



UNIVERSIDAD  
**NACIONAL**  
DE COLOMBIA

PROYECTO **CULTURAL, CIENTÍFICO Y COLECTIVO** DE NACIÓN

# Sustainable processes in mineral raw materials production

## *Fundamentals of sustainability*

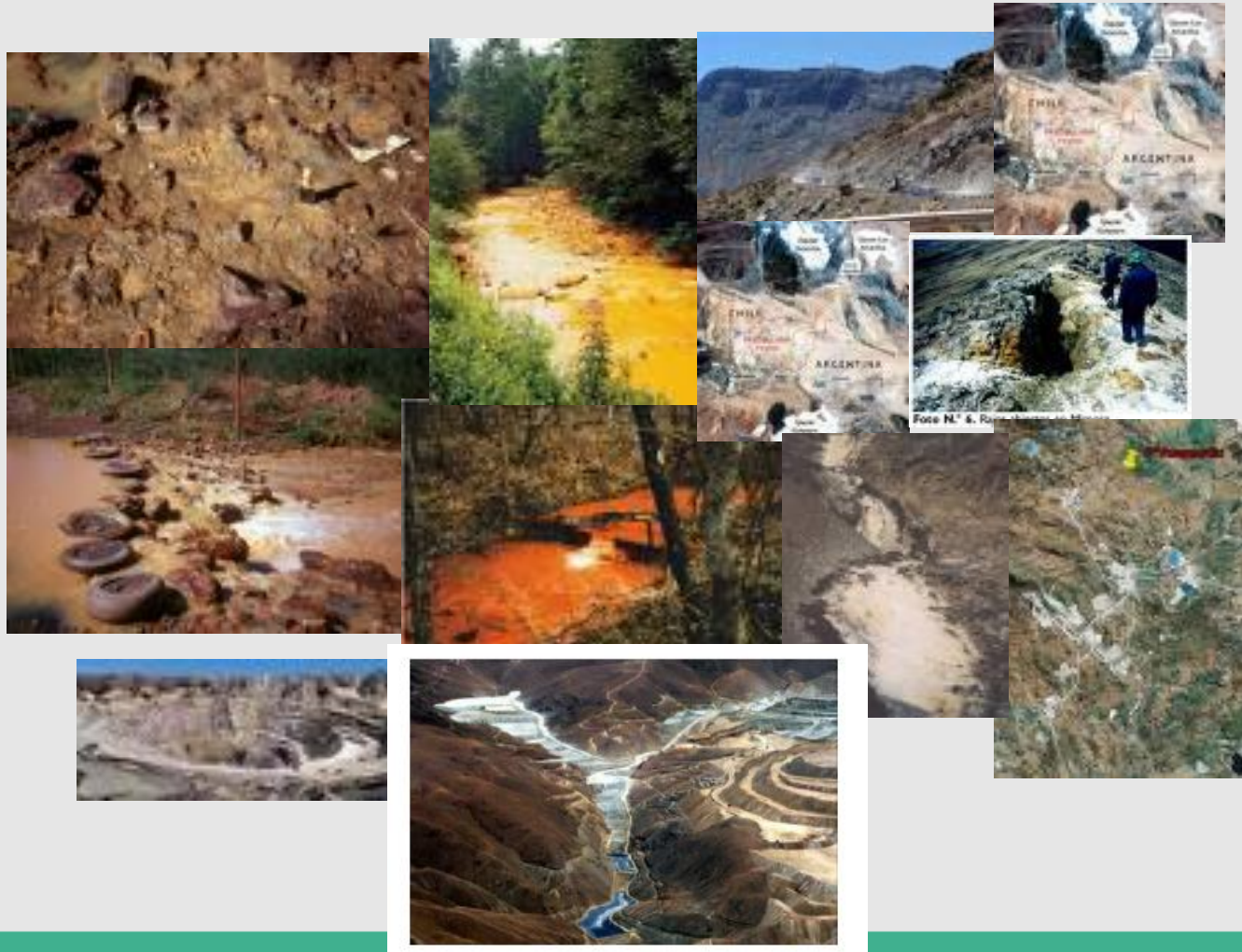
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Óscar Jaime Restrepo Baena  
Departamento de Materiales y Minerales  
Facultad de Minas  
Universidad Nacional de Colombia  
e-mail: [ojrestre@unal.edu.co](mailto:ojrestre@unal.edu.co)

HEI4S3-RM Project Webinar  
March 28th 2023



# PRESENTATION





# PRESENTATION



Imágenes tomadas de: Google

# IMPORTANCE OF RESPONSIBLE MINING

## Job Generation



**THE BENEFITS OF  
SUSTAINABLE MINING  
ARE LONG-LASTING  
ASSETS**

## Regional Development



## Environmental Sustainability



Imágenes tomadas de: Google

## Royalties



## Foreign Investment



# What is Sustainable Development?

“Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

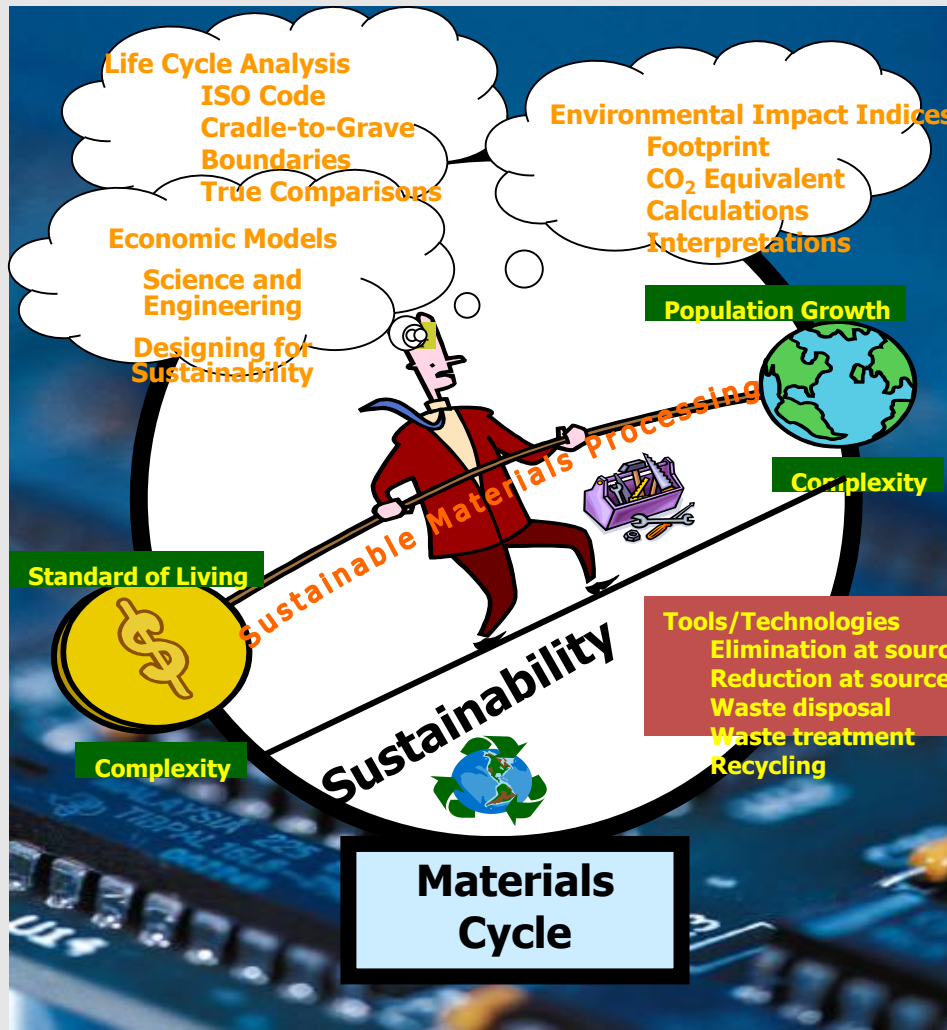
Informe de la Comisión Bruntland de



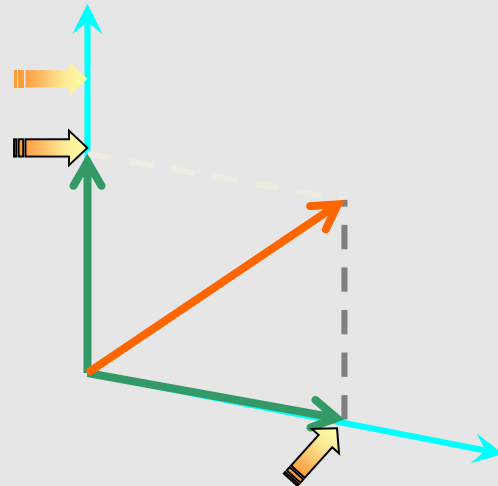
...m for thinking about a future  
...l, social and economic  
...nced in the pursuit of  
...quality of life.”

Unesco, 2012.





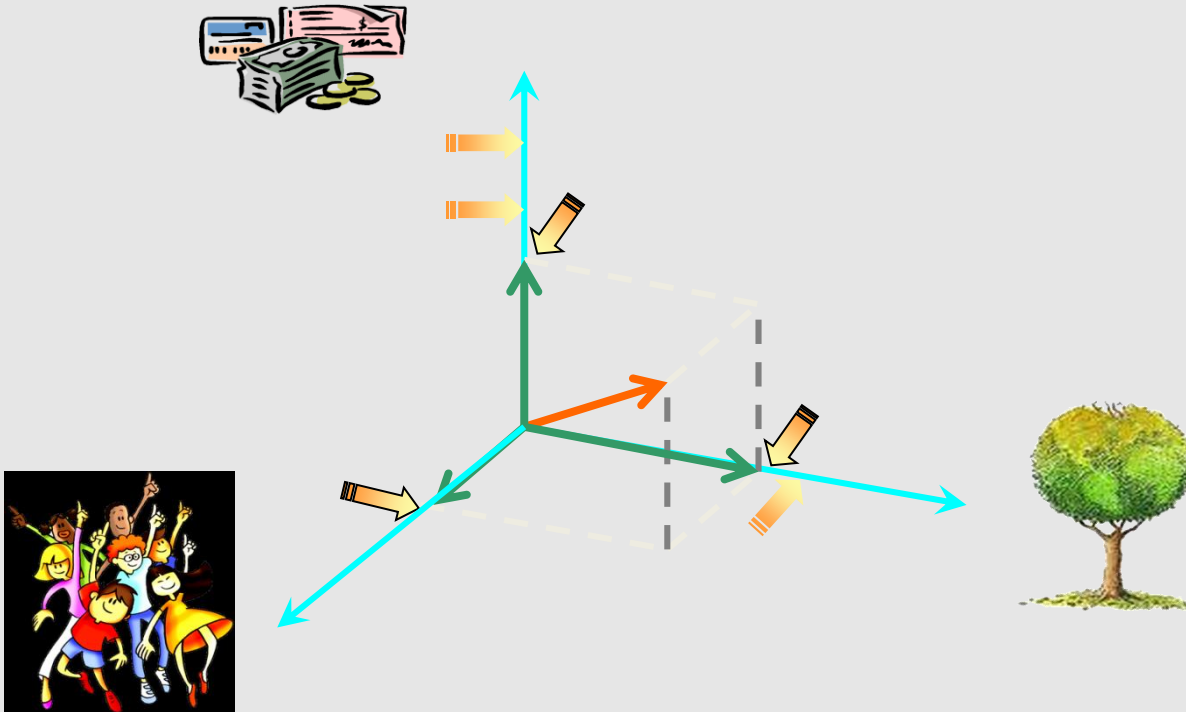
Poncet JM, 1996



**ONE-DIMENSIONAL CONCEPT OF DEVELOPMENT**

**TWO-DIMENSIONAL CONCEPT OF SUSTAINABLE DEVELOPMENT**





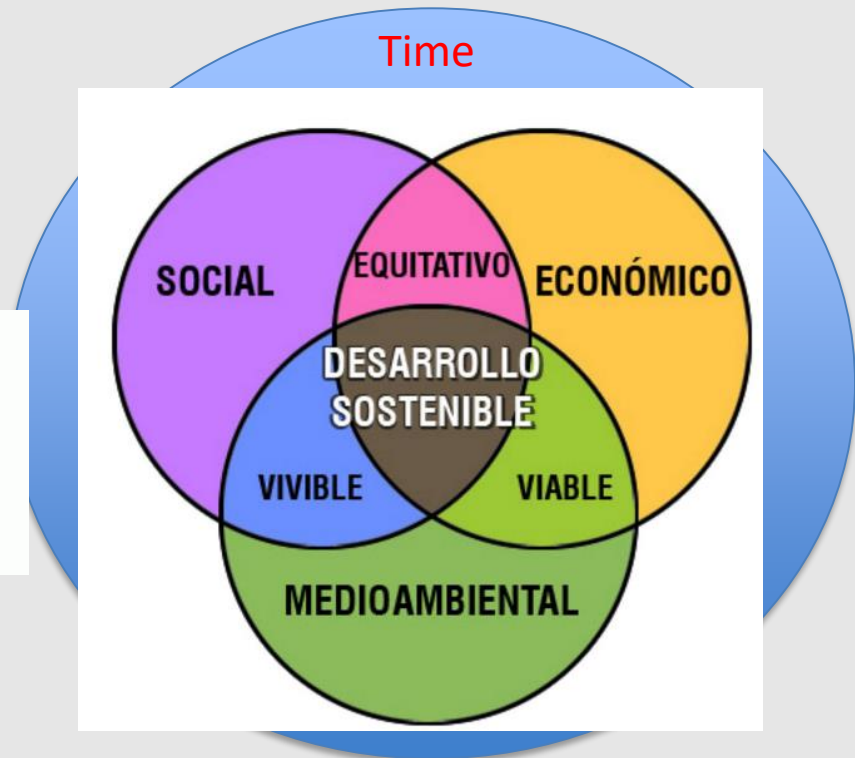
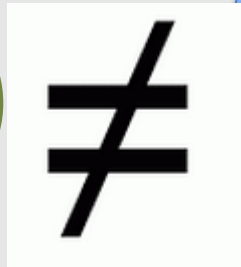
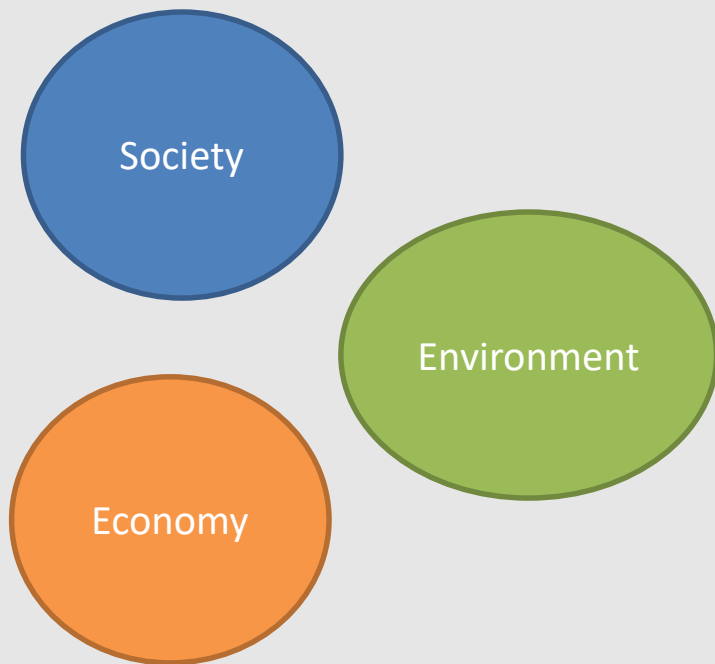
**3-DIMENSIONAL CONCEPT OF  
SUSTAINABLE DEVELOPMENT**



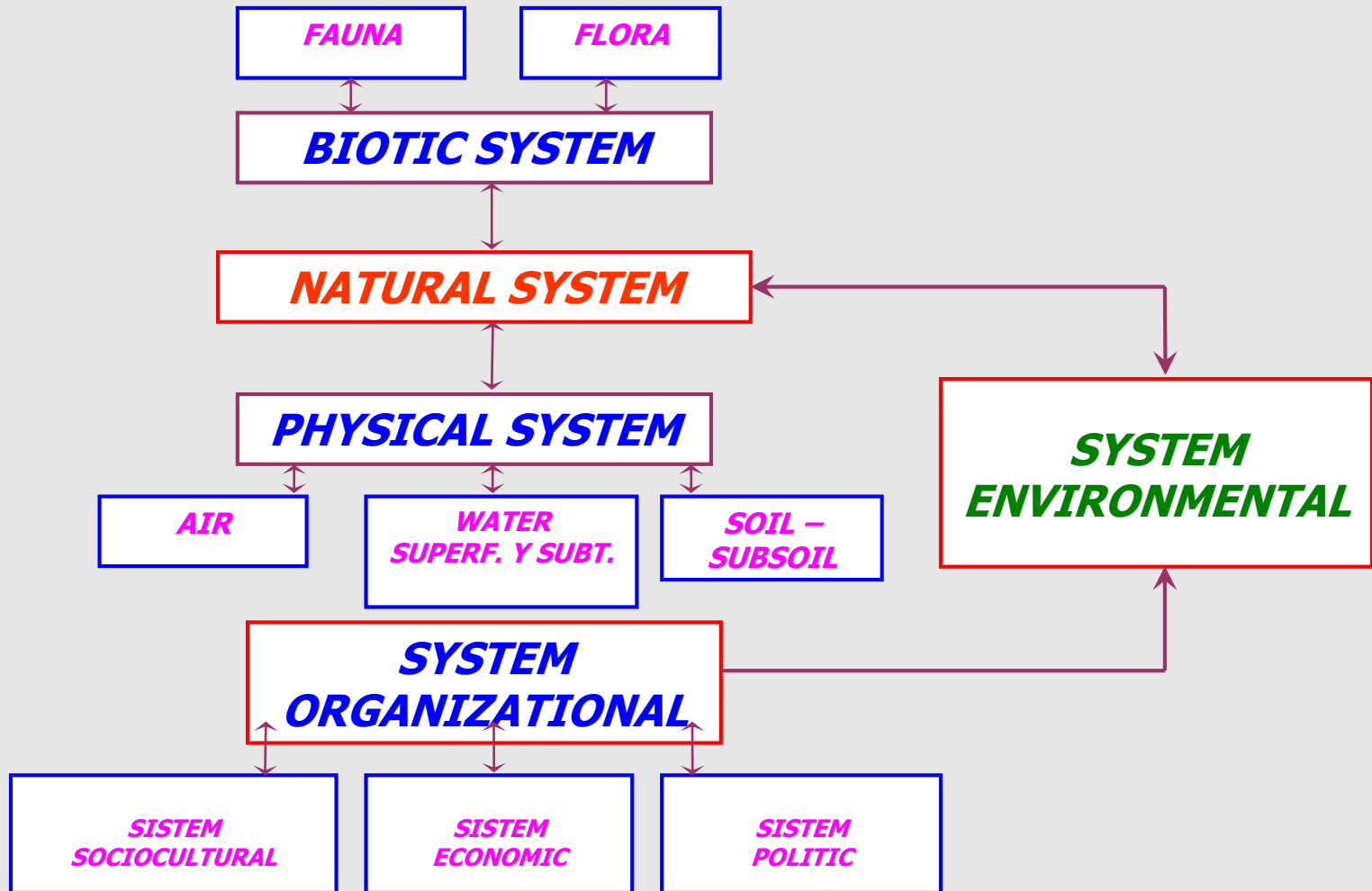
***This dimension involves the dynamics of each of the variants***

***Social and cultural changes over time  
Economic changes over time  
Environmental changes over time***

# Principles of Sustainable Development



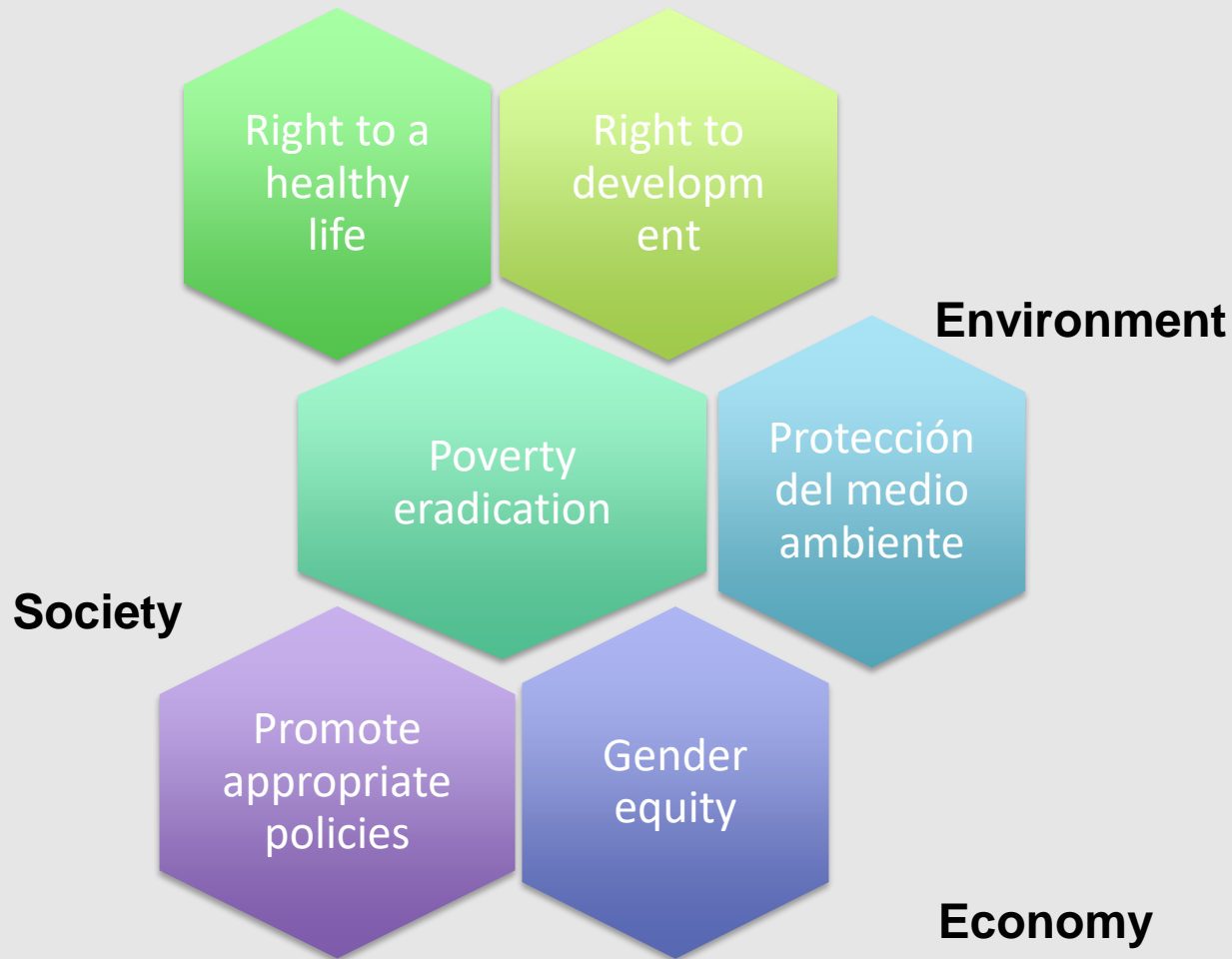
# Environmental system structure



MMA-Unal 1998



# Principles of Sustainable Development





# SUSTAINABLE DEVELOPMENT GOALS

17 GOALS TO TRANSFORM OUR WORLD

<b>1</b> NO POVERTY 	<b>2</b> ZERO HUNGER 	<b>3</b> GOOD HEALTH AND WELL-BEING 	<b>4</b> QUALITY EDUCATION 	<b>5</b> GENDER EQUALITY 	<b>6</b> CLEAN WATER AND SANITATION 
<b>7</b> AFFORDABLE AND CLEAN ENERGY 	<b>8</b> DECENT WORK AND ECONOMIC GROWTH 	<b>9</b> INDUSTRY, INNOVATION AND INFRASTRUCTURE 	<b>10</b> REDUCED INEQUALITIES 	<b>11</b> SUSTAINABLE CITIES AND COMMUNITIES 	<b>12</b> RESPONSIBLE CONSUMPTION AND PRODUCTION 
<b>13</b> CLIMATE ACTION 	<b>14</b> LIFE BELOW WATER 	<b>15</b> LIFE ON LAND 	<b>16</b> PEACE, JUSTICE AND STRONG INSTITUTIONS 	<b>17</b> PARTNERSHIPS FOR THE GOALS 	 <b>SUSTAINABLE DEVELOPMENT GOALS</b>

UN, 2016

# Mining Sector and Sustainable Development (SD)

Different authors posit mining as inherently unsustainable given its exploitation of NRNR (Sterman et al, 2012; Fonseca et al, 2013).

Mining can contribute significantly to the social and economic aspects of SD while mitigating its environmental impacts (ICMM, 2012).

# Requirements for a sustainable mining activity

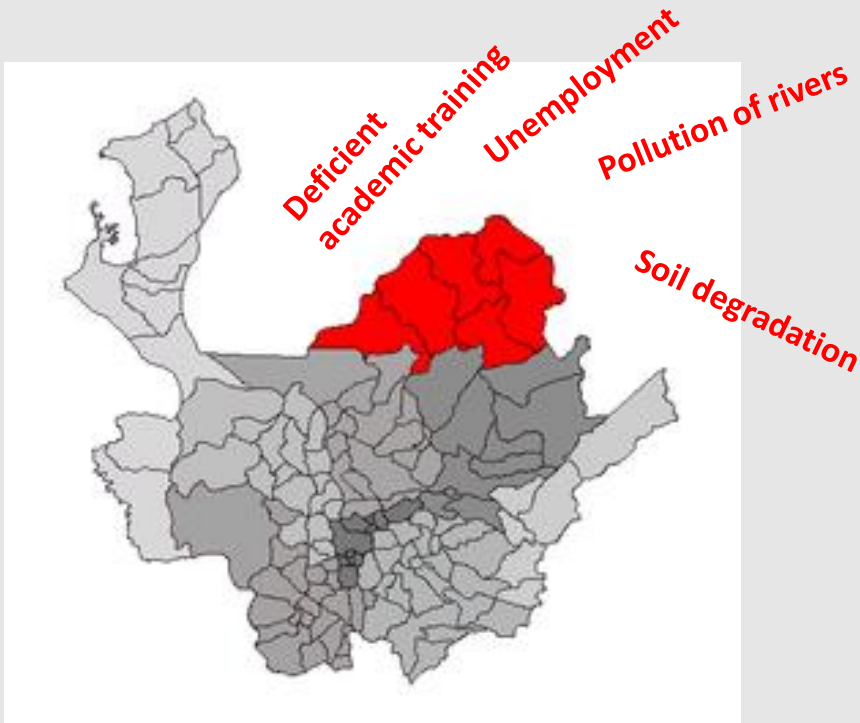




# is it possible to think that mining is sustainable?



**If you start from the premise:  
Problems in SD = Opportunities for innovation.**

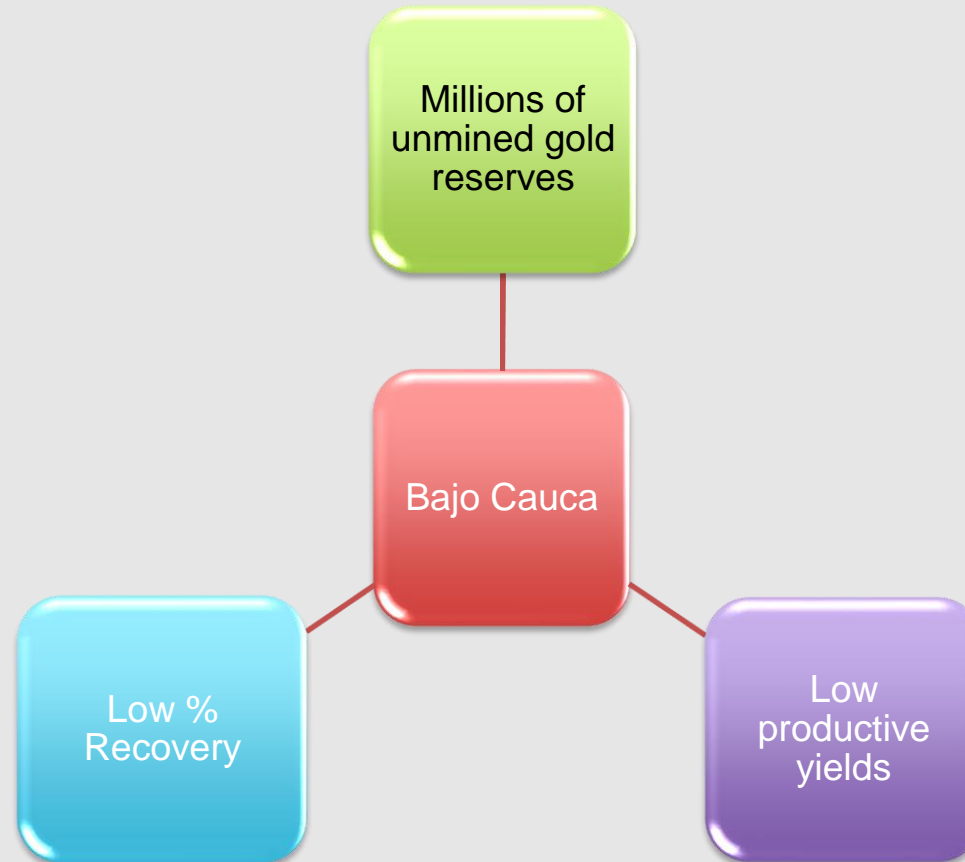


**Impediments to Sustainable  
Development of Mining?**

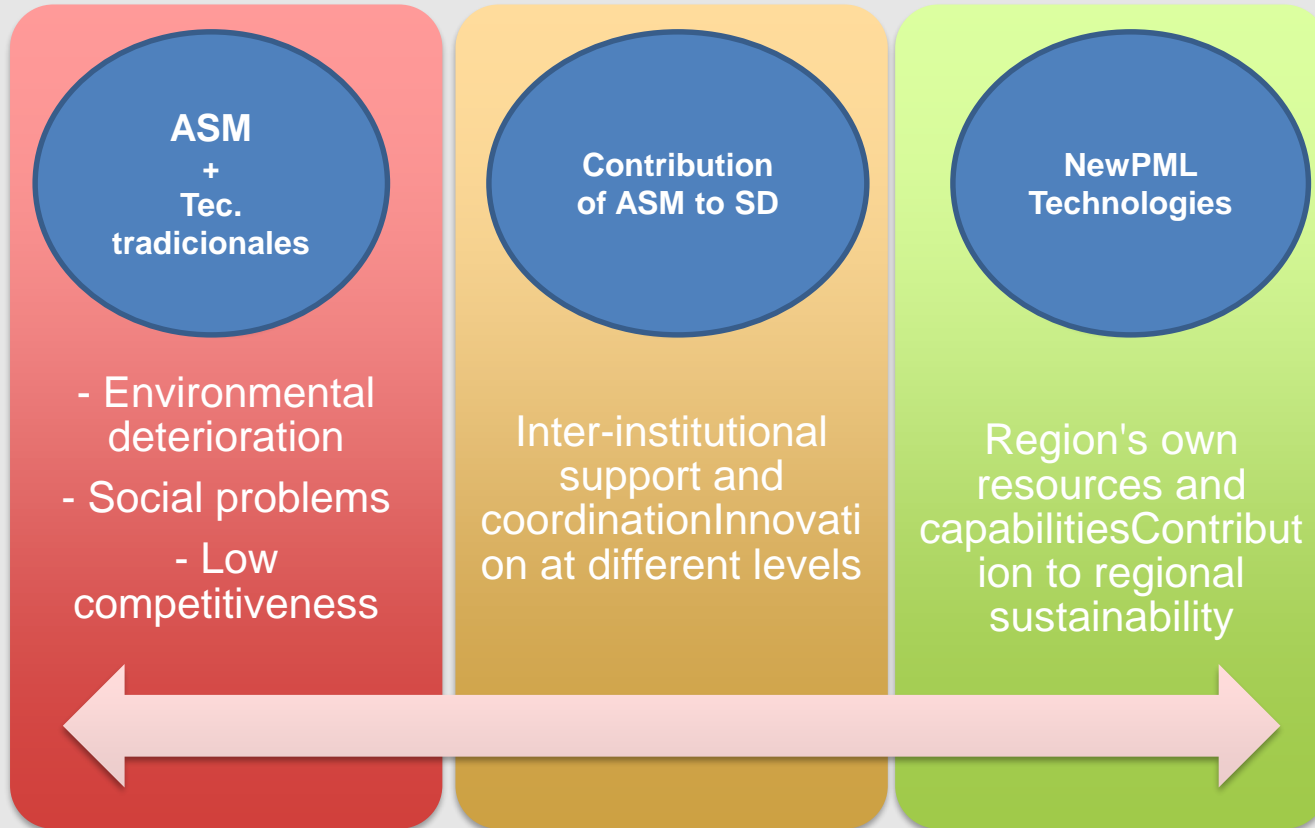
**Justify the presence of  
mining in the region!**

**What kind of mining?**

# Regional Opportunities



# ASM and SD in Bajo Cauca Antioqueño





# Cleaner production in ASM

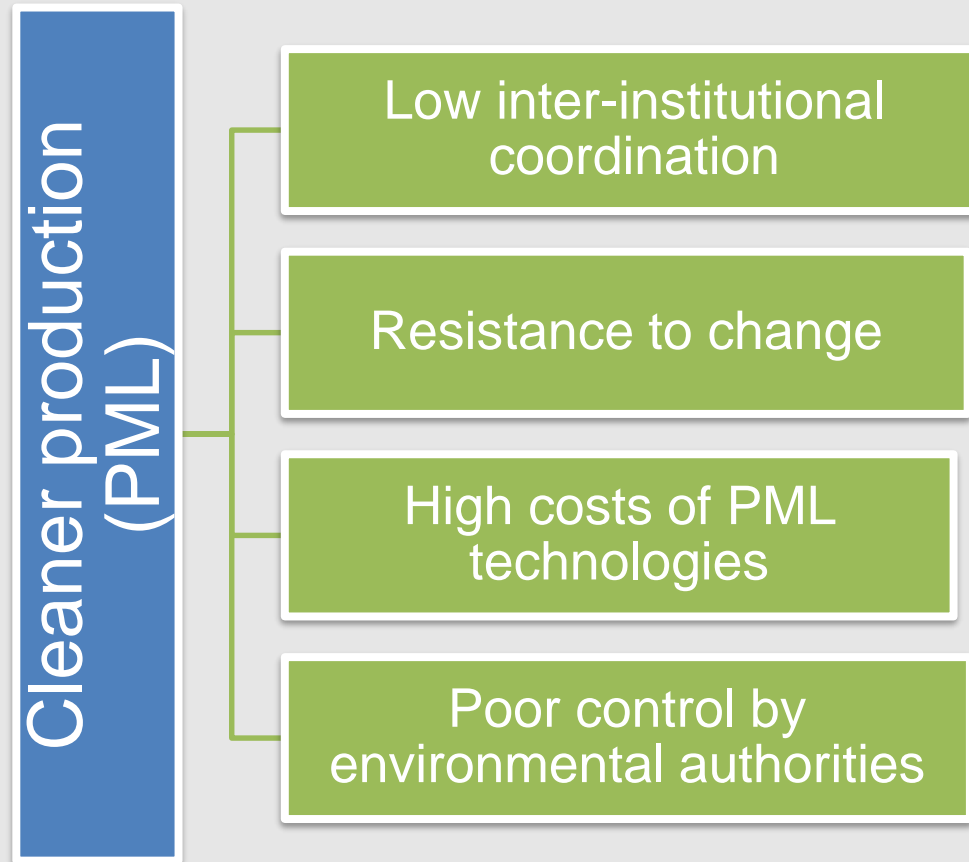
Continuous, comprehensive and preventive environmental strategy

Efficient resource management

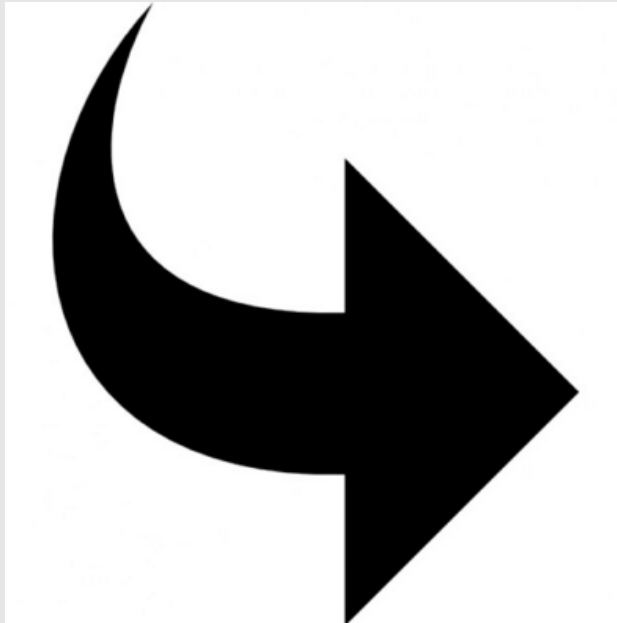
Reduction of environmental impacts

Expertise, improved technologies and attitude towards change

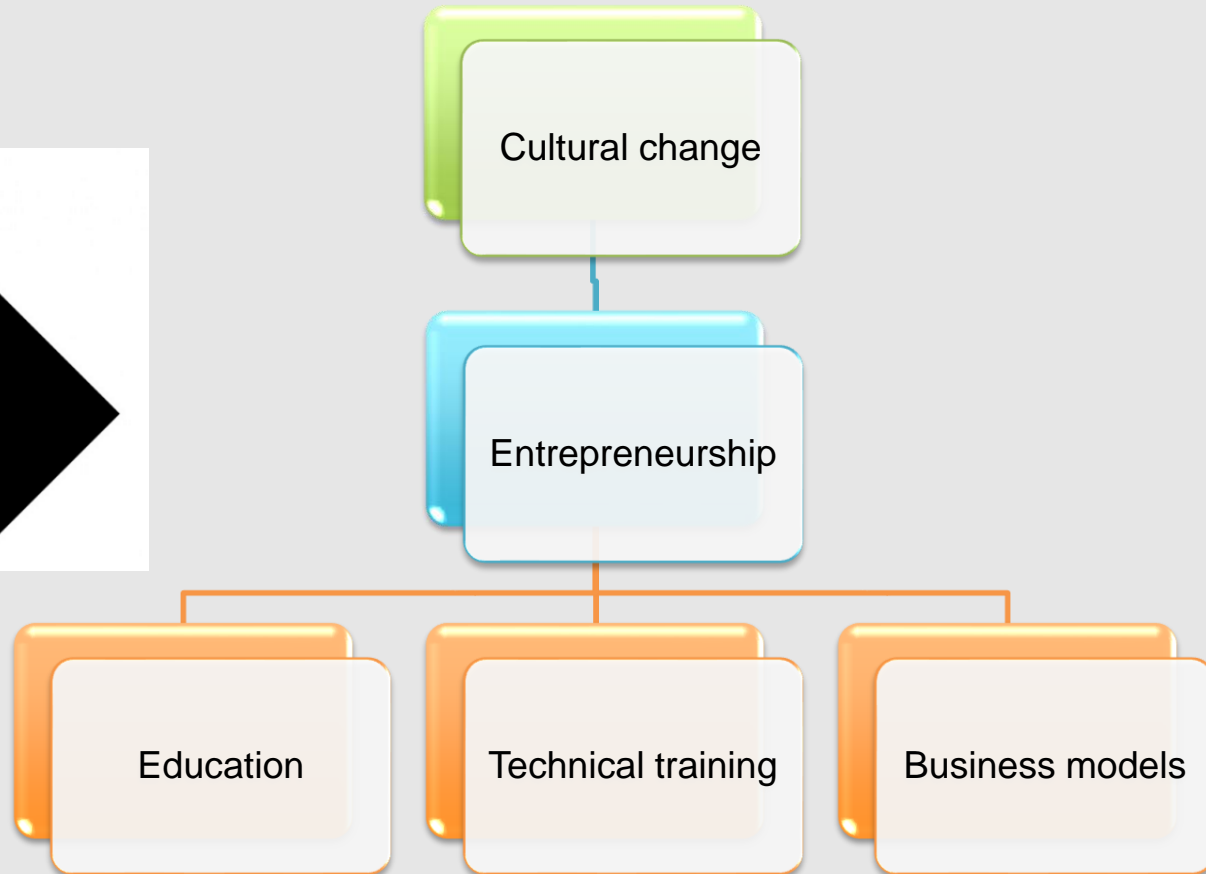
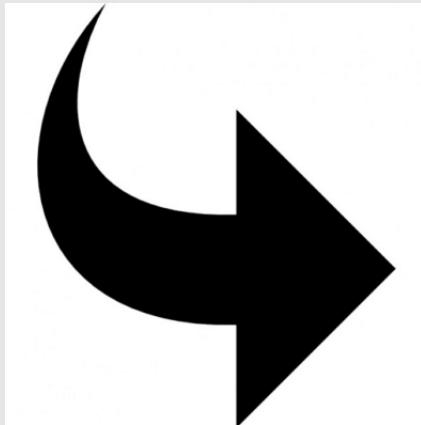
# Why is the application of PML technologies isolated and not integral projects?



# Development of mining regions

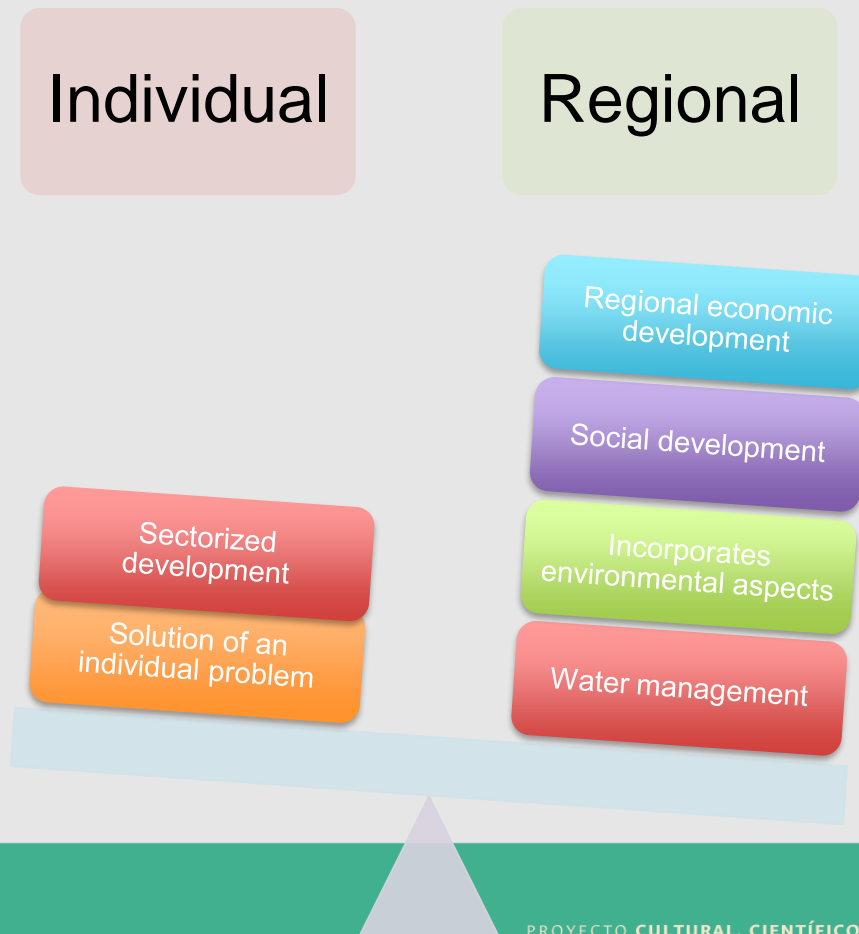


# Development of mining regions



(Silvestre y Neto, 2014)

# Regional vs. individual initiatives



(Milanez y Puppim, 2013)

# The 10 Principles of Sustainable Mining

1. Ethical business practices and sound corporate governance systems

2. Integrate sustainable development issues into decision making.

3. Fundamental human rights and respect for cultures

4. Implement risk management strategies

5. Improving the health and safety sector



# The 10 Principles of Sustainable Mining

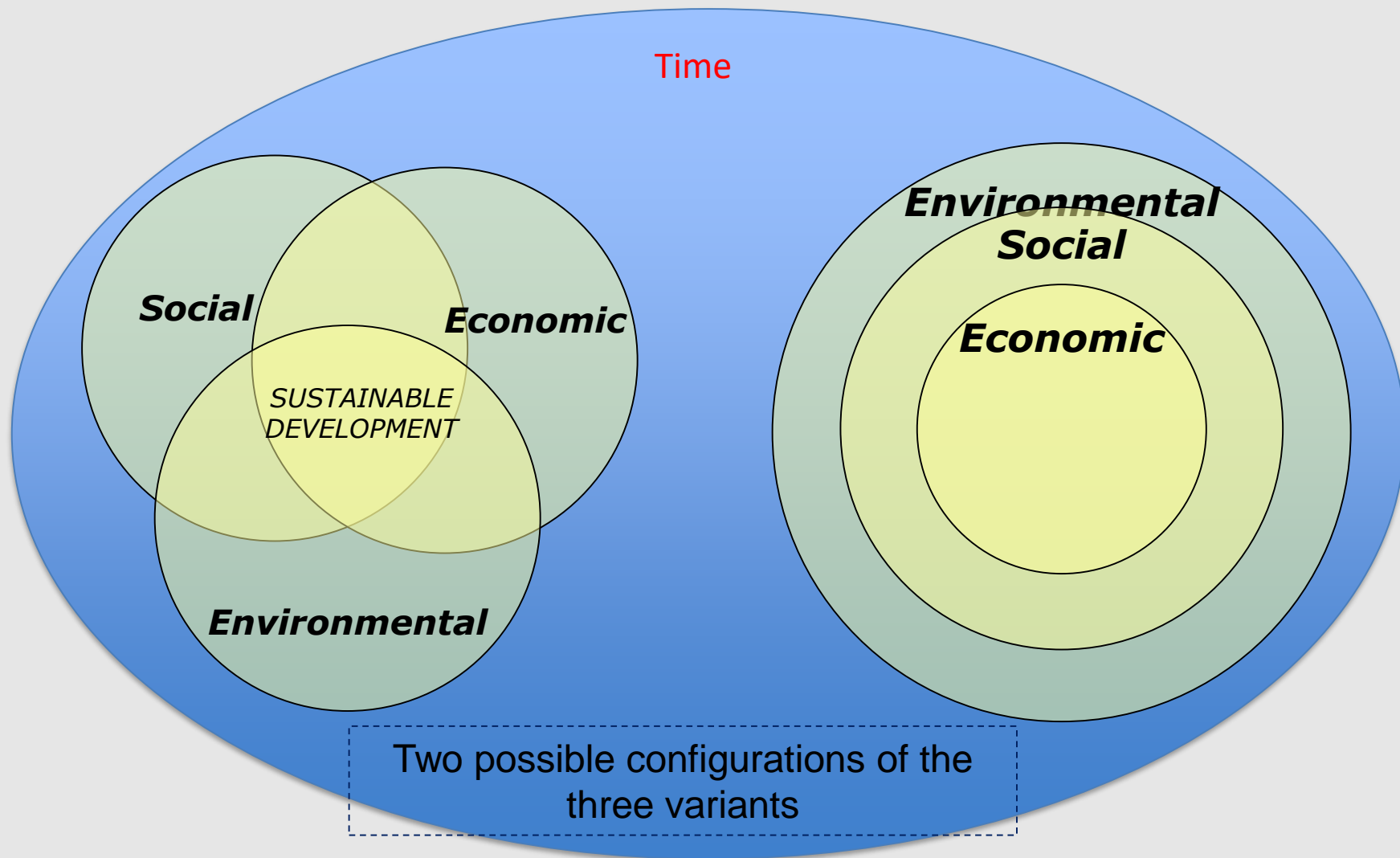
6. Continuous improvement of environmental performance

7. Biodiversity conservation

8. Responsible use of products

9. Social, economic and institutional development

10. Information, communication and participation mechanisms



# Universal S.D. Equation

## Sustainable Development $\approx f$ :

1. Rational use of natural resources
2. Economic growth
3. Social equity

SUSTAINABLE DEVELOPMENT



WITHOUT THE EXTRACTIVE INDUSTRY  
DEVELOPMENT IS NOT POSSIBLE

# WHAT'S NEXT FOR US?



# TRAINING





## Technological Skills

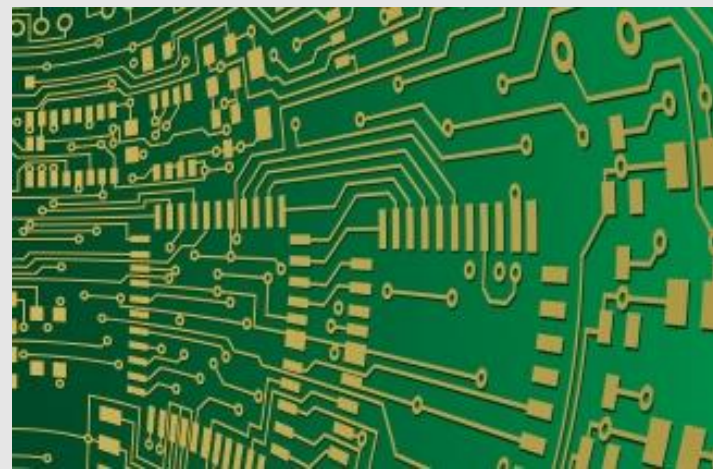
- Identify, formulate and solve engineering problems.
- Conceive, design and develop engineering projects.
- Manage, plan, execute and control engineering projects.
- Effectively use the techniques and tools applied in engineering.
- Contribute to the generation of technological developments and/or technological innovations.

## Social, political and ethical skills

- Perform effectively in work teams.
- Communicate effectively.
- Act with ethics, professional responsibility and social commitment, considering the economic, social and environmental impact of their activity in the local and global context.
- Learn continuously and autonomously.
- Act with an entrepreneurial spirit.

# Challenges







# *Sustainable processes in mineral raw materials production*

*Fundamentals of sustainability*

## *Thank you*

Óscar Jaime Restrepo Baena  
Profesor Titular  
Departamento de Materiales y Minerales  
Facultad de Minas  
Universidad Nacional de Colombia  
e-mail: [ojrestre@unal.edu.co](mailto:ojrestre@unal.edu.co)

[https://www.youtube.com/channel/UCyh50T-iKtQ5\\_TdxLz6cmPA/videos](https://www.youtube.com/channel/UCyh50T-iKtQ5_TdxLz6cmPA/videos)



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