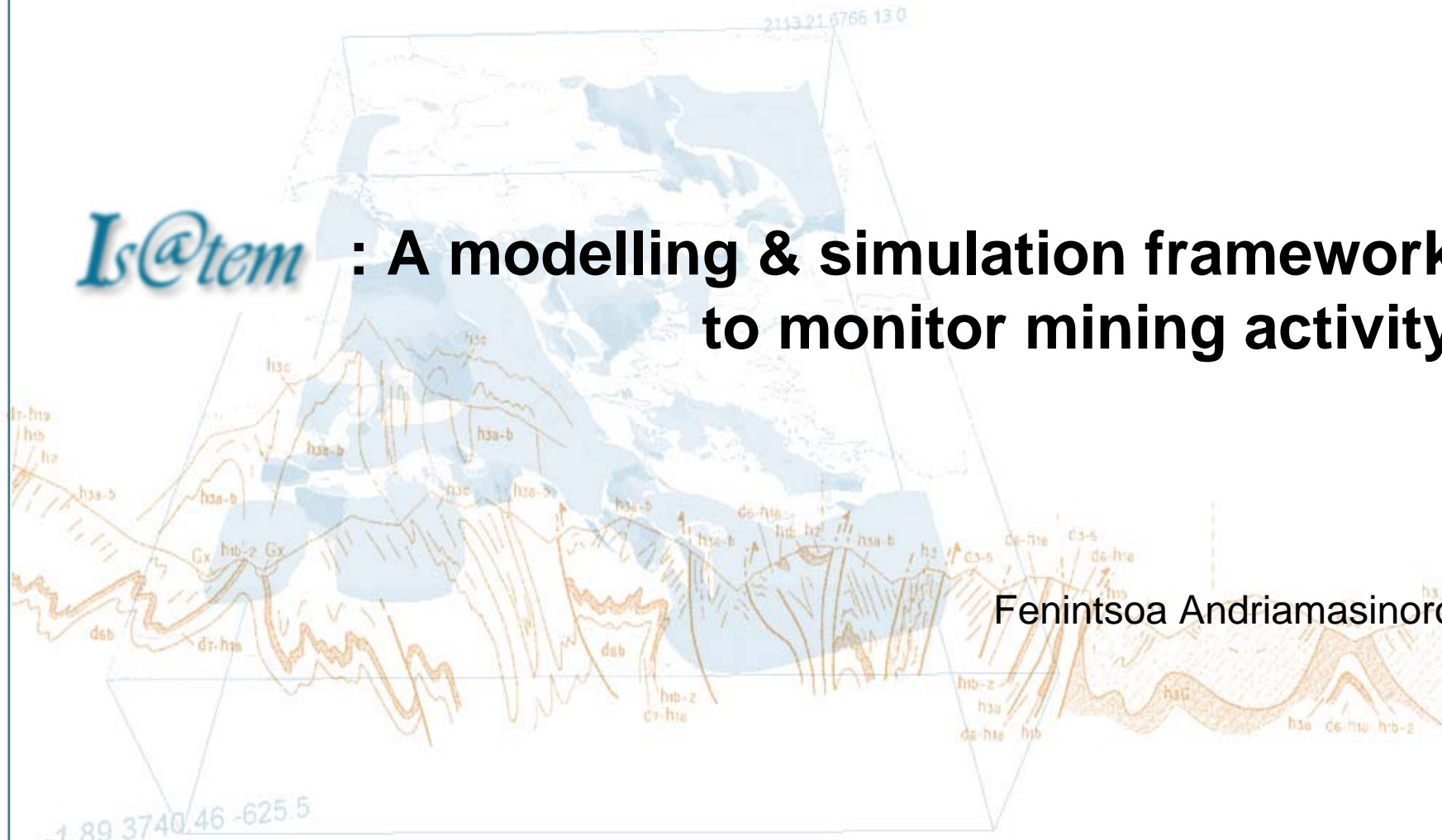




Is@tem : A modelling & simulation framework to monitor mining activity



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EO-MINERS project kick-off



Generalities IS@TEM

> ISATEM

- Integrated System applied to Territory and Environmental Management
- For modelling and simulation
 - deals with complex socioeconomic and socio-environmental [(SE)²] system

> Complex (SE)² System

- Dynamic driven by the interaction between 3 entities
 - resources (mineral resources, water resources, forest, ...)
 - actors (human, enterprise, ...)
 - which exploit resources for SE² purpose/constraints
 - georeferenced spaces
- Scale : micro-meso (spatial) in 20-30 years (temporal)

> Thematic objective

- Help to solve territory development issues :
 - Monitor current situation and evolution trends (via scenarios)

> Scientific objective

- Developing methodological tool
- Appropriation of the tool by stakeholders



Analysis method (2)

> **Socio-economic analysis: impact of the activity on**

- the number of created jobs
- the incomes generated for the population
- distribution of the population (ex: rushes results,)

> **Environmental analysis: impact of the activity on**

- the forests: excessive usage of woods during the shaft extraction
- the fields: due to waste mining, they might become non-fertile
- water:
 - decreasing of the level due to pumping
 - water pollution

> **Socio-environmental analysis**

- impact of the activity on the health:
 - impact of the usage of mercury
 - drinking / using polluted water
- Women and children are more victims
- Cost of gas-oil, CO₂, ...

The prospective modeling approach

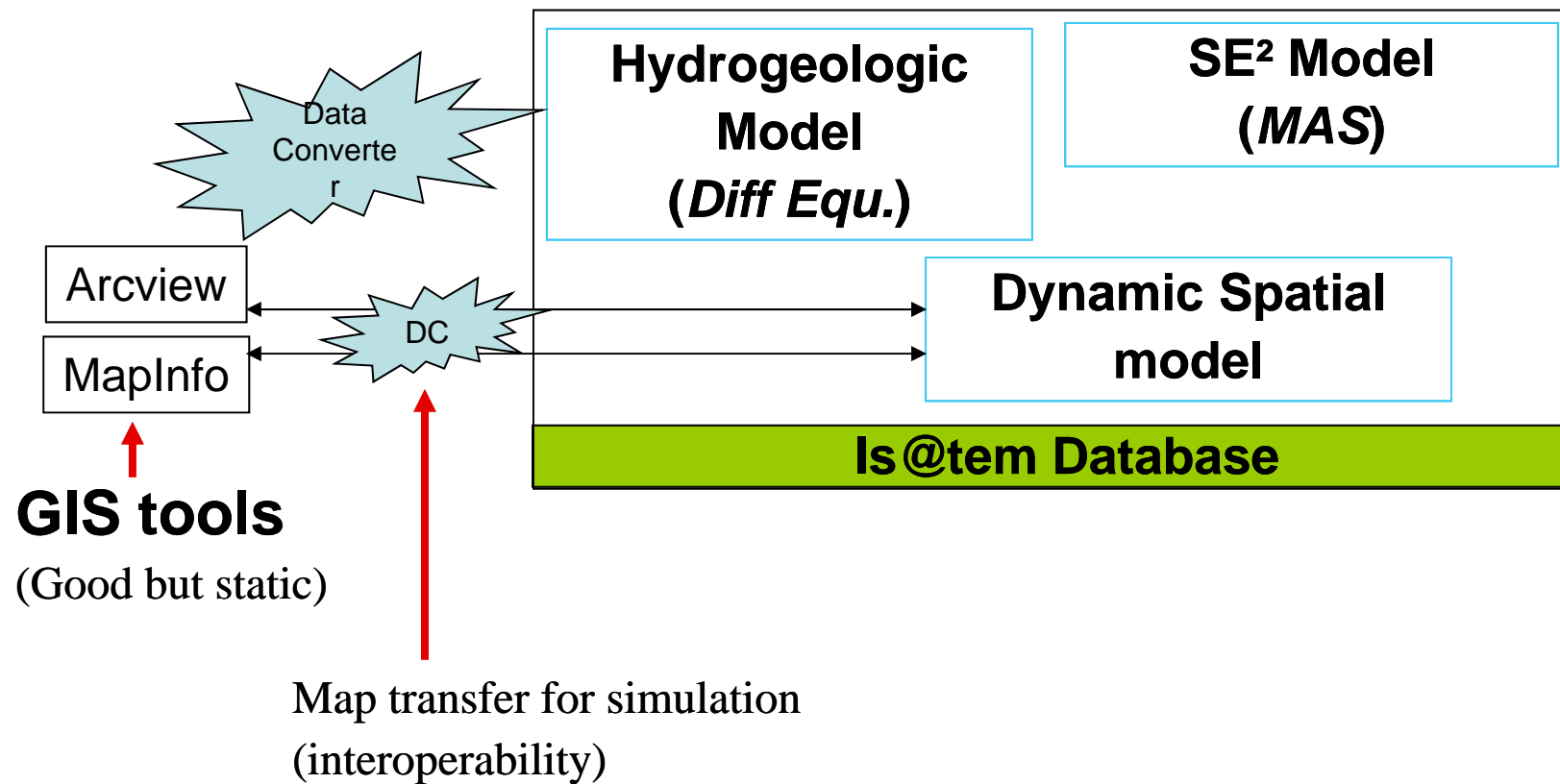
> Prospective modeling & simulation: why?

- deals with the complexity of a system (reproduction, abstraction)
 - the resulting decision-aid model and tool can help decision-makers to:
 - 1) answer questions
 - 2) integrate and consider the results when recommending policies for the future
- via the building, analysis and simulation of scenarios

> The modeling approach used

- Geologic/hydrologic or (pure) economic dynamic
 - ⇒ mathematical/physical/statistical models (*classic approach*)
- But to better deal with the social aspect
 - ⇒ Multi-Agent System (MAS) models (*new approach*)

A meta-model



The user interface (with the current BRGM application)

The screenshot shows the BRGM simulation user interface. The interface is divided into several panels:

- Simulation Explorer:** A tree view on the left showing the simulation hierarchy. The current selected entity is 'Itinerary639'.
- Execution Monitor:** A panel at the top center showing simulation execution details, including 'Frequencies' and 'Execution' time.
- Map Display:** A central map showing a network of roads and nodes. A red line highlights the selected itinerary. A yellow truck icon is visible on the map, and a brown mountain icon represents a quarry.
- Property Editor:** A panel on the right showing the properties of the current selected entity (Itinerary639).

Callouts identify the following components:

- The simulated entities container:** Points to the Simulation Explorer panel.
- The simulation controller:** Points to the Execution Monitor panel.
- The properties of the current selected entity:** Points to the Property Editor panel.
- A city (a consumer actor):** Points to a blue circle on the map.
- the selected itinerary in the space (a map):** Points to the red line on the map.
- A truck (conveys materials):** Points to the yellow truck icon on the map.
- A quarry (a producer actor):** Points to the brown mountain icon on the map.
- The current selected entity (an itinerary):** Points to 'Itinerary639' in the Simulation Explorer.

Name	Value	Unit
Id	Itinerary639	NC
Length	15.89	NC
Departure	22352	NC
Arrival	24932	NC