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

Technical review report for project EuroLithos

This report is part of a project that has received funding by the European Union's Horizon 2020 research and innovation programme under grant agreement number 731166.

INTRODUCTION

Technical review report is part of GeoERA's Monitoring and evaluation process for co-funded projects (*hereinafter: project*). The aim of a technical review is to assess the work carried out under the project over a certain period and provide recommendations. Such technical review evaluates the project reports and deliverables, the proper use of resources, the management of the project and the expected impact.

Technical review report consists of four sections, each representing one level of monitoring and/or evaluation of the project:

Level	Monitor / Reviewer	Input	Aim
1 – Monitoring of progress indicators	Monitoring and reporting officer (GeoZS)	MPPR* FPPR**	Monitoring of the effectiveness of implementation of selected projects with respect to finance, time and administration.
2 – Scientific review	Reviewers (GeoZS)	Submitted deliverables MPPR FPPR	Quality review of the deliverables and review of achieving scientific and professional goals.
3 – Review of the theme progress	Theme coordinators	MPPR FPPR	Review of achieving theme objectives.
4 – GeoERA Progress evaluation	Stakeholder Council member(s)	Sections 1 and 2 of this report Review meetings	Overall project progress and general recommendations.

*MPPR = Midterm Project Progress Report (see PI doc no 2)
**FPPR = Final Project Progress Report (see PI doc no 2)

Monitoring and evaluation process:

M0 = End of reporting period
M1 = Submitted (Final) Project progress Report (MPPR / FPPR)
M2 = 1 – Monitoring & 2 – Evaluation
M3 = 3 – Evaluation of the theme progress
M3 = (Final) Review Meeting & 4 – Progress evaluation

Each project will be reviewed twice: for first project period M1-M18 – Technical review report, and second project period M19-M36 – Final review report.
Technical review report is based on Horizon 2020 templates but adopted to GeoERA needs. Technical reviews of projects shall be carried out on a confidential basis.

GENERAL INFORMATION

ERA-NET Cofund Grant Agreement:	731166
ERA-NET Cofund acronym:	GeoERA
Call identifier:	H2020-LCE-2016-2017/H2020-LCE-2016-ERA
Project full title:	Eruopean Ornamental stone resources
Project acronym:	EuroLithos
Project reference number:	GeoE.171.017
Project topic:	Raw Materials
Project specific topic:	RM2B-Natural stone
Lead partner:	NGU Norges Geologiske undersokelse (Geological Survey of Norway)
Project website:	https://geoera.eu/projects/eurolithos1/

☐ Technical review report
☒ Final review report

Period covered	01/01/2020 – 31/10/2021
Review meeting date	24.11.2021 at 13:30

Contributor:	Role:	Approved on:
Barbara Simić	Monitoring and reporting officer	25.11.2021
Aleksandra Trenchovska	Monitoring and reporting officer	26.11.2021
Gorazd Žibret	Scientific reviewer	1.12.2021
Jasna Šinigoj	Scientific reviewer	29.11.2021
Matija Krivic	Scientific reviewer	29.11.2021
Antje Wittenberg	Theme coordinator	1.12.2021
Björn Schouenborg	GeoERA Stakeholder	30.12.2021
Angela Ehling	GeoERA Stakeholder	26.11.2021

1 LEVEL 1 – MONITORING OF PROGRESS INDICATORS

In this section the project is monitored "remotely" on the basis of the respective reports. This part is filled in by Monitoring and reporting officer with aim to monitor the effectiveness of implementation of the selected projects with respect to finance, time and administration, based on submited MPPR and FPPR.

	Yes	Partially (comment needed)	No
PROJECT MANAGEMENT			
Has the MPPR / FPPR report been submitted on time?	☒	See comment no. 1	☐
Have there been any changes in project partnership?	☒	See comment no. 2	☐
Has the project management been performed as required?	☐	See comment no. 3	☐
Has the collaboration between partners been effective?	☒		☐
Do you identify evidence of underperforming partners, lack of commitment or change of interest of any partners?	☐ (see comment)		☒
DELIVERABLES and MILESTONES			
Have the planned deliverables for the period been submitted on time according to timeline in Project Agreement?	☐	See comment no. 4	☒
Have the planned deliverables for the period been completed (from MPPR / FPPR, sheet 4)	☐	See comment no. 5	☒
Have any changes to deliverables occurred (type/ dissemination level)? (from MPPR / FPPR, sheet 4 and 5)	☒		☐
Have planned milestones been achieved for the reporting period? (from MPPR / FPPR, sheet 4)	☒		☐
Have the project partnership identify any difficulties achieving any of the deliverables / milestones?	☒		☐
DEVIATIONS (from MPPR / FPPR, sheet 5)			
Has the project partnership identify any deviations that will not affect projects outputs?	☒		☐
Have any deviations occur on the project, with impact on project outputs?	☐		☒

In case of deviations, have the project adopted corrective measures?	☒		☐
DISSEMINATION, COMMUNICATION			
Has the project adopted its dissemination plan?	☐		☒
Have the planned dissemination activities been completed for the reporting period? (from MPPR / FPPR, sheet 6)	☒		☐
Have the partners' disseminated project results and information adequately?	☒		☐
Is the project following dissemination plan?	☒		☐
Is the project interacting in a satisfactory manner with other GeoERA projects?	☒		☐
Is the project interacting in a satisfactory manner with national/international bodies?	☐	NA	☐

FINANCE			
To the best of your estimate, have the resources used been utilised for achieving the project? (according to MPPR / FPPR, sheet 9)	☒		☐
To the best of your estimate, have the resources used been in a manner consisted with the principle of economy, efficiency and effectiveness? *	☒		☐
Are there any major deviations in the budget consumptions from the financial plan? (zero consumption in M18; deviation from plan exceeding 20% in M36)	☒	See comment no. 6	☐
Are there any major deviations in the Person - Months consumptions from the plan? (zero consumption in M18; deviation from plan exceeding 20% in M36)	☒		☐
Are any budget modifications for the project needed? (from MPPR / FPPR, sheet 5)	☐		☒

***The principles of economy, efficiency and effectiveness**: refers to the standard of "good housekeeping" in spending public money effectively. Economy can be understood as minimizing the costs of resources used for an activity (input), having regard to the appropriate quality and can be linked to efficiency, which is the relationship between the outputs and the resources used to produce them. Effectiveness is concerned with measuring the extent to which the objectives have been achieved and the relationship between the intended impact and the actual impact of an activity. Cost effectiveness means the relationship between project costs and outcomes, expressed as costs per unit of outcome achieved.

Comments (highlighting the project progress) / deviations / recommendations:

EuroLithos was founded on the idea that increased knowledge of the geology, quality and history of use of natural stone in Europe will stimulate both more sustainable use of stone resources in Europe for the benefit of SME's and our cultural heritage, and a sound land use management for the safeguarding of ornamental stone deposits. The main challenge the project dealt with, was providing harmonized ornamental stone information platform, documentation, databases and recommendations covering the most important aspects of natural stone resources in Europe; partly, by feeding existing solutions, and partly by adding new ones. The challenge has been broken down into 9 project objectives, which have been achieved. The basis for inventory map is established, nevertheless, additional work is still ahead of this project, demanding further involvement of Lead partner by annual update of the data and map itself.

The Covid-19 epidemic had an impact on the course of EuroLithos project. In December 2020 the project has been prolonged by 4 months, from 30.6.2021 until 31.10.2021. The postponed project activities have been adequately communicated to the GeoERA Executive board, which has reviewed and approved the changes with regards to achieving project results. Detailed list of changes is part of the project documentation in the Project plan History of changes.

The project management structure was well defined. The pandemic situation reduced the collaboration of the partnership with its stakeholders and other GeoERA projects, resulting in unsolvable INSPIRE problems and challenges about standards and content of data infrastructure. This affected the end results by one deliverable not being finished and some deliverables not achieving the demanded quality. On the other hand, Ornamental stone map, with 1219 unique stone types from the partner countries, and 375 integrated links to directory reports, case studies, enlightening different aspects of ornamental stone resources in different countries, and 7 atlases is an achievement this project has introduced and for which we expect the impact is yet to be seen. Case studies and atlases will also be published in a scientific volume. The collaboration between partners was good, the project did not identify any underperforming partners that could affect the quality of the project outputs.

Overall, the project budget has been spent as planned. During project implementation some partners have modified their total budget as a response to external changes, overall partners GBA, GSI, IGME-SP / CSIS and NGU have increased their budgets, and partners GEOINFORM and GSD have decreased it.

Comment no. 1: The Final Project Progress Report was submitted on time in draft form. Partners still have a chance to recalculate their financials until the end of calendar year to include the final data, so minor deviations can be expected. The changes will not affect the projects content.

Comment no. 2: At the beginning of the projet, partner Regione Toscana withdrew from the GeoERA. During the implementation of the project, two partnership changes occurred: partner 3 IGME-Gr Institute of Geology and Mineral Exploration has renamed to partner HSGME Hellenic Survey of Geology and Mineral Exploration. Later, Project lead IGME-Sp Geological Survey of Spain has been integrated into CSIC Agencia Estatal Consejo Superior de Investigaciones Científicas. At the end of reporting period 1, the project partner GEOINFORM State Research and Development Enterprise State Information Geological Fund of Ukraine ended its activities and did not participate in the second period. None of the changes above has impacted project's ability to reach its goals and results.

Comment no. 3: Due to some project delays and not finished deliverables at the time of the review meeting, we cannot tick the project management has performed as required. The partnership as a whole has achieved its expected objectives and results, the Project lead has shown great knowledge of this field of work and dedication to the project, yet the pandemic toll has been paid in the deliverables delay. To achieve the required quality, the project is given a chance to upgrade its deliverables.

Comment no. 4: Due to the pandemic situation, some activities were delayed, and deliverables had to be submitted later than planned. The changes in the deliverable dates were communicated with the Monitoring team and the GeoERA Secretariat by amending the project plan.

The deliverable changes in the project implementation period are:

Reporting period 1:
D2.1 postponed from M6 (31.12.2018) → M9 (31.3.2019)
D2.2 postponed from M6 (31.12.2018) → M39 (30.9.2021), the 6 deliverables (newsletters) were combined in one deliverable with 6 newsletters at the end of the project.
D6.1 postponed from M6 (31.12.2018) → M9 (31.3.2019)

Reporting period 2:
D3.2 postponed from M18 (31.12.2019) → M27 (31.10.2020)
D6.3 postponed from M24 (30.6.2021) → M30 (31.12.2020)
D1.6 postponed from M36 (30.6.2021) → M40 (31.10.2021)
D2.2 postponed from M36 (30.6.2021) → M40 (31.10.2021)
D2.3 postponed from M36 (30.6.2021) → M40 (31.10.2021)
D3.3 postponed from M36 (30.6.2021) → M40 (31.10.2021)
D4.1 postponed from M36 (30.6.2021) → M40 (31.10.2021)
D4.2 postponed from M36 (30.6.2021) → M40 (31.10.2021)
D5.2 postponed from M36 (30.6.2021) → M40 (31.10.2021)
D5.3 postponed from M36 (30.6.2021) → M40 (31.10.2021)

D5.4 postponed from M36 (30.6.2021) → M40 (31.10.2021)
D1.7 postponed from M36 (30.6.2021) → M42 (31.01.2022)
D2.4 postponed from M36 (30.6.2021) → M43 (28.2.2022)

Comment no. 5: One deliverable, D6.2 Evaluation of IP prototypes, will not be delivered. Te partnership identified difficulties to do the work before this autmn, they went straight to harvesting.

Comment no. 6: Some project partners spent 20% more than their planned budget, others spent less than 80%. The partners that have exceeded their budget are GBA and IGME-SP / CSIS. Partners that spent less than their planned budget are HSGME and SGL. The consumption of man-months followed the EUR consumption.

The project has coped with the negative external factors and has overcome its challenges in such a way that it has achieved its planned objectives. But an important deliverable has not been finished and project need extra time for quality upgrade. For this reason, the project is rated as "good" at level 1 and thus receives a rating of 3.

Overall assessment of the project:

☐ 5 - **Overachiever** (the project has achieved all objectives and goals for the period and has even exceeded expectations)
☐ 4 - **Excellent progress** (the project has fully achieved its objectives and goals for the period)
☒ 3 - **Good progress** (the project has achieved most of its objectives and goals for the period with relatively minor deviations)
☐ 2 - **Acceptable progress** (the project has achieved some of its objectives)
☐ 1 - **Unsatisfactory progress** (the project has failed to achieve critical objectives)

Summary of dissemination activities:

	SCIENTIFIC COMMUNITY	GENERAL PUBLIC	POLICY MAKERS	EUROPEAN INSTITUTION	NATIONAL INSTITUTION	REGIONAL INSTITUTION	INTERNATIONAL INSTITUTION	LOCAL INSTITUTION	PRIVATE COMPANIES	OTHER	Total number of people reach
EVENTS	51750	535	110	10	32	23	64	2	510		**53036**
MEETINGS		265000									**265000**
ONLINE_MEDIA	429	6			1	55	1	1	4	6	**503**
PUBLICATIONS	10320	15615	950	910	1010		300		900	21000	**51005**
MEDIA	10650	4650	1000	970	1090	190	50	100	1000	100	**19800**
Total	73149	285806	2060	1890	2133	268	415	103	2414	21106	389344

	ABSTRACTS	CONGRESS	FACEBOOK	INTERNAL PROJECT MEETING	MAGAZINE	MEETING	MEETING WITH OTHER GEOERA PROJECTS	MEETING WITH OTHER PROJECTS	NEWSLETTER	NON SCIENTIFIC PUBLICATION	OTHER	POSTER	RADIO, TV	SCIENTIFIC PUBLICATION	SEMINAR	TWITER	WEBINAR	WEBSITE	WORKSHOP	YOUTUBE	Total
EVENTS		11													3		3		2		19
MEDIA					1								2								3
MEETINGS				7		6	6	1			2										22
ONLINE_MEDIA			109								1					158		13		1	282
PUBLICATIONS	1								5	10	1	2		11							30
Total	**1**	**11**	**109**	**7**	**1**	**6**	**6**	**1**	**5**	**10**	**4**	**2**	**2**	**11**	**3**	**158**	**3**	**13**	**2**	**1**	**356**

Are the dissemination activities adequate?

☒ 5 - **Overachieved** (the projects dissemination activities have exceeded expectations)

☐ 4 - **Excellent** (the projects dissemination activities have fully achieved its expectations)

☐ 3 - **Good** (the projects dissemination activities are adequate)

☐ 2 - **Acceptable** (the projects dissemination activities are acceptable)

☐ 1 - **Unsatisfactory** (the project has failed to disseminate)

Cummulative financial statement:

	Person months	**Total eligible costs**	**Reimbursement rate**	**GeoERA contribution**	**In-kind contribution**
Plan	**164,16**	**1.104.649,56**	**29,7**	**328.080,94**	**776.568,62**
1st period consumption	74,14	432.022,54	29,7	128.310,69	303.711,85
2nd period consumtion	120,57	661.485,11	29,7	196.461,08	465.024,03
TOTAL	**194,71**	**1.093.507,65**	**29,7**	**324.771,77**	**768.735,88**

2 LEVEL 2 – SCIENTIFIC REVIEW

In this section the project is reviewed ”remotely” on the basis of the respective reports. This part is filled in by reviewer with aim to review the quality of the deliverables and review of achieving scientific and professional goals. Scientific review is based on submitted deliverables and reported Impact statement in MPPR/FPPR.

Impact statement (from MPPR / FPPR, sheet 8):

“Improved knowledge-sharing across Europe through a common understanding of Europe’s raw material sources and an increased understanding of Europe's construction raw material deposits”: Eurolithos has developed a common platform for sharing knowledge in a harmonized way across Europe. The combination of min4EU harvesting from national databases, the unique stone maps and the directory collectively make the start of a system that can continue to grow after the project end. Partners and other countries can continue to upload stone type “ID-cards” to the directory, or upload new versions without loosing links. NGU will regularly upgrade and republish map for at least the next five years. We believe this is the first real attempt of creating a solid knowledge platform on ornamental stone. “Contribution to environmental friendly raw materials production”: by providing the information infrastructure on ornamental stone, Eurolithos will hopefully stimulate more use of locally/regionally sourced stone in a European market. The highest CO2 emissions regarding stone is related to transport, and future regulations will necessarily turn more focus towards European sources. We believe that Eurolithos came at the right time, and that this knowledge platform will continue to grow and become more and more used. Eurolithos also provides tools in the shape of guidelines that can be applied for better and more sustainable management of such resources. “Provision of relevant information for the construction sector (including architectural and cultural heritage preservation) facilitating the conservation of Europe’s national monuments, protected structures and the built environment in general”: Eurolithos is the start of a comprehensive knowledge system, containing key information about traditional stone types, also those of mostly historical interest, and will so far represent the best tool for this sector. The guidelines and case studies will also be of help.

Expected impact (from Project Agreement):

Impacts described in the RM2 scope: 11 Improved knowledge-sharing across Europe through a common understanding of Europe’s raw material sources and an increased understanding of Europe's construction raw material deposits as a prerequisite to supplying Europe's construction raw material needs By lifting knowledge from national to European levels, and providing solutions for harmonised and comparable data, the project will improve cross-European knowledge sharing. Accompanied by guidelines the project will also contribute to a common understanding of European

natural stone resources, their value and significance, and create a platform for further development. When it comes to European supply, natural stone is not among the critical raw materials, and theoretically, Europe may survive well by using concrete and imported stone for future construction. However, a lot of values will be lost on the way, heritage, crafts and traditions. “Raw material needs” is not just a quantitative measure, regarding stone it is primarily qualitative. For a community, the closure of the last local stone quarry may be critical enough, causing loss of both heritage values and economic development. Contribution to environmentally friendly raw materials production Key factors of importance to the environmental performance of natural stone production are transport and energy consumption. Since the project seeks to provide methods and information that can facilitate the process of including other aspects than price in, for example, tenders, it will be of benefit to regional and local stone industries. This will imply that such SMEs’ can strengthen their market position, particularly in the rural areas of Europe. The project will in this respect provide tools for the SME’s themselves (i.e. historical importance of their stone, their craft) and to the decision makers (using heritage values and/or geological information more actively in tenders). It is our view that these factors will stimulate a higher awareness of local and regional sources of stone, and consequently, reduce transport distances. The project will not directly target energy consumption in natural stone production, but indirectly, we will claim that the upgrading of values related to local/regional sources and craft, contributes to improving the conditions for SMEs’, and in general, small companies use smaller machines and more craft than big ones. Provision of relevant information for the construction sector (including architectural and cultural heritage preservation) facilitating the conservation of Europe’s national monuments, protected structures and the built environment in general The project will make the world easier for those that are in charge of Europe’s built heritage, and for those who want to develop business from that. It will not only provide information and guidelines on how to find and employ authentic sources, but also facilitate the search for alternatively “matching” sources in case the former is not available. Stimulation of the consolidation of the cooperation and communication between national/regional subsurface organizations and European stakeholders that deal with spatial planning in relation to Energy, Mining and Urban Areas One of the main focuses of the project is the spatial distribution of geological formations of importance to our built heritage. This alone will provide tools for spatial planning, where the weighing of significance for different land use is crucial. Moreover, a valorisation tool for the intrinsic value of quarries and quarry landscapes we believe is equally useful. 12 Other main impacts the project will create a framework and an information platform that will meet many of the requirements that a future GI for non-agricultural products will bring. Thus, the project will facilitate the implementation of EC work on this task.

Evaluation of deliverables

No.	Title	Status (Approve/ Reject)	Comments
D1.4	Project review meeting presentation 1	Approved	See comment below
This deliverable presents a comprehensive and clear description of work done within M0-M18.			
D1.5	Cumulative expenditures report 3	Approved	By Level 1
D1.6	Final project progress report	Approved	By Level 1
D1.7	Project review meeting presentation 2	Approved	
D2.3	Printed atlases	Approved	See comment below
I believe this is the core deliverable of the project. Only electronic version of atlas was available, and some partner countries did not contribute to this deliverable.			
D2.4	Scientific volume		The final version of this deliverable was not available for me at the time of review.
D3.2	Country and European-level Atlas templates	Approved	See comment below
This deliverable brings the foundations for Atlas, which will be delivered in two parts: as mapviewer (as part of EGDI) and as printed book. Standardization of terms and codes is a welcome approach and very useful, deliverable presents a comprehensive list of commercial names of ornamental stones, update for Minerals4EU database code list and establishing link to INSPIRE are useful. However, I have 2 comments: - I wonder why standardized color charts were not used for color determination; - Technical parameters, like abrasion index, resistance to freezing, compressive and other strengths, specific weight etc. are not mentioned in D3.2, but atlas contains them. Is this intentional, or an error?			
D3.3	Country-level atlases	Approved	See comment below
This deliverable presents a nice overview of ornamental stones in EUROLITHOS partner countries, as well as detailed factsheets for selected ornamental stones with photographs, mineralogical, petrological and physical characteristics. Unfortunately, I couldn't find on-line GIS database on the EGDI portal at the time of preparing this review. Here are some observations: - I wonder why there are no factsheets from Croatia, Ireland, Luxembourg, Romania, Sweden, UK and Ukraine, despite there are localities listed, and very few ones for Italy.			

- My recommendation would be to add all of the factsheets to the D3.3 master file as appendix (or at least attached excel table), because no link to the EGDI dataset is provided. - Clicking on hyperlinks on page 7 returns "HTTP Status 404 – Not Found" - A link to quarry operator where this tone is extracted would be extremely beneficial and useful! - I suggest merging the appendix (Excel file) as annex of this deliverable. - It shall be stated that mineralogical, chemical and physical characteristics in atlas are only indicative, because of natural variations in the rock formation (vertical and lateral). Alternative way is to provide possible range of values (if available).			
D4.1	Working version of the directory containing information from selected countries	Approved	
D4.2	Guideline for using the Directory	Approved	
D5.1	Case study collection	Approved	See comment below
D5.1 presents a short description of case studies. Some (but not all) detailed reports can be found on EuroLithos web page, some are still missing. I suggest to merge all the reports into single D5.1 pdf file as appendix. The case studies are very useful, however, I couldn't find the information about how this material (text, data, graphics) can be used further on. An example of citation can be added (valid also for other deliverables).			
D5.2	Best practices and guideline: How to assess values of stone types, quarries and quarry landscapes	Approved	See comment below
D5.2-D5.4 delivers an overview of the most important aspects of dimension stone quarrying evaluation beside its economic values. It refers to the various case studies, presented in D5.1. However, some analysis of the results is missing. I suggest adding (time- and resources-wisely) the generally valid findings from this case studies (similarities, dissimilarities), and lessons learnt - something condensed the reader can remember after reading this document, without the need to look at individual case studies.			
D5.3	Best practices and guideline: How to do inventories of links between stone resources and built heritage	Approved	See comment above
D5.4	Best practices and guideline: how to approach crafts for value assessments	Approved	See comment above

D6.1	Definitions and requirements for the IP	Approved	See comment below
D6.1 presents the quick overview of the key ornamental stone evaluation parameters, including commercial name, color, petrography, composition, various important physico-chemical properties etc., which are used to prepare other deliverables, like atlas and GIS platform.			
D6.2	Evaluation of IP prototypes	Not delivered	
D6.3	Application of UNFC for ornamental stone resources	Approved	See comment below
D6.3 presents a case study for using UNFEC classification for ornamental stone. This is welcome and very useful addition to the project results.			

Has the quality as a whole been achieved according to the objectives? Has the project as a whole been making satisfactory progress?

☐ 5 - **Overachiever** (the project has achieved all objectives and goals for the period and has even exceeded expectations)

☒ 4 - **Excellent progress** (the project has fully achieved its objectives and goals for the period)

☐ 3 - **Good progress** (the project has achieved most of its objectives and goals for the period with relatively minor deviations)

☐ 2 - **Acceptable progress** (the project has achieved some of its objectives)

☐ 1 - **Unsatisfactory progress** (the project has failed to achieve critical objectives)

Comments (highlighting the project progress) / deviations / recommendations:

Eurolithos is one of the few international projects dedicated to the natural stone. this sector is underrated in the EU, although it provides high added value (compared to other construction materials) and jobs, building material and contribute to the cultural and landscaping identity of a specific region in the Europe. So in such way, Eurolitos paved the way for possible future international collaborative projects in that area. There could be three core outputs recognized: the atlas (with the individual stone's factsheets), case studies and data collection (available in the form of clickable maps). In my opinion the atlas is woth exposing in a very positive manner. It is pity it is not available as a single pdf file (or printed book!), because links can be broken, mapviewers obsolete or not available etc.

Although there are still significant data gaps (geographical), where even not all Eurolithos partner countries are evenly covered, I think that the deliverables can be a good and solid starting ground to fill these gaps in the future. The results as are they

at the moment can be very useful, especially for the architects, civil engineering sector, interior and landscape designers etc. I hope that the word about Eurolithos reached this target group. Geologists and experts from other fields of earth sciences can also benefit from Eurolithos results, because the project provides a comprehensive set of information about natural stones.

In my opinion the goals of the project have been achieved in satisfactory manner. Especial credits go to NGU, which is willing to support the project also after the funding period expires, to all WP leaders and partners in this project. I personally really wish that more international projects from this topic are funded in the future.

D2.1 project web page is simple, but it serves its purpose well. Few suggestions:
- there is no information what the permissions are to use provided materials and photos,
- pdf files for some case studies are missing (no. 6, 7 and 12),
- links to all mapviewers (EGDI and GeoEra) shall be added to the first page,
- when you click on D4.1-2 it returns D3.3!
- not all deliverables are available.
- please synchronize case studies with the actual work done (project agreement stated 6, 9 was done, web page mentioned 12 case studies)
- the user is a bit lost between all different kinds of data and deliverables, which topic overlaps.

These comments are related to Eurolithos GIS results (GeoERA web page and EGDI):
- it is pity that there are still large gaps in data
- topographic background map would be useful
- very few information available by clicking on specific dot, at least geographic coordinates shall be listed, perhaps information about stone provider?
- it is not clear whether there are active or abandoned quarries (or both)
- it looks like it is still some sort of "beta" version
- why there are prospects only in Czech Republic
- I suggest color coding of the data points, according to the designated stone color (i.e. white stones are represented by white dot etc.)

D2.2 Newsletters are useful tool for project results dissemination and awareness rising.

D4.1-D4.2 provides a template for ornamental stone factsheets from D3.3

3 LEVEL 3 – REVIEW OF THE THEME PROGRESS

In this section the project is reviewed ”remotely” on the basis of the respective reports. This part is filled in by Theme coordinator with aim to review the achieved scientific goals in accordance with theme objectives, on the basis of Sheet 3 in MPPR / FPPR – Project contribution to GeoERA project.

Project contribution to GeoERA project (from MPPR / FPPR, sheet 3):

EuroLithos: European Ornamental stone resource is a pioneer project that looks beyond obvious economic aspects associated with primary raw materials and Critical Raw Materials (CRM) especially. Several facets are addressed which deal with an improved exchange of knowledge across Europe through a common understanding of the European raw material sources and a better understanding of the European mineral deposits and for which the results are made available, i.e.:

1) Develop inventories in conjunction with the Information Platform (i.e. contribution to the IP central database etc., propose and deliver standardized spatial information tailored for Natural Stone resources to the EGDI).

Results: EuroLithos has delivered 1219 unique European ornamental stone resources in partner countries with basic characteristics in shape of a map to EGDI.

2) Information of Europe's exploitation sites and prospective areas of ornamental stone deposits and provide a visualization which can be used for land-use planning (i.e. by country and regional case studies […] and in close liaison with H2020 projects MINATURA2020 and MinLand.

Results: Spatial distribution of ornamental stone resources partly available through Min4EU, partly by EuroLithos directory (non-structured delineation of resources).

3) Explore the applicability and interoperability of standard codes among partners for harmonised reporting of resources (i.e. case study).

Results: EuroLithos delivered a case study to the Mintell4EU project on UNFC (D6.3).

4) Ensure data coherence within a given raw material and among GeoERA partner countries (ISPIRE compliant) (i.e. EN standards, INSPIRE, guideline for data description and coherence for natural stone).

Results: Existing INPIRE standards were assessed and evaluated regarding “fit for purpose”. In conclusion INPIRE standards are not satisfactory meeting the need to describe a natural stone properly nor in harmony with EN12440. Hence, existing standards are adopted on the short term, proposals of change and a guideline for translating data are provided.

5) Provide appropriate input to SRT RM1 (i.e. *guideline for input of spatial data, and demonstrate through data delivery for selected partner countries).*

Results: deliveries to EGDI has been provided with guidelines.

6) Provide advice on how forecasting for the demand of these materials can be improved so that policy formulation and government resource management can be enhanced and capital investment by industry can be prioritised.

Results: For natural stone, such generic forecast studies will have little impact at this stage of common EU policies. Instead, EuroLithos provide advice on how government

authorities can improve their resource management through collaboration through a more holistic view, i.e. for improving both heritage management and SME conditions. Guidelines are provided on how to valorise and evaluate non-economic values.
7) Provide readily accessible information and easy to use decision making tools for the public and local authorities, respectively.
Results: Guidelines and best practices for different aspects of importance to natural stone management provided aimed at raising the interest and awareness of natural stone production, history and use.

Theme objectives:

GeoERA Raw Materials Theme objectives are defined by the Grant Societal Challenges identified by the European Union and the UNSDG and outlined theme specifically by the Raw Materials Initiative, derived policies (i.e. COM(2008) 699 final; COM(2011) 25 final), and in particular:

- *the security and sustainability of mineral raw materials supply from EU domestic sources and other sources (primary and secondary) and*
- *the management of competing uses of the European surface and subsurface*.

The overarching goal "Improvement of EU raw material resilience" is key to all GeoERA RM projects, whilst the scientific projects are focussing on specific facets of the challenge. Whiles the EC gives focus to the CRM GeoERA Raw Materials followed a wider approach considering the high importance of mineral raw materials for our society. Eurolithos shows through the work on natural stones their importance for our cultural heritage, our jobs, our wealth and our identity as Europeans.

Eurolithos adds to the predefined main goals of GeoERA RM *"Extending, deepening, upgrading the quality of the pan-European primary and secondary continental and marine resources inventory"* particularly by providing e.g. case studies, the atlas and details on natural stone properties in. The goal "*Implementation of innovative and efficient approaches throughout the mineral raw materials value chain, with the aim of optimizing the use and management of the resources, while minimizing negative environmental, health and societal impacts*" is approached by valorisation of natural stone and the show cases in relation to cultural heritages and local identity of workers and residence. The provided show cases as well as the atlas respond well to the gaol of "*Performing pilot studies supporting exploration and development of mineral raw materials"*. N.B.: The fourth goal *"Updating contributions to and augmenting the coverage of the Annual Minerals Yearbook published by the Minerals4EU project*" is addressed specifically by MINTELL4EU. However, Eurolithos findings may contribute to an updated version in future.

Interoperability of data, exchange of knowledge within GeoERA and beyond, and improving the level of understanding through science on the society are part of the conducted work. Within the GeoERA that has been realised mainly within the Theme and in particular in close collaboration with MINTELL4EU to improve

Europe's raw materials inventory and to visualise the information on the webserver well supported by GIP-P.
Eurolithos has meet the designated objectives of GeoERA Raw Materials and those defined within the project. Eurolithos has meet the designated objectives of GeoERA Raw Materials and those defined within the project, but stronger bonds to stakeholder groups where expected.

Has the project as a whole achieved the objectives and expected impact of the theme?

☐ 5 - **Overachiever** (the project has achieved greater impact on project theme and/or other themes than expected)
☐ 4 - **Excellent progress** (the project has fully achieved its objectives and goals towards the theme as expected)
☒ 3 - **Good progress** (the project has achieved most of its impact towards the theme for the period with relatively minor deviations)
☐ 2 - **Acceptable progress** (the project has minor impact)
☐ 1 - **Unsatisfactory progress** (the project has failed to achieve critical objectives and/or has no impact on the theme)

Comments / deviations / recommendations:

EuroLithos shows how important it is to work across narrow boundaries of predefined political objectives. As a pioneering project, EuroLithos has to master major challenges in terms of standardization and harmonization of data and information. The long tradition in the use of natural stone by various trades and for a wide variety of applications has also led to specific norms and standards that cannot currently be translated in accordance with INSPIRE. The lack of appropriate INSPIRE terminology and the need to find solutions to bridge from widely used EN standards to INSPIRE conform terminology could not be solved to full satisfaction by EuroLithos as it goes beyond their responsibility. However, recommendations to overcome those identified bottlenecks, suggestions on the terminology and on bridging documents should be provided via the European Commission to the relevant and mandated working groups. With that EuroLithos fulfils a general request of the European Commission.

The different addressees of the Eurolithos products range from small and medium-sized craftsmen to architects and restorers to political decision-makers at local and international level. Further steps are required to ensure adequate access to the data and information for the addressee. The data accessibility via EGDI AND via the EuroLithos homepage should be expanded in close cooperation with the interest groups.
The willingness of the team to work on the quality, quantity and availability of the information for the next five years is much appreciated. Maintaining data availability

and regular updates are central to sustain the work and to improve constantly the knowledge base.

4 LEVEL 4 – GEOERA PROGRESS EVALUATION

In this section the project is reviewed on the Review meetings, where projects present their overall progress and achievements. This section relates to particular project, broader impact of GeoERA as a whole on policies will be covered at the Final Review meeting with questionnaire and interview with Evaluator.

Based on technical review summaries provided by Sections 1 – 3 of this report, and project presentation on the (Final) Review meeting:

Has the project as a whole been making satisfactory progress according to your own understanding and expectations of the GeoERA project?

☐ 5 - **Overachiever** (the project has exceeded expectations)
☐ 4 - **Excellent progress** (as expected)
☒ 3 - **Good progress** (minor recommendations given below)
☐ 2 - **Acceptable progress** (below expectations)
☐ 1 - **Unsatisfactory progress** (the project did not meet expectations)

Overall comments for the project (overall recommendations, modifications, corrective actions, or re-tuning the objectives to optimize the impact or keep up with the State of the Art, re-focusing, or a simple praise)

Stakeholder 1 review:

With natural stone occurrences, the project focused on a sector that had not previously been dealt with in this complexity within the framework of georesources in Europe. That's why it pioneered the field, even though only 16 countries were involved. The time frame was quite short.
Nonetheless, the goals were broad with the groundwork to standardize terminology and harmonize data input. This includes not only the different data of the individual countries, but in the case of natural stones must not only satisfy the scientific requirement, but also take into account commercial, socio-ecological and cultural-historical (monument conservation) aspects. The results show that all this had been considered. They did a really good fundamental work.

I agree with all the main comments which had been made by the reviewers.

I would like to make brief comments or recommendations on the following points:

- Terminology: I prefer “Natural Stones” instead of “Ornamental Stones”

- presentation of the results: The results are presented as deliverables at the webpage of Eurolithos and in the form of two maps at the GeoERA- and the EGDI-webpages. It is presented due to the workpackages of the project. As I understand it, this project should be seen as a pilot project and the basis for involving all European countries. For this goal it is necessary to make the important results (standards, guidelines, template) immediately and clearly visible on the webpage in order to keep the access hurdle for interested partners from other countries as low as possible. At the moment you have to really search for them within the deliverables.

- atlas: just now there are two maps at different webpages – that is a bit confusing – there should be links to both at the starting page of the Eurolithos-webpage to them with a short explanation.

- atlas: the countries that provided data show how informative this maps could be. The number of countries is still far too small, even in this project

- atlas: the data are a bit inconsistent from country to country; the most annoying is when the rock names are missing

- atlas: Is it still planned to add geology to the maps?

Finally, I would like to congratulate the project participants on their results. It is important that this project is continued by the further implementation of data also from other countries. The important information for this must be found quickly and clearly on the webpage - and/or on the GeoERA information platform. The natural stone industry should be even more involved (EUROROC), as it has both a strong interest and financial means to provide the appropriate data. A link with the IUGS initiative on Heritage Stones and its national activities can also bring input

Stakeholder 2 review:

At the time of the review meeting on 24th November, several deliverables were not entirely completed and downloading from the Website not fully functional. On the 20th I received a mail with the information about the update of several deliverables. I have therefore included these in my review.

I am a bit ambiguous between giving the score 3 or 4. Score 3 is for the project as a whole taken into account some very ambitious goals, especially concerning outreach and usefulness for specific stakeholders. To my knowledge, the project has not succeeded in delivering this and the main stakeholders have not been engaged to a satisfactory extent, the stone industries and federations as such. One of the most important groups of buyers of natural stone are the cities/municipalities. To my knowledge, they have not been incorporated or approached during the project. How,

they will benefit from the project is still unclear. Similarly, major owners of buildings where natural stone is used have not been contacted.

The second criticism is the choice of the expression Ornamental stones. The properly used and acknowledged expression is Natural stones, an expression also used in the European standardization, e.g. CEN TC 246 Natural stones. The use of ornamental stones provide an ambiguous understanding leading to sculptures and ornaments in contradiction to the main use which is for building and infrastructural purposes. Natural stones is all that. This is more important than merely a personal statement from one reviewer. Natural stones in Europe competes with other building products like Paving stone of concrete and bricks, Façade cladding of concrete, ceramics, glass, metal, Floor covering of ceramic tiles, Roofing materials etc. If a buyer of e.g. flooring tiles shall be led into the possibility of using stone instead of ceramics etc, the buyer has, according to the project, to look for ornamental stones. This is very wrong and a draw back of the project goals to reach a larger community of natural stone users.

From the final statement on the Website's "About", I see there is still hope!

4.1 ENGAGING in partnerships with GeoEra members to provide a harmonised natural stone information platform for the European community

In the context of the GeoEra partnership, the best way of contributing to meet the objectives
is a natural stone information platform, providing documentation, databases and recommendations covering the most important aspects of natural stone resources in Europe;
partly, by feeding existing solutions, and partly by adding new ones.

Enough of complaints! **The deliverables are really useful, a very good work instruction existing, primarily national, information and making it searchable on a broader, European level. The information compiled by the project also have a high potential in attracting interest to the natural stone area by several stakeholder groups such as students, geologists, geological surveys in general land use planers and local authorities, heritage authorities and politicians. It highlights the importance of natural stones through the ages, not only in ancient times but also in modern time.** Please consider additional means of packaging and disseminating the information. Use the stone industries and federations and start with EUROROC (HOME | Euroroc). Universities etc could also be approached.

The concepts of Life Cycle Analysis (LCA) and Environmental Product Declaration (EPD) are extremely important for the natural stone industry to survive in a sustainable society also in a circular economy due to the great reusability of especially paving stones. The LCA of natural stone has been mapped in several countries and the great advantage in comparison to "competing" building products have been validated every

time. LCA and EPD have been mentioned in presentations but I can't find it in any deliverable. It would be most usable to provide such information! It is the key to "Sustainable ornamental stone production" as mentioned in para. 9 Deliverable 5.1! I recommend that one part of 5.2 – 4 can be dedicated to climate impact.

Details:
Please check all deliverables for abbreviations that are not evident for the stakeholders and explain as early as possible, e.g:

D6.2 IP prototypes
First line on page 1: EGDI

In deliverable 5.2 – 5.4, page 8 you refer to Global Heritage Stone Resource (GHSR) and a website which will be closed. I have contacted the new chairman of the Commission on Geoheritage and asked about the future of the GHSR concept (I was the previous chairman).

Point by point comment related to the objectives:

1. Framework
As the description emphasize, the present inventories are fragmented. The largest and most comprehensive of them all is INSK (Internationale Natursteinkartei). However, this is not reachable online and not updated for several years. Eurolithos provides a very good platform for the purpose. Some of the vocabulary is evidently chosen more from a geological point of view compared to the natural stone industry/market vocabulary. Please consider this for future updates/revisions.

2. Database
As far as I understand the database has just begun and the most important part is building a template and providing good examples. Still some work on harmonizing the input, but no major work. The template is good. Some of the input needs better quality assurance and traceability information. It is not completely clear how the Eurolithos database will "collaborate" with national databases.

3. Atlas
Not yet completed
The relationship with EGDI has to be better explained and more visible.

4. Value
Valorizing natural stones, both from a historical point of view and in modern society is extremely important for the industry to survive and both needs to be connected. This is also done in the project and many good examples have been provided.

Deliverable D3.3 is really nice although some of the main links to the different national atlases do not work – Check all! When following the links, I'd like to comment on the importance of providing proper references to the physical properties! It is not clear from where and when they are "taken" which is very important information from the stakeholder point of view. There are also some other links within the document itself that doesn't work, e.g. page 39 for Italy and the last link. Hm… the same with the others.

Anyway, the template is very good and the existing/reachable atlases very well structured. As mentioned above, you may consider to add one, please consider adding one part for future compilation of LCA and EPD data.

5. Outreach

As mentioned before the outreach to all mentioned stakeholders could be better and I am willing to assist since I think the results should be spread as much as possible and I have been working closely with both the industry and cites and major building owners for more than 30 years. In some cases, it can be considered to prepare dedicated information leaflets on certain stone types in a simpler and more market oriented way. Please also consider renaming several of the deliverables in the same direction regardless of what you have called them in your proposal. The titles should be interesting and useful for the stakeholders.

I want to thank the project team for including me in the discussion and congratulate you to a very good project with plenty useful deliverables! I also urge you to continue the work and include more natural stone types, more countries and initiate a closer collaboration with stakeholders outside the geological surveys which can benefit largely from the information.
Congratulations!

Annex 1: Review meeting list of participants

Name	Function	Beneficiary
Joop Hasselman	GeoERA coordinator	Netherlands Organisation for Applied Scientific Research
Björn Schouenborg	GeoERA Stakeholder	RISE Research institutes of Sweden
Angela Ehling	GeoERA Stakeholder	Federal Institute for Geosciences and Natural Resources, Germany
Antje Wittenberg	Raw Materials Theme coordinator	Federal Institute for Geosciences and Natural Resources, Germany
Barbara Simić	Monitoring and Reporting Officer	Geological Survey of Slovenia
Aleksandra Trenchovska	Monitoring and Reporting Officer	Geological Survey of Slovenia
Gorazd Žibret	Scientific reviewer	Geological Survey of Slovenia
Jasna Šinigoj	Monitoring and Reporting Officer – data management	Geological Survey of Slovenia
Matija Krivic	Monitoring and Reporting Officer – data management	Geological Survey of Slovenia
Tom Heldal	EuroLithos Project manager	Geological Survey of Norway
Cyprien Habimana	Project member	Geological Survey of Norway
Jorge Carvalho	Project member	The National Laboratory of Energy and Geology
Angeliki Arapakou	Project member	Hellenic Survey of Geology and Mineral Exploration
Anne Liinama Dehls	Project member	Geological Survey of Norway
Željko Dedić	Project member	Croatian Geological Survey