EU Interreg project: Baltic Sea Underground Innovation Network (BSUIN)

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Working together to improve the utilization level and the capacity for innovation of the underground laboratories in the Baltic Sea region.
Contents of the presentation

• Background
• Baltic Sea Underground Innovation Network
• Underground Laboratories
Rationale for forming the Baltic Sea Underground Innovation Network

**Background:** Underground Laboratories (ULs) have usually been constructed for mining, underground storing, tunnels for transportation or research. The underground facilities have been built for a specific use and are generally closed after ending the operation.

**Possibilities:** Laboratories, in ULs provide unique opportunities for using the underground research infrastructure for technical development with focus on innovation. By developing the service concepts, the underground laboratories can incubate new businesses and provide unique test and R&D environments for established companies.

**Suggestion:** In order to facilitate new and innovative use of underground facilities in the Baltic region the formation of a Baltic Sea Underground Innovation Network (BSUIN) was suggested.
Baltic Sea Underground Innovation Network

The BSUIN creates:

a) Coordination network for sharing expertise and best practices between the ULs

b) Community of commercial users of the Baltic Sea ULs to guide the development of the services and facilities of underground research infrastructures.

c) Service design for strengthening the capacity for Innovation and new business incubation

d) Joint marketing activities for the ULs and their users

e) Sharing of the procedures for technical characterization, administrative and safety routines between the ULs

f) Broaden the underground research and technical development possibilities and increase the selection of experimental and demonstration locations
The Baltic Sea Underground Innovation network
BSUIN fact box

• Interreg Baltic Sea Region project
  • Capacity for Innovation the thematic area is priority for research infrastructure

• Project duration
  Oct 1\textsuperscript{st} 2017 – Sep 30\textsuperscript{th} 2020

• 13 full partners and 18 associated organizations

• Total of 15 activities, project management and communication in five work packages

• Lead partner: University of Oulu, Kerttu Saalasti Institute
BSUIN partner laboratories
- Callio Lab, Pyhäsalmi mine, Finland
- Äspö Hard Rock Laboratory, Oskarshamn, Sweden
- TU-Freiberg’s Research and Education mine “Reiche Zeche”, Germany
- Conceptual Lab development coordinated by KGHM Cuprum R&D centre, Poland
- Ruskeala, Russia
- Underground Laboratory of Khlopin Institute, Russia

BSUIN Associated Underground Laboratories
- Experimental mine Barbara, Poland
- Hagerbach Test Gallery, Switzerland
Associated organizations
Why the BSUIN project is needed

Territorial challenges

Under-utilization BSR underground infrastructures
Several world class underground infrastructures in BSR (deep mines, specially constructed tunnels), maintained by organizationally quite small Underground Laboratories (ULs)

Innovations and growth of underground businesses through co-operation
The BSR Underground Laboratories and their users benefit from transnational co-operation to speed up the development of the ULs capabilities to serve industries, maintain high quality of the UL operations, and create new services and joint marketing efforts

Unique knowledge base
In BSR, there are world leading science organizations and industrial companies, specialized in geophysics, low background instrument manufacturing and underground construction

Territorial strengths

Vision & Aim

Create networking activities to gain Synergy benefits for development
efficient methodologies to standardize the characterization of the underground facilities for end users, improved and innovative service concepts to enable the more efficient use of BSR ULs as a “natural resource” and to save cost and effort by joint development and sharing of best practices, especially for safety and improving underground facilities as a working environment

wider visibility, shared cost, new innovation through cross-pollination
By creating networking activities for continuous development, joint marketing and branding, more efficient utilization of technical resources and expertise, bigger variety of improved services and easy access to customers

Project activities

WP1 Project Management and Administration

WP2 Characterization of Underground Labs

WP3 Service Design

WP4 Underground Environment Improvement

WP5 Networking of BSR Underground laboratories and their users

Project outcome

1. Characterization of ULs to create shared methodologies for the assessment of technical properties (geophysics, structural and background radiation properties) of the underground facilities and the operational and legal requirements for using the underground infrastructures

2. Service design of methodologies and new service concepts so that the outside users can better utilize the ULs and the facilities as a capacity for innovation

3. Facility development especially related to ergonomics, health and safety and visitor experience

4. Networking, branding and business development activities to reach global market, providing easier access and one-stop-shop approach to BSR underground facilities
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Wider visibility, shared cost, new innovation through cross-pollination
By creating networking activities for continuous development, joint marketing and branding, more efficient utilization of technical resources and expertise, bigger variety of improved services and easy access to customers.
# BSUIN Outcomes

## Project activities

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## Project Outcomes

1. **Characterization of ULs**: Each of the underground laboratories is unique in their geological, technical, managerial, service and legislative settings. Set of methodologies to characterize and to compare the ULs have been created.

2. **Service design**: They key services, partners and current market segments have been identified. New service concepts have been created so that the outside users can better utilize the ULs and the facilities as a capacity for innovation.

3. **Facility development**: As the key characteristics of each UL have been evaluated, placed on the same evaluation terms, the suggestions for facility development especially related to working environment, health and safety and visitor experience has been introduced.

4. **Networking, branding and business development activities**: One of the key items identified is the narrow customer segments and wider marketing of the ULs. The Innovation platform has been created to provide easier access and one-stop-shop approach to BSR underground facilities.
Co-creation provides resources, new opportunities and enhances innovations!

**Shared measurement equipment and systems**
- e.g. Gamma-spectrometer and analysis resources, site mapping

**Standards for technical characterization**
- e.g. Site Discription Model

**Joint marketing**
- e.g. Fairs and conferences, publications, LinkedIn, Facebook, Twitter, bsuin.eu

**Multi-disciplinary knowledge base**
- e.g. Geological, geophysical, structural

**Events and conferences**
- e.g. Organizing joint-events on underground science, education and technology: BSUIN roadshows

**Open innovation platform**
- UL characterisation, innovation and service design information for the clients to choose the optimal ULs for their needs.

**Collaboration projects**
From BSUIN to EUL:
European Underground Laboratories association

The BSUIN consortium is preparing to carry on the well-progressed work as the European Underground Laboratories association.

More in the following presentations.
The Underground Laboratories
Callio Lab, Finland

- **Status**: Operational
- **Location**: Callio Lab is located at 1,444m deep Pyhäselmi Mine in Finland. Mine is owned by FQML Ltd. Underground mining ending in 6/2021. Callio – Mine for Business operates the re-use facilities.
- **Rock type(s)**: granite bedrock surrounding massive volcanogenic sulfide deposit.
- **Activities**: Research, tourism, agriculture RDI/Testing, Underground Rescue, Feasibility studies on energy storage.
- **Future**: Callio Lab facilitates several types of actors, incl. research institutions and companies.
Ruskeala Mining Park, Russia

- **Status**: Operational
- **Location**: Ruskeala Mining Park is located in the Russian Karelia. The depth of the cave system is 36m.
- **Rock type(s)**: The dominant crystalline rock type is marble.
- **Activities**: Main activities are around tourism. Geological and –physical, and also water chemical measurements are on-going
- **Future**: Mining heritage centre with underground sites for geological and –physical studies
**Status**: Operational

**Location**: The Äspö Hard Rock Laboratory (Äspö HRL) is located in Oskarshamn, Sweden and is owned by SKB. The depth is 460 m.

**Rock type(s)**: The dominant rock types are Äspö diorite and Ävrö granodiorite.

**Activities**: Main activities related to methodological and technical development of spent nuclear fuel storage facility. Also environmental, geotechnics, geo-energy, material science and technical development projects.

**Future**: The aim is to turn the facility over to future research and development stakeholders.
The underground Low Background Laboratory (LBR) of Khlopin Radium Institute

- **Status:** Operational
- **Location:** The underground Low Background Laboratory (LBR) of Khlopin Radium Institute is located in St. Petersburg at the underground metro lobby of Gostiny Dvor. The laboratory is located at the depth of 58m.
- **Rock type(s):** Dominant is Cambrian Clay.
- **Activities:** Low, radioactive, background measurements with gamma spectrometers
- **Future:** Laboratory is used for scientific and commercial operations.
Research and Education Mine “Reiche Zeche”, Germany

- **Status**: Operational since 1919
- **Location**: Research and Education Mine ”Reiche Zeche” is located in Freiberg, Germany and it is run by TUBAF. The Mine is accessible up to a level 230m.
- Rock type(s): Lead-zinc deposit.
- **Activities**: Reich Zeche is used by research institutions and industrial partners R&D and testin of new technologies. Additionally multiple Universities use the site to train new mining professionals.
- **Future**: To develop the mine into a European platform for enchancing mining techniques and educations. To build a ramp to develop new fields, rooms and drifts.
Conceptual Lab development co-ordinated by KGHM Cuprum R&D centre, Poland

- **Status:** Conceptual design phase
- **Location:** The KGHM mines are located 75 km NW from the city Wroclaw, Poland. Mines reach 1300 m.
- **Rock type(s):** Salt rock, fine grain sand stone, copper bearing ore
- **Activities:** In existing mine workings trials & pilot panels used to be furnished for research purposes. The mines were constructed mainly for the copper extraction.
- **Future:** Low background laboratory and other research facilities at the salt deposit, macro scale industrial testing at copper deposits
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More information

www.Bsuin.eu