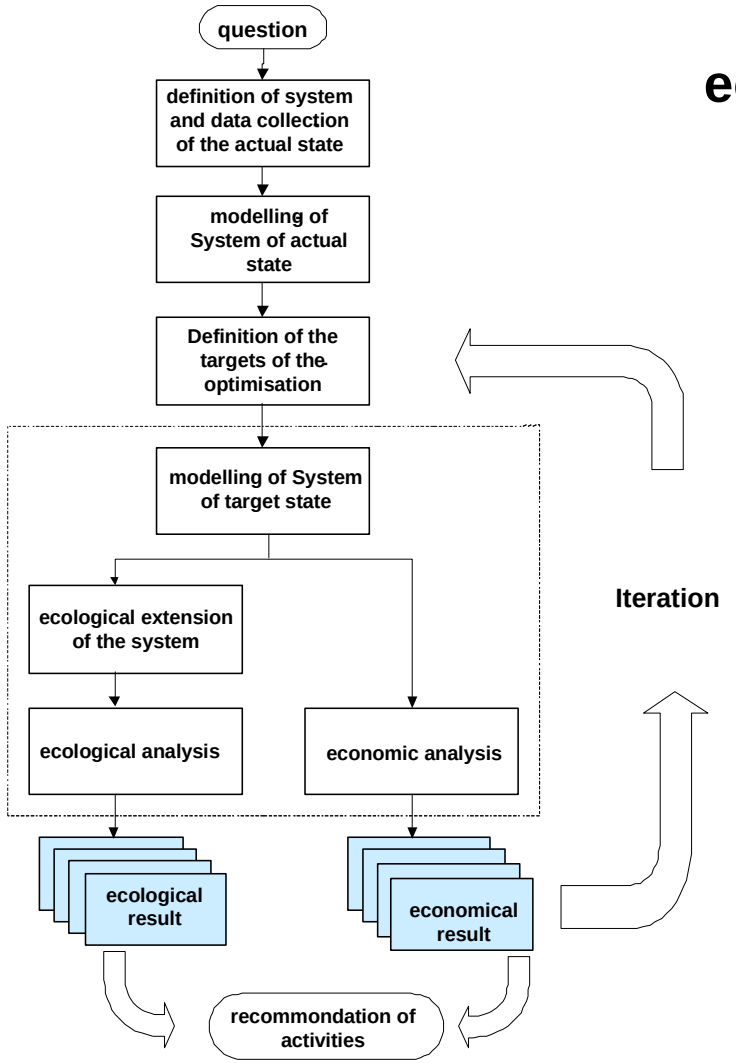
LCA

for Optimization

of electroplating SME's

Outline of the presentation

1. Methodology of ecological plant optimization - (EPO)
2. Participants of the project
3. Results
4. Benefit of the projects



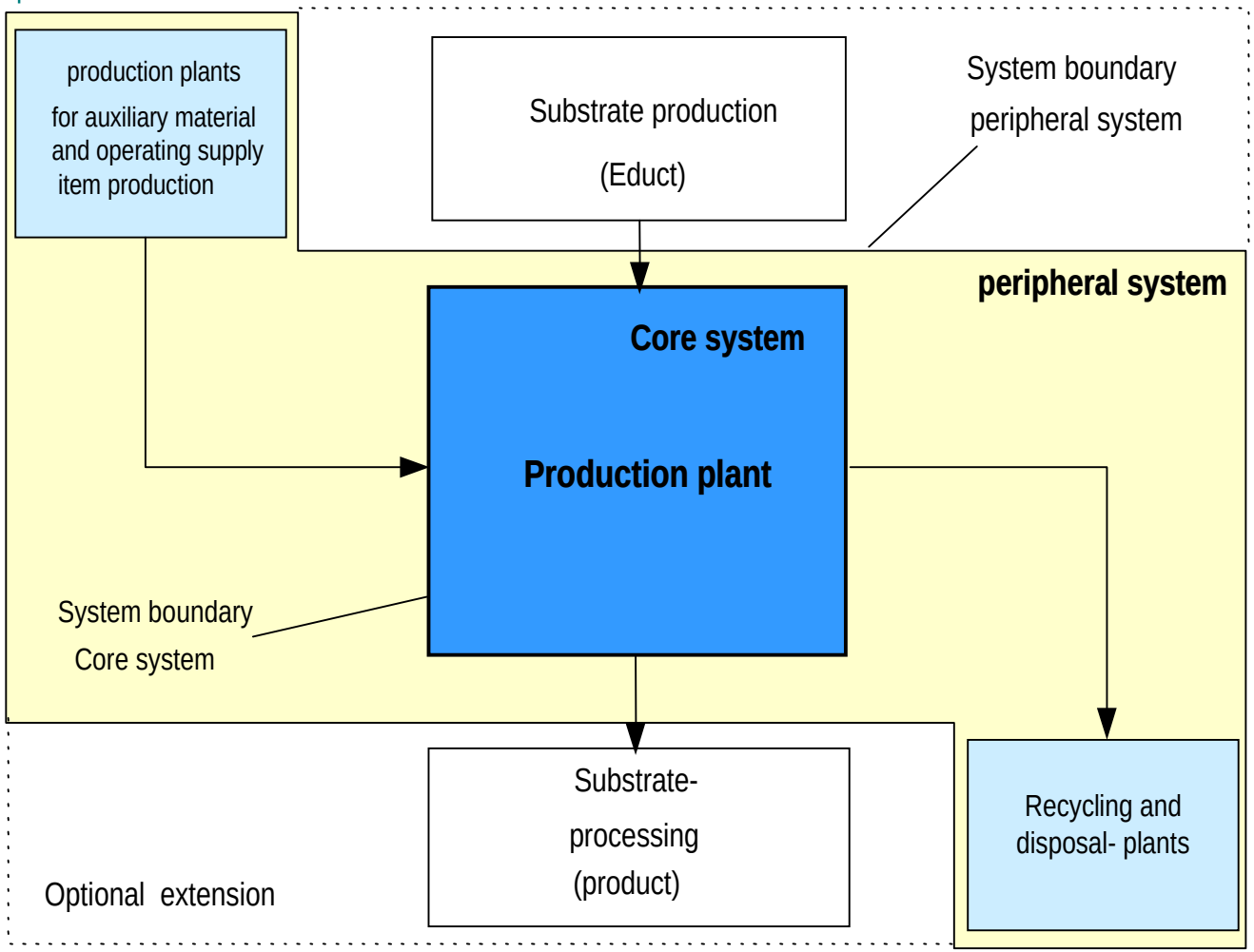
ecological plant optimisation - EPO -

Iterative procedure through systematical Material - and energy - flow modelling to:

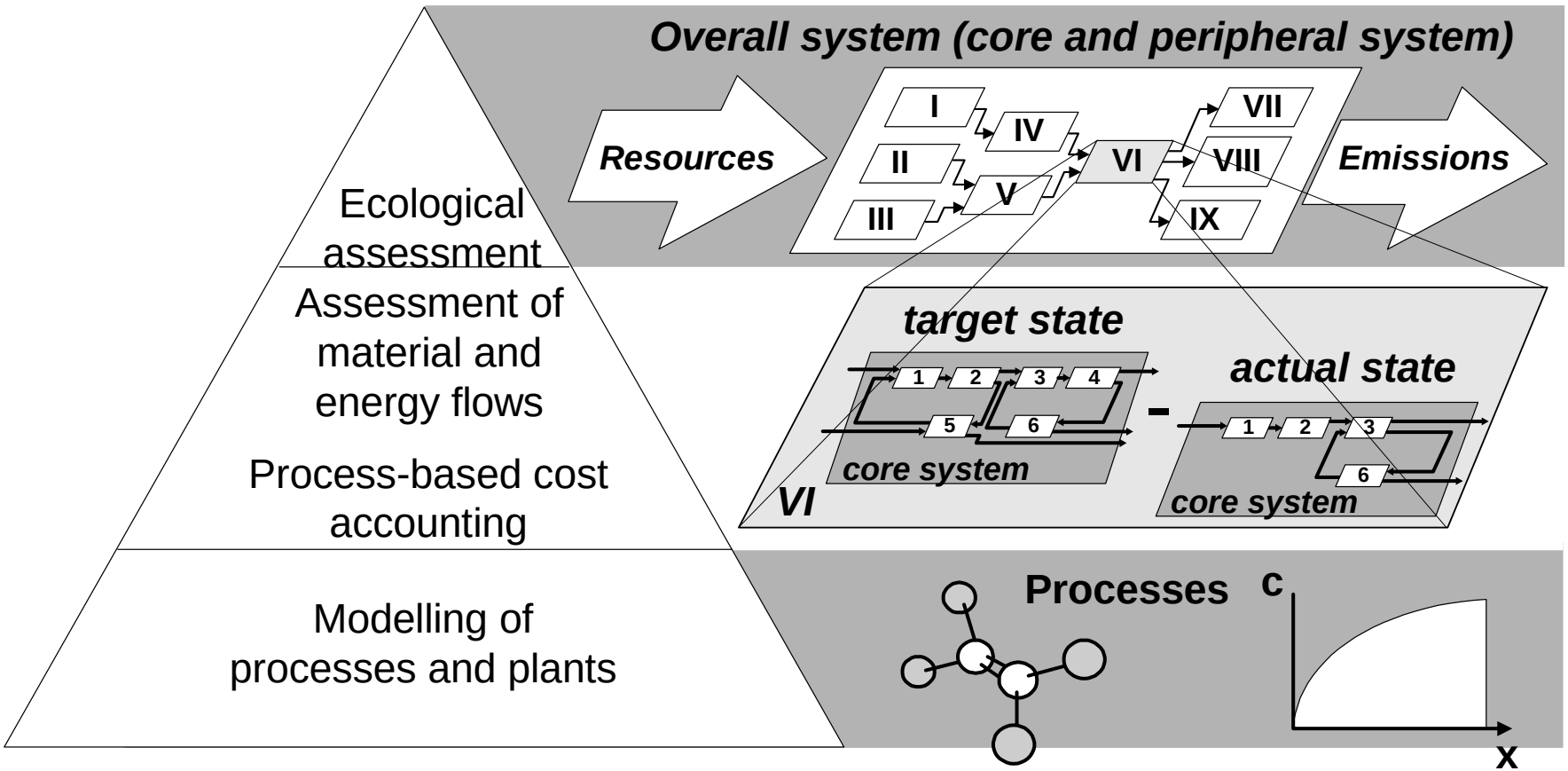
- technological analysis
- economic analysis
- ecological analysis

of plant optimisation.

System view of the EPO

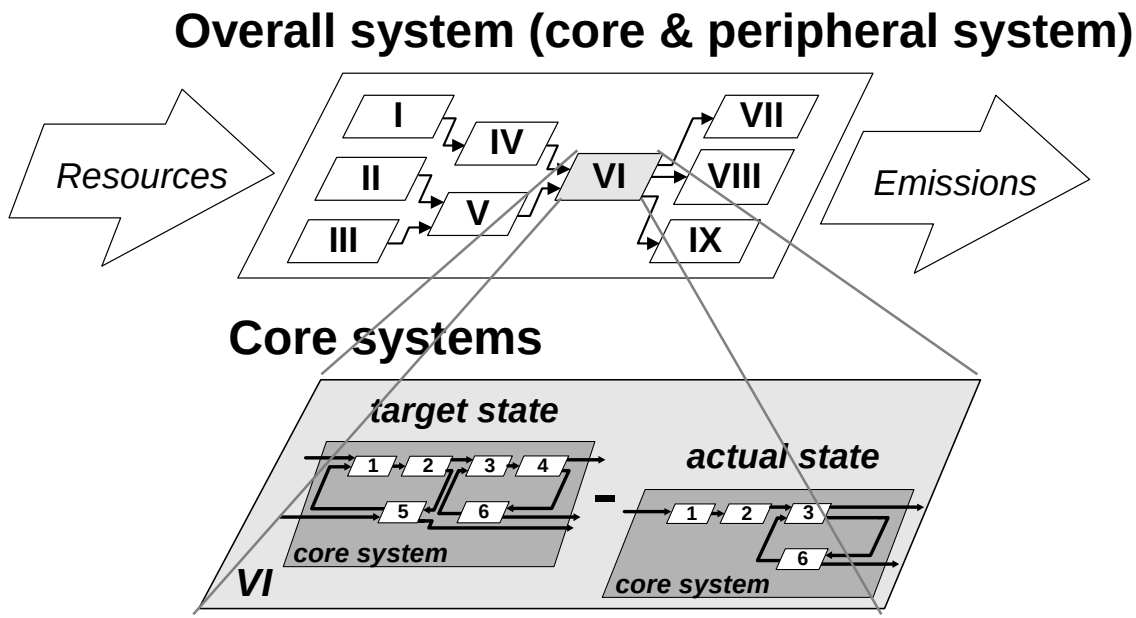


Separation of core system and peripheral system


Overall system (core and peripheral system)
Resources
I
II
III
IV
V
VI
VII
VIII
IX
Emissions
Ecological assessment
Assessment of material and energy flows
Process-based cost accounting
Modelling of processes and plants
target state
1
2
3
4
5
6
core system
VI
actual state
1
2
3
6
core system
Processes
c
X

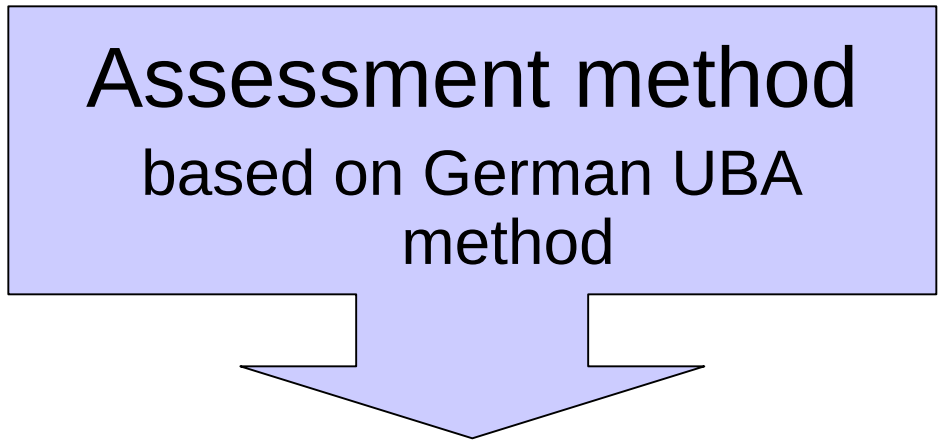
Changing elementary flows

Difference of Mass balances



Impact categories

- Resources
- Air acidification
- Depletion of ozone layer
- Eutrophication
- Aquatic ecotoxicity
- Human toxicity
- Green house effect
- Photochemical oxidants

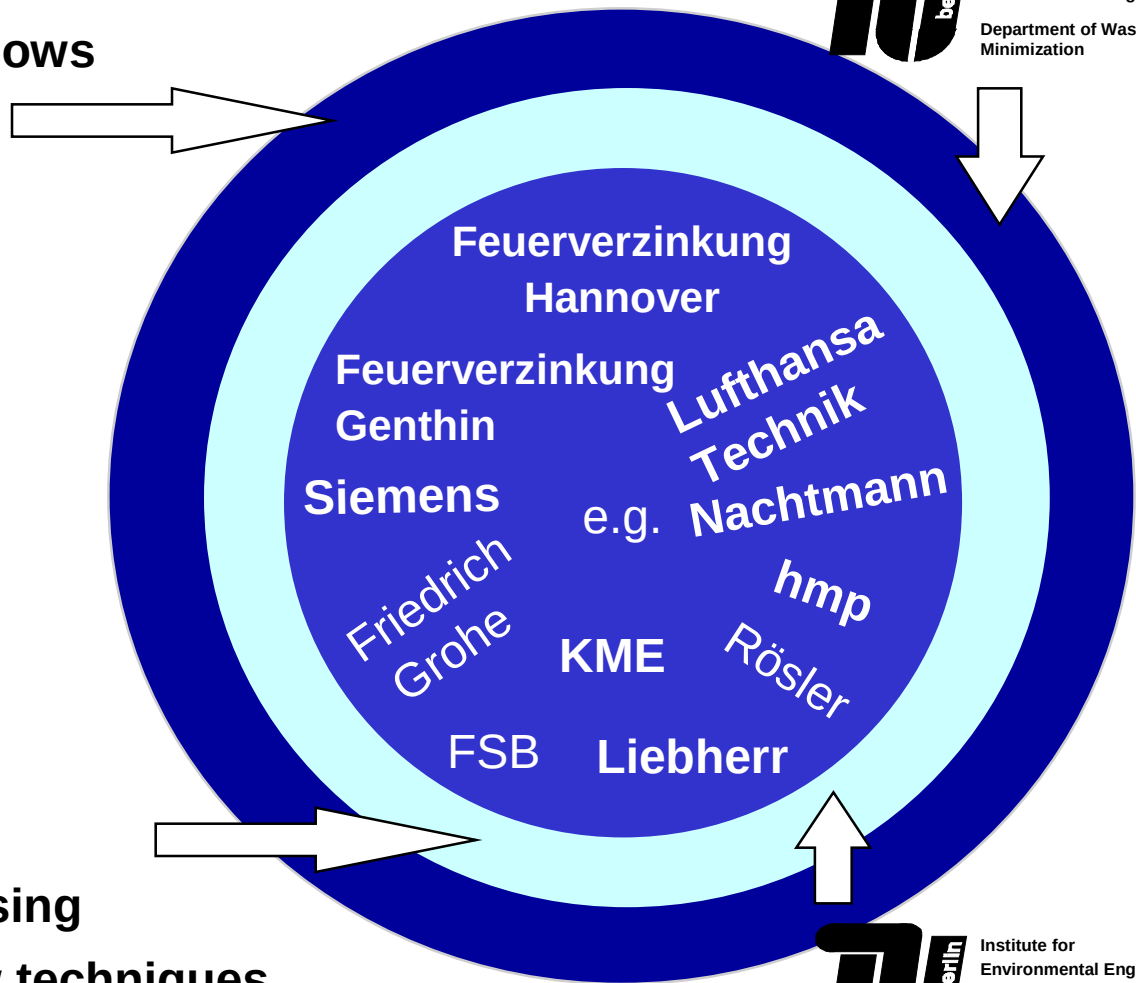


Discussion of results in the society needs to have an assessment method accepted by the society

Institute for Environmental Engineering
Department of Waste Minimization

Closed loop material flows for surface treatment processes

About 40 companies involved



Conversion of existing electroplating plants using optimized material flow techniques

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analysed plants

- repairing- resp. Component electroplating in aircraft ind.
- electroplating for decorative surfaces
- electroplated deplating
- acid polishing of glass
- producing of printed circuit boards
- anodisation of aluminia
- electroplating of plastics
- hot dip galvanizing
- vibratory finishing

processes

- Waste water traetment
- Anodisation of aluminia incl. nanofiltration, vaporization and recycling
- alkaline rinsing
- etching (pickling)
- Accelerate
- Cadmium-recycling
- Electroless nickel plating
- Chromate-detoxification
- Alodine
- Chromium sulphuric acid etching
- Cyanide- detoxification
- pickling
- E0-pickle; E6-pickle
- Electrolytical degreasing
- Electrolytical metal-extraction (Cu, Ni, Ag, Zn)
- degreasing
- Softend water process
- Demetalization
- Demetalization with sulfate sludge separation
- Epal-pickle
- External Recycling of Al-etching waste
- Dyeing of aluminia
- Hot dip galvanzing
- Fluxing
- Glinting conventional and with vaporation and recycling
- Glinting nickle plating
- Vibratory finishing
- Hard chrome plating
- Ion exchanger circuit installation
- Circuit rinsing
- PCB-slightly etching with exchange, process heating and regeneration
- PCB etching-inner layer
- Matt nickle plating
- Sodiumpersulfate etching with NaPS-Regeneration
- Neutralisation/ precipitation
- quality rinsing
- Nitric acid etching of copper
- Hydrochloric acid etching
- Acid rinsing
- Acid polishing
- Sulphuric acid etching of copper
- Sealing and nickle sealing
- rinsing
- Rinsing water cascade
- Thermal conzentration
- drying
- Reverse osmose
- Chromium plating
- Copper plating
- Nickle plating
- electrosilvering
- Zinc plating
- Tin plating
- Full desalination of water
- Inside rinsing

All optimised production plants have decreasing

environmental impacts and

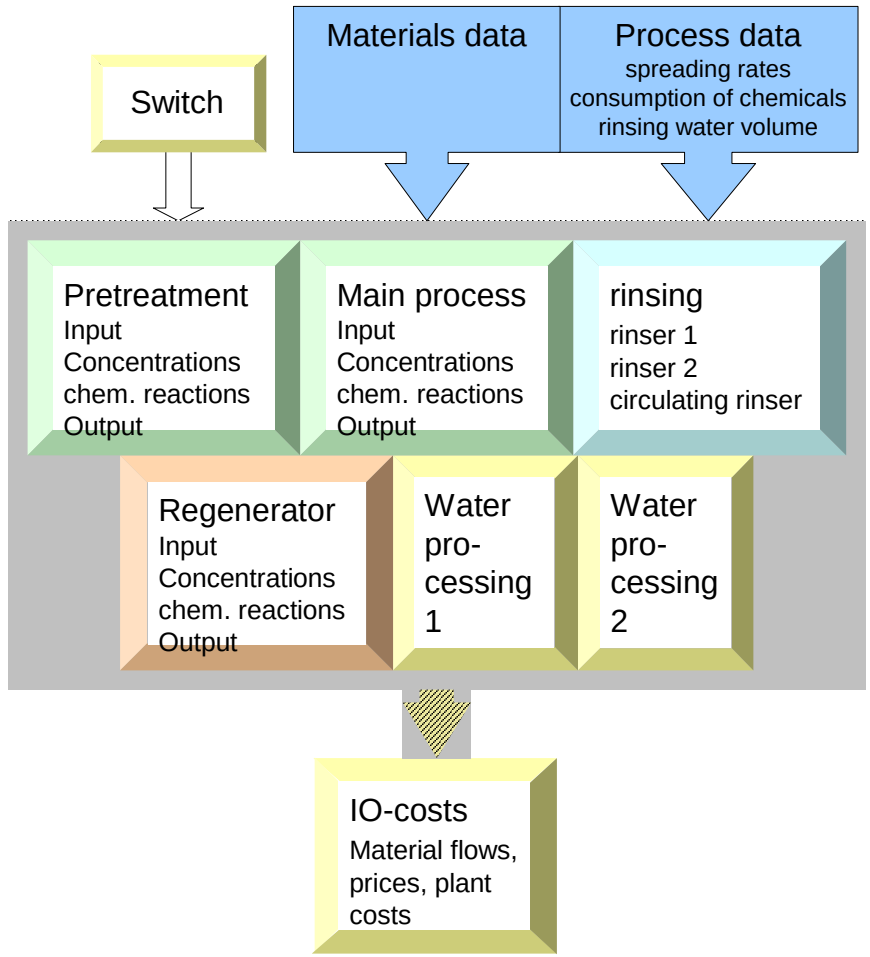
Cost savings

but

Not every target and actual state are comparable

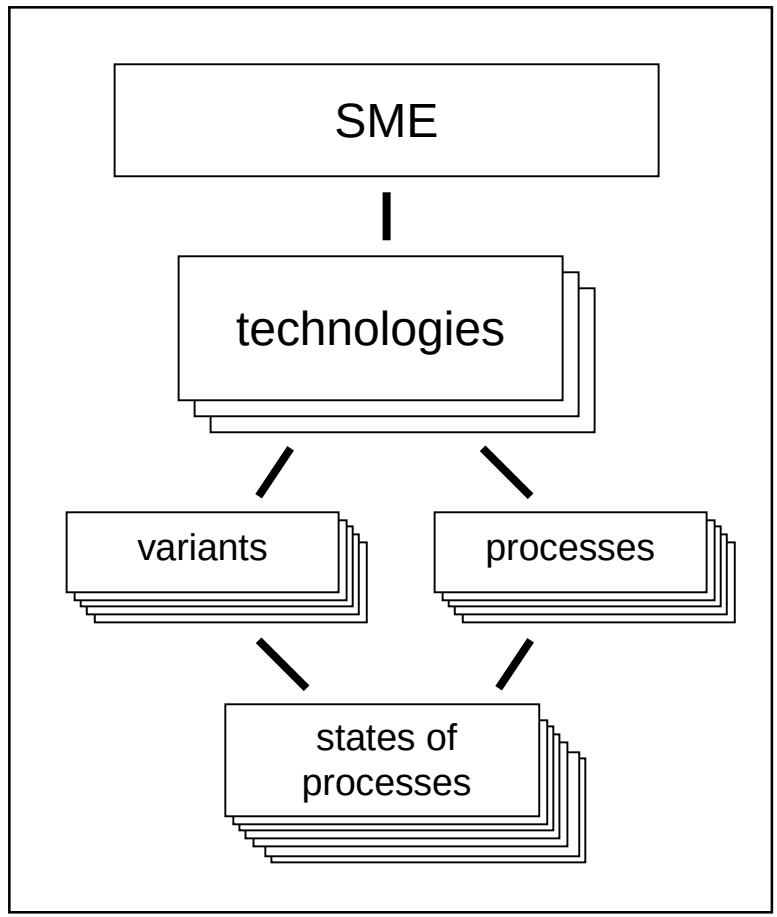
Modeling of a process: EXCEL workbook

- Pool of Excel-Models (about 900) of electroplating processes
- Central Excel-Workbook supporting the modelling of core systems



Knowledge database with the qualitative results of the research projects „Optimizing of electroplating SME's“

→ providing information for all analysed, modeled and optimized processes and process-chains



structure of the database for one SME

- The development of the EPO-Method was successful
- The plants were successfully optimised (environmentally and economical)
- Several Excel-Models are ready for use
- For new users there is a Database for the first steps of an EPO

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