A Tool for Charting Circular Consumption Journeys

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Abstract

Circular economy proponents often argue that products should be designed to last long, be fit for circular (re-) production flows, and be offered through circular services. While this is essential for bringing about a transition to a circular economy, changes in consumption are equally important. Transitioning from linear consumption processes (i.e. buying new products, using, and disposing of them as trash) to circular consumption processes (i.e. obtaining pre-used products, using, and passing them on to others) can however be challenging for people. Renting, borrowing, trading and other circular paths of consumption commonly require more time, effort and planning than linear paths of consumption. In order to make it more preferable for people to circulate products from consumer to consumer, products and services should be designed to make circularity convenient and desirable in everyday life. Such design processes require an in-depth understanding of people's consumption processes. Yet, the available support to explore what circular consumption processes entail for people in everyday life is insufficient. Therefore, this paper introduces a tool for charting circular consumption journeys, which can support the development of products and services fit for circularity. This tool was developed during 2016-2019 in an iterative process in which the tool was tested by industry representatives and design students. In parallel with these activities, a team of researchers continuously developed and refined the tool based on gained insights. The tool aids designers and other agents to chart people's consumption processes step-by-step, with a focus on people's activities, actions, decisions and experiences. By charting circular consumption journeys, insight can be gained regarding critical hinders that may keep people from engaging in circular consumption. Moreover, it will unveil consumption-related challenges that should be addressed when designing circular products and services. Overall, the tool can aid organisations to both increase their understanding of circular consumption processes and to explore opportunities to develop products and services for a circular economy.

Keywords: Circular Consumption, Design tool, Circular Design, Consumption processes, Circular Economy

1. Introduction

Literature on design and the circular economy commonly highlights opportunities to design products so that they last long, are fit for circular (re-) production flows, and can be offered through circular services that can increase product utilisation (see e.g. Bakker et al., 2014; Bocken et al., 2016). The prevalent narrative regarding design opportunities for circularity is framed from a production and business model point of view, which emphasizes opportunities for primarily changing how products are produced and offered (Selvefors et al., 2018). Although innovations in production and business are essential for bringing about a transition to a circular economy, changes in consumption are equally important (EEA, 2015; Kirchherr et al., 2017; de los Rios and Charnley, 2016). Hence, there is a need to think beyond the current narrative of exploring opportunities for circularity solely from a production and business model point of view, and also address opportunities from a consumption point of view.

Design opportunities can be explored from a consumer point by taking people's consumption processes as a point of departure (Selvefors et al., 2019). A general consumption process can be considered to cover three main phases: obtainment, use, and riddance (see e.g. Antonides and Van Raaij, 1998; Jacoby et al., 1977; Lehtonen, 2003; Lucas, 2002). Throughout such a process, people have many options to engage in alternative modes of consumption, i.e. possible paths of consumption (Selvefors et al., 2019). As illustrated in grey in Figure 1, people can choose to obtain new products and dispose of them as trash in a linear fashion, but they can also choose to obtain and rid themselves of products through circular paths of consumption. They can pass on products in such a way that the products' parts or material can be recovered, and they can also salvage parts or materials as an alternative to buying new products. More importantly however, as illustrated in colour, they can obtain pre-used products and pass products on in such a way that they can be reused by someone else. Each path of consumption necessitates different strings of activities, decisions and experiences that typically influence which paths that are possible to carry out and/or are desirable for people to consider. Adopting a particular consumption path may afford people opportunities to engage in desirable activities, or may deny them such opportunities. People can also be forced to engage in undesirable activities, as well as to be relieved of them (cf. Hiort af Ornäs and Rexfelt, 2006)
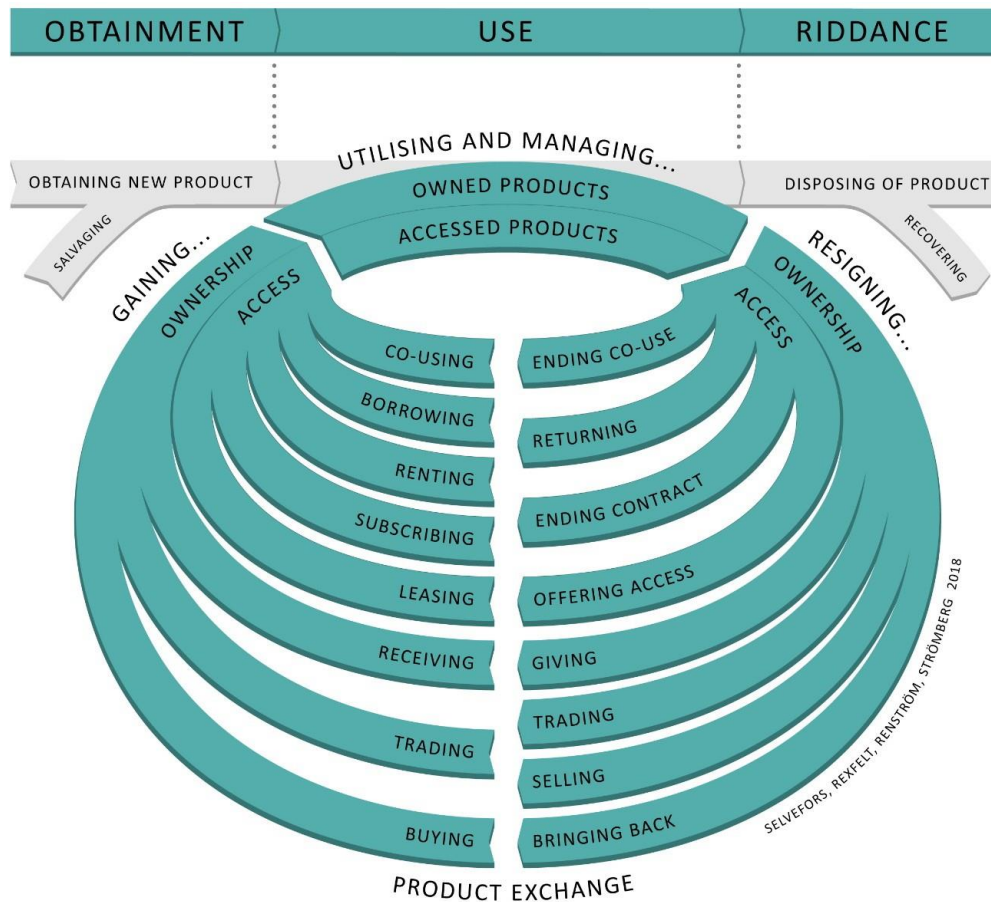
Figure 1*. Product circularity framed from a consumer point of view, highlighting circular paths of consumption in relation to a linear consumption process. (Adapted from Selvefors et al., 2019).*

People have many possibilities to shift from linear paths of consumption (i.e. buying new products, using, and disposing of them as trash) to circular paths of consumption (i.e. obtaining pre-used products, using, and passing them on to others), but these alternatives are commonly not preferred as they often involve undesirable activities, difficult decisions, and negative experiences. For instance, circular paths of consumption, such as renting, borrowing, or trading products so that they are circulated from use to use commonly require more time, effort and planning than linear paths of consumption. To reduce the risk of having to engage in undesirable activities, people might avoid certain consumption paths (e.g. selling used products on the second-hand market) and choose a more convenient option (e.g. disposing of it as trash or storing it in the garage). If linear instead of circular consumption processes are preferred, products will not be circulated and the transition to a circular economy will not gain momentum.

In order for circular consumption to become preferable and desirable for people in everyday life, products and services must be designed in a way so that they are fit for circular consumption processes. When exploring such design opportunities, it is key to have an in-depth understanding of what circular consumption, compared to linear consumption, entails for people with regard to using, managing, and circulating products. Yet, the available

support for designers and other agents to explore what circular consumption processes entail for people and design is insufficient. Available circular design tools, such as The Circular Design guide (IDEO and Ellen MacArthur Foundation, 2018), Business as Unusual (Mackatsoris et al., 2017), and the Circular Pathfinder (van Dam et al., 2017), can aid exploration of different types of design opportunities, but they primarily focus on design opportunities related to production processes and/or business models. They do take (some) aspects related to consumption into consideration, such as circularity-related behaviours and factors influencing acceptance of circular offers (Camacho-Otero et al., 2019 forthcoming), but do not sufficiently address the changes in activities, decisions and experiences that circular consumption compared to linear consumption often entails for people. As a consequence, important design opportunities to support circular consumption, such as designing products that make it easy for people to inspect, value, or disassemble a product, are often overlooked (Selvefors et al., 2019).

The aim of this paper is to introduce a new circular design tool that has been developed to especially support designers and other agents to explore people's consumption processes and identify relevant design challenges, which can support the development of products and services fit for circular consumption. Following a brief method overview, the tool will be presented along with two design cases to exemplify its use. Implications for design practice will be discussed and the tool is compared with other available tools.

2. Methods

The tool introduced in this paper is one of the results of an explorative and iterative process that began in 2013. The process was initiated with an explorative workshop in which seven researchers in the fields of user-centred design and sustainable design explored how product circularity could be framed with the user taking centre stage. A new user-centred perspective on product circularity, the Use2Use-perspective, was then developed during the following years. For a detailed description see (Selvefors et al., 2018; Selvefors et al., 2019). In 2016, the work to embody this perspective into a design tool was initiated. It was developed and evaluated through five main activities, some of which overlapped each other.

First, workshops were conducted during 2016 and 2017 with designers, product developers and product managers from six companies (in total four workshops, each with 6-8 company representatives) to verify the need for the tool and to identify the requirements on it. The workshops were arranged in collaboration with the Swedish companies Transformator Design and Hultafors Group. The participants were asked to explore circular consumption journeys related to their product and service offers aided by early versions of the tool. The generated ideas and the participants' experiences of using the tools were discussed afterwards, both by the participants and the workshop organisers, and also analysed by the research team.

Second, workshops were held to further improve the tool, according to the results of the initial tests with companies. The focus was to refine the tool into something that could be used to analyse circular consumption even more in depth, i.e. how circular consumption influences people's everyday lives in terms of activities they engage in and the consequences these may have. Three workshops were conducted (each with 3-5 participating researchers) to map out activities, decisions and practicalities in relation to different paths of consumption, e.g. renting, borrowing, and buying second hand.

Third, refined versions of the tool were used as a foundation for workshops with design students in courses on Sustainable Design at Chalmers University of Technology (altogether on six occasions during 2017-2019, each

with circa 30 students). The tasks were to gain an understanding of what circular consumption entail for people and come up with innovative ideas to make circular consumption preferable. The generated ideas and the tool's potential to support idea generation were discussed afterwards with the students.

Fourth, refined versions of the tool were also tested by design students in their master thesis projects (in total by 9 students in five teams) to chart consumption journeys relevant for their projects in order to identify design opportunities. The thesis projects concerned the design of a mobile application for sharing (Chalandon and Lindborg, 2019), a digital platform for sharing assets within the culture sector (Lindgren and Trens, 2019), an autonomous delivery droid for collaborative consumption (Janebäck and Kristiansson, 2019), a tent for a rental service (Hagman and Wendt, 2018), and a sofa for a furniture subscription service (Rosman, 2018). The experiences of the thesis students were monitored throughout their projects and all students were interviewed retrospectively to gain insight into their use of the tool and the challenges and implications they had experienced.

Fifth, an empirical study was conducted to gain deep insight into the practicalities of circular consumption processes. The study was carried out together with an upper secondary school in Sweden and 73 pupils took part in the study. Each pupil was challenged to try out two different circular consumption paths during a week. They could, for instance, sell or give away unused items that might be useful for someone else, or they could borrow or buy items they needed from someone else. The pupils documented their activities and experiences in diaries and reflective reports. The purpose of the study was to validate that all activities, decisions and experiences that are commonly part of people's consumption processes can be addressed with the tool.

Through these five activities, insights regarding the tool's potential value and usability were gained from different perspectives and opportunities to improve the tool were identified. The tool was adjusted accordingly and revised into the format presented in this paper.

3.   Introducing the Circular journeys exploration tool

The main purpose of the developed tool is to support designers and other agents to identify opportunities to design products and services for circular consumption, by increasing their understanding of how circular consumption processes are carried out and how people experience such processes. As shown in figure 2, the Circular journeys
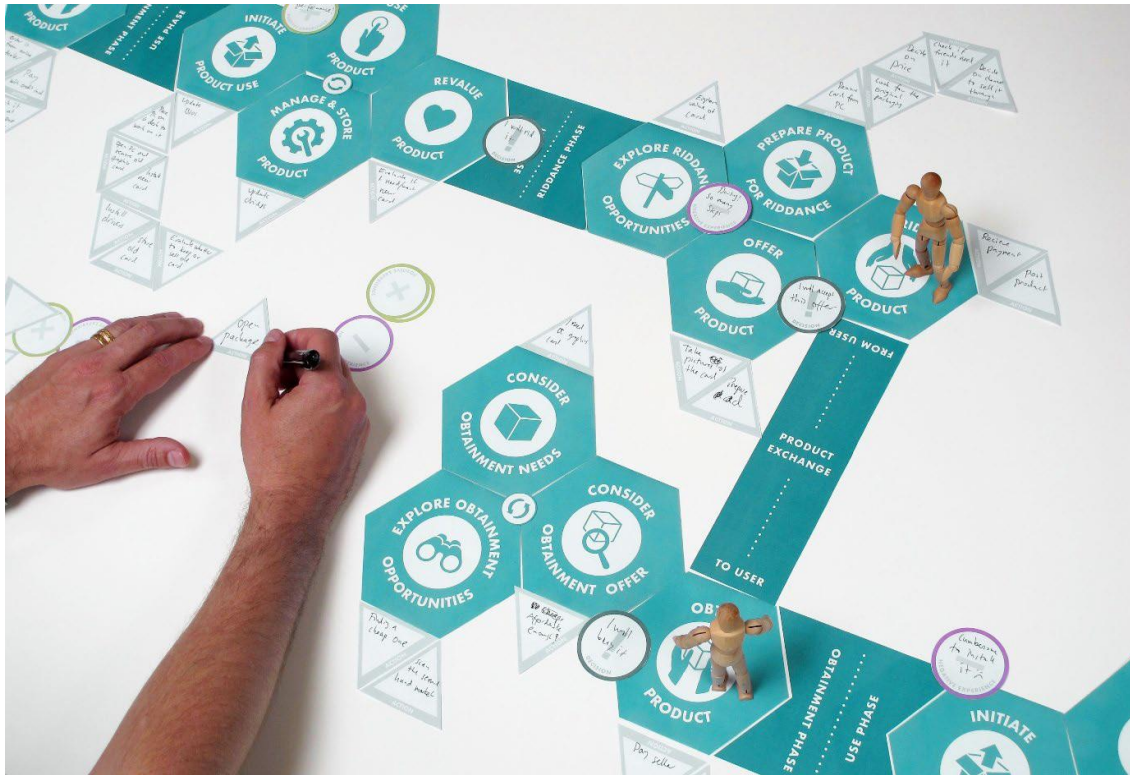
Figure 2. The Circular journeys exploration tool.

exploration tool provides a pack of different pieces that facilitates the charting of people's consumption processes. By charting such journeys, insight can be gained into people's activities as well as decisions and positive and negative experiences, which will highlight important design challenges.

Charting consumption processes

The pieces provided can be used to step-by-step map people's activities, actions, decisions and experiences. The most central pieces in the tool are the pre-defined hexagonal activity-pieces, which constitute the backbone of every mapped consumption journey. These pieces are specifically designed to cover activities related to all three phases of a consumption process: obtainment, use and riddance. In total, there are twelve such pieces that describe central consumption activities, such as "Explore obtainment opportunities", "Initiate product use" and "Prepare product for riddance". Other key pieces are the action-pieces, which are used to detail how the main activities are carried out, and pieces to highlight important decisions and experiences that are typically perceived negative or positive by people.

Before starting to chart journeys using the tool it is important to decide what to chart. Doing so involves three main decisions: deciding on the particular path of consumption that is to be explored, deciding on what product that is used and circulated through the process, and deciding on who (i.e. a consumer or a category of consumers) that takes part in the process and carries out the activities. As shown in figure 3, the process to chart consumption processes involves three main steps. Figure 3 illustrates these steps for a journey that describes how a typical consumer buys and sells furniture on the second-hand market.
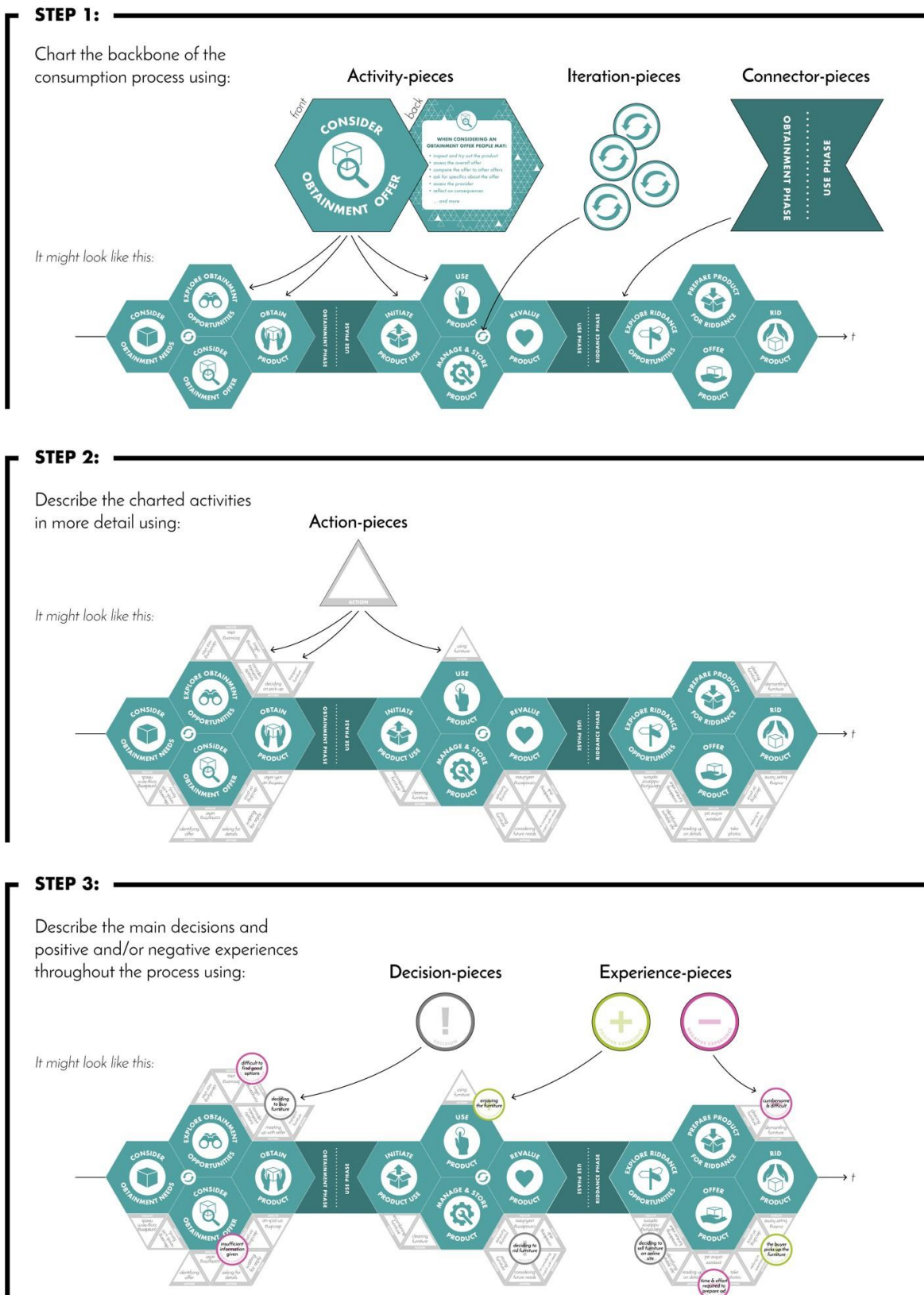
Figure 3*. How to chart consumption journeys with the Circular journeys exploration tool.*

During Step 1, the backbone of the process is charted using the hexagonal activity-pieces, and if needed iteration- pieces and connector pieces, and laid out on a flat surface such as a table. The backside of the activity-pieces provides examples of what the different main activities may entail in terms of more specific actions, to facilitate the choice and charting of the pieces. The activity-pieces can be grouped into the three main phases

of consumption, i.e. obtainment, use, and riddance, using the connector-pieces to emphasise the three phases. The pieces are charted with an imagined time-line to describe the consumption process over time. Activities that are carried out in parallel can be placed above/below each other (see placement of e.g. "Explore obtainment opportunities" and "Consider obtainment offer" in figure 3, Step1). In addition to activities carried out in parallel, people may sometimes also iterate between activities. For instance, people may go from using a product, storing it temporarily, revaluing it, using it again, storing it for a longer period, until finally deciding to pass it on after yet another revaluing activity. Such iterations can be indicated using the iteration-pieces (see placement of e.g. "Use product", "Manage & store product" and "Revalue product" in figure 3, Step1).

Once the backbone of the process has been charted, it is time to in more depth explore what people do throughout the process. Step 2 thus involves describing specific actions that people carry out as part of their main consumption activities. By thinking through each step of the process, actions that are important to understand and hence important to highlight can be identified. For instance, when offering furniture on the second-hand market, one may need to identify a suitable sales channel, read up on terms and conditions, identify the furniture's brand and model so that this information can be provided, prepare an ad and take photos, communicate with potential buyers, and more. Actions relevant to pinpoint are actions that in different ways are significant to people and their consumption processes. For example, actions that require a lot of effort or time, are difficult, boring or inconvenient, or bring about particular experiences are important to identify. The examples on the backside of the activity-pieces can be used as inspiration. Once identified, the actions can be described using the action-pieces and placed next to the activity-pieces, see figure 3.

After all relevant actions have been described, people's main decisions and experiences can be added during Step
3. As illustrated in figure 3, decisions-pieces and experience-pieces are used to emphasise the most important decisions and experiences throughout the journey. Two types of experience-pieces are available, which can be used to describe positive and negative experiences respectively. The pieces can be placed on one or several of the action-pieces to in more detail describe the consumption process.

By charting consumption processes according to the three steps outlined above, insights will be gained into important design challenges that can be documented and addressed in subsequent design processes.

Charting opportunities

The tool can be used to chart consumption processes that have already been thoroughly researched through user studies but this is, however, not a prerequisite for using the tool. Less explored journeys can also be charted, based on for instance one's own experience or assumptions. In addition, the tool can be used to mediate user studies to gain novel insights from consumers. Hence, the use of the tool and potential outcomes may vary from case to case. If charting a journey based on previously conducted in-depth user studies or as part of conducting new user studies, one can expect to end up with a rather detailed and realistic description of the journey. This may be advantageous in many cases as it can unveil more design challenges compared to less detailed journeys.

Nevertheless, sometimes a less detailed journey is enough to identify the most critical design challenges to

address.

As previously described, journeys can be charted for different paths of consumption, different products, and different consumers. The journey illustrated in figure 3 describes the charting of one particular journey, i.e. how a typical consumer buys and sells pre-used furniture. Figure 4 provides additional examples of journeys that describe different paths of consumption and focus on other products. As illustrated by the figures, the tool can be used to chart consumption processes with different character, that include different activities and actions and that involve different types of decisions and experiences at different stages during the process. As shown by the first journey in figure 4, the tool can be used to chart a journey for a specific consumer, or a category of consumers, throughout the entire consumption process, i.e. the three phases obtainment, use, and riddance. The tool can however also be used to chart a particularly interesting segment of a consumption process or the link between two consumers' consumption processes. For instance, the tool can be used to chart a product exchange process in which a product is transferred from one consumer to another, as illustrated by the other two journeys in figure 4. For such journeys, two consumers, or categories of consumers, needs to be considered. Moreover, their relation is essential to define as the process may look very different depending on if they are family, friends, or strangers.

Furthermore, by charting two or more journeys these can be compared to gain insight into why people may prefer one particular path of consumption over another. Depending on the case at hand, there are several types of journeys that may be relevant to compare. First, it can be interesting to chart several journeys in which a consumer follows the same path of consumption, e.g. selling a product, but interacts with or makes use of different services or exchange agents during the process, e.g. selling a product on eBay or Facebook Marketplace. By defining what services or exchange agents that are involved in the processes, it becomes easier to describe the processes in more detail and to identify their differences. This may in turn provide valuable insight into relevant design challenges. Another comparison that can be relevant is to compare journeys that describe different paths of consumption, for example, comparing a linear consumption journey with a journey for a circular path of consumption such as renting, subscribing or borrowing. By doing such a comparison one can better understand why people may consider linear consumption more preferable than circular alternatives, which may aid the identification of design opportunities (for an example, see Rosman, 2018). Yet another relevant comparison to make is to compare the journeys of a current consumption process and a potential future process, which involves a new product, services or exchange agent. This type of comparison allows for a before/after analysis and makes it possible to 'prototype' potential future journeys in relation to a particular offer (for an example, see Chalandon and Lindborg, 2019).

Accessing the tool

The tool for charting circular journeys introduced in this paper is part of the Use2Use design toolkit, which includes five mind-expanding packs designed to boost product circularity by aiding the development of products and services fit for circular consumption processes. Together, the five tools address elicitation of user needs, specification of design challenges, concept generation and evaluation in early phases of a user-centred design process. The toolkit is freely available at www.use2use.se (from 1 September 2019).
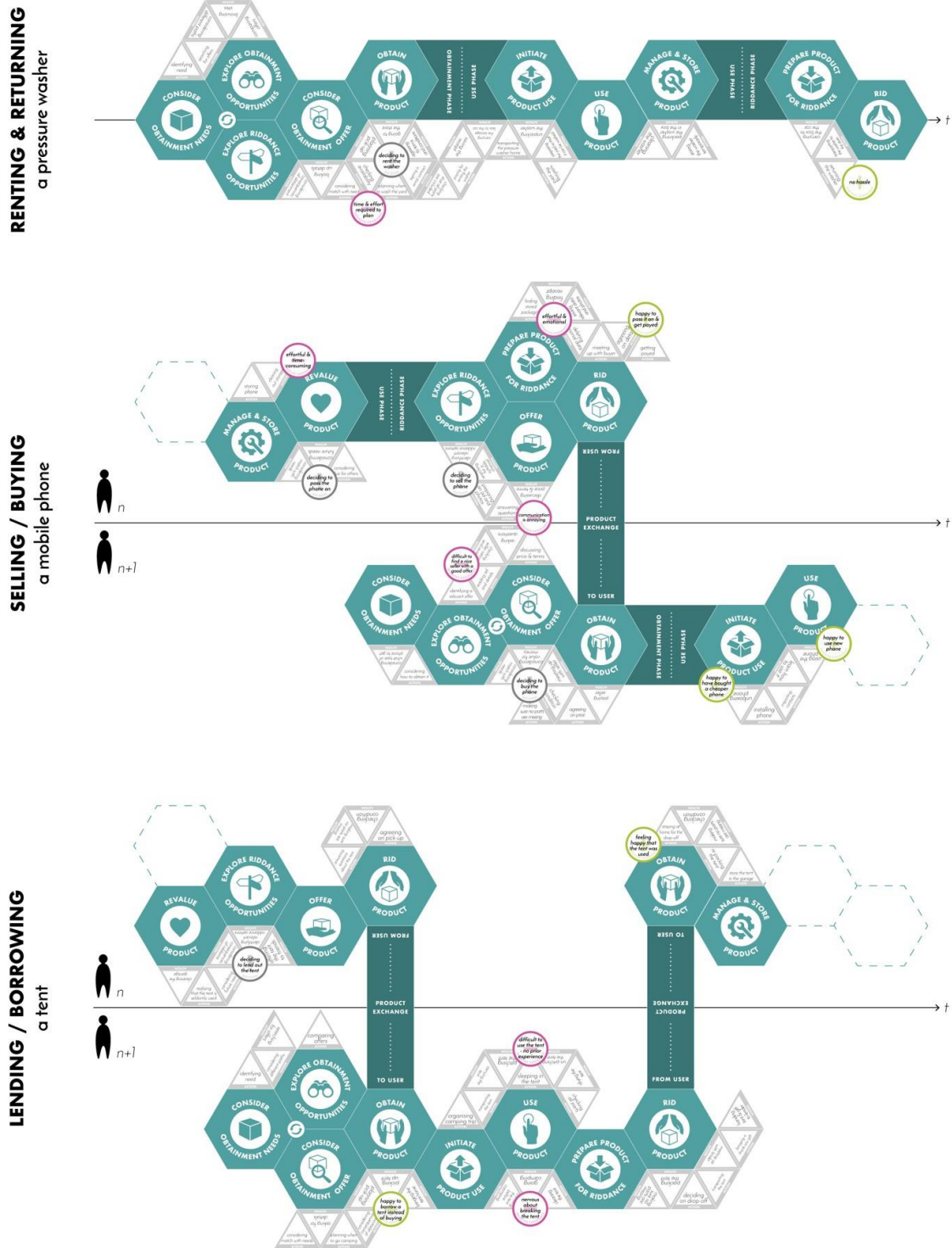
***Figure 4**. The tool can be used to chart consumption journeys of various character*

4. The tool in use: two design cases

This section describes two examples of how the tool has been applied in design cases. The examples illustrate different contexts in which the tools can be used, ways in which it can be applied in practice, and what type

of design challenges and opportunities that can be identified by using the tool.

Case 1: The design of a mobile application for sharing

In 2019, a master thesis project (Chalandon and Lindborg, 2019) was carried out by two design students at Chalmers University of Gothenburg aiming to integrate a feature into an inventory management app that would enable the people to borrow products from one another. The initiator of the project was the start-up company Futuresaurus AB, who had developed the inventory management mobile application Sortapp. The company was interested in exploring the sharing potential that an inventory app entails, i.e. digital inventories can be used to make it easier for people to see what products others have and to make requests to borrow them.

The Circular journeys exploration tool was applied by the two students during a workshop in the project, see figure 5. The workshop was facilitated by two researchers (the developers of the tool and authors of this paper). Before the workshop the students had carried out user studies through surveys and interviews, and they had a fair understanding of the apps' targeted users and their requirements. The students decided to chart two consumptions journeys: (1) how products are lent/borrowed today, and (2) how product might be lent/borrowed in the future using the app. In the workshop, they choose to address a ski jacket, since such a product is typically used periodically and is suitable to lend to someone. They also choose to chart the journey for a pair of neighbours, since such a relation might make the consumption process more challenging than if the consumers had been close friends.
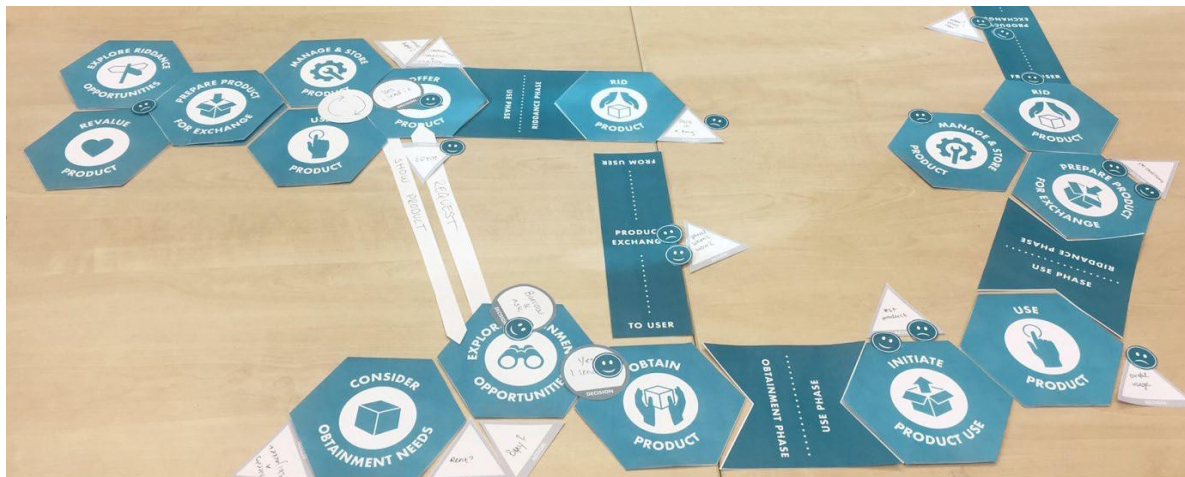

***Figure 5**. A previous version of the tool being used to chart the process of a consumer borrowing a ski jacket from a neighbour.*

By charting the first journey (how products are lent/borrowed today), a number of valuable insights were gained. Most important of these were the identification of hinders that today often stop lending/borrowing from happening, for example:

- People are unaware of what products other people have, particularly people one isn't friends with.
- If people happen to know what products other people have, they do not know if they are willing to lend them …and they find it a bit embarrassing to ask.
- If people borrow something one might be afraid to use it as if it were one's own …and if problems occur (e.g. the product breaks down, gets lost, or that it is not handed back in time) things might get very

complicated, since you generally have rather loose terms for how these situations are to be handled.

When charting the second journey (how product might be lent/borrowed in a future using the app), it became apparent how large potential the app had to alleviate these hinders. This helped the students to pinpoint what to focus on when designing the new functions of the app, for example:

- When a user of the app adds a product to their digital inventory, they need to be able to define whether they are willing to lend it to someone …and to whom. Is it just to friends, or anybody in general?
- The users also need to be able to state the terms for this, e.g. for how long the product can be borrowed, and how it should be returned etc. 'Standard terms' that can be assigned to the products can make this process more efficient.
- Users who are looking for a product to borrow need an effective search function and a non-intrusive way requesting the product.

In retrospect, the students stated that the Circular journeys exploration tool was vital for their project. In particular, using the tool helped them to put the finger on exactly how the app could support people's processes of lending/borrowing products, and what features to include in the app.

Case 2: The design of a digital platform for sharing products within the culture sector

In another master thesis project carried out at Chalmers University of Gothenburg (Lindgren and Trens, 2019), two students developed a digital platform for product sharing within the culture sector. The initiator of the project was the environmental organisation Returkultur, who are exploring the possibilities to establish a pool of equipment, such as light/sound equipment and music instruments, that will available to actors in the culture sector in the west of Sweden. Currently, cultural institutions like the Gothenburg Opera throw away a lot of equipment that through Returkultur's pool could become valuable to smaller cultural organisations or individuals.

The Circular journeys exploration tool was applied during a workshop in the project. The workshop, which was facilitated by the students, engaged nine potential users all active in the culture sector (DJs, artists, actors etc.). Before the workshop the students had carried out user studies and had a fair understanding of the widespread informal sharing scene among actors in the culture sector. In preparation for the workshops, the students used the tool to chart a typical sharing journey based on their collected data and their understanding of the sharing processes in the culture sector. This journey was introduced to the participants in the workshop, and they were asked to modify it to make it more correspondent with their own experiences of sharing. All participants however thought it was a good representation of the sharing process and opted not to adjust it. In the next part of the workshop, each participant was given a piece of paper on which they, separately and in silence, wrote down their typical actions and considerations for each stage of the sharing process, see figure 6. To help and guide them they had questions for each phase proposing actions, considerations and problematic areas, such as "How does the need for a product arise?", and "What aspects determine what you do with the product after use?". After this exercise the participants read their thoughts out loud and discussed them in the group. This discussion was recorded and the students took additional notes.

Figure 6. A previous version of the tool being used in a workshop with users. (Lindgren and Trens, 2019)

Similar to Case 1, this case used the Circular journeys exploration tool to chart the users' circular consumption processes based on insights from user studies. However, the students in this project also used their charted journey to gain additional insights from users. According to the students this was very valuable, and their approach of letting the users reflect on each hexagonal activity piece was an effective way to carry it out. Through this approach, the students could elicit rather detailed user requirements related to each step of the consumption process. As an example, requirements on what info the users' need during the activity "Consider obtainment offer" included: Product availability, Picture of the product, Product weight, Product dimensions, Product compatibility, Product manual, Product specifications (electricity type etc.), Product accessories (needed cables etc.), Product complexity, Condition of specific product, Pick-up/drop-off location, Accessibility at pick-up/drop-off location, Pick-up/drop-off process, and Service hours at pick-up/drop-off location. According to the students, to gain insight into such user requirements for every step of the users' consumption processes was extremely helpful when designing a digital platform to support sharing.

5.   Discussion

The contribution will be discussed in regard to the tool's implications for design practice. In addition, the tool is compared to other available tools and plans for future work are described.

Implications for design practice

The tool has been developed based on a user-centred design philosophy, i.e. that the more a designer knows about a user's situation or process, the better equipped she/he is to develop solutions that meet user needs in a way that is appreciated and preferable by users. The tool is hence designed to support designers and other agents to

explore people's consumption processes in depth so that they can identify design opportunities and develop attractive circular offers. Although this is the tool's primary purpose, it can also be used for a number of other purposes. As already highlighted, the tool can be used to collect new insights during user studies, to compile previously collected insights, to prototype new consumption processes or offers, and to compare and evaluate journeys for different offers. Hence, the tool can prove beneficial for a number of different design activities in the early stages of a design process. In particular, its value lies in its potential to aid designers and others to embrace a consumer perspective to better understand circularity and explore opportunities to support circular consumption. As it takes people's consumption processes as a point of departure and supports the identification of design challenges from a consumer perspective, it presents a unique circular design tool that can complement the already existing tools available to designers.

Comparison with other available tools

If one considers design tools which are not specifically adapted for circular design, there is a range of other tools and methods available which aim to provide insights into what people do and to increase the understanding of user/customer processes. These include methods often applied in the field of Human-Machine Interaction and Human-Computer Interaction, such as Cognitive Walkthrough (Wharton et al., 1994), Predictive Human Error Analysis (Baber and Stanton, 1996), and Usability testing (Nielsen, 1993). These methods are however less useful to gain insights into consumption processes, since they focus on the specifics of interaction. Another method is Critical Incident technique (Flanagan, 1954), which is a task analysis method that is used to pinpoint the reasons for human error in tasks such as piloting planes and performing surgery. Yet another method that incorporates people's courses of actions is Service blueprinting (Shostack, 1994), which is used to visualise the relationships between different service components. While it does include the customer as one of those components, it also has an equal focus on the backstage processes needed to deliver the service, making it overly complex if one is only interested in the users'/customers' processes.

One popular method among designers, which seems to be the one that is most comparable with the tool presented in this paper, is Customer journey mapping (see e.g. Stickdorn and Schneider, 2010; Trischler and Zehrer, 2012). It is commonly used to visualise the process that a person goes through in relation to a specific service, in order to increase the understanding of customer needs and pain points. It encompasses what the customer generally does in this process and how she/he generally experiences it, often from the perspective of one or more personas and rarely from the perspective of a single customer.

The journey is typically divided into different phases or stages, often covering the customer experiences related to different touchpoints before, during and after interacting with the service. Customer journey mapping has similarities with the tool presented in this paper. Both tools can be used to map out existing journeys, and to prototype new journeys (although customer journey maps predominantly are used to map existing ones (Følstad and Kvale, 2018)). They can also both be used to chart journeys based on thorough empirical data from user studies, but also more hypothetical ones based on the existing understanding among the agents who are using the tool. There are however also important differences between customer journey maps and the tool presented here, and three significant ones will be discussed.

First, the Circular journeys exploration tool can be used to map consumption journeys that are not tied to a specific service or company. The point of departure for the circular journeys are the paths of consumption, such as renting,

borrowing and buying second hand, and these journeys can include interactions with a variety of companies. This can provide a richer description of the consumer's everyday consumption processes, which rarely revolves around an isolated business or service. There are also paths of consumption that are carried out without the involvement of companies at all, such as borrowing something from a neighbour, which can be charted using the tool. In addition, the more open-ended approach in the introduced tool may help designers to identify more radical design opportunities, while Customer journey mapping often focus on refining existing services and working out its associated kinks. The tool presented in this paper however requires that the consumption journeys to be charted includes the flow of one or more products. This means that the tool cannot be used to chart journeys where products are not handled by consumers, such as for instance the process of hiring a painter (which can be explored using customer journey mapping). This is a prerequisite for our tool, since the overall purpose of using it is to reduce linear consumption by making circular alternatives more attractive.

Second, the introduced tool provides a set of pre-defined pieces to chart the journeys. This enables a top-down approach to charting, starting by laying out the hexagonal activity pieces to form the backbone of the journey and then fleshing it out. Customer journey maps starts without any predefined pieces (even though a pre-defined canvas to help sketch the journey might be applied), meaning that the overall structure of the journey often needs to be defined during the exercise. There are a number of advantages of using pre-defined pieces. It is easier to use, making it possible to use the tool without expert facilitators present. It is also faster, allowing for alternative journeys to be rapidly charted and compared. Additionally, the pieces can also function as a check-list, since the people using the tool will consider all pieces during the charting process. However, the major potential drawback of using pre-defined pieces is the reduced flexibility this entail. The pieces might force the charting of journeys that deviates from people's actual consumption journeys. To evaluate if this is a valid concern for the presented tool, the 146 description of circular consumption processes collected from the 73 Swedish upper secondary school pupils were analysed with this risk in mind. All activities included in the descriptions could be represented by the tool's hexagonal activity-pieces. Among the master students who applied the tool in their design processes this was not a problem either, although the students in Case 1 opted to tweak the tool slightly by adding custom pieces that visualized the communication between different consumers more clearly.

A third significant difference between the introduced tool and customer journey mapping is that while customer journey maps generally have both an analytic and communicative purpose, i.e. their utility lies both in the process of creating them, and in the process of communicating their end results with others. Customer journey maps are, in their final form, often of a relatively high fidelity, since that polish will enable more effective communication. When charting consumption processes with the presented tool, the purpose is predominantly analytic. The main takeaway is the insights you get during the charting process and, if you use the tool to prototype new processes, the descriptions you get of these processes. While these insights and processes may be documented when the charting is done, it may not be optimal to communicate it to someone who has not been part of the charting process (as an example, when a reader of this paper looks at the figures with charted journeys, it is probably difficult to draw the same conclusions as the persons who were part of charting them could). There is however nothing that prevents someone who have used the tool to afterwards apply a more communicative method to make the results easier to understand. One such method that is suitable to communicate consumption processes is Storyboarding (see e.g. Babich, 2017), which has the goal of producing sequences of illustrations arranged to illustrate a course of events. Another option could be to illustrate the findings though infographics

(see e.g. Smiciklas, 2012), which was a strategy that the students in Case 2 applied effectively.

While customer journey mapping often is used as a design tool, a different customer journey approach has evolved within the field of marketing (Følstad and Kvale, 2018). In this field, the customer journeys focus on the process of purchasing a product or service, i.e. certain aspects of the obtainment phase, and the customers' decisions during this process. This approach is of limited use when designing for circularity since it does not encompass the entire consumption process. Addressing the full process, i.e. the three phases obtainment, use and riddance, is crucial since certain combinations for obtainment and riddance paths are prerequisites for product circularity. Nevertheless, exploring consumption processes from a business and marketing perspective can provide complementary insights valuable for design, since marketing has a big influence on people's consumption-related decisions.

In summary, the presented Circular journeys exploration tool has some things in common with already available design tools, but it also has important differences. The tool is designed to be easier, more effective and more efficient to use for gaining insight into circular consumption processes. These advantages have their roots in that the tool has been custom made to be applied in this specific setting.

Future work

Although the tool already provides a new way for designers and other agents to gain insight into people's consumption processes and related design challenges, it is in need of additional testing and possibly also further development. Supplementary testing of the tool will be conducted to explore the tool's usefulness for studying people's consumption processes and gaining insight into challenges that are relevant to address when aiming to design products and services fit for circular consumption. Such evaluative studies will also address the tool's user friendliness, fit with companies' current design processes and other tools in use, and its potential to contribute to new innovative designs fit for circular consumption. Activities to test the tool will be carried out with representatives from industry in upcoming research projects but also with design students.

6.   Conclusions

This paper introduces a tool for charting circular consumption journeys, which should be seen as complementary to previously suggested tools for circular design. In contrast to other tools, the introduced tool provides support to explore circular design opportunities from a consumer perspective, with a specific focus on people's consumption processes and their related activities, decisions and experiences.

The presented tool helps designers and other agents to chart people's consumption journeys step-by-step. Different types of consumption journeys can be mapped by linking consumer activities and actions identified to be of special importance for circular journeys compared to linear journeys. By doing so, insight can be gained regarding critical hinders that may keep people from engaging in circular consumption. Such insight is vital when identifying new design opportunities for developing circular products and services that have the potential to make circular consumption preferable for people. The tool can be used to chart existing consumption journeys based on empirical data, to mediate user studies, and to prototype future journeys. Overall, the tool can aid organisations to both increase their understanding of circular consumption processes and to explore opportunities to develop products and services for a circular economy.

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