

# Callio FireLAB 2021 - 2022

MINE FOR BUSINESS

# CALLIO

PYHÄJÄRVI, FINLAND



## PROJECT OBJECTIVE

In underground facilities, fire is particularly dangerous: slow escape, smoke and toxic gases are moved in the direction of escape, often the inadequate smoke exhausting efficiency and the difficulty to rescue people due to hard access and long distances. Callio FireLAB project will develop a fire laboratory utilizing the unique underground infrastructure of the Pyhäsalmi mine for piloting and demonstrating business needs. The target group of the project are: underground mining and tunneling technology companies, construction and energy industry, mining companies, blasting companies and research institutes, and regional fire & rescue departments developing or testing new products and solutions for future.

## MARKET NEEDS

- There is a clear business need (business aspect) for developing fire safety in underground facilities.
- Underground fire tunnel can be used to pilot the fire resistance of load-bearing and / or partitioning structures and components such as future smart materials and vehicle batteries, and to demonstrate fire behaviour characteristics such as spread rate, smoke intensity or flame residence time.
- Opportunities to apply structural fire protection techniques and methods (theory, practice, digital technology) and analysis of explosive gases in underground conditions. Such facilities are still almost completely missing in Finland.
- Development of extinguishing exercises and performance tests e.g. training and testing of new breathing apparatus.

## OUR APPROACH

- Identifying fire laboratory business needs by leveraging existing underground mining infrastructure.
- Developing a knowledge and innovation environment for rock mechanics and functional fire safety, design and protection of underground facilities.
- Testing the fire resistance of partitioning and load-bearing structures and new materials by various combustion tests.
- Developing intelligent solutions for proactive fire detection and monitoring (Digitalisation and IoT solutions).
- Building Callio FireLAB service concept and business model.

## HOW WE DO IT

- Emissions – e.g. CO<sub>2</sub>, CO, HCN, O<sub>2</sub> in different fires.
- Optical radar – modelling of fire and smoke behaviour.
- Thermal imaging – modelling of heat transfer (infrared).
- Combustion tests – fire and smoke dynamics and high-speed imaging analyzes of experiments from various fire sources with life-saving containers and refractory materials.



## BUSINESS BENEFITS & OPPORTUNITIES

- Callio FireLAB project enables piloting and demonstration of electrified mining machines and low carbon vehicles fire safety in a controlled environment.
- The project results will improve the ability to respond appropriately in the event of an underground fire, and to develop functional fire safety, design and protection of underground facilities, such as the use of energy efficient extinguishing techniques and protection materials..
- The project will create a significant education, training, development and innovation environment and “smoke & fire science” to the Northern Ostrobothnia region.