Designing products and services for circular consumption - A circular design tool

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Designing products and services for circular consumption - A circular design tool

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Abstract: Most circular design tools focus on how to design durable products that are fit for circular (re-)production flows, or how to design circular business models. The crucial role users play for a transition to a circular economy is often overlooked in existing tools, as is design opportunities to enable and support circular consumption. This paper presents one of the tools in the Use2Use Design Toolkit, the Circular Designs Ideation Pack, which is a user-centered circular design tool especially developed to aid designers and others to design for circular consumption. The tool supports design of products and services that can create enabling preconditions making it more convenient, and preferable for people to circulate products from use to use. In contrast to other available circular design tools, it supports exploration of circular design opportunities from a user perspective and in relation to people's consumption processes. The tool has been tested in eight workshops with professionals and students, who considered it easy and fun to use. The workshop participants found the tool instructive and inspirational, and said that it helped them to discuss relevant design opportunities and come up with promising circular ideas. They also expressed that looking at circularity from a user's point of view made it easy for them to address the topic. While the tool was found both usable and valuable in an educational workshop setting, the tool's potential when utilised in companies' regular design processes is yet to be explored. Future research will address how to integrate the tool as a part of existing processes to effectively support companies to design for circular consumption.

Introduction

Recent literature has highlighted the crucial role design plays for a successful transition to a circular economy. It is often suggested that the transition requires that products and services are designed to enable long-term product use and circular flows, which allow for repair, redistribution, refurbishing, remanufacturing or recycling (see e.g. Bakker, et al., 2019; Bocken, et al., 2016). During the last couple of years, several circular design tools have been released to support designers to explore such design opportunities.

Need for a user perspective

A common denominator amongst most circular design tools is that they primarily focus on how to design durable products that are fit for circular (re-) production flows, or how to design circular business models. However, a transition to a circular economy not only requires changes in production and business, but also changes in consumption (Kirchherr et.a., 2017). After investigating how five circular design tools

consider and integrate aspects related to consumption, Camacho-Otero and colleagues (2019) concluded that although some tools acknowledge the need to gain consumption-related insights, the crucial role that users play in a circular economy is often overlooked along with design opportunities related to users and their consumption processes.

A circular economy is dependent on that people shift from being traditional consumers that engage in linear consumption processes (i.e. buying new products, using, and disposing of them as trash) to becoming users that engage in circular consumption processes (i.e. obtaining pre-used products, using, and clearing them by passing them on to others). Designing for circular consumption (e.g. making it easy and attractive for people to rent, borrow or pass products on) presents new types of challenges for designers (Selvefors et al., 2019; Poppelaars, 2020). Many of these challenges are closely linked to the activities and practicalities that circular consumption processes entail in everyday life. Apart from enabling long-term use, designers must also

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consider how to make products fit for use by multiple users throughout multiple use-cycles and how to facilitate product exchange processes (Selvefors et al., 2019). For instance, designing for easy inspection, handling, and assessment becomes important, as do designing for diverse user needs, detachment, and long product careers.

Most design tools frame circular design opportunities from an industry setting, i.e. how production and business constraints can be addressed through design. But the design characteristics which would make it easier for users, to for instance repair or upgrade a product, may be very different to how a design should be adapted to industrial processes.

Since design challenges related to users and their consumption processes are rarely highlighted by circular design tools, there is need for more user-centered tools.

The Use2Use Design Toolkit
Recently, a new circular design toolkit – the Use2Use Design Toolkit – was developed by the authors (Rexfelt & Selvefors, 2019) to aid the design of products and services that can enable and facilitate circular consumption from a user perspective. The toolkit includes five tools that can be used in the early phases of a user-centered design process to explore people's consumption processes and the design challenges they entail. The tools aid elicitation of user needs, concept generation and evaluation and can be used consecutively but also independently of each other. All tools are freely available at www.use2use.se.

Aim
The aim of this paper is to present a rich description of one of the tools in the Use2Use Design Toolkit, the Circular Designs Ideation Pack, which can be used in ideation sessions to spark ideas for products and services fit for circular consumption. In addition, the paper will present initial experiences from applying it in design work to discuss the tool's potential.

Methods
The methods used to develop the tool is briefly described followed by a description of how the tool has been applied so far.

Developing the tool
The key activities that contributed to the development of the Circular Designs Ideation Pack comprised of four main undertakings during 2016-2019.

First, relevant literature and available ideation tools were reviewed to assess to what degree previously proposed circular design strategies addressed design challenges related to people's consumption processes.

Second, activities and practicalities linked to different stages of the consumption process were analysed to identify key design challenges that designers should consider.

Third, early versions of the tool were developed based on gained insights and evaluated in three ways. Workshops were conducted with six companies (4 workshops, each with 6-8 representatives) to verify the need for the tool and to identify the requirements on it. Moreover, early versions of the tool were tested with design students at Chalmers University of Technology through workshops in courses on Sustainable Design (6 occasions, each with 30 students) and in master thesis projects (13 students in seven teams).

Lastly, the tool was redesigned based on gained insights and packaged into the format presented in this paper. This included formulating novel design strategies as well as re-formulating previously proposed design strategies from a user perspective.

Applying the tool
The tool's potential to support development of products and services for circular consumption has been explored in workshops with a mix of professionals and novices, including designers, project managers, technical specialists, and attribute leaders.

Due to the current covid-19 pandemic, some workshops were organised online using digital workshop canvases. Four workshops were carried out with in total 70 professionals (7 physical and 8 digital working groups) and four workshops with in total 125 students (20 physical and 19 digital working groups). In the workshops, the tool was either applied to purely fictious cases, or to cases resembling the companies' regular projects. All workshops were foremost educational, but also carried out to generate valuable ideas.

Data regarding the tool's potential to support the participants in their work was collected through observations of the workshops and during follow-up discussions with both professionals and students. In addition, participants in three of the workshops with professionals were asked to fill in a survey prior

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to the follow-up discussions (41 respondents). The survey included seven Likert scale questions and the possibility to leave free-text comments. The collected insights from the workshops were analysed qualitatively along with the survey data.

The Circular Designs Ideation Pack

The Circular Designs Ideation Pack helps designers and other agents to envision products and services that enable circular consumption. It can be used by anyone that want to explore circular design opportunities from a user perspective. The tool is best used in early design phases to provide inspiration and spark ideas during creative workshops.

Figure 1. The Circular Designs Ideation Pack.

Design strategies
The tool highlights different types of design challenges related to four main design strategies. The strategies point to a variety of design opportunities and are, as illustrated in Figure 2, related to people's consumption processes in different ways.
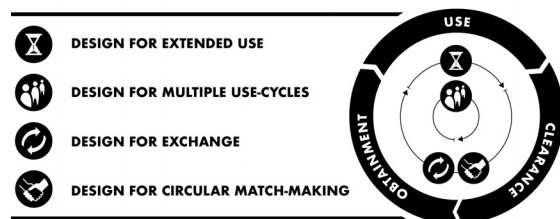

Figure 2. The four design strategies covered.

The strategy *Design for extended use* is related to the use phase and addresses challenges associated with a product's lowered utility, attractiveness, and need-fulfilment over time.
The strategy *Design for multiple use-cycles* addresses challenges that arise when products are repeatedly circulated from use to use. For

instance, design challenges associated with diverse user needs, shortened use-cycles, and long product histories are important to consider to make each use-cycle relevant and attractive for people.
The strategy *Design for exchange* highlights the importance of facilitating people's obtainment and clearance processes, i.e. facilitating the process of product exchange. For instance, challenges covered relate to handling, inspecting, transporting and re-activating products stuck in disuse limbo.
The strategy *Design for circular match-making* addresses design challenges related to interactions between two subsequent users. It covers challenges around how people can be supported to connect, trust, avoid conflicts, and make deals with others.

Tool composition
The tool consists of a deck of cards that includes an introduction to the four design strategies and 38 ideation cards that highlight design challenges and opportunities related to the strategies.
As Figure 3 shows, each ideation card has a short introduction, which describes a typical design challenge, and a set of trigger questions aimed to support ideation. An inspiring design example, i.e. a product or service that can help users overcome the described challenge, is included on the back of each card.

Experiences and insights

A central quality of a design tool is its usability, e.g. that it is easy and pleasant to use. A tool also needs to be effective in helping the users achieve the indented output and be relevant for the users to apply in their everyday work. The experiences gained by testing the tool will therefore be described related to the tool's *usage*, *effectiveness,* and *relevance*.

Usage
The participants expressed that they had a good time using the tool. It was also ranked very high on "*Fun*" and high on "*Quick and convenient*" in the survey, see Figure 4. The participants commented on the tool's inviting design, on how relatable the topics were, and how well they sparked discussion. One participant stated that "*I can participate without being a circular economy pro*". Overall, it was clear that both professionals and students, irrespective of their background, could easily

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The main design strategy addressed

The design challenge addressed

The key question to consider

Additional questions highlighting different ways to address the key question

Identification number

An example of a design that utilises the strategy

DESIGN CHALLENGE
Many of the products people own lie unused and forgotten in drawers, closets and storage spaces. These products will remain inaccessible resources unless they are passed on to others.

HOW CAN YOU ACTIVATE PEOPLE TO CIRCULATE THEIR PRODUCTS SO OTHERS CAN USE THEM?

Can the product or service remind or even compel the user to circulate the product?

Can you support potential future users in noticing the product and requesting it?

Can you make users aware of these products by other means, such as helping them clean out their garages?

A USE2USE DESIGN TOOL

People looking to borrow a product generally don't know what products others have and which of these they are willing to lend. To make more people offer their products to others, this digital inventory app concept is designed to trigger people to mark which of their items they are willing to share. These items become searchable for others who can easily request to borrow them. Courtesy: Patricia Lindborg & Olivia Chalandon.

Figure 3. The design of the ideation cards.

use the tool. When observing the workshops, it however appeared as though the participants with design experience got the hang of it all a bit quicker than the others.
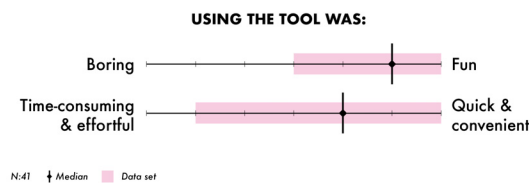

USING THE TOOL WAS:

Boring — Fun

Time-consuming & effortful — Quick & convenient

N:41 Median Data set

Figure 4. How usable the participants found the tool to be.

Many participants commented on the number of cards in the tool. Some said that the sheer number of cards made the tool more challenging to use, as it was difficult to gain an overview of all available topics and identify the most relevant ones. Some also thought that it was a bit tricky to visually differentiate one card from another. However, other participants viewed the number of cards as an advantage: "*It felt luxurious to have all these cards prepared for me to pick from*".

Effectiveness
Overall, the participants found the tool effective, and considered the results of using it to be meaningful. Many commented on how the tool helped them to view circularity from the user's point of view, and that their understanding of the challenges circular consumption entails for people's everyday life was broadened. The

survey data, see Figure 5, also suggest that many participants found it inspirational to explore circularity from a user perspective.
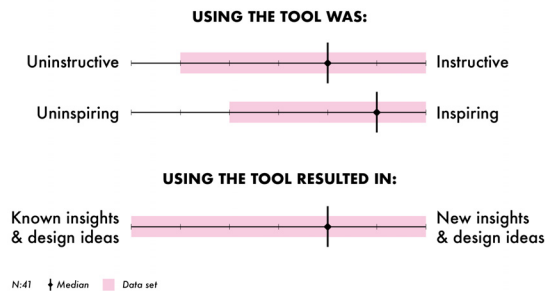

USING THE TOOL WAS:

Uninstructive — Instructive

Uninspiring — Inspiring

USING THE TOOL RESULTED IN:

Known insights & design ideas — New insights & design ideas

N:41 Median Data set

Figure 5. How effective the participants found the tool to be.

Regarding the novelty of the ideas generated during the workshops, a few participants were a bit unsure. They thought that the ideas were not that new, which could be a consequence of them having used the other tools in the Use2Use Design Toolkit prior to this tool. Others were of the opposite opinion: "*I already work with similar questions as I am the chief designer for a service exactly like the one in the workshop case. But I still found the tool very useful!*".

Some of the participants stated that the characteristics of the generated ideas made it challenging to move forward. The workshops typically resulted in a mix of service and product ideas, and some of the participants stated the product ideas were difficult to manage before one knew more about the solution on a service level. One participant suggested that a smart

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way to use the tool would be to *"…use it in two rounds, one to ideate on the overall service process, and one to capture the details further on in the design process. One could also collect the most relevant cards and make sure to return to them later"*.

Relevance
The participants expressed that the pack included many relevant ideation cards, more than they had time to discuss during the workshops. While the number of cards may make the tool a bit more challenging to use, it also makes the tool flexible. Although a few cards were considered irrelevant in most of the workshops, the participants said that "*It's good to have many cards to choose from*" and that "*Even though one card may not be relevant for a particular case, it makes you broaden your mind*".

As the survey data in Figure 7 shows, the participants had varying opinions regarding whether it would be *Rewarding/Irrelevant* and *Easy/Difficult* to use the tool in their everyday work. This is not surprising considering the mix of participants. Some expressed that they did not currently have a position, or clients, that made it relevant to ideate circular solutions. In contrast, many participants that normally worked with user-centered design projects found the tool spot on: "*It enables user-centered designers to relate to and address circularity*".

USING THE TOOL IN MY EVERYDAY WORK WOULD BE:

Irrelevant ———————— Rewarding

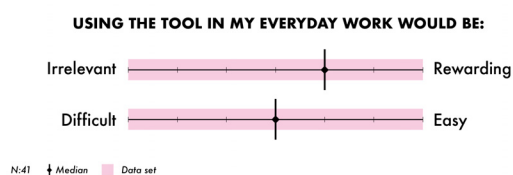Difficult ———————— Easy

N:41 ⊣ Median ▨ Data set

Figure 7. How relevant the participants found the tool to be for their everyday work.

Both students and professionals considered the tool fit for cross-functional ideation sessions. It enabled people that do not normally work with product and service design to contribute and ideate together with more experienced designers. Some participants also highlighted that the tool would be useful in ideation sessions together with clients: "*It would really make them expand their minds and get new ideas*".

Overall insights and final remarks
Discussions with the participants confirmed the need for a user-centered circular design tool. Many professionals clearly stated that they are currently reaching in the dark and need support to address circularity. They considered the tool to be very easy to start using and that it facilitated circular thinking even for people not already engaged in the topic.

The professionals, as well as the students, expressed that the tool helped them to start cultivating a new mindset and to explore circular design opportunities from a user perspective. When using the tool for the first time, some participants experienced the number of cards as slightly overwhelming. When one has learnt how to use the tool and know what ideation cards it includes, is will be easier to identify and focus on the most relevant cards for the case at hand.

The participants were generally happy with the ideas and insights gained but the perceived possibilities to implement them varied. One key cause may be the circumstances under which the workshops were conducted. The sessions were organised separate from the companies' ordinary processes and with new cross-functional groups, making it difficult to move forward. Future research will focus on how the tool can be utilised as an integrated part of existing processes and not only for educational purposes.

Overall, the experiences so far point to that the Circular Designs Ideation Pack is a promising and appreciated tool with potential to aid companies to explore user-centered circular opportunities and design for circular consumption.

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