



European Institute of  
Innovation & Technology

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## The innovation projects' importance for social acceptance of mining activities and the raw material industry



European Institute of  
Innovation & Technology



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European Union

HEI4S3<sup>RM</sup>

# Building Ecosystem Integration Labs at HEI to Foster Smart Specialization and Innovation on Sustainable Raw Materials

HEI4S3-RM



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for social acceptance of mining  
activities and the raw material industry

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**International**

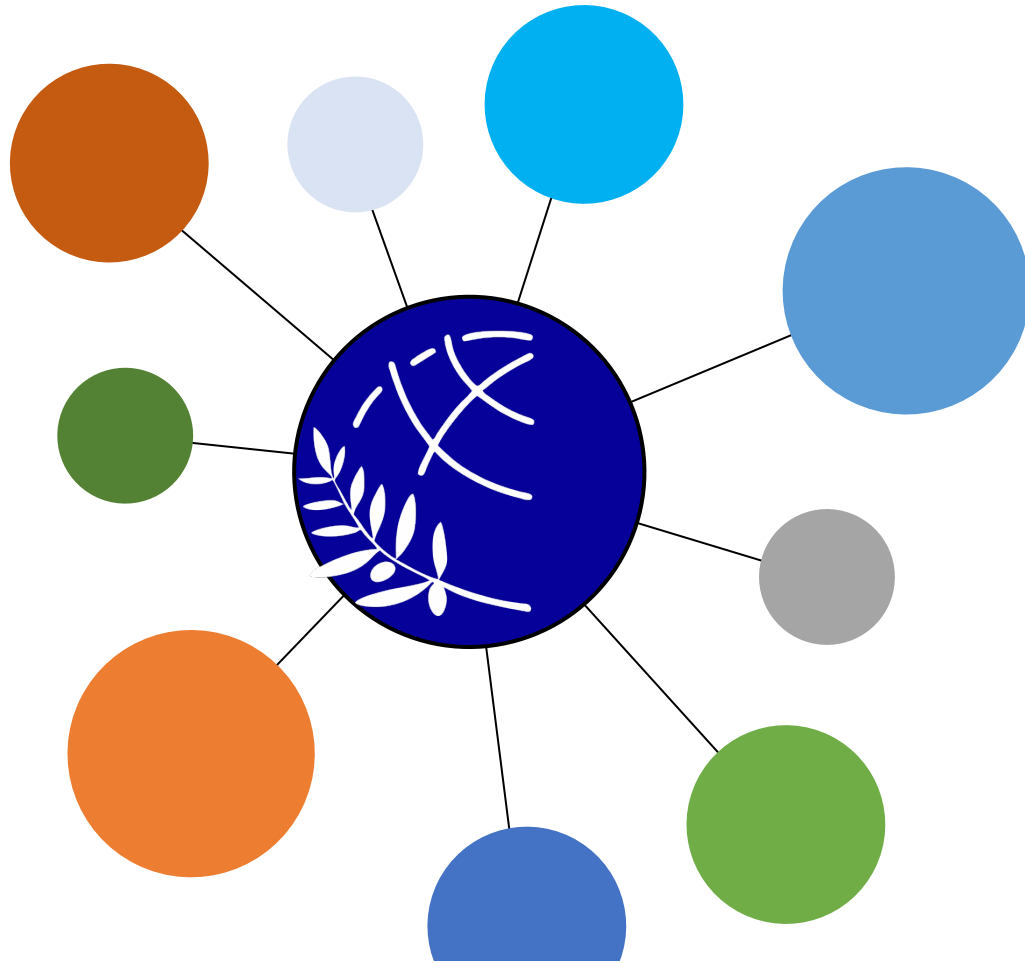
**Hellenic**

**University**

**School of Science**

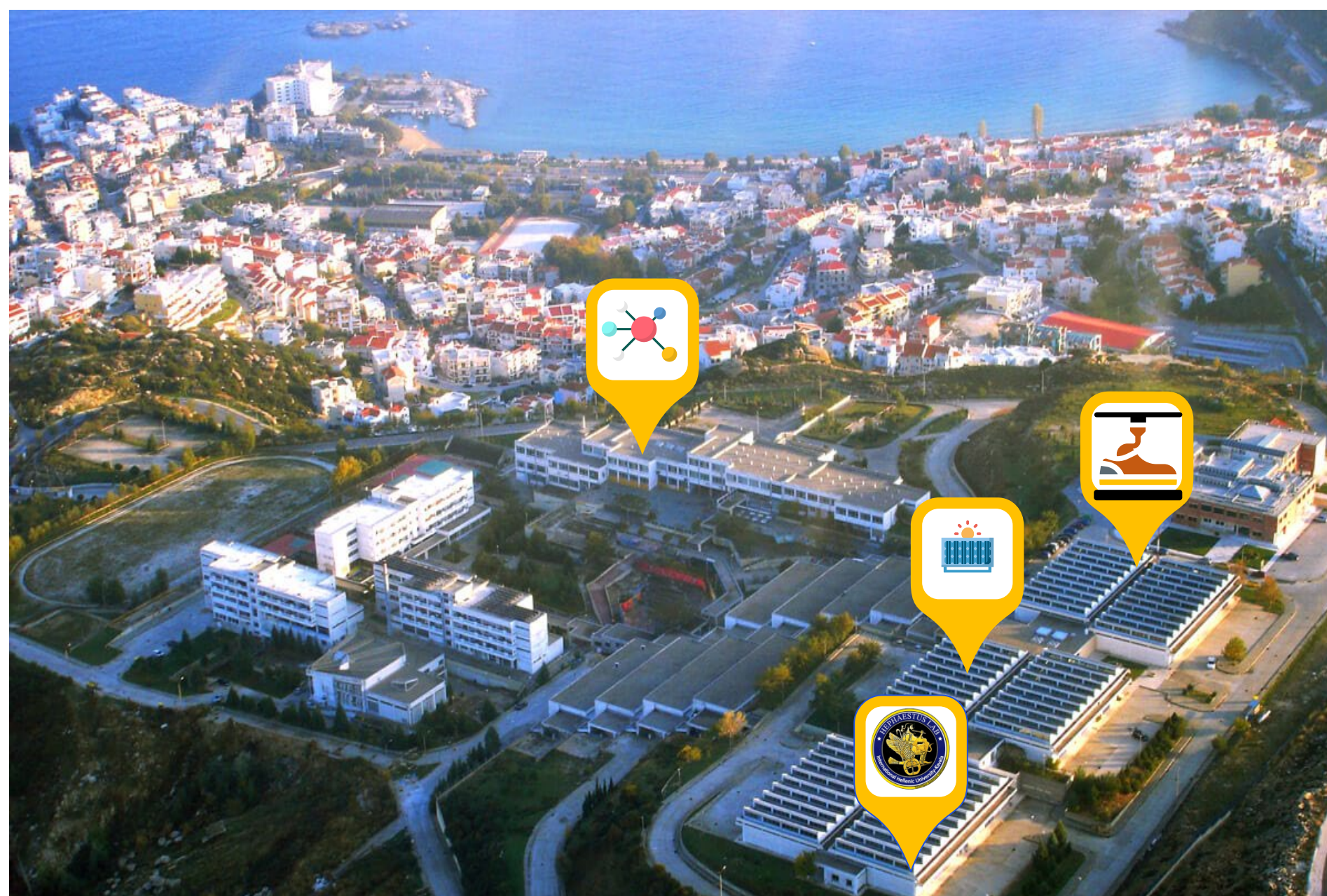
# IHU structure

**9** Schools  
**33** Departments

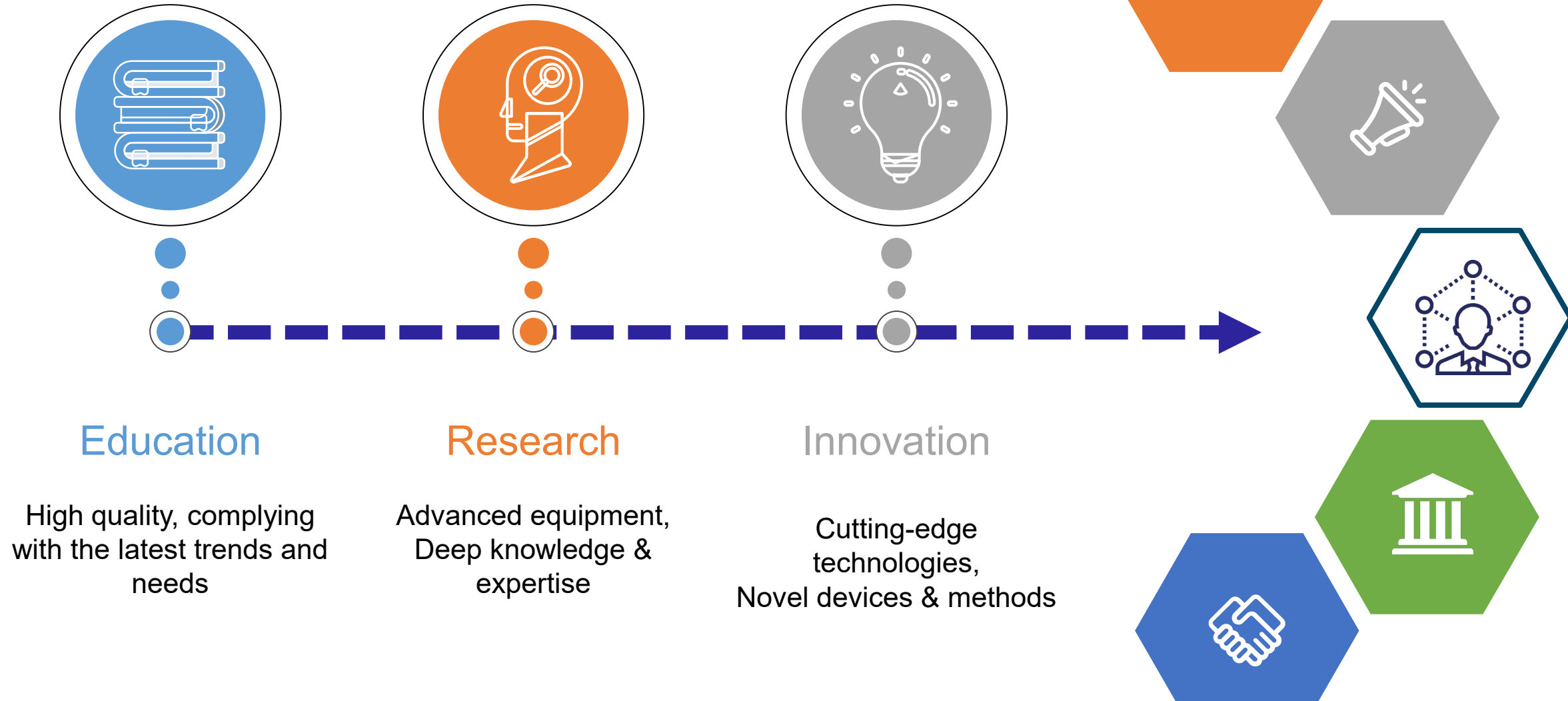


# KAVALA Campus

School of  
Science



# Our Mission



Faculty members,  
Post-Doc, PhD &  
external colleagues

>200  
researchers

20,000,000€  
<

In advanced  
equipment

Publications  
in open  
access and  
peer-review  
journals

>1000+

**R**esearch  
in **I**HU

10,000,000€  
<

In private &  
public  
funding

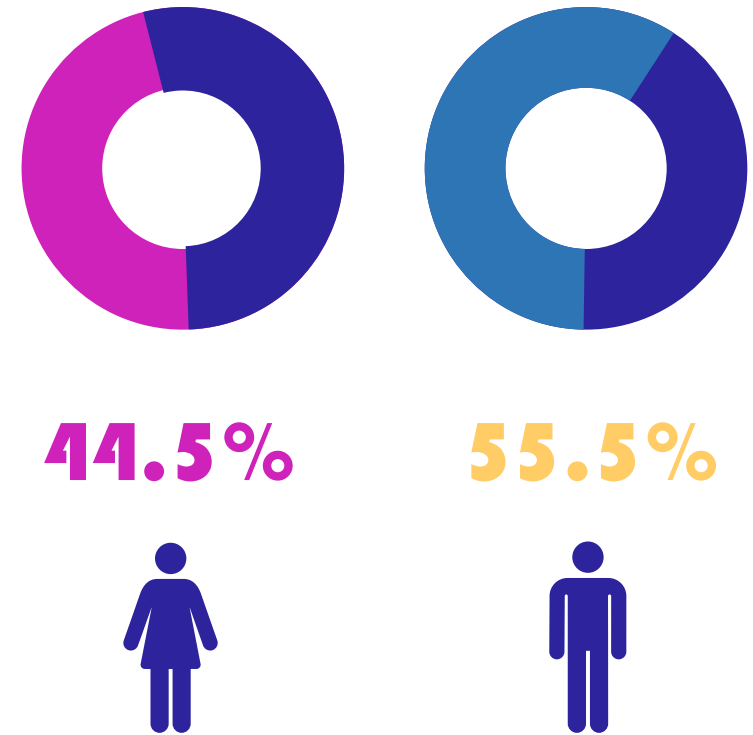
Patents in  
the past 5  
years

+20

+5 fields

Multidisciplinary  
research

# Research in sectors





# AIM OF THE COURSE



## AIM OF THE COURSE

- Learners' introduction to the problem of social acceptance in relation to mining activities
- Innovative proposals to strengthen the social acceptance of citizens



# CONTENTS



## CONTENTS

- 1 INTRODUCTION**
- 2 MINING ACTIVITIES AND RAW MATERIAL INDUSTRY**
- 3 FACTORS AFFECTING SOCIAL ACCEPTANCE**
- 4 INNOVATIONS IN MINING ACTIVITIES AND RAW MATERIAL INDUSTRY WHICH AFFECT SOCIAL ACCEPTANCE**
- 5 HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE**
- 6 CONCLUSIONS AND RESULTS**
- 7 BIBLIOGRAPHY - REFERENCES**



# INTRODUCTION



## INTRODUCTION

The general picture of the perception is presented that prevails worldwide about the intention of citizens to accept the initiation of activities of extraction and exploitation of primary materials, close to the place where they live.

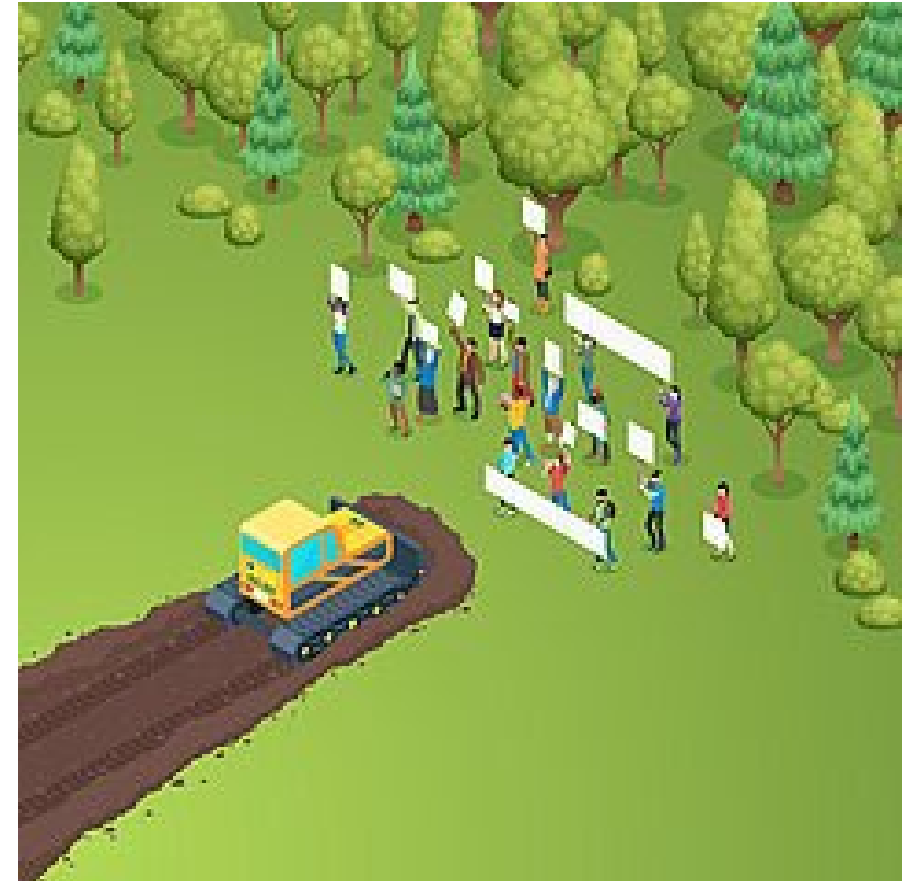
## INTRODUCTION

**Protests** and **reactions** from citizens. Citizens are being informed about the effects of industrial development on the environment and consequently on health. The mining companies do not easily convince them about their plans.



## INTRODUCTION

Mining companies **take special care of the environment**, but also of **local communities**. Therefore, for **an investment to succeed**, the company, the local authorities, and the community must relate and cooperate peacefully and effectively. Otherwise, conflicts arise.



## INTRODUCTION

**Attempts** to solve this problem: identifying the interests of the individual stakeholders, working out a compromise, and suggesting solutions that would help resolve the situation and bring benefits to all parties concerned.

In any case, the social aspect in the mining activity is very important.



## INTRODUCTION

The **aim** of the lectures:  
Introduction of students to the  
problem of social acceptance  
mining activities, and innovative  
proposals to strengthen the social  
acceptance of citizens.

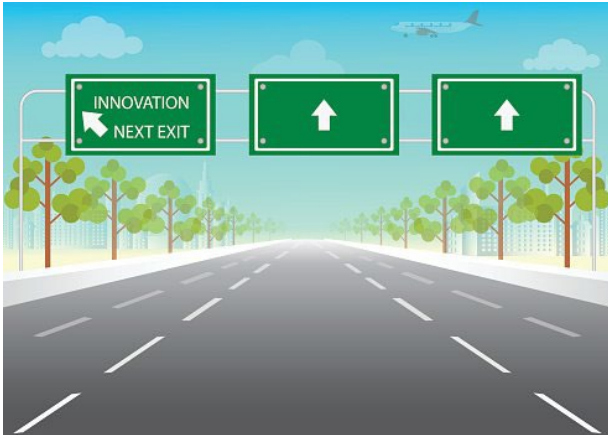


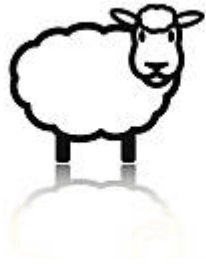
## INTRODUCTION



What are the social benefits of mining?

The social benefits of mining include **low-cost, reliable electricity and the materials necessary to build homes, schools, hospitals, roads, highways, bridges and airports.**





# MINING ACTIVITIES AND RAW MATERIAL INDUSTRY



## MINING ACTIVITIES AND RAW MATERIAL INDUSTRY



## MINING ACTIVITIES AND RAW MATERIAL INDUSTRY

### Mining activities definition

The processes of extracting metallic mineral, non-metallic mineral or industrial rock deposits from the Earth.



## MINING ACTIVITIES AND RAW MATERIAL INDUSTRY

### Raw materials definition

Raw materials are the input goods or inventory that a company needs to manufacture its products.

Examples of raw materials include **steel**, oil, corn, grain, gasoline, lumber, natural gas, forest resources, plastic, coal, and minerals.



Examples of raw materials include steel, **oil**, corn, grain, gasoline, lumber, natural gas, forest resources, plastic, coal, and minerals.



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# New concept for circular solutions with alternative raw materials



## MINING ACTIVITIES AND RAW MATERIAL INDUSTRY

### Raw materials localization

#### Countries that Produce Raw Materials

*According to 2020 World Bank data, beside are the world's top natural resource producers as a percentage of their gross domestic product (GDP).*

**Gross domestic product (GDP)** is the total monetary or market value of all the finished goods and services produced within a country's borders in a specific time period. As a broad measure of overall domestic production, it functions as a comprehensive scorecard of a given country's economic health.

*The World Bank calculates these percentages using natural resource rent. Natural resource rent is the revenue remaining after deducting the cost to access and produce the resources.*

The Congo Republic	37,4%
Iraq	32,4%
Guyana	32,4%
Kuwait	32%
Mongolia	28,1%
Sudan	26,2%
Angola	25,5%
Liberia	24%
Equatorial Guinea	23,4%
Iran	23,3%

# DIFFERENT STAGES OF MINING

EXPLORATION



CONSTRUCTION



PRODUCTION



CLOSURE



Photos: <https://pixabay.com>



# FACTORS AFFECTING SOCIAL ACCEPTANCE



The roll of economy (direct and indirect), the social (status), the political and the cultural factors are discussed.

## FACTORS AFFECTING SOCIAL ACCEPTANCE

### Economy

People work in the quarry

A **lot of people work** in the quarry so they have very good financial earnings.

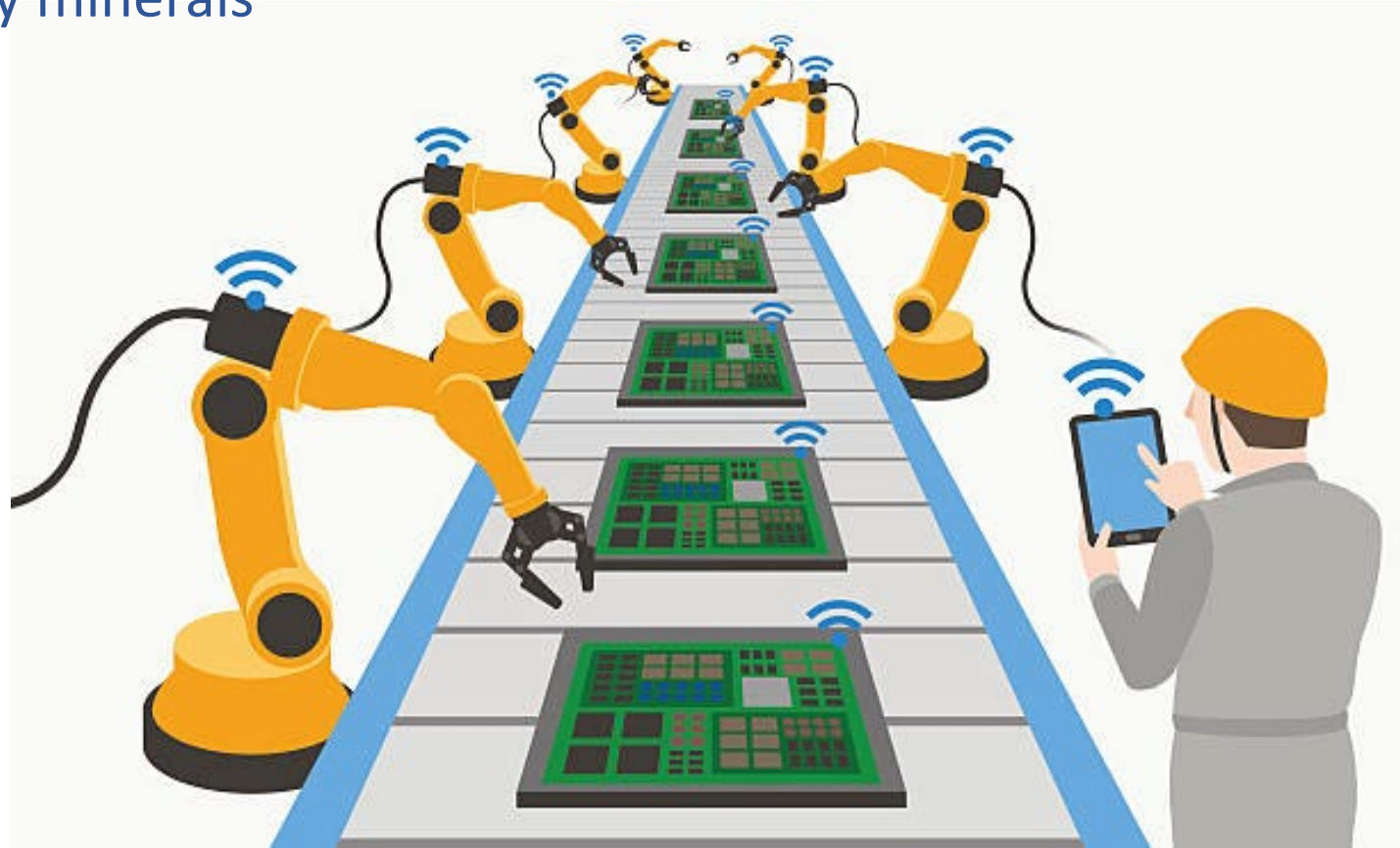


## FACTORS AFFECTING SOCIAL ACCEPTANCE

### Economy

Sectors dependent on access to many minerals

**Sectors** such as construction, chemicals, automotive, aerospace, electronics, power generation and machinery manufacturing are completely **dependent on access to many minerals.**



## FACTORS AFFECTING SOCIAL ACCEPTANCE

### Economy

New materials are being developed

**New materials** are being developed – used, for example, in modern electronics and renewable energy technologies – for the production of which rare metals are sometimes used and for which it is difficult to find a substitute.



## FACTORS AFFECTING SOCIAL ACCEPTANCE

### Economy

#### The energy transition faced by EU countries

An important **driver** of the increase in mineral resource demand will be, i.e, the energy transition faced by EU countries. Photovoltaics, wind turbines, and other similar machines will provide energy, through the exploration of mining materials.



## FACTORS AFFECTING SOCIAL ACCEPTANCE

### Social

Support and accept the quarries through the influencers

Many **people** support and accept the quarries as advertised **through influencers** as they **trust** and believe their opinion.

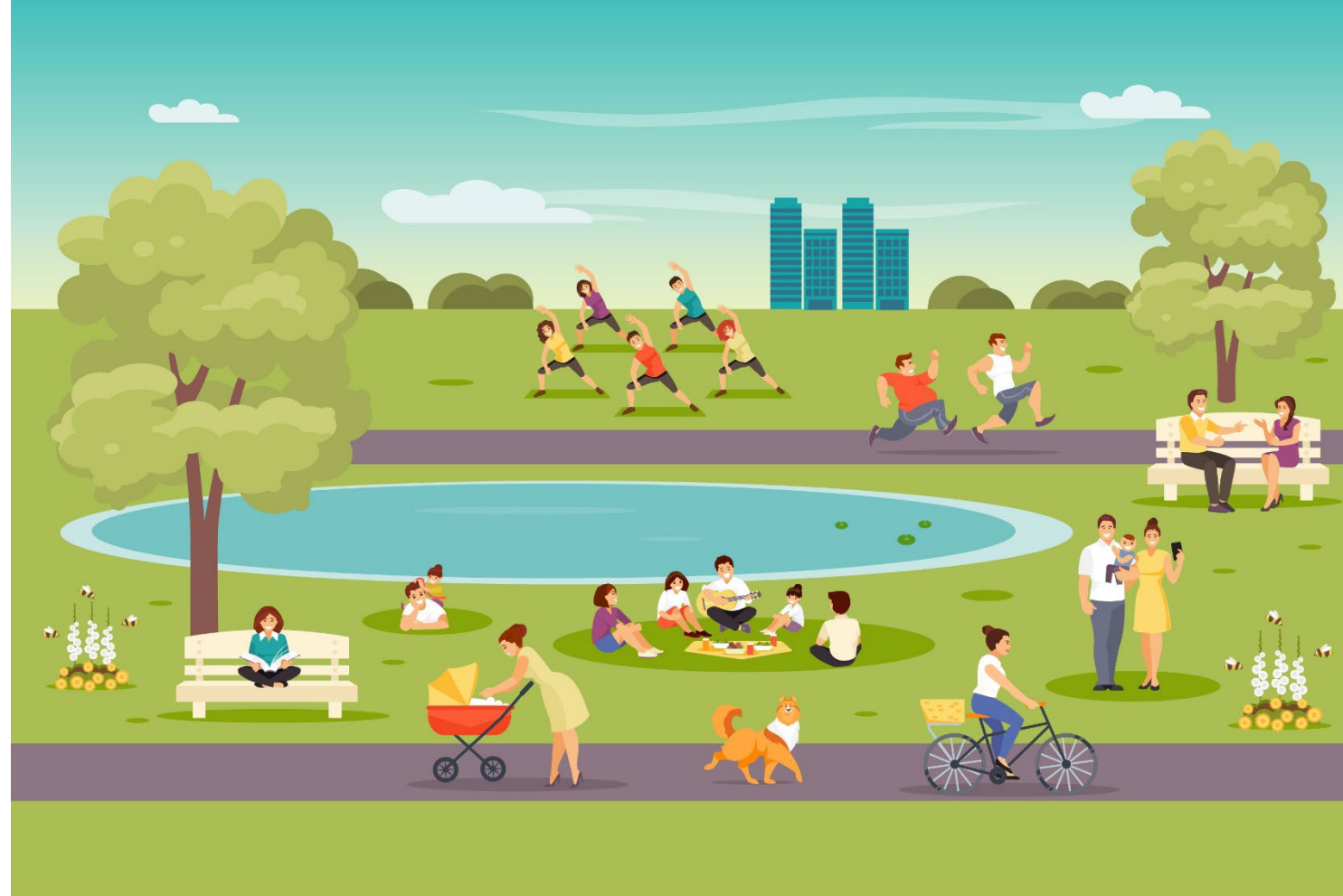


## FACTORS AFFECTING SOCIAL ACCEPTANCE

Social

Better life quality

It is more environmental  
and therefore better for  
**citizens' quality of life.**



## FACTORS AFFECTING SOCIAL ACCEPTANCE

### Social

#### Phenomenon of urbanization

The workforce will settle around the quarry areas resulting in population growth and consequently the creation of the phenomenon of **urbanization**.



## FACTORS AFFECTING SOCIAL ACCEPTANCE

### Political

The politician gains popular support

The **politician** who will invest in the quarry will give **jobs to people** when they vote for him in the elections.



**ELECTION DAY**

## FACTORS AFFECTING SOCIAL ACCEPTANCE

### Political

### Material exports

There will be **exports** both domestically and abroad, so there will be **economic development** for the country and **public relations** between the countries and politicians.

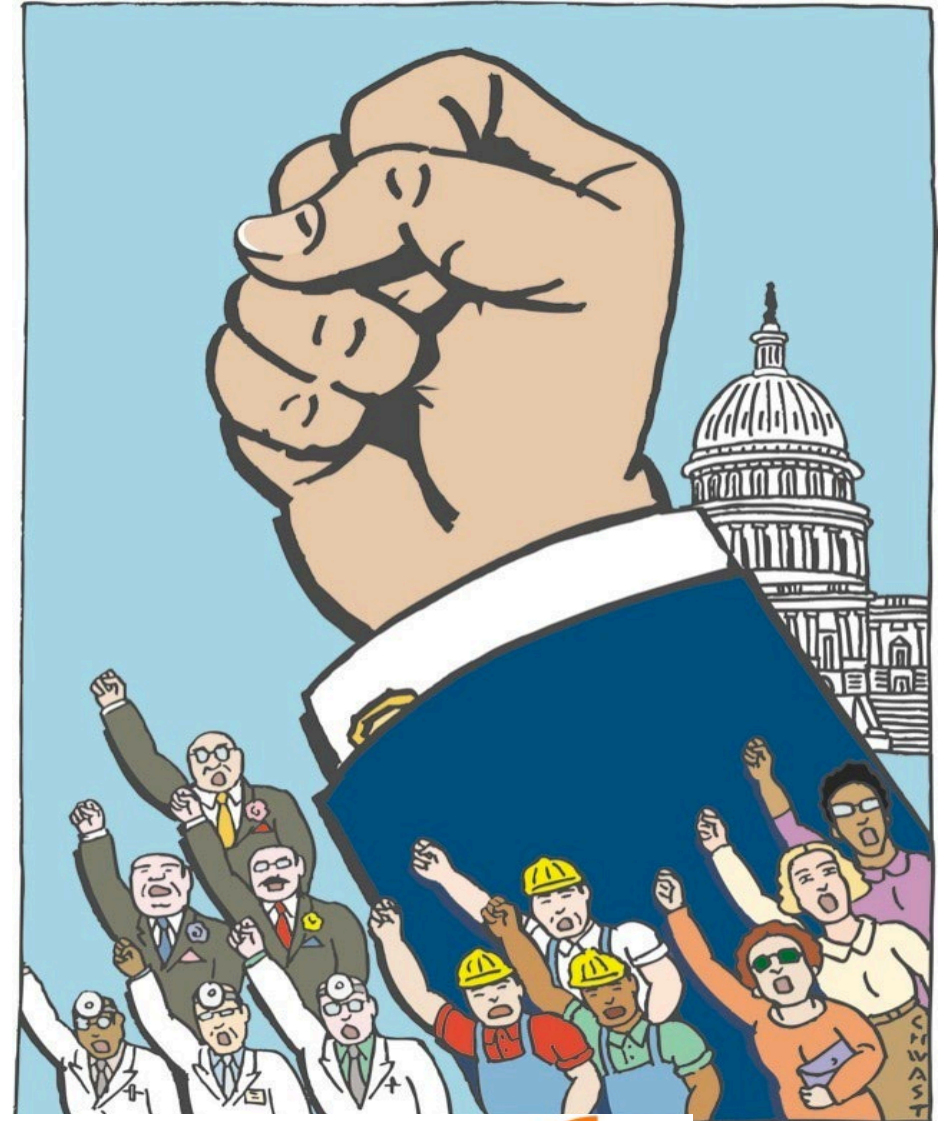


## FACTORS AFFECTING SOCIAL ACCEPTANCE

### Political

There is benefit to the politician

The **politician gains power** and therefore does things for the country and for his fellow citizens.



## FACTORS AFFECTING SOCIAL ACCEPTANCE

### Cultural

There is life in the marketplace

**Tourists** after visiting the quarry, there is **life and vitality** and of course they **bring money** to the local residents and shopkeepers.



## FACTORS AFFECTING SOCIAL ACCEPTANCE

### Cultural

The quarries will be part of the history of the area

The quarries will be **part of the history** of the area as they contributed to its development both economically and socially.





# INNOVATIONS IN MINING ACTIVITIES AND RAW MATERIAL INDUSTRY WHICH AFFECT SOCIAL ACCEPTANCE



Among others, the following topics are being discussed:

- Mining activities in several environments
- Innovative methods for the utilization of raw materials for the circular economy
- Use of innovative materials for mining activities solutions
- Innovative methods for sustainable mining
- Innovative methods for recycling in mining
- Automations

# INNOVATIONS IN MINING ACTIVITIES AND RAW MATERIAL INDUSTRY WHICH AFFECT SOCIAL ACCEPTANCE

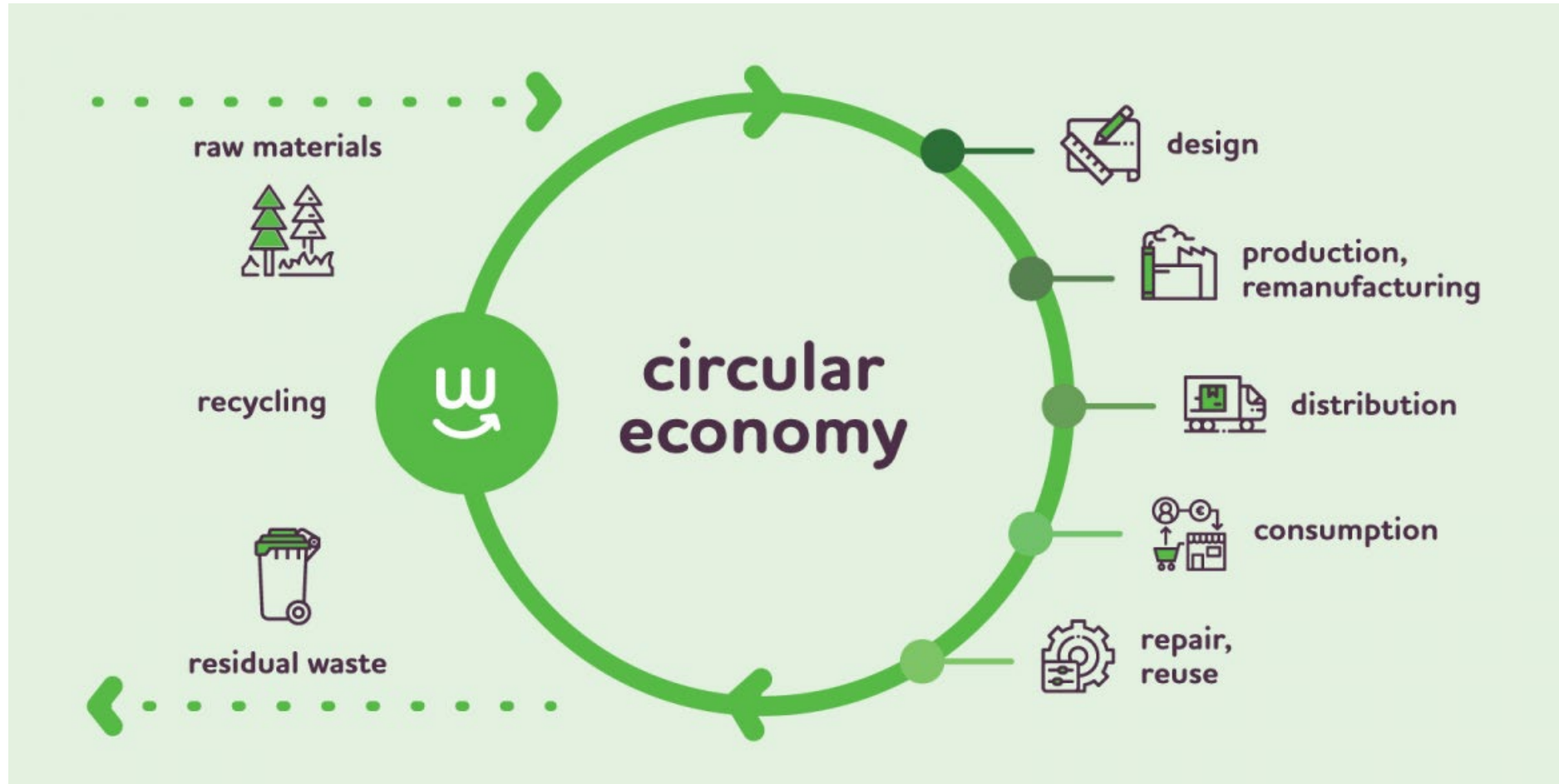
## Mining activities in several environments

There are **four main methods of mining**: *underground*, *surface*, *placer*, and *in-situ*, depending on the kind of resource for extraction, the deposit's location below or on the Earth's surface, and the capacity to extract the resource. Each method also has varying degrees of safety and impacts on the surrounding environment.



# INNOVATIONS IN MINING ACTIVITIES AND RAW MATERIAL INDUSTRY WHICH AFFECT SOCIAL ACCEPTANCE

## Innovative methods for the utilization of raw materials for the circular economy



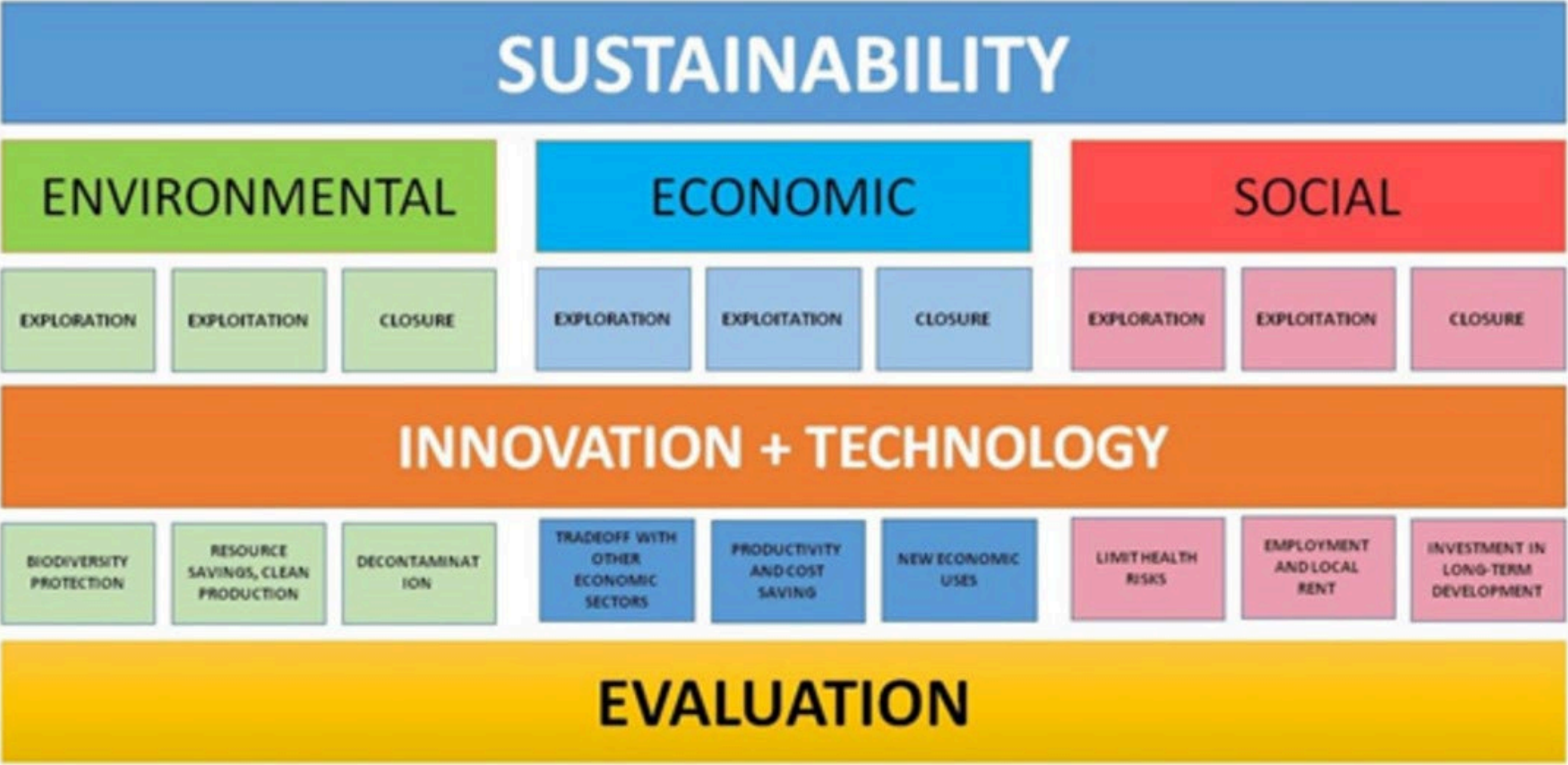
## INNOVATIONS IN MINING ACTIVITIES AND RAW MATERIAL INDUSTRY WHICH AFFECT SOCIAL ACCEPTANCE

### Use of innovative materials for mining activities solutions



INNOVATIONS IN MINING ACTIVITIES AND RAW MATERIAL INDUSTRY WHICH AFFECT SOCIAL ACCEPTANCE

Innovative methods for sustainable mining



# INNOVATIONS IN MINING ACTIVITIES AND RAW MATERIAL INDUSTRY WHICH AFFECT SOCIAL ACCEPTANCE

## Innovative methods for recycling in mining



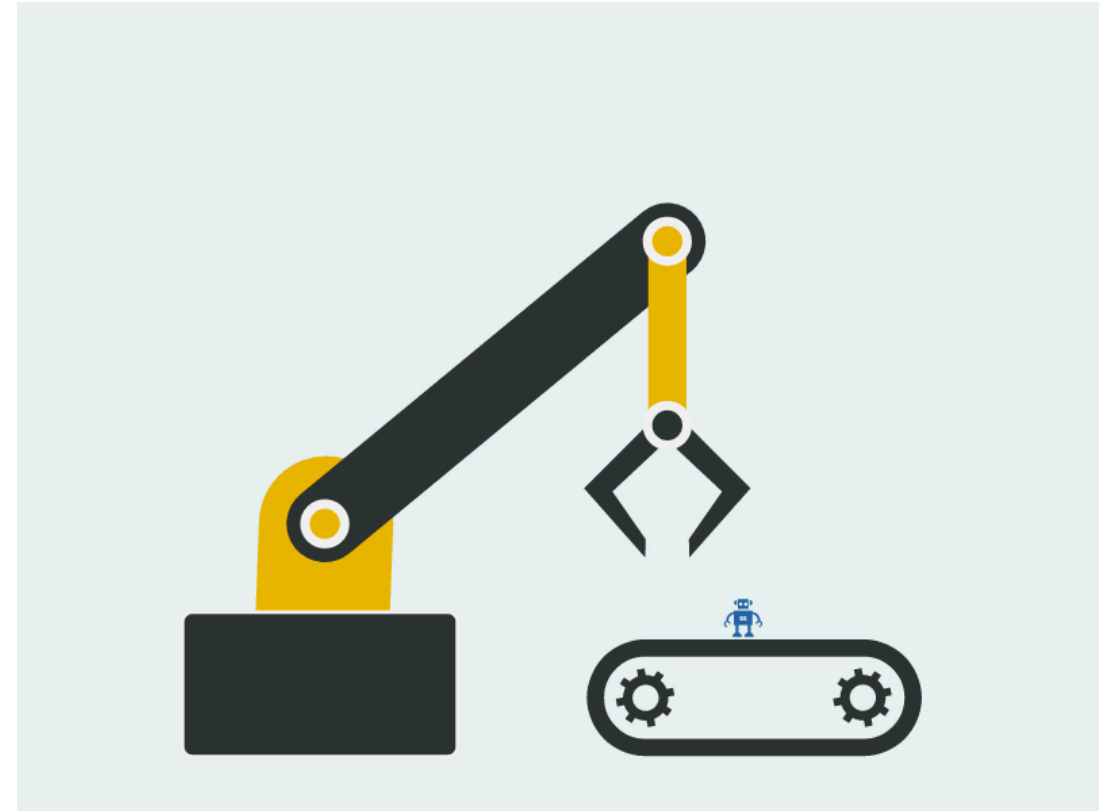
# INNOVATIONS IN MINING ACTIVITIES AND RAW MATERIAL INDUSTRY WHICH AFFECT SOCIAL ACCEPTANCE

## Innovative methods for recycling in mining



## Automations and Robotics

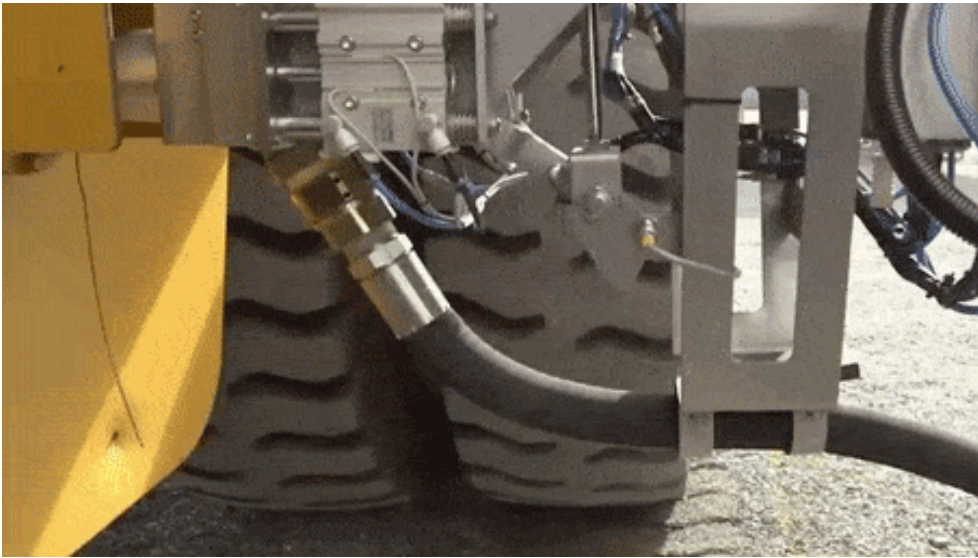
**Automation** and **robotics** are more common in the mining industry, for safer and more efficient extraction of minerals, i.e. automated drilling rigs.



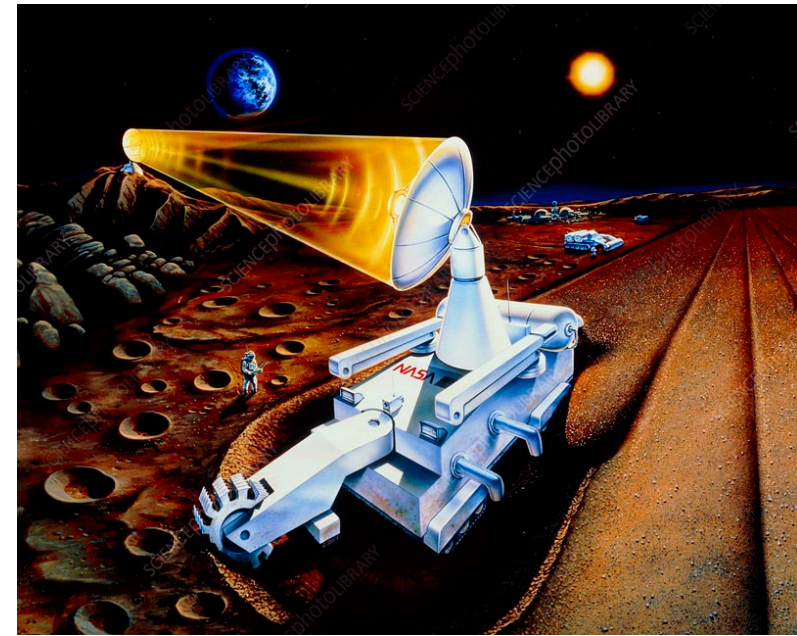
# INNOVATIONS IN MINING ACTIVITIES AND RAW MATERIAL INDUSTRY WHICH AFFECT SOCIAL ACCEPTANCE

## Automations and Robotics

One day mines may be fully automated, not just on land but in the oceans and even in space.



**The Robot Arm That Fuels Up Massive Mining Dump Trucks**



**Robot mining machine on Lunar surface**

# INNOVATIONS IN MINING ACTIVITIES AND RAW MATERIAL INDUSTRY WHICH AFFECT SOCIAL ACCEPTANCE

## Automations and Robotics



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# INNOVATIONS IN MINING ACTIVITIES AND RAW MATERIAL INDUSTRY WHICH AFFECT SOCIAL ACCEPTANCE

## Automations and Robotics





# HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE



The topics which are examined with the factors are:

- More jobs (or more qualified staff)
- Tourist attraction (abandoned quarry as a motocross track)
- Restoration (restoration, environmental terms)
- Sophisticated solutions for more green approach and operation
- Utilization of wastes (rubble, aggregates etc.)

## HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

### More jobs (or more qualified staff)

Educational seminars

Organization of seminars for the training of the basic knowledge of mining materials and technological development.



RAW MATERIALS SUMMIT



4/7/2023



## HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

### More jobs (or more qualified staff)

Employment in quarries and industries

Local residents can work in the mining operations with **full-time and high wages** due to the danger.



## HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

### More jobs (or more qualified staff)

Finding staff instructors

Experienced specialized trainers can train unskilled workers, hence the work offered is more qualitative and cost-effective.

## HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

### Tourist attraction

Abandoned quarry as a motocross track

A marble quarry, after exploiting its raw material, could be **turned into a motocross track** for the entertainment of locals and tourists.



## HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

### Tourist attraction

Abandoned quarry as a motocross track



## HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

### Tourist attraction

Utilization of the surrounding area as a place for recreation and enjoying the view

With the creation of some **refreshments**, some sports facilities, with the planting of trees, **tourism will be attracted**, and money will be brought into the area.



## HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

### Tourist attraction

Utilization of the surrounding area as a place for recreation and enjoying the view

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## HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

### Tourist attraction

Utilization of the surrounding area as a place for recreation and enjoying the view



## HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

### Tourist attraction

Easy access for cultivating crops that beautify the surrounding area



## HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

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Easy access for cultivating crops that beautify the surrounding area



## HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

### Tourist attraction

Easy access for cultivating crops that beautify the surrounding area



## HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

### Tourist attraction

Easy access to create spaces for animal protection and care



# HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

## Tourist attraction

Abandoned quarry to create a garden area



# HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

Tourist attraction

Available parking space



4/7/2023

# HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

## Restoration

Filling the voids and planting vegetation



# HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

## Restoration

Filling the voids and planting vegetation



## HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

### Restoration

Depending on a location of the quarry, establishment of a refreshment centre, observatory, hotel units, ski resorts, given the easy access



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### Restoration

Depending on a location of the quarry, establishment of a refreshment centre, observatory, hotel units, ski resorts, given the easy access

# HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

## Restoration

Depending on a location of the quarry, establishment of a refreshment centre, observatory, hotel units, ski resorts, given the easy access



# HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

## Restoration

Landscape restoration while simultaneously increasing the visual absorption capacity of this landscape



## HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

Sophisticated solutions for more green approach and operation

## HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

### Utilization of wastes

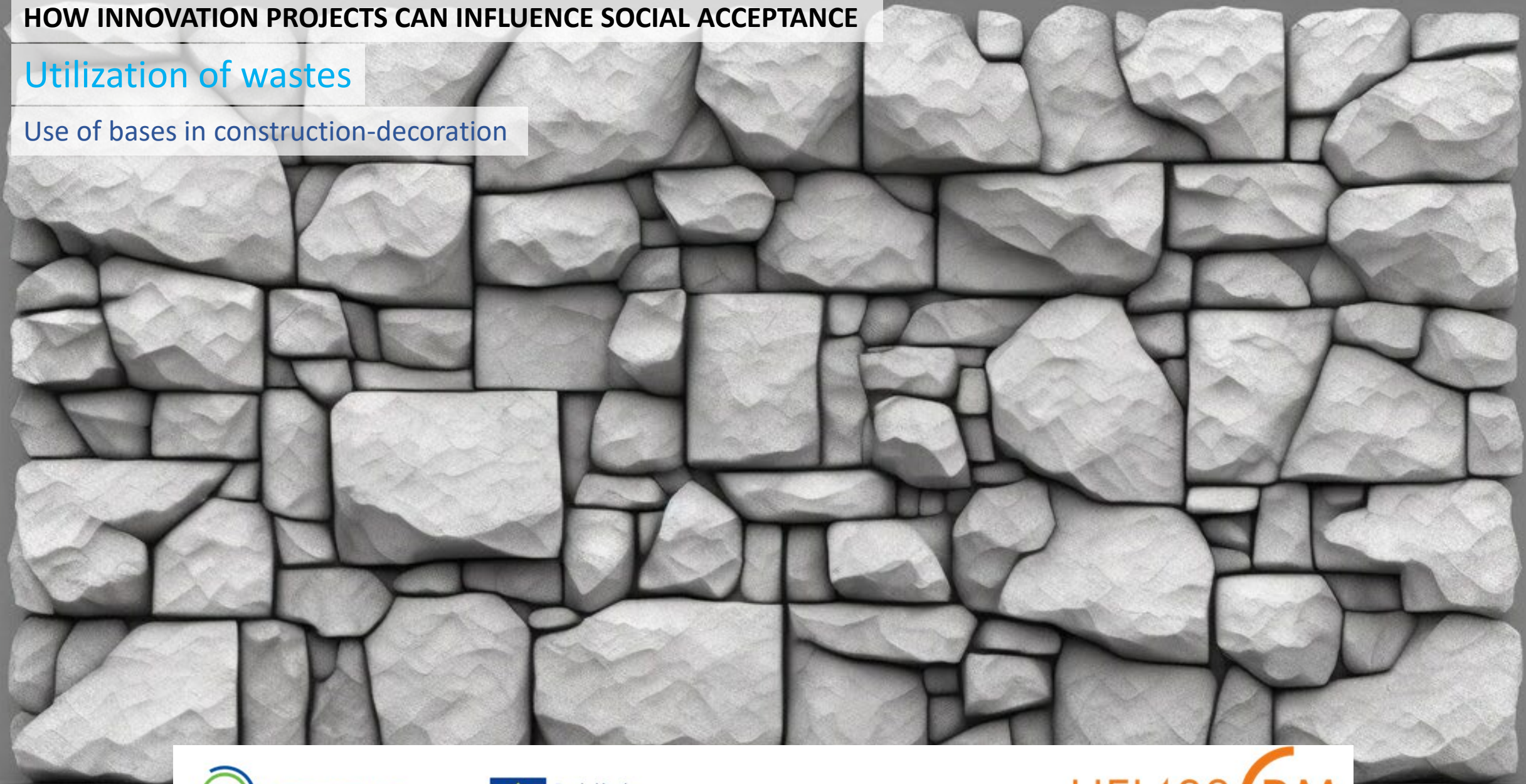
Utilization of calcium-containing marble dust to create more fertile soils



# HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

## Utilization of wastes

Use of bases in construction-decoration



## HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

### Utilization of wastes

Using the broken marbles for decorating gardens, walls and more



# HOW INNOVATION PROJECTS CAN INFLUENCE SOCIAL ACCEPTANCE

## Utilization of wastes

Waste management for power generation



# Disused quarry transformed into tourism town in east China's Shandong





4/7/2023



4/7/2023



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# CONCLUSIONS AND RESULTS



Recent innovations in mining activities and in raw material industry aim to improve social acceptance.

**Low public awareness** of the use of mineral resources in daily life and the economy, is an everyday phenomenon.

Common is the public aversion to mining activities and the **misleading identification of mining as only coal mining** and with only negative consequences for the natural environment.

Citizen protests that **prevent many mines from coming into operation** in many countries have serious consequences for the population.

Such phenomena **limit the development of the extractive industry in countries** that provide mineral resources necessary to meet the living needs of present and future generations and for the competitive economic development of these countries. This will have significant negative consequences soon.

This is because it will make it necessary for many industries to **import mineral raw materials necessary to ensure continuity of production, even though their national resources in many cases are very rich** and it is estimated that their sufficiency will be for more than one hundred years – this applies mainly to minerals.

To address this problem, **one suggestion is to address the youth**. Young people of school age are at the most appropriate age to be provided with competent and up-to-date knowledge in this area, using subjects (mainly Geography) which are compulsory in the primary and secondary education curriculum.

One of the main actions that should therefore be taken is **to pursue a reliable information campaign on the effects of geological and mining activities on the environment, which will be based exclusively on scientific knowledge.**

It is also important **to be promoted innovative mining technologies** that do not have a negative impact on the environment and, through existing rehabilitation legislation, to be returned all unused areas to nature or to society.

**Social acceptance is the main goal, and this can be achieved through proper education of society.**

It is necessary to conduct **extensive educational campaigns** about mineral resources, especially **for the younger generation and especially in an era of widespread digitalization.**

If we want to explain to young people where the basic **raw materials** that meet their needs come from, **we need to show examples that captivate their imagination.**

Recent innovations in mining activities and in raw material industry aim to improve social acceptance.  
**Let's see a few examples.**

# 1. Sustainable Mining and Raw Materials Practices

- Sustainable practices to **minimize the impact** on the environment and surrounding communities.
- Advanced technologies and equipment to **reduce emissions, reusing water and waste materials**, and **restoring land** after mining activities.

### 2. Community Engagement

- Importance of **engaging with local communities** to build trust and establish positive relationships.
- Partnering with local organizations to create **economic opportunities**, supporting **education** and **training programs**, and addressing **community concerns**.

### 3. Technological Innovations

- **Reduce the impact** of mining activities and raw material industry on the environment and local communities.
- **Autonomous mining vehicles** reduce the risk of accidents, while **sensor-based monitoring systems** can help prevent environmental damage.

### 4. Green Mining

- Use **renewable energy sources**, reducing carbon footprint, recycling, and reusing materials, and minimizing environmental impact.
- **Gain social acceptance** by demonstrating the commitment to sustainability.

## 5. Transparency and Accountability

- **Transparency to the activities**, including reporting on environmental and social impact.
- Building trust with local communities and **improving social acceptance**.

Mining and raw material companies that prioritize sustainability, community engagement, and technological innovation, **can improve social acceptance** and build long-term relationships with the communities in which they operate.



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4/7/2023



137

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### **Turning Quarries into Parks**



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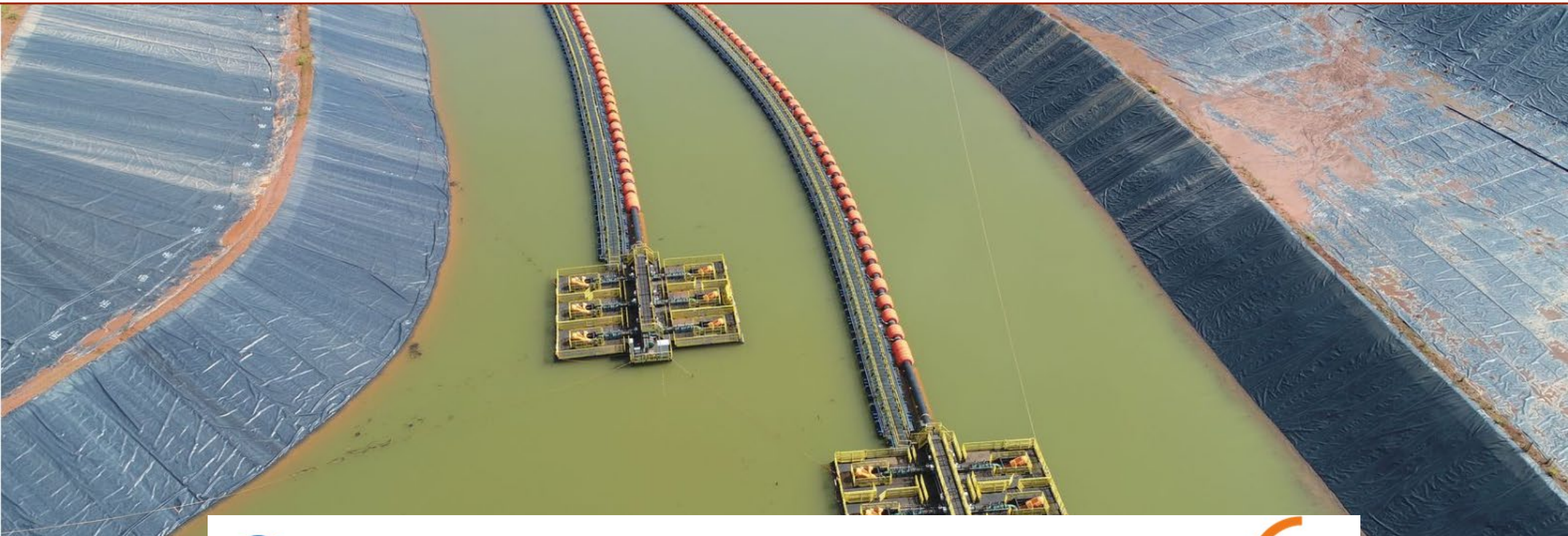
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# QUESTIONNAIRE FOR THE EVALUATION OF THE PARTICIPANTS



## Ancient examples of quarry reuse



a. Priscilla Catacombs, Rome.



b. Le Fontanelle Cemetery, Naples.  
Dominik Matus/©BY-SA-4.0



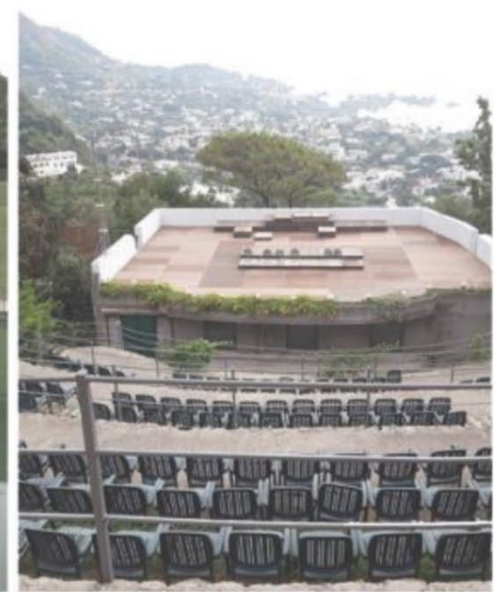
c. Mauthausen concentration camp,  
Austria.  
Bundesarchiv, Bild 192-269/©BY-SA 3.0



d. Air-raid shelters, Colleferro, Italy.



e. Boboli Gardens, Florence.  
Carlo Mori/©BY SA 3.0



f. La Mortella Gardens, Ischia, Italy.  
Katia Talento

Part of the Lusatian Lake District in the former East Germany, where billions of euros have been spent converting old brown coal mine pits, into artificial lakes.



Derelict open-cast mines dating from communist East Germany are being flooded, transforming the area into Europe's biggest artificial lake district. Developers hope it will become a tourist magnet as well.



# China's Economic Dependence on Coal Mining



A construction company in Zhangpu had placed potted plants and turf on concrete or sandy ground to disguise them as green lands.



# Metal ore extraction quarry in Krivyi Rih, Ukraine





Thank you very much for your attention!