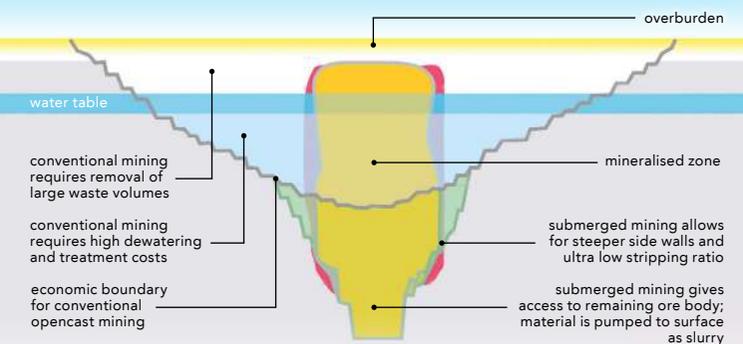




## VIALE ALTERNATIVE MINE OPERATING SYSTEM

iVAMOS! is developing a prototype underwater, remotely controlled, mining vehicle with associated launch and recovery equipment.



MINE EXTENSION POTENTIAL

## iVAMOS! PARTNERSHIP

### BMT Group Ltd

United Kingdom

### SMD

United Kingdom

### Damen Dredging Equipment

The Netherlands

### INESC TEC

Portugal

### Fugro

United Kingdom

### Zentrum für Telematik

Germany

### Montanuniversitaet Leoben

Austria

### Minerália Minas, Geotécnia e Construções

Portugal

### Marine Minerals

United Kingdom

### Sandvik Mining and Construction GmbH

Austria

### Geološki Zavod Slovenije

Slovenia

### La Palma Research Centre

Spain

### Fédération Européenne des Géologues

Belgium

### Trelleborg Ridderkerk

The Netherlands

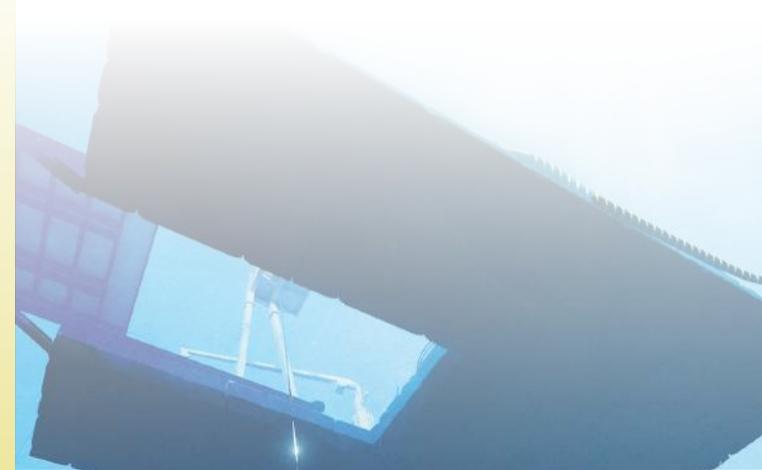
### Federalni Zavod za Geologiju Sarajevo

Bosnia and Herzegovina

### Fondacija za Obnovu i Razvoj Regije Vareš

Bosnia and Herzegovina

# i vamos!



## VIALE ALTERNATIVE MINE OPERATING SYSTEM

## VIALE ALTERNATIVE MINE OPERATING SYSTEM

Start date

1 February 2015

Duration

42 months

EC funding

9.2 million EUR

Coordinator

BMT Group Ltd

Technical management

SMD

Quality and risk management

Damen Dredging Equipment

For any additional information please visit us at

[WWW.VAMOS-PROJECT.EU](http://WWW.VAMOS-PROJECT.EU)



@ProjectVamos



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A SAFE, CLEAN AND LOW IMPACT WAY TO ACCESS UNEXPLOITED EUROPEAN MINERAL RESOURCES



Estimates indicate that the value of unexploited European mineral resources at a depth of 500 - 1,000 metres is in the order of 100 billion EUR. Many of these deposits are submerged, in unmined deposits which are below the water table.

The iVAMOS! project is developing a safe, clean, and low impact automated solution for the extraction and pre-processing of ores found in water-bearing strata inland or in coastal waters. The project is constantly engaging with stakeholders to make sure that the technology developed is environmentally, economically and socially acceptable.

Major benefits of iVAMOS! over conventional inland mining include:

- ultra-low stripping ratio (in (semi-) vertical deposits);
- no dewatering costs and/or barrier construction and maintenance;
- no blasting noise, ground vibration, fumes or dust nuisance;
- no discharge of mine water;
- no personnel in the mine;
- lower energy requirements and CO<sub>2</sub> emissions.

Additionally, iVAMOS! provides a chance to address rehabilitation problems that have been left behind at former mining sites.

#### DEVELOPMENTS

The iVAMOS! technology has evolved from its original concept into a system composed by many parts, that saw their completion in Summer 2017.

Crucial system components include:

- mining vehicle with cutter head;
- Launch & Recovery Vessel with power distribution and control unit;
- dual stage slurry pump and slurry circuit system;
- processing and dewatering facilities;



- mining vehicle
- real time slurry production measurement and grade control
- launch and recovery vessel
- floating discharge hose to processing facilities on shore
- riser hose and umbilical
- AUV for survey and spatial awareness

### THE iVAMOS! MINING TECHNIQUE: REMOTELY CONTROLLED VEHICLES WITH LAUNCH & RECOVERY EQUIPMENT

- control cabin with Virtual Reality Human-Machine Interface;
- Autonomous Underwater Vehicle for survey and spatial awareness;
- real-time grade control technology.

To prove the operability of the iVAMOS! innovative technological approach, the system is deployed at two test sites: the Lee Moor kaolin open-pit site in Devon, UK and Smreka iron open-pit site in Vareš, Bosnia and Herzegovina.

During these trials, iVAMOS! extracts rocks varying in hardness and constitution and operating parameters like machinery productivity, equipment wear, environmental impacts and social acceptance are assessed.

The field testing makes it possible to estimate the industrial viability of the iVAMOS! equipment and the market up-take possibilities, specifically focussing on under what circumstances the iVAMOS! technology outperforms conventional mining methods.

#### EXPECTED IMPACT

The iVAMOS! technique will enable the re-opening of abandoned open pit mines, the extension of mines which are limited by stripping ratio, hydrological or geotechnical problems, and the opening of new, previously inaccessible, underwater mines. In each case iVAMOS! will result in a smaller environmental footprint compared to conventional mining.