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Re-framing Product Circularity from a User Perspective

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Much of the discussion regarding product circularity is framed from a production and business perspective. This paper argues that the current narrative needs to be complemented with a re-framing of circularity from a user perspective and that issues of consumption should be considered in more depth. Such a re-framing is proposed based on an exploration of the consumption process and a discussion regarding what different paths of consumption may entail for people. The paper also delves into the process of product exchange between multiple users over time. It underlines that products can be designed so that they can be transferred in tight loops from one user to another, i.e. from Use2Use, which typically entails environmental advantages in relation to circular production initiatives. Overall, such a perspective suggests an enabling approach, i.e. designing products and services that create preconditions that enable people to circulate products. New opportunities for supporting product circularity from a design perspective are suggested followed by recommendations for future work.

product circularity; circular product design; sustainable consumption; circular economy

1 Introduction

Household consumption in industrialised societies has steadily increased over the last decades, contributing to a rising resource throughput creating significant environmental pressures (EEA, 2015). As a result, it is becoming more and more critical to find new ways of transitioning to more sustainable consumption and production patterns (United Nations, 2016). Such opportunities are explored in the sustainable design and circular economy (CE) literature, which highlights opportunities for narrowing, slowing, and closing material and energy loops to reduce the rising resource throughput (see, for instance, Bocken, de Pauw, Bakker, & van der Grinten, 2016; Go, Wahab, & Hishamuddin, 2015).

Narrowing resource flows from a product and production point of view, i.e. designing products so fewer resources are used per product, can be considered insufficient in itself as it risks resulting in an increased consumption rate due to rebound effects (Cooper, 2005). Several authors thus argue the

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need to also slow the resource throughput by increasing the lifespan of products (Bakker, Wang, Huisman, & den Hollander, 2014; Cooper, 2005). Strategies for slowing the throughput of products, such as designing for durability and reparability, are argued to have potential to extend and/or intensify the utilisation period resulting in a slower flow of resources (Bocken et al., 2016). In contrast, the third opportunity commonly discussed is aimed at closing resource loops instead of slowing down the throughput. It covers strategies for looping resources in technological and biological cycles based on the Cradle-to-Cradle design philosophy (McDonough & Braungart, 2010).

Much of the discussion around these three opportunities for reducing the throughput of resources is framed from a production and business perspective (see, for instance, the review by Go et al., 2015). Even though innovations in production and business are essential for reducing resource throughput and for bringing about a transition to a circular economy, changes in consumption is equally important (De los Rios & Charnley, 2016; EEA, 2015). Much literature discussing innovations for the circular economy however lacks a profound consumption and user perspective (De los Rios & Charnley, 2016; Lofthouse & Prendeville, 2017; Piscicelli & Ludden, 2016; Welch, Keller, & Mandich, 2017). Focusing only on the production and business opportunities, without also considering the user in the circular economy, may limit the possibilities for new innovations that are both commercially profitable and attractive to users. Lofthouse and Prendeville (2017) argue that gaining a better understanding for issues of consumption has potential to open up greater opportunities for innovation and success.

Recent discussions have picked up on the importance of considering the user in the circular economy. For instance, many papers in the review by Camacho-Otero, Pettersen, and Boks (2017) address users' acceptance of circular business models. These papers unquestionably address important aspects and contribute valuable insight, but they often overlook user and consumption related aspects in favour of business and production related aspects.

Considering the user in the circular economy should not only be about addressing people's attitudes towards, and acceptance of, particular business models and design strategies, but to immerse in issues of consumption from a user perspective. As Lofthouse and Prendeville (2017) highlight: "*If we do not understand users, how can we expect to design business models that they aspire to?*" (p.214). People don't care about circular business models per se (cf. Røxfelt & Hiort af Ornäs, 2008), instead they may reflect on questions like: *Do I dare to buy a second-hand phone? Is it better to sell my car and join a car pool? Should I declutter my closet and donate clothes to charity?* Gaining a better understanding of such issues may aid the exploration of new opportunities to support product circularity.

In order to contribute to a more profound understanding of issues of consumption and the user in the circular economy, this paper aims to explore what a user perspective on product circularity may entail for design. The paper will first address consumption and user-related issues that are often overlooked in CE literature and discuss how these aspects can help re-frame the current production focused narrative. Next, a user perspective on the circulation of products is presented. The paper will conclude with a discussion on what such a perspective may involve regarding design opportunities and challenges for enabling circulation of products.

2 Consumption and user-related aspects in need of further attention

As highlighted in the introduction, important issues of consumption remain underexplored in the current literature on circular economy. This section will address some of these aspects and discuss how they can contribute to the re-framing of product circularity from a user perspective.

2.1 Consumption as a three-parted process

The focus on production and business opportunities, instead of issues of consumption, in the CE literature is not surprising given its strong heritage from ecodesign (Lofthouse & Prendeville, 2017). In its early days, ecodesign had a strong techno-centric focus and design opportunities were often

framed in relation to stages of a product life-cycle. Thus, the role of consumption and user involvement was often limited to a use or utilization stage in the product life-cycle (see e.g. Brezet & Van Hemel, 1997; European Commission, 2014; van Hemel, 1995). This tradition of framing the discussion of design and innovation opportunities in relation to the stages of a product life-cycle is also evident in CE literature today, which often frames people's consumption in relation to a use phase, often preceded by a distribution phase and followed by a collection or end-of-life phase. Even though some frameworks point out opportunities for product re-use, they are still based on a simplified framing of consumption that does not sufficiently take into account issues of consumption from a user's point of view.

If looking outside the CE field, some publications provide a more nuanced narrative. These refer to consumption as a process that can be considered to cover three main phases: acquisition, use, and disposition (Antonides & Van Raaij, 1998; Jacoby, Berning, & Dietvorst, 1977; Lehtonen, 2003; Lucas, 2002). Even though the importance of considering all three phases is stressed, the spotlight is however often on the process in which people purchase goods or services. In consumer behaviour literature specifically, a marketing perspective rather than a user perspective is often applied, and people are often seen as objects rather than subjects (Antonides & Van Raaij, 1998). When considering consumption in relation to circularity, additional issues of consumption become relevant to recognise. In regard to acquisition, it must for example be acknowledged that products can be acquired without any financial transactions (through e.g. receiving gifts and borrowing) and that people themselves can exchange ownership of, and access to, products without any company involvement. Even though these types of issues are highlighted in literature on sharing and collaborative consumption (Botsman & Rogers, 2011; Matzler, Veider, & Kathan, 2015), they should receive further attention.

Additionally, disposition has also been given less attention than it deserves (Lucas, 2002). Lucas describes how complex the disposition process really is:

In the general economy of the household or the person, shedding off possessions can be as complex a process as acquiring them, and acts such as giving away, recycling and discard, need to be examined as different responses to this process. In many cases, there is a variously strong reluctance to discard; hoarding unused, unneeded objects is a common practice... (Lucas, 2002, p. 17)

Hence, understanding the complex process of product disposition is key since certain disposition paths are prerequisites for product circularity.

In sum, addressing consumption as a three-parted process – consisting of acquisition, use, and disposition – can provide valuable insight for exploring new opportunities for supporting product circularity.

2.2 Paths of consumption

When looking closer at the phases of acquisition, use and disposition, they can be understood as processes in which people make decisions and engage in activities over time in relation to one or more products. Even though some common consumption decisions and activities are discussed in CE literature, for example activities such as maintaining and repairing products during the use phase, many other decisions and activities are still underexplored or given too little attention despite being highly relevant from the perspective of product circularity.

For instance, in regard to acquisition, people may engage in different activities that succeed the recognition of need but precede the actual acquisition of a product, such as gathering information and reflecting on options. When it is time to make a decision about how to acquire the product, they can, for instance, choose to gain ownership by buying it or to gain temporary access by renting or borrowing it. Regardless of the reasons behind the choice of acquisition method, it inevitably leads to a particular path of consumption that may require additional activities and/or decisions. Once the

product is obtained the user can, in addition to utilising the product, engage in different activities to manage the product, such as making adjustments or repairing it. In due course, the user will contemplate the disposition of the product in regard to three general choices: keep the product, permanently dispose of it, or temporarily dispose of it. Jacoby et al. (1977) argues that if the decision is to keep the product, the user can continue to use it for its original purpose, repurpose it, or store it away for potential future use. In contrast, if the decision is to dispose of the product, a number of different disposition paths can be considered, for instance, the user can sell it, trade it, or loan it to someone temporarily.

A range of aspects influences which paths and modes of consumption people find desirable. In relation to acquisition and disposition specifically, the literature typically highlights aspects related to the product, the consumer, and situational influences (see e.g. Guiltinan, 2010; Jacoby et al., 1977; Lehtonen, 2003; Van Nes & Cramer, 2005 for more detailed discussions). However, most of these aspects are primarily discussed in terms of how they influence *what products* people choose to consume, and not *in which way* they choose to consume. Nevertheless, when exploring opportunities for product circularity, aspects that influence which path of consumption that people choose become vital to understand, especially in terms of which activities and other consequences a particular path involves, in comparison to other paths. If a path is perceived as having relative advantages over other paths, it will become more desirable (Rexfelt & Hiort af Ornäs, 2009).

Adopting a new consumption path may afford users opportunities to engage in desirable activities, as well as be stripped of such opportunities. Users can also be forced to engage in undesirable activities, as well as be relieved from them (cf. Rexfelt & Hiort af Ornäs, 2009). There are a multitude of activities that a consumption path may involve: inspection of the product; bargaining with someone; planning ahead when to use something; pricing a product; meeting a seller; and cleaning a product, just to name a few. At the risk of having to engage in undesirable activities, users might avoid certain consumption paths (e.g. selling used products on the second-hand market) and choose a more convenient option (e.g. dispose of it as trash or store it in the garage).

Even though people's consumption is discussed in terms of decisions in this paper, it is important to note that people's actions are not always a result of active decisions; like people's actions in general, some things "just happen". When buying a new mobile phone for instance, the old one may be put in a drawer without any extensive reflection and left there for years as a result of inaction.

In sum, people make many decisions and engage in many activities throughout the consumption process that influence resource throughput. Hence, understanding people's decisions and activities holistically throughout the three stages is essential when exploring opportunities for product circularity. The likelihood that a user chooses a particular path of consumption must be judged in light of alternative available paths. Each path necessitates different strings of activities to be undertaken, heavily affecting their respective attractiveness.

2.3 Tight loops between users

Due to the current production and business narrative and the tradition of framing opportunities in relation to the stages of a product life-cycle, the CE literature emphasises circular production loops to a larger extent than circular consumption paths. Consequently, opportunities for design and innovation are most often discussed in terms of circular production and post-production initiatives focused on re-processing products and recycling materials. Even though these types of loops are important, there is potential to also enable tighter loops between users focused on increasing product utilisation over time. Such loops do not only have potential to reduce the product throughput but can also reduce the resources and costs commonly associated with circular production and post-production initiatives (Ellen MacArthur Foundation, 2013).

Since a large number of products are only needed and used for short periods of time, often with long periods of hibernation in-between, increasing product utilisation presents an untapped potential for reducing the number of products put on the market. Even though people may use a particular

product to satisfy their needs at a certain point in time, changes in needs or conditions over time can reduce the rate of product utilisation and even render the product obsolete. Low utilisation and low needs fulfilment will increase the risk of the product ending up in prolonged storage (Lehtonen, 2003; Lucas, 2002). Prolonged storage not only limits a product's potential to fulfil needs, but may also lower its value and technical utility over time, making it less attractive to others. Low needs fulfilment can also trigger product replacement and directly increase the resource throughput (see review by Van Nes & Cramer, 2005).

When considering the negative effects of low utilisation and low needs fulfilment on resource throughput, it becomes relevant to address these aspects in more depth and explore opportunities for circulating products in tighter loops between users. Some measures that enable tighter loops have previously been suggested, such as new business models that advocate access instead of ownership (see e.g. Gruen, 2017) and services for sharing and collaborative use of products (see e.g. Botsman & Rogers, 2011; Leismann, Schmitt, Rohn, & Baedeker, 2013).

3 Introducing the Use2Use perspective

While the previous section highlights the need to address product circularity from a user perspective, this section discusses what such a perspective entails for design. An overall approach for addressing consumption and user-related aspects is introduced and followed by a discussion regarding what design opportunities that can be considered especially relevant for enabling circulation of products from a user perspective.

3.1 *Take the consumption cycle as a base for exploring opportunities*

As argued above, there is potential to explore new opportunities for supporting circulation of products by taking a user perspective on product circularity, i.e. by considering people's entire consumption process including the variety of options and activities related to different paths. Taking such a perspective requires a shift in focus; rather than solely exploring opportunities from a production and business point of view, they should also be explored from a user's point of view. Hence, basing the exploration of opportunities on the product life-cycle, which is typically done in CE literature, is not sufficient. Instead, opportunities should also be explored in relation to the consumption process. To aid such explorations and the development of innovations that reduce resource throughput, a consumption cycle adapted for product circularity is proposed in Figure 1.

The consumption cycle frames consumption from the users' point of view; instead of viewing consumption only as a use stage, preceded by marketing and sales, and succeeded by end-of-life processes, Figure 1 divides the consumption process into the three main phases *Obtainment*, *Use*, and *Riddance*¹. The figure deliberately excludes producers, providers, and other players, as they do not have to be involved in people's consumption processes (even though they often are). Instead, different paths of obtaining, using, and ridding products, which can be carried out by a single person, but also jointly by a household or a larger collective, are in focus. The consumption cycle thus highlights alternative modes of consumption and provides an overview of the main options people have throughout the process, i.e. possible paths of consumption. The paths are grouped according to whether they influence people's ownership or access to a product as this typically frames which paths that are possible to carry out and/or are desirable to consider.

The figure highlights people's main paths but does not illustrate the consequences associated with particular paths. However, as argued in the previous section, these are essential to understand as they influence how people prioritise and choose between paths. Hence, explorations of opportunities for supporting product circularity should not be based solely on people's main options, but also on an understanding of what those options entail for people. As people's consumption

¹ Regarding choice of words: Obtainment is used instead of Acquisition to put less emphasis on buying products and more on other ways of gaining ownership or access to products. Riddance is used instead of Disposition to put less emphasis on creating waste and more on making them available for someone else.

processes are linked to each other it is also essential to consider what transaction costs, such as time, effort, and money, that may be associated to the exchange of products between users in relation to particular paths.

THE CONSUMPTION CYCLE

OBTAINMENT > USE > RIDDANCE

Figure 1 The consumption cycle with examples of different paths of consumption.

3.2 Address the exchange of products between users

The paths of consumption illustrated in Figure 1 describe different scenarios for how products can be circulated in tight loops from one user to another, i.e. from use to use (Use2Use). The exchange of a particular product between two users can be realised in many different ways depending on what paths of obtainment and riddance that are considered desirable by the users involved. For instance, as illustrated in Figure 2, a user that has purchased a product may choose to offer someone else temporary access, and then later resign ownership by giving it to a third user. If in good condition, the product can be used in multiple use-cycles before it reaches a decayed stage in which component or material recovery is the only option. Such tight loops between use-cycles have potential to increase both product utilisation and need fulfilment while also reducing the product throughput.

Figure 2 Products can be circulated in tight loops and used in multiple use-cycles before recovery is needed.

Exchange of ownership or access between users can be enabled by:

- exchange agents that facilitate exchange without gaining ownership, such as: **C** connectors, **M** mediators
- exchange agents that gain ownership temporarily, such as: **R** retailers
- ⬡ exchange agents that maintain ownership and offer access, such as: **R** renters, **L** lenders
- ▲ exchange agents that support other agents, such as: **C** cleaners, **M** menders
- ... other types of exchange agent(s)
- the users without involvement of any exchange agent

Figure 3 Examples of how exchange agents can support the transfer of ownership or access between users.

The loops between use-cycles illustrated in Figure 2 could be realised directly between the users without any intermediary or through the involvement of exchange agents. As shown in Figure 3, different types of exchange agents can facilitate or enable the exchange of products between users. Exchange agents can support the transfer by, for instance, providing a channel through which people can connect and carry out the exchange or by temporarily taking over ownership and ensuring that the product is in good condition before it is transferred to a new user.

Companies can thus take on many different roles for enabling product circularity, some which will be more relevant than others depending on the particular company. For instance, even though some

companies may consider it crucial to develop new business models and circular offers, this may be unnecessary for others if they can design products that fit into another company's successful circular business model. For instance, companies involved in building new homes could adapt these so they are suitable for sharing and fit with the business model of Airbnb.

3.3 Design for Use2Use

A Use2Use perspective has many implications for design: it highlights new design strategies for enabling and facilitating product circularity, as well as points to a number of aspects that need to be further explored in order to develop products and service offers that are relevant and desirable from a user perspective.

One central design strategy is to enable and facilitate exchange between users, i.e. *Design for Exchange*, either by designing circular service offers or by designing products that directly facilitate exchange. To Design for Exchange, gaining in-depth insight regarding the decisions, activities and other consequences that particular paths of consumption entail for people is essential. If the design of services and circular offers, i.e. the modes of provision, is based on such insights it has potential to increase users' appreciation and adoption of the associated modes of consumption. For instance, insight on required but undesired activities that are related to a certain path highlight opportunities for exchange agents to offer services that incorporate those activities. Some new and innovative companies have already successfully applied this tactic. Sellpy, Simplet and Tiptapp are services that not only assist in selling products that people no longer need, they also take care of the transport, sorting, and sometimes the cleaning of the products, as these activities have been identified to hinder people from resigning ownership. In addition to designing the modes of provision, products can also be designed for exchange, for instance by making it easy for people to:

- inspect and evaluate a product's condition, completeness, and cleanliness prior to and during the exchange
- package, carry, and transport a product
- understand how to install and use a product
- adapt a product to their needs
- maintain a product's condition by proactively changing parts that are most prone to wear and tear
- prepare for exchange of ownership or access

Which particular aspects that are crucial to address may vary between products but also between paths and exchange occasions. However, since people may choose any obtainment or riddance path, it can prove valuable to explore design opportunities in relation to all paths illustrated in Figure 1.

Another design strategy is to *Design for Multiple Use-Cycles*. Tight loops between users will increase the number of exchange occasions as well as the number of users per product, which presents challenges for design. If tight loops between use-cycles are to be realised, new questions are thus essential to address from a design perspective: *How can products be designed in such a way that they are durable and attractive to multiple users over time instead of one user for a prolonged time? How can need fulfilment and a satisfying user experience be ensured not only for the first user, but also for the 2nd, the 10th or even the 100th user?* Furthermore, when considering how the product should be designed to be useful not only for the first user but for multiple users throughout multiple use-cycles, it becomes relevant to question which user need(s) it is designed for. *Should it be designed to fit a particular need, cater for the multiple needs of future users, or be customisable to needs that emerge over time?*

In order for tight loops to come to pass, products and services must not only be designed so that they are attractive to future users but also so that users will want to circulate the products to others; i.e. they must be designed for detachment. The strategy *Design for Detachment* can be applied by, for instance, envisioning how people can be supported to:

- recognise when they no longer need a product
- avoid forming emotional bonds to a product
- assess the benefits of resigning ownership or access to a product
- erase (or leave behind) traces of use and personal information
- identify when to resign ownership or access to a product so it can benefit someone else

In sum, a Use2Use perspective points to several design opportunities that can be explored to enable and facilitate the circulation of products from one user to another. While some of the highlighted opportunities have been discussed previously in literature, or even been implemented by companies, others have not.

4 Discussion

This paper introduces the Use2Use perspective as a complementary lens through which opportunities for product circularity can be explored. The overall contribution of such a perspective and its implications will be discussed in this section along with aspects that remain to be explored in more depth.

4.1 *Shifting to an enabling approach*

This paper argues that the current knowledge and views on product circularity need to be complemented with a re-framing of circularity from a user perspective. It also argues that the current framing is done from a production and business perspective. Questions like “How can we make users accept our circular business model?” are still common in research and industry, indicating that some user-related aspects are considered. Nevertheless, companies are most often interested in whether an innovative business model can be *pushed* out on the market or not. However, a new offer from a company just adds another option to the almost endless number of options available to people at any given moment in time. While people for instance may have heard about Uber, what Uber constitutes for their everyday lives is just another option for transportation that they may consider using. Hence, the primary focus on people’s acceptance of business models has limited power in integrating a user perspective on product circularity.

A question that is more important to answer from a user as well as an environmental point of view is “how can we enable people to choose more sustainable paths of consumption?”. This *enabling* approach does not mean that there is no room for innovative business models, but they should be designed so that they provide preconditions that enable people to circulate products. In order to accomplish this, exploring and understanding the users’ paths of consumption is key.

How attractive people consider the different paths of consumption to be is influenced by their preconditions, which are partly determined by the design of available products and services as well as the current context or infrastructure. In order to create preconditions for circularity a systems approach thus needs to be applied and all three – products, services, and infrastructure – must be designed so that they together enable people to circulate products. No company can aspire to accomplish this alone, but each company can find their role in contributing to creating enabling preconditions for paths of consumption that people aspire to.

4.2 *New design opportunities*

Even though the implications of applying a Use2Use perspective need further exploration, this paper has nevertheless highlighted new design opportunities for slowing and closing product loops that previously have received little attention in literature.

In regard to design opportunities for slowing the product throughput, strategies already discussed in literature include, for instance, the need to design products for longevity, durability, and product life extension activities such as repair and maintenance (Bakker et al., 2014; Cooper, 2005; Haug, 2016; Hebrok, 2014; Van Nes & Cramer, 2005). Since these strategies are frequently discussed, they have not been the focus of this paper even though they are essential also from a Use2Use perspective.

Previous research also argues for slowing the product throughput by designing for attachment as a product life extension strategy (Cooper, 2005; Page, 2014; Van Nes & Cramer, 2005). Some concerns connected to this strategy are however raised in literature. Lehtonen (2003) argues that product attachment can be considered a cause for why people do not dispose of products. Van Nes and Cramer (2005) similarly reason that bonding with all of our products would be a real burden and that increased attachment with all products is unwanted. They therefore stress that the strategy to enhance product attachment should be well considered and applied delicately. When considering the strategy of designing for attachment from a product circularity point of view, it can be argued that it risks decreasing the potential for reducing product throughput. If products are designed for attachment regardless of if people have a long-term need for the products or not, the strategy may reduce both utilisation and need fulfilment resulting in a market pull for additional products. This paper therefore argues to also consider the opposite strategy, i.e. Design for Detachment, which has also recently been suggested by Choi, Stevens, and Brass (2017). For some product types, this alternative strategy may be more suitable as it can be used to encourage tighter loops, and increase utilisation and need fulfilment, which may reduce the overall product throughput.

In regard to design opportunities for closing product loops, literature commonly focuses on strategies to design products for circular production initiatives, in which components and materials are re-processed, and strategies to design products for circular post-production initiatives, in which products are refurbished and remanufactured in-between use-cycles (see e.g. Go et al., 2015; Pigosso, Zanette, Guelere Filho, Ometto, & Rozenfeld, 2010). From a Use2Use perspective, designing for refurbishment and remanufacturing are also important strategies to ensure that exchange agents can uphold products' performance and durability over multiple use-cycles. However, designing for even tighter loops is preferable for many types of products since tighter loops have potential to reduce both the product throughput and the resources and costs associated with re-processing (Ellen MacArthur Foundation, 2013). Even though re-use loops are often argued for in literature, it is rarely discussed how products can be designed to enable and facilitate such loops. In contrast, the strategies Design for Exchange and Design for Multiple Use-Cycles proposed in this paper suggest how products can be designed to facilitate the transfer of ownership or access between multiple users over time.

4.3 Use2Use related aspects to explore in future work

While the proposed Use2Use perspective provides new insights into product circularity, it also indicates some areas in need of further exploration. One central area is eliciting user needs and requirements for circular consumption patterns. Traditional user studies focus on people's needs and use of products/services during the use phase, but that perspective needs to be complemented with further methodological support to elicit needs in relation to all three phases of consumption. This includes exploring how needs change over time, both changes within a single use-cycle and long-term variations connected to different stages of life.

In addition, a better understanding of the exchange of products between users is needed, as well as of the consequences and activities that the different paths of consumption involve. Besides understanding those activities, methods and guidelines for how to design with them in mind needs to be developed. Today, such tools are scarce.

Another important aspect that needs further attention is how different types of products relate to the various consumption paths. While some products may be inherently more suited for certain paths, others may bring about undesirable user activities that can cause people to consider the same paths less attractive in particular situations and for particular products.

5 Conclusions

This paper argues that the current conceptualisation of product circularity needs to be complemented with a re-framing of circularity from a user perspective, which addresses issues of

consumption in more depth. Consumption needs to be understood as a three-parted process: obtainment, use, and riddance. The consumption process encompasses a range of possible paths, each influencing how consumption is carried out. Besides understanding these paths it is equally important to understand how users relate to them. The likelihood that a user chooses a particular path of consumption should be seen in light of available alternative paths. Each path comprises different activities that users may engage in and which will affect the attractiveness of the path. Designing products and services with these activities in mind in order to enable users to obtain pre-used products and transfer them to new users is key to making circularity happen. By addressing product circularity from such a Use2Use perspective, i.e. considering people's consumption processes and the exchange of products between users, this paper has highlighted new design opportunities and the specific strategies: Design for Exchange, Design for Multiple Use-Cycles, and Design for Detachment.

This paper has merely touched upon some of the many important aspects of consumption and some of the relevant design opportunities that may be of interest to consider in relation to product circularity. Hence, the Use2Use perspective deserves more attention and this paper will hopefully stimulate future research on the role of the user in the circular economy.

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