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X-MINE project in support of a sustainable mining in EU

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The sustainable supply of raw materials is a major European challenge, in particular for metals and minerals, where the EU's share of the global production decreased from 50 % in 1850 to 5% in 2009. For EU, to increase the level of self-sufficiency in regards to minerals whilst balancing the complicated land use situation, extraction of metals/minerals must be combined with a reduced environmental impact from the exploration and mining. These problems are addressed by the X-MINE project (2017-2020) under the Horizon2020 program. The project consortium includes 15 organizations from 9 countries (Finland, Sweden, Poland, Czech Republic, Romania, Bulgaria, Greece, Cyprus and Australia), bringing together public and private academic and research organizations as well as industrial companies.

The X-MINE project supports better resource characterisation and estimation as well as more efficient ore extraction in existing mine operations, making the mining of smaller, lower grade and complex deposits economically feasible and increasing the potential European mineral resources without generating any adverse environmental and health impacts.

The X-MINE project implements large-scale demonstrators of novel sensing technologies combining X-Ray and 3D vision to improve the efficiency and sustainability of mining operations.

There are three main directions in the project: (1) smart exploration through improved support of 3D geological modelling of the shape of the ore bodies and the extent of proximal mineralising structures. Improved resource definition can reduce the blasting of excess waste rock (i.e. less release of NO_2 and other potential harmful substances), reducing the overall environmental impact of the mining operations; (2) selective drilling: real-time online data collection while exploration drilling can allow mining companies to make better informed decisions about extending, re-prioritising or diminishing drill holes in order to maximize the efficiency of the exploration campaign and the mining operation; (3) optimal extraction: novel sensing technologies can be used to reject unmineralized rock fragments, thus reducing energy consumption.

The X-MINE project is currently developing a real-time mining sensing platform comprising of: 1) a set of high performance sensors based on X-Ray Fluorescence (XRF) and X-Ray Transmission (XRT) technologies, 2) a platform combining X-Ray sensors with machine vision based 3D shape measurement of particles and 3) the integration of the sensing components and results thereof with mineral sorting equipment, mine planning software systems and exploration software and work procedures.

The technical outcomes of the project are an exploration drill core scanner and an "ore from waste"-sorter that both will be demonstrated in full scale at the participating mines.