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

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

## 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



## Needs and Motivation

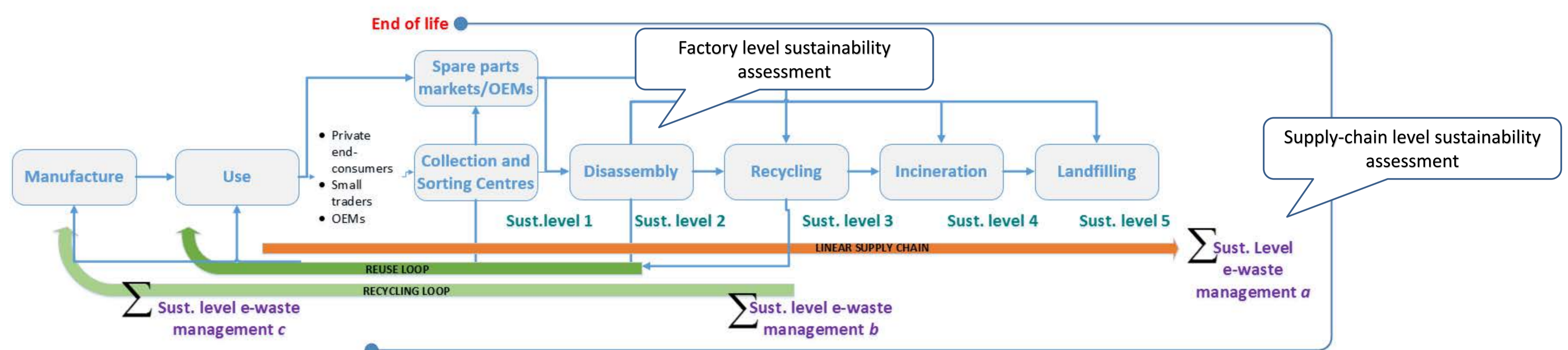
- Sustainability as a prerequisite for competitiveness
- E-waste management is not *sustainable per se*
- Stand-alone actors in the e-waste value chain unaware of the operations and needs upstream and downstream
- Profit over virgin materials is the only driver for decision making → short-term? really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

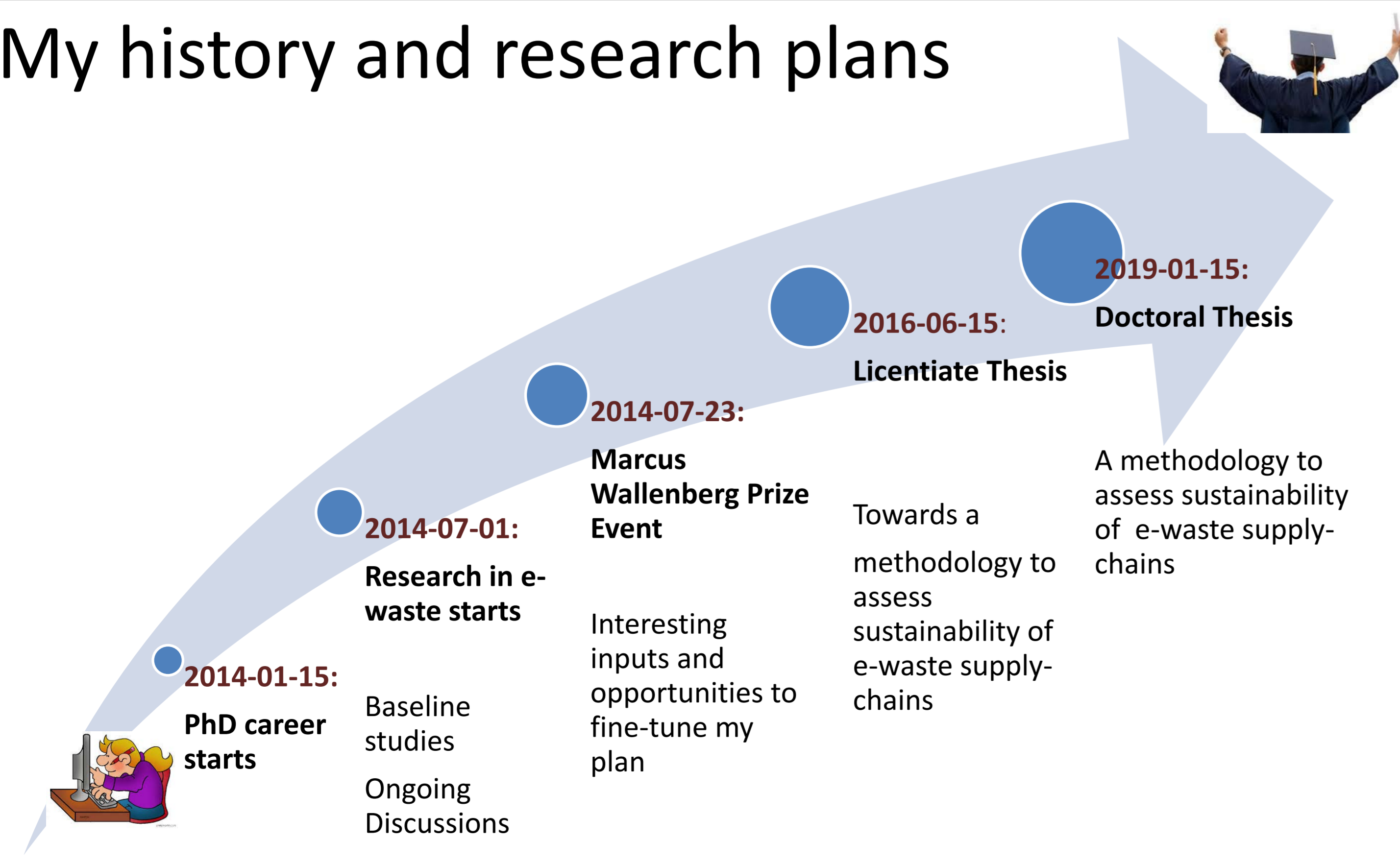
## Research Methodologies

- 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



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triple-bottom-line  
system dynamics  
waste management  
Key Performance Indicators  
case-study methodology  
WEEE  
end-of-life e-waste  
sustainability  
discrete event simulation