Towards a methodology to assess sustainability of electronic waste supply-chains

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Context

- Giant volume of e-waste: 93.5 million tons in 2016
- Hazard for environment (e.g., lead, mercury)
- Gain from recovering virgin material (e.g., gold, copper)
- Tremendous opportunities for new players, business models and automated solutions
- WEEE Directive in EU not well-addressed so by companies
- E-waste illegally exported in developing Countries

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Needs and Motivation

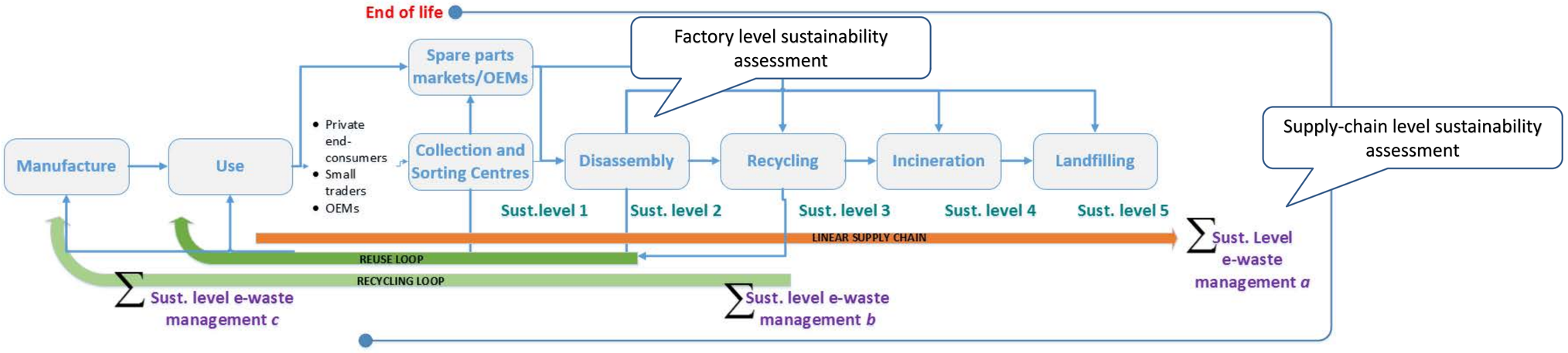
- Sustainability as a prerequisite for competitiveness
- E-waste management is not *sustainable per se*
- Stand-alone actors in the e-waste value chain unaware of the operations and needs upstream and downstream
- Profit over virgin materials is the only driver for decision making→ short-term? really good decisions?

Purpose

To develop a methodology that can **quantify the level of sustainability** of one specific **e-waste stream's management.** This should be done by assessing the economic, environmental and social performance of the reverse value chain and its facilities from an operation-management perspective.

Research Objectives

- To investigate and map **e-waste end-of-life dynamics**, problems and challenges in the Nordic Countries
- To review and select Key Performance Indicators (**KPIs**) suitable for a full sustainability assessment
- To model, through **simulation approaches,** facilities' systems design and operations within them and along supply chains
- To develop a methodology to measure sustainability positioning of e-waste management at **factory level and supply-chain level** through simulation, by displaying and aggregating the results through KPIs



Vision and future impacts

- To be able to measure a ***sustainability footprint*** of e-waste management
- Achieve decisions that economic, environmental and socially sound simultaneously
- The creation of the concept of ***green-and-socially friendly demanufacturing***

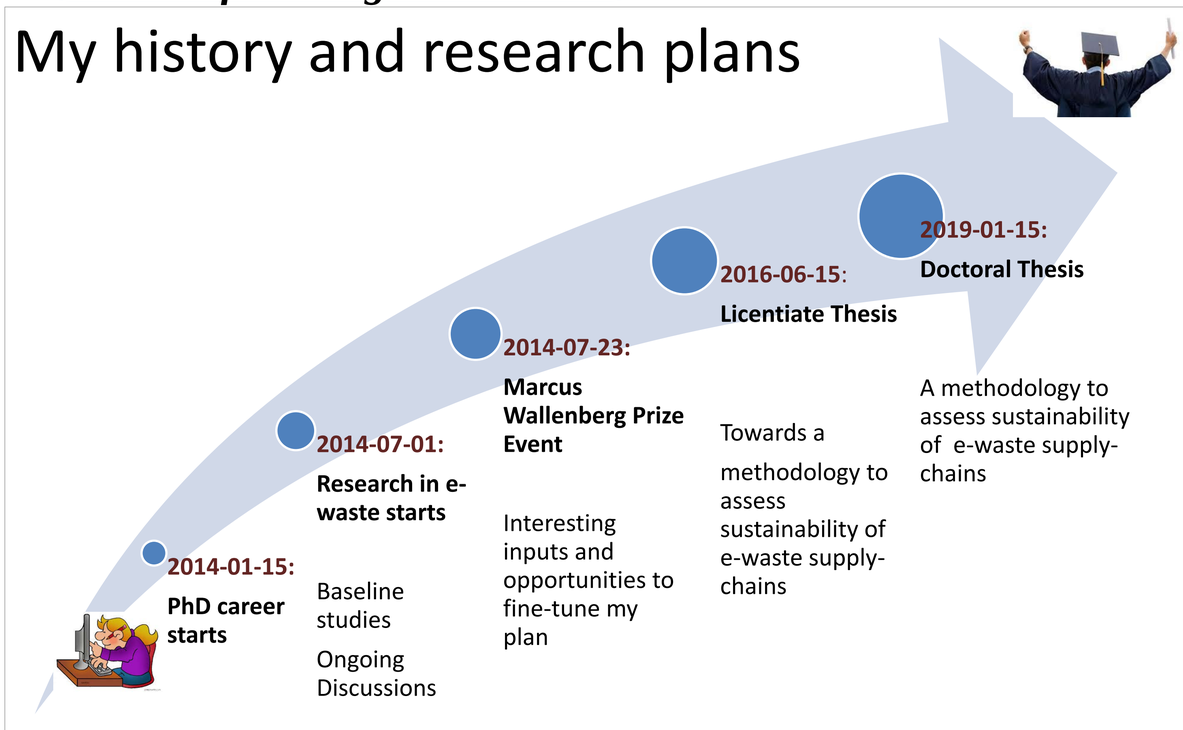
Research Methodologies

- Case study methodology
- Qualitative research;
- Simulation and Modelling approaches (Discrete Event Simulation, System Dynamics)

Methods and Tools

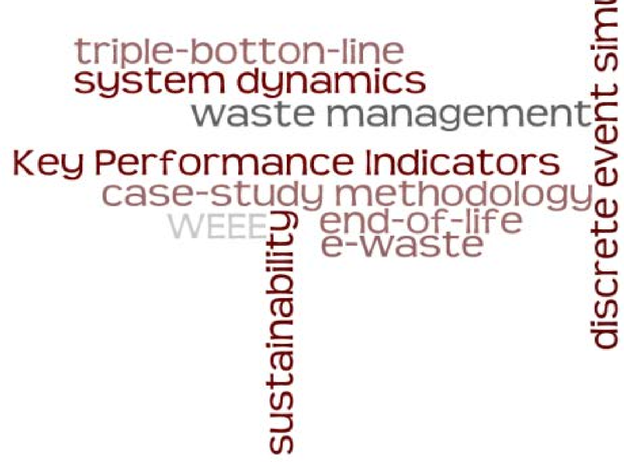
- Life-cycle costing; Life cycle assessment
- Cash-flow and investment analyses
- Material flows analyses
- Literature and review studies
- KPIs
- Interviews, questionnaires

My history and research plans



Partners and projects

PRODUCTION – A CHALMERS AREA OF ADVANCE
REFIND Technologies
CHALMERS INDUSTRITEKNIK
VINNOVA
WEEE ID



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Pictures 1,2, and 3 have been taken from the Internet in the following websites: 1) http://www.maximumpc.com/article/story_e-waste_what_happens_tech_once_its_trash 2) http://www.powersmithswow.com/ 3) http://www.ewaste-recycling.com.au/e-waste-we-accept/