



EMPOWERING  
UNDERGROUND  
LABORATORIES  
NETWORK USAGE

# Empowering Underground Laboratories network usage

**Scientific Dissemination Report**

**2022**

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 **Interreg**  
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## WP4 Task A4.3

The aim of the sub-WP 4.3 was the outreach for target groups through scientific events for collaboration and contribution with scientists who are interested in using ULs for their scientific research - (potential customers of Underground laboratories of EUL (post-BSUIN) network (private & companies, academic institutions, think-tanks (NGOs) and wider society).

The goal of this sub-WP was to test outreach strategies through dissemination for target groups at scientific events. The main aim was to find workable strategies for how to reach the scientific audience. EUL members have been participated in scientific events and introduced the European Underground Laboratories Association and underground laboratories, their possibilities, and services to the scientific audience and to the mining community.

The target of this sub-WP 4.3 was to visit at least 3 of these types of events.

### List of Scientific events

During the year 2021 EUL participated in 9 separate scientific events (mostly online):

1) EGU2021, EGU General Assembly 2021, <https://www.egu21.eu/> – EUL and related topics were presented with vPICO presentations (April 29 and 30, 2021). Approximately 50 participants in the session.

The program and abstracts are available on EGU website: [https://meetingorganizer.copernicus.org/EGU21/session/40950#vPICO\\_presentations](https://meetingorganizer.copernicus.org/EGU21/session/40950#vPICO_presentations) and [https://meetingorganizer.copernicus.org/EGU21/session/40956#vPICO\\_presentations](https://meetingorganizer.copernicus.org/EGU21/session/40956#vPICO_presentations).

Materials still available on the EGU website:

- European Underground Laboratories Association EUL – An International Partner for Underground Research Opportunities - Helmut Mischo, Krzysztof Fuławka, and Jari Joutsenvaara.
- The MINETRAIN project: Lifelong Learning opportunities for mining industry related professionals in real-life underground mining conditions; Dealing with the aftermath of two innovative pilot courses - George Barakos, Kirsi Luolavirta, Jari Joutsenvaara, Saija Luukkanen, Hannah Julia Puputti, and Helmut Mischo.
- Abandoned mine after-use as a museum and research site - Vesta Kaljuste, Erik Väli, and Andrus Paat
- 4) Characteristics of natural background radiation in selected underground laboratories BSUIN and EUL projects - Katarzyna Szkliniarz
- Minimal setup for neutron background measurements - summary of the BSUIN project - Karol Jedrzejczak, Jacek Szabelski, Marcin Kasztelan, Marika Przybylak, Przemysław Tokarski, Jerzy Orzechowski, and Włodzimierz Marszał.
- A geoscientific site descriptive model for the Äspö Hard Rock Laboratory, SE Sweden - J.Petersson et al.
- Empowering Underground Laboratories Network Usage in the Baltic Sea Region - Eija-Riitta Niinikoski and the team.
- From Earth and beyond – Callio Lab underground centre for Science and R&D - Julia Puputti, Jari Joutsenvaara, Ossi Kotavaara, Eija-Riitta Niinikoski.
- Finite Element Method-based geomechanical risk assessment of underground laboratory located in the deep copper mine - Krzysztof Fuławka, Witold Pytel, Piotr Mertuszka, Marcin Szumny

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vEGU21 has included 18,172 scientists from 135 countries, attending 13,643 live presentations in 642 scientific sessions. live session pages were loaded 200,901 times in total with a median of 141 virtual participants per session. The number of daily unique visitors to our conference was around 13,000. The authors uploaded 12,015 display materials alongside their abstracts, including 5,412 videos hosted on Vimeo.

2) 13th Conference “Man and Rock” in Sortavala and Kirjavalahi, May 21-22, 2021. Presentation by Petrov, P. and Yushko, A. about EUL project start. Total audience coverage over two days - up to 60 people. First day 12 people went with Pavel Petrov on an underground excursion to Ruskeala mining park and during second day up to 25 people went on an excursion along the eco-trails of the Mountain of Composers.

3) 9th International Conference on Radiation in Various Fields of Research, 14-18 June 2021, <https://www.rad2021.rad-conference.org/> . EUL participated with 2 online presentation: Jan Kisiel, Kinga Polaczek-Grelik, Agata Walencik-Łata, Katarzyna Szkliniarz “Underground laboratories in the Baltic Sea Region – EUL Project” and Katarzyna Szkliniarz, Kinga Polaczek-Grelik, Agata Walencik-Łata, Jan Kisiel “Measurements of natural background radiation in the underground laboratories of the BSUIN and EUL projects”. Outreach number was approx.. 120 live participants and 174 virtual participants. [Abstracts](#) are available on the RAD9 conference website - <https://www.rad-conference.org/books.php> .

4) International Cosmic Ray Conference (ICRC) 2021 - 37th International Cosmic Ray Conference, 12-23 July, online, <https://icrc2021.desy.de/> . EUL participated with 3 poster presentation. Materials are available on the website <https://pos.sissa.it/395>. Outreach: over 1000 people attended the ICRC conference (about 700 talks and 690 posters).

5) 17th International Conference on Topics in Astroparticle and Underground Physics (TAUP 2021), 26 August – 3 September 2021, <https://congresos.adeituv.es/TAUP2021/>. EUL participated with online presentation by Jari Joutsenvaara.

6) International Conference on Radiation Application, In Physics, Chemistry, Biology, Medical Sciences, Engineering and Environmental Sciences - online conference, 6-8 September 2021, <https://www.rap-conference.org/21/index.php> . EUL participated with 2 oral presentation on September 7, 2021. Outreach: 30 people reached live, about 100 people offline.

7) Silesian Science Festival, Poland, 9-15 October 2021, <https://us.edu.pl/en/event/5-slaski-festiwal-nauki-katowice/>. Szkliniarz, K. and Walencik, A. participated and presented a lecture on natural radioactivity and also mentioned the EUL project. Outreach: about 30 people attended the lecture. It was also broadcasted via YouTube - lecture has been seen by ~800 people.

8) TalTech participated at the FEM 2021 Conference, Boliden Online event on November 4, 2021, <https://femconference.fi/speakers-4-nov-2021/>. Veiko Karu from TalTech introduced EUL/UIs possibilities and services to the mining community. Outreach number during this session was approx. 504. The biannual [FEM Conference](#) - Fennoscandian Exploration and Mining Conference, founded in 1998 and brings together over thousand exploration and mining industry leaders, experts and researchers from over 30 countries. The event was also broadcasted via Youtube and the online session and the presentation is still available on official FEM Conference Youtube channel - [https://www.youtube.com/watch?v=HazhGPbD7yc&t=5806s&ab\\_channel=FEMConference](https://www.youtube.com/watch?v=HazhGPbD7yc&t=5806s&ab_channel=FEMConference) (total views 153).

9) TalTech participated at [Raw Materials Week satellite event](#) in person on November 23, 2021 in Porto, Portugal. Karin Robam made the presentation and also introduced as speaker EUL/UIs possibilities and services to the mining community. Outreach number was approx. 30, the event was also broadcasted via Youtube and the recording is still available on Youtube: [https://www.youtube.com/watch?v=JYkJkWIwj5o&t=6053s&ab\\_channel=MineHeritageEITRawMaterialsEuropeanProject](https://www.youtube.com/watch?v=JYkJkWIwj5o&t=6053s&ab_channel=MineHeritageEITRawMaterialsEuropeanProject) (total views 109).

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10) SEP - Biggest conference related to underground mining in Poland, 27-29 September 2021, <https://szkolaeksploatacji.pl/program/program-szkoly-szkola-2021/>. EUL project has been presented with oral presentation by KGHM CUPRUM R&D "Modification of drilling and blasting pattern for preparing of functional chambers with additional protection of the roof and walls in the conditions of the Lubin mine". Scope of presentation covered also spreading of information about European Underground Laboratories Association which should allow to establish new connections between companies and EUL association. This symposium which is present in Poland 30 years, gathers lots of participants interested in exploitation of mineral resources from many perspectives. There were representatives of mines e.g. KGHM, JSW, PGG and companies cooperating with mining industries such as ABB, IBM, Sandvic, Komatsu, Hitachi.

11) The Fifth International Symposium on Mine Safety Science and Engineering in Poland, 21-25 November 2021, [https://www.aconf.org/conf\\_173525.html](https://www.aconf.org/conf_173525.html). EUL project has been presented by KGHM CUPRUM R&D.

12) International ethnofestival "Land of Kalevala", October 1, 2021. EUL project has been presented. Presentation about the EUL project at the plenary session.

TalTech presented EUL at SANDVIK on December 16, 2021 in Tampere, Finland. During the visit TalTech introduced EUL and underground laboratories' possibilities and services. Also, Sandvik test mine was visited. The state-of-the-art Test Mine at our Tampere production unit provides real mine conditions for rapid prototype testing and quality assurance verification of underground equipment before customer delivery. During the visit the outreach and discussion with 12 people.

Unfortunately, the COVID19 situation didn't allow proper dissemination of the EUL project in the conferences in person, the conferences were mainly held online. Due to this reason most of EUL's participation and presentations were made online. It was a great success that EUL participated in the outreach activities via virtual tools in more conferences than was originally planned at the beginning of the project.

During the year 2021 EUL participated in 11 separate scientific events and also visited company named Sandvik Mining and Construction, in Tampere, Finland. Sandvik is an engineering group in mining and rock excavation, metal-cutting, and materials technology.

## List of Scientific publications

During the reporting period also 10 publications has been published and one more submitted in different journals:

1. K. Szkliniarz, A. Walencik-Łata, J. Kisiel, K. Polaczek-Grelik, K. Jędrzejczak, M. Kasztelan, J. Szabelski, J. Orzechowski, P. Tokarski, W. Marszał, M. Przybylak, K. Fuławka, S. Gola, Characteristics of Natural Background Radiation in the Polkowice-Sieroszowice Mine, Poland, *Energies* 14(14):4261, 2021, DOI: 10.3390/en14144261.
2. K. Szkliniarz, A. Walencik-Łata, J. Kisiel, K. Polaczek-Grelik, K. Jędrzejczak, M. Kasztelan, J. Szabelski, Characterization of natural radioactivity in the BSUIN and EUL underground laboratories based on the developed standard scheme, *Proceedings of 37th International Cosmic Ray Conference, PoS(ICRC2021)* 395, 517, 2021, DOI: 10.22323/1.395.0517.
3. M. Kasztelan, M. Kasztelan, T. Enqvist, K. Jędrzejczak, J. Joutsenvaara, O. Kotavaara, P. Kuusiniemi, K.K. Loo, J. Orzechowski, J. Puputti, A. Sobkow, M. Słupecki, J. Szabelski, I. Usoskin, W.H. Trzaska and T.E. Ward, High-multiplicity neutron events registered by NEMESIS experiment, *Proceedings of 37th International Cosmic Ray Conference, PoS(ICRC2021)* 395, 497, 2021, DOI: 10.22323/1.395.0497.

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4. K. Szkliniarz, Characteristics of natural background radiation at BSUIN and EUL Underground Laboratories, RAP CONFERENCE PROCEEDINGS 6, 44–47, 2021, DOI: 10.37392/RAPPROC.2021.09.
5. A. Walencik-Łata, K. Szkliniarz, J. Kisiel, K. Polaczek-Grelik, K. Jędrzejczak, M. Kasztelan, J. Szabelski, J. Orzechowski, P. Tokarski, W. Marszał, M. Przybylak, R. Hildebrandt, K. Fuławka, Characteristics of natural background radiation in the GIG Experimental Mine 'Barbara', Poland, Energies 2022, 15, 685. DOI: 10.3390/en15030685
6. K. Szkliniarz, Characteristics of the natural radioactivity of the underground laboratories in the Baltic Sea Region participating in the BSUIN and EUL projects – submitted to the journal, after approval for publication.
7. K. Pactwa, M. Konieczna-Fuławka, K. Fuławka, P. Aro, I. Jaśkiewicz-Proć, A. Kozłowska-Woszczycka. Second life of post-mining infrastructure in light of the circular economy and sustainable development – recent advances and perspectives. Energies journal - accepted for publication.
8. W. Pytel, K. Fuławka, B. Pałac-Walko, P. Mertuszka. Rock burst risk assessment and the usefulness of friction stabilizers in underground galleries. Minerals journal - publication under review.
9. Additional manuscript: Under preparation - it will be finished at the beginning of 2022. Geomechanical feasibility study of underground laboratory subjected to seismic load- case study from Polkowice-Sieroszowice mine, Poland. (Krzysztof Fuławka)
10. Additional manuscript: Under preparation -almost finished. Repurpose of underground workings for sustainable development – challenges and solutions. (Krzysztof Fuławka)