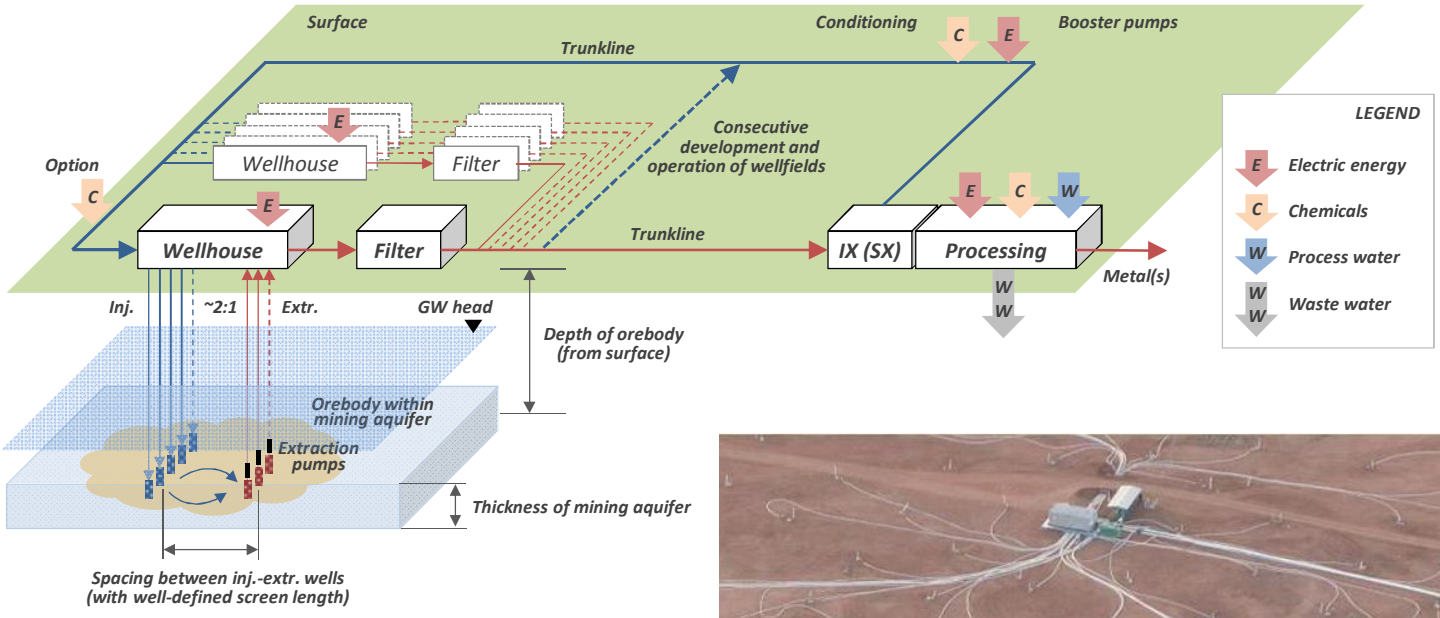
In-situ Recovery of Technology Metals
Prospection and Engineering

New Perspective on In-situ Recovery (ISR) – the Intelligent Mining Alternative

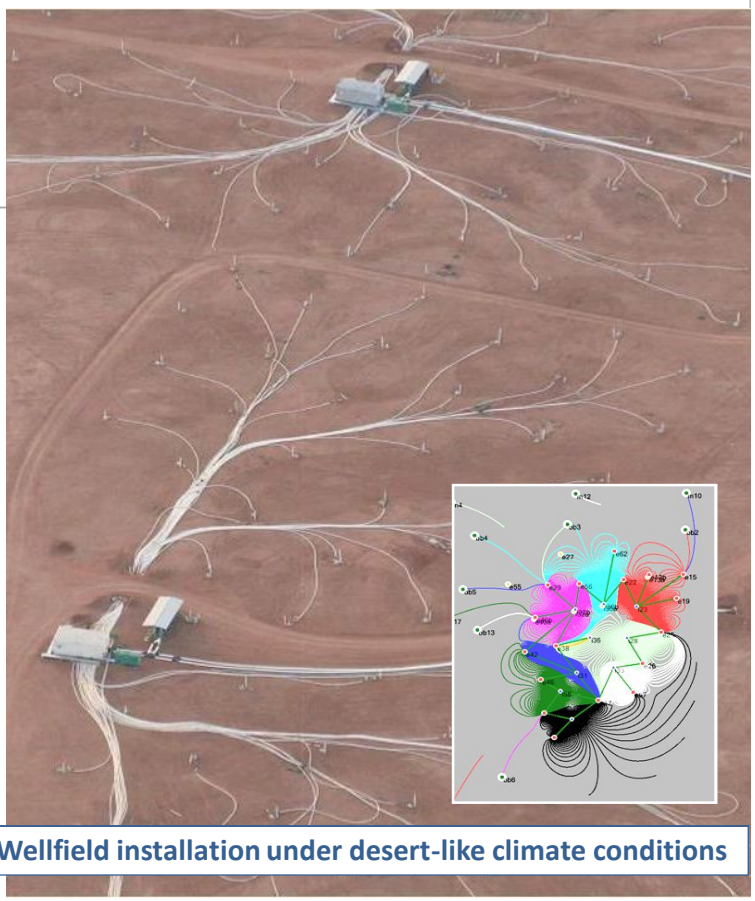
- ISR – a technology developed in the 1960s, mainly applied to uranium production from sedimentary deposits (meanwhile the predominant U recovery technology worldwide)
- ISR – an attractive recovery technology with **significant advantages over conventional mining** (underground, open pit) including:
  - Low to moderate costs for mine development
  - Lower environmental impacts
  - Reduced period of project development and start-up
  - Lower CAPEX/OPEX (energy, labour, equipment, restoration, CAPEX partially distributed over project lifetime)
  - Profitable on lower grade deposits
  - Reduced solid waste (no waste rock, no tailings)
- ISR – in addition to uranium, **industrially applied (at least pilot-tested)** to:
  - Some **key industrial metals** (Cu, Zn, Ni) and others (Au, V, Mo, …)
  - Several **technology metals** including Re, Se, Sc, Y, REE

ISR – just operating wellfields and selectively leaching the metal(s) of interest from the orebody directly



ISR – MINING without MINEWORKS

Well construction preserving vegetation



Example: Wellfield installation under desert-like climate conditions

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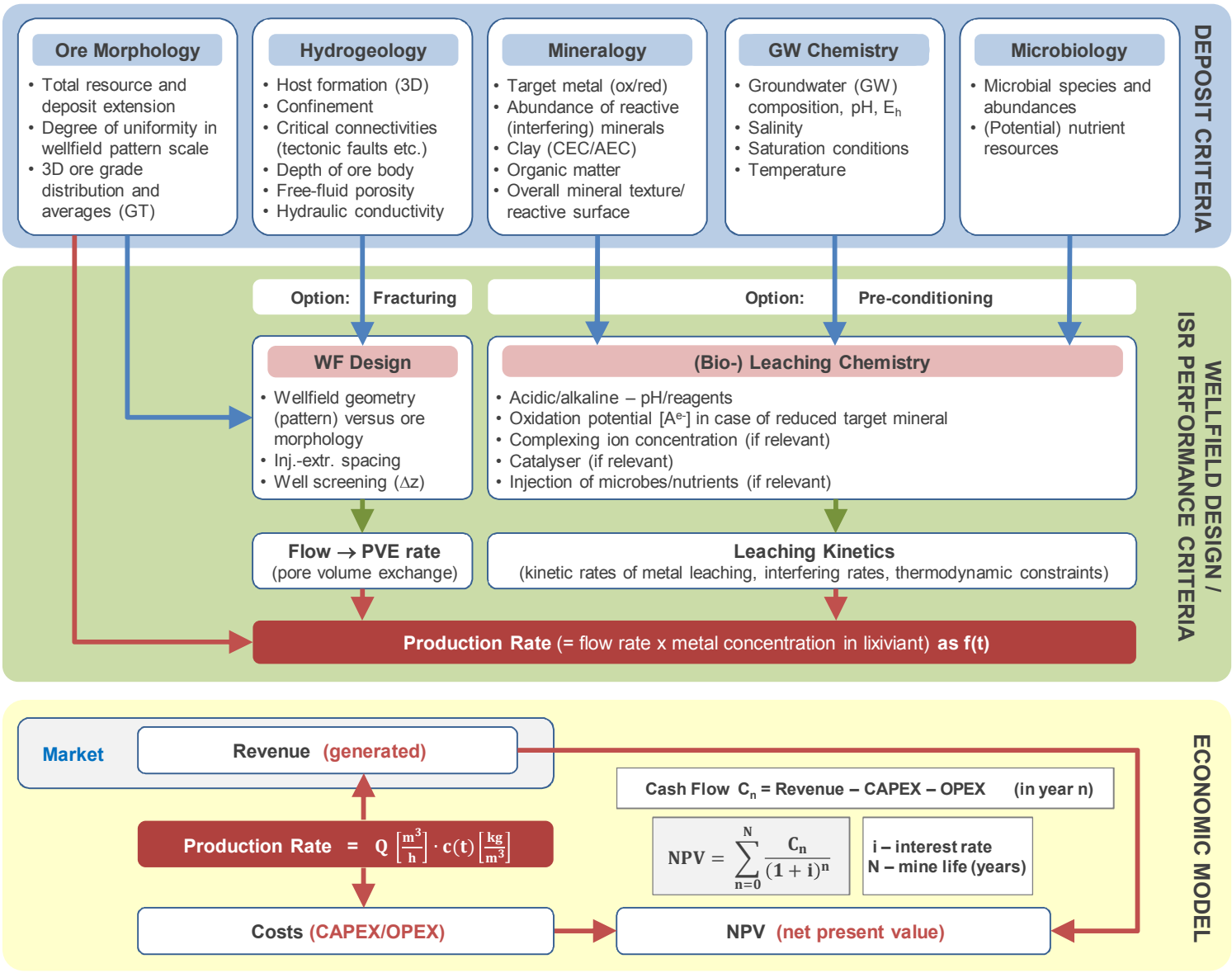
UIT's Competence – Based on Industrial Practice and Scientific Approaches

- **Feasibility studies** by the generic modelling of potentially ISR amenable deposits and conceptual metal processing
  - Combining advanced ISR-model-based recovery predictions with **economic models** (schematic below)
- Advanced **exploration technologies** specifically developed and optimized for ISR deposits
  - High-resolution, shallow seismic and other geophysical surveying methods
  - Efficient, highly integrative borehole logging
- **3D structural modelling** combining the hydrogeological framework with ore morphology
- Performance of dedicated **lab tests** and model-based interpretation for **upscaling to field conditions**
  - Core assays and kinetic leach tests (including radioactive, NORM-bearing samples)
  - Specialized (temperature-controlled, pressurized) column test facilities, precisely controlled and equipped with automated data acquisition and graded sampling
- **3D hydrological modelling** combining
  - Regional hydrology (natural groundwater model)
  - Local wellfield hydrology (based on **wellfield design**) embedded in regional model
- **1D-3D reactive transport modelling** for simulating and **optimizing ISR performance**
- Optimal **ISR monitoring** solutions (networks) for environmental compliance
- **Engineering** of wellfields and processing plant
- Post-mining measures securing **environmental compliance**

UIT's partners:
HZDR (DE)
CSIRO (AU)
BGS (GB)
IAEA (UN)
and others



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