from all freely available data in the area and was subsequently published through the OneGeologyEurope portal with the associated metadata residing in the EU-SEASED portal, which was maintained by the Geo-Seas project.

The next phase of the EMODnet-geology project is planned to start in the end of 2013 and will aim to increase the resolution to 1: 250 000 and extend coverage to all European sea areas.

Use Case: Planning for offshore wind farms

When planning for offshore wind farms, geological and geophysical data are used for a number of purposes both in relation to ground investigations and for environmental impact assessments. Very often contractors acquire high-resolution data in the specific target areas, but will be able to save lots of money if the existing data are accessible free of charge. The use scenario below illustrates the possible interaction of a consultant with the EGDI in order to obtain information about seabed substrates for the development of an overview habitat map in an area of interest (in this case, the North Sea)



Flow of Events

1. The consultant searches the Internet for “seabed North Sea” and finds a link to EGDI
2. The consultant activates the link and is presented with an interactive map, with a marine substrate map covering the North Sea turned on.
3. The consultant zooms to the area of interest and performs a visual inspection of the map
4. The consultant searches for, finds and turns on the layer “data coverage for substrate map” and the position of all geophysical lines and boreholes on which the map is based are displayed on top.
5. The consultant assess that the confidence in the area of interest is satisfactory.
6. The consultant clicks the “metadata”-button for the substrate map and gets a list of information about who is responsible, when it was last updated etc. The list also contains a link to download the map data as GIS files.
7. The consultant clicks on “download to ArcGIS” and downloads a zip package consisting of a shape file and a lyr file (containing symbolisation and legend info).
8. The consultant opens ArcMap and imports the newly downloaded data
9. The consultant categorise the polygons according to coarse- or fine-grained sediments and uses the result as input to the habitat map.

Requirements from use case

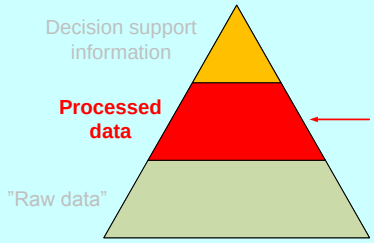
Requirements for EGDI datasets

- Marine substrate map (the more detailed, the better)
- Data coverage map relating to substrate map
- Dataset harmonised according to an Inspire compliant and community validated data model (ex: to collect and download harmonised substrate dataset).

Requirements for functionality

- Interactive map with standard pan- and zoom functionality
- Metadata-button connected to data layers
- GIS-file download (e.g. ArcMap package containing shape file and lyr file)

Placement in information pyramid



3.2 Mineral Resources

3.2.1 Summary of case study

The case study on Rare Earth Elements presented in D2.3 stressed the importance to relate EGDI to the European Innovation Partnership (EIP) on Raw Materials and the newly published Strategic Implementation Plan for this partnership. More specifically, the importance of connecting EGDI to the currently running FP7 projects Minerals4EU and EURare was recognised. Any use case developed for this thematic area, therefore should be (and is) coordinated with these two projects.

The case study revealed that there are high expectations from the European Commission (especially DG ENTR) towards EGDI as being the sustainable knowledge base for mineral intelligence. However, the Commission is to be considered as a high-level end user that will not need direct access to the EGDI and therefore do not impose any functional requirements on the system. The stakeholders from DG ENTR stressed that EGDI is to be considered one part of a geological service – the other part being the geological experts that will be able to provide swift and reliable answers to policy questions based on the updated and reliable content of EGDI. Indirectly that imposes a business requirement on EGDI as being an "operational platform" to serve this geological service in relation to the mineral resource area.

The case study, furthermore, analysed the current data situation and highlighted the fact that the results of the two just ended projects ProMine and EuroGeoSource could be good starting points. Discussions during a dedicated break-out-session at the second stakeholder workshop in Malta 10th of September, however, revealed that care has to be taken since none of these two databases are kept updated after the end of the projects, so if EGDI should somehow take over these data, it should be as "archived data" and other should be properly informed about this fact. Appendix XX is a questionnaire filled in by the break-out-group on Mineral Resources at the stakeholder workshop.

3.2.2 Use Case: Assessment of Rare Earth Element Potential in Europe

User Visions/Expectation

A European *decision maker* can contact EGS and ask for an overview of ten rare earth element deposits in Europe most likely to be exploitable. A mineral resource expert will process the request by searching the EGDI and looking at EGDI-linked resources (external sources of data and information, EGS networks on mineral resources etc.), and will produce a report with a map and a description of the relevant deposits, targeting many politically relevant issues such as economy (tonnage, grade, composition, bi-products, costs of extraction, infrastructure), health (e.g. Uranium content of deposits), environment (proximity to important biotopes, ground water reservoirs, lakes, rivers, nearby sources of sustainable energy), land use (proximity to ground water bodies, shale gas reservoirs, nature parks, settlements etc.), private sector aspects (existing licenses etc.).

Use Case Diagram

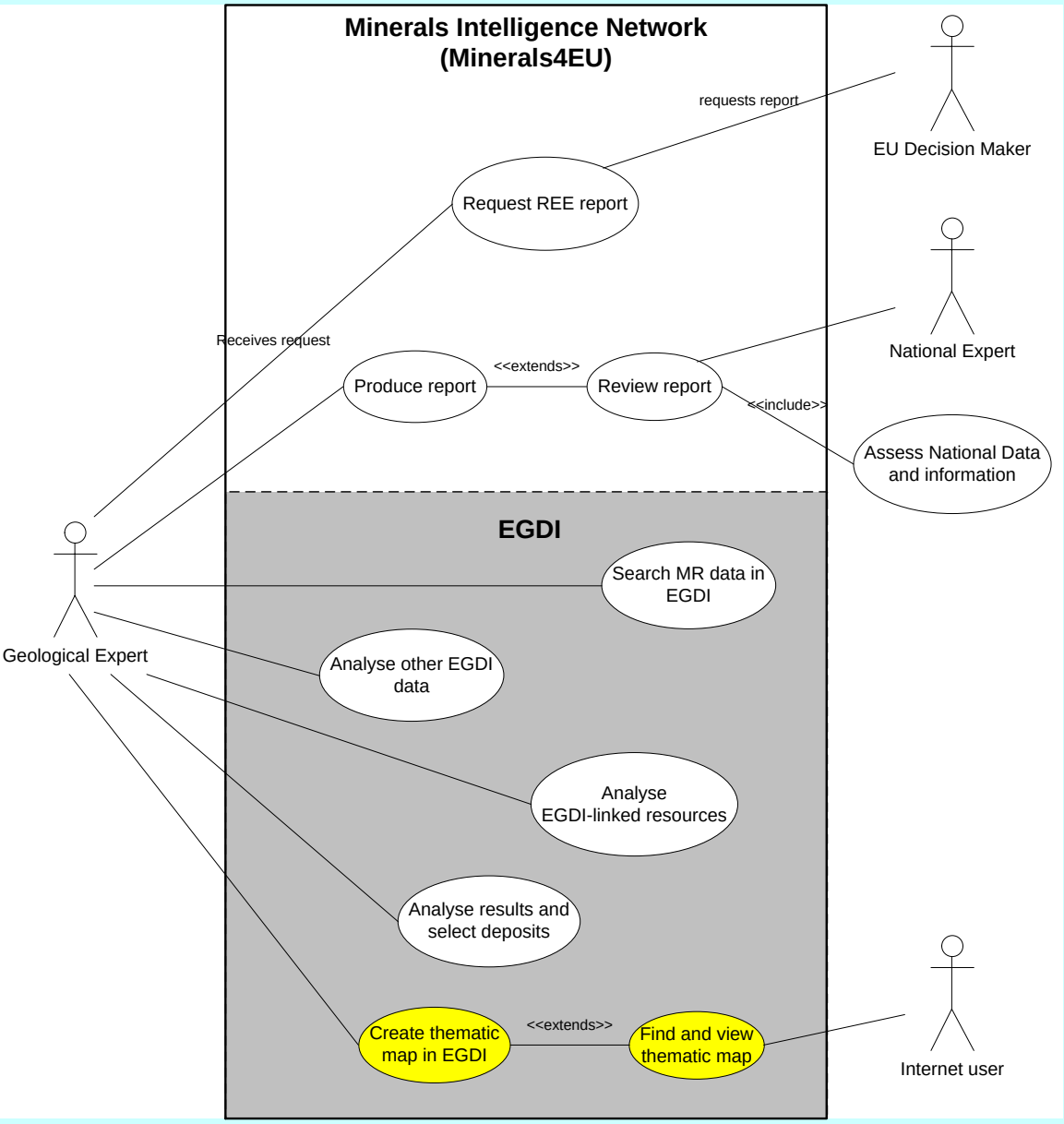


Figure 1. Use case diagram related to the REE use case. The use case partly builds on the preliminary considerations of the Minerals4EU project, and shows a possible future link between the EGDI and the Permanent Minerals Intelligence Network, which will be established by Minerals4EU.

Flow of Events

1. A European decision-maker contacts EuroGeoSurveys (EGS) and asks for an overview of the ten Rare Earth Element (REE) deposits in Europe most likely to be exploitable in the future.
2. EGS assigns a mineral resource expert to answer the question (through the mineral resources expert group).
3. The expert searches the EGDI for Mineral Deposits having Commodity= REE and Mining=No. The result is a gross list of REE deposits and a map showing their location.
4. The expert filters the result list according to a) resource numbers and b) total grade of REE.
5. A drill-down analysis of the highest ranking deposits on the list helps the expert categorise the list in terms of predominance of light or heavy REE.
6. Further analysis reveals the deposits where the mineralogy supports economically viable extraction of the metals.
7. The expert now studies the details of each deposit in order to evaluate if it contains bi-product which can be of economic importance.
8. Also based on EGDI data, the expert assesses if the Uranium content can pose a problem (for health and security reasons this is politically important).
9. From the above mentioned criteria, the expert has now narrowed down the list of interesting deposits and the result list and map now show only the deposits selected by the expert.
10. By geographical inspection on an interactive map provided by the EGDI interface, the expert now assesses the proximity of the mineral deposits on the filtered list to important ground water reservoirs (EGDI layer), shale gas prospects (EGDI layer), other hydrocarbon prospects (potentially an EGDI layer), settlements (an EGDI-integrated layer), nature parks (an EGDI-integrated layer), critical biotopes (EGDI-integrated layer) etc.
11. Furthermore, the expert should preferably be able to integrate licensing information through EGDI-integrated external web services.
12. The expert now exports the detailed information regarding each of the interesting deposits in Excel, Word or PDF format. He furthermore generates a series of maps (as jpg files) displaying the geographical relationship between the deposits and the occurrence of ground water bodies, nature parks, lakes, rivers, infrastructure, biotopes, etc.
13. The expert writes a report containing the result of the above mentioned analyses with inclusion of the downloaded deposit details and the generated maps.

14. On the EGDI resource portal, the expert finds contact details of the delegated mineral resource

Requirements from use case

Requirements for EGDI datasets

- Mineral deposit data, including
  - Location of deposit
  - Resources numbers
  - Commodity
  - Mining (yes/no)
  - Grade of REE, LREE, HREE and relevant bi-products (including Uranium)
  - Mineralogy
- Ground water bodies
- Shale gas reservoirs
- Community validated and Inspire compliant shared data model in the above mentioned modes and corresponding data collection flows (MS-EU or EU-EU….)

Requirements for EGDI-linked datasets/services

- Licensing information
- Land cover (lakes, rivers, towns)
- Infrastructure (roads, railroads, etc.)
- Ecosystem maps
- Nature parks
- All based in shared Inspire compliant data models

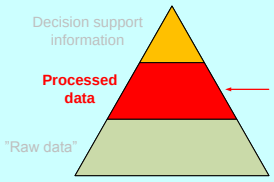
Requirements for other EGDI resources

- Contact information for national mineral resource experts

Requirements for functionality

- Search criteria: commodity and mining info
- Interactive map display
- Result list sorting (resource numbers and grade)
- Result list filtering (i.e. “select from the list, and remove others”)
- Interaction between result list and map (only show selected deposits on map)
- Export of mineral resource information as Excel, Word or PDF files
- Map generation (as image of pdf files)
- Optional: The possibility to log in and define thematic maps.

- **Placement in information pyramid**



3.3 Water Resources

3.3.1 Case Study

The present case study was not presented in D2.3, but has been included here to make sure that all prioritised thematic areas are covered.

Water resources from a geological perspective mainly deal with groundwater, which is important for society because it is used as drinking water in many countries and because it interacts with aquatic ecosystems, and hence affects biotopes and influences flooding events.

The present case study deals with the chemical quality of groundwater, but other case studies could also be considered relevant for this thematic area such as e.g. the application of a European Groundwater-Surface water model.

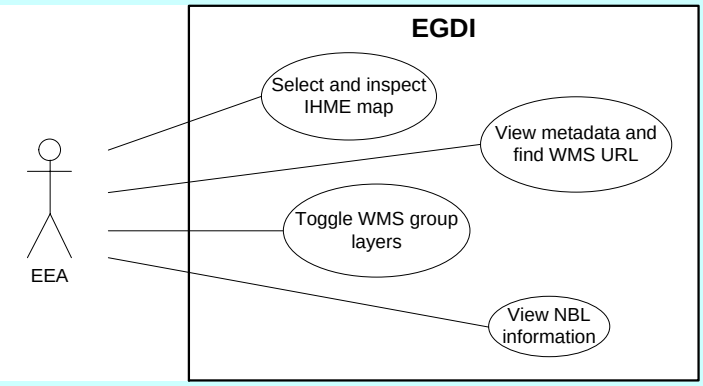
The *Water Framework Directive* stipulates that groundwater status must be accessed and that good chemical and quantitative status much be achieved by 2015 in order to protect human health and associated dependent ecosystems. The *Groundwater Directive* defines threshold values (TV) as qualitative standards for pollutants in groundwater which need to be set by individual Member States.

Before 2008, the Member States defined TVs and reported these to the European Commission based on some established guidelines. These TVs, however, differ from country to country both in terms of value (Arsenic for example ranging from 0.75 to 189 µg/l) and the level of determination. Most of the groundwater TVs were established at Member State level, some at groundwater body level and a few on a river basin district level. Hence, the need for a more systematic approach is obvious.

The FP6-funded BRIDGE project (2005-2006) involved scientists from 11 European countries that worked jointly on the definition of a harmonised European aquifer typology map as a mean to conduct regional differentiation of natural background levels (NBLs) and TVs of pollutants in groundwaters of Europe.

3.3.2 Use Case: Natural Background Levels of As in groundwater reservoirs

Use Case Diagram



Flow of Events

1. The European Environment Agency (EEA) or a consultant wants to assess the groundwater chemical status of groundwater bodies in Germany based on the Arsenic content and comparisons with Natural Background Levels (and/or threshold values) for relevant aquifer types as either reported by the member states or calculated by a common harmonised method.
2. EEA opens a desktop GIS and displays all reported groundwater samples from Germany (from WISE) and symbolises the dots according to the Arsenic content.
3. EEA access the thematic EGDI portal concerning water resources through a web browser.
4. EEA turns on the hydrogeological map of Europe (IHME).
5. EEA chooses "view metadata" for the layer and finds the WMS URL for the layer
6. EEA adds the WMS service to the desktop GIS project and the IHME map is displayed below the Arsenic symbols.
7. EEA now toggles between the layers included in the IHME service and compare reported Arsenic values to estimated Natural Background Levels (or threshold value) for relevant aquifer types:
    a. Lithology level 1 to 4
    b. Aquifer types
    c. Natural Background Levels (NBL) related to lithology classes
8. EEA calculates the difference between observed concentration(s) and the estimated background value/threshold value in evaluated aquifer type.
9. If zero or negative the groundwater chemical status is good (green colour) and no action is required if positive the data indicate poor groundwater chemical status (red colour) and further investigations and possibly remediation measures are required.
10. EEA or consultant assess the results and write a report.

3.4

Requirements from use case

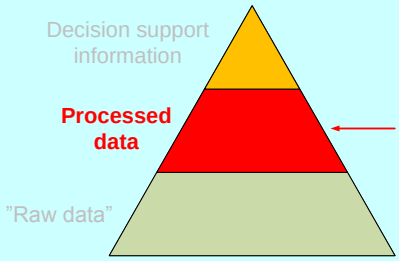
Requirements for EGDI datasets

- IHME lithology levels 1 to 4
- IHME aquifer types
- Natural Background Values for the main, critical pollutants in groundwater mapped to the lithological classes of the IHME dataset (at an appropriate level)

Requirements for functionality

- WMS functionality
- WMS URL's in metadata

Placement in information pyramid



Geohazards (subsidence)

3.4.1 Summary of case study

A number of European projects have dealt with ground instability in densely populated areas (PanGeo, SubCoast, TerraFirma). The case study included in D2.3 mainly analysed the PanGeo project in which ground movement in 52 of Europe's largest towns had been assessed. The study how national experts – based on Persistent Scattered Interferometry (PSI) data, high-resolution geological data and auxiliary information – had delineated areas of relative ground movement as polygons in a GIS system and attributed each of these polygons with information about the cause of the geohazard. For each town, the experts had furthermore produced a geohazard description report, which together with the polygons were made available through the PanGeo portal.

The case study analysed the end user groups of PanGeo data and the paths of communication. Local authorities are the main end user category, but media and local citizens could also be potential users of the information provided by the project. The local authorities are represented by both some high-level end users who use the information for decision making and some technical departments (or hired consultants) who will access PanGeo to extract (preferably download), digest and forward the the information to the decision-makers.

In order to include the PanGeo products in EGDI, consideration needs to be given to the legal rights, present governance structure and future business model of PanGeo. PSI data on which the geohazard descriptions are based are partly owned by the PSI providers and partly made freely available by the TerraFirma Legacy project. The ground instability polygons are served as WMS service by the data providing geological surveys and made available for users by BRGM on the OneGeologyEurope portal. The main portal and a central database component is maintained by NPA (formerly Fugro, coordinator of PanGeo).

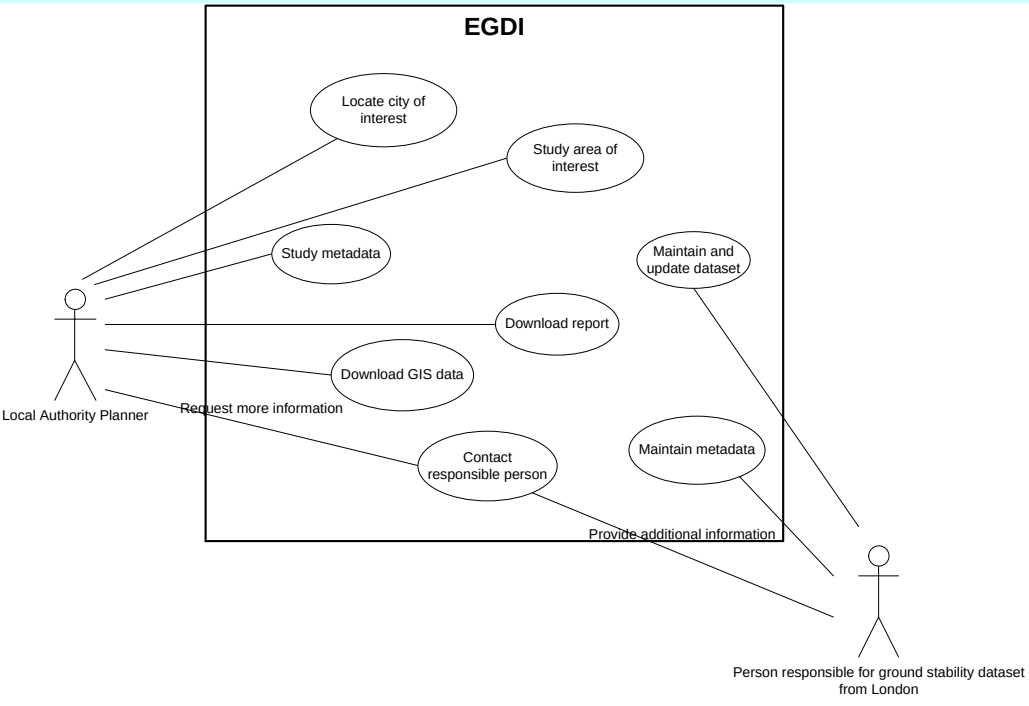
A MoU is being developed by the central partners in the project defining business flow and income sharing if/when new town want to be included. BRGM is part of that MoU as portal provider. When OneGeologyEurope is migrated to the EGDI, arrangements such as this MoU need to be considered.

3.1.1 Use Case

User Visions/Expectation

A decision-maker in the municipality of London requests information about geohazard risks in a certain area along the Thames in order to make qualified decisions regarding local planning in the area. The technical department swiftly finds the EGDI portal on the Internet by searching for “geohazards London”, finds, analyse and downloads the ground instability information and write a report to the decision-maker.

Use Case Diagram



Flow of Events

1. A local authority planner (L.A.) in London wants to know if a certain area of the city is prone to subsidence.
2. L.A. searches the Internet for “subsidence London”.
3. In the top of the list of results, L.A. finds a link to EGDI.
4. L.A. clicks the link and opens the EGDI data portal with the PanGeo subsidence layer switched on.
    a. Option a) EGDI displays a map of Europe with symbols at the location of all cities where subsidence data exist. Clicking a symbol will make the map zoom in to the extent of the chosen city and the ground stability polygons will be made visible.
    b. Option b) The link from the Internet search engine will automatically take the user to a zoom of the city searched for on the Internet.

5. L.A. zooms in on the area of interest and inspects whether there is registered observed or potential subsidence (indicated by a ground stability polygon).
6. If yes, L.A. clicks on the polygon an read the interpreted causes of ground instability.
7. L.A. searches for, finds and turns on the PSI data layer and studies the average rate of subsidence in measuring points in the area of interest (colour coded according to accompanying legend)

Requirements from use case

Requirements for EGDI datasets

- Ground stability polygons (from PanGeo)
- PSI data
  - Imagery
  - Time series in a community validated and Inspire compliant format.
- Metadata (including up-to-date information about contact point for dataset)

Requirements for EGDI-linked datasets/services

- Urban Atlas

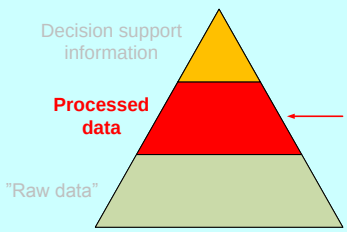
Non-functional requirements

- It should be possible to find EGDI on the Internet by searching for e.g. “subsidence <city name>”

Requirements for functionality

- City search (potentially externally controlled in case of event 4b)
- Zoom-dependent display (event 4a)
- Zoom and pan
- Click-info
- Display of legend on top of map
- Time series display (graphs)
- Easy access to metadata about the displayed dataset
- Download of reports associated with dataset
- Download of ArcGIS projects (geometry and legends)

Placement in information pyramid



3.5 Soil/Superficial deposits

3.5.1 Case Study

The case study included in D2.3 deals with the EU Biodiversity Strategy to 2020 and describes the role of the European Environment Agency (EEA) in helping member states reaching the strategic 2020 targets by developing methodologies for biophysical baseline mapping and assessment.

The case study describes the EEA workflow relating to ecosystem mapping and ecosystem assessment, and the added value of geological and geochemical data in this respect.

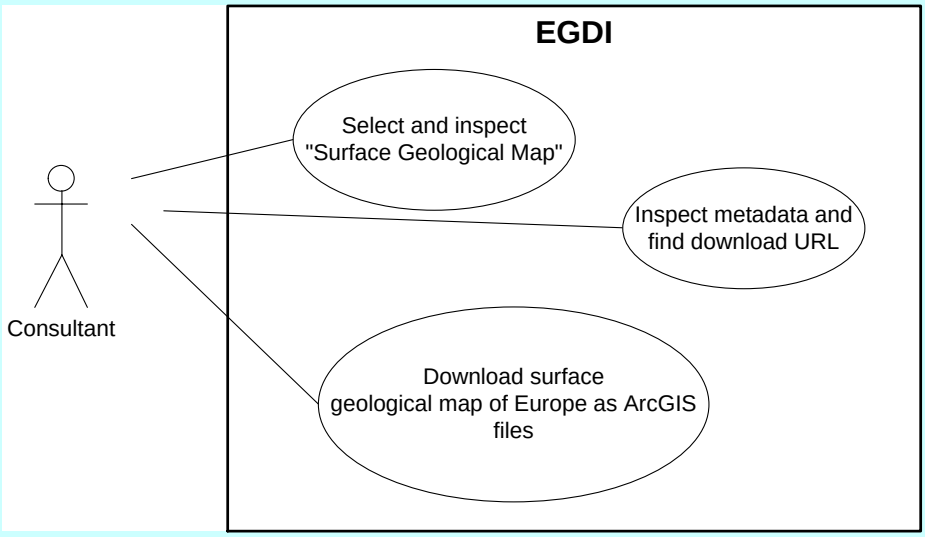
Especially the use of soil maps and geological maps in the thematic refinement stage of the ecosystem mapping process is described, as is the application of soil and sediment geochemistry in the characterisation of ecosystems as habitats and as baseline data.

A number of European datasets exist that will be able to contribute to EEA's ecosystem tasks, such as the OneGeologyEurope surface geological map, the shallow subsurface lithological classes of the Hydrogeological Map of Europe in 1: 1.5 million (IHME), the quaternary map of Europe in 1: 2.5 million (IQUAME2500), and the GEMAS dataset comprising geochemistry of agricultural and grazing soils across Europe.

Two use cases will be elaborated below; one related to the thematic refinement of ecosystem map; and one related to the geochemical characterisation of ecosystem conditions. EEA is in both cases the end user.

3.5.2 Use Case 1: Ecosystem mapping

Use Case Diagram



Flow of Events

1. Based on the Corine Land Cover and the European Nature Information System (EUNIS), EEA has developed an ecosystem map covering the major categories of terrestrial, freshwater and marine ecosystems. The map contains a 100 x 100 m grid, where each cell is classified according to the agreed typology.
2. EEA opens a web browser and accesses the EGDI portal.
3. EEA turns on the surface geological map of Europe
4. EEA clicks the “show metadata” button for the geological map
5. EEA finds the part of the metadata record containing the download URL
6. EEA downloads the map as ArcGIS files (shape file and lyr file)
7. EEA imports the map into ArcMap and produces a 100 x100 m grid (or a multiply thereof) with cell corners corresponding to the cells of the ecosystem map.
8. EEA applies various business rules through a number of grid calculation routines to obtain a new map where the various ecosystem categories are thematically refined according to the underlying geology.

Requirements from use case

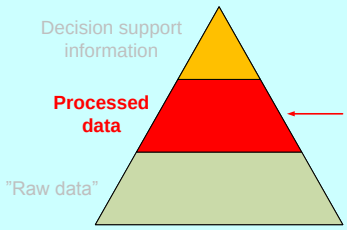
Requirements for EGDI datasets

- Full-coverage pan-European surface geology map

Requirements for functionality

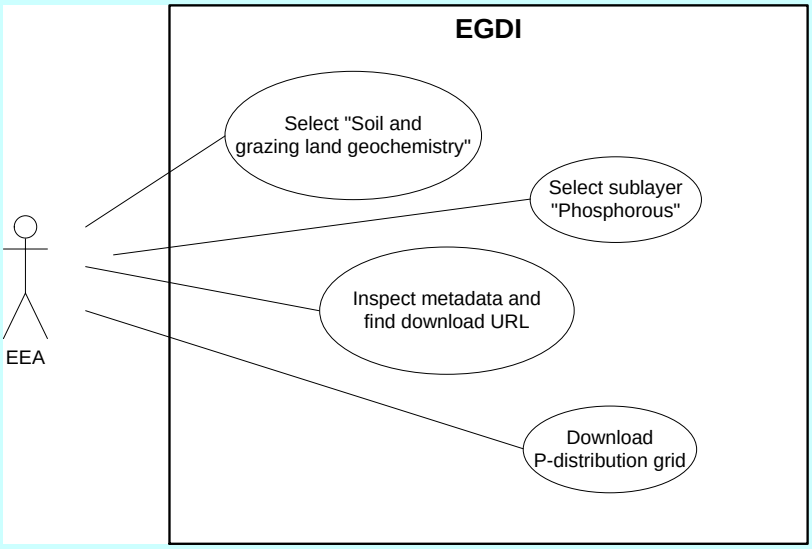
- Display of top-level metadata (e.g. metadata for the aggregated geological map – not only the underlying national services)
- Download of aggregated dataset in GIS format (e.g. ArcMap projects consisting of shape files and lyr files)

Placement in information pyramid



3.5.3 Use Case 2: Ecosystem Assessment

Use Case Diagram



Flow of Events

1. EEA wants to assess the effect of Phosphorus on some European ecosystems in order to map certain species to habitats
2. EEA opens a web browser and accesses the EGDI portal.
3. EEA searches for, finds and turns on the “soil and grazing land geochemistry” group layer (which contains the “Phosphorus” sub layer).
4. EEA turns on the “Phosphorus” sub layer and a European-level distribution map of P is displayed (grid)
5. EEA finds the part of the metadata record containing the download URL
6. EEA downloads the P-distribution map as ArcGIS files (grid and lyr file)
7. EEA imports the map into an ArcMap project containing ecosystem and species distribution grids (generalised to a resolution equal to the P-distribution grid), and applies various business rules through a number of grid and other geoprocessing calculations to obtain new maps showing the relationship between certain species and geochemically characterised ecosystem classes.

Requirements from use case

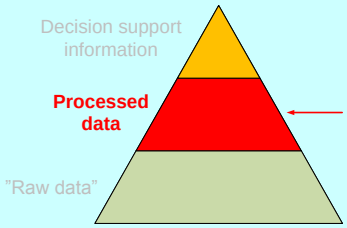
Requirements for EGDI datasets

- Distribution map of Phosphorus (and other nutrients) in a community validated and Inspired compliant format.

Requirements for functionality

- Layer grouping in interactive map
- Display of metadata for each layer in a group
- Download of gridded datasets in GIS format (e.g. ArcMap projects consisting of grids and lyr files)

Placement in information pyramid



4. Specification of System Requirements

In this section all requirements reported in D2.2, D2.3 as well as the requirements from the use cases are translated into system requirements for use in the system design (WP4) and final implementation plan (WP1). The “gaps” are filled by additional requirements coming out of a number of desktop sessions where IT people together with geological experts evaluated the content and functionality of existing European portals and their ability to provide the information that the EGDI-Scope stakeholders expect from a future European Geological Data Infrastructure.

4.1 General requirements

1. EGDI should be easy to find by the major Internet search engines (Google, Bing etc.).
2. There should be single-click entrance to the data portal from the search engines, i.e. the user should not have to navigate through one or more project web pages before finding the data portal.
3. All texts (labels, content, descriptions, etc.) should be human readable, i.e. directed towards users – not developers.
4. Although there could be many interfaces towards EGDI, there should at least be a discovery portal comprising a map viewer and various search facilities.
5. All themes depicted on the web map should have legends, click-info and metadata descriptions.
6. The user interface should be simple and intuitive.
7. User interfaces should be targeted towards end user from different geoscientific domains (e.g. environment, raw materials, geohazards ect.).
8. Advanced routines should be targeted towards professional users and should be accessed through “more options” buttons.
9. The EGDI portal should be usable on tablet computers.

4.2 Quality of Service

10. The EGDI portal should perform fast. Load time for pages (including encapsulated EGDI services) should comply with the Inspire Technical Guidance for the implementation of Discovery/View/Download services.
11. It should be possible to find information regarding the service status, i.e. if a data layer has geographical gaps, it should be possible to see whether it is caused by missing data or one or more malfunctioning data provider services.

4.3 Maps

12. It should be possible to switch projection on the fly, and the available projections should at least be useful in northern and southern Europe.

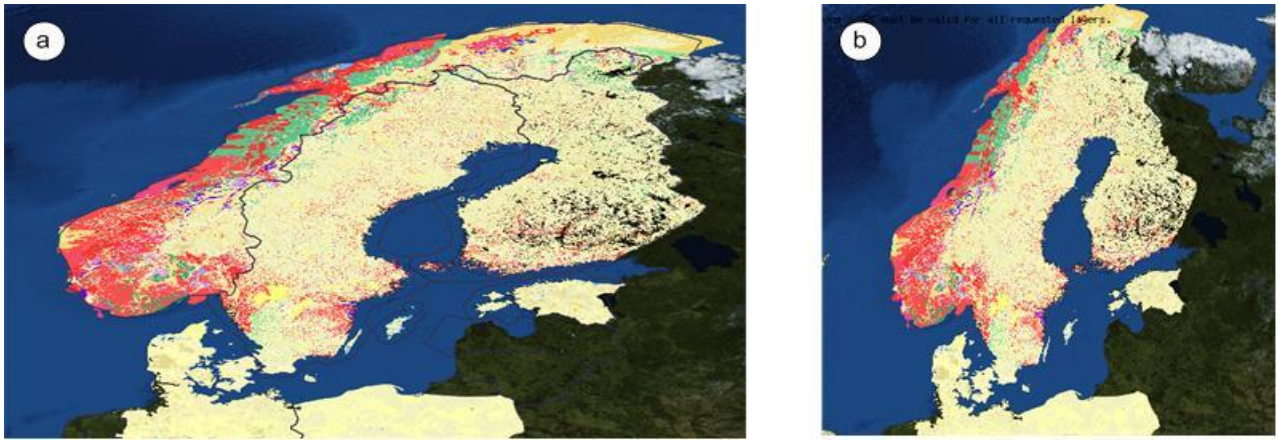


Figure 2. Examples of two supported projections in the OneGeologyEurope portal. A) a projection not suited for the whole of Europe, and b) a projection that is better suited for northern Europe .

13. The legend entry for an entity on a map should be consistent with the corresponding attribute in the click-info box. I.e. if a geological polygon is red because its lithology is e.g. nephelin syenite then the legend should show that red polygons mean “nephelin syenite” and the click-info for a red polygon should state that lithology=” nephelin syenite” (beyond other attributes such as age, etc.).
14. The legend should be viewable on top of the map it describes.
15. Click-info boxes should be well laid out and contain simple, correct and human readable labels and content.

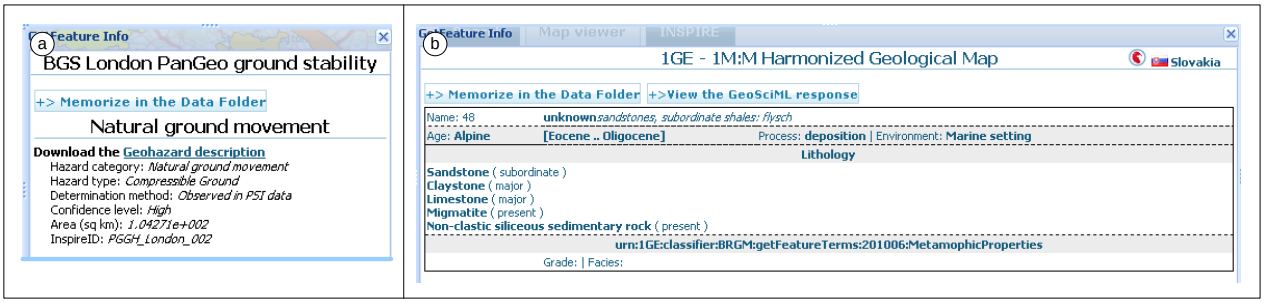


Figure 3. Examples of click-info from a) the PanGeo portal and b) the OneGeologyEurope portal. The info on the PanGeo portal is easy to read (with the exception of the area information), whereas the information box from the 1GE portal is difficult to get an overview of, contains superfluous information and information that is of little use to most users (e.g. urn:1GE:classifier:BRGM:getFeatureTerms:201006:MetamophicProperties).

4.4 Metadata

16. A metadata catalogue should be available
17. Metadata should be INSPIRE compliant
18. Metadata on a general level (top-level metadata) should be available for all data layers, e.g. by an "i"- or "?"-button next to the layer name.

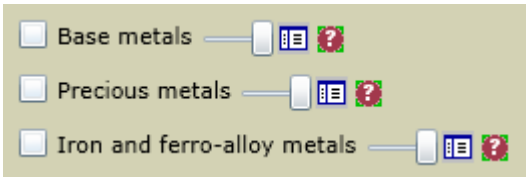


Figure 4. Example of intuitive interface from the ProMine portal. Individual map layers each have a legend and a metadata button associated.

19. The top-level metadata should contain links to metadata for the individual datasets that contribute to the data layer.

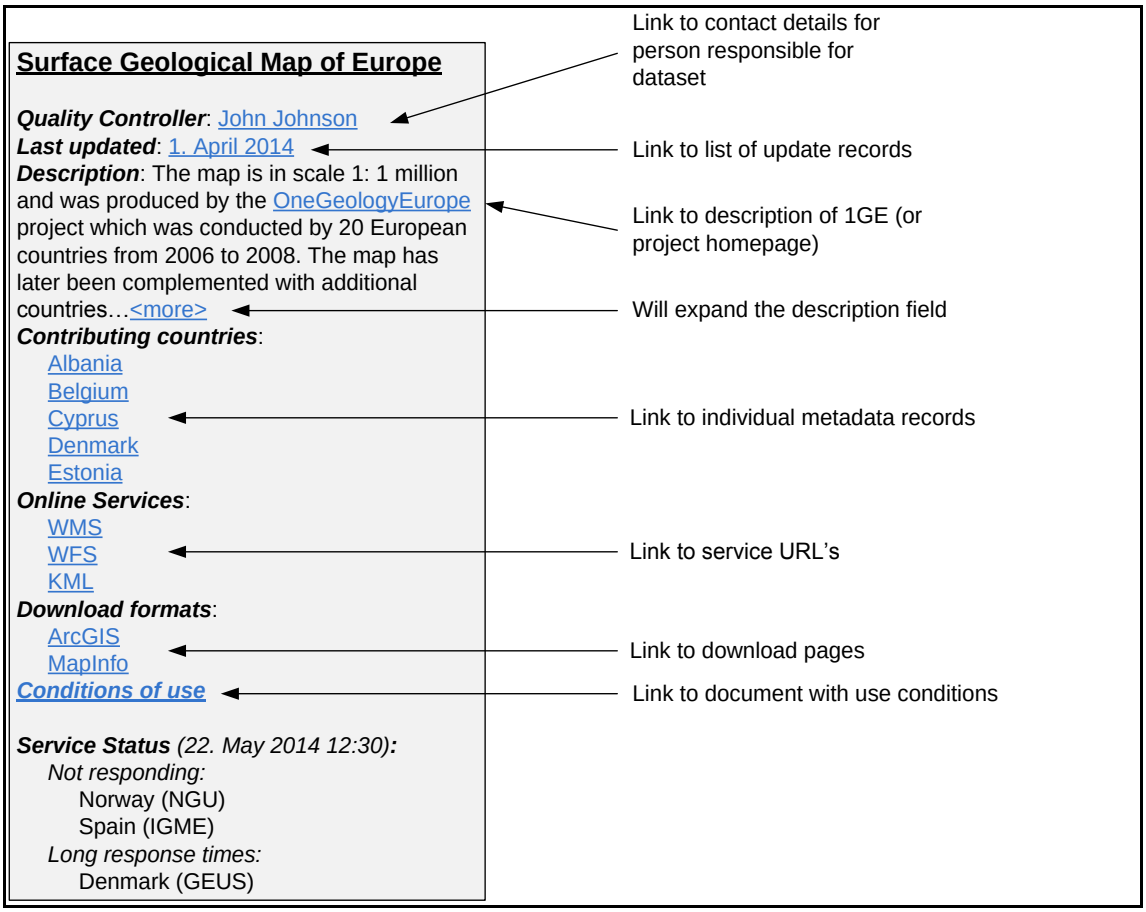


Figure 5. Tentative example of top-level metadata for a dataset

20. The metadata catalogue should be arranged logically (e.g. hierarchical).
21. There should be a standard for the title field in the metadata to make result lists manageable.

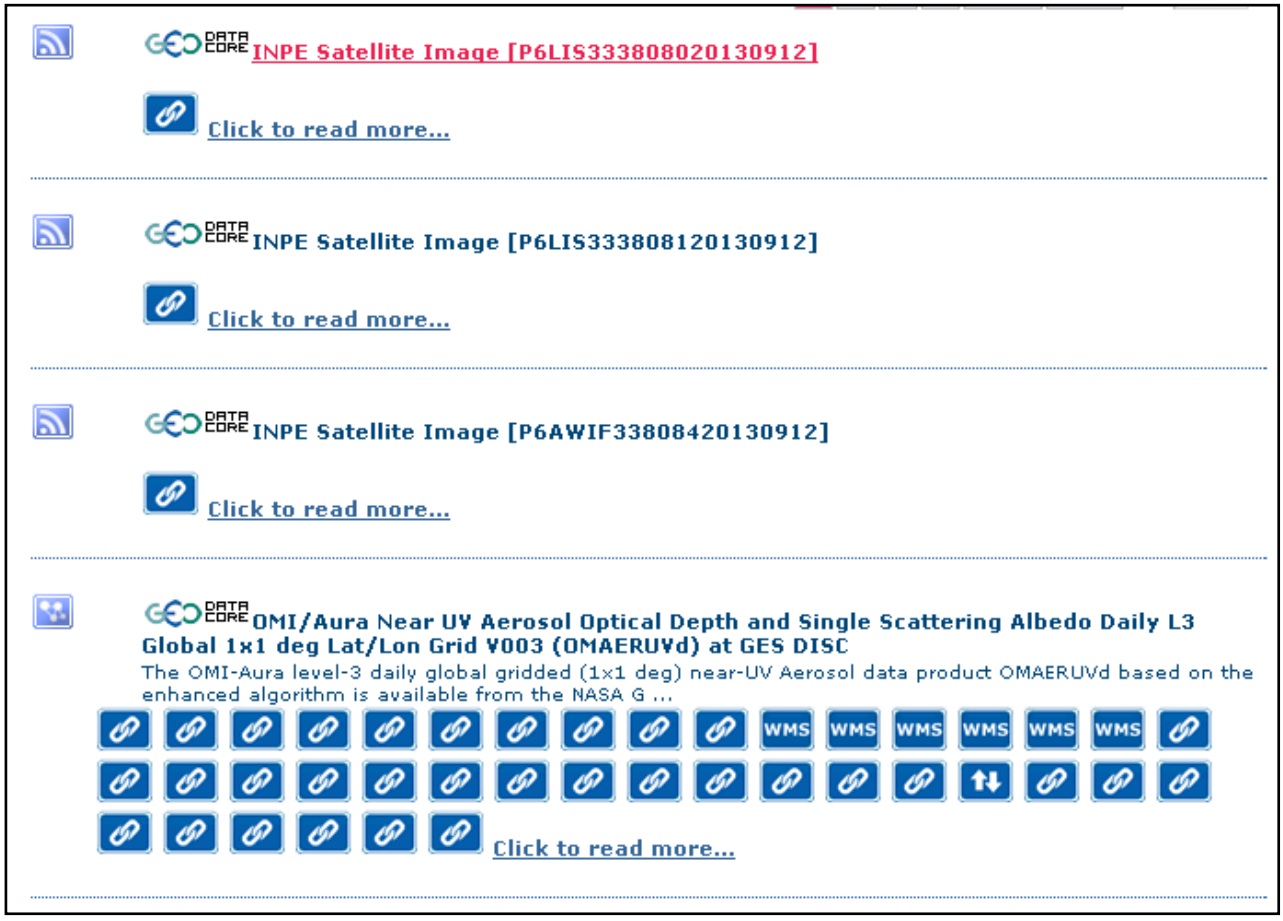


Figure 6. Example of a list of datasets from the GEOSS portal (www.geoportal.org). This list is of little use to users since some datasets have the same title. Furthermore, the last dataset in the list contains a lot of links, but the users don't have a chance to distinguish between them.

4.5 Search facilities

22. The EGDI-portal should support geographical search, metadata search (important to distinguish between top-level metadata and metadata for national datasets), and in some thematic areas more intelligent data search (e.g. "show all mineral deposits with a gold grade above 10 ppm").
23. Search results should be reliable and it is essential that data from all providers are queried. If a distributed service is malfunctioning, it is highly important that data from that service are not included in the search results.
24. Search options should in general be unique, i.e. it should be clear what attribute is searched and what values are allowed, e.g. Commodity=Gold in contrast to free text search through all attributes.

4.6 Online resources

25. EGDI should provide URL's for OGC web services (WMS, WFS, WCS, WMTS) both for top-level datasets and individual contributions.
26. Web services should comply with INSPIRE as far as possible. If the INSPIRE specifications do not suffice, new data specifications should be developed as pure extensions to INSPIRE and complying with international standards (GeoSciML, EarthResourceML etc.)
27. Maps should be delivered by a view service according to INSPIRE network service specifications.

4.7 Offline resources

28. GIS datasets should be downloadable in formats that can be read by the most common GIS software packages (ArcGIS, Map Info, etc.).
29. Downloadable geometry data (e.g. shapefiles) should be accompanied by legend info (symbolisation and entity descriptions) (e.g. as mxd files in case of ArcGIS downloads).
30. Tabular data should be downloadable as spread sheets.
31. Downloadable file packages should be accompanied by (Inspire compliant) metadata and contain a file that explains copyright and conditions of use.
32. Gridded data should be available for download in only a few fixed, but widely used formats (E.g. Ascii Grids and NetCdf).

4.8 Advanced features

33. The thematic analysis tool implemented in OneGeologyEurope is useful and should be implemented for other data layers as well.
34. It shall be possible to activate thematic analysis from the legend, e.g. clicking on "Fluviatile sand" in the legend for a geological map could result in a thematic map where only fluviatile sand is rendered.
35. A set of "fixed thematic maps" with predefined search criteria and symbolisation could be set up with persistent URL's to be indexed by Internet search engines. An ideal situation would be for a user to be able to search for "gold deposits Europe" on an Internet search engine and get a link to e.g. www.egdi.eu/goldmap, which would open an interactive map of Europe showing all gold deposits and symbolised with circles of different sizes according to their tonnage.

4.9 Data Provider Requirements

36. INSPIRE compliant data and metadata should be delivered only once. Either EGDI should utilise the same service URL as INSPIRE or EGDI should act as a gateway and transmit the national services to INSPIRE either as individual services or – more desirable – as top-level services.
37. The web front end architecture should respect server side limitations at the data provider side. That means for example, that zooming and panning on a map should not post too many service requests against the underlying distributed web servers.
38. EGDI should be able to deal with both distributed and centralised datasets.

4.10 Operational Requirements

39. There should be an operational group responsible for the technical maintenance of EGDI, including
    a. Maintenance of the shared data models and codelists (vocabularies)
    b. Maintenance of discovery portal
    c. Maintenance of thematic portals
    d. Maintenance of database
    e. Implementation of new top-level datasets
    f. Registering distributed services to existing top-level datasets. Including maintenance of discovery, view and download services infrastructures
    g. Updating centralised datasets
    h. Keeping metadata catalogue up to date
    i. Technical support to users
    j. Technical guidance to developers of thematic portals
    k. Backup
    l. System monitoring
    m. User management
    n. Software licenses
40. There should be a quality controller role in the EGDI governance structure. People with that role should be responsible for the quality of each top-level dataset in EGDI.
41. The quality controller should have access to
    a. Log in
    b. Create and update top-level metadata
    c. Register new services
    d. Monitor services (availability and performance)

4.11 Requirements specific to Geology

This section contains requirements stemming from a number of use cases described earlier.

42. EGDI should be easy to find by the major search engines when searching for things like “geological map Europe”, “geological map Alps”, “substrate map Europe”, “geology Europe”, “Archaean geology Europe”, quaternatry geology Europe” etc.
43. All geological maps should have full European coverage
44. EGDI should contain a surface geological map
45. EGDI should contain a quaternary geological map
46. EGDI should contain a basement geological map
47. The basement geological map should consist of both geological unit polygons and lineaments such as faults and thrusts.
48. EGDI should contain a marine substrate map
49. EGDI should contain a data coverage map relating to the marine substrate map

50. The polygon classes of the above mentioned geological maps should at least be attributed with harmonised age and lithology information

4.12 Requirements specific to Mineral Resources

The following section contains requirements revealed during development of the REE use case (D2.3) and through answers to a questionnaire provided by a break-out group dedicated to discuss matters related to integration of mineral resource data in the EGDI during the second stakeholder workshop held in September 2013. This group consisted of representatives of the EGS expert group on mineral resources as well as core members of the currently running Minerals4EU and EURare projects as well as the past Promine and EuroGeoSource projects.

51. EGDI should serve as database for the Minerals4EU and EURare projects.
52. EGDI should possibly host the results of the ProMine and EuroGeoSource projects (or parts thereof).
53. EGDI should serve mineral resource data
54. Resource classification should as much as possible comply with the UNFC standards.
55. EGDI should contain a web-accessible repository for thematic maps, market figures, PDF reports and 3D modelling PDF's.
56. EGDI should provide links to European vocabularies to be used by data providers (e.g. list of minerals, types of deposits etc.)
57. EGDI should provide data on
    a. Location of individual metals and minerals in Europe
    b. Information about commodities
    c. Information about grades, composition and tonnage of individual occurrences.
    d. Information about "how good" a deposit is taken into consideration a combination of factors like tonnage, grade, mineral composition, bi-products, etc.
    e. Information about the predominant ore and gangue minerals in individual occurrences
    f. Information about bi-products in individual occurrences
    g. Information about the geology (age, host rock, age of host rock, terrain, deposit type, genesis etc.) of individual occurrences
    h. Georeferenced reports on the mineral potential in given areas
    i. Information about reserves and resources in Europe and in individual European countries.
58. It should be possible to search for
    a. Commodity
    b. Deposit type
    c. Biproducts
    d. Grades of individual compounds
    e. Deposit size

4.13 Requirements specific to Water Resources

59. EGDI should serve the Hydrogeological map of Europe (IHME) and support symbolisation according to the four lithology levels as well as the aquifer types defined in the dataset
60. The lithology classes (at an appropriate level) should be assigned "Natural Background Levels" for the main, critical pollutants for groundwater.

4.14 Requirements specific to GeoHazards

61. EGDI should serve ground stability polygons from the PanGeo project
62. EGDI should serve the PSI data on which the above-mentioned dataset is based (imagery and time series)
63. It should be possible to find the geohazard part of EGDI by searching for e.g. "subsidence *<city name>*" on the Internet.
64. It should be possible to search for the name of a town in EGDI and have the map automatically zooming and panning to the desired location.
65. EGDI should support zoom-dependent display (so that ground stability polygons are not rendered before a certain zoom level)
66. It should be possible to click a PSI measuring point to see a dynamically-generated graph of the ground motion time series.
67. There should be support for download of the reports containing the geohazard descriptions of the individual PanGeo towns.

4.15 Requirements specific to Soil

68. EGDI should contain distribution maps of the main geochemical elements included in the geochemical atlas of agricultural and grazing land soils of Europe.
69. EGDI should support display and download of gridded datasets

5. Conclusions

The current report contains a number of use cases, which are chosen to be representative of a broad spectrum of use scenarios, but do not cover all possible aspects. The use cases are mainly deducted from the case studies presented in D2.3 supplemented with use cases on geology and water resources in order to cover the thematic areas prioritised by the full EGDI-Scope consortium at the last progress meeting held in September 2013.

The functional and non-functional requirements from the use cases together with requirements from the stakeholder consultation activities reported in D.2.2 and D.3 are translated into system requirements that have been ordered logically in the requirement specification, which forms the second part of this report.

The requirement specification is organised in a way that is intended to be of direct use for the *Implementation Plan for datasets* (D3.3) and the technical design to be reported by D4.3 (*Report on Infrastructure needs*) and D4.4 (*Report on recommendations for implementation of the EGDI*).

The requirement specification together with case studies and associated use cases are to be considered the final results of Work Package 2 and should provide useful input into the final EGDI implementation plan (D1.3). Other data types and use cases may be relevant to consider at a later stage. This is e.g. the case for 3D geology, which is a complex topic where the analyses of the pan-European aspects are not at present very advanced. It has therefore been left out of the present report.

Appendix 1: Agenda, second stakeholder workshop

08.30 – Registration

09.00 – Opening statements and project status (Rob van der Krogt, Coordinator EGDI-Scope)

09.35 – EGS International Cooperation and Developments (Luca Demicheli, EGS)

09.55 – OneGeologyEuropePlus (Dana Capova, Czech Geological Survey)

10.15 – Break

10.30 – The EEA/EGDI-Scope soil use case (Geertrui Louwagie, EEA)

10.50 – EMODnet geology (Alan Stevenson, BGS)

11.10 – Minerals4EU (Juha Kaija, GTK)

11.30 – The need for geological data and services from the view of professional geologists (Vitor Correia, EFG)

11.45 – A potential use case on integrated groundwater-surface water models (Klaus Hinsby, GEUS)

12.00 – The European Location Framework (Dave Lovell, EuroGeographics)

12.15 - GeoMol (Gerold Diepolder, Bavarian Environment Agency (LfU))

12.30 - InGeoClouds (Jørgen Tulstrup, GEUS)

12.45 – Lunch

14.00 – Introduction to break-out-sessions (Mikael Pedersen, GEUS)

14.15 – Break-out-sessions (15.15 possible change):

- Minerals (Facilitator: Daniel Cassard, Rapporteur: Juha Kaija)
- Marine geology (Facilitator: Henry Vallius, Rapporteur: Alan Stevenson)
- Environment (Facilitator: Geertrui Louwagis, Rapporteur: Jan Høst)
- Geohazards (Facilitator: Rob van der Krogt, Rapporteur: Eleftheria Poyiadji)

16.10 – Reporting from break-out-groups

16.45 – Wrap-up of the day and follow-up (Rob van der Krogt)

17.00 – Drinks

Appendix 2: List of Participants, second stakeholder workshop

Name	Organisation
Alan Stevenson	EMODnet-Geology, BGS, United Kingdom
Anna Ladenberger	Geochemistry Expert Group, SGU, Sweden
Boris Malyuk	Ukrainian State Geological Research Institute
Carlo Cipolloni	ISPRA, Italy
Céline Andrien	EuroGeoSurveys
Claudia Delfini	EuroGeoSurveys
Dana Capova	Czech Geological Survey
Daniel Cassard	Mineral Resources Expert Group, BRGM, France
Dave Lovell	EuroGeographics
Eleftheria Poyiadji	Earth Observation Expert Group, IGME, Greece
Fernando Perez	IGME, Spain
Francois Robida	BRGM, France
Gábor Turczi	Geological Survey of Hungary
Geertrui Louwagie	European Environment Agency
George Tudor	Geological Survey of Romania
Gerold Diepolder	Bavarian Environment Agency, Germany
Henry Vallius	Marine Geology Expert Group, GTK, Finland
James Baker	Minerals4EU, Selor, The Netherlands
Jan Høst	NGU, Norway
Jarmo Kohonen	GTK, Finland
Jasna Sinigoj	GEO-ZS, Slovenia
Jean-Jacques Serrano	BRGM, France
Jørgen Tulstrup	GEUS, Denmark
Juha Kaija	Minerals4EU, GTK, Finland
Kathryn Lee	BGS, United Kingdom
Klaus Hinsby	Water Resources Expert Group, GEUS, Denmark
Kristine Asch	BGR, Germany
Lars Kristian Stölen	SGU, Sweden
Luca Demicheli	EuroGeoSurveys
Marco Komac	GEO-ZS, Slovenia
Mary Carter	GSI, Ireland
Matthew Harrison	BGS, United Kingdom
Mikael Pedersen	GEUS, Denmark
Rob van der Krogt	TNO, The Netherlands
Robert Cibula	State Geological Institute of Dionýz Stúr, Slovakia
Robert Tomas	Joint Research Centre
Roland Eichhorn	German State Geological Survey
Sara Hugelier	KU Leuven, Belgium
Tamara Bardygola	Ukrainian State Geological Research Institute
Tirza van Daalen	TNO, The Netherlands
Vitor Correia	European Federation of Geologists

Appendix 3: Results of break-out sessions

During the second stakeholder workshop held in Malta 10. September 2014, four break-out groups were established to discuss issues related to mineral resources, geohazards, marine geology and environment. Each group was given a questionnaire, and asked to provide written answers and report these back to plenum after the group work. This section contains the filled-in questionnaires from each of the groups.

Questions for Mineral Resources Break-out Group

Introduction

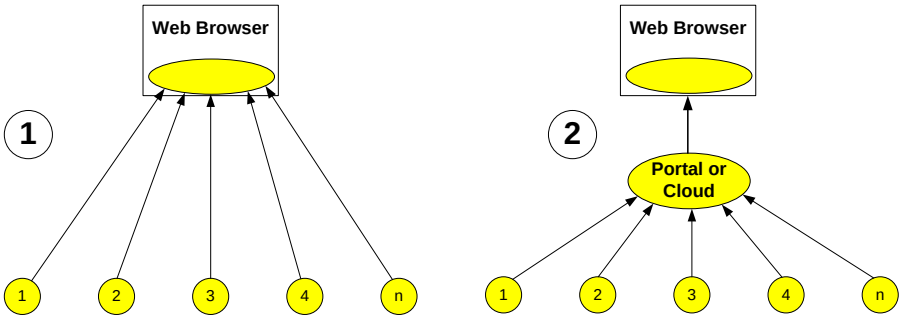
This document contains a list of questions/suggestions to be addressed during the break-out-session on mineral resources during the stakeholder workshop (WP2) in Malta (10/09/2013). They are related to the Rare Earth Elements use case, especially addressed by the EURARE project, but they cover also more general topics. **The answers should be reported back to the plenum after the session, and the filled in questionnaire should be given to a member of the EGDI-Scope core team.**

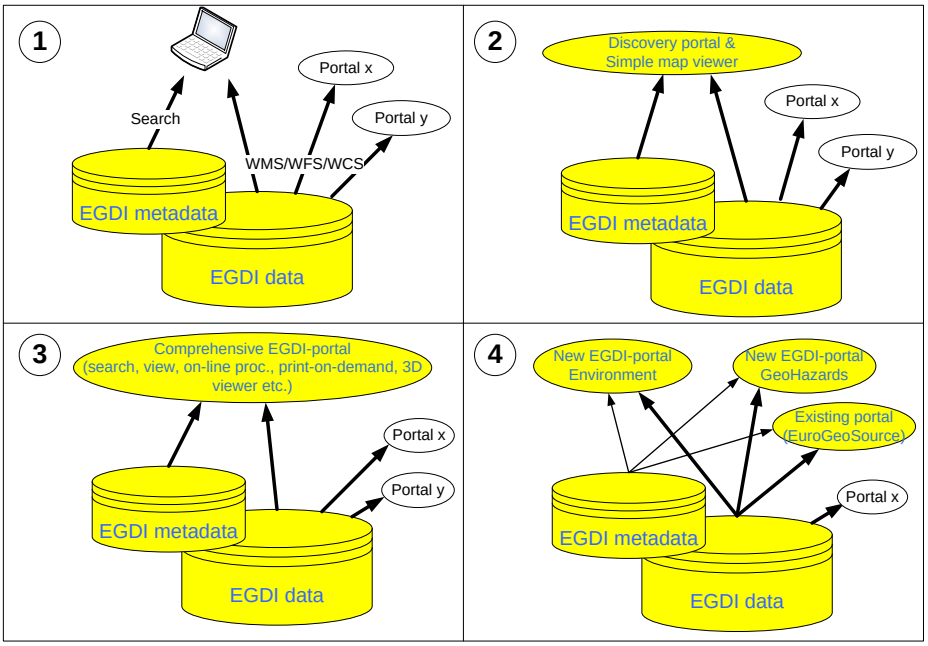
Questions and suggestions from the user point of view	**Yes / No / Comments**
There is a need for a complete and reliable European knowledge base on raw materials	Yes, obviously
There is a need for a supply and demand foresight on raw materials at European scale	Yes, there is a real need for this
Such a system should provide the following information: 1. Where REE occur in Europe (all, HREE, LREE or individual element) 2. What are the grades, composition and tonnages of individual REE occurrences 3. What are the main REE-bearing minerals in the occurrences 4. What is the U content of the occurrences 5. What other minerals/metals are associated with an occurrence (i.e. by-products) 6. What is the geology of an occurrence (age, host rock, host rock age,	1. It is important to know where REE´s are located even if we do not know which REE´s are present 2. Yes, but data not always located in surveys (mining institutes etc), in some countries non-public and confidential 3. Yes! 4. Yes. Important information (mining waste…) 5. Yes as usual.

terrain, type, genesis, etc.)	6. Yes, mandatory and compliant with INSPIRE specifications
7. Are the occurrences **licensed to anyone** and if yes then who	7. Yes, for point 1. But data not always located in surveys (mining institutes etc), in some countries non-public and confidential
8. What is potential for finding hitherto unknown deposits in a given area	8. Yes, if this information is available preferably in the form of georeferenced reports
9. How "good" is a deposit (in terms of tonnage/grade/mineral composition/etc.)	9. Yes, information available through INSPIRE webservices. Ideally using common classification.
10. What are the reserves and resources of REE (total, HREE, LREE, individual elements) in Europe	10. Yes.
11. What are the reserves and resources of REE (total, HREE, LREE, individual elements) in individual countries within Europe	11. Yes, but some information from countries non-public and confidential
What service level should EGDI provide (see figure)? 1. Basic infrastructure with data access through metadata catalogues and OGC services (option 1) 2. Infrastructure with simple web interface (map viewer) (optionn 2) 3. Infrastructure with complex functionality (option 3 & 4). In that case what? a. Download of data i. GIS files ii. Excel spreadsheets iii. SegY-files iv. PDF documents b. Print-on-demand c. User driven on-line symbolisation	Open issue….option 4

d. 3D viewer e. Advanced processing services f. Other, specify which	
Is there a need to know the date of the last update of the data	Yes
Should all data of the same type should be displayed with the same portrayal rules for a European map	Yes, has to provide the rules.
Not only REE data should be available, but also documents (legal texts, reports, …)	Yes if open-access
European vocabularies defining terms (list of minerals, type of deposits, …) should be available and used for European products	Yes
Best practices, methodologies used to produce European maps and results should be available (to be linked to metadata?)	Yes
Should the existing MR data come from project databases (EuroGeoSource, ProMine) or from national databases?	If projects databases are **maintained and updated**. National databases are regularly **updated and maintained** and might contain information not included in projects.

Questions / suggestions for the data/services provider point of view	**Yes / No / Comments**
Should EGDI *sustain* the results of ProMine?	Should pass under EGDI umbrella
Should EGDI sustain the results of EuroGeoSource?	
Should EGDI sustain the results of EURare?	
Should EGDI sustain the results of Minerals4EU?	
Should EGDI take over data provisioning for the existing ProMine and EuroGeoSource portals or should a new portal be build?	Too early to answer
Should data be maintained at the “best” level (= data providers level) and made available for the European level (INSPIRE requirement)	Yes
Should data be delivered according to INSPIRE data specifications (when exist)	Yes
What to do with data not in the scope of INSPIRE ? EGDI to define European data specifications ?	Yes probably

Should maps be delivered by a view service according to INSPIRE network service specification	Yes
Where to process/integrate data (to make European "products"): - Data collected from national services and then processed at the European level - Data processed at the national level to create the national part of the European product (then this part is used to make the final Product) - 	Depends on the product you want to deliver
How can a European product be validated when it is the result of the sum of national parts (how the quality control is done)?	Based on best practises in each part. Should be managed in a dedicated project.
Which components available in EGDI should be used by new projects? (metadata catalogue, web services)	All + common terminology
How new projects as EURARE can contribute to EGDI (before they are closed)?	Can bring new services and components. Consortium Agreements, IPR issues must be taken in to account



Yellow colour represents components to be built by EGDI.

Questions for the geohazard break-out group

Introduction

This document contains a list of questions for the stakeholder workshop in Malta 10th September 2013. They are related to the both the ground instability use case and more generally to other geohazard domains. **The answers should be reported back to the plenum after the session, and the filled in questionnaire should be given to a member of the EGDI-Scope core team.**

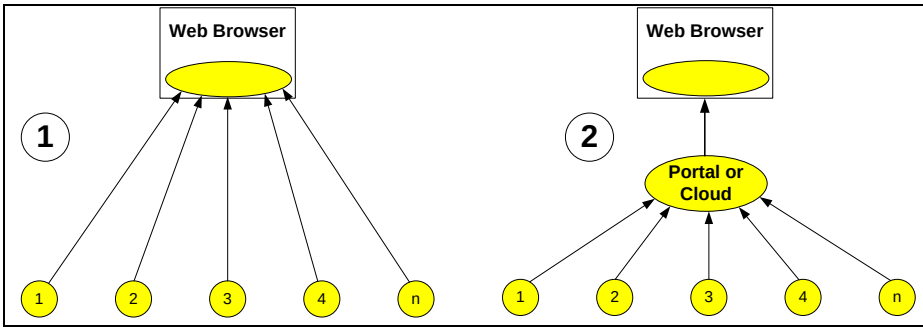
Relevant Projects

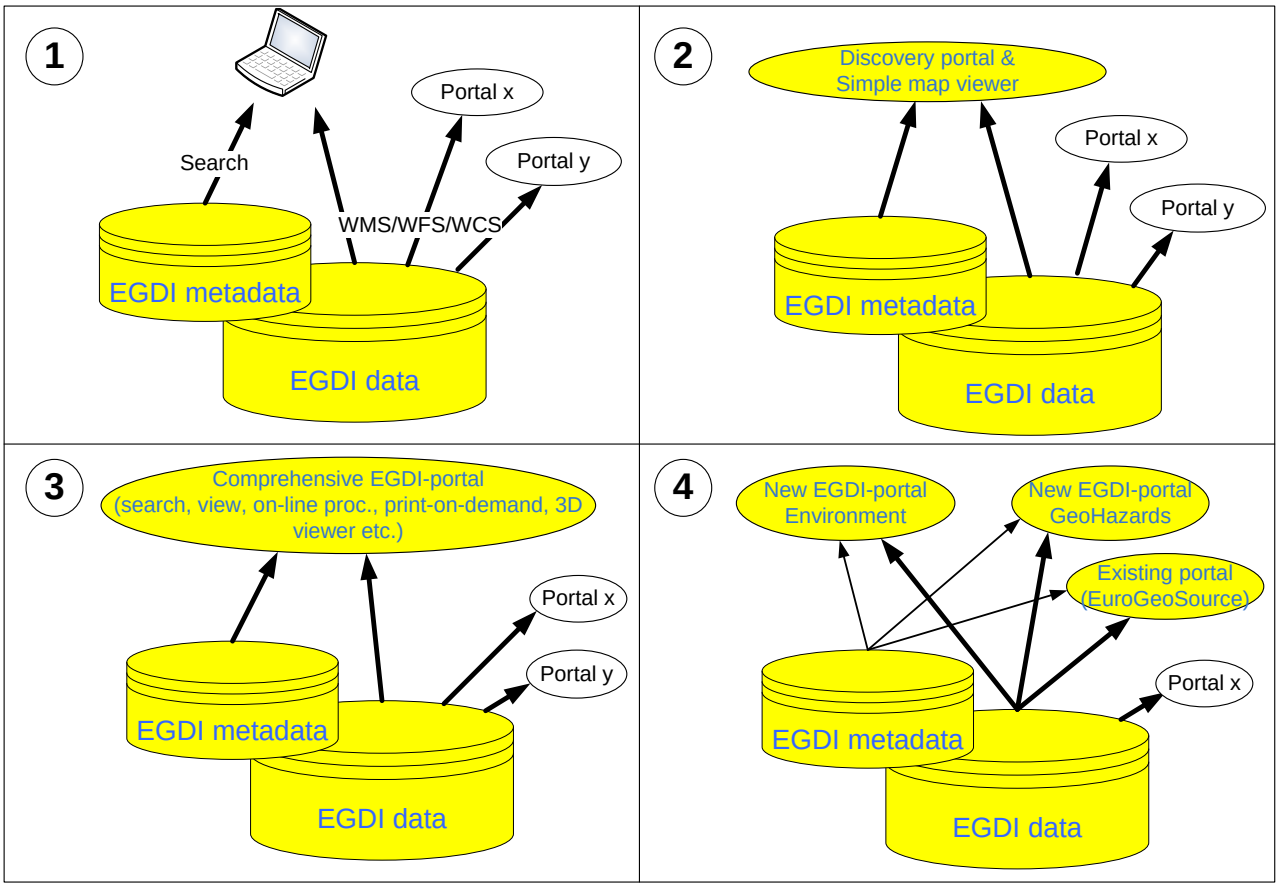
PanGeo, Terrafirma, IngeoClouds, SubCoast, Safeland, doris, eENVplus, adaptalp

Questions and suggestions from the *user* point of view	**Yes / No / Comments**
Should EGDI be an important source of harmonised European geohazard information?	Yes
What pan-European or crossborder datasets are most important in relation to geohazards?	Digital elevation, river networks, land-use, land-cover, engineering geological formations,
What level of information should EGDI provide? 1. Basic geological data? 2. Derived, interpreted products?	Both, the derived interpreted products will be available in low resolution
Should EGDI contain only free data?	Yes but with certain limitations (licensed, and possible access to different levels with specific links)
What service level should EGDI provide (see figure)? 4. Basic infrastructure with data access through metadata catalogues and OGC services (option 1) 5. Infrastructure with simple web interface (map viewer) (optionn 2) 6. Infrastructure with complex functionality (option 3 & 4). In that case what? a. Download of data i. GIS files ii. Excel spreadsheets iii. SegY-files iv. PDF documents b. Print-on-demand c. User driven on-line symbolisation	Maybe is too soon to define but a combination of 2 and 4 might be good.

d. 3D viewer e. Advanced processing services f. Other, specify which	
Should it be possible to view the EGDI-datasets together with datasets from other sources? (topographic data, land use data, etc.)	Yes

Questions / suggestions for the *data/services provider* point of view	**Yes / No / Comments**
Should EGDI sustain the results of PanGeo?	We should maintain it if stakeholders want it. This could be done during the implementation by visiting statistics.
Should EGDI sustain the results of SubCoast?	We should maintain it if stakeholders want it. This could be done during the implementation by visiting statistics.
Should EGDI sustain the results of TerraFirma?	We should maintain it if stakeholders want it. This could be done during the implementation by visiting statistics.
Should EGDI serve PSI data?	**Yes**
Should EGDI take over the provision of data to the portals of the three aforementioned projects? Or should a new portal be build?	**No**
Should data be maintained by data providers and made available at European level (INSPIRE requirement)? – i.e. a distributed architecture like 1GE	Yes, with some exceptions
Should data be delivered according to INSPIRE data specifications (when exist)?	Yes
What to do with data not in the scope of INSPIRE ? Should EGDI define European data specifications ?	Yes, but we may use international
Maps should be delivered by a view service according to INSPIRE network service specification?	Yes
Where to process/integrate data (to make European "products"): 1. Data collected from national services and then processed at the European level 2. Data processed at the national level to create the national part of the European product (then this part is used to make the final Product)	1. yes 2. depends

	
How should European products be quality controlled when it is the result of the sum of national parts?	
Which components available in EGDI should be used by new projects? (metadata catalogue, web services)	It depends
How can new projects dealing with geohzards contribute to EGDI?	Dedicated wp for connection to EGDI with suitable funding
What other e-Infrastructures should be linked/integrated with EGDI?	



Yellow colour represents components to be built by EGDI.

Questions for the marine geology break-out group

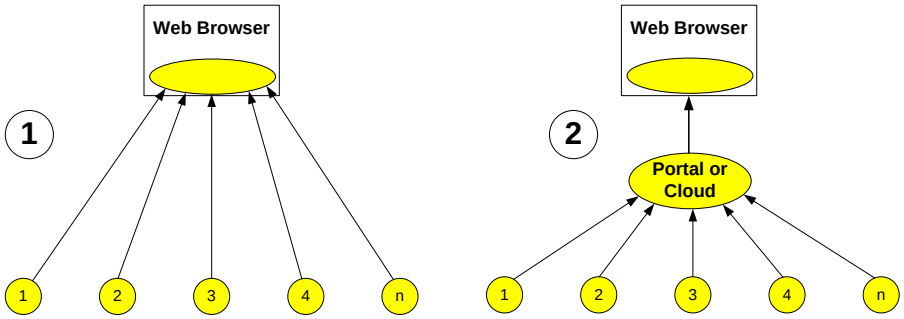
Introduction

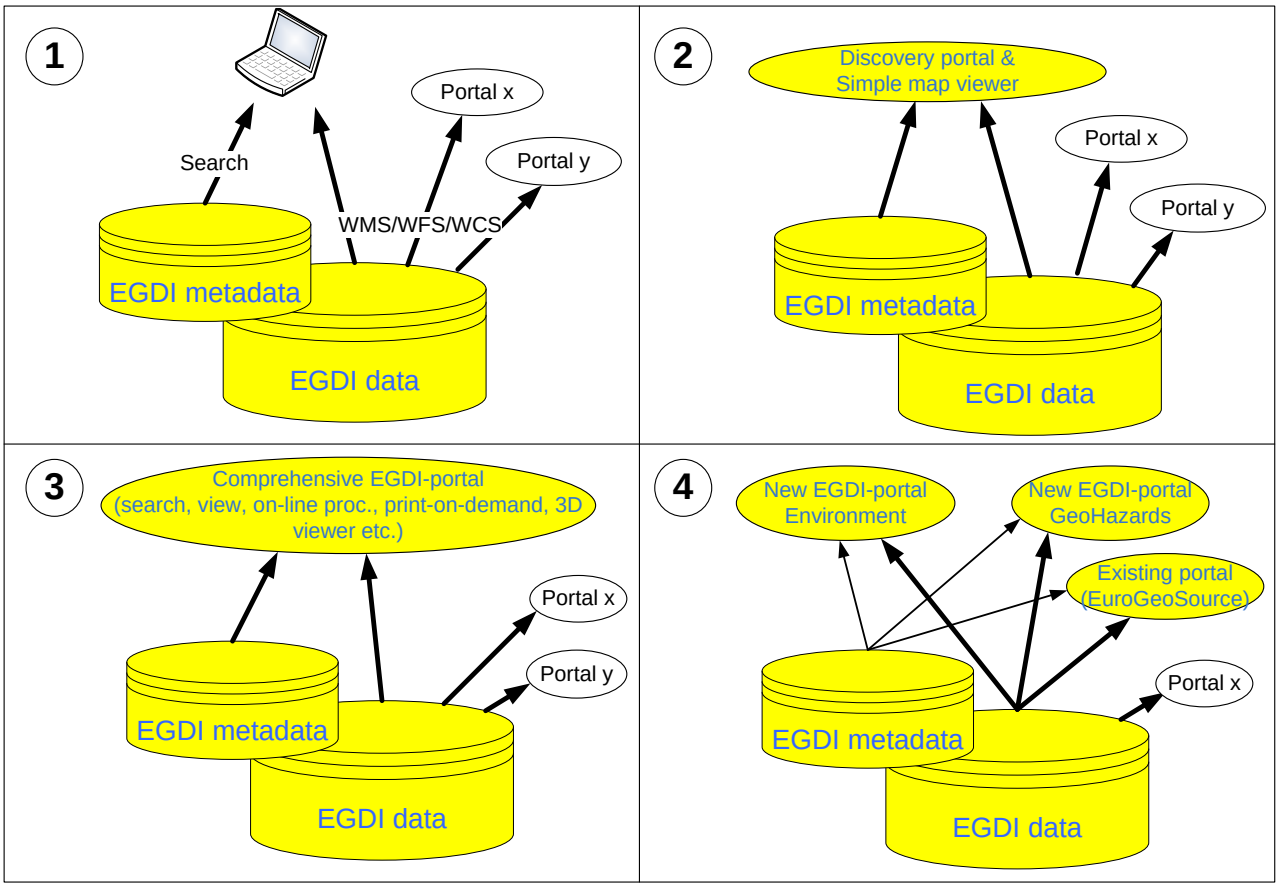
This document contains a list of questions for the stakeholder workshop in Malta 10th September 2013. They are related to the offshore wind farm use case, which specifies how marine geological and geophysical data are used during the planning phase of a wind farm, but should also shed light on the role of a future EGDI in meeting the needs of users of marine geological data.

Questions and suggestions from the *user* point of view	**Yes / No / Comments**
Should EGDI be an important portal for marine geological and geophysical information?	Yes
What pan-European or crossborder datasets are needed?	EMODnet model will provide methods for harmonisation. Datasets are mainly national responsibilities whereas interpreted information can be compiled at national and cross-border level if common approaches are adopted.
Should EGDI provide "raw" geological and geophysical data or only derived products?	Within the current scope of the GeoSeas system access to raw information can be a part of EGDI. Consideration of long-term ownership and maintenance of raw data access needs to be resolved.
Will/should EGDI be a valuable for end users in the offshore wind farm use case?	Regional information is useful to provide a framework for more detailed work which is a requirement of the regulars is of value.
What other marine data users would benefit from an EGDI?	Planning agencies (marine spatial planning directive) Regulators Private sector e.g mineral

	exploration industry; aggregates Environmental authorities (water authorities; environment agencies).
Should EGDI contain only free data?	Yes.
What service level should EGDI provide (see figure)? 7. Basic infrastructure with data access through metadata catalogues and OGC services 8. Infrastructure with simple web interface (map viewer) 9. Infrastructure with complex functionality, and in that case what a. Download of data i. GIS files ii. Excel spreadsheets iii. SegY-files iv. PDF documents b. Print-on-demand c. User driven on-line symbolisation d. 3D viewer e. Advanced processing services f. Other, specify which	Option 2. Option 2
Should it be possible to view the EGDI-datasets together with datasets from other sources? (biological data, oceanographic data, etc.)	Yes. Possible through the EMODnet portal.

Questions / suggestions for the *data/services provider* point of view	**Yes / No / Comments**
Should EGDI sustain the results of EMODnet-Geology?	Yes
Should EGDI sustain the results of Geo-Seas?	See above
Data should be maintained by data providers and made available at European level (INSPIRE requirement)? – i.e. a distributed architecture like 1GE	Harmonised and distributed as required e.g Quaternary information will be distributed.
Data should be delivered according to INSPIRE data specifications (when exist)?	Yes
What to do with data not in the scope of INSPIRE? Should EGDI define European data specifications?	We would always look for existing specifications and if none found then EGDI/EGS could play a role.

Maps should be delivered by a view service according to INSPIRE network service specification?	Yes
Where to process/integrate data (to make European "products"): 3. Data collected from national services and then processed at the European level 4. Data processed at the national level to create the national part of the European product (then this part is used to make the final Product) 	Option 2.
How should European products be quality controlled when it is the result of the sum of national parts?	Individual product co-ordinators e.g in EMODnet GTK supervise the sea-bed substrate layer.
Which components available in EGDI should be used by new projects? (metadata catalogue, web services)	All availableif Option 2 is agreed.
How can new projects as EMODnet-Geology-II contribute to EGDI?	By providing information layers within the lifetime of the project and helping to sustain expert networks.
What other e-Infrastructures should be linked/integrated with EGDI?	Open to all.



Yellow colour represents components to be built by EGDI.

Questions for the <u>environment</u> break-out group

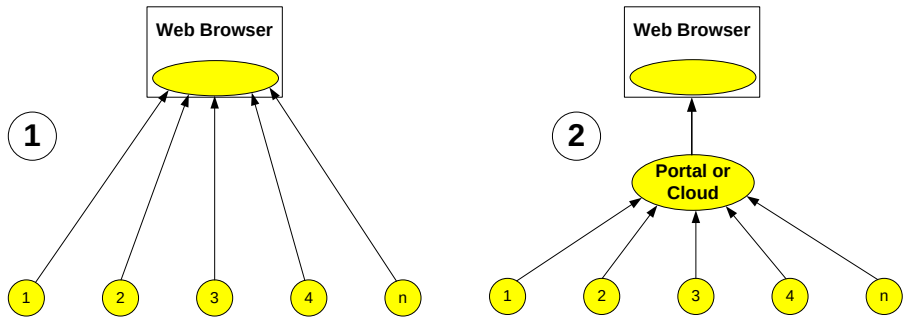
Introduction

This document contains a list of questions for the stakeholder workshop in Malta 10th September 2013. They are related to the both the ecosystem use case and more generally to other environmental use cases. **The answers should be reported back to the plenum after the session, and the filled in questionnaire should be given to a member of the EGDI-Scope core team.**

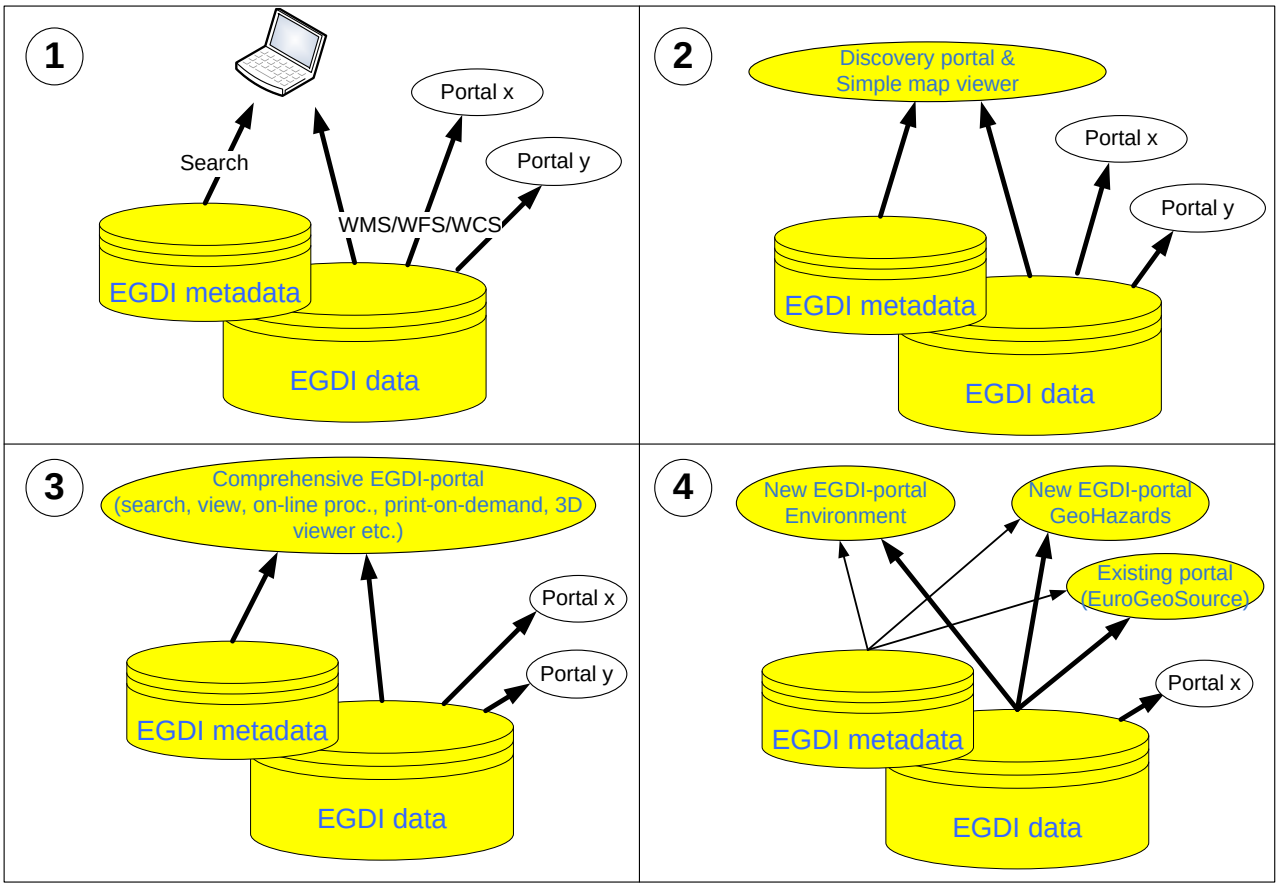
Questions and suggestions from the *<u>user</u>* point of view	**Yes / No / Comments**
Should EGDI be an important source of harmonised geological information in support of environmental assessments?	Yes. E.g. soils/parent material, geochemistry and groundwater most important. Stress the need for harmonisation.
What level of information should EGDI provide? 3. Basic geological data? 4. Derived, interpreted products?	1. Basic geological data necessary foundation for applied use. 2. In many cases geologists are closest to assess how basic data be translated into useful products for others (biologists, environment specialists, health, hazards authorities etc. Examples: Geographical variations of nitrate in groundwater. Radon suceptible rocks and superficial deposits
What existing pan-European datasets are most needed?	Accept that pan-european datasets might (only) provide helicopter view. Broad datasets are available: Hydrogeology (1:1,5 mill),

	Geochemistry... Derive properties based on OneGeology if possible
What non-existing pan-European datasets are most needed?	E.G: Groundwater chemistry (status and trends) - EGS Water EG?
Should EGDI contain only free data?	Pan-european datasets/maps should be free, in principal. Local, regional scales are governed by national policies unless EU legislation makes free geodata mandatory
What service level should EGDI provide (see figure)? 10. Basic infrastructure with data access through metadata catalogues and OGC services 11. Infrastructure with simple web interface (map viewer) 12. Infrastructure with complex functionality, and in that case what a. Download of data i. GIS files ii. Excel spreadsheets iii. SegY-files iv. PDF documents b. Print-on-demand c. User driven on-line symbolisation d. 3D viewer e. Advanced processing services f. Other, specify which	Manpower needed to maintain a structure important. Model 3 would be necessary both to view and work with the data.
Should it be possible to view the EGDI-datasets together with datasets from other sources? (topographic data, land use data, etc.)	YES

Questions / suggestions for the *data/services provider* point of view	**Yes / No / Comments**
Should EGDI sustain the results of GEMAS?	Yes, but processing needed to create GIS files

	(applies also for the other geochemical datasets) Update and dynamic issues, adaption to change
Should EGDI sustain the results of Ewater (boreholes)?	Yes, better to sustain than letting the solutions disappear Update and dynamic issues, adaption to change
Should EGDI sustain the results of GeoMind (geophysics)?	Yes Update and dynamic issues, adaption to change
Should EGDI serve the International Hydrogeological Map of Europe?	Yes Update and dynamic issues, adaption to change
Data should be maintained by data providers and made available at European level (INSPIRE requirement)? – i.e. a distributed architecture like 1GE	Yes, unisone
Data should be delivered according to INSPIRE data specifications (when exist)?	Yes, avoid duplicate work - use standards right from the beginning
What to do with data not in the scope of INSPIRE ? Should EGDI define European data specifications ?	Yes, who else should do it?
Maps should be delivered by a view service according to INSPIRE network service specification?	Yes, avoid duplicate work
Where to process/integrate data (to make European "products"): 5. Data collected from national services and then processed at the European level 6. Data processed at the national level to create the national part of the European product (then this part is used to make the final Product) 	2 (implies a harmonised approach), provided this means that the deliveries from national level are harmonised. Will also improve up-time.
How should European products be quality controlled when it is the result of the	EGS experts should define the unified methodology

sum of national parts?	to produce the national contributions. The quality is guaranteed by involved surveys.
How and when should EGDI-datasets be updated?	Depending on their inherent dynamism. (Hydogeochemical monitoring could be presented in a dynamic map interface.)
Which components available in EGDI should be used by new projects? (metadata catalogue, web services)	All data in the public domain should be reused by others, provided the give credit to the source. (E.g: 1GE maps now being used to produce a radon suceptibility map of Europe)
How can new projects dealing with environmental data contribute to EGDI?	It could be possible
What other e-Infrastructures should be linked/integrated with EGDI?	What other.... unfinished



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