


# Le géologue des ressources, entre observation et imagination

Michel Jébrak



UQÀM





# De la géologie aux géosciences

Science naturaliste qui s'est lentement  
transformée en géoscience.

# Le géologue des ressources 1910-2000




- Une profession spécialisée
- La réussite technique: trouver des gisements en surface ou pas loin
- L'exploration, entre analogie et science
  - La métallogénie, uranium vs le reste
  - Géologie de terrain vs métallogénie

# Le géologue des ressources



Un romancier du paysage...





# Les défis des ressources

Les quatre principaux enjeux de ressources minérales au 21<sup>ème</sup> siècle.





Transition  
énergétique



Transition  
démographique



Transition durable



Transition  
géopolitique

Differents types of ore deposits



## Transition énergétique



Des gisements plus gros



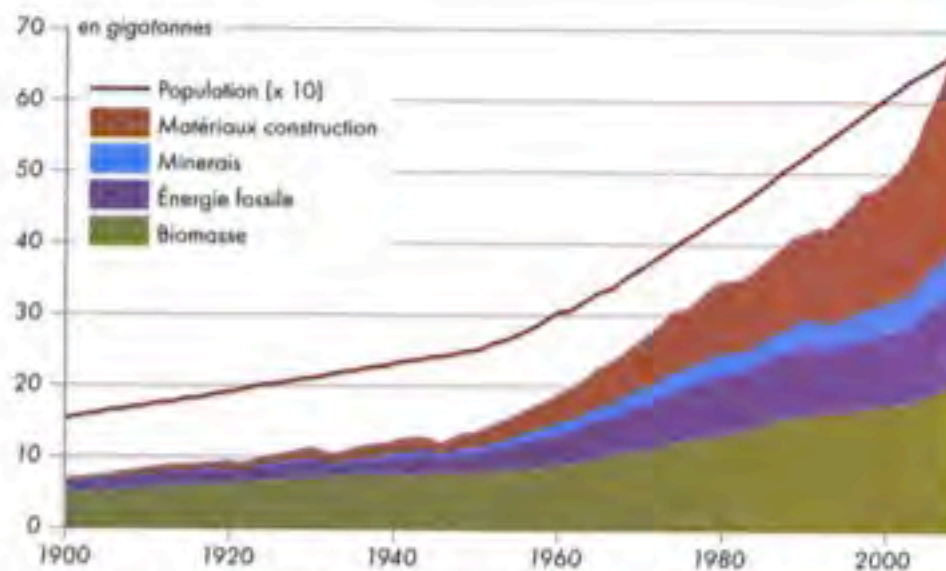
Transition  
démographique





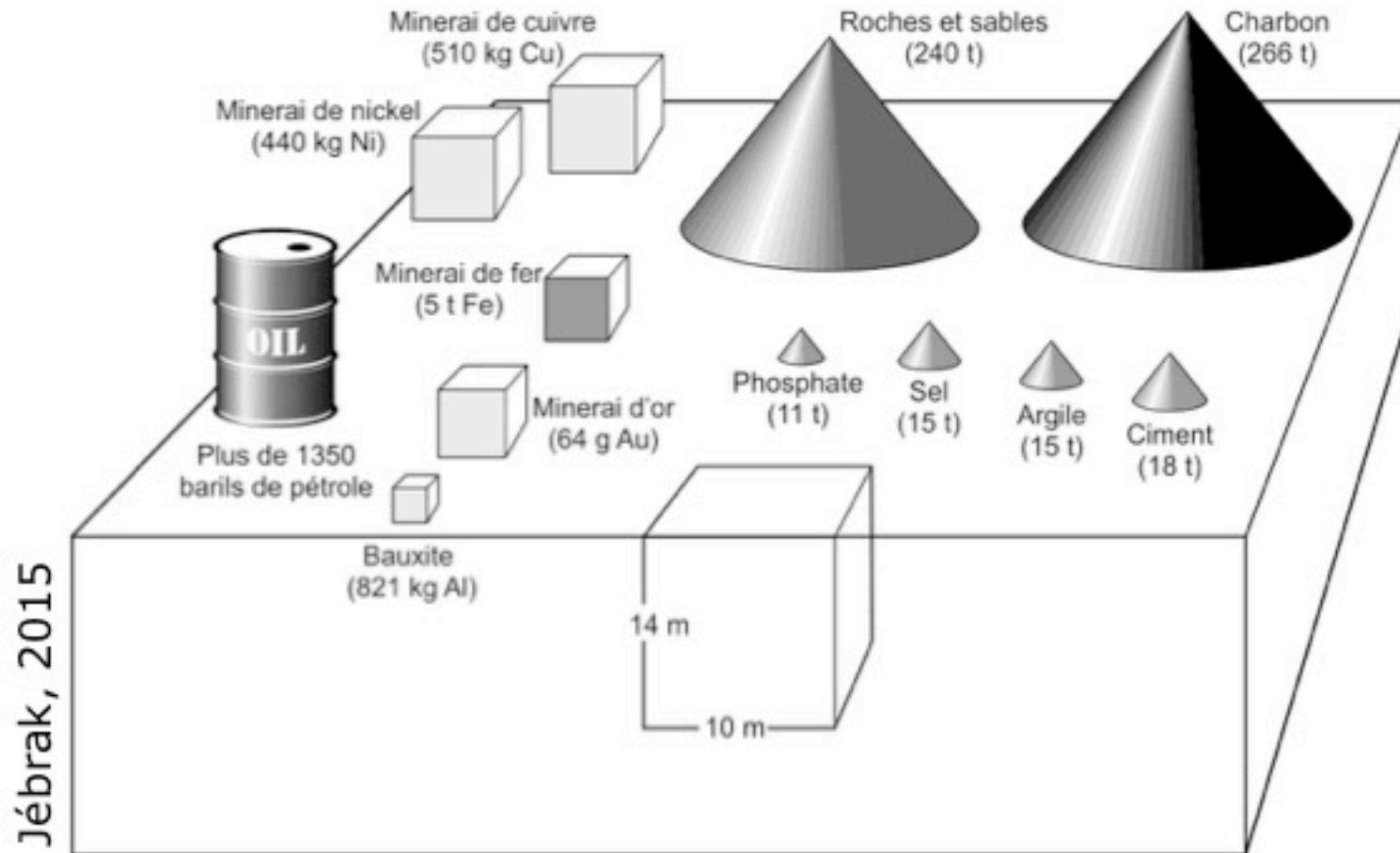
# Increase of the world consumption

World consumption =  
population x  
average individual consumption



Source : O. Appert, « Marché de l'énergie 2012 », Panorama, IFP Énergies nouvelles, 2012, Colloque Paris 26 janvier 2012.

# Metals for life...



# Copper consumption by year and per capita (2006)



340 g  
Indes



2,6 kg  
Chine



8 kg  
France

An increasing competition



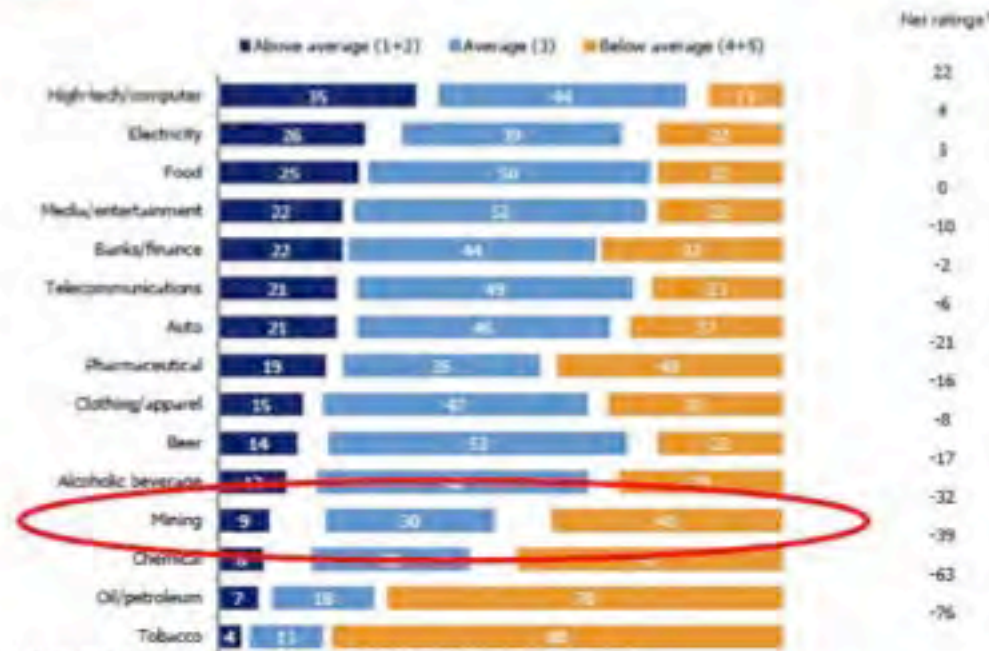
Transition durable

# Une industrie peu performante au regard de la responsabilité sociale

## CSR Performance of Industry Sectors



2011



<sup>1</sup>(1+2)-(4+5) where 1 means "Among the very best" and 5 means "Among the very worst."

<sup>2</sup>Please rate each of the following types of companies on how well they fulfil their responsibilities to society. Compared to other types of companies, would you say [INSERT COMPANY TYPE] are ...? In answering, please use a scale of 1 to 5, where 1 is "Among the very best," 3 is "Average," and 5 is "Among the very worst."



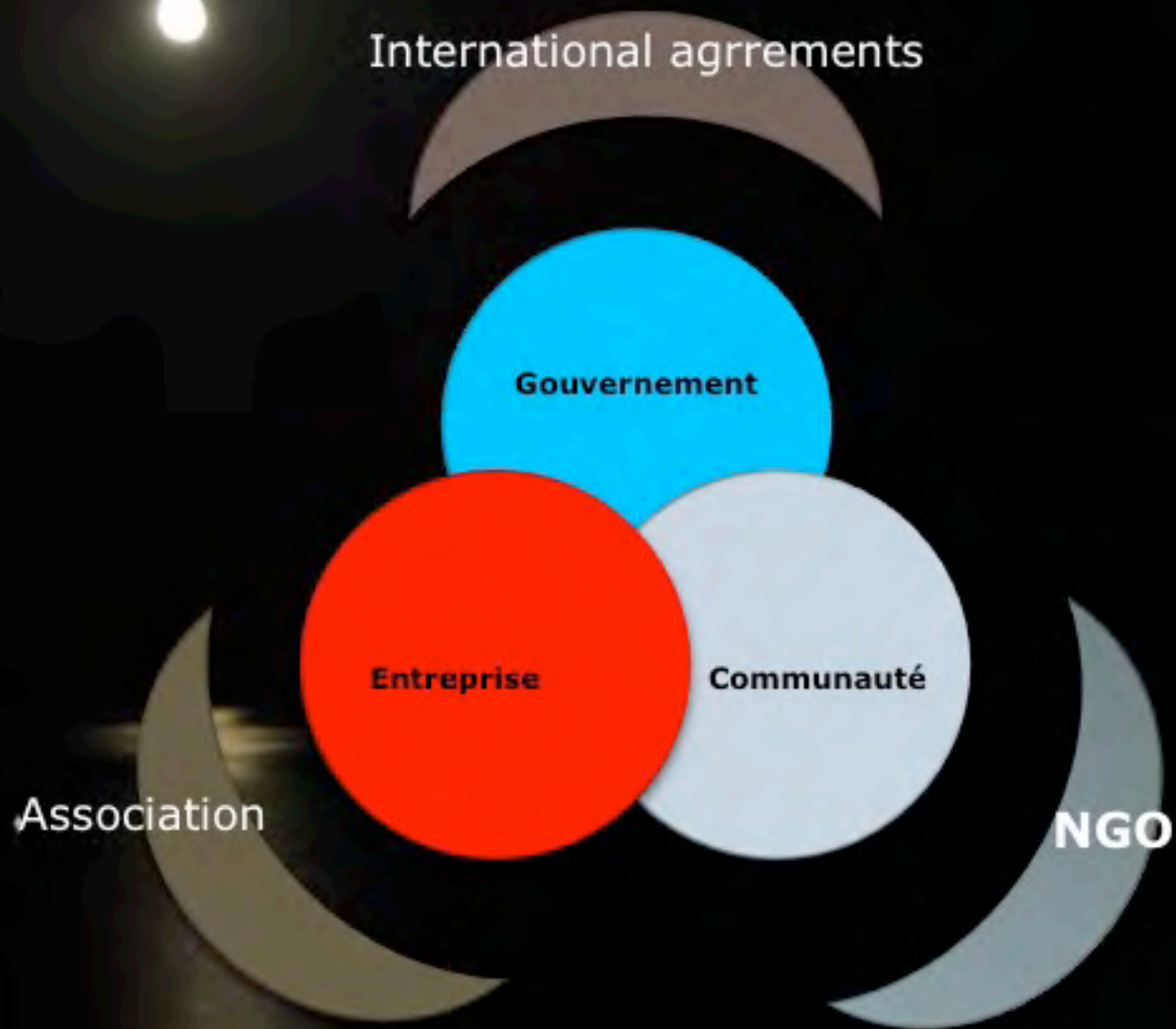


# Wider challenges

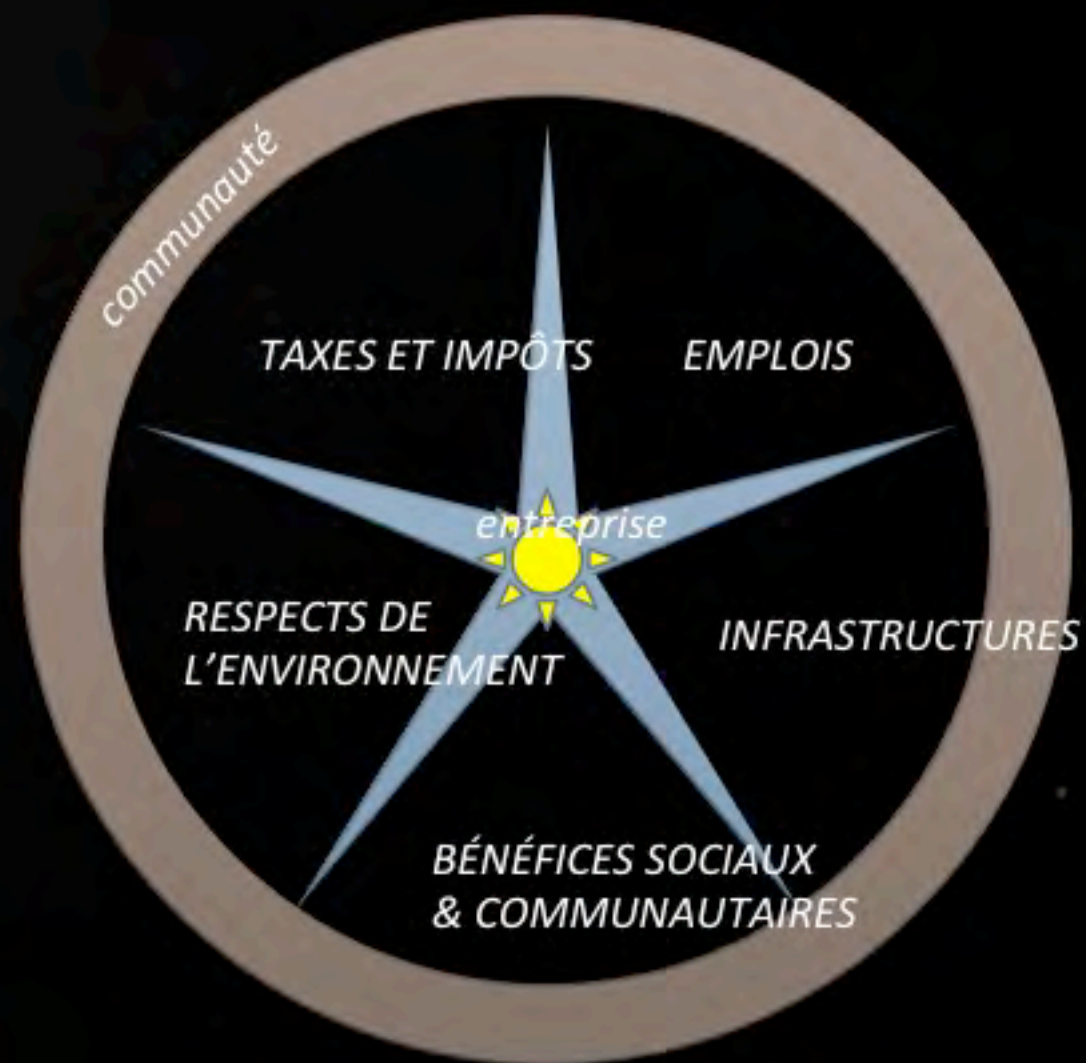


From inside oriented to outside oriented

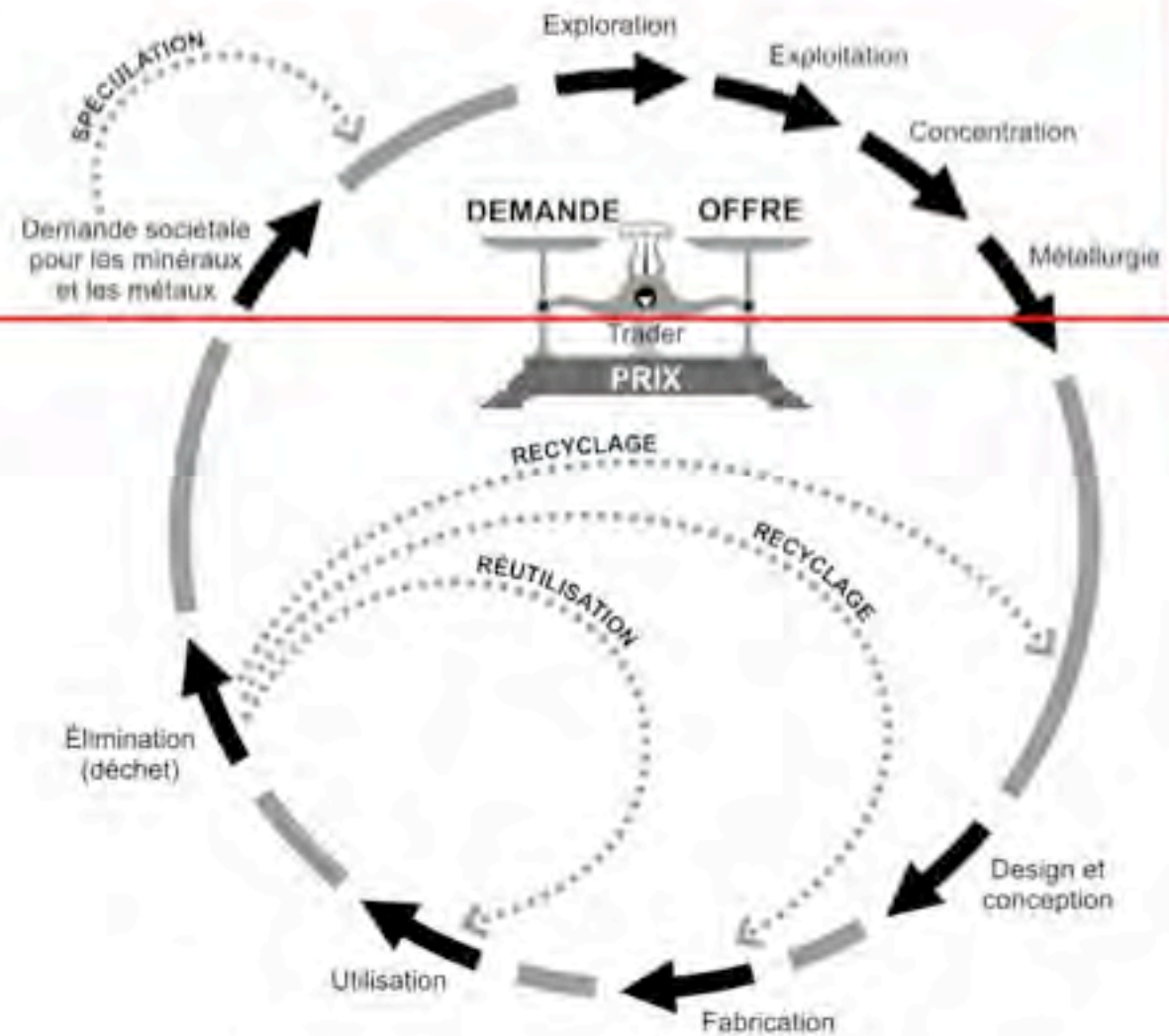
# More complex challenges



# Les critères clef de la RSE minière



# Extractive industry





# Différents mining projects



Transition  
géopolitique

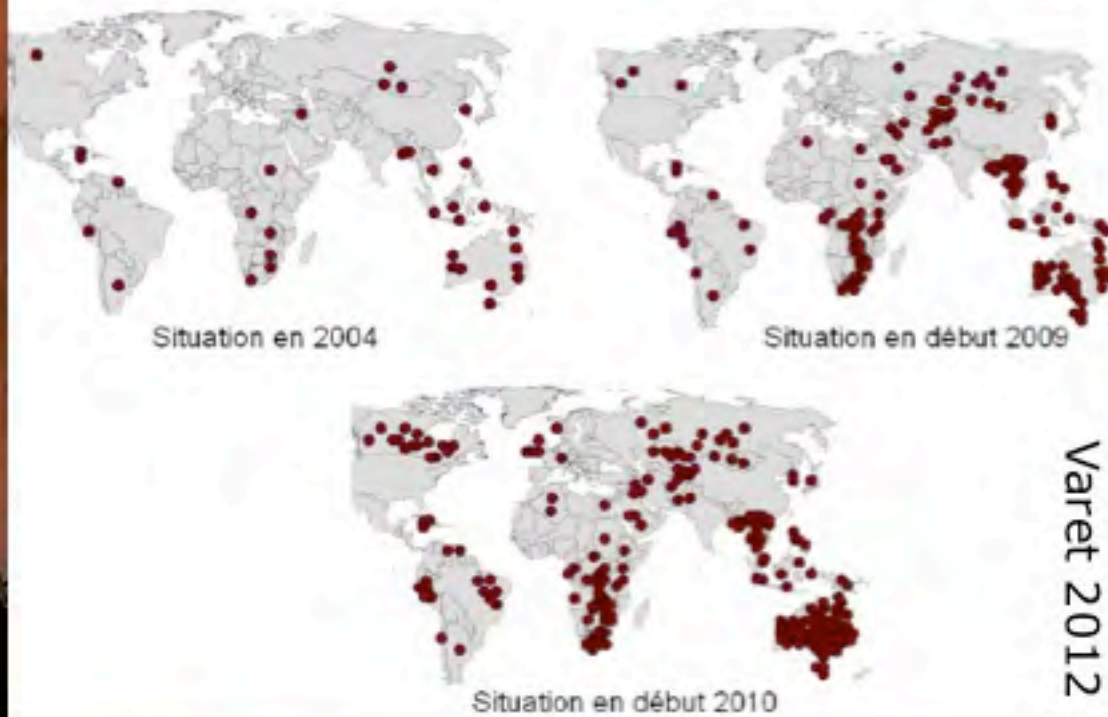




# China is back

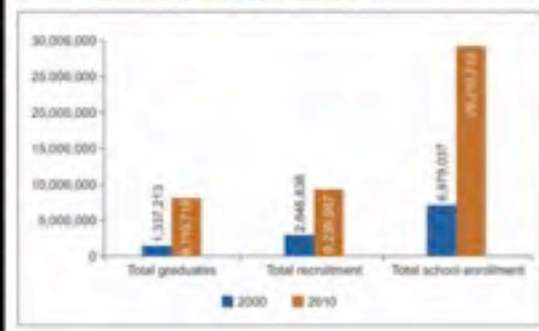
## Prises de participations chinoises dans l'industrie minière mondiale

(D'après Van der Waz, Bateman Beijing Axis, « China and Africa: A Global Natural Resources Alliance? »)



Varet 2012

Figure 6: Annual student recruitment, graduates and total enrollment in China, 2000 and 2010

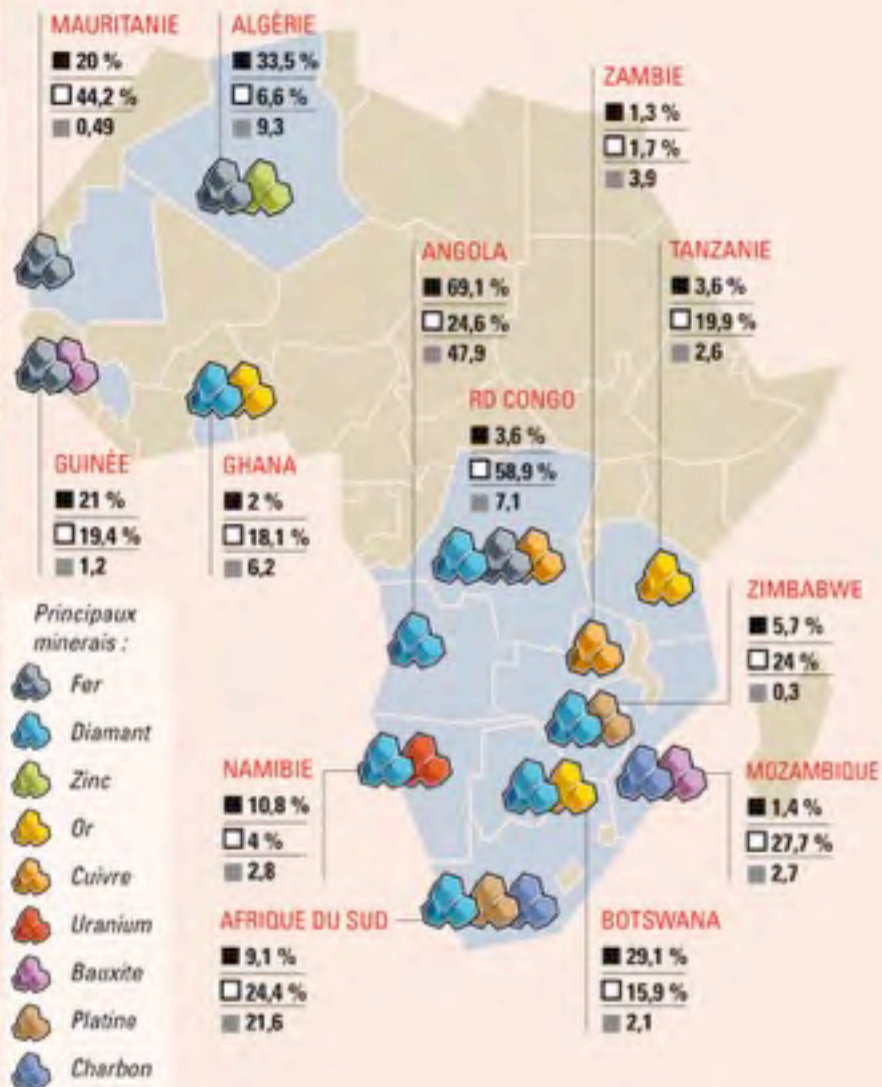


As Africa...  
in 2100



### Treize pays passés au crible

- Contribution des industries extractives au PIB
- Taxe sur les bénéfices
- Investissements directs étrangers 2007-2010 (en milliards de dollars)



SOURCE : RAPPORT ERNST & YOUNG AFRICAN MINING INVESTMENT ENVIRONMENT 2011



## Observation and imagination

La géologie des ressources exige toujours  
de marier observations rigoureuses et  
imagination.



## Bottom line: field works

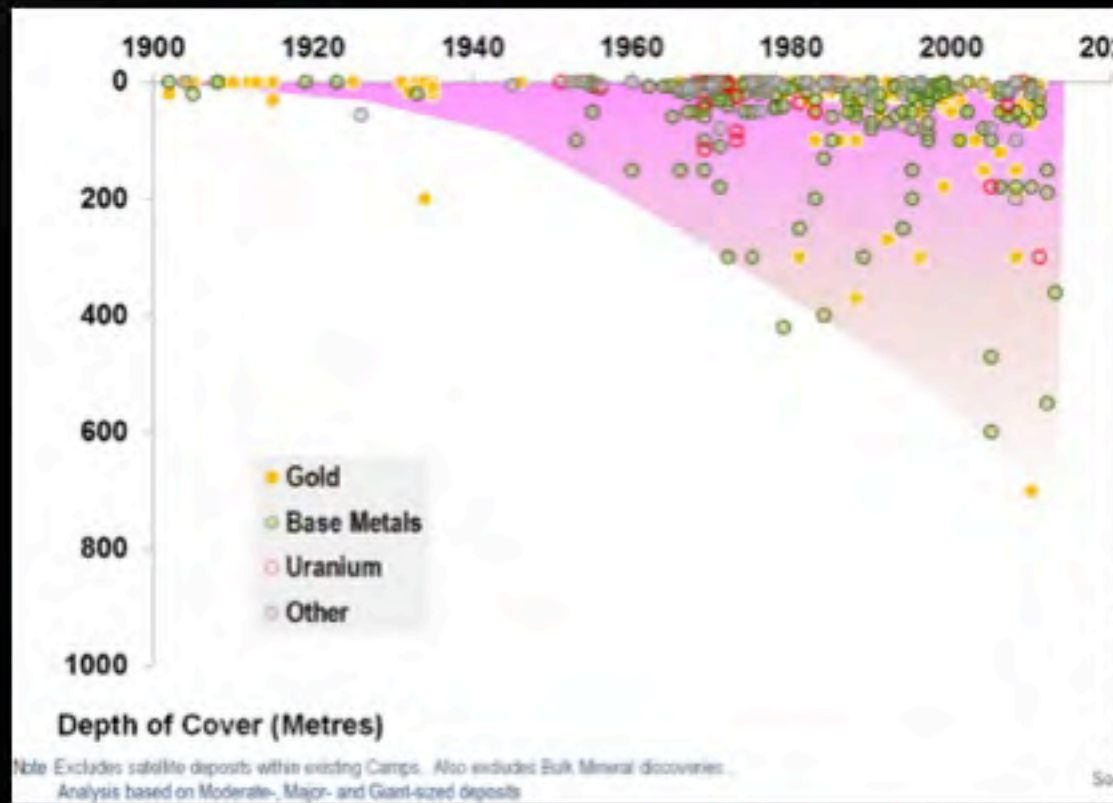


Columbia School of Mines  
1866



UQAM, 2014

But the field itself is changing...



Schode, 2014



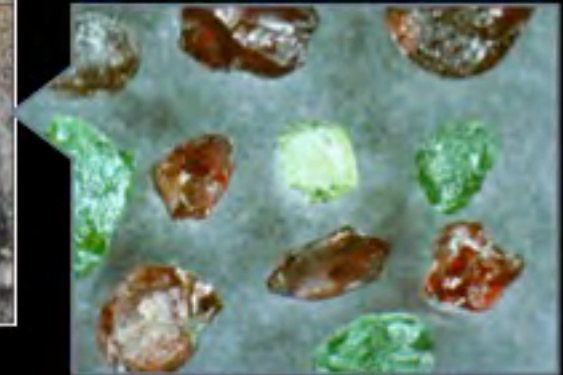
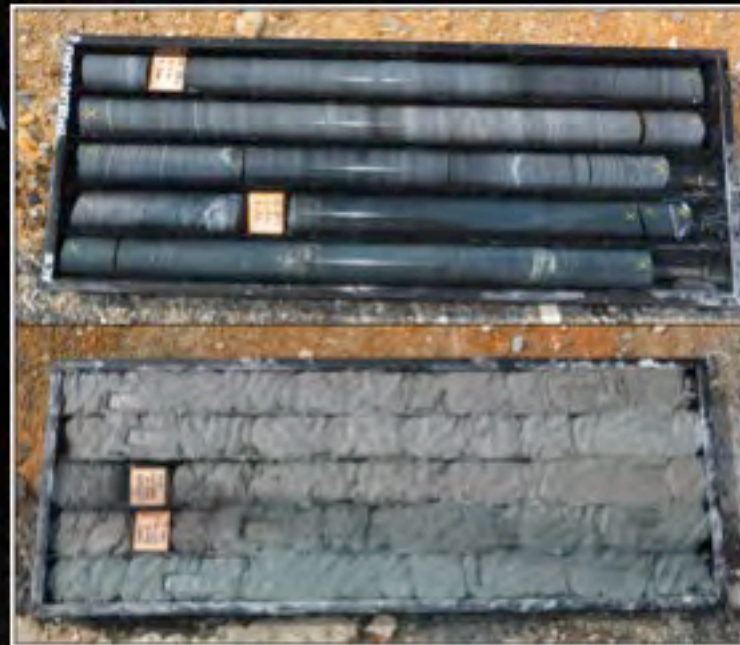


Bombore 2013

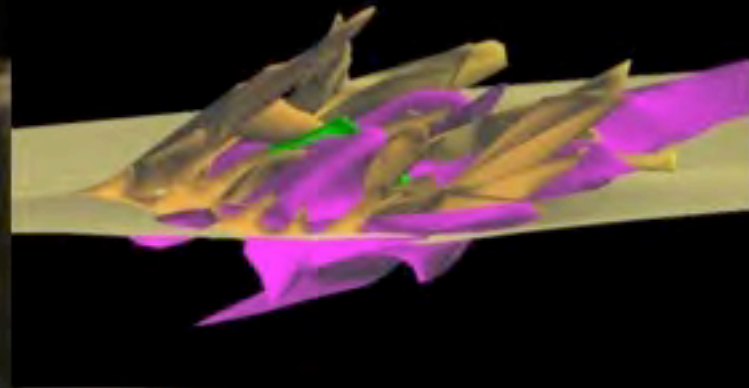
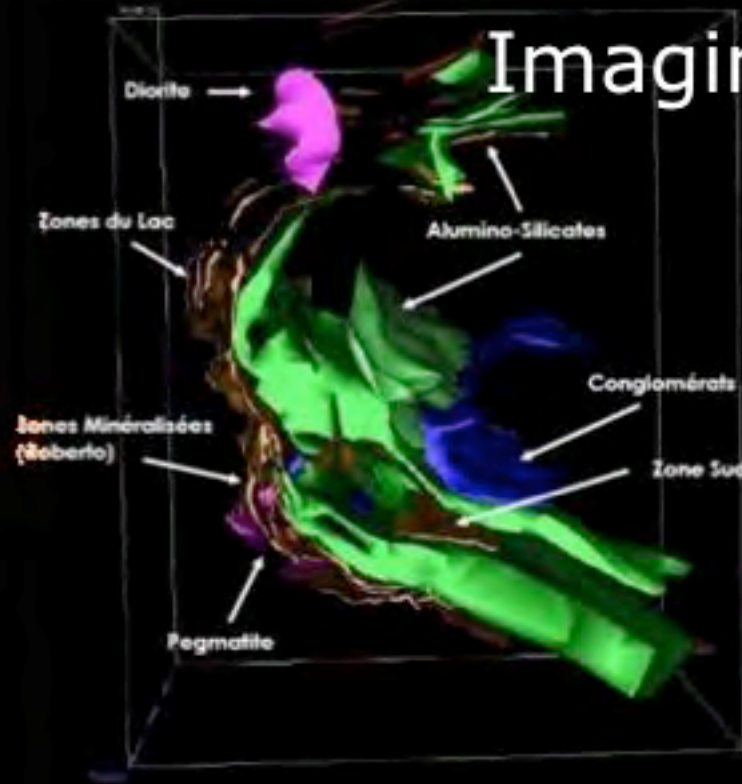


DET-CRC 2013

# Revolutionary innovations



# Imagination sustained by computer sciences







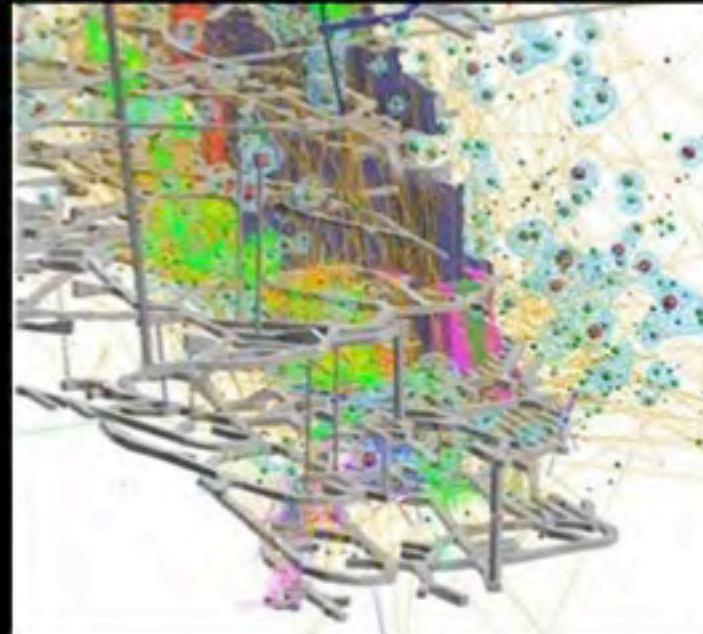
# Changing our world representations

s de la mine d'uranium d'Arlit, massif de l'Air, Niger (19°00' N - 7°38' E).  
annarthusbertrand2.org

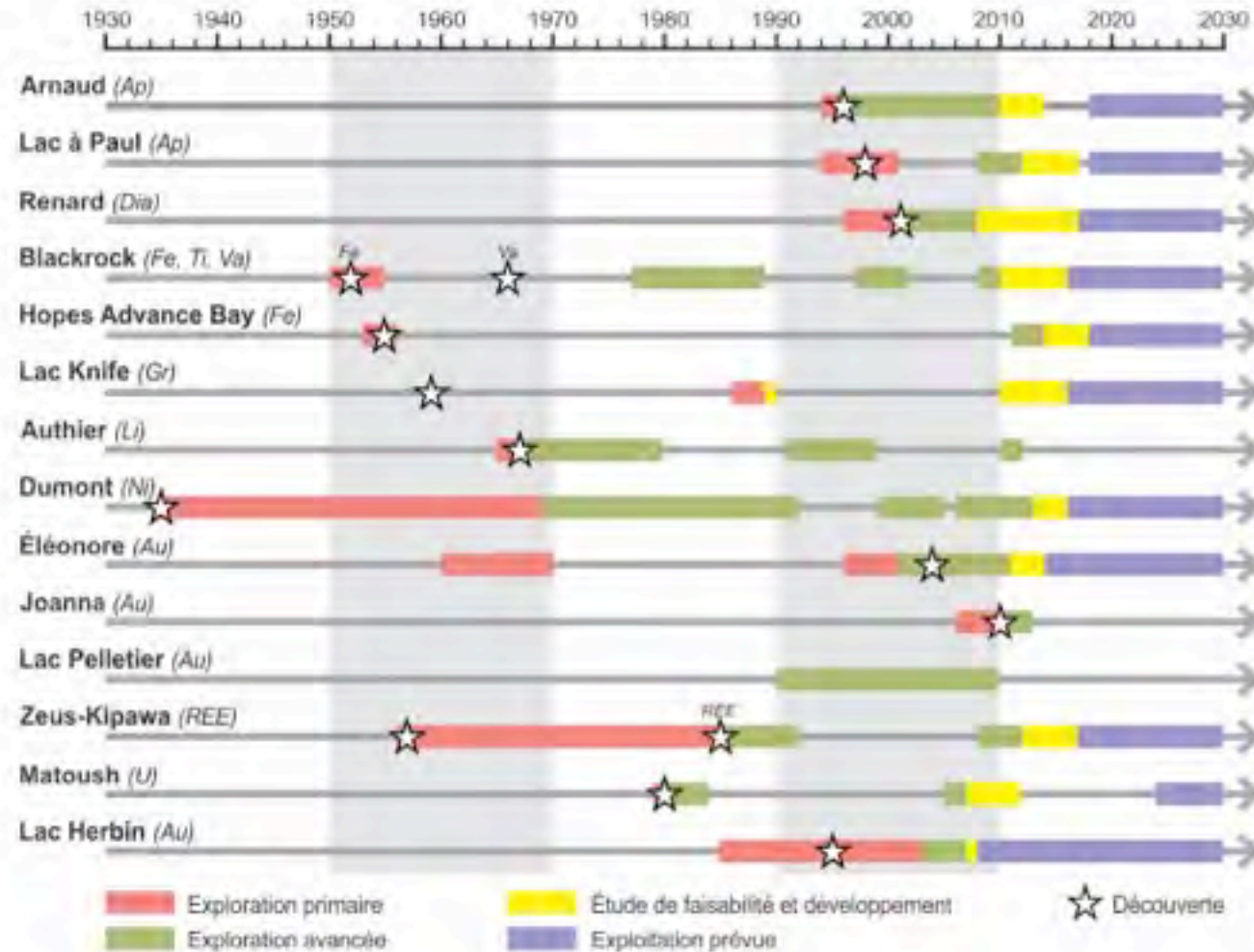


# An effective fusion of disciplines

Geology  
Geochemistry  
Geophysics  
Mining



# The punctuated exploration









Un vent de changement

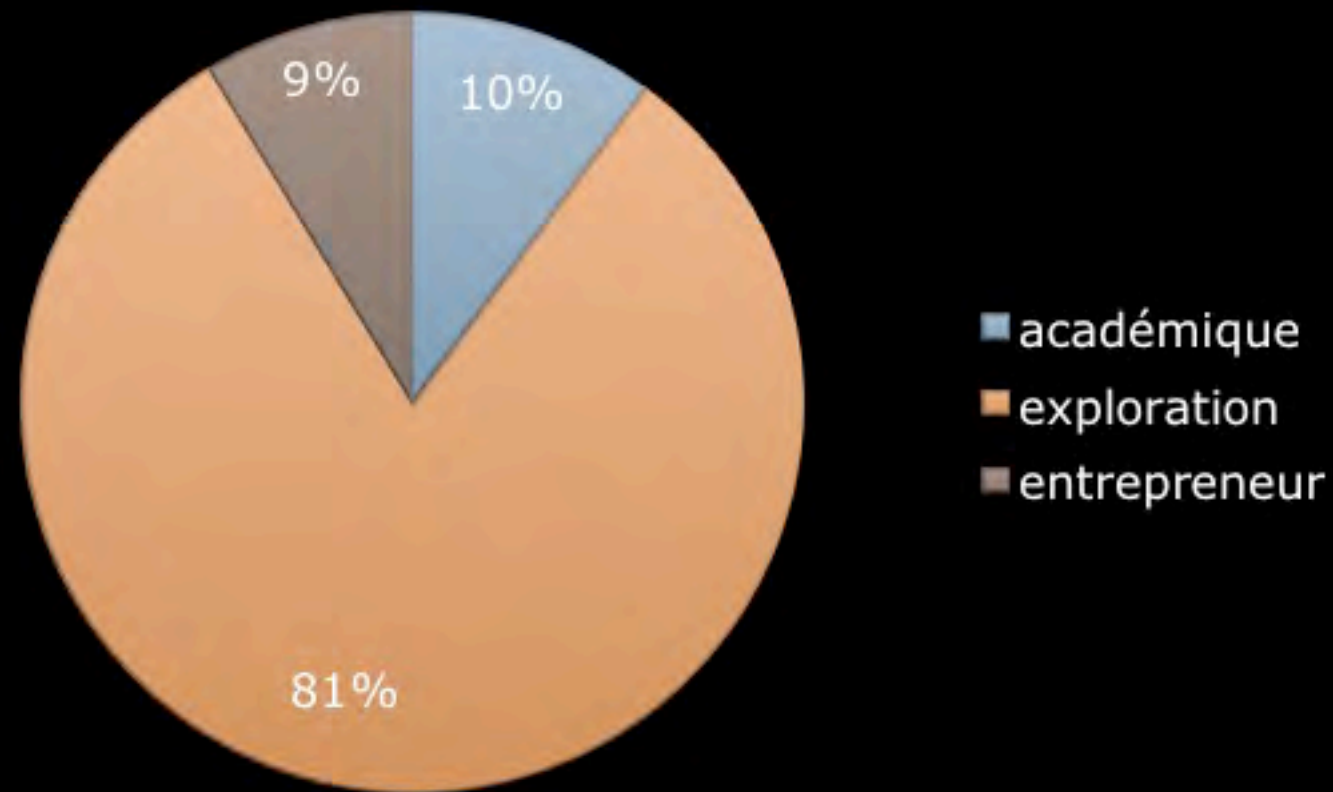




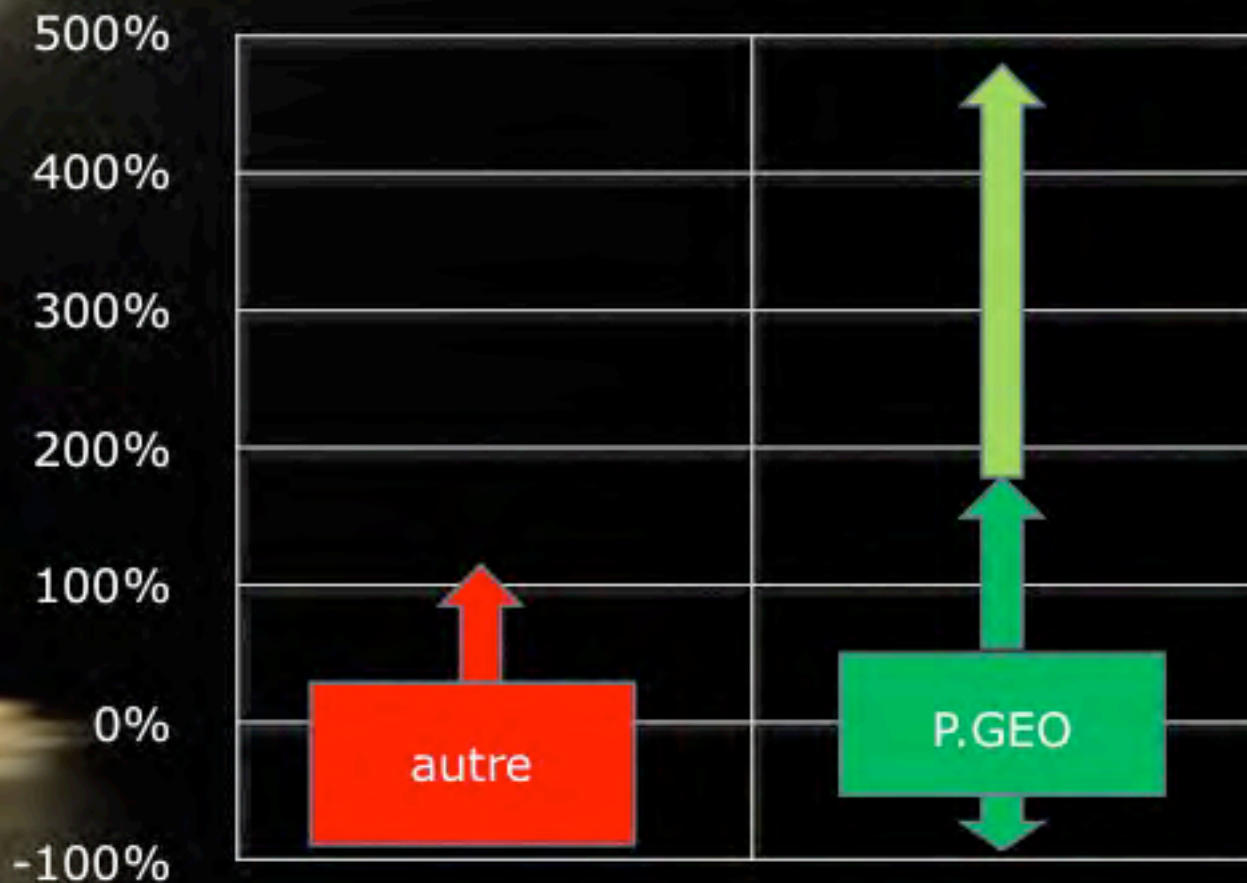
## Changing our vision

Il est donc temps de modifier radicalement  
nos façons de former les futurs géologues  
des ressources.

## Who are the resources geologists ?



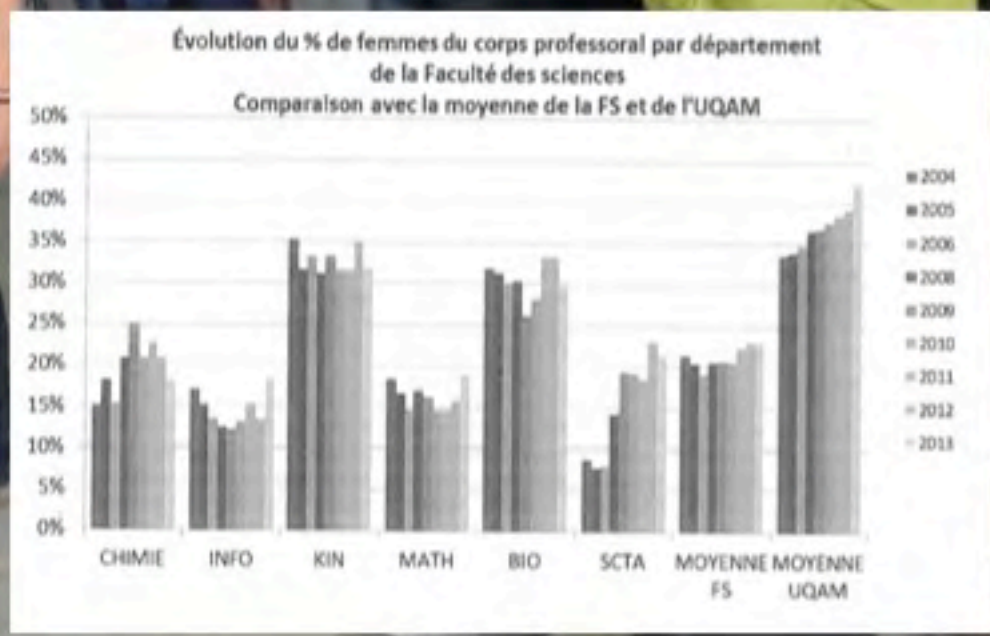
# Better to get a geologist for president !



% of gain for mining junior shares and president job



# A more feminine job



Données UQAM

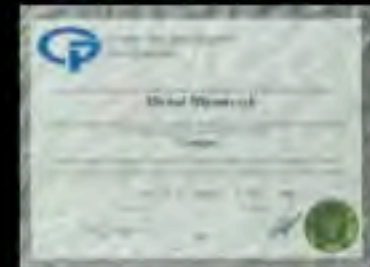


# A professional activity



Claim rush, 1926  
(Cartigny 2013)

- The rise of professional association after the BRE-X clash (1996)
- A regulated profession
- Effects on protectionism
- Knowledge vs competency...

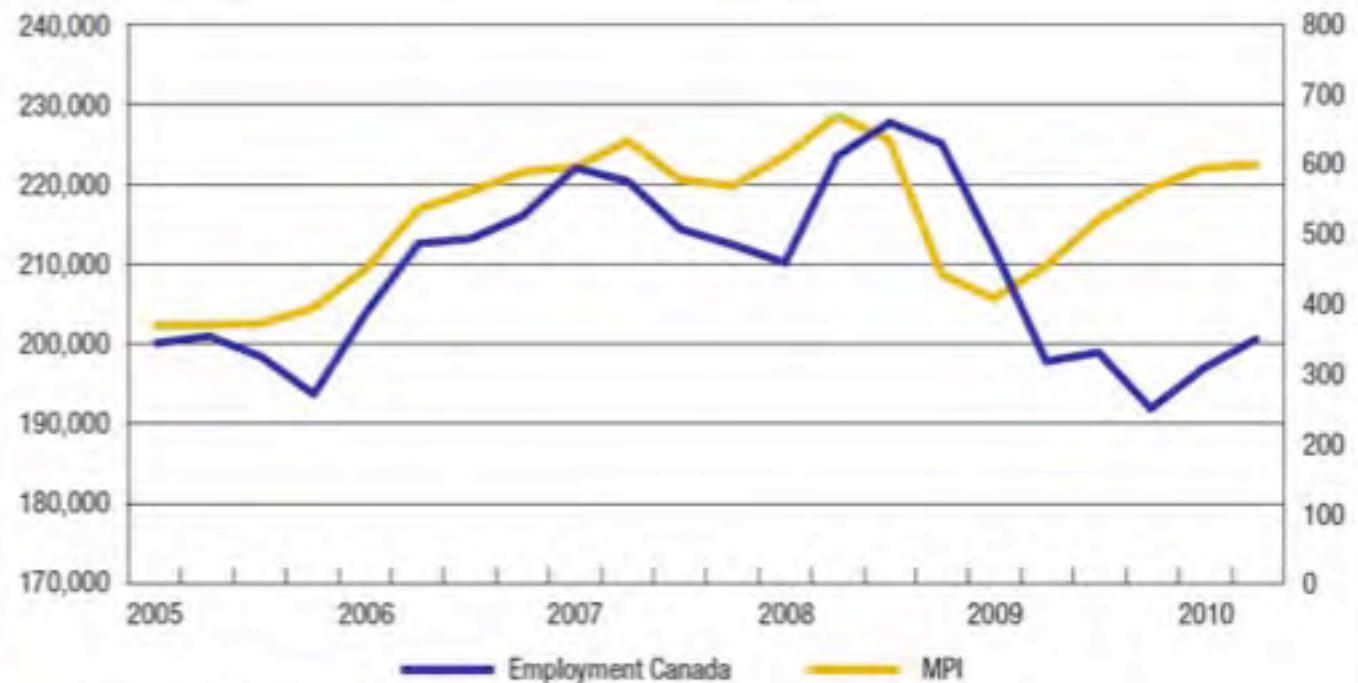


## Unemployment rate Québec 2013

Technician geologist 0%  
Mining engineer 5,9%  
Ore processing engineer 0%  
Mining geologist 0%

# Jobs are a function of the metal market

Mining Employment and the Minerals Price Index (MPI)



Source: Mining Industry Human Resources Council; Bank of Canada; Statistics Canada.

# What is an ore deposit ?

- A concentration
- A economic minable concentration
- A economic minable concentration and socially acceptable

**GEOLOGY**  
**ECONOMIC**  
**GEOLOGIST**  
**THE NEW GEO**



# What is an ore deposit ?

- A concentration

GEOLOGIST

- A economic minable conccentration

ECONOMIC GEOLOGIST

- A socially acceptable and economic minable  
concentration

THE NEW GEO

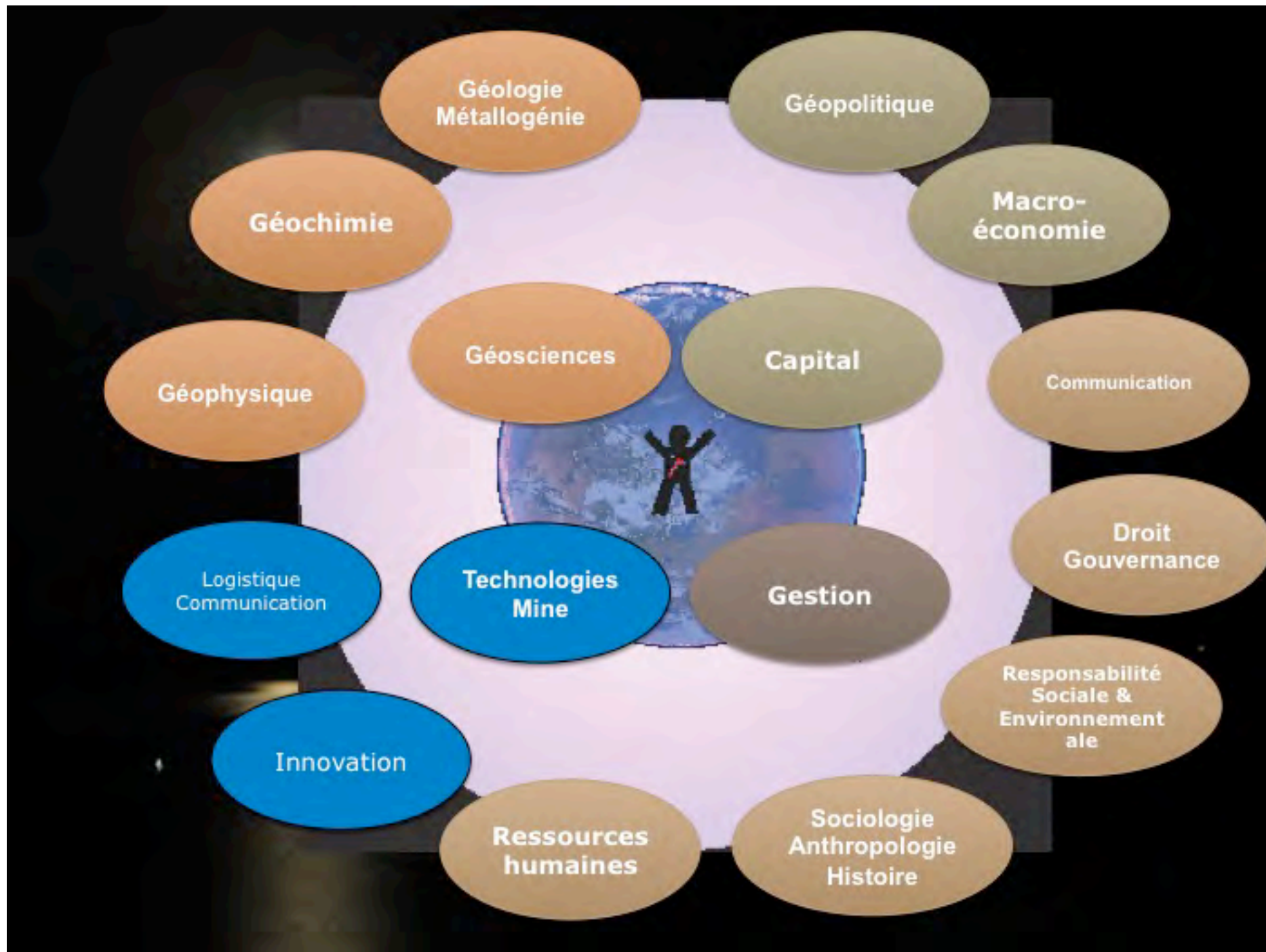
More of...

Indice de risque  
social (Canada)

- Sciences politiques
- Communication
- Droit
- Sciences de la Terre
- Sociologie
- Économie
- Gestion

Gazouille (France)

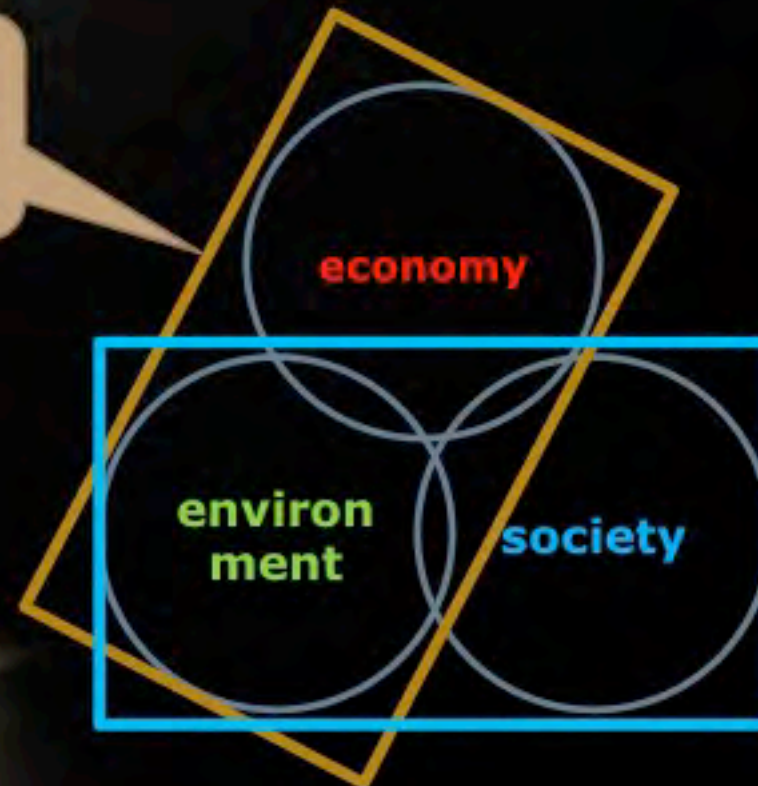
- Psychologie
- Géographie
- Histoire
- Droit privé et public
- Sciences de la Terre
- Économie
- Sociologie



# Quels assemblages de profils ?

Compétences techniques

Jusqu'ou peut-on étirer les compétences ?



Études socio-environnementales



# Innovative formations

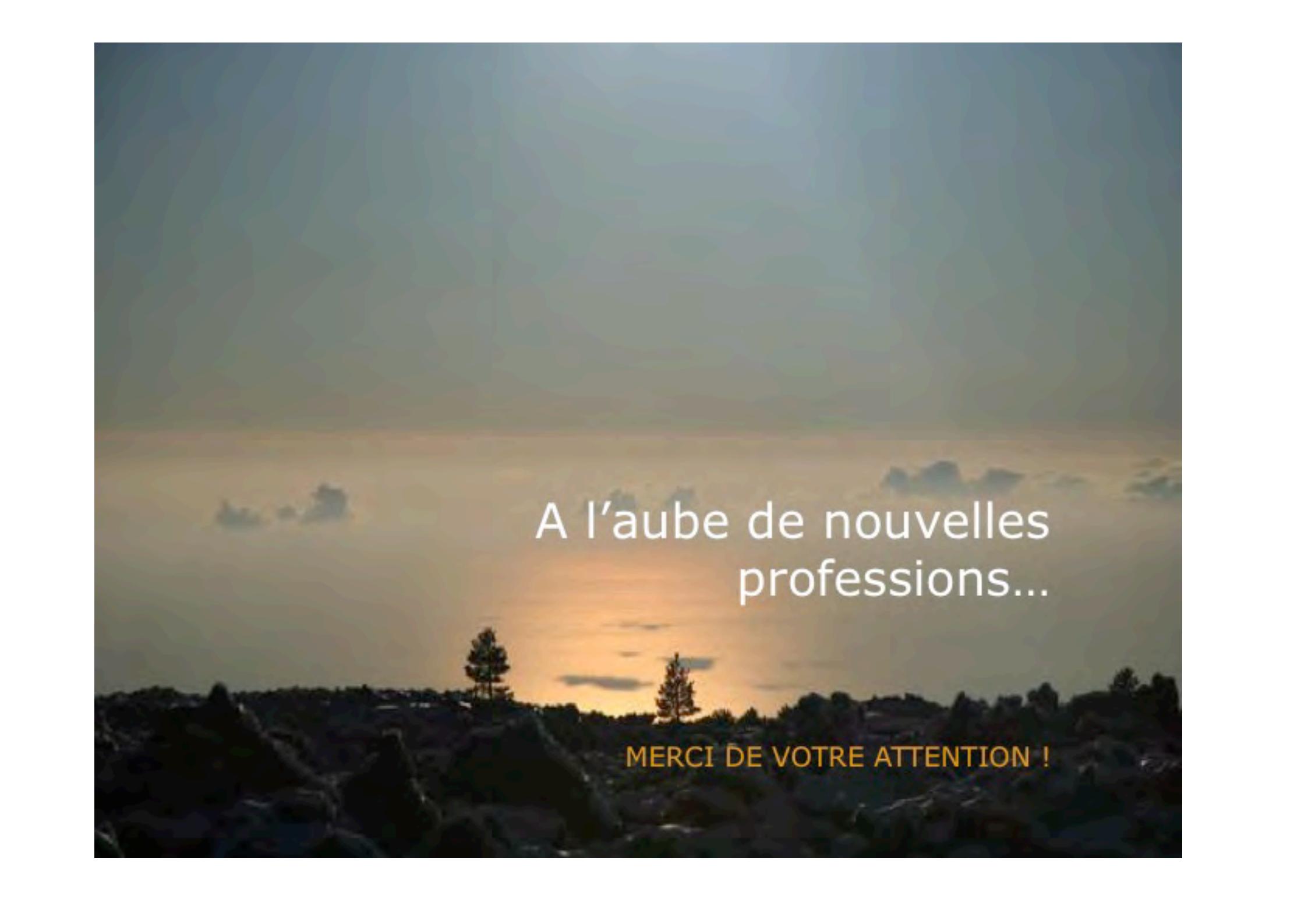
- Mba Mines, UQAT/UQAM
- 4<sup>ème</sup> cohorte

- Better connections between University, Business School and Engineering School ?



# conclusions

- Challenges are opportunities
  - New style of deposits
  - New ways of exploitation/processing
  - New values for the mineral industry
- Geosciences has already open to environment
- Next steps are toward human and social sciences
  - The demand come from the society throughout (some part of) the industry

A landscape photograph at dawn. The sky is a mix of soft blues, greys, and oranges, with a few wispy clouds. The sun is low on the horizon, creating a warm glow. In the foreground, there are dark, silhouetted trees and a rocky or uneven terrain.

A l'aube de nouvelles  
professions...

MERCI DE VOTRE ATTENTION !