

# Material Data Base for EEE from an end-of-life perspective

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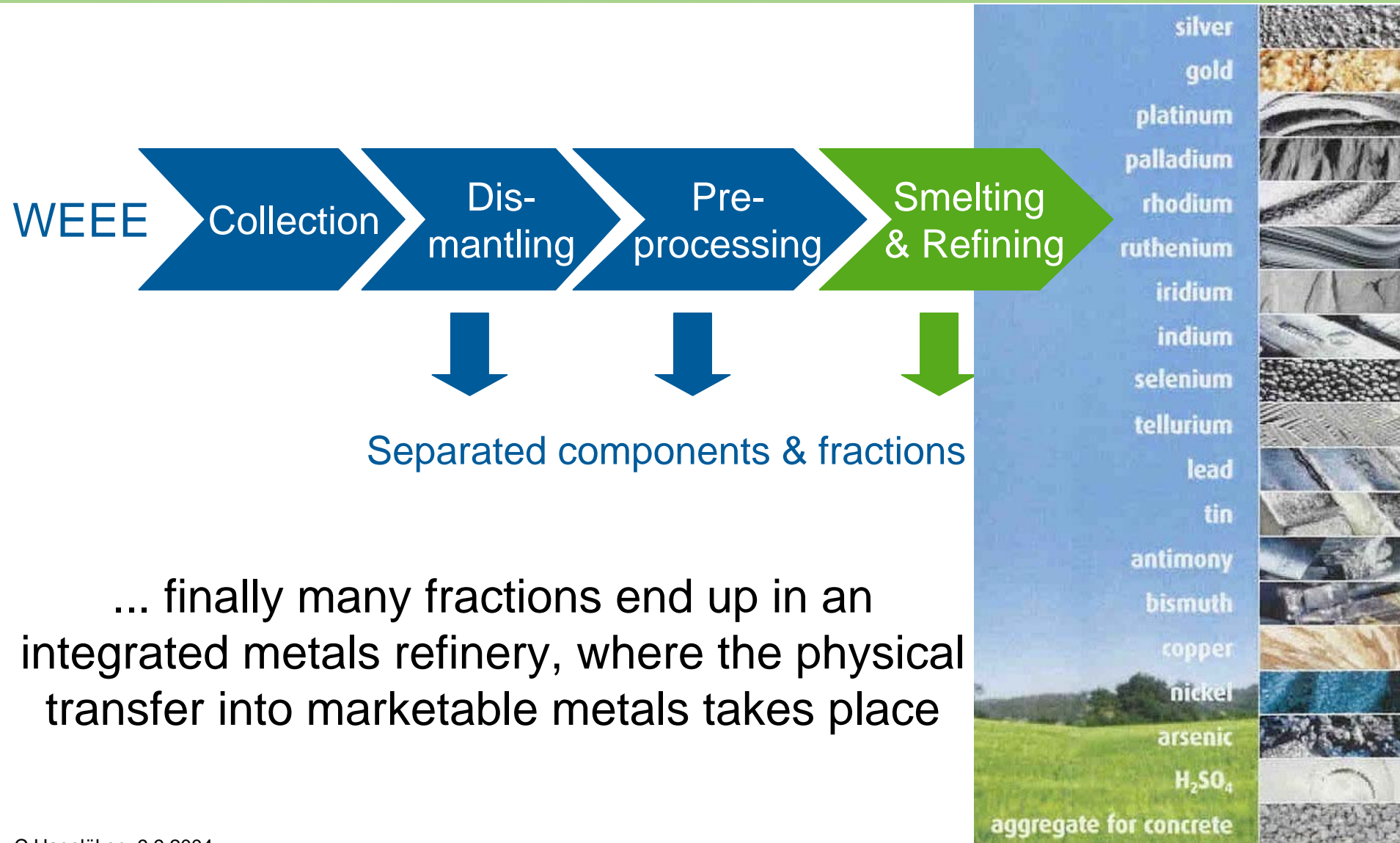
**NEMI Material Data Exchange Coordination Meeting**

**Berlin, Fraunhofer IZM**

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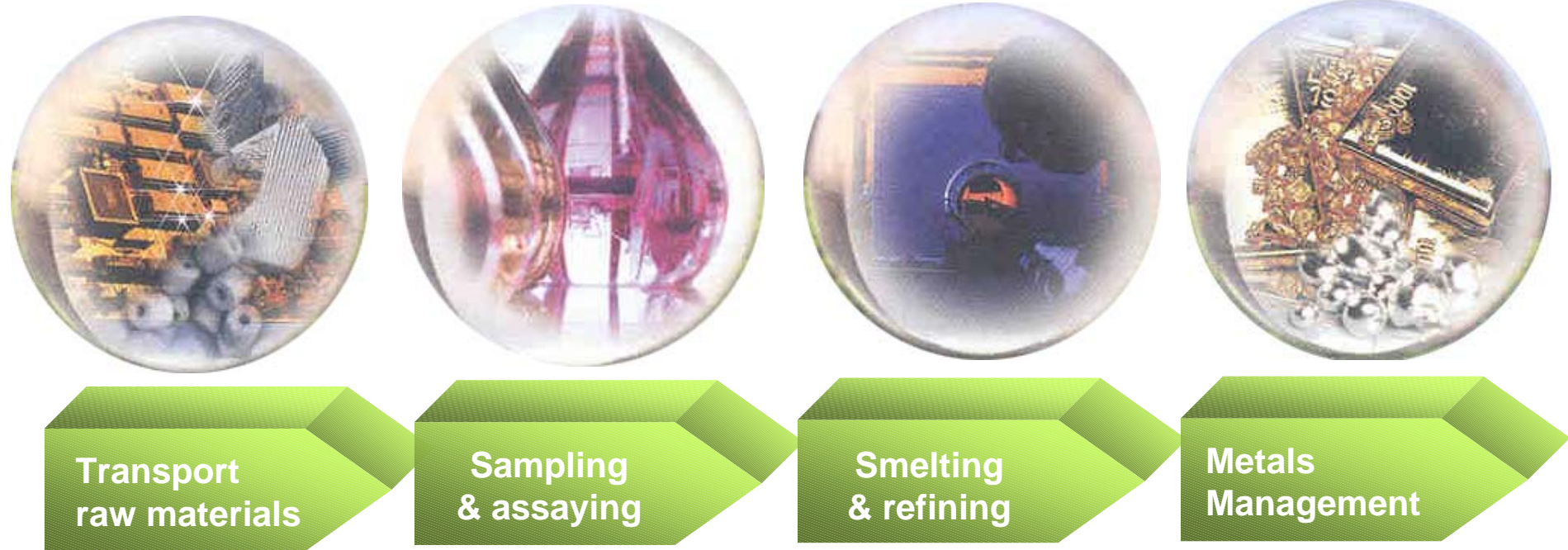
# Whatever is done in the recycling chain ...



... finally many fractions end up in an integrated metals refinery, where the physical transfer into marketable metals takes place

# Our Core Business

**Providing dedicated refining & recycling services to an international customer base**



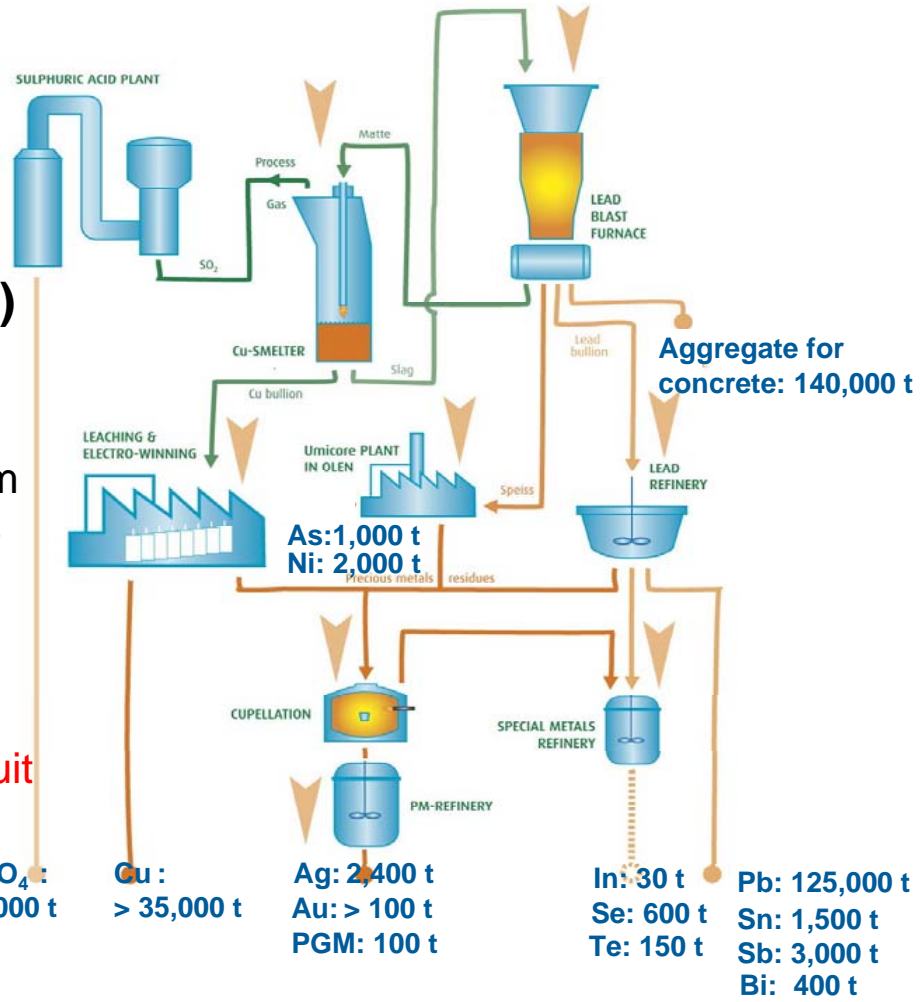
***Umicore Precious Metals Refining 's integrated logistics chain***



# How material composition affects processing - example: Umicore's integrated smelter & refinery

**INPUT**  
250,000 tpy

**OUTPUT**



## Complex (precious-) metals bearing materials:

- industrial residues from metallurgical operations
- production scrap / obsolete materials
- EOL-catalysts etc.
- **EOL-WEEE, e.g.: circuit boards, mobile phones, components etc.**

- Precious Metals
- Base Metals
- Special Metals
- Chemicals
- Aggregate for concrete

Plastic content of feed can be utilized as reducing agent (partial substitution of coke)



# What data do we need - and why ?

## Data are needed for:

- **Value determination**
  - **process lay-out, monitoring and control**
  - **environmental responsibility (concern)**
- 
- **Cu, Ag, Au, Pd, Pt, ... (value)**  
-> influence on intrinsic value and reasonable process intensity
  - **Fe, Al, Ni, Sn, Pb, Zn, ... (process)**  
-> influence on defining the optimum metallurgical process routes
  - **Hg, Be, Cd, As, Sb, Bi, ... (concern)**  
-> influence on EHS infrastructure required and handling procedures
  - **Halogens (Br, F, Cl, ...) (concern)**  
-> influence on required offgas treatment

# What is the benefit for the OEM to provide such data ?

- Finding the best (most eco-efficient) recycling path (including dismantling, pre-processing and end-processing steps)
  - maximise value of recycled materials
  - minimise costs of total recycling chain
  - minimise total environmental burden
- Enabling early developments of future recycling processes for new material combinations (e.g. In = 670 \$/kg > Ag = 220 \$/kg)
- Reliable data base (incl. recycling) e.g. for calculation of recycling quotes, LCA-evaluation, substitution questions (Pb-free solders) etc.

**The earlier the recycling companies are aware of new material compositions, the earlier they can develop appropriate recycling solutions**

# What additional information can we supply to the OEMs in return ?

- **Real EOL data of recycling input streams:**  
all feed material in our integrated metals refinery is homogenised, sampled and analysed per individual shipment (for metal content per element).  
The data derived hereof could be also put into a material data base and cross-checked with bottom up generated data from the manufacturing process (but: generally average data of mixed EEE origins)
- **test campaigns and detailed sampling/analysis can be conducted and evaluated for individual materials. Mass balances can be set up (incl. environmental effects).**
- **High analytical expertise for trace elements, especially for precious metals.**
- **Mutual development of best recycling solutions for specific materials (together with pre-processing companies)**

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### Your recyclables



PRINTED  
CIRCUIT BOARDS



AUTO CATALYSTS



E-SCRAP



INDUSTRIAL  
CATALYSTS



MOBILE PHONES



INDUSTRIAL  
BY-PRODUCTS  
e.g. bullions

### Excellence in recycling



sampling  
pre-processing



smelting



refining

### Our valuables

AIR



GOLD



SOIL



SILVER



WATER



PLATINUM  
GROUP METALS



RESOURCES

