



# THOUGHTS ABOUT AN IDEAL VALIDATION ENVIRONMENT FOR MUOGRAPHY APPLICATIONS

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**CALLIO** LAB

Underground Center for Science and R & D



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**M**uographers  
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- Introduction
- What is muography?
- Validation and verification environment
  - Basic needs for a macroscale environment
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*I have tried to look at the question of the ideal validation environment for muography from both a facility provider and a user point of views. However, your thoughts would warmly welcomed.*

*Have your say at  
<https://www.menti.com/u6sy7p5o75>*

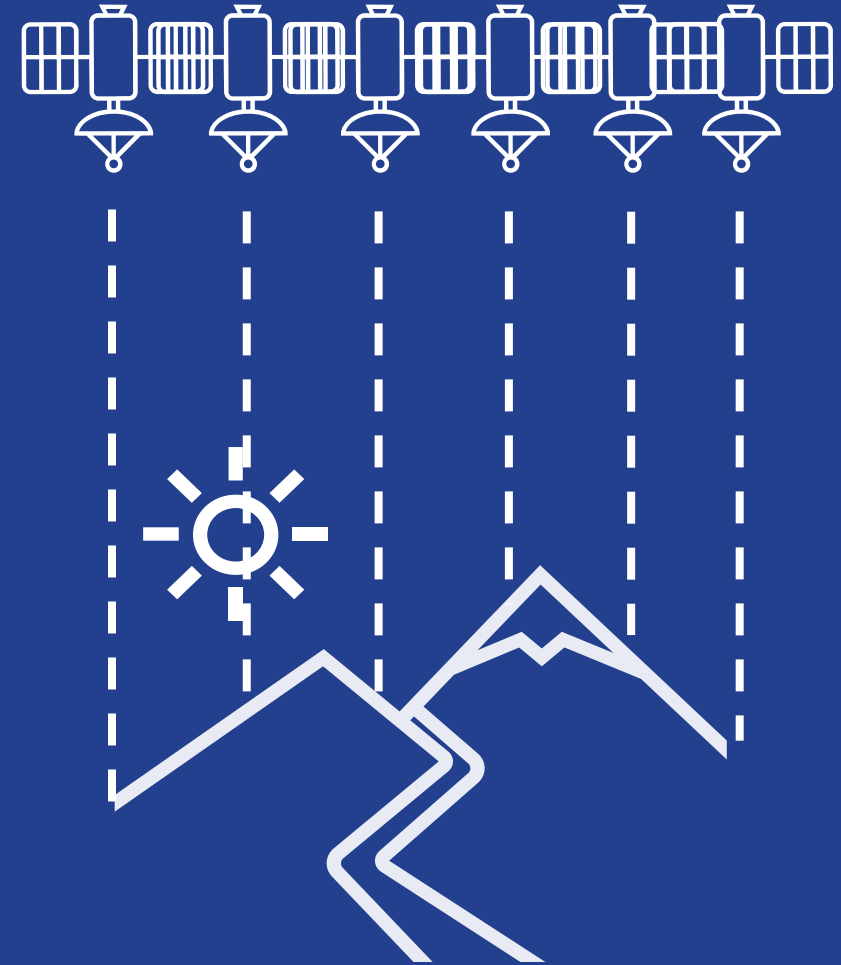




*Muography is an imaging technique to observe density anomalies within volumes*



# Basic needs for a macroscale environment



Digital Elevation Model



Basic needs for a  
macroscale  
environment



Digital Elevation Model



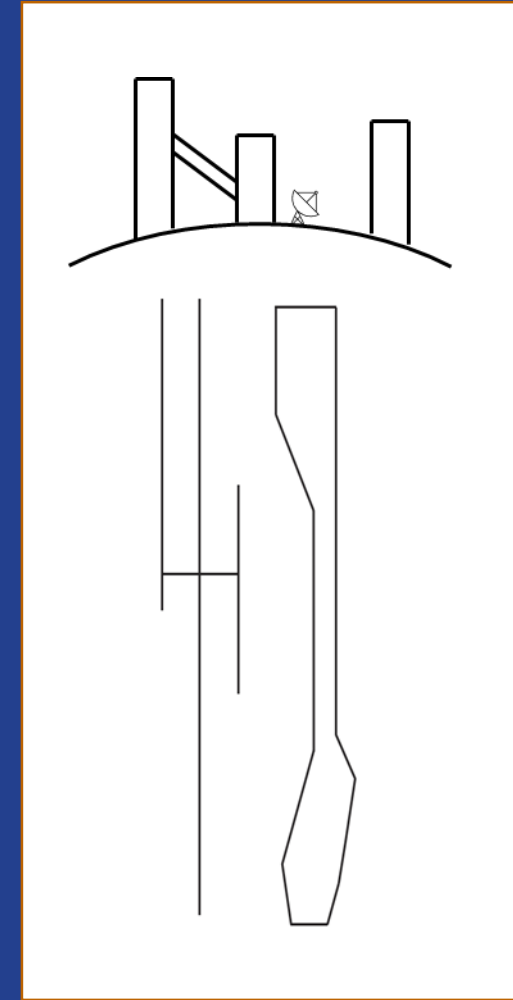
Basic needs for a  
macroscale  
environment



Accurate mine models



# Basic needs for a macroscale environment

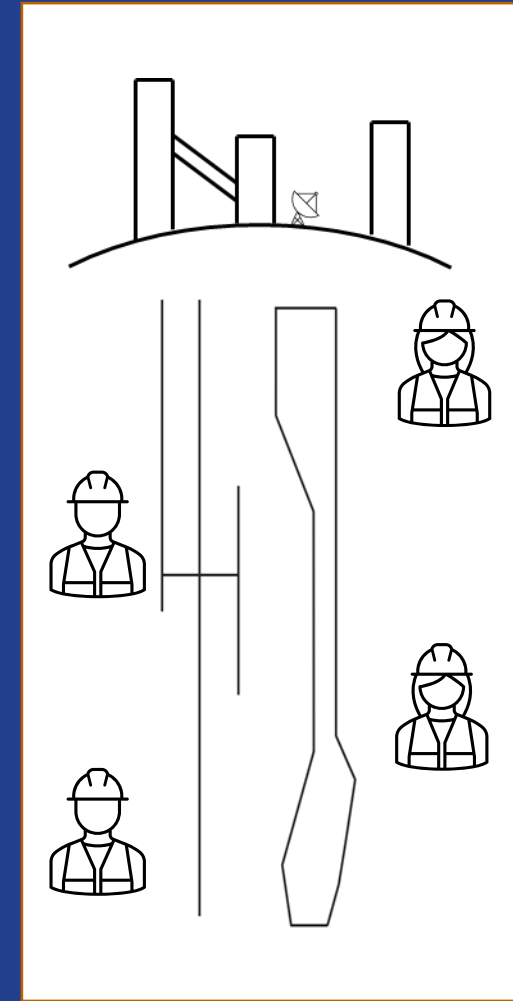


Well-known geology





# Basic needs for a macroscale environment

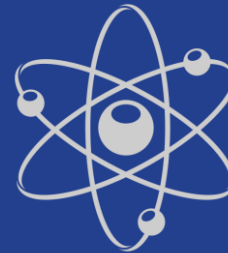


Access to various depths

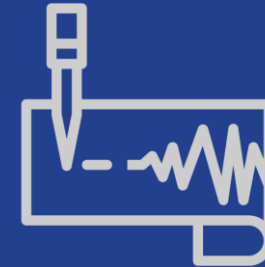


Created by Clea Doltz  
from Noun Project

# Basic needs for a macroscale environment



Created by Mahmure Alp  
from Noun Project



Created by Sumit Saengthong  
from Noun Project



Created by Smalllike  
from Noun Project

Accompanying  
geophysical data



# Basic needs for a macroscale environment



Weather data



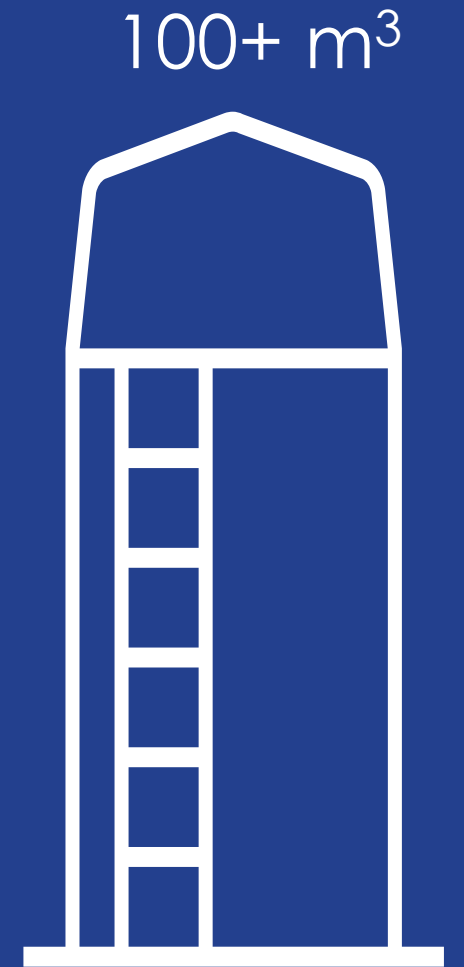
# Basic needs for a macroscale environment



Onsite infrastructure



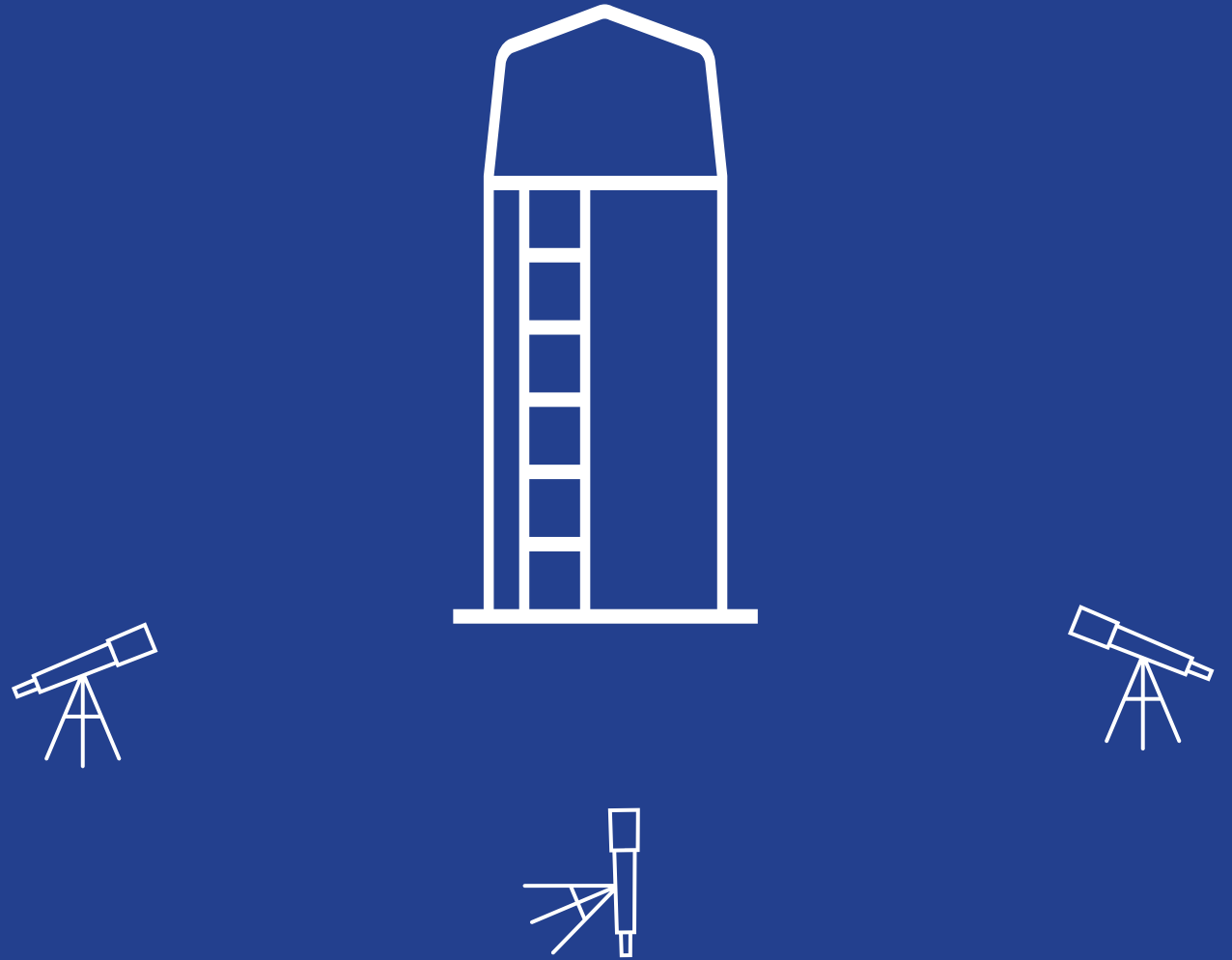
# Possibilities of a microscale environment



Known, controllable  
high-contrast targets



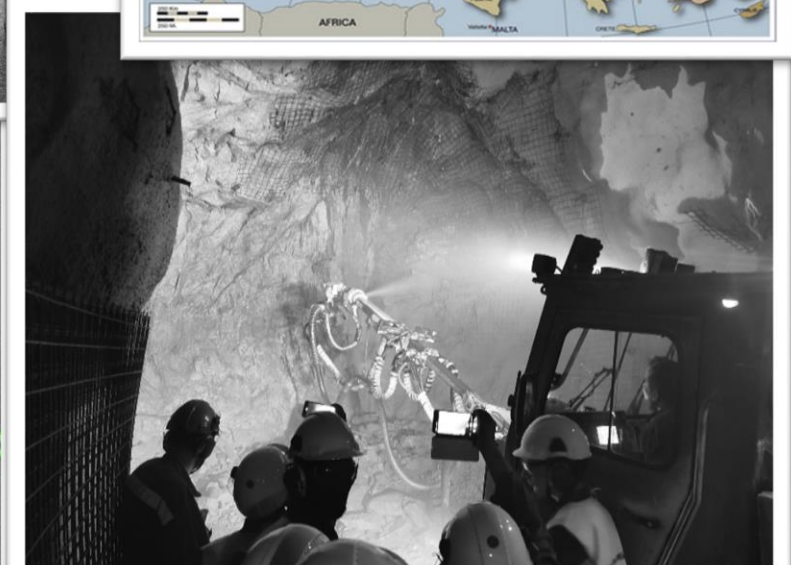
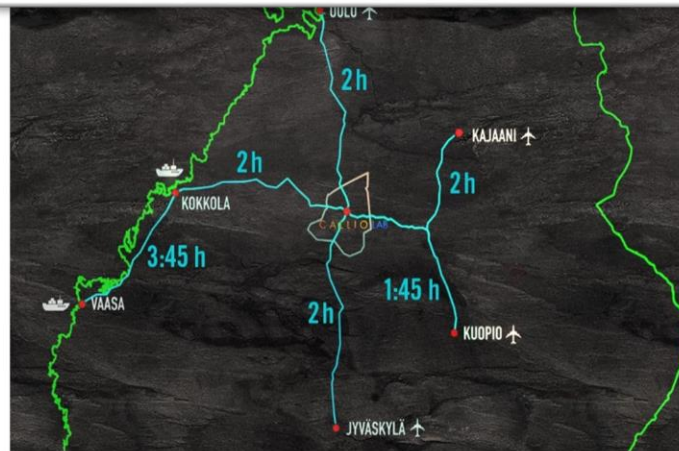
Possibilities of a  
microscale  
environment



Possibilities for “rapid” near  
surface prototyping



# Possibilities at Callio Lab

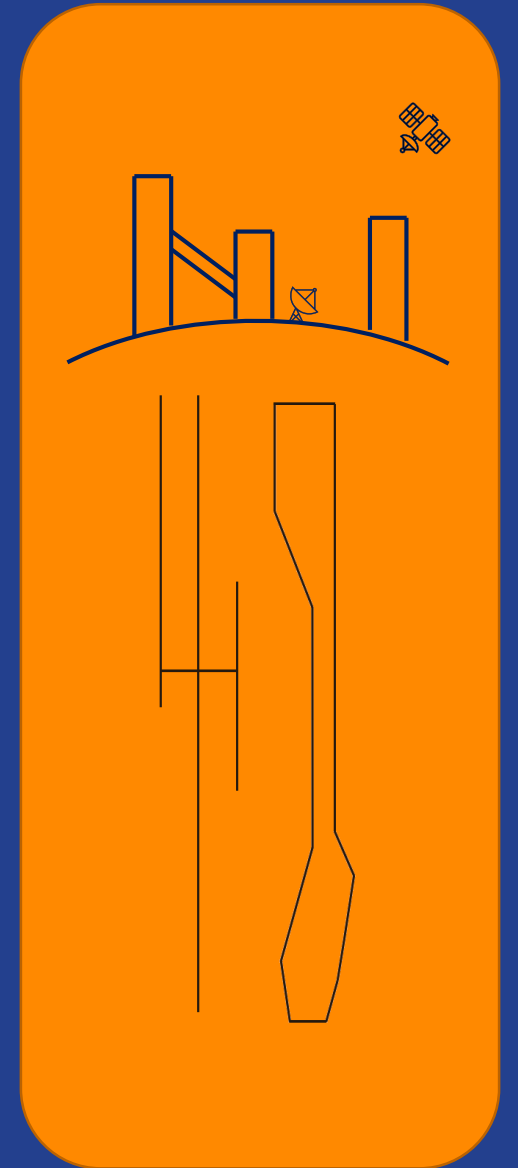




# Possibilities at Callio Lab

- Unique 1.4 km (~4.1 kmwe) deep mine with flat overburden.
- Access to all levels through 11.7 km long incline
- Well-known & documented geology and mine model
- Accompanying geophysical datasets
- Electricity and safety remote access capable network available
- Soon 24/7 accessibility
- Research coordinated by Kerttu Saalasti Institute, University of Oulu

**We offer coordination, cooperation, networking and facilitation**

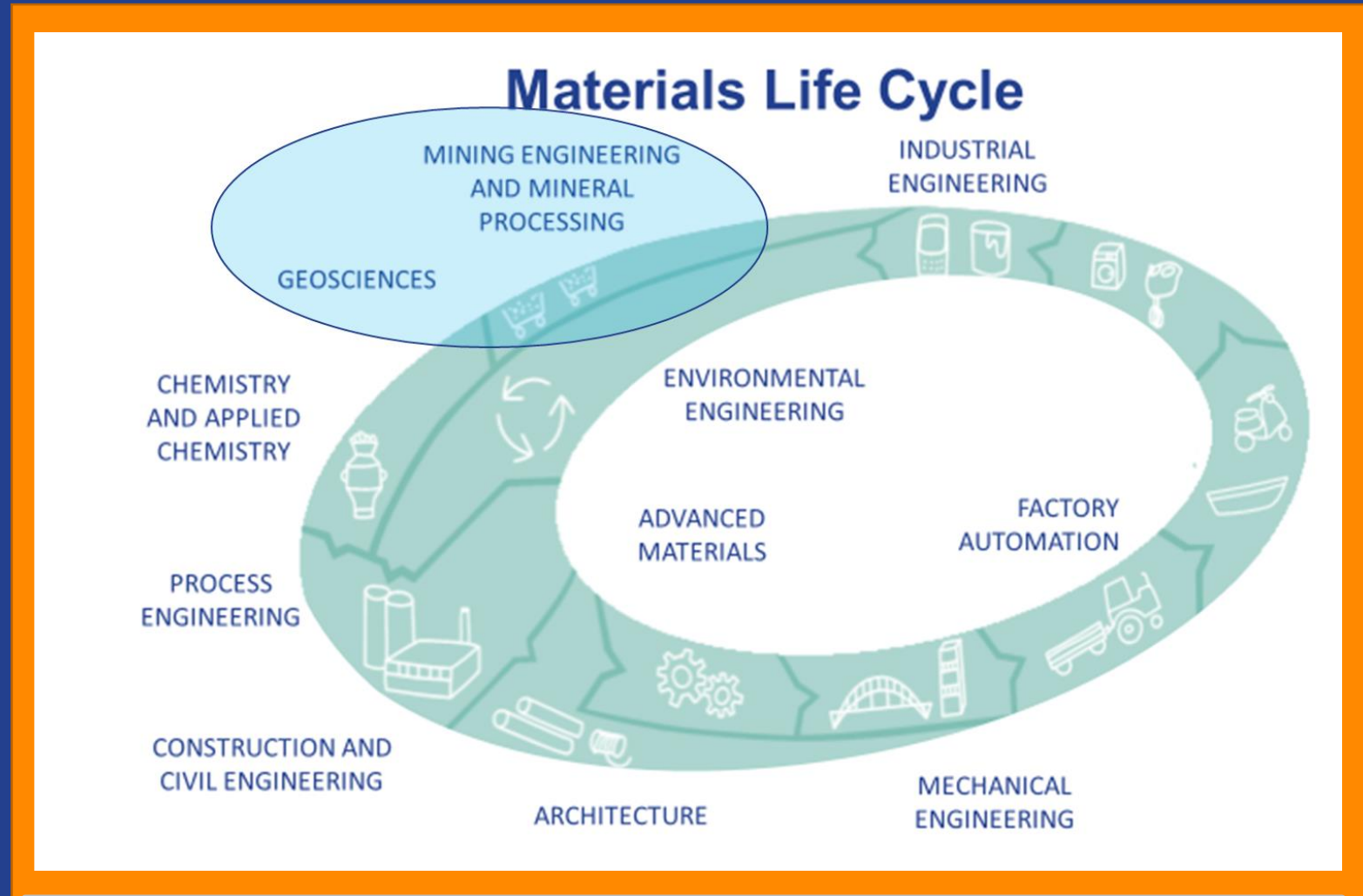






# Possibilities at Callio Lab, and at the University of Oulu

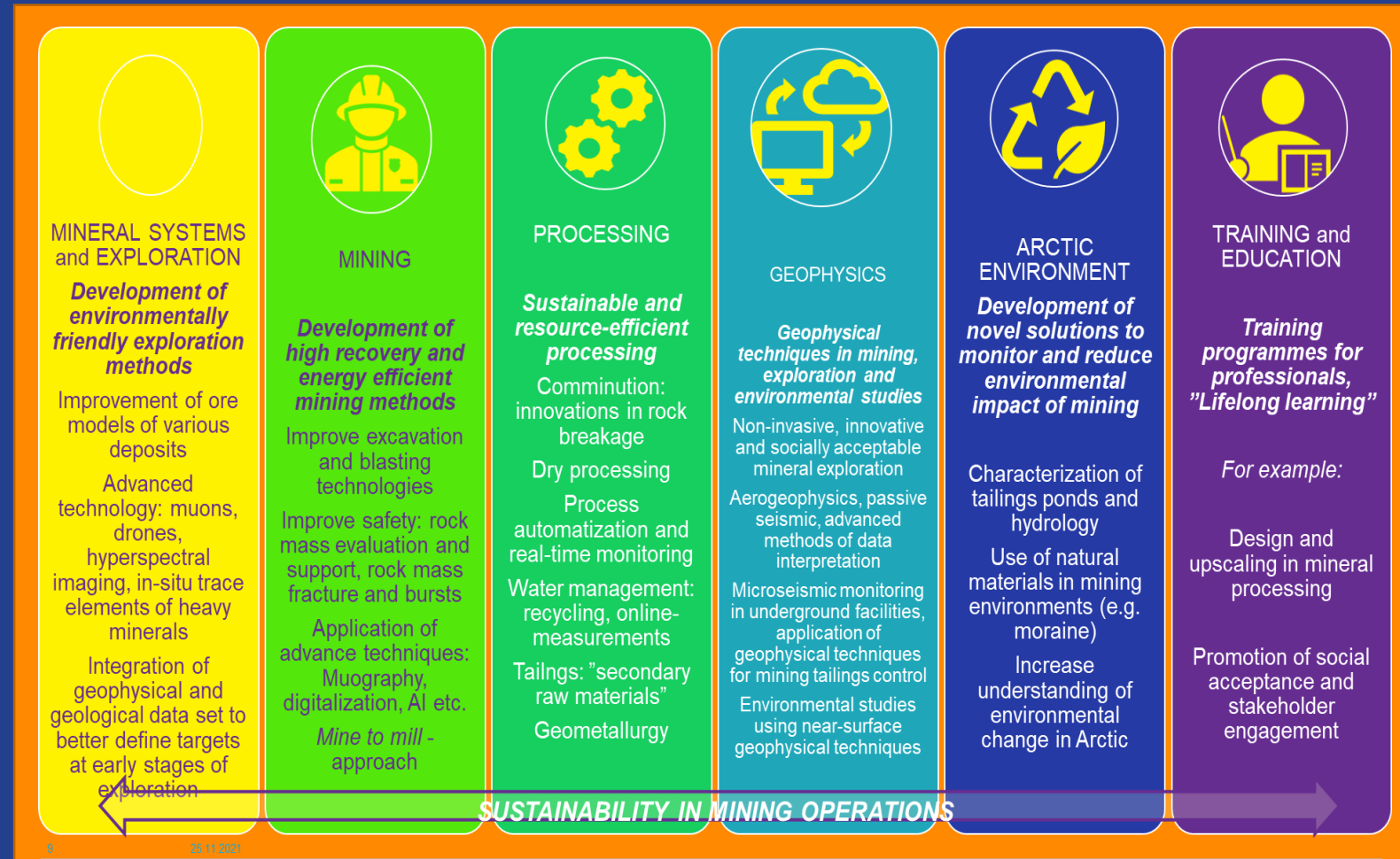
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Muography becoming an integrated part of research and education



# Possibilities at Callio Lab, and at the University of Oulu



Muography becoming an integrated part of research and education



# Possibilities at Callio Lab, and at the University of Oulu



## Muography becoming an integrated part of research and education



And what were your considerations for ideal validation environment for muography applications

Go to [www.menti.com](https://www.menti.com) and use the code 5592 8861

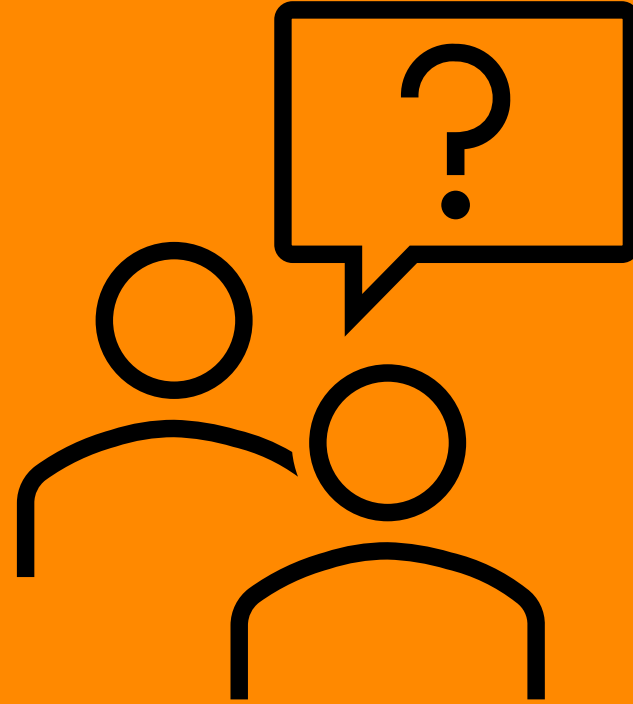
In your opinion what are the key characteristics or parameters for a successful muography validation and reference environment?

 Mentimeter





Questions?





Thank you!

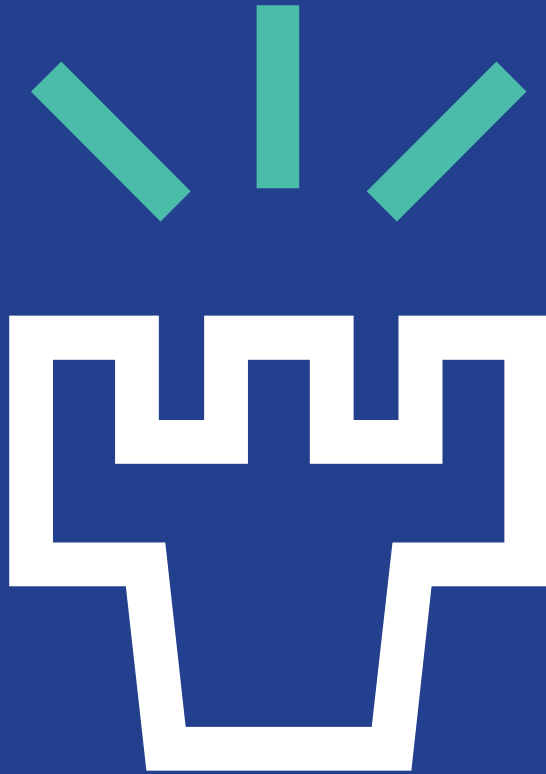
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