



**NEXT**

New Exploration Technologies



| Discover the Ore |

**IMPROVE YOUR  
EFFICIENCY WITH OUR  
NEW EXPLORATION  
TECHNOLOGIES**

# NEXT IS BUILT ON 3 PILLARS OF TECHNOLOGICAL ADVANCE



## MINERAL SYSTEMS MODELING

Holistic evaluation of various geological processes and robust conceptual 3D models for selected target sites that in combination with pathfinders allow to predict the location and the size of ore deposits at depth.



## EXPLORATION METHODS AND APPROACHES

New electromagnetic (EM) geophysical surveying technology also with unmanned aerial vehicles (UAV) and multi-source surface geochemical field analysis methods.



## DATA PROCESSING AND DATA INTEGRATION TOOLS

Multi-method approaches to post-process geophysical data and to combine modern data mining, integrating spectral, multiscale, multi-sensor exploration and geo data.

# INTRODUCTION

## WHAT IS NEXT?

The NEXT – New Exploration Technologies – project will highlight the possibilities of exploring for raw materials in Europe in the most sustainable and socially acceptable way leading to an extension of the knowledge of existing deposits in Europe. NEXT will enhance our understanding of the mineral systems and develop new sensitive exploration techniques. By integrating industry, academia and research institutes with expertise and excellence in exploration and 3D modelling, it is our ambition in NEXT to develop new tools that are specifically aimed at increasing the competitiveness of the European exploration industry.

Within NEXT, the focus of our developments is on new geomodels, novel sensitive exploration technologies and data analysis methods which together are fast, cost-efficient, environmentally less intrusive, and therefore, potentially, more socially acceptable.

We want to develop methods that will reduce the current high exploration costs, and we aim at enhancing participation of civil society from the start of exploration, raising the awareness and trust of the general public. Moreover, the reduced environmental impact of the new technologies and better knowledge about the factors influencing social licensing may help to improve the relationship between the mining industry and broader society, a precondition for the further development of Europe's extractive industry.

The NEXT project brings together mining industry, service providers and research institutions to develop an enhanced integrated exploration approach. The whole value chain from technology development and exploration to mining is represented within the members of the NEXT consortium, and a broad range of stakeholders are engaged in the research process.

The commercialization of the new exploration tools will lead to faster and new discoveries of mineral deposits within the EU. Targeted critical raw materials include: lithium (Li), tungsten (W), phosphorus (P) and cobalt (Co). Also gold (Au), zinc (Zn), lead (Pb), copper (Cu), silver (Ag), and tin (Sn), which are important for EU industries, are included in the NEXT deposit targets.



## FIGURES:

Call:

**H2020-SC5-  
13C-2016-2017**

New solutions for sustainable production of raw materials

**6.9 MIO. €**

Total budget

Duration:

**01.05.2018 -  
30.04.2021**

## 16 PARTNERS

Consortium from research institutes, academia, service providers and industry from

## 6 EU COUNTRIES

Finland, Spain, Sweden, France, Germany, and Malta

Coordinator:

**GTK (FINLAND)**

[www.new-exploration.tech](http://www.new-exploration.tech)



## **ORE DEPOSITS ARE RELATIVELY SMALL GEOLOGICAL FEATURES THAT ARE DIFFICULT TO FIND**

Are you spending a lot of time for searching? And money on sampling, drilling, lab analytics and many other activities? Do you also have the feeling that you could increase your success rate if you would have more precise, faster or cheaper techniques and better abilities to get more out of the huge sets of acquired data and information?

NEXT is working on improving your efficiency. This will be done by our integrated exploration approach, combining mineral systems modeling, novel geophysical and remote sensing technologies, field geochemical testing and data analysis methods.

The overall concept of NEXT is to combine the knowledge derived from the geological mineral systems research with the new advanced technological solutions. The new exploration techniques developed in NEXT are aimed to be sensitive for critical raw materials exploration and also environmentally sound.

We will create a totally new concept of unmanned aerial vehicles (UAV) technology for geophysical surveying combined with the well-established but constantly emerging portable geochemical exploration tools (XRF, LIBS, Raman) and remote sensing technologies. In addition, our consortium facilitates the biogeochemical technology for mineral exploration. Furthermore, the partners of NEXT are devoted to bringing the analysis of expanding mineral exploration related data to a new level by combining modern data mining, artificial intelligence (here: self-organizing maps (SOM) and artificial neural networks (ANN)) and prospectivity mapping technologies. Research and characterization of mineral systems is a key starting point in defining and ranking vectors towards new undiscovered mineral deposits.

# WE ARE DEVELOPING INNOVATIVE AND SENSITIVE EXPLORATION CONCEPTS AND NEW TECHNOLOGIES

## OBJECTIVES

- 01** New geological/litho-geochemical technologies for the exploration of hidden critical metal-enriched ore deposits
- 02** A novel geophysical EM system for ore exploration based on Unmanned Aerial Vehicles (UAV)
- 03** A high-end accurate vector magnetic system integrated to UAV in order to upgrade mineral exploration survey to a totally new level
- 04** Better cost-efficient and environmentally-friendly multi-source surface geochemical exploration techniques for target scale mineral exploration
- 05** New environmentally friendly instruments for mineral exploration using optical spectroscopy
- 06** New geophysical inversion software for modern drone exploration surveys
- 07** New on-site geochemical and mineralogical analysis techniques
- 08** New advanced methods of data processing and data integration for the development of mineral prospectivity maps and spatial data mining
- 09** Improved relations between the mining industry and broader society by enhanced participation of civil society from the start of mineral exploration
- 10** New scientific and technical synergies between European projects dealing with raw materials

# SOCIAL LICENSE TO EXPLORE AND OPERATE

*The objective of our work on social licensing is to help improve the relations between the mining industry and broader society by enhancing participation of civil society from the start of mineral exploration and throughout the production cycle.*

Based on in-depth interviews and surveys with stakeholders in selected localities where new technology is tested, we will generate new knowledge about local actors' understanding of and attitudes toward new technologies. We also explore local actors' experiences of, and expectations on, interaction with

mining companies. Based on the results, a practical NEXT toolkit is designed to assist exploration companies to improve their relations with local communities. Some of the key questions being answered are: What are the key factors influencing social licensing at the exploration stage and beyond? What is the importance of new sensitive technologies and early contacts with local communities for obtaining and maintaining a SLO? What tools can be used to assess risks associated with mineral exploration and promote best practices?



**BETTER RELATIONS WITH LOCAL COMMUNITIES AND BROADER SOCIETY MAY ENHANCE SUSTAINABILITY AND CREATE MARKET VALUE!**

## EXPECTED BENEFITS OF NEXT DEVELOPED METHODS



### ENVIRONMENT & SUSTAINABILITY

Exploring for critical raw materials in Europe in the most sustainable and socially acceptable way. Developed solutions are more environmentally friendly and reduce the environmental footprint compared to conventional exploration methods.



### ACCEPTANCE

Less intrusive and environmentally sound exploration and active engagement with local actors may help to improve the relationship with local communities and broader society.



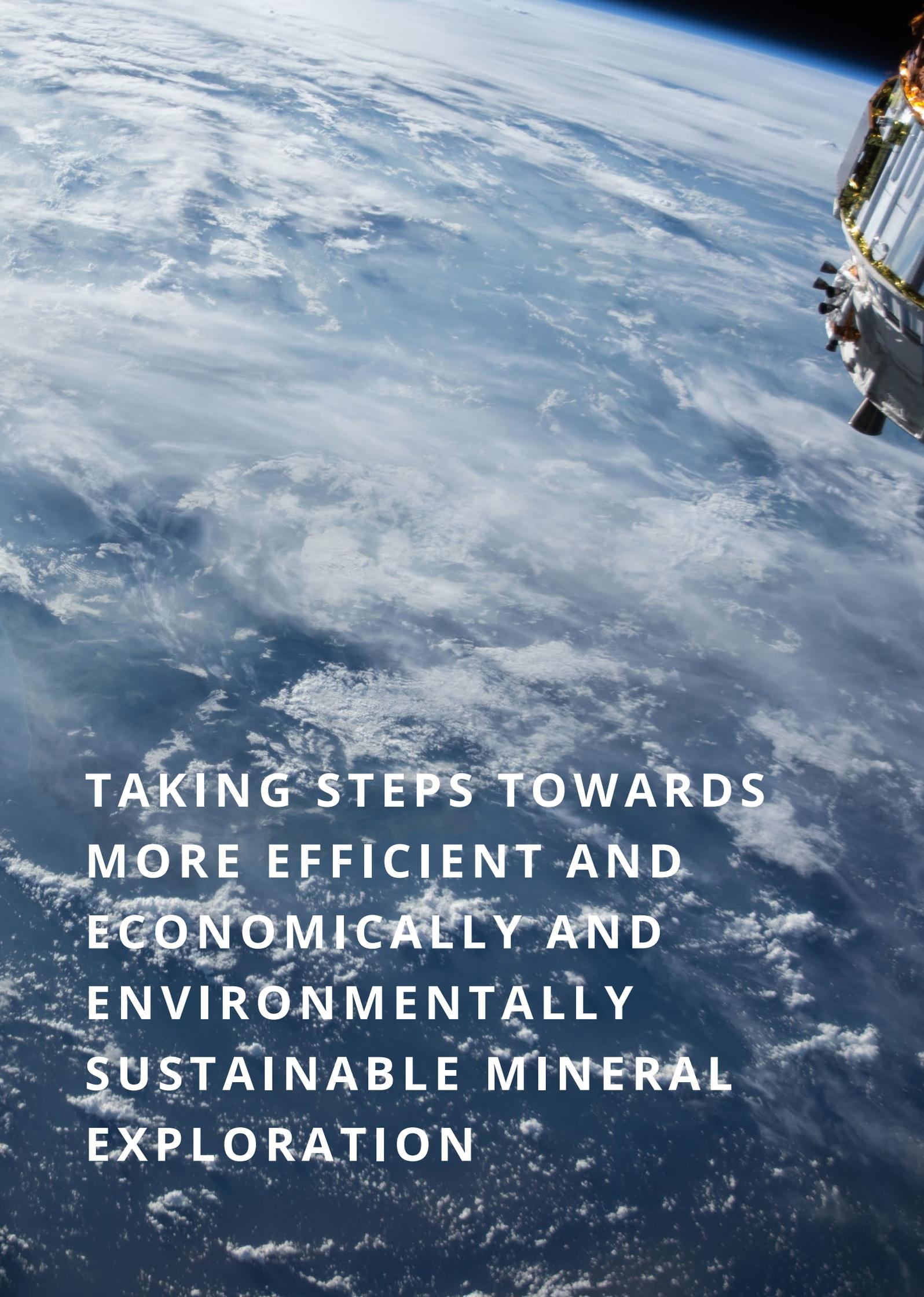
### ECONOMY

Exploration at lowest possible costs by development of more cost-efficient exploration solutions, such as UAV based techniques, and higher success rate for critical raw materials exploration.



### TECHNOLOGICAL ADVANCE

Technological innovations for better targeted exploration with more precise methods that are sensitive for critical raw materials exploration.



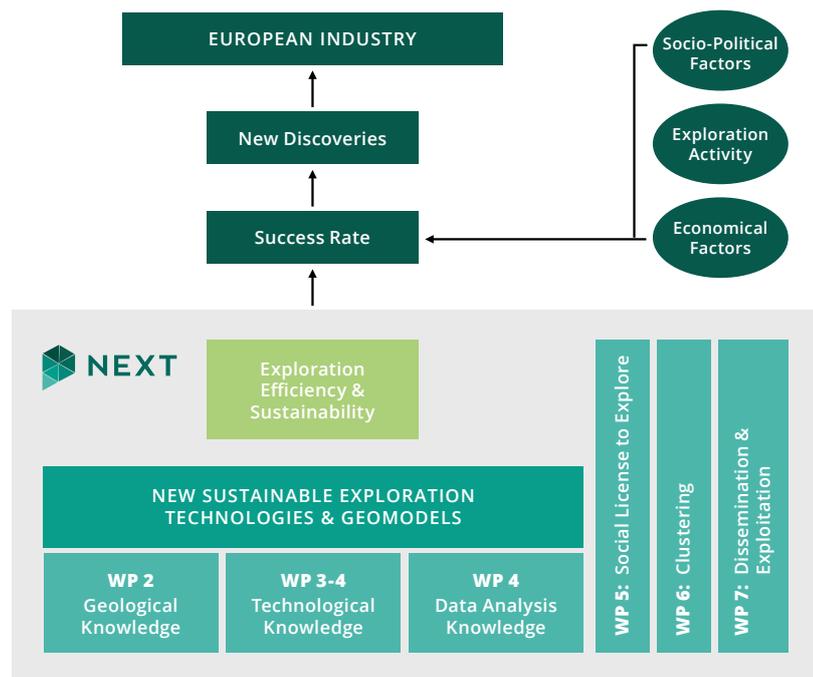
**TAKING STEPS TOWARDS  
MORE EFFICIENT AND  
ECONOMICALLY AND  
ENVIRONMENTALLY  
SUSTAINABLE MINERAL  
EXPLORATION**



| Implementation |

# WORK PACKAGES AND STRUCTURE

The results from the work packages dealing with mineral systems modeling (WP2), new exploration technology development (WP3), and multi-method approaches to reprocess geophysical and optical spectral data (WP4) will lead to mineral intelligence in the form of new exploration techniques and models. This intelligence will be tested and implemented by the industry partners involved. WP5 focuses on the early stages of the production cycle and the role of company-community relations during the exploration phase for improving the awareness, acceptance and trust of society in the exploration phase and throughout the production cycle. Raising broader awareness is the focus of WP6 (to the scientific community dealing with the mineral value chain) and WP7 (to all levels of society).



# NEXT CONSORTIUM

*The innovations in the NEXT project are achieved by a pan-European consortium of 16 partners from research institutes, academia, service providers and mining industry from the six EU member states Finland, Sweden, Germany, France, Malta and Spain.*

The whole value chain from technology development and exploration to mining is represented within the members of the NEXT consortium.

63% of partners are from industry and technologically oriented SMEs, 37% from natural/technological and social science research organizations and universities. The consortium members represent the main metal-producing regions of Europe: the Baltic Shield, the

Iberian Variscan Belt and the Central European Belt. These economically most important metallogenic belts of the EU have diverse geology with evident potential for different types of new mineral resources. The mineral deposits in these belts are the most feasible sources of critical, high-tech and other economically important metals in the EU.

To strengthen the connections of NEXT to industry and society, an Advisory Board including experts on NEXT concepts from outside the EU (Australia, Brasilia and Norway) assists the consortium.

The project is coordinated by the Geological Survey of Finland (GTK).



**GTK** | Geological Survey of Finland  
[www.gtk.fi](http://www.gtk.fi)



**Beak** | Beak Consultants GmbH, Germany  
[www.beak.de](http://www.beak.de)



**CSIC** | Consejo Superior de Investigaciones Científicas, Spain | [www.csic.es](http://www.csic.es)



**UL** | Université de Lorraine, France  
[www.welcome.univ-lorraine.fr](http://www.welcome.univ-lorraine.fr)



**Radai** | Radai Oy, Finland  
[www.radai.fi](http://www.radai.fi)



**DMT** | DMT GmbH & Co. KG, Germany  
[www.dmt-group.com](http://www.dmt-group.com)



**LTU** | Luleå University of Technology, Sweden  
[www.ltu.se](http://www.ltu.se)



**LaY** | Lapin yliopisto University of Lapland, Finland  
[www.ulapland.fi](http://www.ulapland.fi)



**HZDR** | Helmholtz-Zentrum Dresden-Rossendorf, Germany | [www.hzdr.de](http://www.hzdr.de)



**Loop and Line Oy** | Finland  
[www.loopandline.fi](http://www.loopandline.fi)



**IRMCo** | Integrated Resources Management (IRM) Company Ltd, Malta | [www.environmentalmalta.com](http://www.environmentalmalta.com)



**MAWSON** | Mawson Oy, Finland  
[www.mawsonresources.com](http://www.mawsonresources.com)



**EFTAS** | EFTAS Remote Sensing Transfer of Technology, Germany | [www.eftas.de](http://www.eftas.de)



**VALORIZA** | Valoriza Minería SL, Spain  
[www.valorizamineria.com](http://www.valorizamineria.com)



**MATSA** | Minas de Aguas Teñidas S.A.U., Spain  
[www.matsamining.com](http://www.matsamining.com)



**YARA** | Yara Suomi Oy, Finland  
[www.yara.com](http://www.yara.com)

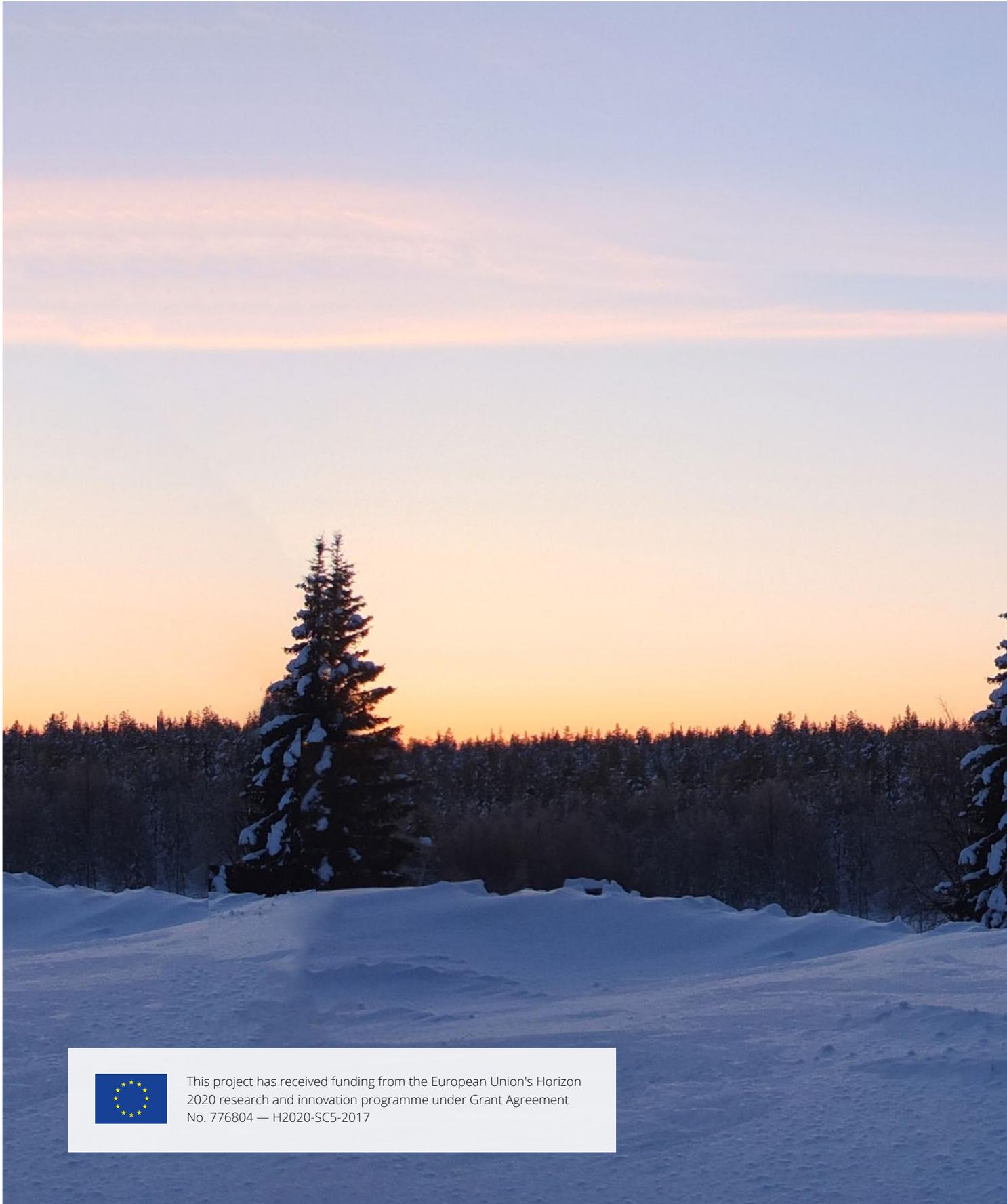
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