

Operational model for eco-efficient management of mining wastes

Approach developed in the KaiHaMe project

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kemira



Endomines



Programme for Sustainable Growth and Jobs

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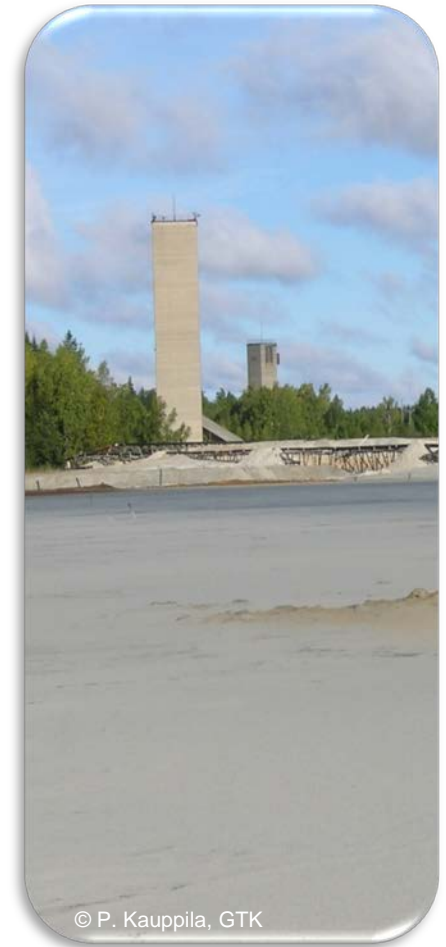
Background

- Management of mining wastes is one of the primary challenges of sustainable mining
 - Only a small part of excavated rocks is usually utilized and the rest is disposed as mineral waste
 - Disposed waste poses hazards to the environment
 - Hazardous waste requires sealed structures
 - Waste disposal is costly and may mean squander of natural resources
- Solutions to increase raw material value of wastes are needed



KaiHaMe project

- ERDF funded project May 2015- April 2018
- Develops tools for the utilization and management of mining wastes:
 - To decrease the amount of disposed hazardous waste
 - To increase raw material value of excavated Au and base metal ores
 - To decrease negative impacts of mining waste disposal
 - To promote sustainable mining by enhancing material eco-efficiency already in the planning phase of the mines
- In co-operation with Boliden Kevitsa Mining Oy, Kemira Oyj and Endomines Oy



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KaiHaMe project structure

WP1 Operational model for optimization of mining wastes

WP3 Increased utilization and raw material potential through processing of mining wastes

WP2 Long term stability of mining wastes and prediction of seepage water quality

WP4
Dissemination and communications

Objectives for the operational model (1)

- To develop cyclic approach for the optimization of mining wastes
 - by combining development of mineral processing with the assessment of raw material value and environmental risks of mining wastes
 - to modify and optimize waste properties and fractions based on their raw material and utilization potential, environmental performance and environmental impact assessment
 - concentrating substances hazardous to environment or unstable to one waste fraction with limited amount
 - to minimize environmental impacts simultaneously improving usability of other waste fractions or by developing new by-products for industry



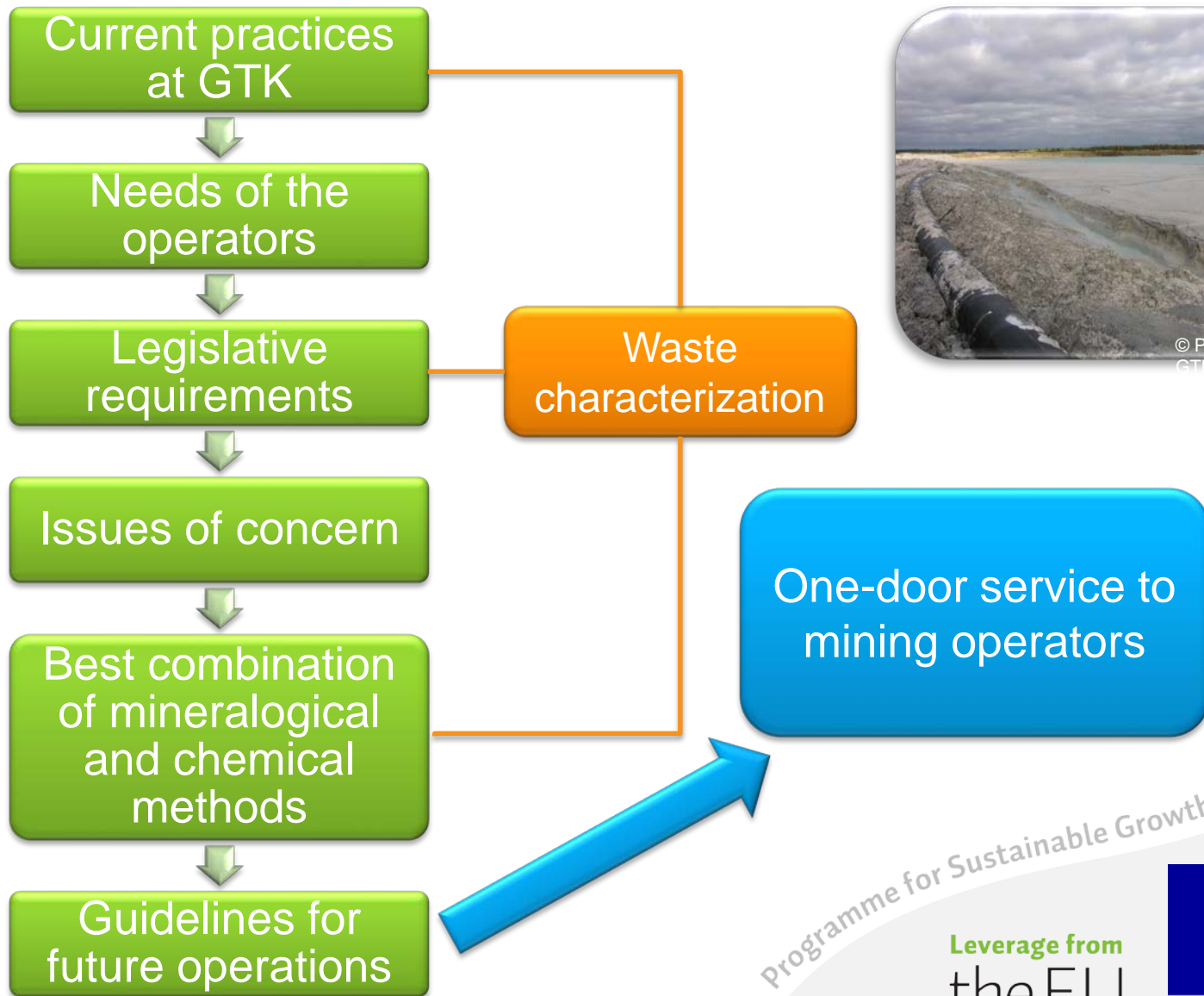
Objectives for the operational model (2)

- To improve the use of data from mineral processing in the evaluation of environmental impacts and planning of mine waste management early on
- To increase raw material potential and versatile use of mining wastes and their evaluation
- To decrease amounts of disposed (hazardous) waste and its carbon footprint
- To improve feasibility of mining operations and to decrease its environmental impacts

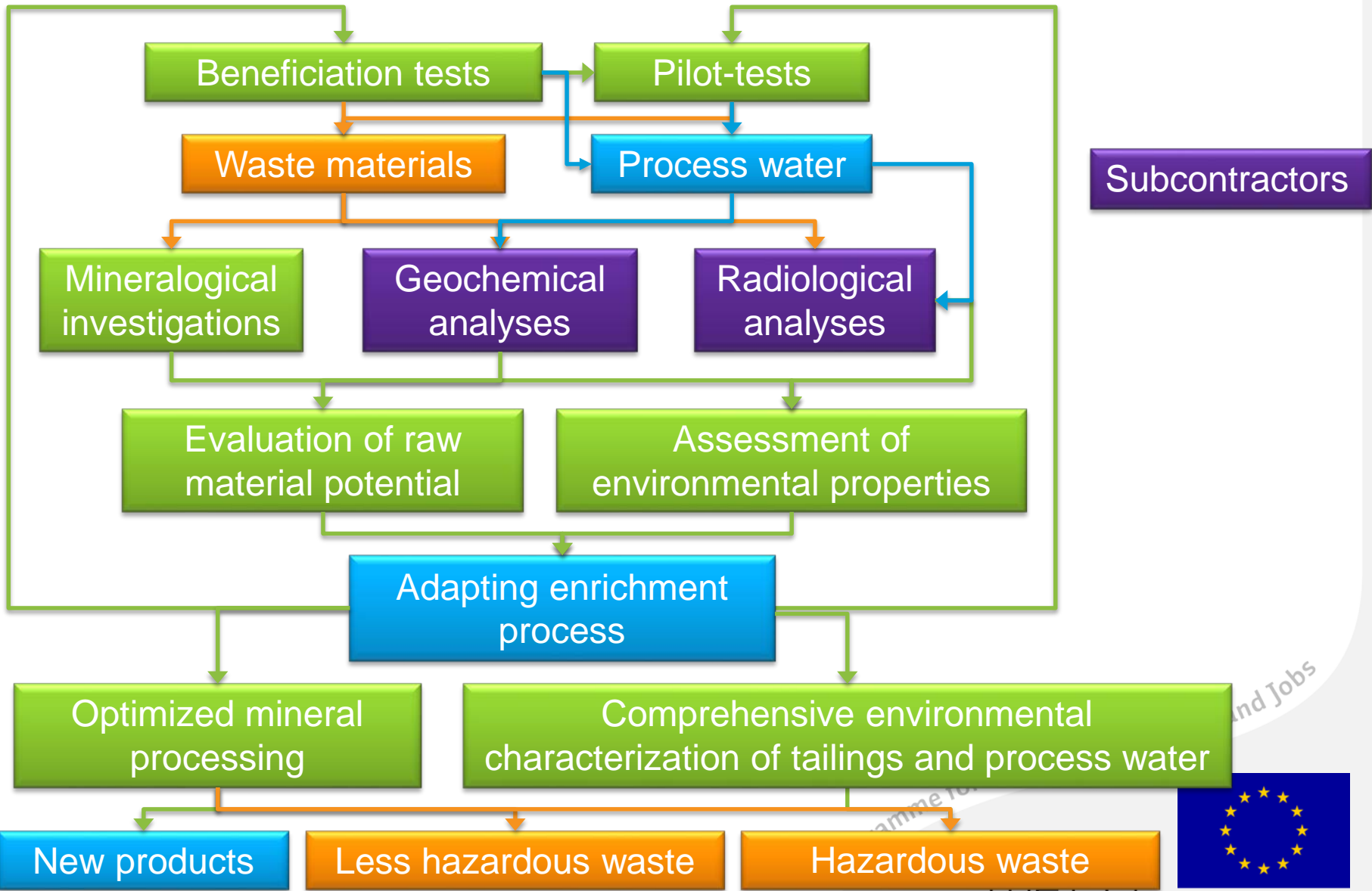


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Development of the operational model



Suggested operational model

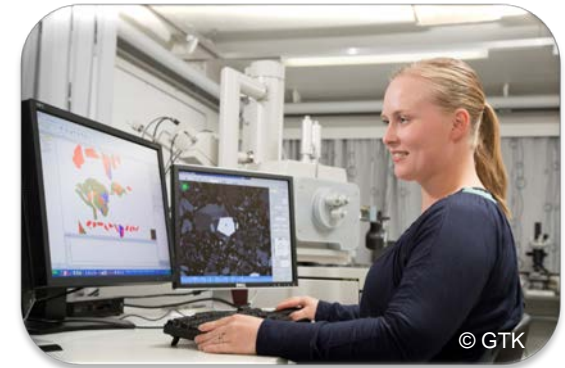


Importance of mineralogical studies

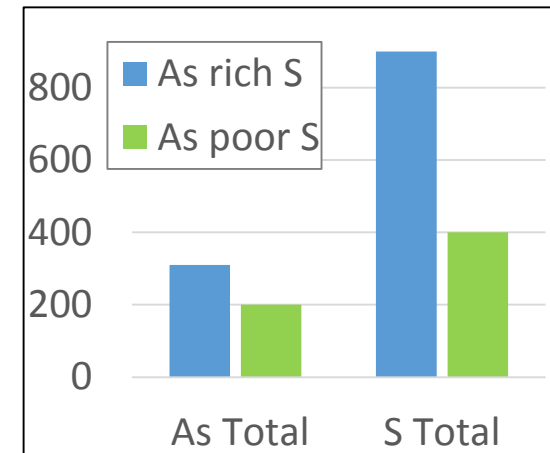
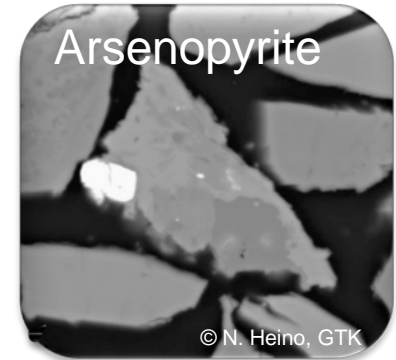
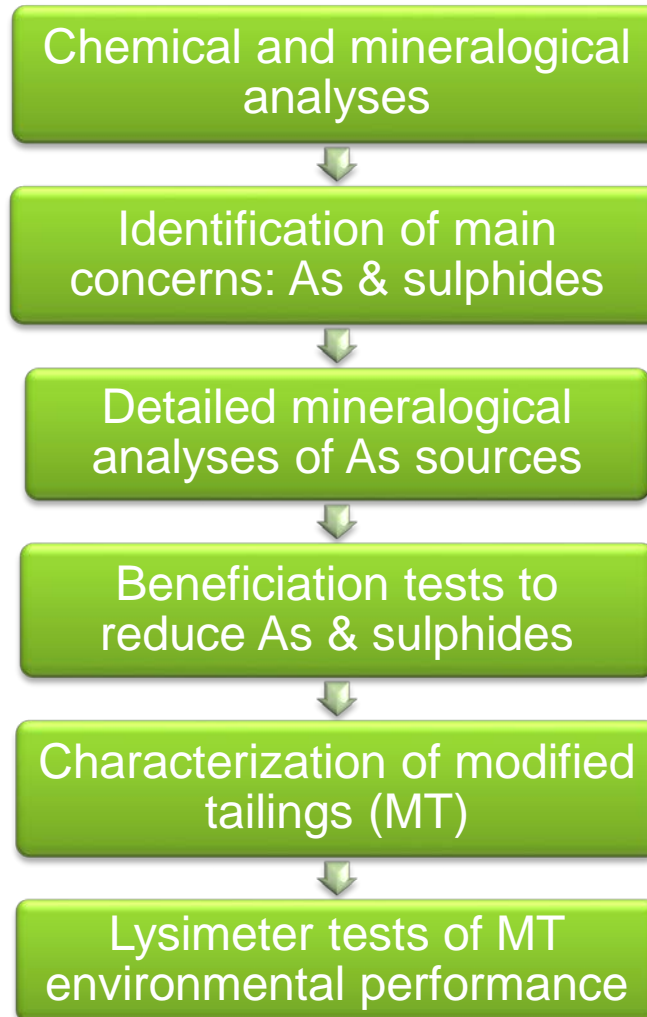
- Identification of hazardous and exploitable minerals in mining wastes
- Elemental department of toxic and valuable elements into specific mineral phases: major (%) to trace element (ppm) levels
- Mineral associations, liberation degree and grain size distribution of interesting minerals

 Crucial information:

- Environmental risk assessment & long-term behaviour of mining wastes
- Raw-material potential (new products)

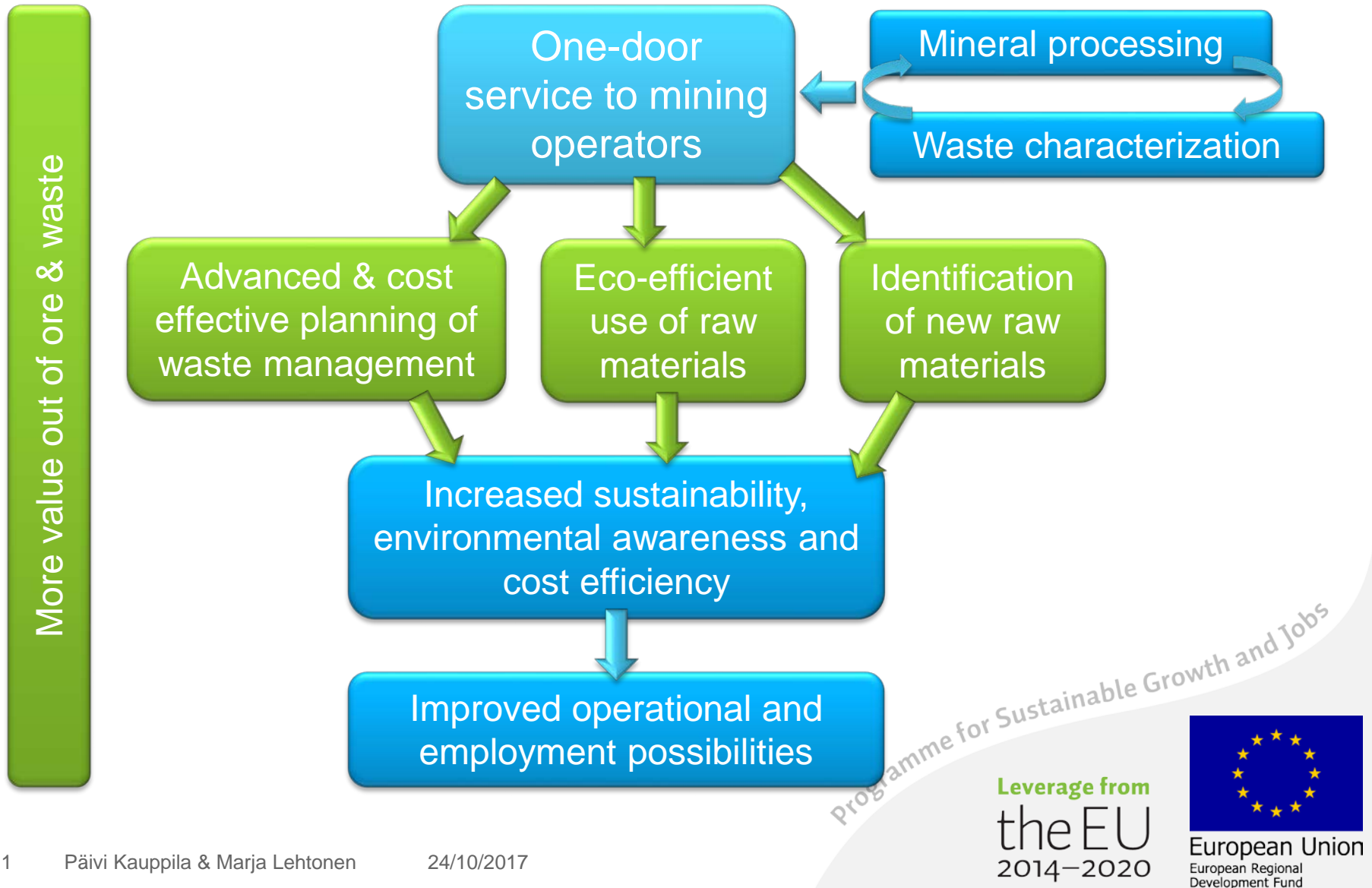


Example of the KaiHaMe project: Processing of Au ore



...one for Sustainable Growth

Benefits of the operational model



Thank you for your attention!



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<http://projects.gtk.fi/KaiHaMe>



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