MINERAL INTELLIGENCE FOR EUROPE

Deliverable 1.3 Final

Project management report

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GENERAL INTRODUCTION

The European Union has identified security of supply, improvement in environmental management and resource efficiency as key challenges for the raw materials sector. Data regarding the location and spatial distribution of primary and secondary raw materials, with respect to exploration, exploitation, production and trade activities, underpin decision making in government and industry. Given the dynamic character of such data, regular updates of comprehensive, reliable and harmonized information across borders are required. The overall aim of MINTELL4EU is to improve the European Knowledge Base on raw materials as there are several sources of non-harmonized data with different coverages developed for different purposes during national and international projects over recent decades. All data are shared at the European Geological Data Infrastructure, EGDI.

Tasks include updating the electronic Minerals Yearbook produced in the Minerals4EU project as well as extending the spatial coverage and quality of data currently in the Minerals Inventory. Furthermore, MINTELL4EU aims to increase the degree of harmonization, communication and interaction between existing data platforms, with the ambition of reaching a fully operational and reliable data knowledge management system, fulfilling the European needs and taking into account the Raw Materials Information System (RMIS) of the European Union. Finally, the applicability of the UNFC classification system for obtaining more accurate Pan-European mineral inventories are tested through a large number of case studies on different commodities across Europe.

MINTELL4EU has 27 partners each representing a national or regional geological survey organisation from 25 European countries.

EXECUTIVE REPORT SUMMARY

This report is the final project management report describing the results achieved in the project in the period from month 19 until month 40 (from the 1st of January 2020 until the 31st of October 2021).

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1 MINTELL4EU IN BRIEF

Despite the progress achieved in MINTELL4EU, it is important to remember that the work builds on efforts achieved in previous projects. The electronic Minerals Yearbook (e-MYB) and the Minerals Inventory as well as associated code lists have been updated, and the underlying database (MIN4EU) restructured enabling the integration of the e-MYB into the same data base as the Minerals Inventory. The updating and harmonization of code lists ensure a higher level of transparency and interoperability, e.g. between the e-MYB and the Inventory, and UNFC codes have been added to allow reporting using this classification method. A map with historic mines has been created, and the United Nations Framework Classification for Resources (UNFC) has been tested on a range of commodities across Europe. Besides, efforts have been put into assuring future data collection in a harmonized and automized way, and in securing visualization of data at the EGDI Portal in user friendly and targeted maps. Finally, the potentials for interacting with other data platforms have been exploited

Below, the progress in MINTELL4EU is described in brief for the period 1 January 2020 until 31 October 2021 per work package. More details can be found in the deliverables per work pages (mainly D2.1, D3.1 ver.2, D3.3, D4.1, D4.2)

Overviews of meetings, deliverables, and communication & dissemination activities can be found in tables 1, 2 and 3 at the last pages of this report.

Finally, reflections on the project progress and remaining challenges are added at the end of each chapter and in the last conclusive chapter.

2 WP1: MANAGEMENT, COMMUNICATION, DISSEMINATION, AND SUSTAINABILITY

This work package is concerned with the overall financial, administrative and operational management of the project as well as coordinating activities across work packages.

2.1 Extension of project period and amendments

Most of the period, since March 2020, has of course been affected by restrictions implemented across Europe due to the COVID-19 situation. One major implication has been that physical meetings have not been possible, another that not all partners were capable, at least not the first months, of working from their private home as they were sent out of office. However, this gradually improved during summer 2020 but resulted in some delay and as a result, MINTELL4EU (as most other GeoERA projects) were extended with four months from the end of June until the end of October 2021.

The delay and extension naturally resulted in a number of delayed or postponed deliverables, presented to and agreed by all project partners and finally approved by the GeoERA Executive Board. This was necessary twice, in February 2021 and in September 2021. In February, some budgetary adjustments were also implemented as two partners withdrew part of their budget, thereby releasing a sum for other partners to take over for extra tasks, see chapter 2.4.

2.2 Coordination of the work

The project has been coordinated through 20 online monthly Project Board Meetings (no. 15 to 34). All WP leaders were present or represented at these meeting, but all non-Project Board partners were also encouraged to join and usually a few of them did. Besides, the Raw Materials Theme Coordinator, Antje Wittenberg (BGR) attended as often as possible. Furthermore, a number of bilateral meetings, often informal with the involved partners and colleagues, were arranged on specific task to ensure smooth project progress. The necessity of having more online meeting due to COVID-19 has had the positive effect that all partners are now more willing and better ‘educated’ to attend online meetings, and all have learned to get the maximum benefits via these fora as physical meetings have been impossible during more of than half of the project period.

In addition, an online Project Assembly (no. 3) was arranged back-to-back with two workshops (see chapter 4.3 and 5.3) and an online Project Board meeting (no. 23) in October 2020. Finally, a concluding Project Assembly (no. 4) was arranged to close the project on 29 October 2021, presenting the main outcome of the project to all partners.

As an extra benefit for the coordination of the work in the GeoERA Raw Materials projects, the Theme Coordinator, Antje Wittenberg (BGR) has since the March 2020 coordinated weekly meetings between and with the four project leads (PLs):

- EuroLithos: Tom Heldal (NGU)
- FRAME: Daniel Oliveira (LNEG)
- MINDeSEA: Francisco Javier González Sanz (IGME)
- MINTELL4EU: Lisbeth Flindt Jørgensen (GEUS.

Besides, the GIP-P PL Jørgen Tulstrup (GEUS) and the RM liaison officer from GIP-P James Trench (GSI) have participated in a number of these meetings where relevant.

These coordinating meetings have been invaluable, ensured partly coordination of activities (e.g., on the integration of new data collected in especially EuroLithos and FRAME into national databases to ensure that these are also shared with MIN4EU), partly lifted the level of dissemination activities with common posters, presentation and publications. A monograph on the full overarching outcome of the GeoERA Raw Materials project is under development and will be submitted to an international peer-review journal before the end of 2021.

2.3 Deliverables

Besides from this report (D1.3 Final), D1.5 (A roadmap for future actions toward full sustainability) has been compiled, describing in brief the data collected in MINTELL4EU and how these are secured in the MIN4EU database. The routines and automatization in the data collection, the data base maintenance, the network of expert behind all the work, and some remaining challenges are anticipated to continue and be further elaborated in the program expected follow GeoERA, the CSA GSE[1].

2.4 Economy

The project budget has been closely monitored by the PL requesting feedback from the project participants every six month regarding the use of resources per work package. This mainly to monitor whether budget was used as expected and to take the necessary steps to move budget between partners if required. The main challenge here was the withdraw of half of the budget for one partner (GeoInform) and a smaller reduction in budget by another partner (GSD) announced in summer 2020. Both partners kept their project input at the same level but at a lower budget. Other partners were willing to take over this budget for different tasks: further national data collection (AGS), further development of national database, contribution to the historic mine sites task and extra work on the UNFC pilot (GBA), increased funding for a table top book (GSI), and finally yet another contributor to the task on the historic mine sites (GTK). The partners are expected to use their budgets as established by these budget allocations implemented in February 2021, but small discrepancies must be expected.

2.5 Dissemination and communication

The project and the expected outputs and impacts have been presented at more events, e.g., at GeoUtrecht 2020 and GeoKarlsruhe 2021, EGU 2020 and 2021, at two UNECE events in 2021 and at PDAC 2021. See table 3 for more events.

MINTELL4EU PL contributed to a scientific publication ‘GeoERA Raw Materials to support Europe’s resilience on raw materials’, SGA news no. 48, p.6-10, a paper jointly authored by the GeoERA Theme Coordinator and the Raw Materials PLs.

MINTELL4EU PL and WP leads have participated in regular (biannual) meetings between the MREG[2] group and the GeoERA RM projects, in the reporting period two

[1] Coordination and Support Action: Geological Service for Europe: a project proposal is being prepared under the leadership of EuroGeoSurveys, the Geological Surveys of Europe; call HORIZON-CL5-2021-D3-02-14: Support to the activities of the European Geological Services.
[2] EuroGeoSurveys Mineral Resources Expert group (EGS MREG)

as online events in Sept. 2020 and April 2021, one partly physical, partly online in Sept. 2021.

On the initiative of the MINTELL4EU PL, but strongly supported by the Theme Coordinator and the other three GeoERA RM PLs, a twitter account 'Did you know…' was issued at the beginning of the COVID-19 lockdown, at that point with the ambition of highlighting the importance of raw materials in the Green Transition and when producing medical equipment necessary during a pandemic. Later, the twitter account has been used to highlight several outputs from the GeoERA RM projects and related events as well as important political initiatives related to (critical) raw material. The tweets are also shared at blogs at the GeoERA web page under the Raw Materials Theme page. In total, 68 tweets/blogs were issued.

3 WP2: UPDATE TO ELECTRONIC MINERALS YEARBOOK

3.1 Work progress:

In the period from January 2020 to October 2021, the final data sets were collected, compiled and delivered for the e-MYB. An online survey was designed and conducted during this period to gather resources, reserves and exploration data. Data providers were also able to enter production data if they wanted to.

Following correspondence between BGS, GeoZS and GEUS, production data for 2017-2018 was made ready for electronic transfer, and similar data for 2019 was finalised, checked through BGS's internal quality control procedures and finally made ready for the electronic transfer. Trade data for 2017-2018 were purchased, quality checked and prepared for electronic transfer. Production and trade data were delivered to GEUS in early month 39, the delivery of these data was slightly delayed on the BGS side due to internal scheduling issues for the data delivery.

The online survey was closed in month 36. Mineral resources and reserve data were provided by 17 countries and exploration data were provided by 7 countries. Following extraction of the survey data by GeoZS, an in depth, iterative process of data quality assessment data quality control was conducted by BGS and GeoZS between months 37 and 39. The final data set was delivered to GeoZS in month 39.

Data are visualised on the MINTELL4EU map viewer hosted by EGDI, and a corresponding meta-dataset has been created at the EGDI metadata base. The e-MYB data are covered by a CC-BY-NC-SA license.

3.2 Deliverables

D2.1 (Report describing the processes developed for updating the electronic European Minerals Yearbook) describes the data and the methodology for data collection for production, trade, resources, reserves and exploration. It outlines issues and challenges and how these were addressed.

3.3 Communication and dissemination

The e-MYB has been presented at GeoKarlsruhe 2021 and EGU 2021.

3.4 Remaining challenges

Not all data providers were able to provide updated information on their resources and reserves. Data providers also provided data in different formats (CRIRSCO-compliant non-compliant, nation reporting and UNFC) and as such doesn't enable us to have a unified resource value for Europe for any one commodity, however, the increased uptake in UNFC was encouraging.

4 WP3: MINERALS INVENTORY

4.1 Work progress

In the period from January 2020 to October 2021, the increased spatial coverage of the Minerals Inventory has been fully implemented with data from Western Balkan countries in cooperation with the RESEERVE project, from Luxembourg, and with data from one German State (Baden-Württemberg). Besides, contact has recently been established to Kosovo that would also like to add their data to MIN4EU. This work will continue after the end of MINTELL4EU.

By the end of October 2021, 36 data providers covering 31 European countries provide data to MIN4EU. Of these 36, 18 have implemented a data service while 13 have filled in an Access template developed for this purpose, and a data service was created and hosted by GeoZS or GEUS to allow these data to be collected (harvested) together with the other 18 data services. Data for the remaining five data providers are datasets collected in the Minerals4EU project which have been transferred to the MIN4EU database. These are datasets from three countries that were partners in Minerals4EU but not in MINTELL4EU (The Netherlands (TNO), Romania (GIR) and Switzerland (SWISSTOPO)) as well as datasets from two MINTELL4EU partners (Greece (HSMGE) and France (BRGM)) that did not succeed in updating and upgrading their national datasets to MIN4EU as expected (see chapter 4.4). For these five countries, dedicated 'services' were created for a previous version of the database (1.1.2) and data from these services have been transferred to 'countries referential databases'. This allows their old data to be included in MIN4EU DB meaning that no data services are available for the latest version (v.2020.08) for these countries) via harvesting. After October 2021 only the v 2020.08 will be harvested continuously.

The database structure has been updated and the e-MYB integrated into the database. Code lists (commodity type, UNFC types etc.) have been updated and harmonised between the two datasets.

Besides, existing data providers have updated or modified their data. Related to the tasks mentioned above, a harvesting system for collecting and validating mineral occurrence data has been created. On top of this, improved access to technical routines intervening during the harvesting phase has been implemented to enable rigorous control of the data quality. Besides, a MINTELL4EU Quality Control Application (QCA) was developed enabling data providers to visually check their latest reported data.

Data from the central database MIN4EU are visualised at the MINTELL4EU map viewer hosted by EGDI, and a metadataset *MIN4EU harmonized dataset - "Minerals Inventory"* has been created in the EGDI metadata base. The Minerals Inventory data are downloadable and covered by a CC-BY license, however, with one exception as the Polish data are covered by a CC-BY-NC-ND license.

A specific task in WP3 focused on historic mine sites with touristic components. More partners than expected contributed to this tasks, and almost 500 sites can be accessed at a map at EGDI covering most of Europe. More information is available when selecting individual sites by clicking on them. The sites are also presented on a 'Story map' and in a 'Coffee table book' under production at the Geological Survey of Ireland.

4.2 Deliverables

D3.1v2 (Mineral Inventory Report version 2) is a report describing how the data collection for the Minerals Inventory has developed (e.g., spatial coverage) during the last 25 months, how the database has been developed, and how the data providers have contributed. Challenges and possible future improvements are also described.

D3.3 (Quality control system for harvesting report) describes the existing harvesting quality control system, and how it is developed to check the mapping of national data on mineral resources to the MIN4EU DB (v2020.08.02). It describes interactive tools which were developed to support data providers in performing data quality control of their data after each harvesting.

D3.4 (Historic tourist mines GIS) describes how the historic mine sites were collected and how the maps have been generated.

4.3 Communication and dissemination

The Minerals Inventory and/or the historic mine sites task has been presented at GeoUtrecht 2020, at GeoKarlsruhe 2021, EGU 2020 and 2021 as well as at a JRC RMIS workshop in 2020, and at an EIT Expert Forum

A dedicated workshop on how to update national or regional datasets was organised as an online event in October 2020 building on experiences from the REESERVE project and from guidelines developed by the ORAMA project.

Due to the complex system of collecting data, the network of technical staff working with the harvesting of national data as well as national minerals expert is extremely important to ensure long-lasting sustainability of data, collected in the MIN4EU database.

4.4 Remaining challenges

Two MINTELL4EU partners did not succeed in updating their national datasets to the MIN4EU as expected. These are HSMGE (Greece) that did not accomplish in identifying an external part to help the in-house IT department with this task, and BRGM (France) that has identified the required software to publish the web services as incompatible with its new IT urbanisation. Both partners have emphasized that the datasets collected under Minerals4EU are to a very large extent still valid. Therefore, these datasets have been transferred into MIN4EU.

Even though the whole consortium has worked to enhance harmonization on RM data across Europe, some challenges on e.g., a common understanding of code lists still exists. It is suggested that the work on this will continue in the CSA GSE.

5 WP4: UNFC PILOT

5.1 Work progress

In the period from January 2020 to October 2021,19 case studies have been performed on a range of commodities (metals, industrial minerals, on- and offshore aggregates, natural stone) and at different levels (national, regional and site level). The first results and a selection of case studies was presented in an online workshop 29 October 2020. Advantages as well as the challenges by using UNFC were also discussed. Partners in MINTELL4EU, also outside WP4, participated in the workshop. In addition to identification of advantages and challenges the need to work on visualisation of UNFC was also raised.
After the workshop and until June 2021 all partners finalized their case studies. The case studies were reviewed by NGU and GTK and resulted in two reports; A case study review giving the current status, key challenges and recommendations on applying UNFC (D4.1) and a report addressing the challenges and harmonization issues identified in the case studies (D4.2)
As recommended from the workshop in October 2020, it was decided to work on visualisation of UNFC and it was agreed that GTK should do this. A proposal on how UNFC can be visualised in EDGI was prepared and was discussed with GEUS and NGU. The proposal was also sent out to all MINTELL4EU WP4 partners for comments. The proposal on visualisation of UNFC is delivered as an appendix to D4.3.

5.2 Deliverables

D4.1 (Case study review with guidance and examples for applying the UNFC to European mineral resources) gives an overview of the case studies and how they performed by the induvial partners participating in this task. The deliverable also gives guidance on how to apply UNFC. The case studies themselves are available in an Appendix (UNFC pilot case studies compiled as part of MINTELL4EU WP4).

D4.2 (Report on harmonization issues, data gaps and challenges, reviewing also the quality of Pan-European aggregated inventories for selected commodities) describes harmonization issues, data gaps and challenges, reviewing also the quality of Pan-European aggregated inventories for selected commodities.

D4.3 (Supply data to WP2, 3 and 5 for inclusion into resource databases and information systems) is not a report but more a kind of milestone, but it was decided to issue this deliverable with an Appendix (GTK's proposal for visualisation of UNFC) describing how UNFC could be visualised.

5.3 Communication and dissemination

The UNFC pilot in MINTELL4EU has been presented at several occasions e.g., at two UNECE UNFC events, Raw Materials Week 2018, EGU 2021, and at GeoKarlsruhe 2021. The work will also be introduced at the Raw Materials Week in November 2021.

A workshop on the case studies was organised as an online event in October 2020 where some of the case studies were presented and discussed.

Finally, a paper on one of the national case studies has been submitted to the journal "Resources Policy".

5.4 Remaining challenges

The work in WP4 as such has proceeded as expected and highlighted some challenges in implementing the UNFC on European Raw Materials. The reports described the current status of UNFC on Raw Materials in Europe and have made recommendations for further efforts on this issue which is expected to be elaborated in the CSA GSE to follow GeoERA, and where a Centre of Excellence on UNFC in Europe is suggested.

6 WP5: IMPROVEMENT OF KDPS' APPLICATIONS AND INTERACTION WITH THE RMIS AND THE GEOERA INFORMATION PLATFORM

6.1 Work progress

In the period from January 2020 to October 2021, most work in this work package has been on the visualization of data from the MIN4EU database at the EGDI Portal.

Another important task was the cooperation with the Raw Materials Group of the Joint Research Centre on how the Raw Materials Information System (RMIS) can interact with MIN4EU. After a number of beneficial meetings and some suggestions from MINTELL4EU's side, a solution was reached where RMIS links to the MIN4EU viewer at two separate pages: the Resilience, Autonomy, Security-of-Supply, & Criticality and Raw Materials' Profiles. The linkage ensures that the maps will always show the same data as at EGDI.

6.2 Deliverables

This WP has produced a number of deliverables describing how the work should proceed during the project as well as afterwards.

D5.3.2 (Integration of the e-Minerals Yearbook into the MIN4EU database) describes how the Minerals Inventory and e-MYB have been merged into one single database as defined in D5.3.1.

D5.4 (Review and data exchange prototype(s)) is a short description of the outcome of the cooperation between JRC, GeoZS, and GEUS on the interaction between MIN4EU and RMIS.

D5.5 (Review and application delivery prototype(s)) describes an API for communication and interaction between RMIS and MIN4EU.

D5.6 (Review and dedicated search prototype) presents the development of a search API enabling RMIS to perform targeted searches in other raw materials databases.

After the completion of deliverable D5.5 and 5.6, it became clear that such APIs cannot be enabled in RMIS for the time being. Instead, as described above, dialogue about alternative solutions to facilitate the visibility/dissemination of up-to-date mineral resource data and information through the RMIS web portal was initiated, and another solution was found.

D5.7.2 (Report and testing of integration into the Information Platform) describes the process of testing the data integration and how the data are displayed at EGDI.

6.3 Dissemination and communication

This WP has not had specific dissemination and communication activities in terms of individual presentation of the work at conferences or meetings, but the work has been included in general MINTELL4EU presentations. However, the work done to make data available and visible at EGDI as well as exploitations carried out to find a way to share data with RMIS count as important dissemination and communication activities.

6.4 Remaining challenges

The possibilities to develop further automated harvesting routines for e-MYB statistical data should be considered. Technically, this has already been tested and is feasible, but there are a number of content related issues to be addressed first, e.g. the frequency of new data at national level (which varies from country to country), harmonisation of classification methods, a revision of the commodity codelist in the MIN4EU database for collecting statistical data (e-MYB). See D5.3.2 for the current status on this issue.

7 OVERALL CONCLUSIONS

In general, MINTELL4EU has succeeded in its ambitions to:

- Updated the e-MYB and integrate it into the central database MIN4EU;
- Increased the spatial coverage and harmonization of the Minerals Inventory, including harmonization of code lists (e.g., between the e-MYB and the Inventory) and updating the data base model, resulting in the new central database MIN4EU;
- Test UNFC on a number of different commodities and at different scales across Europe, identifying strengths and challenges in implementing this classification methods to raw material in Europe;
- Map and integrate data into EGDI, developing user friendly and targeted maps, and sharing data with all interested users and other related portals as RMIS and EPOS.

Remaining challenges:

- The spatial coverage across Europe on resources and reserves data could definitely be increased.
- Further harmonisation of resources and reserves data regarding classification codes is required to get a unified resource value for Europe per commodity.
- 'Old' data from the Minerals4EU project have been reused and integrated into MIN4EU for two partners who did not update their RM data as expected and also for further three data providers that were not a part of MINTELL4EU.
- A full coverage of Europe (EU) has been requested by DG GROW. This would require that data are shared with MIN4EU by the three Baltic countries, Bulgaria and Malta as well as the remaining 15 of 16 German states.
- A common understanding of code lists still needs to be addressed.
- The maintenance of the network of minerals experts as well as IT staff is crucial to ensure consistent updating of MIN4EU.
- The implementation of the UNFC system on Raw Materials has been demonstrated still to be in its infancy in Europe and the need for a Centre of Excellence on this is of large importance to ensure Pan-European harmonised assessment of minerals resources at commodity level.
- The possibilities to further automatise harvesting of data types in the future, e.g. for the e-MYB should be explored.
- There are still potentials in designing maps targeted at specific stakeholder groups based on communication with such groups.

It is suggested that these challenges will be addressed in the CSA GSE expected to follow the GeoERA programme.

Table 1: Project meetings in the period 1 January 2020 to 31 October 2021, all online

What	Character	When	Where	Who (participants)
PB meeting #15	Online	10 Jan. 2020	-	All WP leads, some partners, EGS
PB meeting #16	Online	14 Feb. 2020	-	All WP leads, some partners
PB meeting #17	Online	24 Mar. 2020	-	All WP leads, TC, some partners
PB meeting #18	Online	24 April 2020	-	All WP leads, some partners
PB meeting #19	Online	29 May 2020	-	All WP leads, TC, some partners
PB meeting #20	Online	26 June 2020	-	All WP leads, some partners
PB meeting #21	Online	28 Aug. 2020	-	All WP leads, some partners
PB meeting #22	Online	25 Sep. 2020	-	All WP leads, TC, some partners
PB meeting #23	Online	28 Oct. 2020	-	All WP leads, 17 partners (b2b with online PA meeting)
Project Assembly #3	Online	28 Oct. 2020	-	All WP leads, 20 partners (b2b with online PB meeting)
PB meeting #24	Online	27 Nov. 2020	-	All WP leads, TC, some partners
PB meeting #25	Online	18 Dec. 2020	-	All WP leads, some partners
PB meeting #26	Online	29 Jan. 2021	-	All WP leads, some partners
PB meeting #27	Online	26 Feb. 2021	-	All WP leads, some partners
PB meeting #28	Online	26 Mar. 2021	-	All WP leads, TC, some partners
PB meeting #29	Online	5 May 2021	-	All WP leads, some partners
PB meeting #30	Online	28 May 2021	-	All WP leads, some partners
PB meeting #31	Online	25 June 2021	-	All WP leads
PB meeting #32	Online	27 Aug. 2021	-	All WP leads, some partners
PB meeting #33	Online	24 Sep. 2021	-	All WP leads, some partners
PB meeting #34	Online	22 Oct. 2021	-	All WP leads
Project Assembly #4	Online	29 Oct. 2021	-	16 of 27 partners participated

Table 2: Deliverables in the period 1 January 2020 to 31 October 2021

No	Title	Responsible partner	Authors	Delivered
D1.3 Final	Project management report	GEUS	Lisbeth Flindt Jørgensen (GEUS), Eimear Deady (BGS), Špela Kumelj (GeoZS), Kari A Aasly (NGU), Marc Urvois (BRGM), Mikael Pedersen, Frands Schjøth & Jørgen Tulstrup (all GEUS).	Month 40
D1.5	Roadmap for future actions towards full sustainability	GEUS	Lisbeth Flindt Jørgensen & Jørgen Tulstrup (GEUS), Eimear Deady (BGS), Špela Kumelj (GeoZS), Kari A Aasly (NGU), Marc Urvois (BRGM) & Mikael Pedersen (GEUS)	Month 40
D2.1	Report describing the processes developed for updating the electronic European Minerals Yearbook	BGS	Eimear Deady (BGS)	Month 40
D3.1 Final	Minerals Inventory Report	GeoZS	Špela Kumelj, Blaž Bahar, Andrej Vihtelič & Katarina Hribernik (all GeoZS), Frands Schjøth, Tjerk Heirboer & David Whitehead (all GEUS)	Month 40
D3.3	Quality control system for harvesting report	GeoZS	Blaž Bahar, Špela Kumelj & Andrej Vihtelič (all GeoZS)	Month 40
D3.4	GIS database layer illustrating relevant historic mine features	GSI	Eoin McGrath & Tim Workman (GSI)	Month 40
D4.1	Case study review with guidance and examples for applying the UNFC to European mineral resources	NGU	Mark U. Simoni & Kari A Aasly (NGU), Pasi Eilu (GTK) & Frands Schjøth (GEUS)	Month 40
D4.1 App.	Appendix: UNFC pilot case studies compiled as part of MINTELL4EU WP4	NGU	Kari A Aasly (NGU) et al	Month 40
D4.2	Report on harmonization issues, data gaps and challenges, reviewing also the quality of Pan-European aggregated inventories for selected commodities	GTK	Janne Hokka & Pasi Eilu (GTK), Frands Schjøth (GEUS) & Kari A Aasly (NGU)	Month 40
D4.3	Supply data to WP2, 3 and 5 for inclusion into the e-MYB,	GTK	Lisbeth Flindt Jørgensen (GEUS) & Kari A Aasly (NGU)	Month 40

	resource database and information system,			
D4.3 App.	Appendix: GTK's proposal for visualisation of UNFC	GTK	Taina Eloranta (GTK)	Month 40
D5.3.2	Integration of the e-Minerals Year-book into the MIN4EU database	GeoZS	Špela Kumelj & Blaž Bahar (GeoZS), Frands Schjøth & Tjerk Heijboer (GEUS) & Eimear Deady (BGS)	Month 39
D5.4	Review and data exchange prototype(s)	GeoZS	Špela Kumelj (GeoZS), Lisbeth Flindt Jørgensen & Christian Brogaard Pedersen (GEUS)	Month 40
D5.5	KDP's applications delivery to RMIS: note accompanying the release of the 'ProSUM' API	BRGM	Daniel Cassard & Francois Tertre (BRGM)	Month 32
D5.6	Dedicated search in KDPs from RMIS: note accompanying the release of the 'OpenSearch' API	BRGM	Daniel Cassard, Jean Goncalves & Francois Tertre (all BRGM)	
D5.7.2	Report on testing of integration into EGDI	GEUS	David Whitehead, Tjerk Heijboer, Christian Brogaard Pedersen & Frands Schjøth (all GEUS)	M40

Table 3: Main (external) communication & dissemination activities, month 1–18 with italics, month 19-40 in bold

What	When	Where	Character	Title	Presented/prepared by
GeoERA Kick-off Meeting	*2-4 July 2018*	*Brussels, Belgium*	*Poster*	*MINTELL4EU*	*Špela Kumelj (GeoZS), Lisbeth Flindt Jørgensen (GEUS)*
Raw Materials Week	*18 Nov. 2018*	*Brussels, Belgium*	*Poster*	*MINTELL4EU*	*Jasna Sinigoj (GeoZS)*
GeoMünster	*25 Sept. 2019*	*Münster, Germany*	*Poster*	*GeoERA RM projects*	*Antje Wittenberg (BGR)*
ORAMA 2nd project progress meeting	*8 Nov. 2018*	*Ljubljana, Slovenia*	*Oral pres.*	*MINTELL4EU*	*Špela Kumelj (GeoZS)*
Raw Materials Week	*16 Nov. 2018*	*Brussels, Belgium*	*Oral pres.*	*UNFC??*	*Kari A Aasly (NGU)*
RESEERVE workshop	*18 Feb. 2019*	*Ljubljana, Slovenia*	*Oral pres.*	*MINTELL4EU, inter-actions with RESEERVE and ORAMA*	*Špela Kumelj (GeoZS)*
ORAMA & JRC RMIS Joint Workshop	*13 June 2019*	*Ispra, Italy*	*Oral pres.*	*MINTELL4EU*	*Henrik Schiellerup (NGU)*
5th Slovenian INSPIRE day	*15 Nov. 2019*	*Ljubljana, Slovenia*	*Oral pres.*	*MINTELL4EU*	*Špela Kumelj (GeoZS)*
Raw Materials Week	*22 Nov. 2019*	*Brussels, Belgium*	*Oral pres.*	*GeoERA RM projects*	*Antje Wittenberg (BGR)*
ORAMA event at RMW 2019	*22 Nov. 2019*	*Brussels, Belgium*	*Oral pres.*	*MINTELL4EU*	*Jørgen Tulstrup (GEUS)*
EIT Raw Materials	**21 Jan. 2020**	**Leoben, Austria**	**Oral pres.**	**Mineral Intelligence for Europe? Where we are, where we are going**	**Špela Kumelj & Jasna Šinigoj (GeoZS)**
EGU 2020 session ERE1.2: GeoERA: Towards integrated European geoscience services for today's and future generations	**8 May 2020**	**Online**	**3 abstracts**	**GeoERA RM projects and RM, MINTELL4EU, Minerals Inventory**	**Antje Wittenberg (BGR), David Whitehead & Lisbeth Flindt Jørgensen (GEUS), Špela Kumelj, (GeoZS)**
GeoUtrecht session on Raw Materials and their	**25 Aug. 2020**	**Online**	**4 oral pres. +abstracts**	**Raw materials, Tourism at Historic**	**Antje Wittenberg (BGR), Eoin McGrath (GSI), Lisbeth Flindt**

Societal relevance for Europe				**mine sites, Minerals Inventory, UNFC**	**Jørgensen (GEUS), Zoltán Horváth (MBFSZ)**
UNECE: UNFC Europe: Ensuring sustainable raw material management to support the European Green Deal	**19 Nov. 2020**	**Online**	**4 oral pres.**	**UNFC case studies**	**Zoltán Horváth (MBFSZ), Janja Solberg & Håvard Gautneb (NGU), Pasi Eilu (GTK), Erika Ingvald (SGU)**
EC DG-JRC / EASME Technical Workshop: "Channelling knowledge from European projects into the Raw Materials Information System (RMIS)"	**3 Dec 2020**	**Online**	**Oral pres.**	**GeoERA – Raw Materials**	**Špela Kumelj (GeoZS) &/ Lisbeth Flindt Jørgensen (GEUS)**
Norwegian Geological Winter Meeting	**6-8 Jan. 2021**	**Online**	**Abstract**	**UNFC: Towards a harmonised inventory for European mineral resources**	**Kari A Aasly, Henrik Schiellerup &Tom Heldal (NGU)**
EGU 2021 session ERE1.2: GeoERA: Developing integrated geoscience services to address European resource supply and management challenges	**29 April 2021**	**Online**	**3 oral pres. + abstracts**	**GeoERA RM projects, MIN4EU, UNFC pilot**	**Antje Wittenberg (BGR), Lisbeth Flindt Jørgensen (GEUS), Kari A Aasly (NGU)**
EU/EGS booth at the PDAC 2021 Virtual Convention	**8-11 March 2021**	**Online**	**Presentation**	Mineral Intelligence for Europe	**Lisbeth Flindt Jørgensen (GEUS)**
UNECE Resource Management Week 2021: Workshop: UNFC in action: Progress	**30 April 2021**	**Online**	**8 oral pres.**	**UNFC pilot in MINTELL4EU / GeoERA RM**	**Zoltán Horváth & Gábor Kovács (MBFSZ), Daniel Oliveira (LNEG), Antje Wittenberg (BGR), Tom Bide (BGS), Kari A Aasly (NGU), Erika**

towards a modern view on integrated resource management					**Ingvald (SGU), Pasi Eilu & Janne Hokka (GTK), Sebastian Pfleiderer (GBA)**
GeoKarlsruhe	**22 Sept. 2021**	**Online**	**5 oral pres. + abstract**	**MINTELL4EU, eMYB, Minerals Inventory, UNFC pilots**	**Lisbeth Flindt Jørgensen, Frands Schjøth, Jørgen Tulstrup & Mikael Pedersen (GEUS), Eimear Deady (BGS), Špela Kumelj, Andrej Vihtelič, Blaž Bahar & Katarina Hribernik (GeoZS), Kari A Aasly & Mark Simoni (NGU), Marc Urvois (BRGM), Janne Hokka & Pasi Eilu (GTK)**
Revija MINERAL (in Slovenian only)	*28 Sept. 2018*	*Slovenia*	*Publication*	*Non-scientific article*	*Špela Kumelj & Jasna Sinigoj (GeoZS)*
Mineral Resources in Slovenia (in Slovenian only)	*Oct. 2018*	*Slovenia*	*Publication*	*Non-scientific article*	*Špela Kumelj & Jasna Sinigoj (GeoZS)*
MINTELL4EU flyer	*Nov. 2019*	*For general use*	*Publication*	*Flyer*	*Lisbeth Flindt Jørgensen (GEUS)*
Bulleting Mineral Resources in Slovenia (year 2020)	**Sept. 2020**	**Slovenia**	**Publication**	**Non-scientific article**	**Špela Kumelj, Jasna Šinigoj & Duška Rokavec (GeoZS)**
GeoERA Raw Materials to support Europe's resilience on raw materials	**Febr. 2021**	**SGA news no. 48, p6-10**	**Publication**	**Scientific paper**	**Antje Wittenberg (BGR), Daniel Oliveira (LNEG), Lisbeth Flindt Jorgensen (GEUS), F. Javier Gonzalez (IGME), Tom Heldal (NGU)**
UNFC test Austria	**Oct. 2021 (submitted)**	**Resources Policy**	**Publication**	**Scientific paper**	**Sebastian Pfleiderer (GBA)**