

## StEP Task Force ReDesign - Terms of Reference (TOR)

### 1. Vision

By moving the design of EEE towards enabling closed loops, EEE should not cause harm to the environment at end-of-life during either appropriate or uncontrolled treatment methods. Design should further encourage (with the following hierarchy except when it may be environmentally detrimental):

- (1) Lifetime extension (including product reuse and repair);
- (2) Refurbishment;
- (3) Recovery of components for reuse;
- (4) Recovery of materials for recycling.

Explicitly, reduction of power consumption throughout the whole product life cycle is a constant goal for all DfR activities.

### 2. Aim, Objectives, and Tasks

Overall aim of the Task Force is to support a sustainable solution of the e-waste problem by focusing on the concept and design of EEE. The main objective is to optimize the Life-Cycle characteristics of EEE, and in particular their adaptation to specific End-of-Life conditions. Whereas “Design for Recycling” activities by now mainly refer to the (high tech) recycling standard in industrialized countries, the Task Force will especially take into account the status in industrializing countries around the globe. The work of the Task Force is driven by the considered opinion, that a vital reduction of potential health and environmental risks of e-waste can be supported by a smart Re-Design of EEE. Within this project we define Re-Design as measures that support an optimal lifetime (use) of a particular product through optimization of design features. Such measures might improve Repair, Refurbishment, Reuse, and Recycling of a product or its components.

#### Specific Objectives are:

- a) To identify and assess critical design aspects in the end-of-life treatment of EEE. This might include the material composition and toxicity, the mechanical design, or other aspects regarding the determination of the remaining lifetime of a product. Compare these assessments with different regional End-of-Life scenarios for EEE (case studies);
- b) To collect information on products that have been designed for a specific end-of-life scenario (Best Practice). Compare present approaches of industry, in order to identify current economical, environmental, and regional design considerations;
- c) To develop and demonstrate new (re-)design solutions of various products (from different product categories). Field test re-designed products under different regional or technical End-of-life conditions. Describe economical and social side-effects of design changes or possible synergetic effects in order to ensure real basis innovations.

**Working tasks and project ideas:****Study on end-of-life implications with regard to product design issues**

- Identifying and assess the environmental or health impacts in correlation to a specific product design: Product condition and remaining life time estimation/ Material content and toxicity/ mechanical design and handling (separation) of discarded product/ Current and future recycling concepts and technologies;
- Crosslink findings to StEP activities which analyze the end-of-life situation in different regions. Identification of main environmental and economical implications (product and region specific). Determination of design effects regarding various regional and technical scenarios by actual case studies (with specific products and specific regions);
- Summarizing findings for global usage/ Information campaign.

**Study on state-of-the art in Eco-Design**

- Comparative assessment of the various initiatives of OEMs to make their products more environmentally friendly in particular regarding the End-of-Life of a product. Collect Best Practice examples for various product categories and describe the essential economical, environmental, and social / regional business and design considerations of the manufacturer. Analyze synergy effects and restrictions;
- Analysis of state-of-art recycling technology for EEE and their concepts. Identify simplified solutions for (still) proper recycling, and contributing design features of products. Develop a catalog of a economically and socially feasible “product to recycling match”. Consider other “low” technology approaches to e-waste treatment;
- Evaluating the findings of the “Eco-Design Awareness Raising Campaign” (see below) regarding a re-design of products. Collect best practice examples from SMEs.

**Study on current technology trends affecting backyard recycling processes**

- Drafting a roadmap of recent and current technology developments in the electronics sector, which might affect reuse and recycling processes in the informal sector (backyard recycling);
- Investigate specifically: Materials and substances used (lead-free, flame retardants, etc.), system integration and interconnection technologies (fine pitch interconnects);
- Determine quality and safety issues, labelling of critical material/design features, global product information dissemination.

**Re-Design solutions and guidelines for regional industry**

- Develop and demonstrate (re-)design solutions of various products (from different product categories). Field test re-designed products under different regional or technical End-of-life conditions. Describe economical and social side-effects of design changes or possible synergetic effects in order to ensure real basis innovations;
- Developing a guideline for recommended design changes to be implemented or fostered with regard to minimizing the environmental, economic, and social disadvantages related to e-waste recycling in industrializing countries;

- Discussing feasibility of design changes with industry partners and elaborate a set of “best practice” examples for design improvements and recommendations. Develop appropriate business models in conjunction to re-design products in order to ensure success. Do not try to achieve a 100% good solution in a couple of years, but follow the idea of a step by step approach with a 20% improvement in a very short term. Develop a mind set of continuous improvement over the long term.

This Task Force is strictly dedicated to product design aspects, but will give all needed input to the other Task Forces regarding recycling technology, logistics, and management, reuse strategies, and policy framework.

### 3. Ongoing or planned projects

- End-of-Life Focussed Product Design Considerations for Electronics (coordinated by Karsten Schischke);
- Defining an Optimal System of Electronic Product Design and EOL Management (vertical project of relevancy for several Task Forces, coordinated by Wayne Rifer);
- EPEAT.europe - Promoting energy-efficient information and communication technology (only the DfR relevant parts of this proposed project are considered to be a StEP activity, coordinated by Karsten Schischke);
- Affiliated: HEATSUN.

### 4. Contact

StEP Secretariat

info[at]step-initiative.org

<http://www.step-initiative.org/contact/index.php>