Establishing the European Geological Surveys Research Area to deliver a Geological Service for Europe

Deliverable

OUTCOME OF STAGE ONE CALL FOR IDEAS

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GENERAL INTRODUCTION

The GeoERA joint call has two stages: Stage One Call for Project Ideas, and Stage Two Call for Project Proposals. This document describes the process from receiving Ideas in Stage One to the deliverance of the call text for Stage Two, i.e. Joint Call Document No. 9.

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1 GEOERA STAGE ONE CALL FOR IDEAS

The GeoERA Stage One Call for Ideas was preannounced on the GeoERA web page on January 1st 2017, and the call was open at least 30 days, as defined by the GeoERA rules, from April 4th until June 7th, 2017. The call was initially distributed and announced on the GeoERA webpage geoera.eu, through EGS, on the ERA-LEARN webpages, and distributed to GeoERA partners' networks through newsletters and web pages. In addition, the Call was announced by direct mail to the GeoERA consortium, to newsletter subscribers, and to already identified stakeholders including industry, policy and educational organizations. The call announcement can be found at the GeoERA webpage.

A standard submission template for submitting ideas was available on the dedicated call page at geoera.eu/call along with guidelines on the call procedure. The call asked for ideas within the four themes Information Platform, Geo-Energy, Groundwater and Raw Materials, and encouraging cross-thematic ideas as well.

The call was open to all interested, both from stakeholders outside the GeoERA consortium, and from members or groups of partners in the consortium. The purpose of the Call for Ideas was a public consultation on research interests and priorities as well as on needs and priorities for geoscientifically based knowledge, data and information services for Stakeholders.

Ideas were submitted by filling in the submission template and emailing this to a central mailbox at the Netherlands Organisation for Scientific Research (NWO). NWO collected the ideas and created overview tables for further elaboration. A condensed overview table with all ideas can be found in Annex 3.

Based on this input the scientific scope of Stage Two was developed, which is reflected in Joint Call Document No. 9. In this document all call texts are developed as Specific Research Topic (SRT) covering a specified issue within each Theme. The Specific Research Topic is fully based on the Ideas received in Stage One. The next stage, GeoERA Stage Two Call for Projects, will open October 17th 2017

2 RECEIVED IDEAS

2.1 Admissibility and eligibility check

The admissibility and eligibility rules for the GeoERA calls can be found in Joint Call Document No. 3 describing how Project Ideas must comply with the following to be admissible:

- Submitted following the instructions given in the supporting Joint Call Documents;
- Readable, accessible, printable, written in English language;
- Submitted within the allotted space, on time.

By the deadline at June 7th, 89 ideas had been submitted. Within the following three days, further three ideas were submitted giving a total of 92 ideas.

NWO established tables with overviews of ideas submitted for each theme and sent these to the GeoERA Executive Board (EB) who decided to accept the three delayed ideas as the input was valuable. All ideas were evaluated to comply with the other admissibility criteria. Two ideas submitted by the same organisation to the Raw Materials were identical, thus resulting in a total of 91 ideas to proceed to the next stage.

All Project Ideas were eligible as this call was open to any submitter.

2.2 Number of ideas received within each theme

Table 1 shows how many ideas were received for each theme as well as the number of ideas received from GeoERA consortium members and from stakeholders, institutions etc. outside the consortium respectively. Numbers in the table are based on tables extracted by NWO.

Table 1: Overview of submitted ideas within the four GeoERA theme

Theme	No. of ideas		
	Total in theme	**Ideas from consortium members**	**Ideas from stakeholders etc.**
Information Platform	**5**	3	2
GeoEnergy	**23**	20	3
Groundwater	**35**	32	3
Raw Materials	**28***	27	1
Sum	***91***	*82*	*9*

* 30 ideas were submitted to Raw Materials but two were identical, and one proposal actually belongs to the Groundwater theme, as communicated by the submitter.

3 REVIEW AND GROUPING IDEAS

As mentioned, NWO established tables with overviews of ideas submitted for each theme. These tables and the received ideas were sent to the EB as well as the theme coordinators shortly after the closure of the call period.

The EB evaluated the ideas individually and did a preliminary assessment and grouping before their first face-to-face meeting in Ljubljana 20-21st of June (see Annex 1 for details on the meeting and the process). This preliminary assessment and grouping was discussed, adjusted and agreed upon at the first day of the meeting. The next day, the Theme Coordinators were invited, and they presented each their view on the submitted ideas from the GeoERA partners. Besides, the Theme Coordinators presented a first estimate of economic commitment for each idea. The EB presented the preliminary grouping from the first day, and based on this and the following discussions, a second grouping of ideas was agreed. These grouping formed the bases for the development of SRTs.

4 FIRST DRAFT OF SPECIFIC RESEARCH TOPICS

During the next two weeks, the EB elaborated the SRTs, one for each grouping of ideas. At the next face-to-face meeting in Copenhagen July 4-5th, with participation of the EB and the Theme Coordinators, this first draft of the SRTs was discussed and adjusted, and a few ideas regrouped. See Annex 2 for details of the meeting and the process.

The final affiliation of ideas to the individual SRTs as well as expectations related to budget per SRT and number of projects to be funded can be found in Tables 2 to 5.

The text was compiled in a draft *Joint Call Document No. 9: Call Announcement and Scientific Scope,* ver. 1. This document was sent to the GeoERA Stakeholder Council on July 17th with an invitation to a workshop for discussing and adjusting the SRTs at September 5th in Vienna, see next chapter.

Table 2: GeoEnergy SRT titles, affiliated ideas, no. of projects expected to be funded, and budget per SRT as of July 4th.

Themes and SRTs	***Affiliated project ideas***	***No. of projects***	***Budget (mill. €)***
GeoEnergy*			
– SRT Fossil Energy, Energy Security & Climate Action	23, 24, 86, 89	Up to 1	0.75
– SRT Geothermal energy: *Innovative and comparative estimation of geothermal energy resources across Europe* *Geological evaluation of new deep geothermal plays in Europe* *Geothermal energy and groundwater in urban areas*	20, 21, 48, 73	Up to 3	1.00 1.00 1.00
– SRT Energy Storage	26 (86)	1	0.75
– SRT Induced Impacts and Hazards	27, 29, 88	Up to 2	1.00
– SRT Advancements in developing and using 3D transnational Geomodels	(2) (9) 5, 13, 18, 30	Up to 2	3.80
– SRT CT Sustainable subsurface management; Geo-Energy management and interactions with groundwater and mining	2, 9, 19, 22, 28	1	1.00
Total Geo-Energy theme			***10.30***

* Two ideas submitted to the GeoEnergy Theme were not included in the SRTs:

- No. 25 on Uranium & Thorium: Little interest at European and national research agenda's and therefore believed not to find much support among the GSOs;
- No. 46 on mapping of energy consuming activities: Considered not feasible for GeoERA partners to carry out; i.e. Likelihood of the European Geological Survey Organization community being the designated organization to effectively address the challenge.

Table 3: Groundwater SRT titles, affiliated ideas, no. of projects expected to be funded, and budget per SRT as of July 4th.

Themes and SRTs	***Affiliated project ideas***	***No. of projects***	***Budget (mill. €)***
Groundwater*			
– SRT Drinking water and human health: *Geogenic diversity and hydrochemical base line* *Anthropogenic impacts*	4 3, 17, 31, 35, 36, 41 12, 62, 63, 68, 71	Up to 2	2.70
– SRT Tools for climate change impact assessment and adaptation	34, 37, 38, 50, 52, 64, 65	Up to 1	1.70
– SRT Harmonization of groundwater resources Information at cross-border to Pan European scale	33, 39, 42, 43, 44, 47, 60, 61, 70	Up to 1	2.50

– SRT CT Sustainable subsurface management; Groundwater management and interactions with energy and mining	51, 66, 67, 69, 78, 87	Up to 2	0.80
Total Groundwater Theme			***7.70***

*One idea submitted to the Groundwater Theme was not included in the SRTs:

- No. 77 on continuation of a groundwater research database. GeoERA build its own Information Platform and requests new (research) activities to be carried out within the scope of GeoERA. Since this existing research database contains interesting data, and GeoERA promotes collaboration, GeoERA will search for synergies between this database as well as other existing databases and the Information Platform as it proves relevant for awarded GeoERA projects.

Table 4: Raw Materials SRT titles, affiliated ideas, no. of projects expected to be funded, and budget per SRT as of July 4th.

Themes and SRTs	***Affiliated project ideas***	***No. of projects***	***Budget (mill. €)***
Raw Materials*			
– SRT Improving and sustaining the Raw Materials knowledge base by periodically delivering a minerals yearbook and inventory Information system	10, 54, 75, 90	Up to 1	2.00
– SRT Construction Material	1, 49, 53**, 57, 72**, 76, 82, 84, 92	Up to 2	1.25
– SRT Metallogeny – geological potential	55, 59, 80, 83, 85	Up to 3-4	1.50
– SRT Forecasting and assessing Europe's strategic Raw Materials needs: *Assessment of undiscovered resources* *Specific Raw Materials*	6, 11, 15, 16, 32, 56, 58, 74, 81	Up to 2	1.00 1.50
– SRT CT Sustainable subsurface management; Raw Materials management and interactions with energy and groundwater	40	Up to 1	1.15
Total budget Raw Material theme			***8.40***

* One idea submitted to the Raw Material Theme was not included in the SRTs:

- No. 91 on extraction of minerals for geothermal brine: Considered not feasible for GeoERA partners to carry out, i.e. Likelihood of the European Geological Survey Organization community being the designated organization to effectively address the challenge.

** Ideas no. 53 and 72 are identical

Table 5: Information Platform SRT title, affiliated ideas, no. of projects expected to be funded, and budget per SRT as of July 4th.

Themes and SRTs	***Affiliated project ideas***	***No. of projects***	***Budget (mill. €)***
Information Platform			
– SRT Development of an Information Platform to support management and provision of data for the three other themes	8, 14	1	3.90
Total budget Information Platform			***3.90***

*Three ideas submitted to the *Information Platform Theme were not included in the SRT:*

- No. 7 on development of a *European Digital Drill Core Archive:* Considered too specific to be included; not likely that such a database will be requested by the other GeoERA projects.
- No. 45 suggesting to extend a web platform developed for unconventional hydrocarbons (EUOGA) to be used as the Information Platform for the whole of GeoERA: The GeoERA proposal suggests to base the Information Platform on EGDI, which has a broader scope and covers all of the geoscientific themes of GeoERA. Nevertheless, GeoERA will search for synergies between existing databases and the Information Platform as it proves relevant for awarded GeoERA projects.
- No. 79 suggesting the use of a specific software for database development from a commercial industry organization: Considered unnecessary for GeoERA as database development will be based on EGDI established under the auspices of EGS.

5 STAKEHOLDER COUNCIL WORKSHOP – CONSOLIDATING SPECIFIC RESEARCH TOPICS

The GeoERA Stakeholder Council (SC) was invited to a workshop in Vienna at September 5th 2017 to give feedback on the call text for GeoERA Stage Two. The GeoERA Secretariat (GES) organized the workshop.

Prior to the workshop, at June 7th, the SC received the draft Stage Two Call text (Joint Call Document No. 9 with the Specific Research Topics). Besides, the Project Ideas submitted in Stage One as well as overview tables of the ideas (91 in total).

Further, the GeoERA Independent Observer Duncan Jarvis, and the GeoERA project-officer Wolfgang Schneider (as the EC is also an important stakeholder), received the document, the submitted ideas, and an invitation for the workshop.

All participants in the workshop were invited for at welcome dinner in Vienna at September 4th.

All SC members (or substitutes) accepted the invitation:

- Andrée Bolduc, Natural Resources Canada
- Charlotte Griffiths, UNECE (substituted by Hari Tulsidas, UNECE, in this workshop)
- Dominique Darmendrail, The French National Research Agency
- Massimo Cocco, EPOS Coordinator

Besides, the following participated in the workshop:

- Duncan Jarvis, EURAMET, GeoERA Independent Observer
- Wolfgang Schneider, EC project-officer
- Yvonne Schavemaker, TNO (GeoERA programme manager, WP1)
- Jörg-Uwe Dam, BGR (GeoERA WP2 lead)
- Lisbeth Flindt Jørgensen, GEUS (GeoERA WP3 lead)
- Jasna Šinigoj, GeoZS, (GeoERA WP4 lead)
- Jørgen Tulstrup, GEUS (GeoERA WP5 lead)
- Kim Nathalia, TNO (GeoERA support secretary)
- Marc de Jonge, NWO
- Hayfaa Abdul Aziz, NWO

5.1 Workshop content

The main topics for the workshop were:

- GeoERA status
- Discussion of the Specific Research Topics
- Information on the project implementation phase

See Annex 3 for the full agenda.

5.1.1 GeoERA status

The GES presented:

- GeoERA objectives, societal challenges, themes and timetable;

- Call documents developed for the GeoERA call Stage One and Stage two; available at geoera.eu/call;
- The online system (ISAAC) for submitting proposals at NWO as well as the procedure for selecting independent experts for evaluation of the proposal;
- The process from collecting and reviewing project ideas submitted in Call Stage One to the development of SRTs;
- Evaluation, ranking and selection of proposals for funding after Call Stage Two.
- Monitoring indicators /Logical Framework for upcoming GeoERA projects
- Communication, exploitation and dissemination expectations towards upcoming GeoERA projects.

The stakeholders asked clarifying questions, among other things related to data availability, accessibility and management (public/restricted), on the transnationality of data, on the interaction between projects and the Information Platform, linkage to other, similar projects etc., and to the allocated budgets per SRT.

The GES welcomed the comments and responded to a number of these by referring to GeoERA statutes, GeoERA proposal, call documents etc. Other comments led to the conclusion that some issues should be clarified in the coming Call Stage Two, see table 6.

Table 6: Actions for the GeoERA Secretariat for improving and clarifying the process and documents

Topic	***Action / decision***
General Call	GeoERA will emphasize in the call document template (Joint Call Document No. 11) the importance to: - connect to other projects/systems (like INSPIRE, WISE, NORMAN) - deliver transnational information - describe state-of-the-art - include that applicants must describe contribution to social engagement ('social impact' will be used in the document in the section on Impact) - emphasize that budget and activities must be balanced in proposals (as SRTs are generally quite broad)
Open data	The Secretariat will discuss if the open data questions are already fully covered by the Data Management Plan and otherwise be amended based on experience of JPI Water and EPOS.
Ethics	Yvonne and Wolfgang will look into the new ethics requirements and whether GeoERA needs to undertake additional activities to secure that GeoERA fulfills to it
Ranking	The Secretariat will explain the ranking procedure in detail during the launch of the call
Ranking	The Secretariat will follow up with clarity on criteria for left-over budget decisions. A description will be discussed at the next General Assembly Meeting (October 10th)
Impact indicators	The Secretariat will continue with specifying the indicators, and take the comments and tips into account
Communication	The Secretariat will develop an exploitation part in the updated Dissemination Plan

5.1.2 GeoERA SRTs

GeoERA Joint Call Document No. 9: *Call Announcement and Scientific Scope* presenting the SRTs were review and discussed. Comments received from GeoERA partners were presented while the SC members commented the individual SRTs. Comments for improving the SRTs, both from partners and from the SC, see table 7, have been considered when adjusting the SRTs before sending the final version to the GeoERA partners

Table 7: Input for improving and clarifying the SRTs

SRTs General	The feedback of the General Assembly and Stakeholder Council will be taken into account when writing an updated version of the SRTs
SRTs General	Keep the cross-thematic SRTs under the themes but delete the cross-thematic reference and change titles on these SRTs
SRTs General	Geography wordings: definitions will be drawn up and expectations will be emphasized in the submission template
SRT Groundwater	GW1: Adjust the text as establishing threshold values is too ambitious, instead search harmonization; risk assessment should be added to the text.
SRT Geo-Energy	GE1: Reintroduce gas hydrates GE2: Clarify sentence on fracking / remove 'shallow' in sentence on geothermal GE4: Clarify relation between use, consequences and mitigation
SRT Raw Materials	RM1: Emphasize cross-border aspects RM2: Change groundwater database into Information Platform (in impact) RM4: Difference strategic versus critical materials will be clarified
SRT Information Platform	Check and if needed adjust the use of wording (communication and dissemination) and exploitation part of the dissemination plan

5.2 Process after the workshop

The Joint Call Document No. 9 (the SRTs) were adjusted according to the comments from the Stakeholder Council as well as those received form the GeoERA partners, and sent September 18th to the GeoERA partners for voting at the General Assembly at October 10th.

Annex 1 – Outcome of first meeting, Ljubljana June 20-21st

EVALUATING IDEAS

After receiving the overview tables as well as ideas from NWO a few days after the closure of the call at June 7th, the EB delegated the ideas from each theme among themselves for a first preliminary review, as illustrated in table A. The intention with this distribution was to avoid bias due to specific geological competences at the individual EB member, allowing a neutral first evaluation of ideas based on their content.

Table A: Delegating first review of ideas among members of the EB

Theme	First reviewer	Second reviewer
Information Platform	GeoZS	TNO
GeoEnergy	GEUS	BGR
Groundwater	BGR	GeoZS
Raw Materials	TNO	GEUS

All Ideas were assessed as described in Joint Call Document No. 7 and on the following aspects:

- General:
  - Are there potential showstoppers (e.g. conflict or overlap with other EU funds)
  - In/Out of the Geoscientific Scope of GeoERA
  - Relevant potential SRT/basis for Stage Two Call text
- Objectives:
  - Clearly specified and justified scientific and technological objectives
  - Addresses the advance beyond the state of the art
  - Provided up to five distinct objectives describing concrete expected outcome
- Stakeholder Usability
  - Clear added value to the GeoERA objectives for scientific or societal impact
  - Clear added value of your Project Idea for Europe
- Feasibility
  - Likelihood of the European Geological Survey Organization community being the designated organization to effectively address the challenge

First and second reviewers shared their preliminary review before the first face-to-face meeting, see below. Part of the process was to identify ideas that could contribute to the SRT text.

The EB had two face-to-face meetings the following month. The first at GeoZS in Ljubljana, Slovenia June 20-21st, and a second at GEUS in Copenhagen, Denmark July 4-5th. Table B shows the participants at the different days of the meetings; both partners present in person and partners participating online e.g. via EGS webex.

Table B: Participants in the face-to-face meetings.

TC= theme coordinator. TC Geo-Energy: Serge van Gessel (TNO), TC Groundwater: Klaus Hinsby (GEUS), TC Raw Materials: Gerry Stanley (GSI); TC Information Platform: Jørgen Tulstrup (GEUS)

Meeting / Participant	Ljubljana		Copenhagen	
	Day 1	Day 2	Day 1	Day 2
BGR	X	X	X	X
GeoZS	X	X	X	X
GEUS	X	X	X	X
TNO	X	X	X	X
NOW	X	X	X	X
EGS	X			X
TC Geo-Energy		X	X	X
TC Groundwater		X*	X	X
TC Raw Materials		X	X	X
TC Information Platform		X	X	X

* Hans Peter Broers (TNO) substituted Klaus Hinsby at this meeting

The EB consists of:

- Yvonne Schavemaker, TNO (project leader, representing GeoERA work package (WP1));
- Jörg-Uwe Damm, BGR (WP2);
- Lisbeth Flindt Jørgensen, GEUS (WP3);
- Jasna Šinigoj, GeoZS (WP4);
- Jørgen Tulstrup, GEUS (WP5).

Kim Nathalia, TNO, participated as secretary of the EB. In addition, the following bystanders participated in (parts) of the meetings:

- Paul Bogaard, TNO;
- Antje Wittenberg, BGR;
- Kirsten Bache, GEUS.

NWO (Marc de Jonge or Bernard Westerop) and EGS (Patrick Wall) participated as supporters in parts of the meetings.

NB: it should be noted that WP5 leader (Jørgen Tulstrup, GEUS) did not take part in the evaluation of ideas submitted for the Information Platform due to possible conflict of interest, being a Secretariat member and also Theme Coordinator for this theme.

Ljubljana meeting, day 1: Joint Assessment of Project Ideas

Agenda:

9:00	Start GES meeting
9:00-11:00	Assessment Geo-Energy Ideas
11:00-13:00	Assessment Groundwater Ideas
13:00-14:00	Lunch
14:00-16:00	Assessment Raw Materials Ideas
16:00-16:30	Assessment Information Platform Ideas
16:30-18:00	Discuss possible clusters and SRT titles

At this meeting, the EB participated with support from bystanders. In addition, EGS and NWO participated with one representative from each organisation to monitor the process.

Main points:

The initial reviews of two EB members per theme were presented and discussed, and ideas were grouped according to their content.

Geo-Energy theme:

A total of 23 ideas were submitted for this theme, 20 from individual GeoERA consortium members or groups of these, and 3 from stakeholders outside the consortium. Some of the ideas had overarching character.

Based on the discussions, the ideas were clustered in 6 initial groups (see also Figure A):

- Geothermal resources (ideas no. 20, 21, 48, 73)
- Fossil resources (ideas no. 23, 24, 86, 89)
- Underground storage (ideas no. 19, 26)
- Impact/consequences from Geo-Energy Exploitation (ideas no. 27, 29, 88)
- Geomodels – cross-thematic (ideas no. 2, 5, 9, 13, 18, 30)
- Spatial planning – cross thematic (idea no. 28)

One idea (22) was initially found to be hard to join with this grouping. Two ideas, (25) on uranium and thorium, and (46) on the assessment of geo-energy industrial impacts were found not to be feasible for GeoERA partners to carry out.

Groundwater theme:

A total of 35 ideas were submitted for this theme; 32 from individual partners or groups of partners in the GeoERA consortium and 3 from stakeholders outside the consortium. Representatives from already established groups in the consortium had formulated 'Overarching ideas' clustering a number of ideas submitted separately. These overarching ideas were used as starting point for the grouping of the groundwater ideas, but the suggested groupings described in these overarching ideas were set aside. Based on this, the following grouping was established (see also Figure B):

- Groundwater + Drinking Water and Human Health (idea no. 4 (overarching))
- Special waters (ideas no. 3, 17, 36)
- Hydrogeochemistry / Background (ideas no. 31, 35, 41)
- Contaminants / Anthropogenic Impacts (ideas no. 12, 62, 63, 68, 71)
- Groundwater + Energy and Mining (ideas no. 67 (overarching), 51, 66, 78)
- Groundwater + Climate Floods and Droughts (ideas no. 52 (overarching), 43, 50, 64, 65)
- Salt water intrusion (ideas no. 37, 38, 69)
- Groundwater + Subsurface Spatial Planning (ideas no. 60 (overarching), 33, 39, 42, 44, 47, 61, 70) – cross-thematic

One idea, (87) on geophysical methods was considered to be cross-cutting, fitting into more of the groups. Ideas no. 34 on a database for numerical models was found to be too general to fit into one specific group, and finally no. 77 on a groundwater project database was not affiliated to any of the groups.

Raw Materials theme:

A total of 28 ideas were submitted for this theme; only one was from stakeholders outside the GeoERA consortium, the rest from individual partners or group of partners in the consortium.

Based on discussions, the following initial groups were established (see also Figure C), with selection of some ideas to be more or less representative (overarching) of the individual groups:

- Minerals E-yearbook and E-database + inventory (ideas no. 54 and 56 (both overarching), 10, 75, 90)
- Aggregates (ideas no. 57 (overarching), 49, 53, 72 (53 and 72 are identical))
- Natural stone (ideas no. 1, 82)
- Critical, Strategic and Conflict Raw Materials (ideas no. 58 (overarching), 6, 11, 15, 16, 32, 74, 81)
- Metallogeny and Methodology (ideas no 55 (overarching), 59, 80, 83, 85)
- Geo-models (idea no. 40) – cross-thematic

One idea (91) on mineral production from geothermal brine, was determined not to be feasible for GeoERA partners to carry out. Another idea (84) on a common mineral resource management tool was found to fit into more than one of the above groups.

Information Platform theme:

Five ideas were submitted for this theme, three from the GeoERA consortium, two from external stakeholders.

Two of the ideas (no. 8 and 14) were found to fit well with the purpose of the Information Platform while the three others (7, 45, 79) were found not feasible for GeoERA partners to carry out.

Cross-cutting issues

At the end of the grouping it was clear that Groundwater, Geo-Energy and Raw material themes all had issues related to a) Geo-modelling; and b) Spatial planning. Thus, it was concluded at the end of the day that it would be an idea to establish one or two SRTs of cross-thematic nature on these issues to encourage the submission of cross-thematic proposals.

Ljubljana meeting, day 2 – Discussing ideas and possible groupings with TC

Agenda:

9:00	Start GES Meeting
9:00-9:30	Presentation vision on SRT and budgets TC Geo-Energy
9:30-10:00	Presentation vision on SRT and budgets TC Groundwater
10:00-10:30	Presentation vision on SRT and budgets TC Raw Materials
11:30-11:00	Presentation vision on SRT and budgets TC Information Platform
11:00-12:00	Discussion on Match between Day 1 conclusions and vision/budgets TCs
12:00-13:00	Lunch
13:00-15:00	Establishments SRT titles and budget
15:00-15:30	Divide work (writing SRTs) and conclude meeting.

At this meeting the Theme Coordinator, NWO and the EB incl. a few bystanders participated.

Main points:

Interaction between Information Platform and project:

The meeting started with a discussion on the interaction between the Information Platform and other projects, and the funding for activities. There are large differences from project to project when it comes to input to and from the Information Platform and the number of IT activities. Also, it is not yet known which projects will be funded. The Information Platform has a fixed budget, and will only have limited degree of flexibility to adapt to the funded projects.

It was concluded that proposals need to be very clear on what is expected from the Information Platform and what is developed in the project itself, and that the latter needs to be described in the proposals in close co-operation with the Information Platform, especially for projects with large interaction with the Information Platform.

Theme presentations:

The Theme Coordinators were invited to give a presentation on their visions on SRTs and to give an estimate on budget allocated to the different topics, based on discussions that had already been going on for some time in the individual Theme groups.

During these presentations scale of projects was discussed, arising from the budget presentations. The EB encouraged smaller projects to avoid situations where a SRT could risk not being funded, while the theme coordinators argued that larger projects will ensure coherence, and that project consortia already more or less are being developed in the process of GeoERA theme groups so far.

After these presentations, the EB presented the grouping established the day before. Based on the following discussion, a few ideas were regrouped, some titles were changes, ideas not assigned to a SRT on day one were assigned to specific SRT and vice versa, etc. (see table C).

Table C: Preliminary SRTs titles and affiliated ideas as of June 21st. CT= cross thematic

	Ideas affiliated	*Ideas not affiliated*
Geo-Energy *(idea not yet affiliated: 22)*		
Fossil Fuels	*23, 24, 86, 89*	*25, 46*
Geothermal Energy	*20, 21, 48, 73*	
Underground Storage	*26*	
Impacts/Hazards/IS	*27, 29, 88*	
Spatial Planning	*19, 28*	
Geomodels – CT	*2, 5, 9, 13, 18, 30*	
Groundwater *(broad ideas, across more SRTs: 61, 87)*		
Special Water	*3, (4), 17, 36*	*34, 77*
Hydrogeochemical background	*(4), 31, 35, 41*	
Anthropogenic Impacts	*(4), 12, 62, 63, 68, 71*	
Floods and Droughts (Climate Change)	*37, 38, 43, 50, 52, 65, 69*	
Impact of Mining activities	*51, 66, 67, 78*	
Subsurface Spatial planning/ Geomodels – CT	*33, 39, 42, 44, 47, 60, 70*	
Raw Materials *(broad idea, across more SRTs: 84)*		
Natural Stone	*1, 82, 92*	*91*
Mineral E-book and inventory	*10, 54, 56, 75, 90*	
Aggregates	*49, 53*, 57, 72*, 76*	
Metallogeny	*55, 59, 80, 83, 85*	
CRMs – strategic and conflicting	*6, 11, 15, 16, 32, 58, 74, 81*	
Geomodels – CT	*40*	
Information Platform		
Information Platform	*8, 14*	*7, 45, 79*

* 53 and 72 are identical

Next, the cross-thematic issues were discussed. Initially, the EB suggested to establish true cross-thematic SRTs on geological modelling and/or spatial planning, but during the day it became clear that although consortia within the Geo-Energy, the Groundwater, and the Raw

Material themes potentially would address e.g. geological models, it would be from their own starting point, i.e. from their own theme point of view. Besides, the funding for one cross-thematic SRT would be difficult as only 10% from each theme could be used in cross-thematic SRTs, and already allocating these 10% to these SRTs would exclude the possibility to be flexible across themes in the ranking procedure. Besides, imposing on applicants to work together in one cross-thematic project from different themes, would come with a higher risk towards them being capable of implementing such a project. Instead it was decided to develop one SRTs within each of the three themes addressing *Subsurface management and decision support* as well as two SRTs in the Groundwater and the Geo-Energy themes respectively addressing *Geomodels for groundwater and geoenergy*. The intention was to ask these projects to co-operate in clusters to exchange experiences and outcomes.

The discussions concluded in preliminary SRT titles, affiliated ideas, and assigned authors for elaborating the SRT texts, see table C.

The meeting was closed with the EB delegating the four themes among themselves to write first drafts of SRTs, as illustrated in Table D. It was agreed to use the same structure as H2020 calls, describing *Challenge*, *Scope*, and *Expected Impact* of each SRT, and to aim at one page per SRT. The EB members could consult the respective theme coordinators during this process.

Table D: Delegation of themes for writing first drafts of SRTs

Theme	**1. Author**	**2. Author**
Geo-Energy	TNO	BGR
Groundwater	GeoZS	GEUS
Raw Materials	BGR	TNO
Information Platform	GEUS	GeoZS

Figure A: Initial grouping of ideas, Geo-Energy

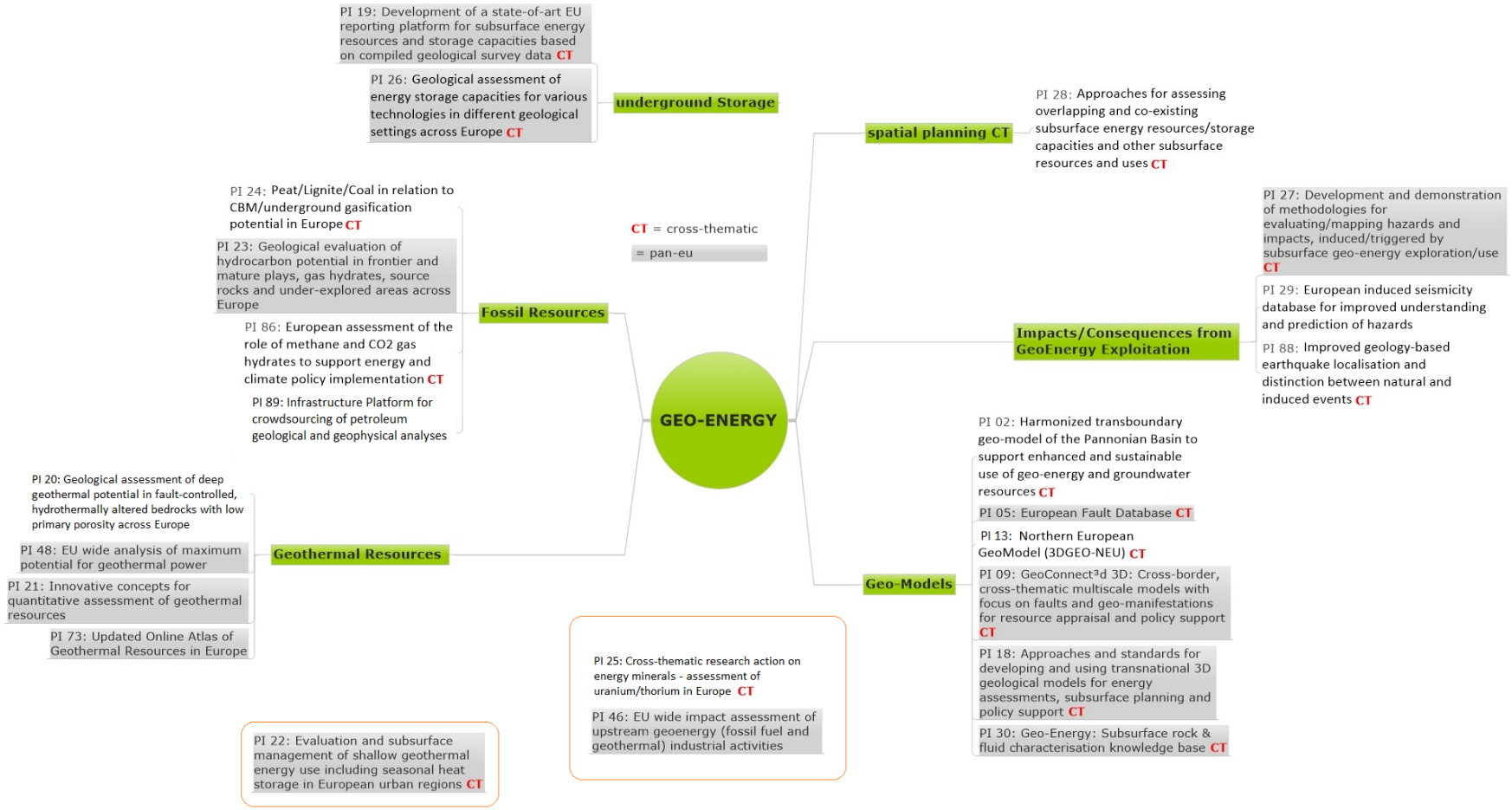


Figure B: Initial grouping of ideas, Groundwater

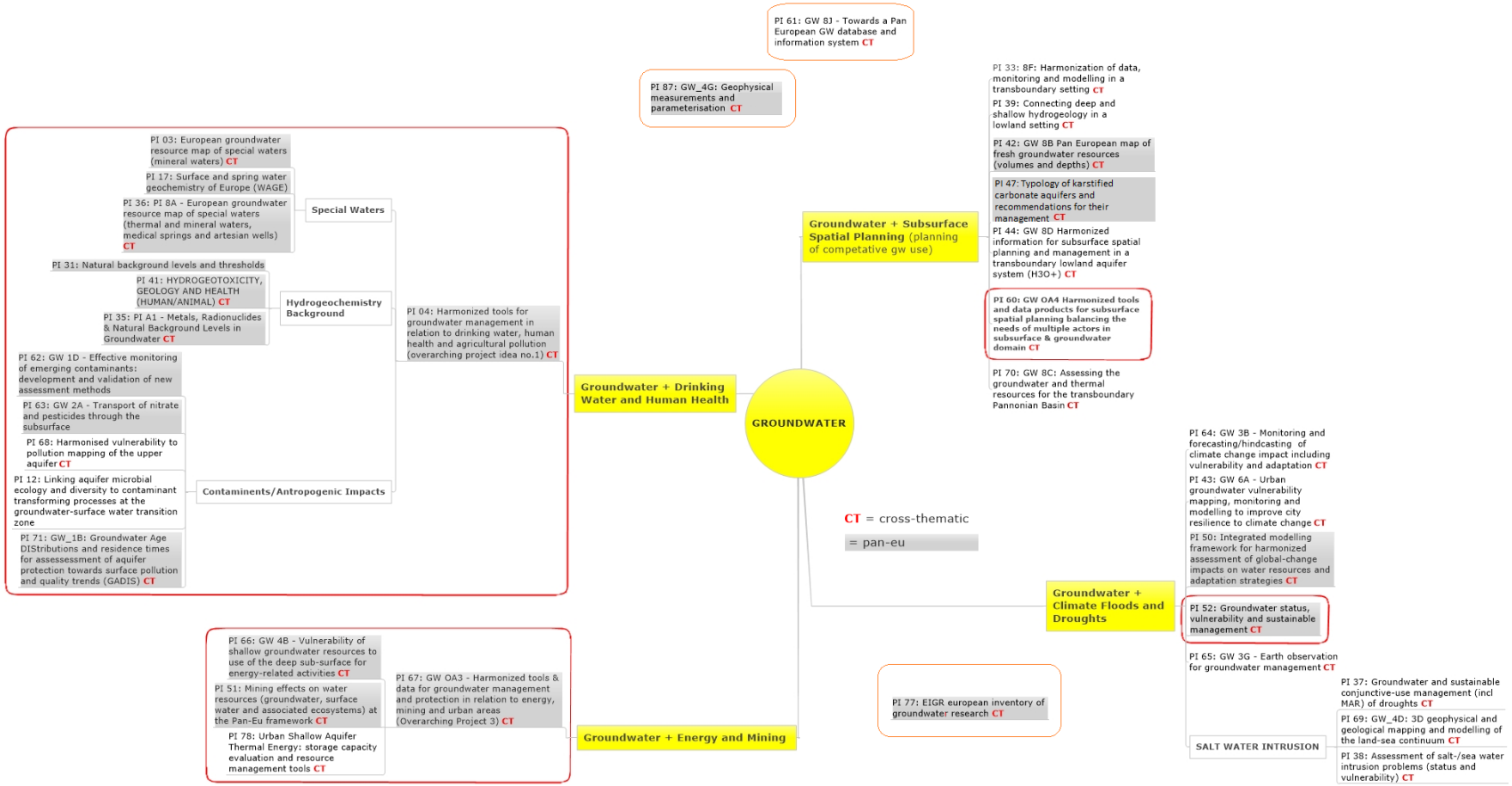


Figure C: Initial grouping of ideas, Raw Materials

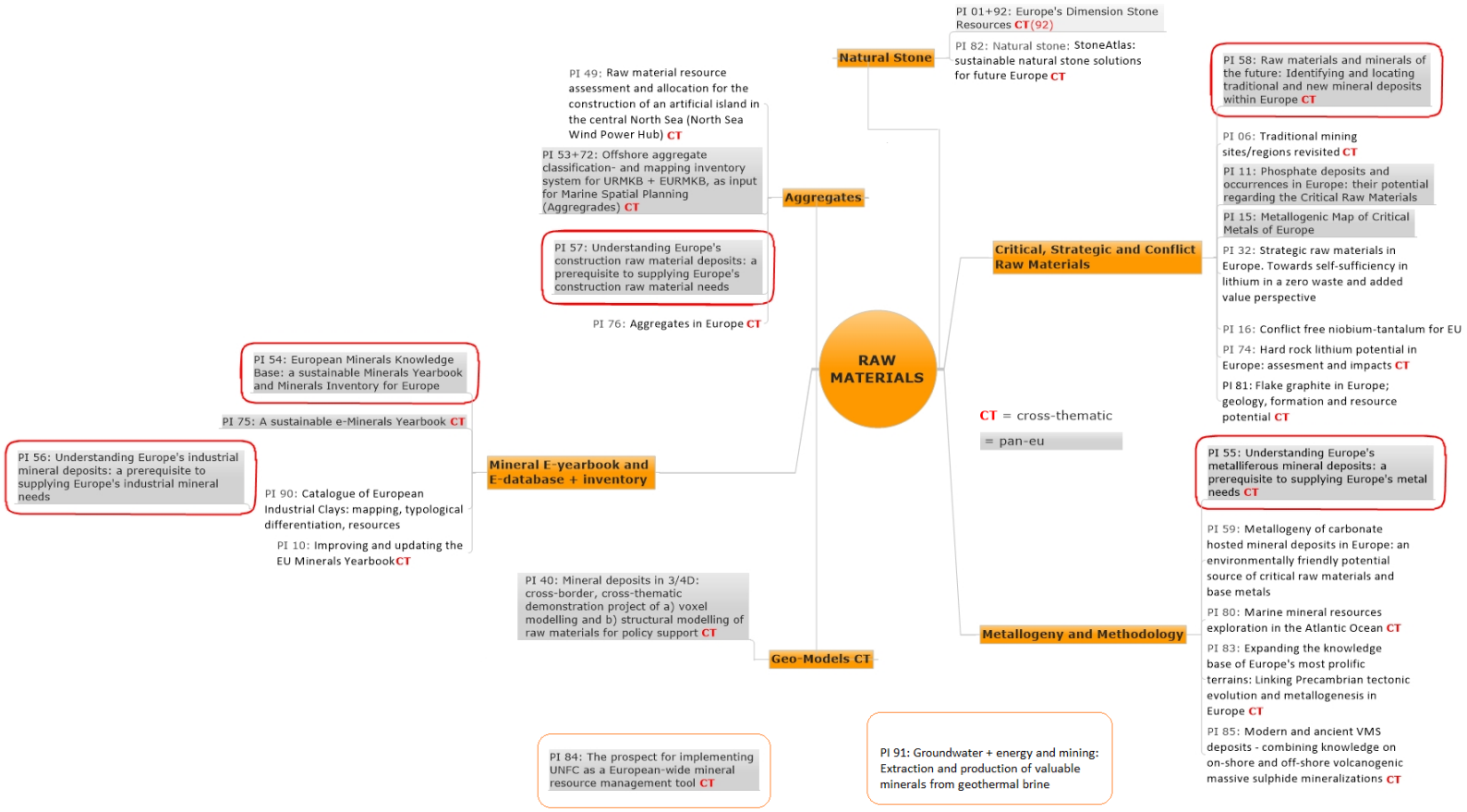
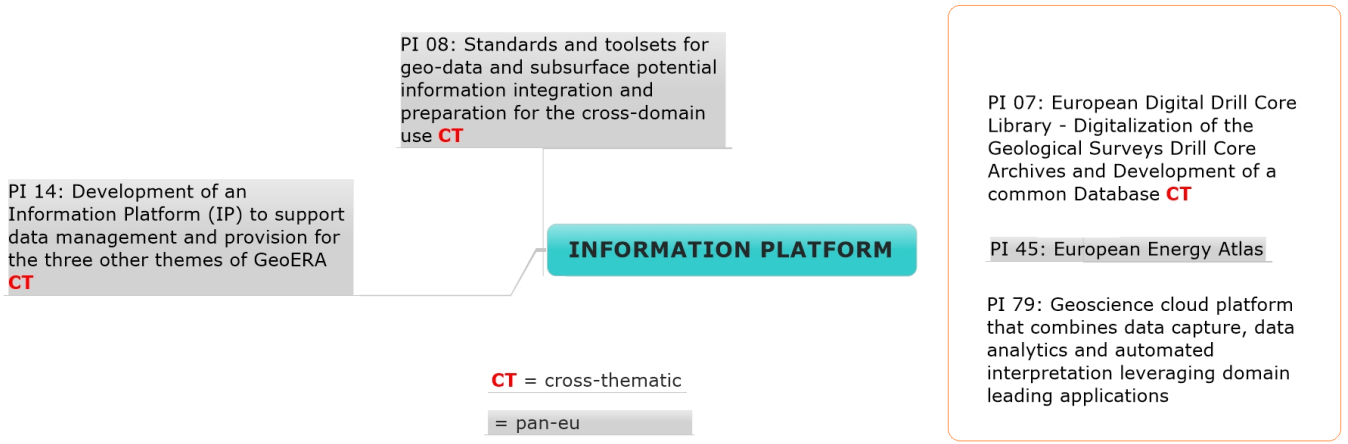


Figure D: Initial grouping of ideas, Information Platform



Annex 2 – Outcome of meeting in Copenhagen, July 4-5th

DRAFTING SRTs

The EB exchanged draft SRTs during the next weeks preparatory to the next meeting in Copenhagen, July 4-5th.

Copenhagen meeting, day 1

Agenda:

Agree on STRs, IP in other projects and SRT level budget:

9:00	Start meeting
9:00-9:30	Share general experience and considerations on writing SRT's - Collect important issues for later (budget) discussions
9:30-12:30	Present specific SRTs and specific considerations
12:30-13:30	Lunch
13:30-14:30	Discuss and confirm (or change) SRT structure
14:30-16:00	Discuss IP vs GE/GW/RM connection on activities and budget
16:30-17:00	Link commitment to SRTs based on PI commitment info TCs

Main points:

The draft SRTs were discussed at the first day of the meeting where the participants were NWO, EB with bystanders, and the four theme coordinators.

Preparing SRTs in the period between the two meetings, it became clear that it would only be possible to have one cross-thematic SRT on Sustainable subsurface management, as the Geomodel SRTs will have little benefit from clustering, having quite different focus. Thus, it was decided to have one subsurface management SRT in each of the three themes Geo-Energy, Groundwater, and Raw Material, each initially focussing on their own theme but taking the other two themes into account. Besides, the three projects, if funded, must co-operate (cluster) during implementation.

Number of projects within each SRT

The initial discussion was on the wording related to number of projects expected for funding within each SRT. It was concluded that the wording should be either a specific number, e.g. 1 or 2 projects could be funded, or a maximum number, e.g. up to 2 meaning that 0, 1 or 2 projects could be funded. Further, a number of pilots/tests etc. could be indicated, e.g. 1 general project, 2 pilots, or up to 2 pilots, within the text.

Too elaborate on Joint Call Doc No. 10 it was decided to describe the selection of projects for funding within each SRT, each Theme and across themes a bit more elaborate in a separate document, see FAQ on Ranking Procedure at the GeoERA web page.

Elaborating SRTs – Geo-Energy (see also table 2 p. 7 and Figure E)

GE1: SRT on *Fossil Energy, Energy Security and Climate Action*: The title was changed (from *Fossil Fuels*) to illustrate that the SRT also includes security and climate actions. Idea no. 89 was affiliated, the text discussed and amended.

GE2: SRT on *Geothermal Energy*: The SRT was split into three subtopics, and three proposals addressing each of these are expected. The text was discussed and amended.

GE3: SRT on *Energy Storage*: The title was changed (from *Underground Storage*), and the text was discussed and amended. Idea no. 86 has elements that fits with this SRT, although the idea is affiliated to GE1.

GE4: SRT on *Induced Impacts and Hazards*: The text was discussed and amended to reflect that 1 main and 1 specific project is expected.

GE5: SRT on *Advancements in developing and using 3D transnational Geomodels*: The title was extended (from *Geomodels*) and ideas no. 2 and 9 main moved to be mainly affiliated with GE6 although elements fit here, and the text discussed and amended.

GE6: SRT on *Sustainable subsurface Management; Geoenergy Management and Interactions with Groundwater and Mining:* The title was changed (from *Spatial Planning*) and ideas no. 2, 9 and 22 were affiliated, and the text discussed and amended.

Idea no. 25 (on Uranium and Thorium) was not affiliated to any of the above SRTs as it was believed not to have sufficient interest and support, and idea no. 46 (on mapping of energy consuming activities) were still considered not feasible for GeoERA.

Elaborating SRTs – Groundwater (see also table 3 p. 8 and Figure F)

GW1: SRT on Drinking Water and Human Health: The three 'subtopics' were merged into two (Special Waters and Hydrogeochemistry = Geogenic Backgrounds) which can be addressed in two separate or one large project, depending on the decision in the consortium. The text was discussed and amended.

GW2: SRT on Tools for Climate Change Impact Assessment and Adaptation: 'Tools on…' was added to the title; idea no. 34 was affiliated, and the text discussed and amended.

GW3: SRT on Harmonization of Groundwater Resources Information at cross-border to Pan European Scale: the title was changed (from Subsurface Spatial Planning), and idea no. 39 was moved to GW4. The text was discussed and amended.

GW4: SRT on Sustainable subsurface management; Groundwater Management and Interactions with Energy and Mining: the title was changed (from Impact of mining activities), and ideas no. 39 and 87 were affiliated. The text was discussed and amended.

Elements of three ideas, no. 34, 61 and 87 are included in more of the groundwater SRTs but each are affiliated to a specific SRT for simplicity. No. 77 on the continuation of a database on groundwater research was not affiliated to any of the above SRTs. GeoERA build its own Information Platform and requests new (research) activities to be carried out within the scope of GeoERA. Since this existing research database contains interesting data, and GeoERA promotes collaboration, GeoERA will search for synergies between this database as well as other existing databases and the Information Platform as it proves relevant for awarded GeoERA projects.

PS: During the last editing of the Groundwater SRTs it became clear that moving PI39 from GW3 to GW4 was a misunderstanding, and it was moved back again to GW3.

Elaborating SRTs – Raw Materials (see also table 4 p. 8 and Figure G)

RM1: SRT on *Improved and sustaining the Raw Materials Knowledge Base by periodically delivering a Minerals Yearbook and Inventory Information System*: The title was changed (from *Minerals E-book and Inventory*). The text was discussed and amended accordingly.

RM2: SRT on *Construction Material*: Title was changed (from *Natural Stone*) and it was decided that two subtopics should be addressed (*Dimension Stones* and *Bulk Material*). Idea no. 84 was affiliated and 56 was moved to RM4. The text was discussed and amended accordingly.

RM3: SRT on *Metallogeny – Geological Potential*: *Geological Potential* was added to the title. The text was discussed and amended accordingly.

RM4: SRT on *Forecasting and assessing Europe's Strategic Raw Materials Needs*: The title was changed (from (Strategic Raw Materials for EU). Idea no. 56 was affiliated to this SRT. The text was discussed and amended accordingly.

RM5: SRT on *Sustainable Subsurface Management; Raw Materials Management and Interactions with Energy and Groundwater*. The title was changed (from *Geomodels*). The text was discussed and amended accordingly.

Ideas no. 91 (on mineral production from thermal brine) was still considered not to be feasible for GeoERA partners to carry out.

Elaborating SRTs – Information Platform (see also table 5 p. 8 and Figure H)

IP1: STR on *Developing of an Information Platform to support Management and Provision of Data for the three other themes*: The title was extended (from *Information Platform*) and the text slightly adjusted.

Ideas no. 7, 45 and 79 were not affiliated to the SRT. No. 7 suggesting the development of a *European Digital Drill Core Archive* considered too specific to be included; not likely that such a database will be requested by the other GeoERA projects; No. 45 suggesting to extend a web platform developed for unconventional hydrocarbons (EUOGA) to be used as the Information Platform for the whole of GeoERA: The GeoERA proposal suggests to base the Information Platform on EGDI, which has a broader scope and covers all of the geoscientific themes of GeoERA. Nevertheless, GeoERA will search for synergies between existing databases and the Information Platform as it proves relevant for awarded GeoERA projects; No. 79 suggesting the use of a specific software for database development from a commercial industry organization: Considered unnecessary for GeoERA as database development will be based on EGDI established under the auspices of EGS.

Copenhagen meeting, day 2

Agenda:

Agree on strategy of SRTs:

9:00	Start Meeting
09:00-12:30	Strategy of linking budgets to SRTs and underlying PIs (how many projects do we want and how to strategically support this (up to/more than/etc.)
12:30-13:30	Lunch
13:30-15:00	Any Other Business
15:00-16:00	Timeline and next steps/follow-up

Main points:

The meeting started with consolidating the budget numbers per SRT (added in table 2 p. 8). Next the minimum and maximum commitment of the GeoERA partners were discussed. The success of GeoERA is to implement projects with a minimum in-kind contribution of €21.3 mill., and the partners have committed to submitting proposals summing to at least this amount. However, partners have indicated that they could contribute more, summing up to a total of €36.2 mill. This opens the opportunity to indicate a minimum and maximum budget per SRT. Still, the partners might not be that flexible in the end, and to make sure enough projects are submitted with appropriate budgets, it was decided to only indicate the minimum budget for each SRT, leaving the opportunity to submit proposals with a (slightly) larger budget. This must thus not

be an excluding element in the review process, and it is the responsibility of the Theme Coordinator to make sure that budgets of proposals within their respective themes are reasonable.

The meeting was concluded with a deadline until July 14th for the EB to refine SRTs, asking advice from the Theme Coordinators if needed.

Figure E: Final grouping of ideas, Geo-Energy

Figure F: Final grouping of ideas, Groundwater

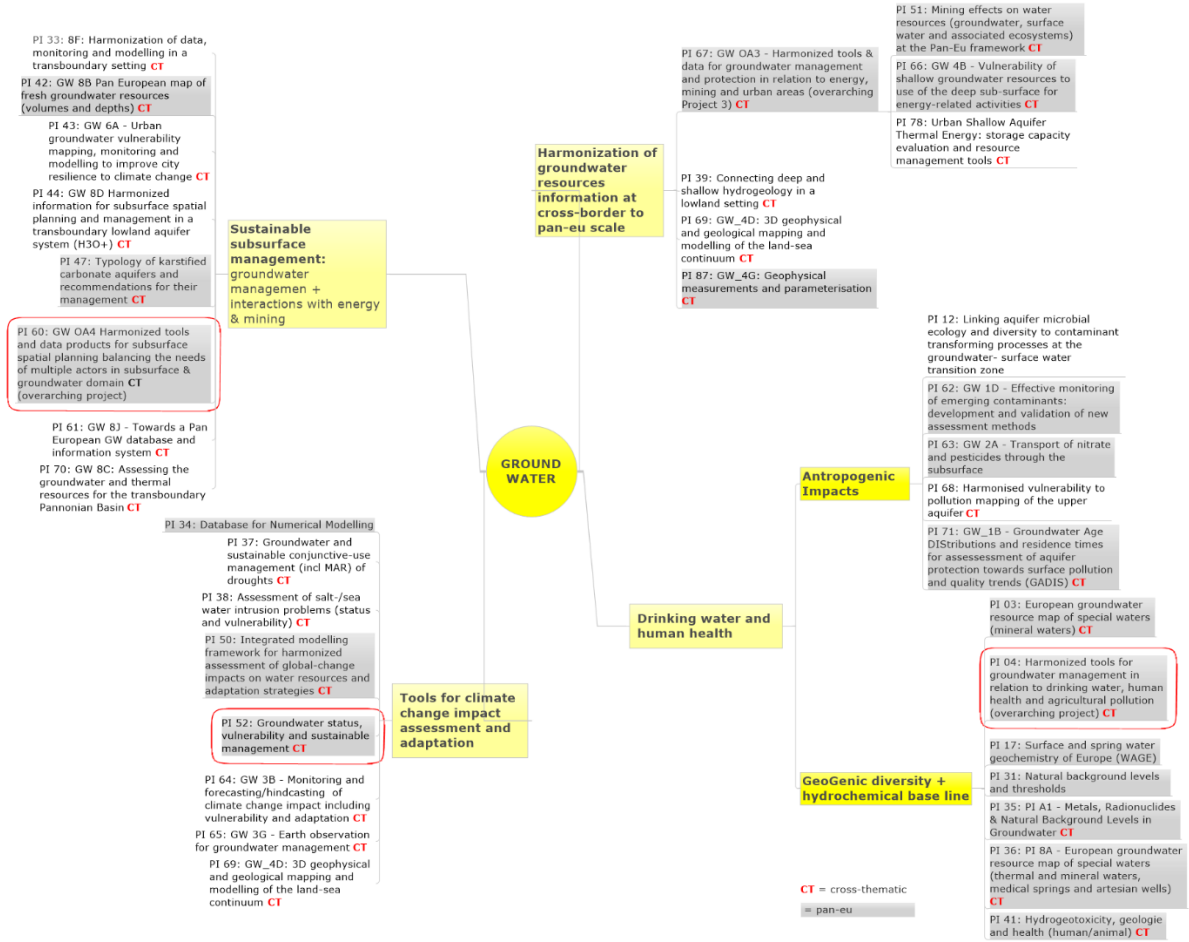


Figure G: Final grouping of ideas, Raw Materials

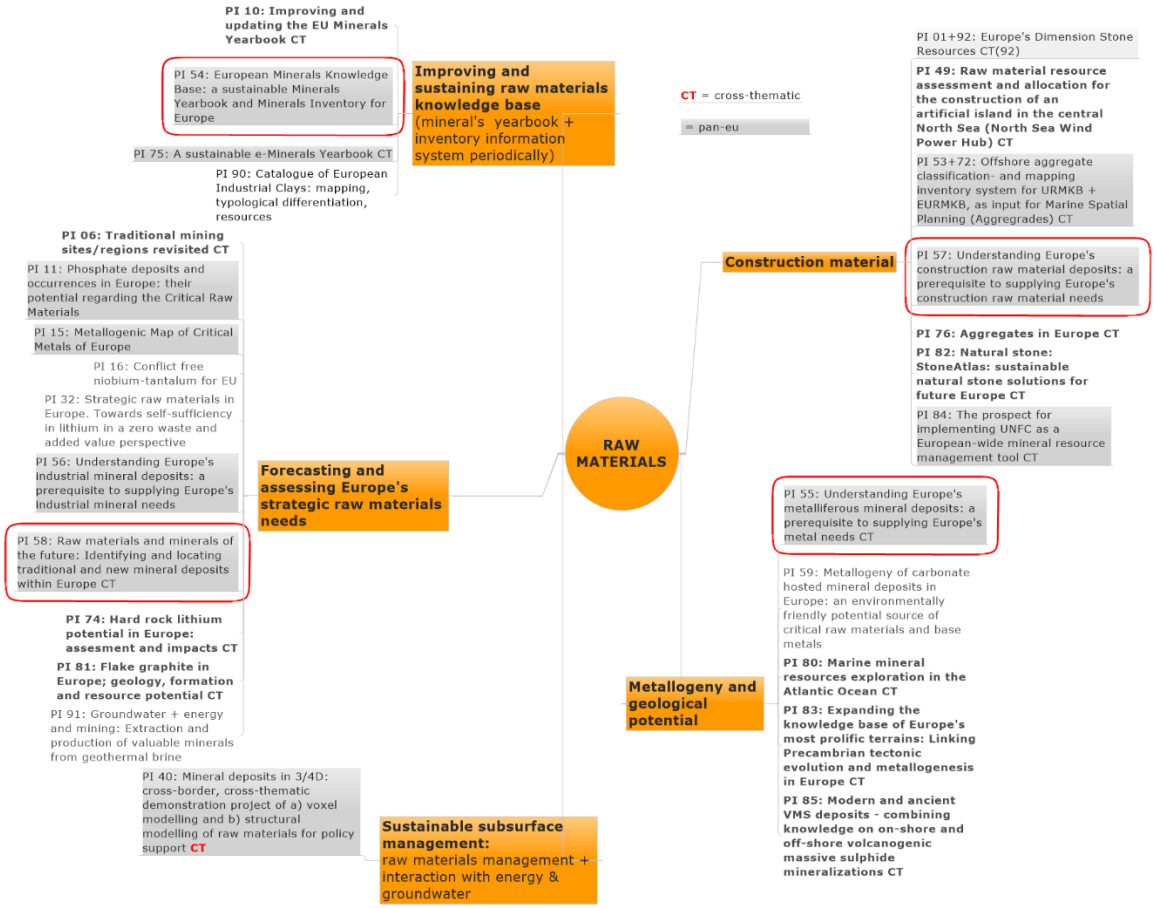
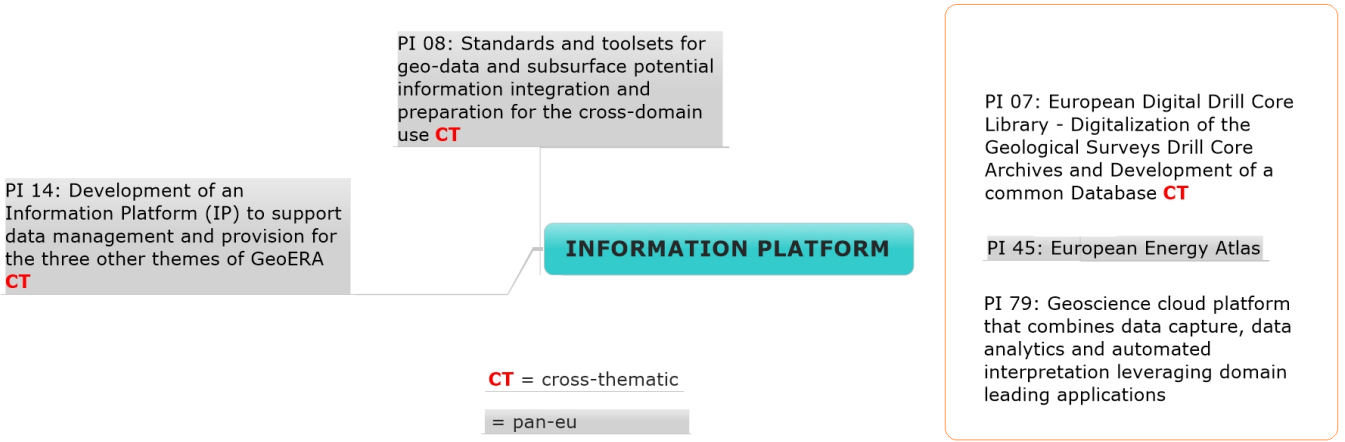


Figure H: Final grouping of ideas, Information Platform



Annex 3 – Agenda, GeoERA Stakeholder Council workshop, September 5th

09:00-12:00 GEOERA STATUS UPDATE

- 9:00 - 9:10 Welcome and introductions
- 9:10 - 9:30 General status update GeoERA (WP1-TNO)
- 9:30 - 10:00 Preparation and Launch of the Call Documents (WP2-BGR)
  - Development of the Call Documents for Stage One: Call for Project Ideas and its organization
  - Stage Two Outlook: Electronic Submission Tool (NWO) and Expert selection
- 10:00 - 12:00 Evaluation and proposal selection (WP3-GEUS)
  - Stage One: Summary submitted Project Ideas
  - Stage One: Process Assessment Project Ideas and development SRTs
  - Stage Two: Process Evaluation and Ranking

12:00-13:00 Lunch

13:00-16:00 DISCUSSION SPECIFIC RESEARCH TOPICS

- Presentation of the DRAFT Stage Two Call text
- Discuss received feedback and considerations
- Amendments, conclusions and next steps

16:00-17:00 PROJECT IMPLEMENTATION PHASE

- Monitoring and Impact Assessment of projects (WP4-GeoZS)
  - Expectations of the projects (e.g. logical framework analyses)
- Communication, exploitation and dissemination (WP5-GEUS)
  - Expectations of the projects (e.g. dissemination activities and data management)

17:00 Closure

Annex 4: overview of submitted ideas

Project Idea no.	GeoEra Theme	GeoEra Category	Coverage	Keywords	Country	Organisation	Member	Type of Submitter	Title
PI 01	Raw Materials	Construction raw materials	11	Ornamental and structural stones, Physical - Mechanical Properties, European Standards	GR	Institute of Geology and Mineral Exploration (IGME)	Yes	A group of organisations	Europe's Dimension Stone Resources
PI 02	GeoEnergy	GeoEnergy resource models and parameters		Pannonian Basin, 3D geological modelling, harmonization, geo-energy assessment, groundwater	HU	Geological and Geophysical Institute of Hungary	Yes	A group of organisations	Harmonized transboundary geo-model of the Pannonian Basin to support enhanced and sustainable use of geo-energy and groundwater resources
PI 03	Groundwater	Groundwater & Drinking Water and Human Health	BA, FZZG, and rest of the countries in the project	Mineral water, European map	BA	Geological Survey of Fed. of Bosnia and Herzegovina	Yes	An organisation	European groundwater resource map of special waters (mineral waters)
PI 04	Groundwater	Groundwater & Drinking Water and Human Health	Multiple countries	Overarching Project Idea on the Groundwater Theme no. 1	FR	BRGM	Yes	A group of organisations	Harmonized tools for groundwater management in relation to drinking water, human health and agricultural pollution (overarching project idea no.1)
PI 05	GeoEnergy	GeoEnergy resource models and parameters	33	Faults, harmonization, database, fault properties, uncertainty	NL	TNO - Geological Survey of The Netherlands	Yes	A group of organisations	European Fault Database
PI 06	Raw Materials	Critical, strategic and conflict raw materials		CRM, mining in Europe, ore deposits	DE	BGR	Yes	An organisation	Traditional mining sites/regions revisited
PI 07	Information Platform		initially 3	1.drill core digitalization 2. drill core database; 3. standardized allocation of drill core data		DMT GmbH &Co.KG	No	An organisation	European Digital Drill Core Library - Digitalization of the Geological Surveys Drill Core Archives and Development of a common Database

PI 08	Information Platform		33	Consistency, feature data, semantics, metadata, rendering	DE	Bavarian Environment Agency (LfU) – Geological Survey	Yes	A group of organisations	Standards and toolsets for geo-data and subsurface potential informa-tion integration and preparation for the cross-domain use
PI 09	GeoEnergy	Cross-border & cross-thematic models for efficient resource appraisal and policy support	33		BE	Vlaamse Overheid, Dept. Omgeving, Vlaams Planbureau voor Omgeving (ALBON)	Yes	A group of organisations	GeoConnect³d 3D: Cross-border, cross-thematic multiscale models with focus on faults and geo-manifestations for resource appraisal and policy support
PI 10	Raw Materials				UK	British Geological Survey	Yes	An organisation	Improving and updating the EU Minerals Yearbook
PI 11	Raw Materials	Critical, strategic and conflict raw materials	33	Phosphate, Rare earth elements, critical raw materials, black shales, potential assessment	BE	Royal Belgian Insti-tute of Natural Sci-ences - Geological Survey of Belgium	Yes	A group of organisations	Phosphate deposits and occurrences in Europe: their potential regarding the Critical Raw Materials
PI 12	Groundwater	Groundwater & Ecology or Groundwater & Agriculture	5-6		DK	Geological Survey of Denmark and Greenland (GEUS)	No	A group of organisations	Linking aquifer microbial ecology and diversity to contaminant trans-forming processes at the ground-water-surface water transition zone
PI 13	GeoEnergy	GeoEnergy resource models and parameters	4	Geomodelling, method development, cross-border harmonisation, subsurface potential, uncertainty	DE	BGR	Yes	A group of organisations	Northern European GeoModel (3DGEO-NEU)
PI 14	Information Platform		All GeoERA partner countries	Geoscience Informa-tion, Web-GIS, 3D geology, Technical and semantic standards	DK	Geological Survey of Denmark and Greenland (GEUS)	Yes	A group of organisations	Development of an Information Platform (IP) to support data management and provision for the three other themes of GeoERA
PI 15	Raw Materials	Critical, strategic and conflict raw materials	Europe wide	Critical raw materials, ores, metallogenic map, resource potential, prospectivity	SE	Geological Survey of Sweden	Yes	An organisation	Metallogenic Map of Critical Metals of Europe

PI 16	Raw Materials	Critical, strategic and conflict raw materials	6	Critical metals, conflict minerals, sustainable supply, metallogeny, niobium-tantalum	SE	Geological Survey of Sweden	Yes	An organisation	Conflict free niobium-tantalum for EU
PI 17	Groundwater	Groundwater & Drinking Water and Human Health	>30	EU Water Framework Directive, hydrogeo-chemistry, harmonisa-tion, database, pan-European	NO	Geological Survey of Norway	NA	A group of organisations	Surface and spring water geochemistry of Europe (WAGE)
PI 18	GeoEnergy	GeoEnergy resource models and parameters	33	3D, consistency, querying, standards, visualisation	DE	Bavarian Environment Agency (LfU) – Geological Survey	Yes	A group of organisations	Approaches and standards for developing and using transnational 3D geological models for energy assessments, subsurface planning and policy support
PI 19	GeoEnergy	GeoEnergy information for planning and policy support	33	Geothermal, CO2-storage, energy storage, hydrocarbons, decision support	NL	TNO – Geological Survey of the Netherlands	Yes	A group of organisations	Development of a state-of-art EU reporting platform for subsurface energy resources and storage capacities based on compiled geological survey data
PI 20	GeoEnergy	Geothermal resources assessment		Geothermal, tight reservoirs, secondary permeability, faults, karst	IE	Geological Survey Ireland	Yes	A group of organisations	Geological assessment of deep geothermal potential in fault-controlled, hydrothermally altered bedrocks with low primary porosity across Europe
PI 21	GeoEnergy	Geothermal resources assessment	33	Geothermal, Explora-tion, Probabilistic as-sessment, Uncertainty Resource-Classification-Framework	AT	Geologische Bundesanstalt / Geological Survey of Austria	Yes	A group of organisations	Innovative concepts for quantitative assessment of geothermal resources
PI 22	GeoEnergy	Geothermal resources assessment	33	Shallow geothermal energy, urban subsur-face, heating/cooling grids, groundwater management	AT	Geological Survey of Austria	Yes	A group of organisations	Evaluation and subsurface management of shallow geothermal energy use including seasonal heat storage in European urban regions

PI 23	GeoEnergy	Fossil resources assessment	33	Hydrocarbons, Shales, Source rock, Hydrates, CCS	UK	Natural Environment Research Council (BGS) Environmental Science Centre	Yes	A group of organisations	Geological evaluation of hydrocarbon potential in frontier and mature plays, gas hydrates, source rocks and under-explored areas across Europe
PI 24	GeoEnergy	GeoEnergy information for planning and policy support		Peat-Lignite, Coal, coal-bed-methane, underground-gasification, impacts	SI	Geological Survey of Slovenia	Yes	A group of organisations	Peat/Lignite/Coal in relation to CBM/underground gasification potential in Europe
PI 25	GeoEnergy	Energy minerals assessment		Uranium, Thorium, granitoid formations, mining, geothermal	NL	TNO – Geological Survey of the Netherlands	Yes	A group of organisations	Cross-thematic research action on Energy minerals - Assessment of Uranium/Thorium in Europe
PI 26	GeoEnergy	Energy and CO2 storage capacities assessment	33	Compressed Air, Hydrogen, Natural Gas, Thermal, Pumped Hydro	NL	TNO – Geological Survey of the Netherlands	Yes	A group of organisations	Geological assessment of energy storage capacities for various technologies in different geological settings across Europe
PI 27	GeoEnergy	Impacts/consequences from geoenergy exploitation	33	Hazard assessment, seismicity, environmental, fault analysis, mapping	NL	TNO – Geological Survey of the Netherlands	Yes	A group of organisations	Development and demonstration of methodologies for evaluating/mapping hazards and impacts, induced/triggered by subsurface geo-energy exploration/use
PI 28	GeoEnergy	GeoEnergy information for planning and policy support		spatial planning; subsurface interactions; synergetic development; competition	NL	TNO – Geological Survey of the Netherlands	Yes	A group of organisations	Approaches for assessing overlapping and co-existing subsurface energy resources/storage capacities and other subsurface resources and uses
PI 29	GeoEnergy	Impacts/consequences from geoenergy exploitation		Induced seismicity, thermo-mechanical behaviour, reservoir dynamics, production, injection	NL	TNO – Geological Survey of the Netherlands	Yes	A group of organisations	European induced seismicity database for improved understanding and prediction of hazards
PI 30	GeoEnergy	GeoEnergy resource models and parameters	33	Thermo-physics, petrophysics, fluid-composition, geo-mechanics, chemistry	NL	TNO – Geological Survey of the Netherlands	Yes	A group of organisations	Geo-Energy: Subsurface rock & fluid characterisation knowledge base

PI 31	Groundwater	Groundwater & Drinking Water and Human Health	All EU member states	Groundwater quality, Water Framework Directive (WFD), Natural background levels, Threshold values	BE	Flanders Environment Agency (VMM)	Yes	A group of organisations	Natural background levels and thresholds
PI 32	Raw Materials	Critical, strategic and conflict raw materials	>5	Critical and strategic metals; European prospectivity; zero waste; self-sufficiency; added value	PT	Laboratório Nacional de Energia e Geologia, I. P. (LNEG)	Yes	An organisation	Strategic raw materials in Europe. Towards self-sufficiency in lithium in a zero waste and added value perspective
PI 33	Groundwater	Groundwater & Subsurface Spatial Planning	3: PL and LT (additional partner: UA)	Hydrodynamic cross-border modelling	PL	Polish Geological Institute – National Research Institute	Yes	A group of organisations	8F: Harmonization of data, monitoring and modelling in a transboundary setting
PI 34	Groundwater	Groundwater & Subsurface Spatial Planning	44	Groundwater, numerical model, needs, input		"Private"	No	One individual	Database for Numerical Modelling
PI 35	Groundwater	Groundwater & Drinking Water and Human Health	Multiple country demonstration	Groundwater quality, natural dissolved content, metals, radionuclides, drinking water	AT	Geological Survey of Austria	Yes	A group of organisations	PI A1 - Metals, Radionuclides & Natural Background Levels in Groundwater
PI 36	Groundwater	Groundwater & Subsurface Spatial Planning	Pan-European	Thermal waters, mineral waters, medical springs, artesian wells, deep groundwater	AT	Geological Survey of Austria	Yes	A group of organisations	PI 8A - European groundwater resource map of special waters (thermal & mineral waters, medical springs & artesian wells)
PI 37	Groundwater	Groundwater, Climate, Subsurface spatial planning, Agriculture, Drinking Water, Human Health	At least 5. Some countries have already expressed interest: ES, DK, SK, IT, UA	Droughts, integration & harmonization, mapping; data compilation, modeling	ES	Spanish Geological Survey	Yes	A group of organisations	Groundwater and sustainable conjunctive-use management (including MAR) of droughts
PI 38	Groundwater	Groundwater & Hazards & Climate & Subsurface spatial planning & Agriculture & Drinking Water & Human Health	At least 7. Some countries have already expressed interest: SE, UA, IT, UK, DK	Droughts, integration & harmonization, mapping; data compilation, modeling	ES	Spanish Geological Survey	Yes	A group of organisations	Assessment of salt-/sea water intrusion problems (status and vulnerability).

PI 39	Groundwater	Groundwater & Subsurface Spatial Planning	DE, NL, DK	Hydrostratigraphy, structural model, harmonization, groundwater protection, decision support	DE	LBEG (Landesamt für Bergbau, Energie und Geologie)	Yes	A group of organisations	Connecting deep and shallow hydrogeology in a lowland setting
PI 40	Raw Materials	Mineral deposits in 3/4D	33	Voxel modelling (sub)-surface RM - cross-border - link other RM and resources - policy support	BE	Vlaamse overheid – dept. Omgeving – Vlaams Planbureau voor Omgeving	Yes	A group of organisations	cross-border, cross-thematic demonstration project of a) voxel modelling and b) structural modelling of raw materials for policy support
PI 41	Groundwater	Groundwater & Drinking Water and Human Health	All GeoEra Partners	Quality, Health, Hydrogeotoxicity, Potentially Toxic Geogenic Trace Elements (PTGTE)	ES	Instituto Geológico y Minero de España, IGME (IGME-Spain)	Yes	A group of organisations	Hydrogeotoxicity, Geology and Health (human and animal)
PI 42	Groundwater	Groundwater & Subsurface Spatial Planning	>30	Volume of fresh groundwater, depth of groundwater resource, Pan-EU, groundwater balance	NL	TNO – Geological Survey of the Netherlands	Yes	A group of organisations	GW 8B Pan European map of fresh groundwater resources (volumes and depths)
PI 43	Groundwater	Groundwater & Urbanized Areas	Key partners from 6 countries, expected coverage from COST Action TU1206 Min 25 countries	Water Framework & Groundwater directives, monitoring, mapping, modelling	NO	Geological Survey of Norway	Yes	A group of organisations	GW 6A - Urban groundwater vulnerability mapping, monitoring and modelling to improve city resilience to climate change
PI 44	Groundwater	Subsurface spatial planning	3	Subsurface planning, transboundary depletion, groundwater age, groundwater protection/utilization	NL	TNO – Geological Survey of the Netherlands	Yes	A group of organisations	GW 8D Harmonized information for subsurface spatial planning and management in a transboundary lowland aquifer system (H3O+)
PI 45	Information Platform		EU	Energy atlas, Europe, energy resources, energy balance	EU	Joint Research Centre of the European Commission	No	More individuals	European Energy Atlas
PI 46	GeoEnergy	Impacts/consequences from geoenergy exploitation	EU	Remote sensing, impact assessment, underground resources, fossil fuels, geothermal	EU	Joint Research Centre of the European Commission	No	More individuals	EU wide impact assessment of upstream geoenergy (fossil fuel and geothermal) industrial activities

PI 47	Groundwater	Groundwater & Drinking Water and Human Health	European karstic and chalk aquifer countries	Karst, calcareous aquifers, management, vulnerability	FR	BRGM	Yes	A group of organisations	Typology of karstified carbonate aquifers and recommendations for their management
PI 48	GeoEnergy	GeoEnergy information for planning and policy support	EU	Enhanced Geothermal Systems, maximum potential in EU, well-defined heat-exchanger	EU	Joint Research Centre of the European Commission	No	More individuals	EU wide analysis of maximum potential for geothermal power
PI 49	Raw Materials	Construction raw materials	Five (NL, DE, BE, DK, NO, UK)	Artificial Island; Aggregate resource; Construction; North Sea Hub.	DK	Geological Survey of Denmark and Greenland (GEUS)	Yes	A group of organisations	Raw material resource assessment and allocation for the construction of an artificial island in the central North Sea (N S Wind Power Hub).
PI 50	Groundwater	Drinking water, human health; agriculture; climate; energy & mining; urbanized areas; ecology; hazards; subsurface spatial planning	Multiple countries		DK	Geological Survey of Denmark and Greenland (GEUS)	Yes	A group of organisations	Integrated modelling framework for harmonized assessment of global-change impacts on water resources and adaptation strategies
PI 51	Groundwater	Groundwater, Energy & Mining	EU	Mining, groundwater resources, water quality, pressures on groundwater	PL	Polish Geological Institute – National Research Institute	Yes	A group of organisations	Mining effects on water resources (groundwater, surface water and associated ecosystems) at the Pan-European framework
PI 52	Groundwater	Groundwater & Drinking Water and Human Health; Climate; Ecology; Hazards	Multiple countries	Impact assessment	DK	Geological Survey of Denmark and Greenland (GEUS)	Yes	A group of organisations	Groundwater status, vulnerability and sustainable management
* PI 53	Raw Materials	Offshore aggregats	In principle all 33 partner countries	Offshore aggregates, Classification, Data harmonization, spatial planning, Minerals4EU	DK	Geological Survey of Denmark and Greenland (GEUS)	Yes	A group of organisations	Offshore aggregate classification- and mapping inventory system for URMKB, as input for Marine Spatial Planning (Aggre-grades).
PI 54	Raw Materials	Minerals Inventory and Yearbook	All partner countries (~33).	Minerals Yearbook; Minerals inventory; Data harmonization; Data harvesting	IE	Geological Survey Ireland	Yes	A group of organisations	European Minerals Knowledge Base: a sustainable Minerals Yearbook and Minerals Inventory for Europe.

PI 55	Raw Materials	Metallogeny	All partner countries (~33).	Deposit types; Geological domains; Onshore deposits; Offshore deposits; 3/4D modelling.	IE	Geological Survey Ireland	Yes	A group of organisations	Understanding Europe's metalliferous mineral deposits: a prerequisite to supplying Europe's metal needs.
PI 56	Raw Materials	Industrial minerals	All partner countries (~33).	Commodities; Onshore deposits; Offshore deposits; Database development.	IE	Geological Survey Ireland	Yes	A group of organisations	Understanding Europe's industrial mineral deposits: a prerequisite to supplying Europe's industrial mineral needs.
PI 57	Raw Materials	Construction raw materials	All partner countries (~33).	Stone atlas; Building materials; Physical properties; Archaeological heritage; Aggregate potential.	IE	Geological Survey Ireland	Yes	A group of organisations	Understanding Europe's construction raw material deposits: a prerequisite to supplying Europe's construction raw material needs.
PI 58	Raw Materials	Raw materials: The future	All partner countries (~33).	CRM; Conflict minerals; Raw materials of the future; Mineral prospectivity; Undiscovered potential.	IE	Geological Survey Ireland	Yes	A group of organisations	Raw materials and minerals of the future: Identifying and locating traditional and new mineral deposits within Europe.
PI 59	Raw Materials	Metallogeny	Approximately 10 countries.	Environmental friendly deposits; CRMs; Metallotects; Deposits through time; European prospectivity	IE	Geological Survey Ireland	Yes	An organisation	Metallogeny of carbonate hosted mineral deposits in Europe: an environmentally friendly potential source of critical raw materials and base metals.
PI 60	Groundwater	Groundwater & Subsurface Spatial Planning	Umbrella of 4 cross-border demonstration projects and 2 Pan-EU products	Cross-border demonstration, EU scale maps, support for subsurface spatial planning	NL	TNO – Geological Survey of the Netherlands	Yes	A group of organisations	GW OA4 Harmonized tools and data products for subsurface spatial planning balancing the needs of multiple actors in subsurface & groundwater domain
PI 61	Groundwater	Groundwater & Subsurface Spatial Planning	4	Resource evaluation, spatial information, European database, European GIS	IT	ISPRA - Geological Survey of Italy	Yes	An organisation	GW 8J - Towards a Pan European GW database and information system

PI 62	Groundwater	Groundwater & Drinking Water & Human Health; Groundwater & Urbanized areas;	Pan European/multiple country	Methodology development & demonstration Impact assessment;	UK	British Geological Survey	Yes	A group of organisations	GW 1D - Effective monitoring of emerging contaminants: development and validation of new assessment methods
PI 63	Groundwater	Groundwater & Agriculture; Groundwater & Drinking Water & Human Health	Multiple countries/pan-European		UK	British Geological Survey	Yes	A group of organisations	GW 2A - Transport of nitrate and pesticides through the subsurface
PI 64	Groundwater	Groundwater & Climate	BA, CY, DE, DK, ES, FI, UK, GR, HR, LT, PL, SK, SE, UA	Vulnerability of aquifers; Resilience of aquifers to climate change; Harmonization; Development	UK	British Geological Survey	Yes	A group of organisations	GW 3B - Monitoring and forecasting/hindcasting of climate change impact including vulnerability and adaptation
PI 65	Groundwater	Groundwater & Climate	Denmark, Ireland, Poland, Spain, UK	Earth observation; Recharge; Groundwater resources; Groundwater management; Climate change	UK	British Geological Survey	Yes	A group of organisations	GW 3G - Earth observation for groundwater management
PI 66	Groundwater	Groundwater, energy & mining; Groundwater & drinking water & human health	Pan-European	Policy support & implementation; Mapping	UK	British Geological Survey	Yes	A group of organisations	GW 4B - Vulnerability of shallow groundwater resources to use of the deep sub-surface for energy-related activities
PI 67	Groundwater	Groundwater, Energy & Mining	Pan-European	Data compilation, Impact assessment, Mapping, Modelling, Parametrization	UK	British Geological Survey	Yes	A group of organisations	GW OA3 - Harmonized tools & data for groundwater management and protection in relation to energy, mining and urban areas (Overarching Project 3)
PI 68	Groundwater	Groundwater & Drinking Water and Human Health	At least: IE, AT, CZ, DE, DK, ES, FR, GR, HR, HU, LT, PL, SK, SE, UA	Vulnerability of aquifers to pollution, aquifer properties, karst, harmonization, development	DE	Federal Institute for Geosciences an Natural Resources (BGR), Germany	Yes	A group of organisations	Harmonised vulnerability to pollution mapping of the upper aquifer

PI 69	Groundwater	All societal issues listed in this category	> 5	Land-sea continuum, 3D geological model-ling, geophysical map-ping, groundwater-surface water interact.	DK	Geological Survey of Denmark and Greenland (GEUS)	Yes	A group of organisations	GW_4D: 3D geophysical and geological mapping and modelling of the land-sea continuum
PI 70	Groundwater	Groundwater & Subsurface Spatial Planning	4	Subsurface planning, transboundary deple-tion, groundwater age, groundwater protection/utilization	DK	Geological Survey of Denmark and Greenland (GEUS)	Yes	A group of organisations	GW 8C: Assessing the groundwater and thermal resources for the transboundary Pannonian Basin
PI 71	Groundwater	Groundwater & Drinking Water and Human Health	> 30	Groundwater age, recharge, protection, vulnerability, trends	DK	Geological Survey of Denmark and Greenland (GEUS)	Yes	A group of organisations	GW_1B: Groundwater Age DIStri-butions and residence times for assessment of aquifer protection towards surface pollution and quality trends (GADIS).
* PI 72	Raw Materials	Offshore aggregates	In principle 33 all partner countries	Offshore aggregates, Classification, Data harmonization, spatial planning, Minerals4EU	DK	Geological Survey of Denmark and Greenland (GEUS)	Yes	A group of organisations	Offshore aggregate classification-and mapping inventory system for EURMKB, as input for Marine Spatial Planning (Aggre-grades).
PI 73	GeoEnergy	Geothermal resources assessment	33	Geothermal, online at-las, hydrothermal, pet-ro-thermal, enhanced geothermal systems	PT	Laboratório Nacional de Energia e Geologia	Yes	A group of organisations	Updated Online Atlas of Geothermal Resources in Europe
PI 74	Raw Materials	Critical, strategic and conflict raw materials	7	Lithium, data augment-tation, social and economic impacts	FR	BRGM	Yes	An organisation	Hard rock lithium potential in Europe: assessment and impacts
PI 75	Raw Materials	Minerals Yearbook	EU full coverage	Minerals4EU, e-Mine-rals Yearbook, Auto-mated feeding, Har-vesting, Maintenance	FR	BRGM	Yes	An organisation	A sustainable e-Minerals Yearbook
PI 76	Raw Materials	Construction raw materials	8 countries: NO (NGU), SE (SGU), GR, (IGME), UA (Geoinform), NL (TNO), AT (GBA), HR (HGI-CGS), CY (GSD)	Sources, resources, land use, sustainability, reuse	AT	Geological Survey of Austria (GBA)	Yes	A group of organisations	Aggregates in Europe

PI 77	Groundwater	All societal issues related to ground-water as listed here	> 30	Research classification, knowledge inventory, trends, gaps, policy	IT	Sapienza University of Rome	Yes	A group of organisations	European Inventory of Groundwater Research (EIGR)
PI 78	Groundwater	Groundwater, Energy & Mining	at least: SE, IRL, CAT, ES, BE, UKR, LT, DK, NO, PG, PL, FR, SB	Shallow geothermal; aquifer thermal energy storage; planning; urban areas; methodology transfer	IE	Geological Survey Ireland	Yes	A group of organisations	Urban Shallow Aquifer Thermal Energy: storage capacity evaluation and resource management tools
PI 79	Information Platform		Pilot 2 countries, extending to all countries for a full project	Data Lake, Analytics, Data Capture, Automation, Value data		Schlumberger Software Information Solutions	No	An organisation	Geoscience cloud platform combi-ning data capture, data analytics and automated interpretation leveraging domain leading applications.
PI 80	Raw Materials	Metallogeny and Critical, strategic and conflict raw materials	7	Critical and Strategic raw materials; Seafloor minerals mapping; European margins exploration	ES	Geological Survey of Spain (IGME)	Yes	An organisation	Marine mineral resources exploration in the Atlantic Ocean
PI 81	Raw Materials	Critical, strategic and conflict raw materials	~5 Countries with flake graphite deposits include NO, SE, FI, DK (Greenland), DE, UA	Graphite, critical raw materials, modeling, resource assessment, industrial minerals	NO	Geological survey of Norway	Yes	An organisation	Flake graphite in Europe; geology, formation and resource potential
PI 82	Raw Materials	Natural stone	18	Natural stone, slate, marble, granite, construction minerals	NO	Geological survey of Norway	Yes	An organisation	StoneAtlas: sustainable natural stone solutions for future Europe
PI 83	Raw Materials	Metallogeny	5-7? Potential partners include countries with mineralized Precam-brian basements, such as the Baltic, Avalonian or Laurentian shields	Mineral systems, mineral resources, metallogeny, Precambrian, Fennoscandia	NO	Geological survey of Norway	Yes	An organisation	Expanding the knowledge base of Europe's most prolific terrains: Linking Precambrian tectonic evolution and metallogenesis in Europe
PI 84	Raw Materials	Minerals inventory	NO, SE, FI, HU confirmed. Pan-European perspective	UNFC, data harmoniza-tion, resource invent-tory and management, land use management, knowledge base	NO	Geological Survey of Norway	Yes	A group of organisations	The prospect for implementing UNFC as a European-wide mineral resource management tool

PI 85	Raw Materials	Metallogeny	~10 - potential partners include all countries with known VMS deposits and/or activity related to deep sea mineralizations	VMS, exploration, prospectivity, metallogeny, copper	NO	Geological Survey of Norway	Yes	An organisation	Modern and ancient VMS deposits - combining knowledge on on-shore and off-shore volcanogenic massive sulphide mineralizations.
PI 86	GeoEnergy	Energy and CO2 storage capacities assessment	DK, FR, ES, UK, IE, NO, PT, IT, RO	Energy; Resources; Methane Hydrates; CO2 Storage; CO2 Hydrates;	UK	Environmental Science Centre, Nicker Hill	Yes	A group of organisations	European assessment of the role of methane and CO2 gas hydrates to support energy and climate policy implementation.
PI 87	Groundwater	All groundwater related societal issues listed here	> 30	Geophysical measure-ments, parameterisa-tion, airborne, well logging	DK	Geological Survey of Denmark and Greenland (GEUS)	Yes	A group of organisations	GW_4G: Geophysical measurements and parameterisation
PI 88	GeoEnergy	Impacts/consequences from geoenergy exploitation	Not applicable	Induced-natural seismi-city, seismic velocity model, seismic monito-ring, earthquake localisation	NL	TNO – Geological Survey of the Netherlands	Yes	An organisation	Improved geology-based earthquake localisation and distinction between natural and induced events
PI 89	GeoEnergy	Fossil resources assessment	9	Crowdsourcing, Inno-vation, Exploration, Production, Storage		Draupner Energy AB	No	An organisation	Infrastructure Platform for crowd-sourcing of petroleum geological and geophysical analyses
PI 90	Raw Materials	Industrial clays	>10	Industrial clays; deposits typology; mapping; resources; European prospectivity	PT	Laboratório Nacional de Energia e Geologia, I. P.	Yes	An organisation	Catalogue of European Industrial Clays: mapping, typological differentiation, resources.
PI 91	Raw Materials	Groundwater, Energy & Mining	5 (CR, SK, HU, AT, RO)	Geothermal brine, mineral extraction, sus-tainable, local produc-tion, waste-to-mineral		AAT Geothermae d.o.o. (AATG)	No	An organisation	Extraction and production of valuable minerals from geothermal brine
PI 92	Raw Materials	Construction raw materials	30 countries	Dimension and deco-rative stones; resource assessment, quarries, restoration works,	PL	Polish Geological Institute, National Research Institute	Yes	A group of organisations	Europe's dimension stone resources

* 53 and 72 are identical – double submission.