LIFE CYCLE ENGINEERING

OF

MINING AND INDUSTRIAL SITES

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"Sustainable Post-Industrial Land Management"

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- The Department Life Cycle Engineering
- Introduction to LCA
- Acid Drainage/Leaching
- Land-use
- Summary

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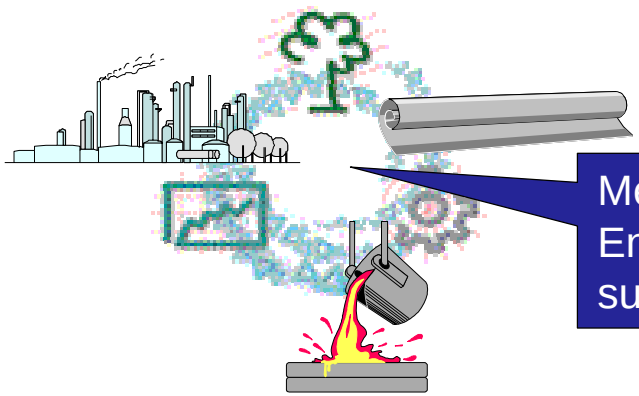
IKP, Department Life Cycle Engineering
Overview

- Dept. LCE founded in 1989 by Prof. Dr.-Ing. Peter Eyerer
- Interdisciplinary team of 10 full time academic staff (Chemical, mechanical, environmental and process engineers; geo-ecologist)

Industry and research projects on ecological-economic-technical analysis and decision-support of products, processes and services



Methodology development (Life Cycle Engineering and Sustainability, substance flow analysis, Indicators)

GaBi 4
Get ready for tomorrow!

Software and database development and maintenance (GaBi software, DfE-tools)

IKP, Department Life Cycle Engineering
Working fields and selected industry partners

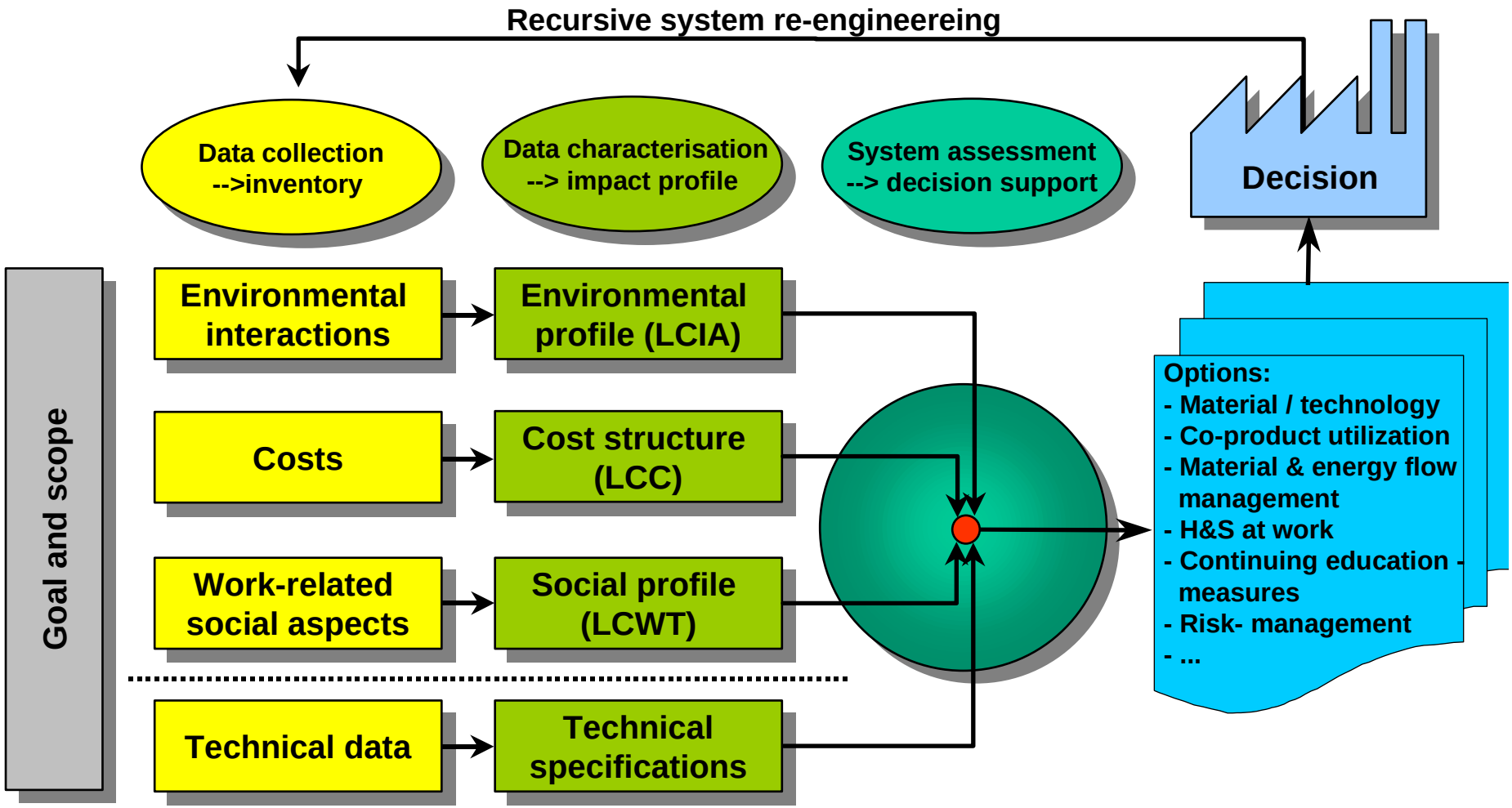
- **Automotive industry** e.g. DaimlerChrysler, Porsche, Renault, Delphi,...
- **Material industry** e.g. Alcan, Borax, Falconbridge, Amplats, ThyssenKrupp ...
- **Construction industry** e.g. Maxit, Heidelberger, Saint Gobain, STO,…
- **Electronics industry** e.g. Motorola, Nokia, Bosch, LG Electronics, Sony, …
- **Chemical industry** e.g. DOW Chemicals, BASF, DSM, PPG, …
- **Surface technology** e.g. BASF, PPG, Dürr, DuPont…
- **Renewable resources** as energy carriers, for automotive applications etc.
- **Energy Supply** e.g. NWS, NIRE/MITI, NorskHydro, Icelandic NewEnergy, ...
- **End of Life / Recycling** e.g. DGfH, ECVM, Siemens, Noell, Thermoselect, …

Development of world-wide leading **GaBi Software-System and databases** together with partner PE Europe GmbH

IKP and PE form together the world's largest LCA/LCE working group

From LCE to LCS

Implementation of Life Cycle Sustainability methodology into GaBi 4 software



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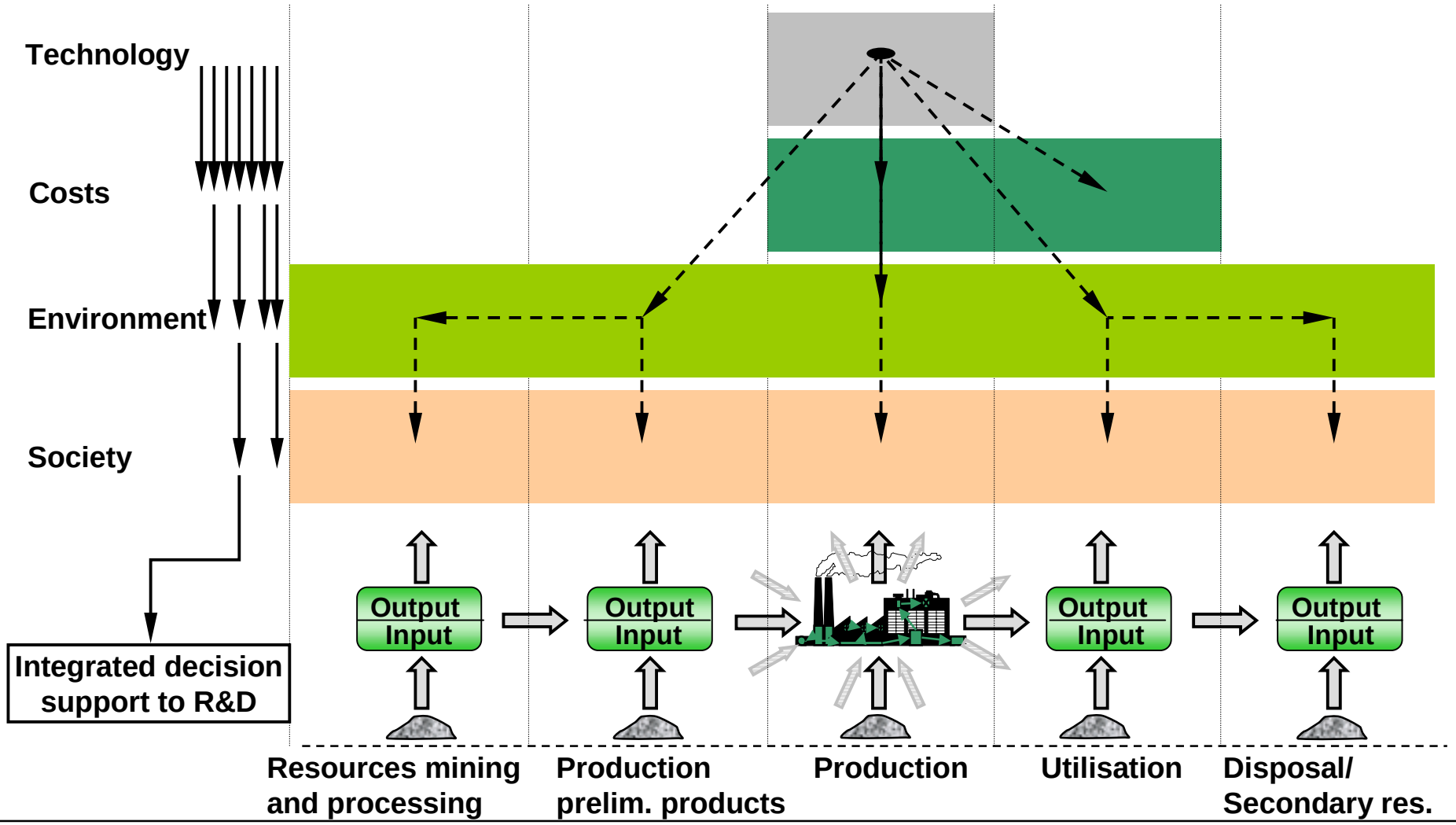
Life Cycle Sustainability in product development

Step-wise procedure in parallel to development achieves best feasible solution



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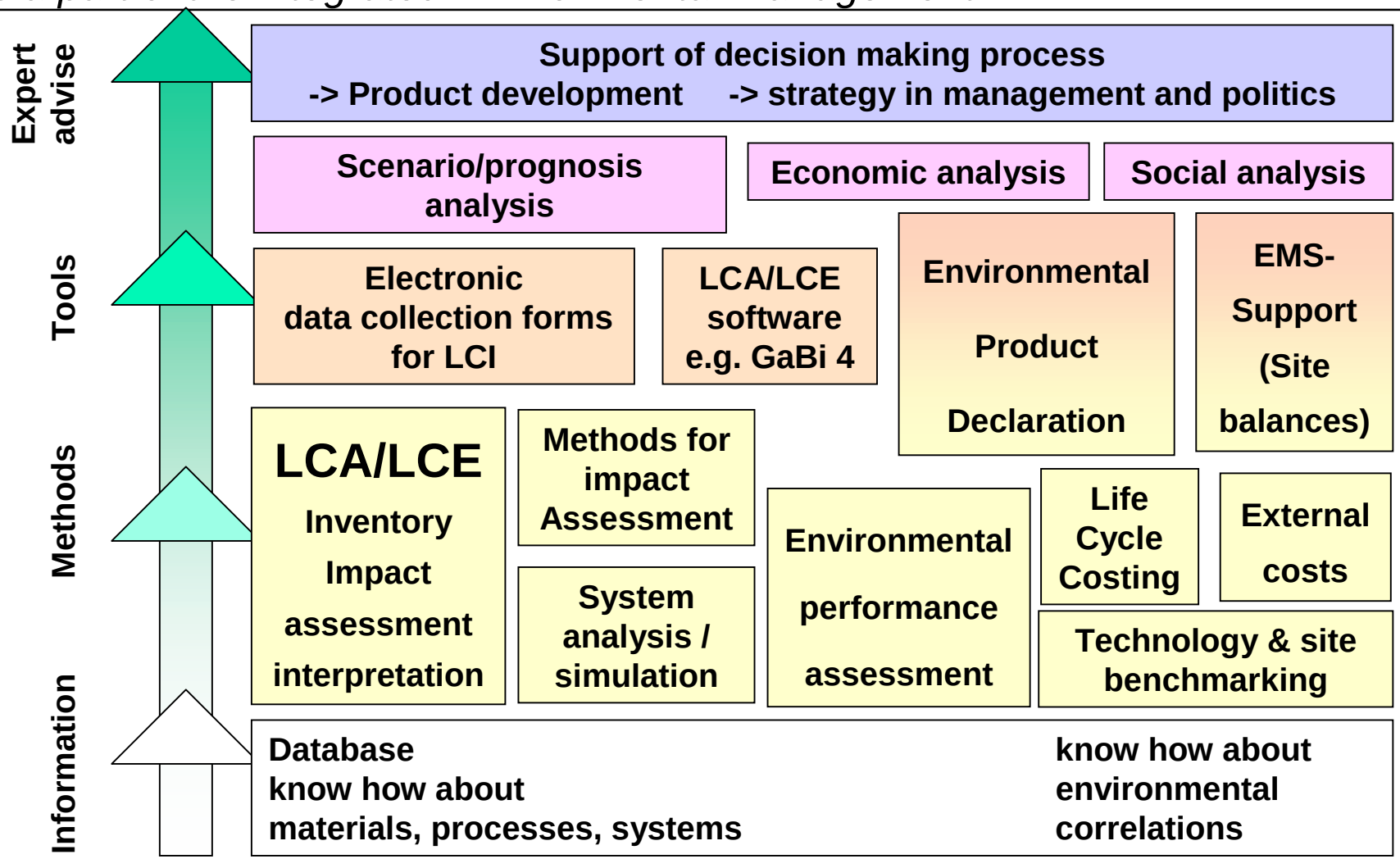
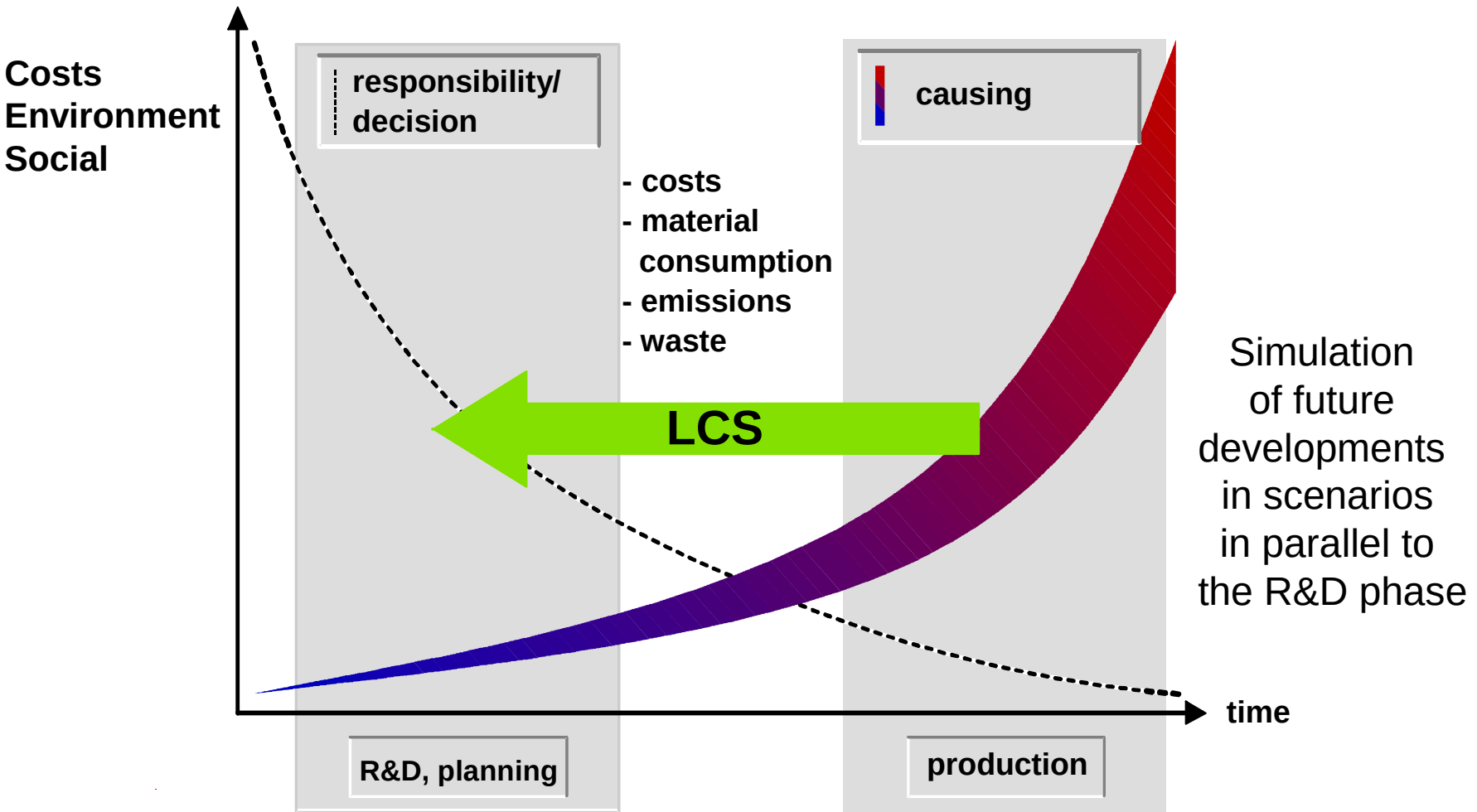
The Life Cycle Approach

as a part of the integrated Environmental Management



Life Cycle Engineering

Development of Life-Cycle Simulation (LCS)



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Current Difficulties

Environmental Management-related Questions

- Energy efficiency
- Resource efficiency
- EU Directive on Mining Waste
- Responsibility towards stakeholders
- Environmental-related questions of customers

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Current Difficulties

Environment-related Questions

- Tailings- and mine waste management
- Water and waste water management
- Acid drainage
- Land-use

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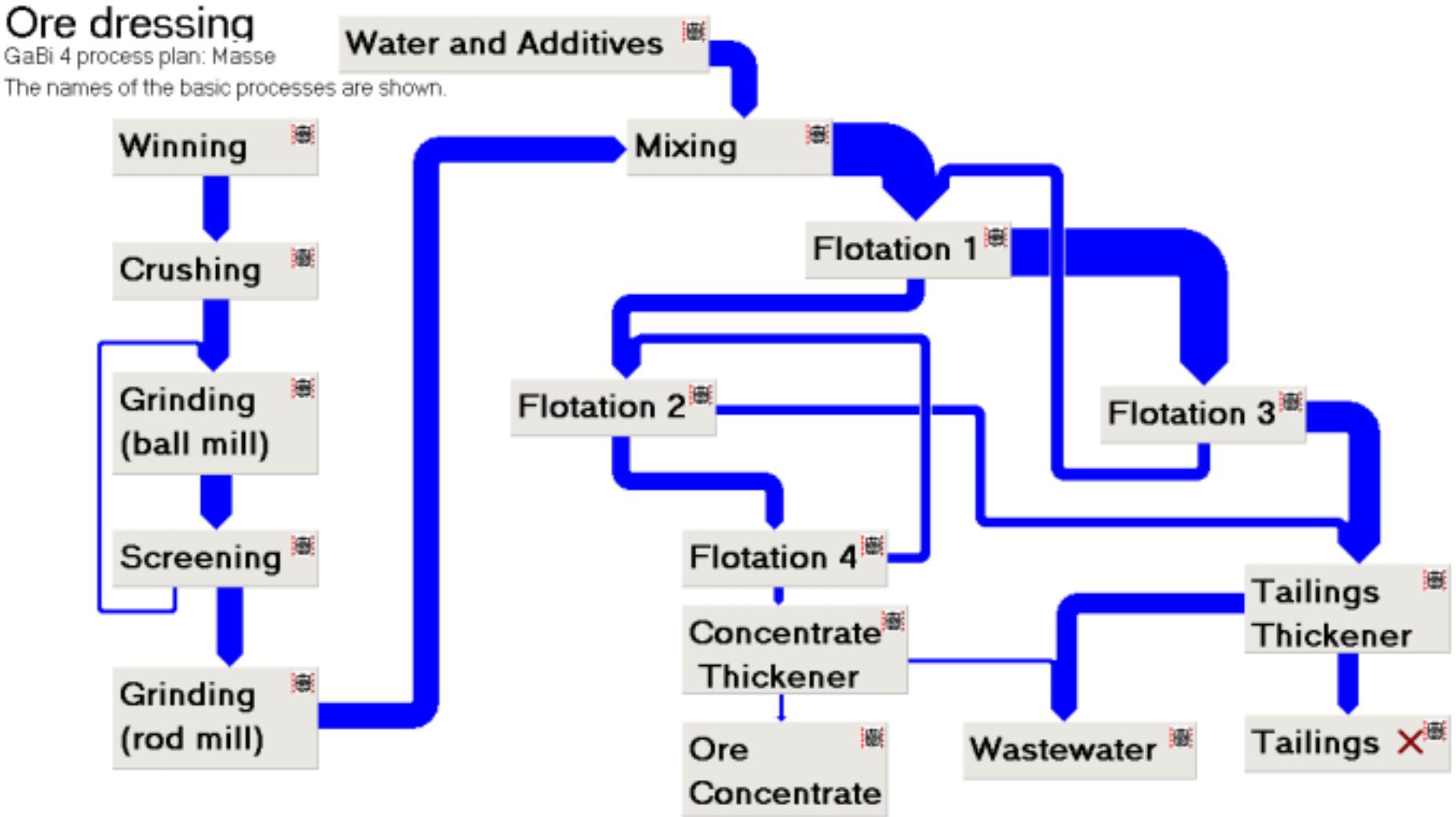
The LCA-Model

Modeling an Ore Concentrator



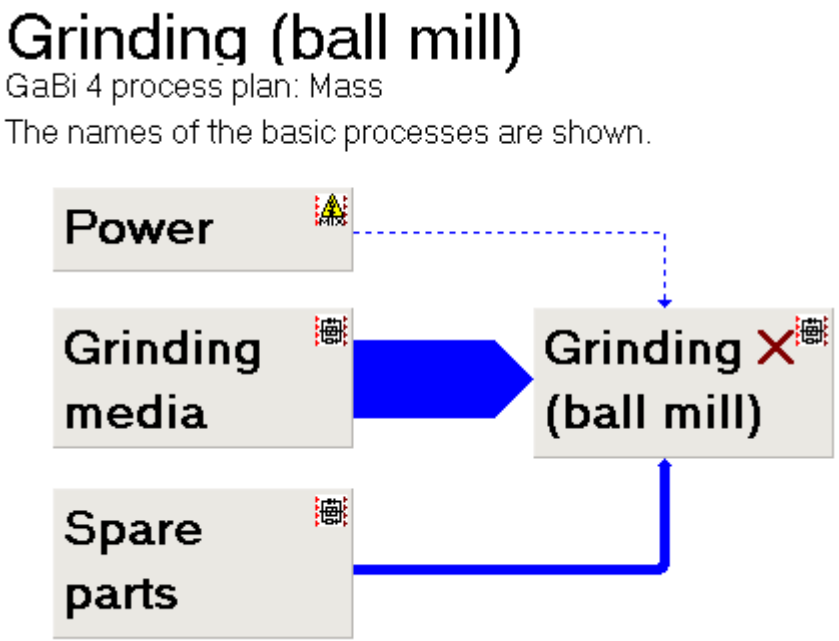
The LCA-Model

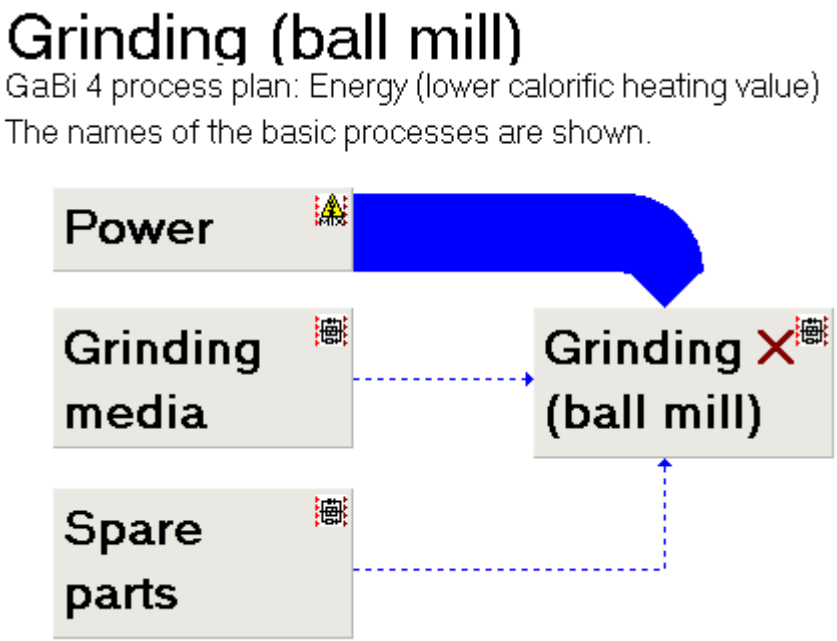
One process-step: The ball mill

Thickness of the arrows shows the

mass **energy content**

of the flows

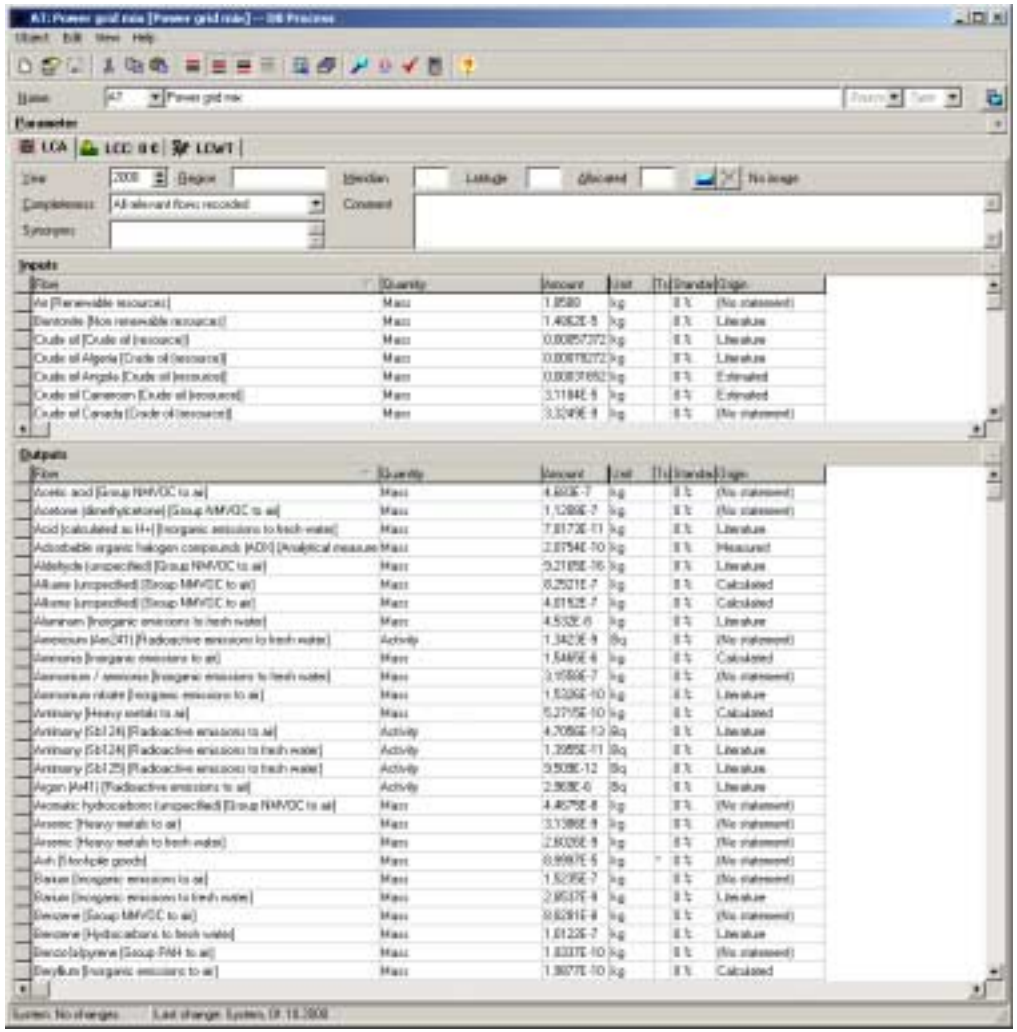




The LCA-Model

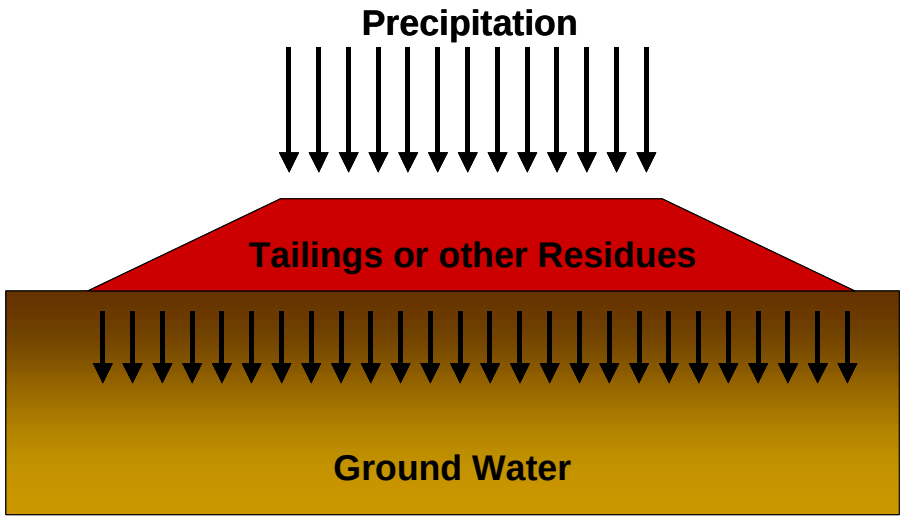
View of a process

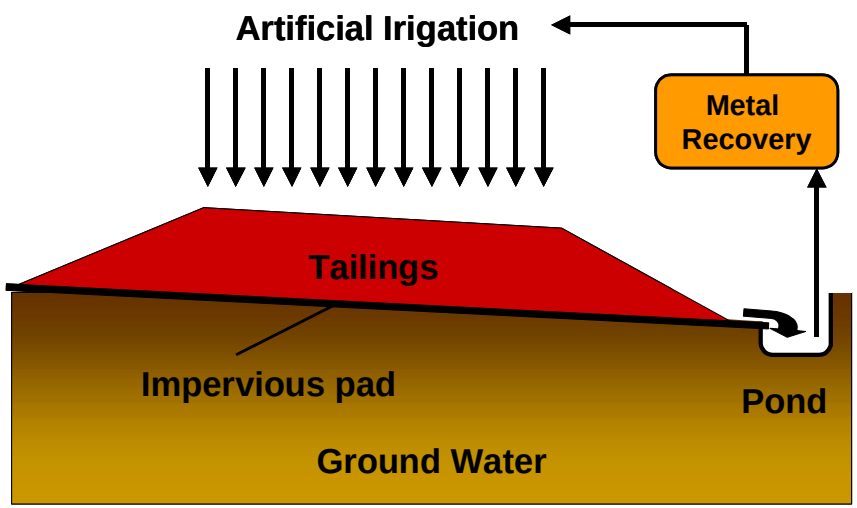
A process in the model basically consists of a list of in- and outputs

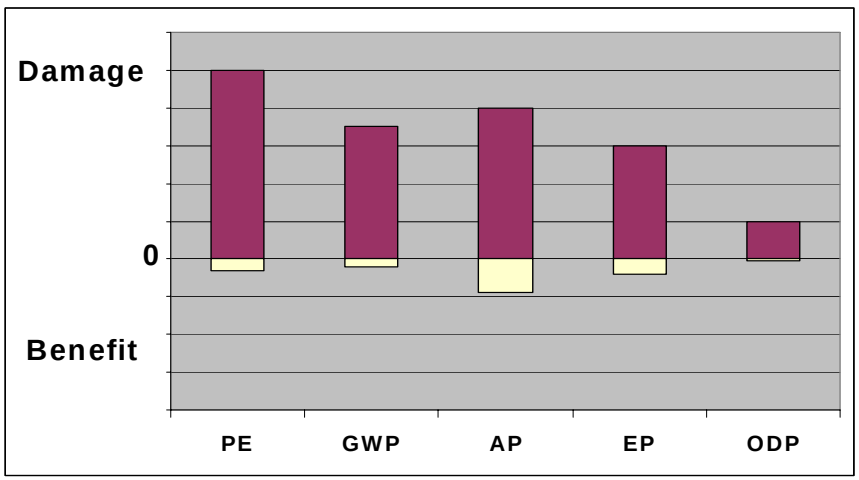


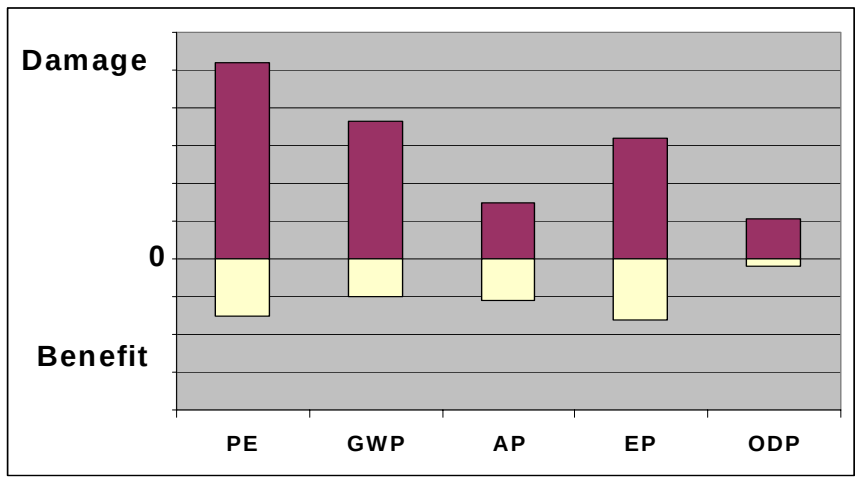
Leaching of Tailings

and Acid Drainage



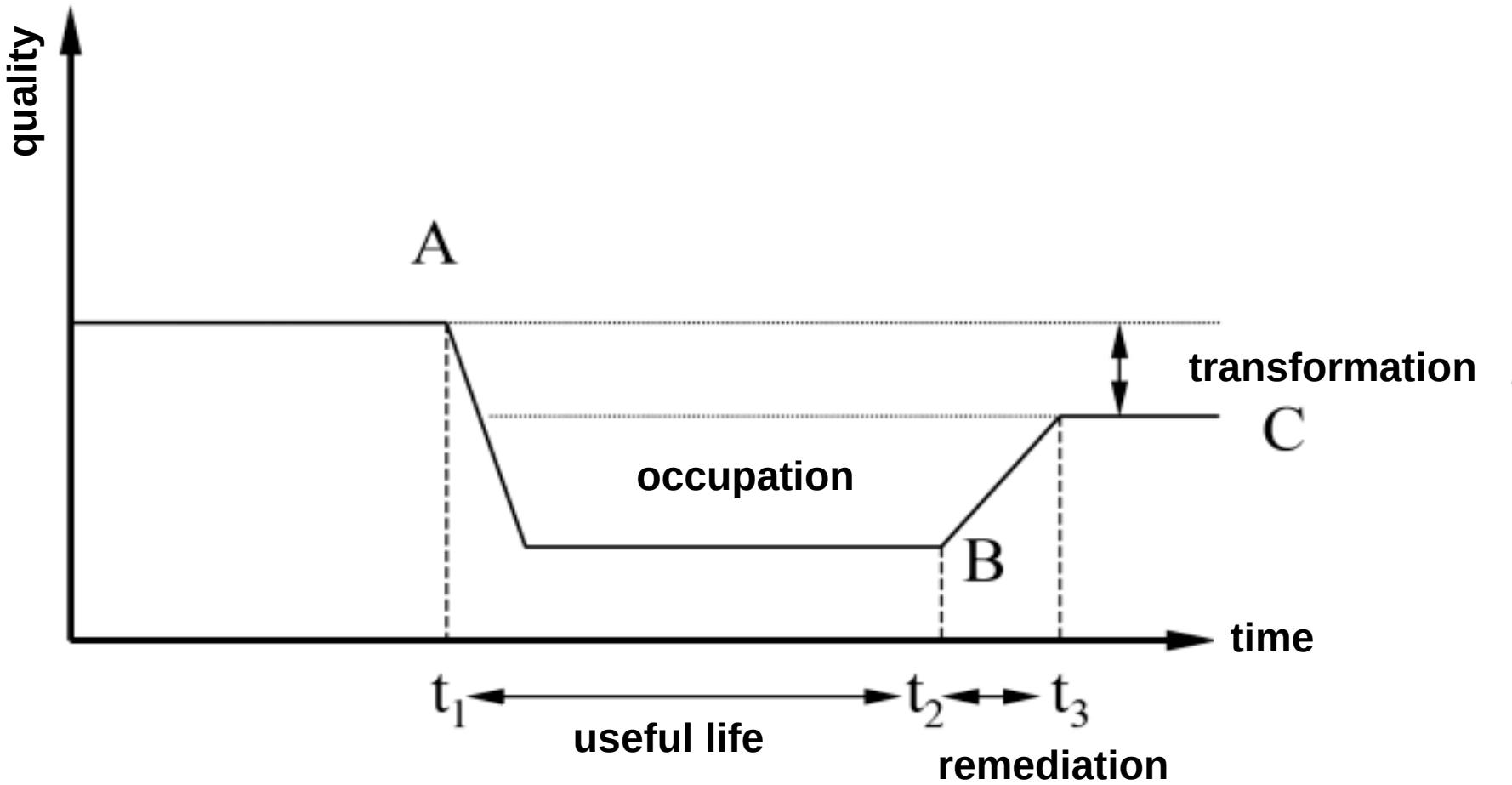






Land use

Occupation and transformation of a land area



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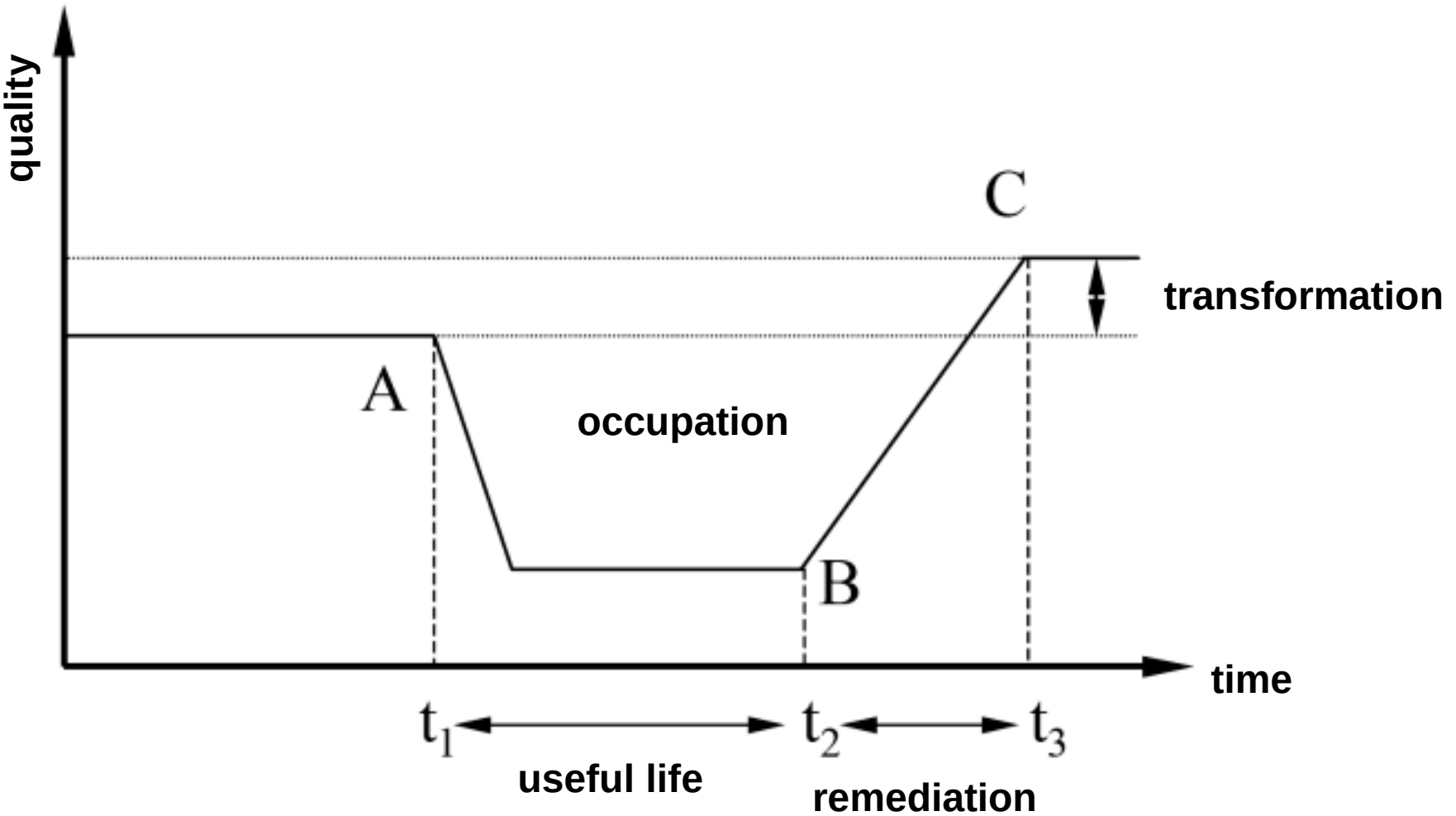

Considered Effects of Land-use

- Erosion resistance
- Filtering, buffer, and transformation ability
- Ground water building function
- Drainage regulation
- Biotic yield potential
- Imission protection
- Ecotope building potential

Benefits

With a LCA-integrated methodology

- the land-use is quantifiable
- a more differentiated picture of the environmental overall-situation is obtained
- a more precise control and sound management is possible

Sustainable Post-Mining Land Management

Summary

- For Environmental Management a Life Cycle Approach should be employed to avoid neglecting or shifting of problems

- Engineered leaching processes have two effects:

  - Increase of recovery rates
  - Prevention of acid drainage

- Land use effects are important to be considered to make sustainable decisions. It can be done with the provided methodology

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Contact

For further questions, information,…

Thank you for your attention !!

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