

## illuMINEation



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THE FUTURE OF MINING

### Summary:

Europe urgently needs to reduce its import dependency in respect to a multitude of raw materials. In order to do so, Europe's mining industry must completely redesign the process of traditional mining via the adoption of pioneering innovations, accompanied by extensive use of data analytics and new types of industrial IoT (IIoT). The EU-funded *illuMINEation* project will highlight significant aspects of digitalisation in underground mining activities with the aim of achieving highest possible levels of safety, environmental and economic performance. The project will establish a robust multi-level distributed IIoT platform based on extensive sensor networks featuring wireless communication capabilities. Advanced user interfaces, dashboards and AR/VR applications will allow for an optimised information flow. A rigorous cybersecurity approach will ensure that all data is properly protected.

### Duration:

1 September 2020 – 29 February 2024

### Objectives:

Via comprehensive digitalisation of important mining aspects, such as (i) the mineral deposit, (ii) the rock mass stability, (iii) the equipment condition monitoring, (iv) the safety of mining personnel as well as (v) the working and mining environment, the *illuMINEation* project addresses all of the three key factors that influence the sustainability and profitability of mining operations: (a) Occupational Health & Safety performance (incl. health & safety aspects of the nearby community), (b) environmental impacts and (c) efficient resource extraction and economic operation.

The transdisciplinary Research & Development concept of *illuMINEation* is to collect data from various sources (new and already available ones such as equipment, machines, infrastructure, mobile phones, etc.). All data acquired by the multitude of sensors installed throughout mining operations and equipped with novel IIoT gateways will be managed, analysed, processed, stored and visualised via a dependable distributed IIoT platform including infrastructure for edge to cloud continuum.

#### The project has four main research objectives:

- (1) Safe Zone Concept for the mining industry via e.g. improved rock stability assessment, comprehensive environmental monitoring or autonomous drones acting as first response unit, thereby contributing to safer and more sustainable raw materials extraction and production.
- (2) Sustainable & intelligent mineral resource extraction utilizing advanced drilling techniques including borehole deviation monitoring, leading to enhanced rock-mass characterization, optimised rock fragmentation and improved resource grade control.

(3) Advanced predictive maintenance & efficient operation via condition monitoring of batteries, automated analysis of equipment telematic data, additive manufacturing of crucial machine spare parts or deployment of autonomous drone as Agile Inspector.

(4) Dependable multi-level distributed Industrial Internet of Things Platform & novel User Interfaces offering e.g. edge analytics, fog & cloud infrastructure, data transfer & communication capabilities and a rigorous cyber security approach.

**Use cases:**

Four European mining companies and one of the leading mining equipment manufacturing companies, together forming the group of use case partners, are part of the *illuMINEation* team:

- 1.-Underground fluorite mine (Minera de Orgiva).
- 2.-Underground magnesite mine (RHI Magnesita).
- 3.-Underground copper mines (KGHM Polska Miedź S.A.).
- 4.-Underground Zinc, Copper & Gold mine (Boliden).
- 5.-Mining equipment and systems manufacturer (Epiroc Rock Drills AB).

**Budget:** € 8 863 685,00

**Partners:**

The nineteen *illuMINEation* project partners collectively constitute a high-quality and multidisciplinary consortium characterised by a well-balanced assembly of world leading industrial and academic players from a multitude of technical fields and applications such as geology, mining, sensor developers, IT networking companies, IIoT specialists and cyber security experts.

- Montanuniversität Leoben (MUL; project coordinator)
- Joanneum Research Forschungsgesellschaft MBH (JRS)
- Epiroc Rock Drills AB (EPI)
- ams OSRAM AG (AMS)
- KGHM Cuprum Sp. z o.o. Centrum Badawczo-Rozwojowe (CUP)
- DMT GmbH & CO. KG (DMT)
- Geoteko Serwis Ltd. (GEO)
- Luleå Tekniska Universitet (LTU)
- Universidad Politécnica de Madrid (UPM)
- KGHM Polska Miedz SA (KGHM)
- Minera de Orgiva SL (MDO)
- RHI Magnesita GmbH (RHIM)
- DSI Underground Austria GmbH (DSI)
- Retenua AB (RET)
- IMA Engineering LTD OY (IMA)
- Fundación TECNALIA Research & Innovation (TECN)
- Worldsensing SL (WSENS)
- Instytut Chemii Bioorganicznej Polskiej Akademii Nauk (Poznan Supercomputing and Networking Center; PSNC)
- Boliden Mineral AB (BOL)

**Social media:**

Webpage: <https://www.illumineation-h2020.eu/>

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