EIS

Exploration
Information
System

Deliverable 5.3

First report on the EIS clustering events

Version 1.0

Lead Beneficiary: GTK
December / 2023

Juha Kaija

Geological Survey Finland

Disclaimer

The content of this report reflects only the author's view. The European Commission is not responsible for any use that may be made of the information it contains.

Document information

Grant Agreement / Proposal ID	101057357
Project Title	Exploration Information System
Project Acronym	EIS
Scientific Coordinator	Vesa Nykänen (vesa.nykanen@gtk.fi) – GTK
Project starting date (duration)	1 May 2022 (36 months)
Related Work Package	WP5
Related Task(s)	Task 5.3
Lead Organisation	Geological Survey of Finland – GTK
Contributing Partner(s)	GTK, BEAK, BRGM, LTU, SGU, LGI, GOLDEN
Due Date	2023-11-30
Submission Date	2023-12-04
Dissemination level	Public

History

Date	Version	Submitted by	Reviewed by	Comments
2023-11-30	0.1	Juha Kaija		
2023-12-04	1.0	Juha Kaija	Hafsa Munia	

Table of contents

Summary

Exploration Information System (EIS) proposal has been compiled by a consortium, which consists of 17 partners from leading research institutes (4), academia (5), service providers (4) and industry (4). The consortium members come from six European Union (EU) member states (FI, FR, DE, ES, CZ, SE) and South Africa. One associate member of the consortium comes from Brazil. This consortium represents the main metal producing regions of Europe: Fennoscandian Shield, Iberian Pyrite Belt and Central European Belt. These economically most important metallogenic belts of the EU have diverse geology with evident potential for different types of new mineral resource. The mineral deposits in these belts are the most feasible sources of critical, high-tech and other economically important metals in the EU. Furthermore, the project has reference sites in South Africa and Brazil. The project consortium has also a vast international collaboration network, e.g. 50% of the Advisory Board members have been invited from outside EU.

EIS will develop new data analysis methods by applying artificial intelligence, machine learning, deep learning into mineral prospectivity mapping together with new geomodels and mineral systems modelling. Methods developed reduce the current high exploration costs and improve the accuracy of the targeting of the early phase exploration. This makes mineral exploration responsible in terms of energy efficiency or minimizing footprint of mineral exploration on nature as the aim is to make most out of the already existing exploration data. Project will apply UNFC code to harmonize the diverse population of mineral deposits and occurrences which will be used as training sites and validation data sets in prospectivity mapping for critical raw materials within EU. In addition, tools will be tested for secondary raw materials prospectivity. Project will also raise awareness of general public on the importance of critical raw materials to the EU's economy and welfare.

Deliverable 5 is part of the Task 5.1 Identification of synergies with relevant project´s and networks, and it is led by the Geological Survey of Finland – GTK. Relevant stakeholders and networks for EIS project engagement have been identified and listed in this document. The list of projects and networks will be updated regularly during the project.

Keywords

WP5, exploration, stakeholder engagement, projects, networks

1   INTRODUCTION

This deliverable is part of the Task 5.3 *EIS clustering events* and it is led by the Geological Survey of Finland – GTK. Contributing partners are BEAK, BRGM, LTU, SGU, LGI and GOLDEN. The main aim of this task is to organize various clustering events and other joint actions with other relevant projects and networks.

2 OBJECTIVES

Synergic effects will be sought for with the identified projects in terms of sharing of publishable results, overall orienting of the research and co-organisation of joint actions aiming at project economy optimising. As stated in the Description of the Action (work plan), the planned main tasks were to organize together with other projects and relevant interested stakeholders:

- Clustering workshops during the Raw Material Weeks in Brussels, targeted to other EU funded projects,
- Side sessions in relation to other EIS work package workshops and seminars,
- One clustering event with international projects,
- SIMS (sixty-minute-seminars) with invited guest projects,
- Online discussions with other related projects.

In the following chapters the work done during the 1st reporting period is described. The main effort was directed at the organizing the EU SuperCluster Lapland Geoconference in October 2023 in Rovaniemi, Finland. This event can be regarded as a replacement of the clustering workshop that was supposed to be organized in connection with the Raw Materials Week 2023. During the period, we didn't yet organize clustering event with international projects and SIMS.

3   CLUSTERING ACTIVITIES

3.1 Mapping of relevant projects and networks

The first list of relevant projects and networks has been compiled and presented in *Deliverable 5.1 List of relevant projects and networks.* The list of projects and networks will be updated regularly and in fact, during the EU SuperCluster clustering event preparations, connections to new projects were established. The concrete cooperation with the identified projects in terms of co-organisation of joint actions started already at the kick-off meeting in Rovaniemi and will continue throughout the project.

The list will be used e.g., to inform about the EIS activities, and especially about the launching of public *EIS Scope Engagement Forum* (Task 5.2). The GDPR compliant list has been also distributed to some other ongoing H2020- and Horizon Europe -projects to help them in organising their clustering activities.

Currently, the updated list of the relevant projects include thirty European Union funded projects and twenty-three important networks or platforms.

3.2 Activities related to project meetings

The EIS consortium organized clustering sessions in its own project progress meetings and participated in other related EU funded R&I projects´ clustering sessions as follows:

Kick-off meeting 8th June 2022 in Rovaniemi, Finland. A clustering session with SEMACRET, AGEMERA, GOLDENEYE and DroneSOM was organized with the following projects presented:

- SEMACRET - Sustainable exploration for orthomagmatic (critical) raw materials in the EU: Charting the road to the green energy transition Horizon Europe, Prof. Shenghong Yang, Oulu Mining School, University of Oulu
- GoldenEye - Earth observation and Earth GNSS data acquisition and processing platform for safe, sustainable and cost-efficient mining operations, H2020, Jari Joutsenvaara, Kerttu Saalasti Institute, University of Oulu
- AGEMERA - Agile Exploration and Geo-modelling for European Critical Raw materials, HE, Jari Joutsenvaara, Kerttu Saalasti Institute, University of Oulu
- DroneSOM - Drone Geophysics and Self-Organizing Maps, EIT RawMaterials, Sami Niemi, Geological Survey of Finland - GTK

MINE.THE.GAP and GREENPEG International Clustering Event 26th October 2022 in Porto, Portugal.

- Juha Kaija, GTK, attended the event and moderated the Interactive session on future raw materials projects & SLE, SLO.
- The clustering event offered important information on e.g.,
  1) the EU funding programmes related to Raw Materials (Peter Handley, DG GROW Raw Materials Unit),
  2) results of the GREENPEG (*New Exploration Tools for European Pegmatite Green-Tech Resources , H2020*) project and
  3) results of projects funded by the MINE.THE.GAP (*Creation and Integration of Novel Industrial Value Chains for SMEs in the Raw Materials & Mining Sectors through ICT, Circular Economy, Resource Efficiency & Advanced Manufacturing Innovation Support*, H2020),
  4) how clusters and networks of clusters support companies in inter-regional collaboration and accessing European grants. The event included also networking with focus on consortia building for future projects.

AGEMERA, SEMACRET, GOLDENEYE, EIS - Management workshop 10th November 2022, Oulu, Finland:

- The planning of the workshop continued with AGEMERA´s coordinator, Jari Joutsenvaara in September-October 2022, and the workshop realized on the 10th November 2022 in Oulu, Finland.
- The main objective was to share the project management experience & the best practices. Juha Kaija shared his experiences from MIREU – Mining and Metallurgy Regions of EU, NEXT – New Exploration Technologies and EIS projects.

SGU has done the internal clustering with different projects (e.g., *FUTURAM*) related to the topic of raw materials and UNFC classification including ongoing secondary raw material mapping in Sweden.

In the frame of the 1st EIS Progress Meeting in Dresden, BEAK together with GTK conducted a clustering workshop on 30th November 2022 with the topic "*Promote scientific cooperation between EU-funded research projects and enhancing exploitation of their innovations to EU mining projects.*" Furthermore, a workshop on *Public Awareness* was conducted (see below the agenda):

30 November 2022: Clustering Workshop & Panel Discussion "Promote scientific cooperation between EU-funded research projects and enhancing exploitation of their innovations to EU mining projects"

- Exploration Information System (EIS), Project Overview (Vesa Nykänen, GTK)
- New Exploration Tools for European Pegmatite Green-Tech Resources (GREENPEG): Project Overview (Wolfgang Reimer, GKZ)
- Vectors to Accessible Critical Raw Material Resources in Sedimentary Basins (VECTOR): Project Overview (Richard Gloaguen, HIF)
- Zinnwald/Altenberg mining prospect: Overview (Martin Köhler, Beak Consultants GmbH)
- Klingenthal exploration prospect: Overview (Jamie Newall, Golden PET)

- Tellerhäuser mining prospect: Overview (Marco Roscher, Saxore Bergbau GmbH)
- Panel Discussion (led by Hafsa Munia, GTK)

30 November 2022: Public Awareness Workshop & Panel Discussion "Fostering awareness and public acceptance of the role of raw materials in the transition to the Green and Digital Economy of EU"

- German Raw Materials Agency: German raw materials strategy & raw materials outlook (Antje Wittenberg, DERA at BGR)
- Saxon State Ministry for Economy, Labour and Transport: Saxon raw materials strategy (Kirsten Schick, SMWA)
- Raw materials data of the Free State of Saxony (ROHSA): Overview & status (Daniel Franke-Laske, LfULG)
- Saxon Mining Authority: Mining cadastre of Saxony: Status & outlook (Bernhard Cramer, OBA)
- Helmholtz-Centre for Environmental Research: Social involvement in raw material research in the Erzgebirge region (GeRohTrans) project: Overview & experience (Diana Ayeh, UFZ)
- Panel Discussion (led by Marie Veys, LGI

MultiMiner - Multi-Source and multi-scale earth observation and novel machine learning methods for mineral exploration and mine site monitoring kick-off meeting was organized in Espoo, Finland on 12 January 2023. Vesa Nykänen presented the EIS project at the clustering session, and Juha Kaija participated at the KoM. Projects presented are listed below:

- S34I - Secure and sustainable supply of raw materials for EU industry, HE. Ana Teodoro, Faculdade de Ciências da Universidade do Porto
- m4mining - Multi-scale, Multi-sensor Mapping and dynamic Monitoring for sustainable extraction and safe closure in Mining environments, HE. Simon John Buckley, NORCE Norwegian Research Centre AS
- GoldenEye - Earth observation and Earth GNSS data acquisition and processing platform for safe, sustainable and cost-efficient mining operations, HE. Marko Paavola VTT
- EIS- Exploration Information System, HE. Vesa Nykänen, GTK
- AGEMERA - Agile Exploration and Geo-modelling for European Critical Raw materials, HE. Jari Joutsenvaara, University of Oulu
- VECTOR - Vectors to Accessible Critical Raw Material Resources in Sedimentary Basins, HE. Chris Stockey, Satarla
- ESA RepreSent - RepreSent: Non-supervised representation learning for Sentinels. Octavian Dumitru, DLR
- RawMatCop - Copernicus for Raw Materials. Fabio Ferri, EIT Raw Materials
- SEMACRET - Sustainable exploration for orthomagmatic (critical) raw materials in the EU: Charting the road to the green energy transition Shenghong Yang, University of Oulu, pre-recorded presentation

The MultiMiner KoM offered a good chance to meet MultiMiner and other project's representatives to discuss about the potential cooperation.

EIS 3rd Progress meeting in Aracena, Spain 17-19 October 2023. On 18 October CSIC organised a session on "USGS research and possible cooperation with EIS & Exploration & mining in South Spain" with the following presentations:

- United States Geological Survey (USGS): Current research, Joshua Coyan, Geostatistician/Research Geologist
- The future of the Iberian Pyrite Belt. Exploration Managers/CEOs of Atalaya Mining, Matsa Sandfire & Las Cruces (Organized by CSIC)
- Raw materials and north-south partnership: the use of natural zeolites in water potability, Isabel Diaz, Deputy Vice-president of Internalization and Cooperation, CSIC
- The critical raw materials act (online), Gerardo Herrera, Policy Officer/National Expert, DG GROW.

3.3 Activities related to conferences, seminars and workshops

The EIS consortium participated, and co-organized different seminars related to the role which the EU is playing in sustainable supply of raw materials, and most particularly through EU funded R&I projects which are aimed at the development of breakthrough technologies for mineral exploration:

Discussions with the University of Queensland, Total Deposit Knowledge, Australia (Nick Cook, Steven Micklethwaite & Katerina Savinova) on possible future cooperation with the M4Mining HE-project started in October 2022 and continued in June 2023 with the planning of the EU SuperCluster Lapland Geoconference. University of Queensland was one of the main organizers of the SuperCluster clustering event.

Beak presented the EIS project in general at the *Workshop "Mining and Processing of Tin and Lithium Ores in the Zinnwald/Cínovec Region"* in Cínovec, Czech Republic (07.-08.09.2022).

BEAK organised the *Mineral Prospectivity and Exploration Targeting - MinProXT 2022* webinar series together with GTK and Technical Research Centre of Finland (VTT). The MinProXT 2022 was divided into two themes: 1) Advances and recent development in the methods of 2D and 3D prospectivity mapping and geoscientific data analyses, and the associated limitations, uncertainties, and challenges; and 2) Real-world utilization of the prospectivity maps in varied fields such as land-use assignments, infrastructure planning and others in addition to mineral deposit exploration.

The Abstracts proceedings of the MinProXT 2022 - Mineral Prospectivity and Exploration Targeting has been published in GTK´s Open File Research Report: [GTK, Open File Research Report 29/2023. MinProXT 2022 – Mineral Prospectivity and Exploration Targeting](#)

25.4.- 27.4.2023: Clusters meet regions in Levi, Lapland, Finland. Juha Kaija attended the high-level event with the matchmaking on raw materials. The event was organised by the regions of Eastern and Northern Finland, together with the European Cluster Collaboration Platform (ECCP) and the MINE.THE.GAP network. Clusters meet Regions East and North Finland | European Cluster Collaboration Platform

25.4.2023: International Raw Materials conference "Sourcing the European energy transition from domestic resources – vision or wishful thinking?" Uppsala, Sweden. SGU participated in the planning of this conference. The event was hosted by the H2020 GREENPEG project together with the European Technology Platform on Sustainable Minerals Resources (ETP-SMR) and the Swedish Mining Association (SVEMIN).

In connection with the above, SGU had discussions with the GREENPEG representatives for possible future collaboration between the EIS and the GREENPEG.

EIS project partners SGU and LTU together with the GREENPEG project have been planning a special session on Granite and pegmatite mineral systems for the 36th Nordic Geological Winter meeting to be organised in Gothenburg, Sweden in 10-12 January 2024. Session has been approved, see: [NGWM_all-sessions.pdf (ngwm2024.se)](#).

The main effort concentrated on the organization of the EU SuperCluster Lapland Geoconference 30-31 October 2023 in Rovaniemi, Finland. Organising committee consisted of Professor Vesa Nykänen, Geological Survey of Finland, Professor Nick Cook, Sustainable Minerals Institute, The University of Queensland and Mr Juha Kaija, Geological Survey of Finland. LGI took care of promoting the event: designing a web page, designing the communication materials, promoting the event on social media and GTK handled the practical arrangements (Satu Ojanen, GTK). The extended abstracts of this clustering event have been published at: GTK, Open File Research Report 55/2023. EU SuperCluster Lapland Geoconference – October 30–31, 2023, Hotel Santa Claus, Rovaniemi, Finland

Twenty-three EU-funded projects focused on raw materials in collaboration with the University of Queensland (Australia), joined forces to organise this 1.5-day clustering event. The clustering event in Rovaniemi attracted 124 participants from over 60 expert organisations from 22 countries. It can be stated that the SuperCluster event was the biggest clustering event ever organised by the mineral raw materials related projects.

The main aim was to foster discussions and facilitate the exchange of ideas pertaining to the current technological challenges and key topics within the raw materials sector. The presentations were divided into five sessions with topics related to innovative mineral exploration, earth observation in exploration and mining, environmental, social and governance in exploration and mining, critical raw materials supply, and new frontiers for exploration. In these sessions, we had 28 oral presentations, and 21 poster presentations were presented. The Abstracts proceedings of the EU SuperCluster has been published in GTK´s Open File Research Report: [GTK, Open File Research Report 55/2023. EU SuperCluster Lapland Geoconference – October 30–31, 2023, Hotel Santa Claus, Rovaniemi, Finland](#)

The list of contributing projects is presented below:

Participating projects funded by the Horizon Europe (HE), Horizon 2020 (H2020), EIT Raw Materials (EIT RM) and European Regional Development Fund (ERDF):

EIS – Exploration Information System (HE)

AGEMERA – Agile Exploration and Geo-modelling for European Critical Raw materials (HE)

CIRAN – CrItical RAw materials extraction in enviroNmentally protected areas (HE)

CRM-geothermal – Raw materials from geothermal fluids: occurrence, enrichment, extraction (HE)

EGT-TWINN – Enhancing research capacity at the Geological Survey of Estonia to accelerate the country's transition to green energy (HE)

ENICON – Sustainable processing of Europe's low-grade sulphidic and lateritic nickel/cobalt ores and tailings into battery-grade metals (HE)

EXCEED – Cost-effective, sustainable and responsible extraction routes for recovering distinct critical metals and industrial minerals as by-products from key European hard-rock lithium projects (HE)

GoldenEye – Earth observation and Earth GNSS data acquisition and processing platform for safe, sustainable and cost-efficient mining operations (H2020)

GREENPEG – New Exploration Tools for European Pegmatite Green-Tech Resources (H2020)

m4mining – Multi-scale, Multi-sensor Mapping and dynamic Monitoring for sustainable extraction and safe closure in Mining environments (HE)

MaDiTraCe – Material and digital traceability for the certification of critical raw materials (HE)

MinExTarget – Enhanced Use of Heavy Mineral Chemistry in Exploration Targeting (EIT RM)

mine.io – A Holistic Digital Mine 4.0 Ecosystem (HE)

MultiMiner – Multi-Source and Multi-Scale Earth Observation and Novel Machine Learning Methods for Mineral Exploration and Mine Site Monitoring (HE)

NetHelix – Intelligent digital toolbox towards more sustainable and safer extraction of mineral resources (HE)

ROBOMINERS – Resilient Bio-inspired Modular Robotic Miners (HE)

S34I – Secure and Sustainable Supply of Raw Materials for EU Industry (HE)

ScaVanger – Sustainable Supply of Scandium for the EU Industries from Liquid Residues from Chloride-Based TiO2 Plants (EIT RM)

SEEMS DEEP – Seismic and Electromagnetic Methods for Deep Mineral Exploration (ERA-MIN)

SEMACRET – Sustainable exploration for orthomagmatic (critical) raw materials in the EU: Charting the road to the green energy transition (HE)

START – Sustainable Energy Harvesting Systems Based on Innovative Mine Waste Recycling (HE)

TRIDENT – Technology based impact assessment tool foR sustaInable, transparent Deep sEa miNing exploraTion and exploitation (HE)

VECTOR - Vectors to Accessible Critical Raw Material Resources in Sedimentary Basins (HE)

New Regional Circular-Economy Promoting Co-operation and Bio-Cover Practices in Arctic Mine Tailings (ERDF)

Projects funded from other sources:

BATTRACE – Sustainable Processing and Traceability of Battery Metals, Minerals and Materials (Business Finland)

MaViSkene – Finnish material flow analysis and scenario work on the use of natural resources in support of circular economy agreement (National funding)

Towards a fossil-free society: the mineral economy as a substitute for peat production (Kohti fossiilivapaata yhteiskuntaa: mineraalitalous turvetuotannon korvaajana/AKKE funding)

Feedback from the SuperCluster participants

The feedback from the participants of the SuperCluster was positive, in the following some selected feedback is listed.

An important event for us a new entrant to Finland as an investor and explorer we were able to note best practice exploration and community work and hope to participate in the future.
- Jason Beckton, Managing Director, Prospech Limited, Sydney, Australia

It was a fantastic event. It exceeded my best expectations. I learned about EU-funded projects that are related to my project. It was very important to establish synergies between projects and partners. I hope you can organize this event again. Portugal (Porto) would be very happy to host this event, but Rovaniemi it's so charming, I wouldn't mind going back 😊
- Ana Cláudia Teodoro, Associate Professor with Habilitation, Dep. Geoscience, Environment and Land Planning, Faculty of Science, University of Porto

Once again congratulations on a well-organised and executed conference. I thought it was highly worthwhile particularly when added on to FEM. To be honest, without FEM I probably would not have attended so that was a big pull. The best part for me as in industry participant was getting to see some results of the multitude of EU projects all at various stages of completion and understand how they could be beneficial to industry.
Well done!
- Ben Lepley, Mining ESG Consultant, Mining Advisory, SLR Consulting Limited, Cardiff, United Kingdom

Attendance to the SuperCluster event was remarkable as a platform for mining technology companies and stakeholders to stay ahead in adopting innovative exploration concepts, methods and tools to discover critical raw materials crucial for strategic sectors.
It also provided an opportunity to engage with the European Commission, EU projects, regional authorities, and exploration companies, contributing to the sustainable development of the raw materials sector in Europe.
I'm absolutely eager to attend the next event of this kind, agree to publish.
- Mario Arancibia, Senior Geologist / Project Manager, Muon Solutions Oy, Finland

The event offered versatile coverage of the latest research in various disciplines and the opportunity to meet colleagues. I hope the event will be organized again and maybe social science research will have its own session?
- Leena Suopajärvi, AGEMERA, University of Lapland

4 SOME LESSONS LEARNT FROM CLUSTERING ACTIVITIES

1. Even a big event is easier to organize when you have a rather small organising committee. In case of the SuperCluster event it is was five persons who took care of the practicalities, communication and abstracts reviewing.
2. To attract the maximum number of participants, the clustering event should be organised in connection with other bigger events. In the case of SuperCluster, it was the Fennoscandian Exploration and Mining confererence organised straight after the Rovaniemi SuperCluster. Sixty (60) persons who attended FEM2023 attended the SuperCluster.
3. Although the EIS project and University of Queensland were the main organizers, all other contributing projects were committed in promoting of the event. This helped a lot to gain more participants.
4. All event materials, dedicated website, roll-ups, etc. must have a common design. For the SuperCluster design, LGI´s Team did outstanding work.
5. The clustering events offer a platform for scientists to present their findings and to get real feedback from the fellow scientists working in other projects. Events provide a clear point for discussion and offer a place where one could e.g., notice that other projects might be working with the same problematics. In the best case, projects will really start to share their research findings and help each other.
6. The above is true also for the daily management of the projects and the legal management. For example, at the project management clustering event organised in Oulu by the EIS, SEMACRET, GoldenEYE and SEMACRET projects, the best practises of the management were openly shared. This helped especially non-experienced project leaders.
7. After the SuperCluster, there have been discussions with other projects on how to continue the cooperating in the fields of communication and promotion.
8. During the SuperCluster an idea to have a session on social sciences in exploration and mining was raised. This idea will be further developed during the coming months, and in the next big event it will be part of the agenda.