

Design for Repurpose

a practical guide for circular product design

Towards a Circular Economy

"Scaling up the Circular economy...to the mainstream economic players will make a decisive contribution to achieving climate neutrality by 2020...while ensuring long-term competitiveness" (EU commission, Brussel, 2020). However, current Repurpose attempts often result in one-off products or products with a smaller sustainable impact. Companies do often apply recycling, although this is one of the least value maintaining methods in the 9R framework (Potting et al., 2017, p. 14) (Technopolis group et al., 2019). From practice, it becomes clear that circularity methods are often applied with "different worlds or thoughts" (Kirchherr et al., 2017) and they are difficult to define. This asks for a clearer definition of Repurpose and a more effective and easy approach. This project aims to answer the following Research Questions:

1. How should Repurpose be defined so it can be effectively applied to maintain value over multiple use cycles?
2. What is needed to make Repurposable Products feasible, viable and desirable from a Designer's point of view?

The project

The AUAS/ HVA (Hogeschool van Amsterdam, 2019) has set up a research group and consortium of companies to develop a Repurpose Design Framework which aims to: "create new products by effectively reuse current obsolete products or parts" as "residual waste is often too valuable for recycling or incineration, but not valuable enough for methods higher up the 9R-ladder, such as Repair, Refurbish and Remanufacture". This graduation project has a slightly different focus on Repurpose: Design for Repurpose in which parts are optimized for reuse before their End of Life. It seems to be more beneficial to immediately consider future products during the design of the first product. A definition on Design for Repurpose is proposed as: Incorporate infinite re-use of product parts, during the design of the first product, to maintain as much value as possible over time.

Repurpose in Practice

From interviews with 9 design companies (connected to the HvA Repurpose project and consortium) it becomes clear that designers need a change in perspective: current linear thinking makes it difficult to see products as "changing systems over time". On the other hand, designers need a clear, familiar, and realistic goal, to minimize the risks, project scope and awareness where to start.

The study shows that Designers need a clear plan of how to

approach Design for Repurpose and specific Design Guidelines for optimizing the Repurposability of their product part. The study results in a toolset consisting of:

- a Process to find clear future product opportunities,
- and specific "Design for Change" guidelines.

A new Design Approach & Guidelines

3 phases are recommended:

1. Starting point: find certain opportunities in the future by highlighting essential valuable aspects of the current product required to be maintained in future products.
2. Product Opportunity: The Designer is guided from 'valuable aspects' to the chosen future product opportunity. 'Search Areas' inspire how value of a current product can be extended to the future.
3. Design for Change: Redesign product and parts for efficient and effective transition into the subsequent use-cycle. See the three images at the right for an overview of the guidelines.

Testing the new Design Approach

A practical case study of a redesign of the Mutsy IGO Stroller, provided by Springtime, was performed to test feasibility, viability, and desirability of the design approach. It learned:

- The proposed toolset has some issues regarding effectiveness and efficiency: the guidelines were adjusted to be more practical, intuitive, easier to comprehend and with more focus on essential Repurpose design steps. The result is a more feasible Design Approach to incorporate this in the workflow of the Designer.
- Prototyping learned: how to generalize modules across subsequent products, simplify overall construction while maintaining specific brand shapes.
- The test case showed a measurable increase of the Repurposability Rate.
- Extra validation steps were added in the process to further validate the future user demand (as this is an essential step to develop a circular value propositions) and to validate the Redesign method as a Circular business model.

Further Case studies are recommended, to align the Design approach in more depth with designers and to find out if the approach is also applicable on other type of products. This Design Case concludes: Repurposing boils down to connect value propositions over time and generalize across multiple products within one design process. This can be complex which requires prioritizing design requirements differently. Concluding it takes investments on the short term to apply the Guidelines which will likely lead to a more Repurposable product on the long term. The final question remains: Are designers willing to consider this this for supporting the Circular economy?

PHASE 1 STARTING POINT

Predict future valuable aspects

a. b. c.

- a. Know when to change
- b. Know what you have
- c. Predict future change
- Validate the future essential product aspects

Future valuable aspects

PHASE 2 PRODUCT OPPORTUNITY

Create subsequent product ideas

a. b.

- a. 'Search Area' brainstorm
- b. Weighted Choice
- Validate the future product choice

Product opportunity

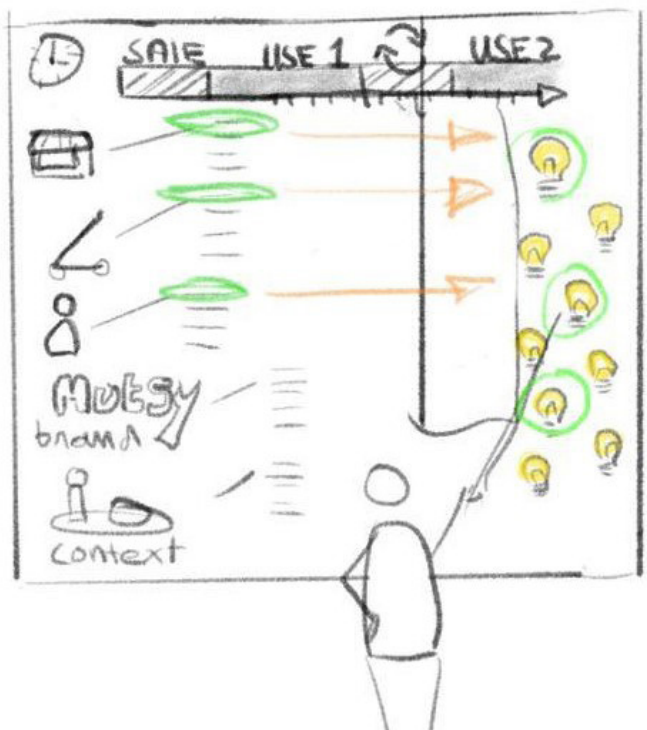
PHASE 3 DESIGN FOR CHANGE

Redesign for efficient transition

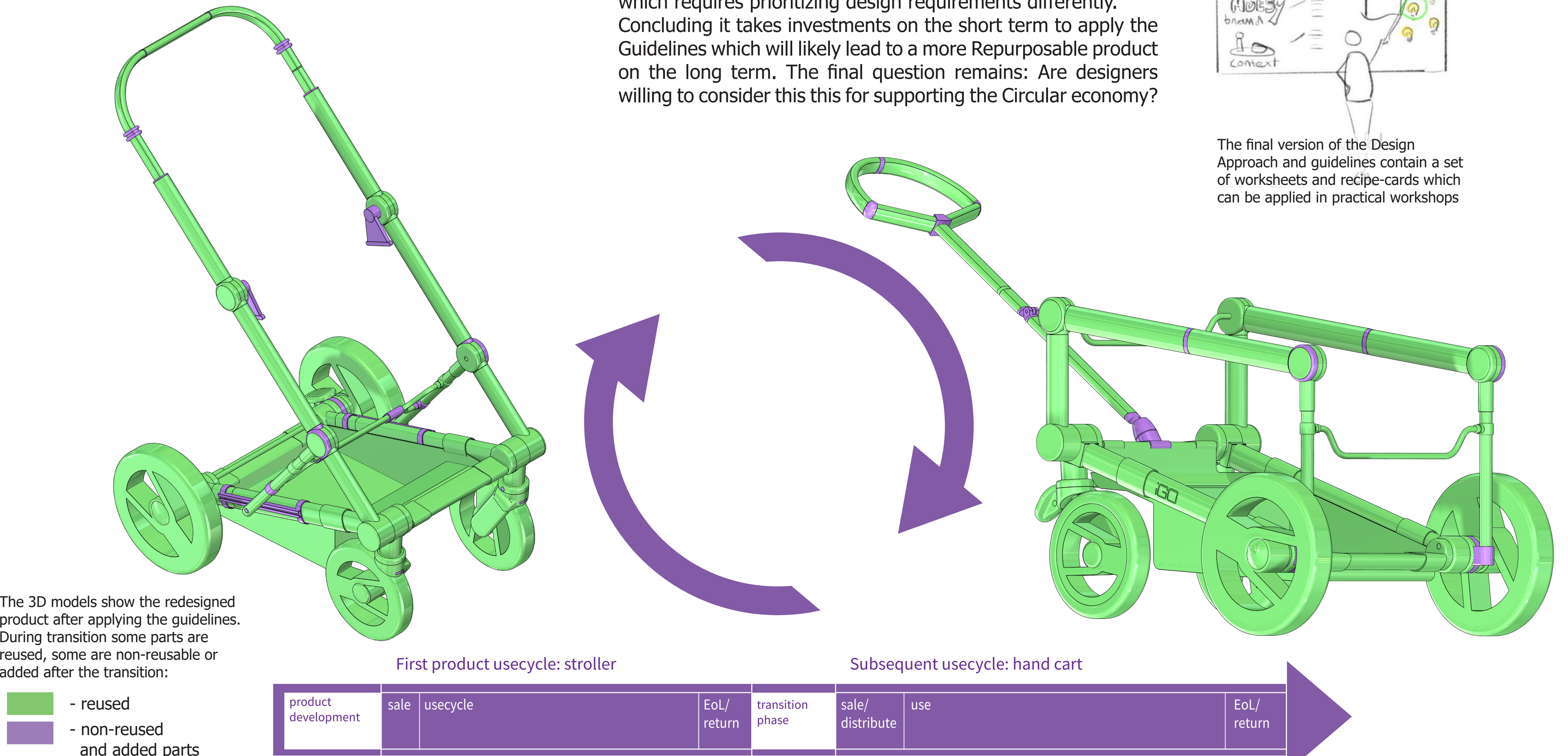
a. b. c. d. e.

- a. Match Modules
- b. Simple construction & shape
- c. Generic: standardization & adaptability
- d. Efficient transition
- e. Quality Perception
- Validate the subsequent products

Repurposable Product



The final version of the Design Approach and guidelines contain a set of worksheets and recipe-cards which can be applied in practical workshops



The 3D models show the redesigned product after applying the guidelines. During transition some parts are reused, some are non-reusable or added after the transition:

- reused
- non-reused and added parts

First product usecycle: stroller

Subsequent usecycle: hand cart



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