X-MINE

Elemental analysis

3D structure

Mineralogy

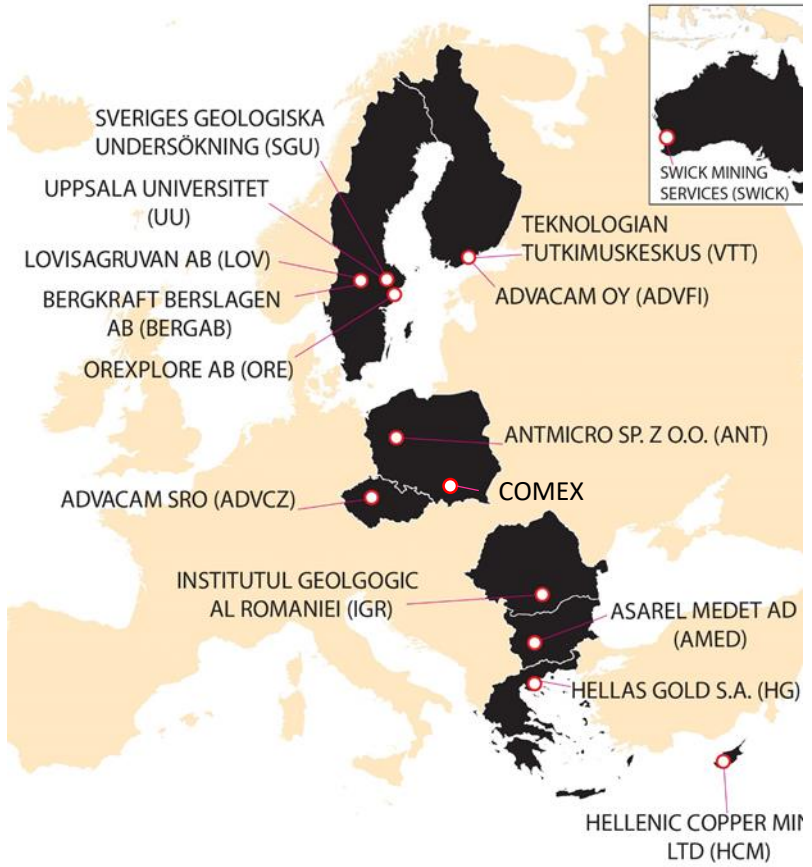
Texture

Smart exploration	3D modelling of ore deposits
Selective drilling	Sensitive drill core analyser
Optimal extraction	Sensor based sorting system

X-MINE

New XRF-XRT sensing technologies

- VTT Technical research centre is coordinating the project
- 15 partners in 9 countries
- 36 month duration, 12M€ project
- Project timeline 2017-2020
- Focus in
  - SMART EXPLORATION
  - SELECTIVE DRILLING
  - OPTIMAL EXTRACTION
- 2 pilot cases
  - SCANNING OF DRILL CORES in 4 mines
  - MULTISENSOR FOR MINERAL SORTING in 3 mines



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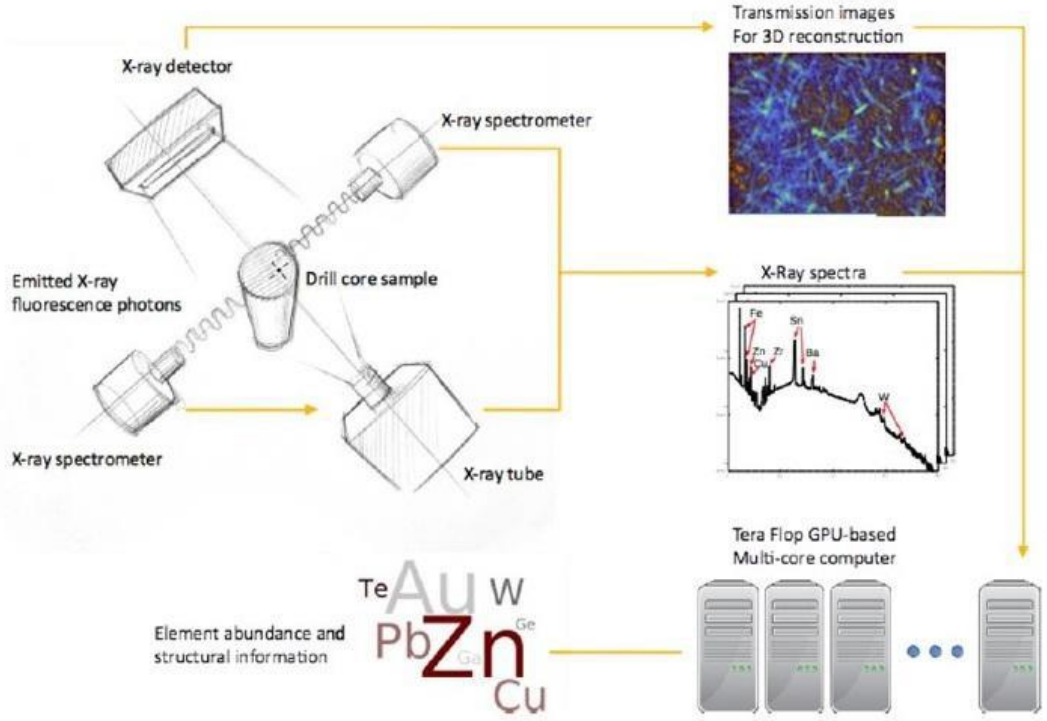
Smart exploration and selective drilling

- The project will develope a new sensitive drill core analyser
  - Penetrative XRF-scanning and 3D tomographic imaging and assaying of exploration drill cores
  - Lead: Orexplore

- The project will develope the utilization of tomographic imagery and structural information with Uppsala University
  - Local-, to regional, 3D geological modelling
  - Lead: Geological Survey of Sweden



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Multisensor development for mineral sorting

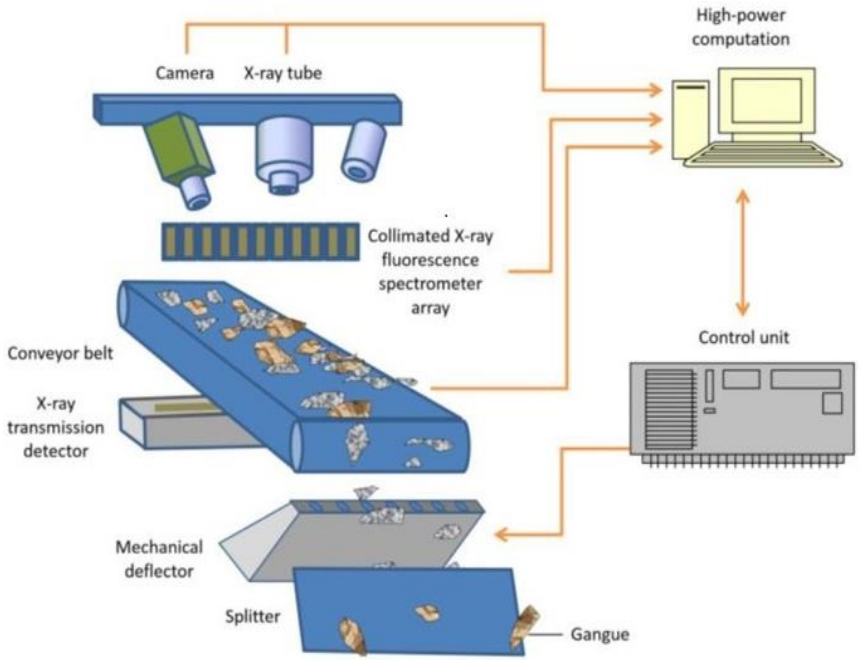
- The multisensor unit development is unique cooperation between partners active in mineral exploration, mineral production, geological mapping and experts in development of highly advanced analytical instruments and process solutions
- The multisensor unit will be integrated into existing Comex waste rock sorting unit
- Existing Comex unit utilises XRT detection and hyper spectral imaging with limited sorting resolution
- New unit utilises XRT, XRF and 3D camera

  SENSOR development: Orexplore, Advacam, Antmicro

  MACHINE LEARNING algorithms for efficient sorting with multisensor datafusion: VTT

  SENSOR integration: VTT

  UNIT integration into sorting lines: Comex



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Project aims at

- Sensor development for efficient sorting of waste from ore in order to
  - Reduce consumption of energy and chemicals
  - Make better use of natural resources
  - Increase profit to enable extraction of lower grades
- Project will also support
  - More sustainable mining of industrial metals
  - Future critical raw materials acquisition for the EU
  - Better planning of mining operations
  - Lower usage of explosives
  - Reduction of CO_2 and NO_2 emissions

Project partners include:

VTT, OREXPLORE, ADVACAM, BERGSKRAFT Bergslagen AB, antmicro EMBEDDED SYSTEMS, SWICK Innovative • Productive • Safe, LOVISAGRUVAN, Hellas GOLD Ελληνικός Χρυσός Α.Ε., Hellenic Copper Mines Ltd, IGR, ΑΓΑΡΕΑ ΜΕΔΕΤ·ΑΔ ASSAREL MEDET·JSC, UPPSALA UNIVERSITET, SGU Sveriges geologiska undersökning Geological Survey of Sweden, Comex Innovative Industrial Technologies

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