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The UNEXMIN Consortium:

- University of Miskolc, Hungary
- Geological Survey of Slovenia, Slovenia
- Tampere University of Technology, Department of Mechanical, Engineering and Industrial Systems, Finland
- Universidad Politécnica de Madrid, Centre for Automation and Robotics, Spain
- La Palma Research S.L., Spain
- INESC TEC – Institute for Systems and Computer Engineering, Technology and Science, Portugal
- Resources Computing International Ltd, UK
- Geoplano, Portugal
- Ecton Mine Educational Trust, UK
- European Federation of Geologists, France
- Geo-montan, Hungary
- Empresa de Desenvolvimento Mineiro, Portugal
- Idrija Mercury Heritage Management Centre, Slovenia

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# UNEXMIN

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**UNDERWATER EXPLORER  
FOR FLOODED MINES**

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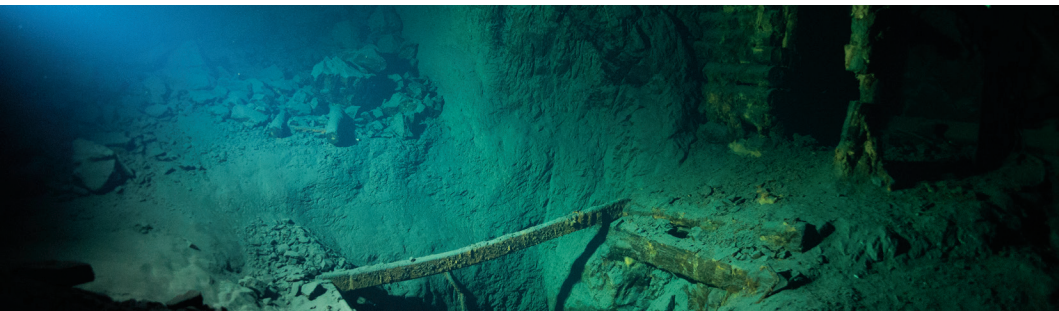
Many of Europe's closed underground mines are now flooded and the last piece of information on their status is decades or over a hundred years old. The complex layout, topology and geometry of most underground mines make it impossible to carry out any surveying by conventional or remotely controlled equipment.

UNEXMIN develops a fully autonomous solution, that will use non-invasive methods for the re-exploration of flooded deep mines that are otherwise inaccessible.

#### Project objectives:

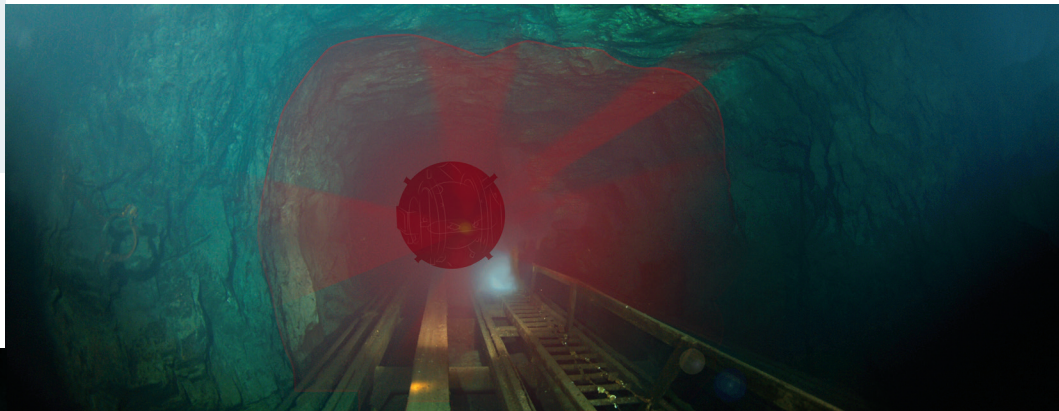
- Design and build a Robotic Explorer (UX-1) for autonomous 3D mapping of flooded mines;
- Develop a multi-robot platform that allows the collaboration and task distribution between several UX-1 robots;
- Demonstrate the operation of the prototype at representative pilot sites.

UNEXMIN's pioneering solution will generate valuable information on underground mine geometry as well as geological data for the development or update of 3D regional geological models, replacing much of the need for expensive drilling from surface.



The UNEXMIN Consortium is developing a novel robotic mine surveying system to be used for the autonomous mapping of flooded underground mines.

The multi-robot platform will link several surveyors together into a distributed payload system, where each of the vehicles can carry a different set of sensors, reducing the size, the weight and the power demands of the individual robots. This approach will provide security of operations for the submersibles that will be able to share data in real time, and will also provide scalability for future operations, where larger mines could be re-explored by a swarm of collaborative robots.



The technology developed by UNEXMIN will increase Europe's capacity to re-evaluate its abandoned mines for their mineral potential, with reduced exploration costs and increased investment security for any future mining operations. By retrieving data from historical sites that are currently inaccessible it will also help to document and safeguard Europe's unique mining heritage.