

# A!

Aalto University  
School of Chemical  
Technology

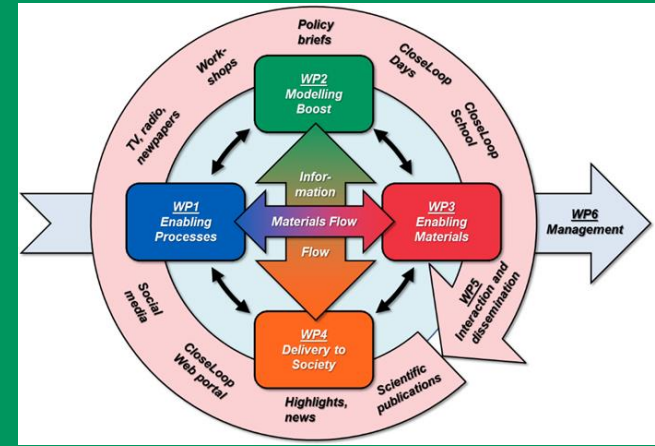
# CloseLoop

## Closing the Loop for High-added-value Materials

**Maarit Karppinen**

*CloseLoop Stakeholders Meeting*

*September 28<sup>th</sup>, 2016*



- SRC (**Strategic Research Council**) proposes THEMES
- Finnish **Government** decides the THEMES
- SRC builds the THEMES into Research **PROGRAMMES**



## 2015 PROGRAMMES

- Disruptive Technologies & Changing Institutions
- A Climate-Neutral & Resource-Scarce Finland
- Equality in Society

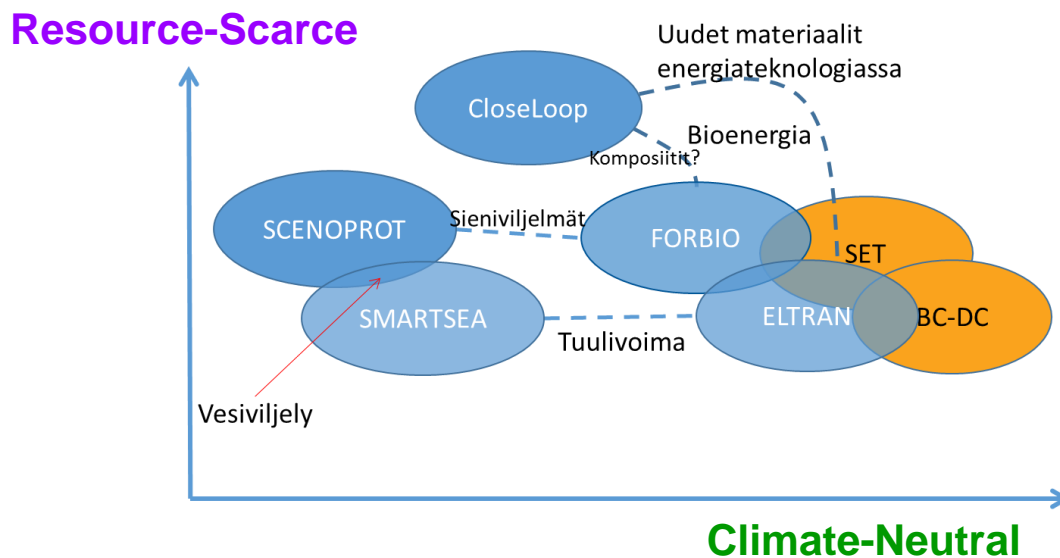
## 2016 PROGRAMMES

- Urbanising Society
- Skilled Employees – Successful Labour Market
- Security in a Networked World
- Health, Welfare and Lifestyles

- High-quality **research**
- Joint **multidisciplinary** approaches
- Concrete **solutions** to grand **challenges**
- Great societal **impact**
- Active **interaction**  
between those who produce and  
those who use new knowledge

# Climate-Neutral and Resource-Scarce Finland Program

- **EL-TRAN:** Resource efficient and climate neutral electricity system (2015-2018)
- **SmartSEA:** Gulf of Bothnia as resource for sustainable growth (2015-2018)
- **FORBIO:** Sustainable, climate neutral and resource efficient bioeconomy (2015-2018)
- **ScenoProt:** Novel protein sources for food security and climate (2015-2018)
- **CloseLoop:** Closing the loop for high-added-value materials (2016-2019)



**PROGRAMME DIRECTOR**  
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# Partners



- Prof. Maarit Karppinen (Principal Investigator), Aalto Department of Chemistry  
Tanja Kallio, Antti Karttunen, Kari Laasonen, Pertti Kauranen (Project Manager)



- Prof. Jari Koskinen, Aalto Department of Materials Science  
Rodrigo Serna, Mari Lundström



- Dr. Tarja Laitinen (Deputy PI), VTT Technical Research Centre of Finland  
Päivi Kivikytö-Reponen, Pertti Koukkari, Tommi Karhela, Maria Antikainen, Johanna Kohl



- Dr. Minna Lammi (Interaction Leader), Univ. Helsinki, Consumer Society Research Centre  
Petteri Repo

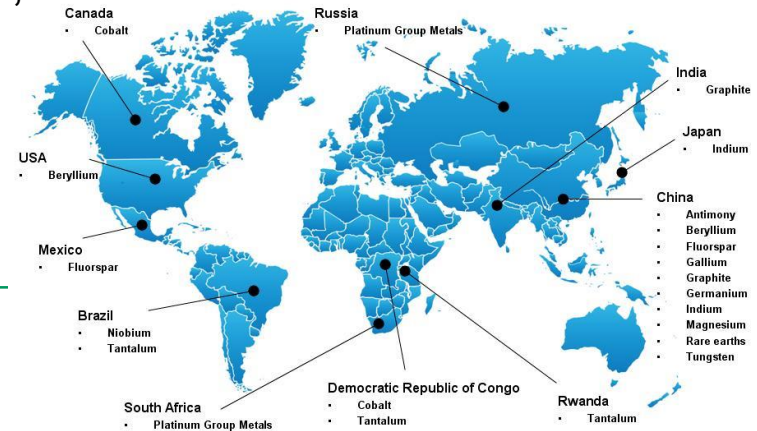


- Prof. Markus Reuter (Collaborator), TU Bergakademie Freiberg

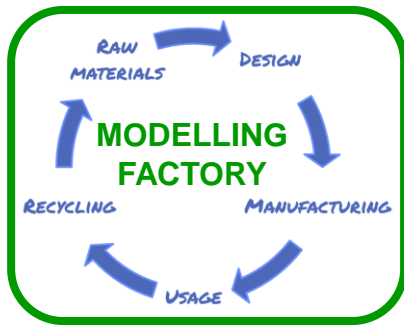
# Background & Motivation for CloseLoop

- **High-added-value Materials** are crucially needed in the Modern Society (ICT, transportation, renewable energy, *etc.*)
- Current Materials & Products are **designed for high performance, NOT for easy reuse or recycling**
- EU has listed 20 **Critical Raw Materials (CRMs)** with a high impact on the society but a high risk of supply shortage
- Currently the **recycling rates** for CRMs are **very low**
- Material substituents are searched for the CRMs, **BUT recycling of the new materials** should be considered as well

Production concentration of critical raw mineral materials

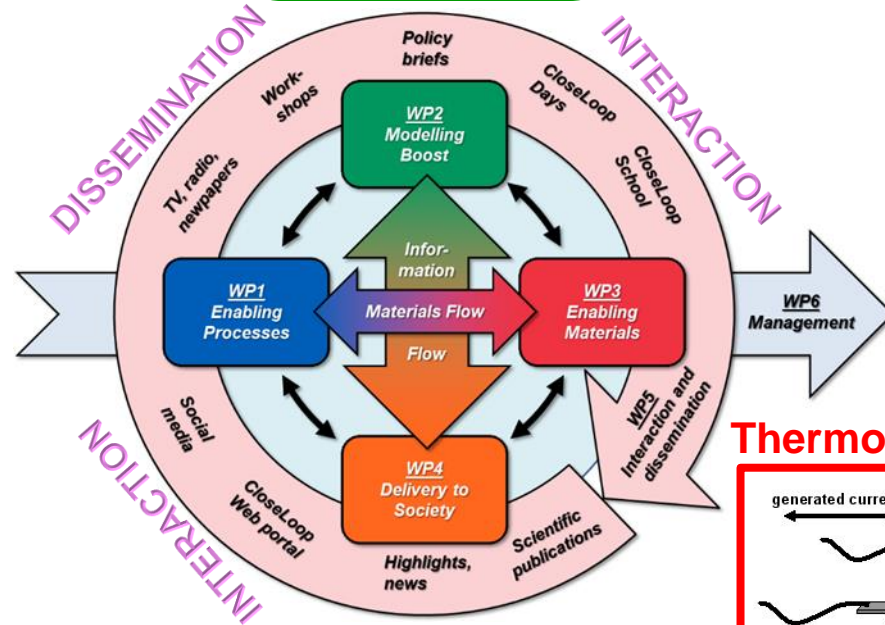
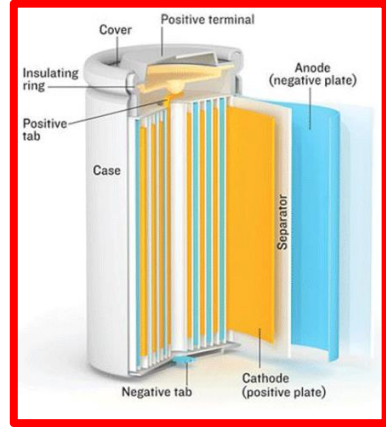


# Processes & Models for (secondary) Raw-Material Resources & Recovery

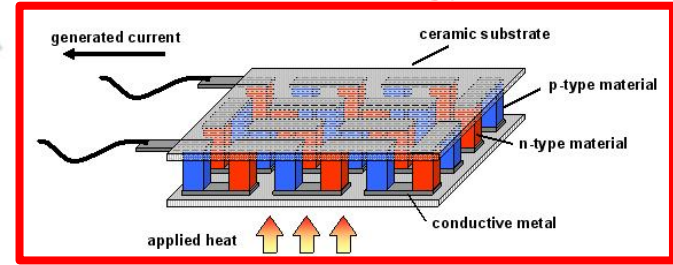


# Life-Cycle Design for High-Tech Materials In Circular Economy

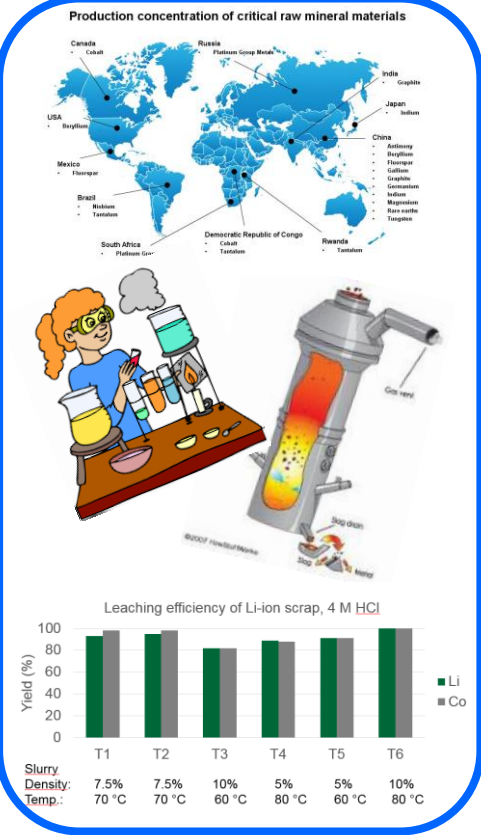
## Li-ion Battery



## Thermoelectric Energy Harvester



**BUSINESS MODELS & CONSUMER BEHAVIOR & STRATEGIC FORESIGHT**



# Expected Results of CloseLoop

- **Technological solutions** for closing the loop of high-added-value materials
- **Scientific progress** in materials and processes enabling the reuse & substitution of CRMs
- **Methods to overcome** political, economical, environmental & technological **barriers** in transition to circular economy
- **Circular economy scenarios** identifying and understanding the drivers, markets and solutions behind them
- Policy perspectives, policy level actions and **positive stakeholder mindset towards circular economy future**
- ~50 scientific articles, ~50 conference presentations, ~3 patents, ~6 policy briefs



# Interaction with the Society

## Tools

- Workshops, policy briefs, web pages, blocks, social media, e-newsletters, conferences & scientific journals

## Audiences

- Co-design Stakeholder Group**, other professional groups, decision makers, general public, scientific community & interested followers

## Messages

- Co-creation, knowledge sharing, background information for decision making, project results, upcoming events & idea sharing

## Stakeholder Group

- Industries (11) & industrial societies (6), ministries (4), cities & municipalities (4), NGOs (1)

