

ADIR DEMO DAY IN GOSLAR

ADIR Demo Day
Goslar, 17.5.2019



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PROGRAMME



■ 14:00 h, Welcome and introduction

Holger Brumm – H.C. Starck Tantalum & Niobium GmbH (HTN)

Maik Bergamos – Electro cycling GmbH (ECG)

Reinhard Noll – Fraunhofer-Institut für Lasertechnik (ILT)

■ 14:15 h, Key note speech

Towards WEEE treatment requirements to enhance resource efficiency in Germany

Regina Kohlmeyer – German Environment Agency, Section extended producer responsibility

■ 14:35 h, The ADIR project – current developments for dismantling of printed circuit boards to recover valuable materials

Reinhard Noll - ILT

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PROGRAMME



■ 14:55 h, Presentations of the project partners of the ADIR consortium

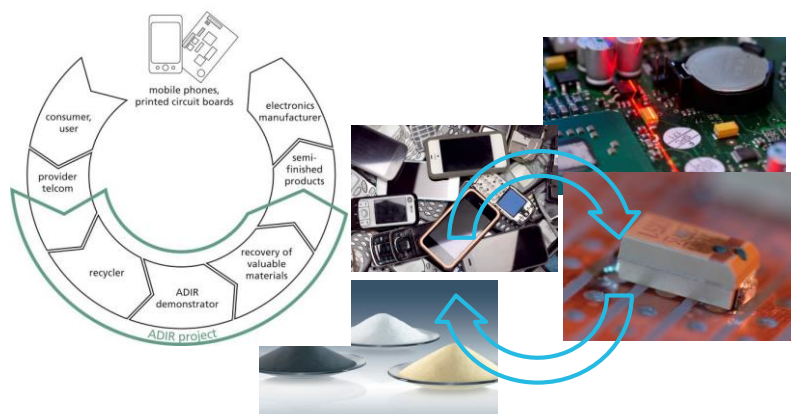
- Electrocyling GmbH, Maik Bergamos
- Fraunhofer-Institut für Lasertechnik, Cord Fricke-Begemann
- Laser Analytical Systems & Automation GmbH, Joachim Makowe
- OSAI A.S. S.p.A., Alice Tori
- TAU Industrial Robotics, Filippo Veglia
- Institute of Non-ferrous Metals, Michal Drzazga
- Aurubis, Marcus Eschen
- H.C. Starck Tantalum and Niobium GmbH, Holger Brumm

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The ADIR project – current developments for dismantling of PCBs to recover valuable materials



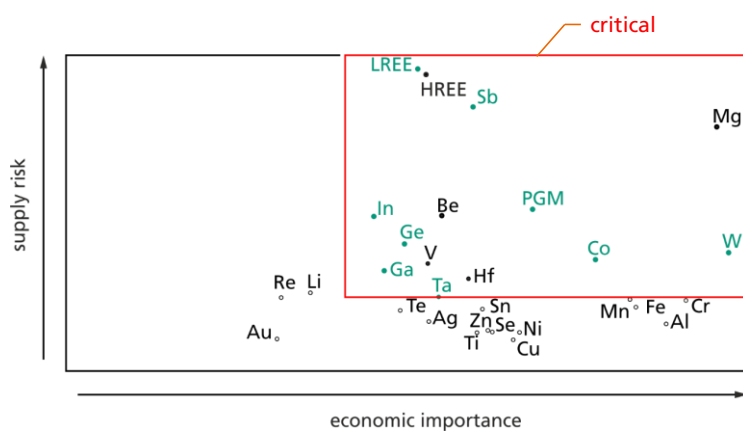
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Video 1

Raw materials and their criticality



→ e.g. tantalum

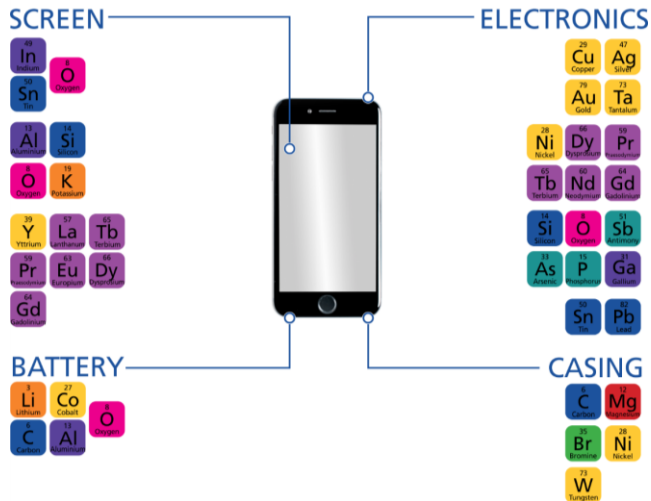
import reliance	100 %,
EU-supply	Nigeria 81 %
recycling input rate	1 %

LREE = light rare earth elements (Nd), HREE = heavy rare earth elements; PGM = platin group metals (Pd)

Report on critical raw materials for the EU, European Commission, 13.9.2017

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Elements in a mobile phone



valuable materials are used in electronic and mechanical components of modern electronic devices

examples

capacitors,
SAW filters
vibration alert
loudspeaker
battery
printed circuit board

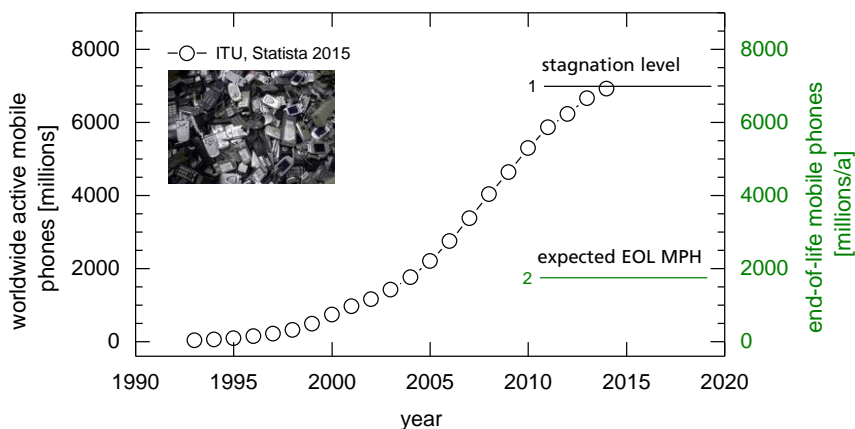
– Ta
– W
– Nd
– Li, Co
– Au, Cu, Sn

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Mobile phones: worldwide active, end-of-life



→ 1.75 billions of end-of-life mobile phones (MPH) per year worldwide
→ 124 mill. EOL mobile phones in drawers in Germany

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<http://de.statista.com/statistik/daten/studie/192704/umfrage/absatz-von-mobiltelefonen-weltweit-seit-2005/>. IDC Corporate USA, 5 Speen Street, Framingham, MA 01701IDC, Gartner. bitcom study, 2018, AZ 13.3.2018
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Urban mining and *inverse* production



■ urban mining

integral management of anthropogenic deposits with the aim of recovering secondary raw materials from durable goods and deposits*

■ *inverse* production

all processes of transformation – preferably using methods of production technology – to recover raw materials, semi-finished products and parts, or to fabricate new products from goods at their end-of-life

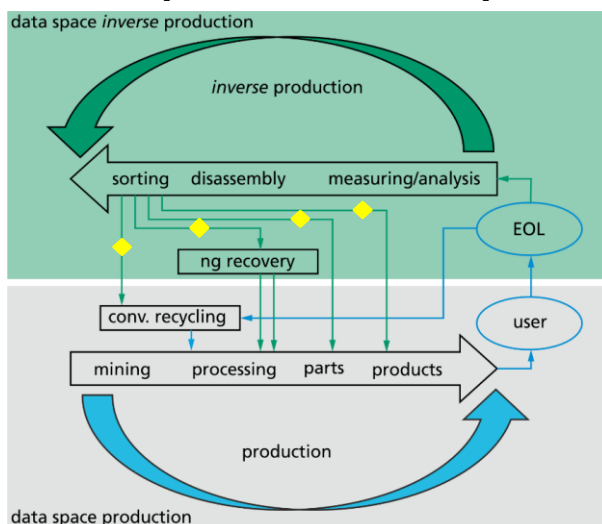
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*Umweltbundesamt

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Inverse production and production – mutual interlinkage



- via measuring/analysis of EOL products to a selective dismantling and sorting
- new return channels ♦ to the production line are opened, at nearly constant entropy
- set-up of a data space of *inverse* production as the key to sustainable recycling
- future vision: digital recycling pass for mass products

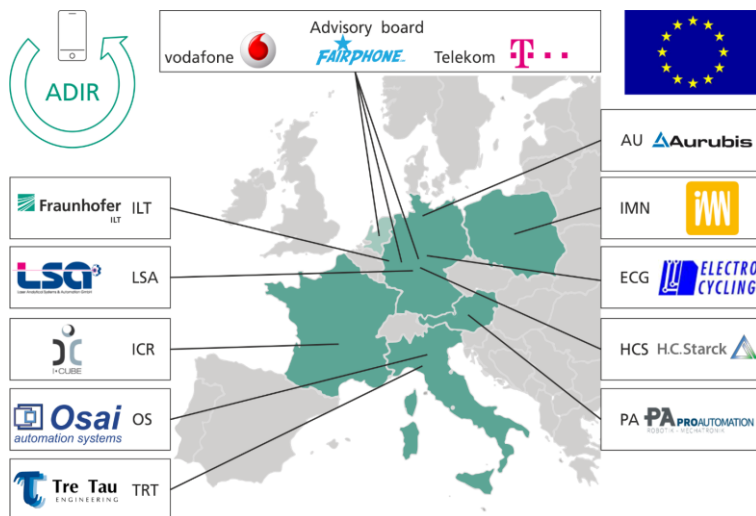
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EOL end-of-life products, ng next generation

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ADIR consortium and advisory board



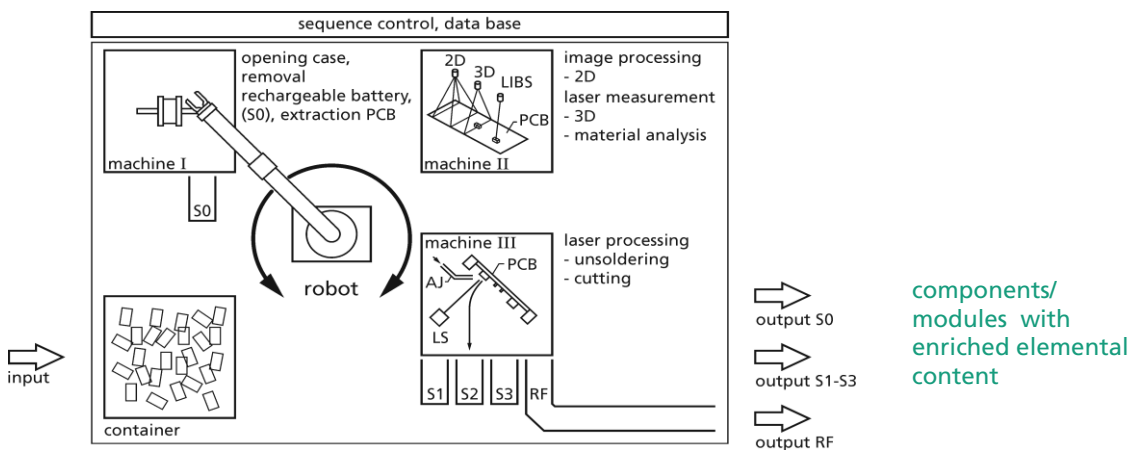
Start: September 2015

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ADIR concept – generation of new high quality sorting fractions



PCB printed circuit board

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LSQ

Osai

TAU

Aurubis

H.C. Starck
Tantalum & Niobium

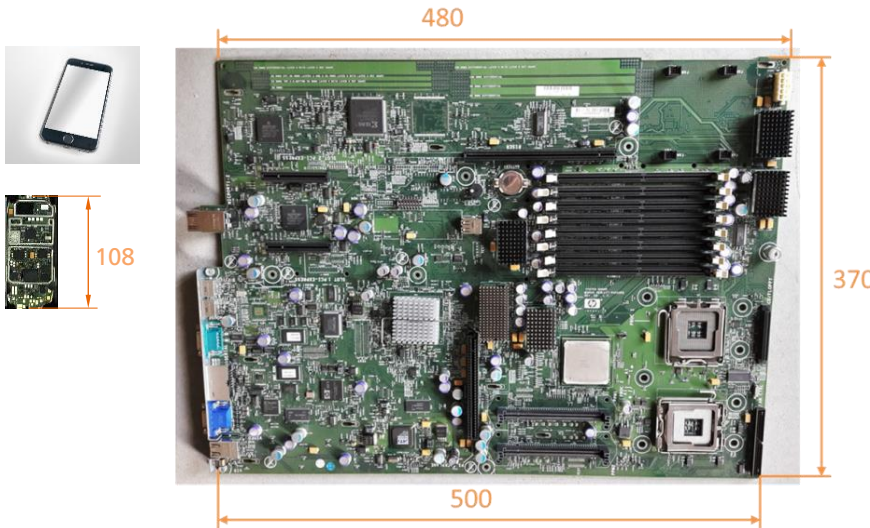
IMN

ELECTRO CYCLING

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Processed piece goods



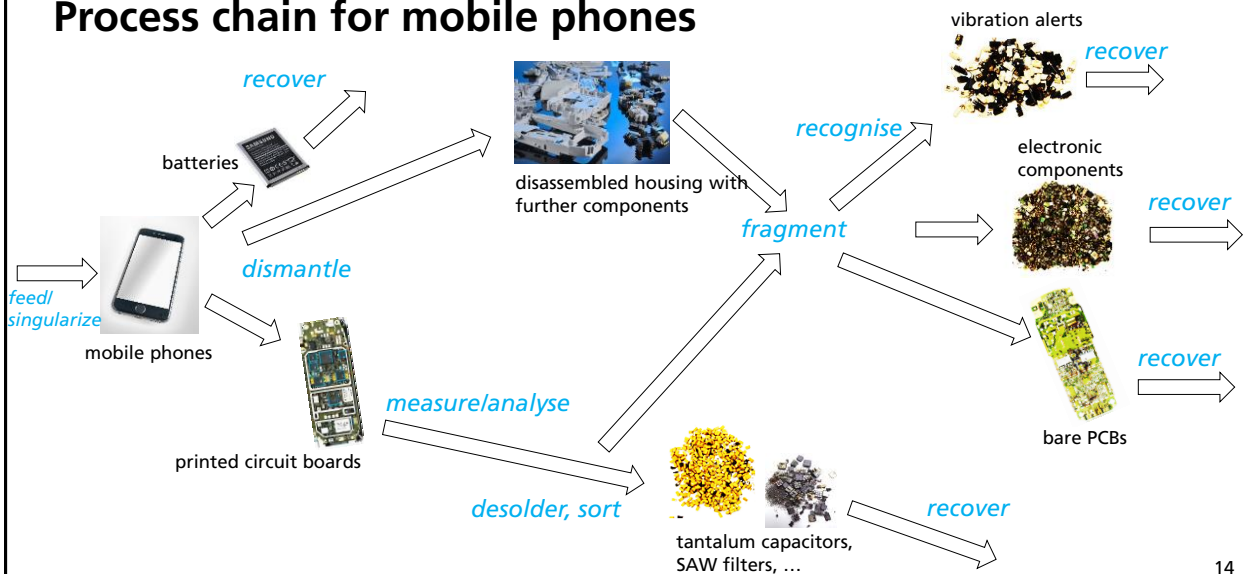
- mobile phones
- PCBs from mobile phones
- PCBs from servers, computers

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Process chain for mobile phones

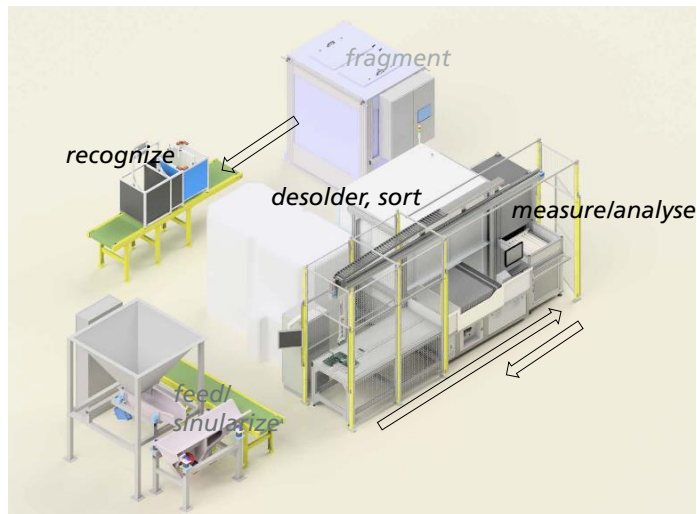


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ADIR Demonstrator



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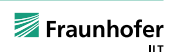
Résumé



- Urban mining and *inverse* production open new ways for the recycling economy – via a selective physical dismantling high-concentrated sorting fractions are gained
→ example: EOL electronics
- We can do this in Europe at a high level of quality and thus avoid serious consequences for health, environment and sustainability due to the export of old products, e.g. into developing countries.
- *Inverse* production is a key technology for future sustainable societies.

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Thank you for your attention!

and thanks to

- the project teams in the ADIR consortium
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