Design to Let Things Go

: Towards an understanding of user detachment from hibernating or accumulated objects at end of use and the promotion of object longevity and material circulation through care practice.

Yoon Jung Choi

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Abstract

This thesis explores the feasibility of adapting and applying the philosophy and theory of care-giving in nursing practice to the care of possessions, and whether such application has value in design processes for extending the lifespan of objects, to promote sustainable disposal behaviour.

Designing for user detachment from hibernating or accumulated objects at end of use offers the potential for extending an object's lifespan and reducing environmental impact. Care-giving behaviour towards objects includes maintaining and repairing them, but also letting them go, and has potential implications for sustainable design. The communicable knowledge is gathered under the concept of 'Carative factors (love and charity and the motive of caring for all)', in the form of a design toolkit, called the Carative Factors Inspirational Toolkit. The Toolkit is designed to provide a better understanding of the user's relationship with hibernating or accumulated objects at end of use, and their responsible and decisive disposal, for designers, in order to create products, services and an environment that will influence users' possession and sustainable disposal behaviour. Through exploratory workshops and design projects in which participants used the Toolkit to generate concepts, the Toolkit was developed and evaluated.

This study begins by defining the need to understand and consider the after-use system during design processes and to identify a need for a user-object detachment guide for designers. It analyses the relationship between users and the hibernating or accumulated object at end of use, and introduces a Toolkit based on four motivational carative factors, for which insights were taken from nursing practice, behavioural change and interviews. Through the action research processes of iterative developments and evaluations involving a workshop method with designers in specific industry sectors, these insights are integrated into a Toolkit for designers. The validation and evaluation is made through analysis of the feedback from Toolkit users in different design contexts.

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Author's Declaration

During the period of registered study in which this thesis was prepared the author has not been registered for any other academic award or qualification. The material included in this thesis has not been submitted wholly or in part for any academic award or qualification other than that for which it is now submitted.

Signature

Yoon Jung Choi

Date March 2020

Glossary of Terms

Attentive user
People who are willing to act (or more) and have the potential to do more. They do as much as they can to help environmental problems: they know what they want, thus they tend to plan for their behaviour.

Benevolence
The desire to do good, or a charitable feeling that is not focused on a particular person – a disposition to express concern that is not followed by specific caring action. Caring action is determined by the distance between care giver and receiver, caring resource availability and the shared intentions of care givers (Shaw et al., 2016). *Benevolence* as a form of care consists of emotional and environment factors which involve eliciting the emotional response of a "desire to do good, or a charitable feeling" in users and providing the appropriate environmental conditions that will facilitate this within the particular context or situation (Dilnot, 2017: Shaw et al., 2016).

Carative factors
The elements that are necessary to increase the efficacy of motivating caring behaviour. They are in the forms of_love and charity, the motive for all caring behaviour (Eriksson, 2006).

Careless user
People who are the least willing to act and less likely to open up to behaving voluntarily or being influenced by what other people do. They are not conscious of their behaviour. The users' situated environment could generate careless behaviour in the user, particularly when the user is in a situation of emergency.

Caring behaviour
The behaviour is as much about maintaining or mending subjects (that is, patients) as it is about ways to "let things go peacefully" (Watson, 1985, p7), and "projecting hope in a shared future" (Jones, 2013, p16). In nursing, care practice of "peaceful letting go" is related to "the ideal of not inflicting harm, but it also includes a reasonably limited commitment to actively working for the preventing of harm" (Pettersen, 2011).

Cautious participant
People who are willing to do more but lack the motivation that leads to behaviour change; however, knowing how other people act in the same circumstances is a critical factor in generating behaviour change. They tend to find quick solutions that are available and tend to limit the amount of work they do. They make decisions based on how the choices are presented to them

End of use
The state where the objects are physically no longer in use.

End of life
The state where the objects are in their stage of disposal as waste.

Hibernation
The dead storage period, when the objects are no longer in use. According to Murakami et al. (2010), "possession span" is the combination of the "duration of use", which refers to when users are using the objects, and the "dead storage period", referring to when objects are no longer in use.

Hibernating or accumulated objects
Objects of quality and value that exist but are not yet developed, that although they are steadily reducing in usefulness, could be 'reawakened' and recaptured. (Wilson, 2017)

Letting go peacefully
The caring process that understands the quality and value of objects, accepting their condition to respect their current state and sending them to a desirable place where there is the opportunity to recapture and re-recognize their value (Purtilo and Doherty, 2010).

Responsible disposal
The action of sending objects at their end of use to a place where they are valued to prolong the circulation in terms of use and materials (Holmes, 2015). The users are aware of their behavioural impact and have a responsibility for knowing where they are, in sending them for reuse, remanufacturing or recycling.

Sustainable disposal behaviour
Environmentally significant behaviour that is based on its impact and users' interaction with products and services, particularly focusing on the disposal phase. It includes the context in which the users are not aware of their behavioural impact. It maximises when it is in use but also recovers and regenerates the resources' value when they are no longer in use: therefore they influence the flow of material and energy effectiveness (Ellen MacArthur Foundation, 2013). This behaviour includes the reuse of objects by multiple users, their return to the product manufacturer (or shop) and recycling behaviour within the circular economy.

Chapter 1 | INTRODUCTION

Human consumption of natural resources has doubled over the last thirty years and continues to accelerate by 1.5 per cent a year (World Wildlife Fund, 2015). Due to the fact that the cultural and economic value of products has changed dramatically, the availability and affordability of mass-produced and low-cost goods has increased in the marketplace (Walker, 2006; Gwilt et al., 2015); consequently people's consumer behaviour is continuously being encouraged. Most people in the wealthy nations of the world are used to the take-make-throwaway system: around 670,000 tonnes of furniture and 310,000 tonnes of textiles are disposed of annually by householders in the UK, although they are still reusable (WRAP, 2012). Wrap (2012) estimate that almost a quarter of the Waste Electrical and Electronic Equipment (WEEE) brought by householders to Household Waste Recycling Centres (HWRC) across the UK has a reuse value, and together this could be worth over £200 million in gross revenue each year. The National Packaging Waste Database reported that around 600m tonnes of products and material enter the UK economy each year; however, only 115m tonnes of this are recycled and the rest is buried in landfill. The continuous growth in consumption and throwaway behaviour severely damages the ecosystem and social systems that support life on earth, and a drive for limitless economic growth could eventually disrupt many local, regional, and global systems (Meadows, 2009). Researchers at the Massachusetts Institute of Technology (MIT) have predicted "global economic collapse" and "precipitous population decline" by the year 2030 (South & Brisman, 2014). In this consumer society more of our everyday reusable and recycled objects are thrown away at the end of their life cycles at ever-increasing rates, causing an increased cost for society to protect the environment from hazardous effects (Krantz, 2010).

1.1. Challenges for Designers

The European Union has introduced a whole range of policies and initiatives to support the shift toward a resource-efficient, low-carbon economy to achieve sustainable development (European Commission, 2011). This is aimed at sustainable consumption and production to improve the overall environmental performance of products throughout their life cycle, stimulate demand for better

products and production technologies, and help consumers make informed choices (Stoerring, 2017). Governmental organisations and representative businesses offer a range of technologies, behavioural options and legislative actions that aim to decrease consumption rates (IPCC, 2014) On the production side, the policy intervenes by increasing the end of pipe costs to producers or regulating the use of hazardous substances (Defra 2005). In spite of the diverse environmental protection schemes that have emerged, and the fact that the insightful notion of planned obsolescence is widespread, the amount of reusable waste and recyclable waste is relatively high.

People's endless desire to possess is one of the barriers for resources circulation and an agent of environmental corruption (Schultz, Kleine, & Kernan, 1989). In particular, replacing behaviour is one of the main factors generating hibernating or accumulated object at end of use and increasing the effect of people's wasteful attitudes and throw-away behaviour (Park, 2010). The old product becomes obsolete and challenges users' decision-making process for the after-use phase. Nonetheless, we keep things we love because they add meaning to our lives; therefore, having an emotional attachment to objects is not always bad. However, in many cases, people take no action when they are no longer needed, piling up objects at the back of the cupboard, as they still have emotional resonance, to be forgotten, or otherwise throwing them away although they are still perfectly functional (Botsman & Rogers, 2011, p.11). Wilson et al (2016, p.1) confirmed that "hibernation, the dead storage periods when a mobile phone is still retained by users at its end-of-life" is a common important barrier to the circular economy. Their survey result showed that only 33.7 per cent of previously owned mobile phones were retuned back into the system in the UK, while the end-of-use hibernation period is on average five years, with an average use phase duration of around two years. A study from Tokyo University showed that out of 2030 consumers surveyed, more than 63 per cent of participants kept their end-of-use mobile phones at home, and more than 30 per cent of them hibernated end-of-use printers (Yamamoto & Murakami, 2017).

In this climate of consumption, appropriate ways to let go of hibernating or accumulated objects for responsible disposal have become less important, and many people pay no attention to it. Responsible disposal involves sending end-of-use objects to a place where they have value because the users take responsibility

for knowing where they are sending it to (Holmes, 2015). Such behaviour is a way to dispose of objects sustainably by considering passing objects to another users, returning them to the product manufacturer (or shop) and recycling them within the circular economy (Ellen MacArthur Foundation, 2013). Nevertheless, people tend to face difficulty in acting decisively when the relationship with an object nears its end; they experience a kind of emotional attachment to objects which might be attributed to loss aversion (Shu & Peck 2011) and endowment effects. Accordingly, users' lack of knowledge, skill and motivation, and the lack of an after-use system, does not foster care practice which is known to help extend the life or use of particular objects (Gwilt et al., 2015). Since the notion of planned obsolescence became popular (Packard, 1963), interest in the lifespans of manufactured objects has become a central component of contemporary design discourse (Cooper, 2002), yet currently objects and systems are not designed to help users to facilitate obsolescence and hibernation period for end of use objects. Designers have the power to affect the life cycle of products by influencing user behaviour through related objects and services, and thus create a direct impact on society and the environment (Bhamra, Lilley, & Tang, 2011), but it is often difficult to apply in practice.

Besides, changing people's behaviour is a complex matter, because although sustainable approaches are addressed through design, users' behaviour still could create an environmental impact. This may be because different users tend to behave differently within the same system. Much of the disposal behaviour which has a damaging (or beneficial) effect on the environment is also driven by other factors. In particular, when people face the situation where they need to make a prompt decision, they face a conflict between personal benefit and social norms. The variation of intrinsic and extrinsic value influences individual behavioural decisions as well (Shaw, 2015). The costs and convenience may be other factors that influence people's decisions about their behaviour. In many ways, encouraging more sustainable behaviour can be seen as a design problem (Lockton, 2013), yet behaviour change presents a challenge for designers.

1.2. Research Context

Many of the leading industries have started to take a circular economy approach through circular product and process design to facilitate product reuse, recycling

and cascading (Ellen MacArthur Foundation, 2013). The circular economy embodies a system shift that builds long-term resilience, generates business and economic opportunities and provides environmental and societal benefits. This system-based model will require a transformation from consumer ownership to usership (Ellen MacArthur Foundation, 2013); thus there is a need for a shared responsibility among all stakeholders and consumers, enabling the return of products for reuse, repair and remanufacturing, as well as the collection of waste for recycling (Ghisellini, Cialani, & Ulgiati 2016) for a zero-waste circular system (Stahel, 2010).

Cooper (2005) states that increasing product longevity and access-based consumption (e.g. product-service systems or other sharing models) are two strategies for slowing resource consumption to sustainable levels. Product longevity (Chapman, 2005, 2010; Evans & Cooper 2010; Van Nes, 2010, 107) is one of the most effective strategies to reduce waste, influence consumption and increase positive environmental impacts. It is potentially a more economically beneficial model and requires a diverse creative approach rather than legislative demand (Chapman, 2009). Equally, moving away from products to services has also considered viable (design) solutions to reduce the impact of consumption (Cooper, 2010; Stahel, 1994; Tukker &Tischner, 2006). In the thriving culture of 'owning less' (Botsman & Rogers, 2011), the lifestyle choice of alternative ownership models has drawn attention to object detachment. The digital society has helped this shift, as users are no longer merely passive consumers but are actively involved as co-creators and providers of resources or services to others (Botsman & Rogers, 2011, p11). This system contributes to a circular economic system by keeping products in circulation for longer, reducing resource consumption, and may generate financial profit while decreasing negative environmental impact (Ellen MacArthur Foundation 2013).

In order for the circular economy model to function effectively, the loss of resources and value within the loop must be reduced, ensuring that the end-of-use products and valuable material that contain are returned back into loop and are not land-filled, incinerated or lost (Wilson, 2017; Darby and Obara, 2005). In essence, the hibernation of objects at end of use will have multiple impacts, as "not only are the precious resources lost for reinvestment as recued products, remanufactured components" or recycled material, but also "the shortfall in

material will necessitate a rebalance with virgin stock" (Wilson, 2017). The definition of 'hibernation' in this study is the period of dead storage. According to Murakami et al. (2010), 'possession span' is the combination of the 'duration of use', which refers to when users are using the objects, and the 'dead storage period', referring to when objects are no longer in use. In this research, hibernation refers to the objects in the domestic environment and suggests "a latent value that, although steadily reducing, could be reawakened and recaptured" (Wilson, 2017).

As Kotler and Armstrong (2004) have noted, many of the sources of customer satisfaction and social and environmental impact are located in the post-purchase use and disposal phases, rather than the purchase. Thus, understanding the emotional factors at play for users (or owners) towards hibernating or accumulated objects at end of use are key to reducing the hibernation period. Such insights have the potential for reducing functional waste and enabling the recirculation of material for a zero-waste circular system, which could have a real environmental impact within such a transition towards a circular economy (Wilson et al., 2017).

In the context of circular economic models, a systematic approach to maintain high quality products and material through taking the closed-loop cycle approach is required. By maximising the resources' values when the object is in use but also recovering and regenerating them when they are no longer in use, the input of natural resources is minimised. For this transition to be viable and sustainable, the bond of ownership between users and hibernating or accumulated objects at end of use needs to be loosened, facilitating their 'letting go' and reuse, their return to the manufacturer, or sorting for recycling behaviour. Those behaviours are environmentally significant and move towards sustainable behaviour that is based on its impact and users' interaction with products and service, particularly related to the disposal phase. How people dispose of objects at the end of product cycle has significant influence on the material and energy effectiveness flow (Ellen MacArthur Foundation, 2013). Nevertheless, the user's decision about 'letting go of hibernating or accumulated objects at end of use' for responsible and decisive disposal is affected by complex factors, and is also dependent upon the user's personality and their situated context. In this regard, Design for Sustainable Behaviour (DfSB) is a useful approach. DfSB has growing

recognition in the development of new products and services (Lilley, 2007). How users interact with products and systems around them, and how designed interventions might change this, is a key concern within design for sustainable behaviour. People's behaviour is inevitably influenced by design and its systems; thus an investigation of places to intervene through design will provide an opportunity to reduce environmental impact.

1.3. Research Statement

Designers need to understand users' relationship with hibernating or accumulated objects at end of use. By considering this during the design process they may promote pro-environmental behaviour such as returning the product for reuse, remanufacturing and recycling. This study argues that users may have a lingering attachment to objects that impedes such behaviour, and that a conventional care practice approach to wasteful behaviour has been overlooked by designers in the field of emotional longevity of products.

The practice of care in design aims to promote sustainable behaviour (Chapman, 2005; Walker, 2006). Particularly in nursing practice, care-giving behaviour is as much about maintaining or mending subjects (that is, patients) as it is about ways to "let things go peacefully" (Watson, 1985, p7), and "projecting hope in a shared future" (Jones, 2013, p16). In nursing, care practice of 'peaceful letting go' is related to "the ideal of not inflicting harm, but it also includes a reasonably limited commitment to actively working for the preventing of harm" (Pettersen, 2011). Therefore the objects designed through the application of caring factors may not become obsolete, and could provide a commitment by users to actively prevent harm, ultimately maintaining the value of the object. This study attempts to shift the view of care practice from a process of increasing the attachment to an object to detachment from hibernating or accumulated object at end of use by users (or owners) for objects' longevity and material circulation that enables designers to facilitate a 'peaceful letting go' approach to promote responsible and decisive disposal behaviour in the user. Such a caring process could influence a user's view on an object's value at the end-of-use stage, and aims to encourage users to preserve the value of the current product condition for other positive opportunities.

Furthermore, the care concept of 'letting go peacefully' resonates with the requirements of sustainable users. Sustainable consumers wish to own high-quality objects at the same time as keeping their accumulation of goods to a minimum, and they tend to practice a certain detachment towards the objects they own, to deal with the issue of obsolescence, hence care practice could help to respond to their requirements and promote sustainable behaviour. Therefore, applying these concepts to user-object relationships may identify ways that are useful to designers in influencing attitudes and behaviour around possession and object obsolescence and throwaway attitudes, in order to encourage responsible and decisive disposal behaviour.

In this regard, it is necessary for designers to understand the emotional aspects at play for users (or owners) towards the hibernating or accumulated objects at end of use to change their behaviour. Understanding these relationships and the emotional factors could provide a potential opportunity for design to intervene to achieve or prolong lifespan and potentially affect care behaviour. Equally, discovering and understanding which factors can motivate a user to 'let go peacefully' may be valuable in promoting user-object detachment and care-giving behaviour, which then can be applied in the design process. Such approaches could allow designers to engage more effectively with the full life cycle of objects during the design process within the circular economy.

1.4. Research Aim

The aim of this research is to provide a better understanding of users relationship with hibernating or accumulated objects at end of use and explore the potential for adapting and applying care giving theory (from nursing practice) to the design process to promote users' detachment from hibernating or accumulated objects at end of use for responsible and decisive disposal. In order to achieve the research aim, the following objectives are investigated:

- To understand and explore the emotional factors at play for users (or owners) towards hibernating or accumulated objects at end of use. This will be achieved through the literature review and further research on the classification of users' relationship with hibernating or accumulated objects at end of use. Users'

relationships with hibernating or accumulated objects at end of use will be analysed as a foundation for forming the design briefs.

- To understand and translate caring factors from nursing practice to design by using metaphor. This will be achieved through the process of translating and extracting the caring factors from nursing literature and the classification of caring themes and carative factors to be applied in the design process.

-To apply caring themes and carative factors to the design process to influence design thinking toward users' detachment from hibernating or accumulated objects at end of use. This will be achieved through the process of developing and evaluating the carative factors in use during the design process. The selected caring themes and carative factors will be applied to a range of design briefs that deal with different types of user relationship with hibernating or accumulated objects at end of use,

1.5. Research Questions

This research will address the following key questions:

RQ1 *Can carative theory from nursing practice be applied to inform the design process, to encourage more responsible and decisive disposal of hibernating or accumulated objects at end of use?*

RQ2 *What factors inform different users' decision-making process towards hibernating or accumulated objects at end of use?*

1.6. Thesis Structure

Figure 1 demonstrates the research progress, the structure of this study and the findings produced throughout the progress of this study. This thesis comprises eight chapters, which are briefly described below.

Chapter 1 constitutes an introduction of this thesis. It includes the problem statement, and challenges for designers in addressing the users' behaviour change, particularly aimed at hibernating or accumulated objects at end of use during the design process. It also describes the design approach that this PhD takes. The

chapter explains the aims of this research and ends by proposing the research questions.

Chapter 2 describes a foundation study to help the reader to understand the background to the caring process and caring behaviour embedded and expressed in daily life within the user-object perspectives and classifies the finding. Then it explains the motivation for setting the hypothesis and the research questions.

Chapter 3 examines the literature on the concept of planned obsolescence, people's possessions and their impact on the environment. It continues with a review of the literature on the circular economy, product longevity, the object detachment approach and the end-of-life phase. It then offers an extensive review of the connection between care practice in nursing and design for sustainable behaviour and caring processes and factors. The idea generation methods and available tools in the design process were examined, to confirm the need for a toolkit in the design process and identify the usefulness for the toolkit development process. Finally, the gaps in the knowledge are identified, and the chapter concludes by acknowledging the need for this research.

Chapter 4 covers the research methodology, including the epistemological stance, theoretical perspective, methodology and specific research phases and methods used to answer the research questions. The data collection and methods of analysis are explained in this chapter, and it concludes by reflecting the validity and reliability of this research.

Chapter 5 describes the research process of understanding the relationship between users and hibernating or accumulated objects at end of use and the obstacles for object detachment from possessions, and categorizes the relationships. The different user-object relationships were adapted as design briefs. This research continues by discussing users' care-giving behaviour from an object-detachment perspective, and selected motivational themes and influential factors from nursing literature are presented. It introduces the 'Four Motives of Caring' themes and influential factors in the collective form of the Toolkit, based

on insights from the literature and interviews which would be applied in the design process (See Figure 30).

Chapter 6 moves on to reports of iterative cycles in which designers use the Toolkit to generate design concepts and ideas. The 'Four Motives of Caring' themes were modified and the 'Five Motives of Caring' themes and influential factors were introduced in the form of the Toolkits (from Version 2.0 to 5.0). The participatory workshop and individual designers' design studies methods were used to examine the application of the Toolkit in the design generation process. The Toolkit has been applied to a range of design briefs that deal with different types of user relationship with hibernating or accumulated objects at end of use to generate ideas. This chapter ends by reflecting on the action research process of the Toolkit development.

Chapter 7 integrates the all of the previous chapters to answer the research questions. This is achieved by reflecting on the insights found in Chapters 5 and 6, together with the implications from Chapter 6, for further Toolkit development. This part reflects on the usefulness of metaphor in translating and understanding the shift from nursing practice to design. It moves on to reflect on the ideas that the toolkit produces, including themes and implications, in a discussion about the circular economy. Then it discusses a critical reflection on the use of carative factors in the design process. This chapter concludes by explaining the limits of the research within an ethic of behavioural change and offers recommendations for further research.

Chapter 8 provides a summary of the research and discusses its significance and benefits to broader fields of design research, with identification of the original contribution to knowledge.

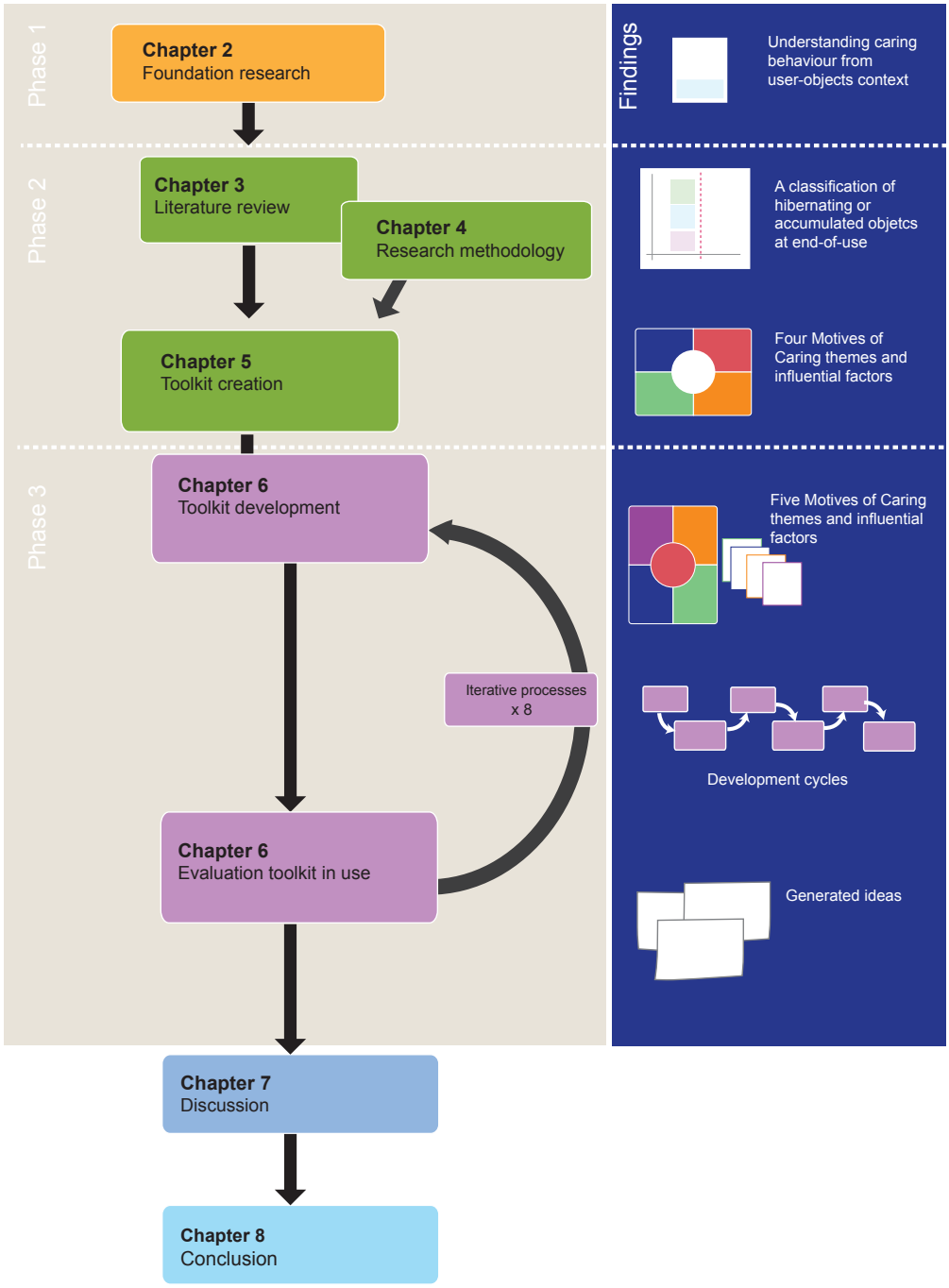


Figure 1. A diagram shows the research progress, the structure of this study and the findings produced throughout the progress of this study.

Chapter 2 | FOUNDATION WORK

2.1. Opportunity for Shifting the Perspective of Care Practice

When I first started to explore the meaning of caring behaviour in a user and object context, I had a strong belief that caring is about a process of increasing (or maintaining) the relationship between the user and the object in order to retain value. I therefore spent a lot of time exploring the various methods of encouraging reuse behaviour, including applying anthropomorphic features to packaging or providing appropriate refill services. Then I had chance to talk to five consumers (including home-makers, engineers and bankers) about these ideas and their creation. I realized that reusable packaging is already on the market using various materials through innovative design features, and it is difficult to apply these to all packaging. Besides, two interviewees were concerned about accumulating unwanted reusable packaging at home, so other approaches were required. In fact, some high street shops offer refill systems that allow consumers to bring in their own containers and pay for the amount they want without paying for the packaging (Whole Foods Market, for example); however this system requires consumers' time and effort, so it is still not very popular. Providing refill services to individual houses may be another option, though water and energy consumption need to be considered. These informal conversations made me realise the challenge that existed in changing people's behaviour and the importance of considering people's complex behavioural issues during the design process.

More significantly, interviewees explained that not all packaging is necessarily reused and maintained by individual users. Providing an example of end-of-use cartridges, some of interviewees prefer to send used products to appropriate sites (e.g. manufacturers), rather than reusing them if there was an available system. The conversation was extended and the interviewees discussed the hibernating or accumulated children's toys, clothing and shoes at end of use. From the perspective of sustainability, increasing the attachment through design for reuse maybe favourable approaches; however, they claimed that the object detachment from possession approach is preferable. They would rather have a system where they can give things away to someone in need or rent goods for a period of time. The informal conversation highlighted that certain types of user-object relations

require a different care practice approach for different types of users. Additionally, the care process of acknowledging the value of the object and locating it at the right point for multiple users has the potential to promote sustainable behaviour, particularly in the disposal phase. This was an interesting perspective; however, it was still based on the interviewee's assumptions. Therefore it was essential to understand and compare the genuine meaning of the caring process and care-giving behaviour by researching into how caring is rooted and expressed in the daily encounter between the user and objects (See section 2.2). Yet this conversation provided me with an opportunity to set a hypothesis and the research questions from a different perspective.

2.2. Understanding and Identifying Care-giving Behaviour

This section aims to understand how products are maintained, and to explore the types of care practice that are adopted by people's everyday routine. Understanding different users' attitudes and their actions to maintain the value of objects or their environment and associating it with the way in which care knowledge and skill is currently delivered and formed into action will help to gather data and identify what kind of individual care practice is currently adopted. The term 'care' has been widely explored in nursing practice. Metaphorical ways of comparing and translating care practice from a human-human perspective to a user-object one of these may be useful. In nursing practice, the caring process helps a person maintain health or die peacefully, which can be classified into three perspectives. They are, namely, to 'maintain', 'heal' and 'let go peacefully' (Watson, 1985). The details of the concept are explained in Chapter 3. To understand the three different categories of care practice in the routine of daily life from a user-object perspective, I conducted an observation and shadowing study of users' daily journeys and activities. This research method was intended to help to uncover the reality of what people really do when they care about (or for) stuff. This study method will therefore help to identify opportunities for design and to efficiently understand a particular design context (Helen Hamlyn Research Centre, no date). Within the three categories of the caring process from nursing practice, it was discovered that the activities that participants were involved in to maintain (or enhance) the value of the objects were included in each category. It is hoped that the data will begin to identify what individual care

practices are in current use, and which category requires more research in a design context. It will also provide an overall picture of the requirements that are needed to support an engagement with care routine by individuals.

Research and Analysis Method

Eight participants were selected from the Canary Wharf College Parents' Association; these included engineers, mothers, architects and teachers, aged between 30 and 50. Following Czarniawska's (2007) shadowing research process, first I located myself at the right venues to engage with the participants within their context. The access was as unrestricted as possible, and allowed third parties for engagement. Second, I closely followed an individual over a set period of time while writing an almost-continuous set of field notes. I recorded and compiled the field notes from the shadowing period and added debriefing notes to maintain the freshness of the experience. Finally, I analysed the large data set that was accumulated during the shadowing period.

Before the study began, I asked a question about whether they care about the environment or not. Knowing this will help to identify the participants' intentional behaviour to some degree. The observation was carried out from 10:00am to 2:30 pm; I tried to keep a distance of 20m from the participants and took photos of their behaviour (Figure 2). Almost-continuous sets of field notes and photos were created by observing the participants. Figure 3 shows examples of actions that were discovered through the observations and shadowing study and they were each written down in a field note. Later they were classified under the three types of care process. Table 1 is a classification of people's caring behaviour, its processes and aims and some examples of actions I observed. Much of our daily behaviour happens unconsciously through habit. Therefore, it was necessary to conduct the semi-structured interviews with participants to understand their intention after the shadowing observation. The notes were examined through the debriefing session and re-read later to analyse the data. This research had limitations, as the some of the conscious behaviour occurred when the participants were aware that they were being observed.

Figure 2. Some examples of participants' care-giving behaviours. Getting rid of food waste from the sink to maintain the sink (top left), retunring the delivery box (top right), mending clothes (middle left), reusing the detergent packaging (middle right), collecting the used capules for recyling (bottom left), reusing the plastic bag (bottom right).

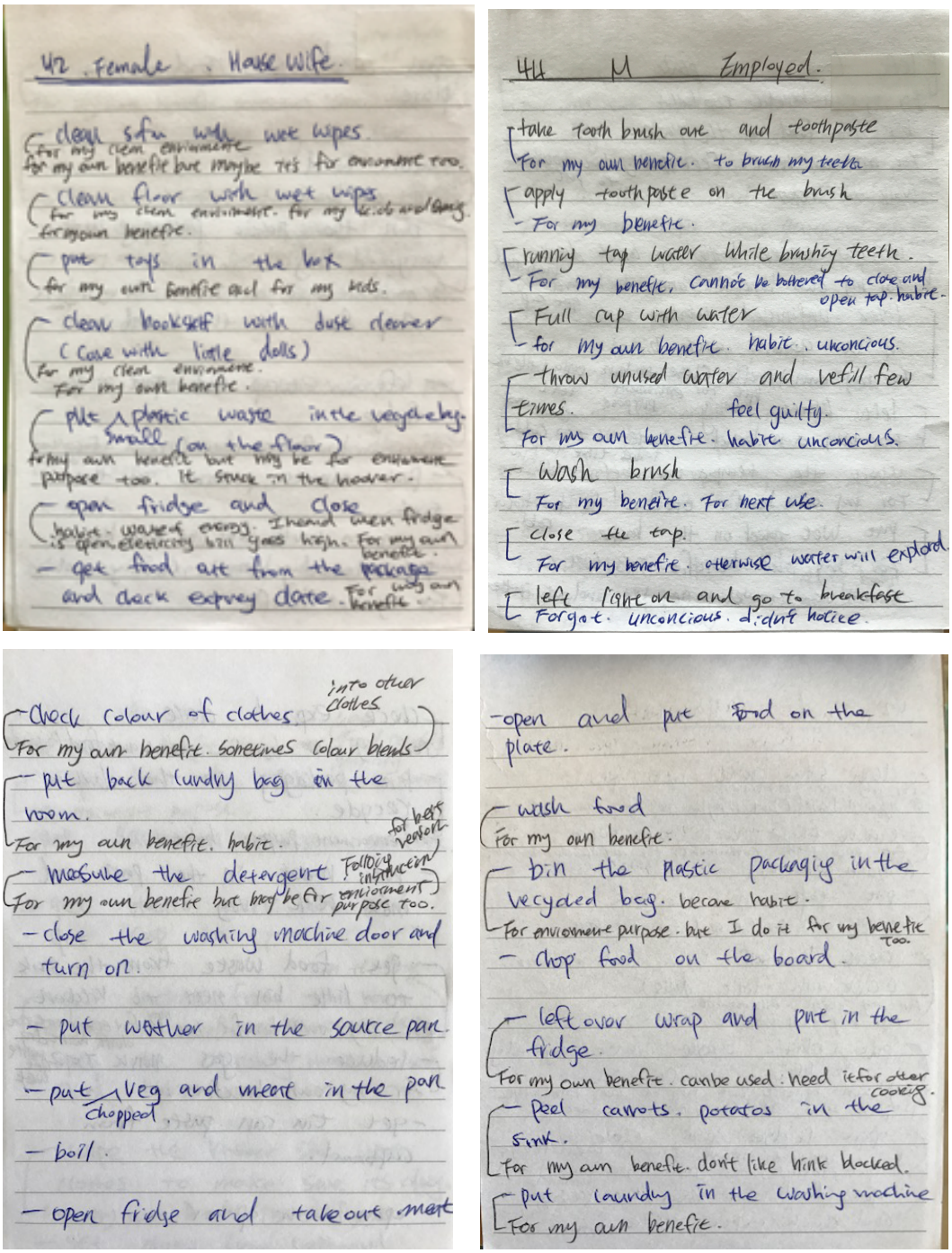


Figure 3. Notes taken during the observation and shadowing study.

Reflection

Types of Caring Processes	Aim	Detailed Care action	Care action examples
Maintain	Maintain the current value of objects	Carry, use everyday	Jeong-eun loves her scarf so she wears it every day.
		Have a certain position and secure position	Anita has a special box to keep her ring. Jeong-eun never put her scarf down on the floor.
		Wrap, cover, avoid damage	Chizu puts the camcorder in the case. Elizabeth cleans her car regularly. She also takes her car to a garage for a regular checkup. Jon cleans the sofa, he has a special cleaner.
		Reuse for the same purpose	Sophie reuses the glass container to store the salt.
		Reuse for another purpose (maintain the shape)	Jenny likes her chocolate box, so she personalized it as a hair clip container.
		Admire aging and keep on using	Jenny likes her chair with a dent and the scratches as it proves the beauty of aging.
		Personalize	Insu personalized his Starbucks's decorative tumbler.
		Provide proper environment	Insu puts the clothe moth killer in his wardrobe.
Healing	Increase or maintain the value of objects	Repair	Ian's uncle fixed a broken lightsaber toy.
		Transformation (form conversion)	Advertisement: A family car transform into a projector and it is used to view family photos.
		Care-reciver's automatic reaction	Self healing coating material
Let go peacefully	Maintain the current value of objects	Sell	Insu no longer needs a buggy for his child but it's a good condition so he sold it on gumtree.
		Donation	Anita collects unneeded clothes and she donates to Oxfarm.
		Exchange	Jon has a bag which he doesn't use it anymore, he had a chance to exchanged it for clothes with his friend.
		Take back	Elizabeth collects used ink cartridges and sends them back to HP.
		Sorting	Cha has a special bag that allows her to divide the wastes into different types of material.
		Recycle bin	Chizu looks for the recycle bin after finishing her lunch.

Table 1. Classification of people's caring behaviour, processes, aims and some examples of care actions.

This research revealed the ways in which caring is embedded and expressed in daily encounters between people and products in a domestic environment. Care-giving reflects users' own experience with things. Experience is shaped by the characteristics of the user, such as their personality, skills, background, and cultural values (Desmet 2007). To understand the user types, the participants were asked whether they care about the environment. Five out of eight participants answered they do care about the environment; two of the participants said they are trying but are unsure if they are doing it correctly, and one answered that he

does not care most of the time. It was revealed that five of the people who answered that they care about the environment tended to consistently deliver caring behaviour towards objects during the observation periods.

Table 1 is a classification of identified care practices and activities from a user-object perspective based on the care theory particularly in nursing practice. Firstly, under the 'maintaining' category, 'keeping it in a certain place', 'wrapping it' and 'covering it to avoid damage' or 'providing a proper environment for it to last longer' were distinctive activities. The aim of this behaviour is to maintain the value of things and increase the length of ownership. Participant B was unsure about her environmental care behaviour: she always got rid of food waste from the sink and stored it in a food waste bin (Figure 2, top left): because she was worried about the smell of the waste when she put it in a general waste bin. She said she would contribute to environmental care more "if there was an accessible and easy solution". Participant B also claimed she cleans the rubber grip in the washing machine door each time after used it, because she doesn't want to spend money on replacing the part. This behaviour occurred for the individuals' own benefit, but could possibly contribute to environmental care. This means that environmental care behaviour is not necessarily aimed specifically at an environmental purpose, but can also be driven by benefit to the individual. The other way to maintain the relationship is to 'reuse things for the same purpose when they reach the end of use (Figure 2, bottom right)' or to 'appreciate the damage or dents on the objects and view these as positive factors'. This relationship includes the tendency to care for and cherish the product and keep it as long as possible. In the course of the relationship, the emotionality of relationship implies the power of the objects to evoke meaningful moments (Demir 2008). Secondly, healing is another type of caring process, which includes 'repair' activity in a creative way to reuse objects, or 'transforming' activity to give new meanings to old objects, as a consequence extending the length of ownership. For example, Participant A created a duvet cover out of end-of-use bed sheets. According to the participant, she hesitated at first about whether she should throw it away, keep it or give it away. However, her emotional attachment to an object motivated her to upcycle the object. Finally, care practices are about letting go of an object (when it has value) to a desirable place where there are opportunities to recapture and re-recognize its value. The process does not

necessarily result in the possession of objects for a longer period but also the passing of objects on for further use. Instead of throwing a pair of jeans into a bin, they can be ‘taken to a flea market’ or 'sold on the online market’ or ‘exchanged’ with another owner. ‘Donating it to charity’, or ‘returning it to the manufacturer with care and consideration’ are other ways to maintain the value and to take care action. For example, Participant C leaves the Abel & Cole (vegetable delivery) packaging box at the particular place where the delivery staff pick up the box, as she said she knew the box was a valuable item which could be reused (Figure 2, top right). Participant D kept end-of-use clothing in a separate bag to be taken to the second-hand shop, because she cares about the environment but also thinks the objects are of too good a quality to be thrown away. Consequently, when the users notice that objects or any related experience is valuable, and expect that value to be carried on even if they do not possess it, then it increases the chance to enact sustainable behaviour. Participant E tries to collect used coffee in a recycling bag provided by company, to be taken by pick-up services (Figure 2, bottom left). She does it for the purpose of environmental concern; however, she complained about the difficulty of this process, meaning that she only does it when the situated environment allows. While Participant H does not have much concern for the environment: he sold his television on eBay rather than throwing it away: this was driven by financial return. This shows that behaviour is always influenced by the environmental, social and economic context in which the interaction takes place.

Unlike the other two approaches, the last care practice approach aims for object detachment from possession and it was explored further in this PhD. The requirements that were identified to encourage ‘peaceful letting go’ of objects are as follows:

- Knowing the result of the user’s action
- Preventing unnecessary expenses
- Individual benefit
- The object has a physical value (e.g. good condition)
- The object provided a valuable experience
- Availability of a pick-up service
- Ease of process

- Financial return

These identified requirements and the classification of users were later adopted in the Toolkit development process (See Chapter 5).

Care-giving behaviour was also demonstrated before making a purchase. This type of behaviour could possibly be further explored to develop sustainable shopping experiences; however, this research will not cover this aspect.

Challenge for Responsible and Decisive Disposal Behaviour

During the conversation, the interviewees pointed out the challenges in disposing of objects in a sustainable way when they come to the end of use, which might also be an opportunity to apply care practice. For certain types of objects (e.g. coffee cups or plastic bags), people tend to make unconscious and prompt disposal decisions (mostly less than 5 seconds); then those objects get thrown away, although other factors also influence their decision-making process. This problematic relationship has been widely explored in design research in terms of encouraging users' conscious behaviour, addressing reusable design, creating interesting waste bin designs or using biodegradable materials (e.g. Ecover's mushroom pack) or providing information through design. This context is not, therefore, included in this PhD research.

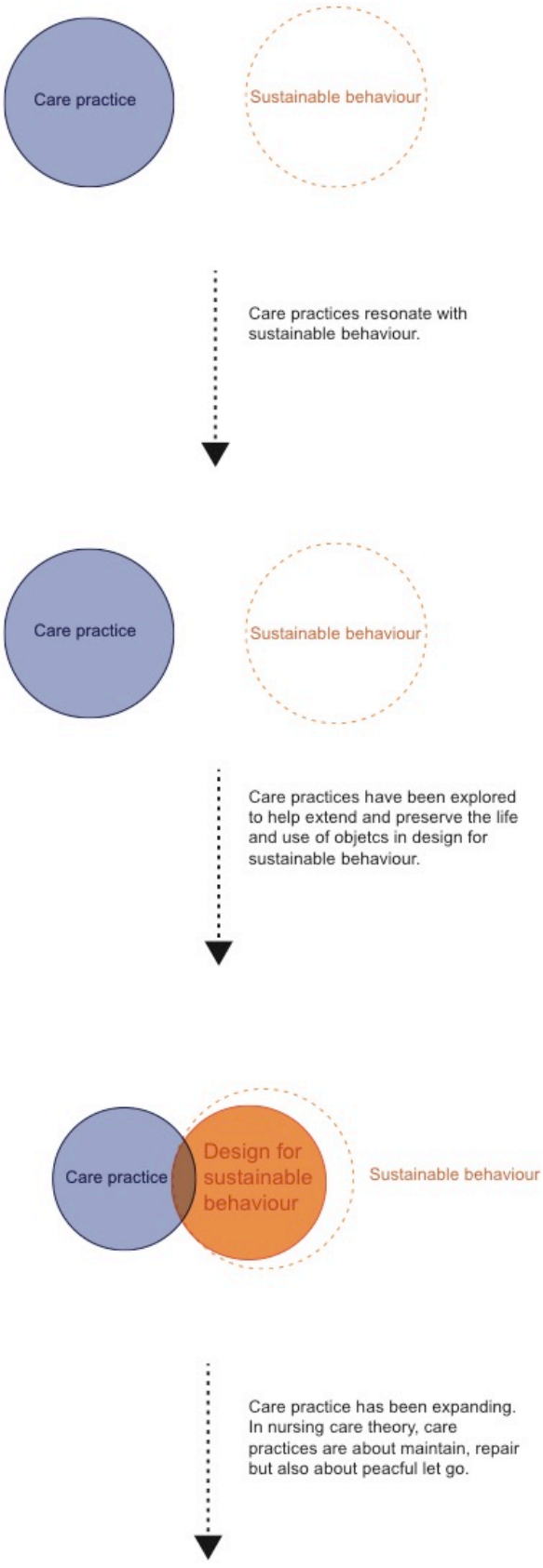
Meanwhile, there are cases when people tend to struggle to make a decision about further action when objects come to the end of use: then they are hibernating or accumulated in a domestic environment, which challenges responsible and decisive disposal behaviour. Examples of the types of objects the interviewees gave are children's clothing, cables and mobile phones, with various reasons for accumulation, such as "I hope someone will take it", "I'm not sure what to do with it" or "I might need it later". However, having an emotional attachment to those objects is not always bad, as we keep things we admire because they add meaning to our lives. But some of the hibernating or accumulated objects at end of use could become a problematic relationship as there is a chance they will be thrown away.

Applying the caring process of "peacefully letting go" to an appropriate place (Watson, 1985) in the approach to the care of possessions might have a value in the design process for extending the product lifespan. However, further analysis of the multi-layered relationship between users and hibernating or accumulated

object at end of use is required to identify the obstacles to responsible and decisive disposal behaviour. Understanding these relationships and the emotional factors at play for users (or owners) towards the end of the product's life cycle could provide a potential opportunity for design to intervene to prolong the lifespan. Such insights have the potential to offer designers a trigger to change consumer behaviour towards more sustainable and responsible habits. However, the characteristics of the user, their situated environment and many other influential behavioural factors also need to be considered. This informal conversation suggested to me the context in which it might most appropriate to apply care practice, and helped me to structure a hypothesis for shaping the research questions.

2.3. Summary of Foundation Work

This work was a foundation for my PhD, which helped me to understand different users' knowledge, skills and attitudes of care practice in their current daily routine. Additionally, it provided me with a better understanding of certain requirements that are needed to encourage and increase an engagement with care routine by users. The caring process comprises the ways to increase the relationships with objects to maintain the objects' quality for a longer period of time. However, detaching the object from its relationship with the owner and letting it go peacefully is another method that precedes a caring process. It allows users to recognise the value of the object and locate it at the appropriate place to be taken care of; such an approach is under-explored within the field of design for behavioural change. However, both approaches should be addressed with the appropriate types of user-object relations, and consider other influential factors, such as user types and their situated environment. The next step of my research sought to establish the defined research questions, understand what factors inform different users' decision-making process toward hibernating or accumulated objects at end of use and find out how design can facilitate caring factors to promote caring behaviour in users to extend the lifespan of objects or reuse the material within the context of a circular economy.


Care practice
Sustainable behaviour
Care practices resonate with sustainable behaviour.
Care practice
Sustainable behaviour
Care practices have been explored to help extend and preserve the life and use of objetcs in design for sustainable behaviour.
Care practice
Design for sustainable behaviour
Sustainable behaviour
Care practice has been expanding. In nursing care theory, care practices are about maintain, repair but also about peacful let go.

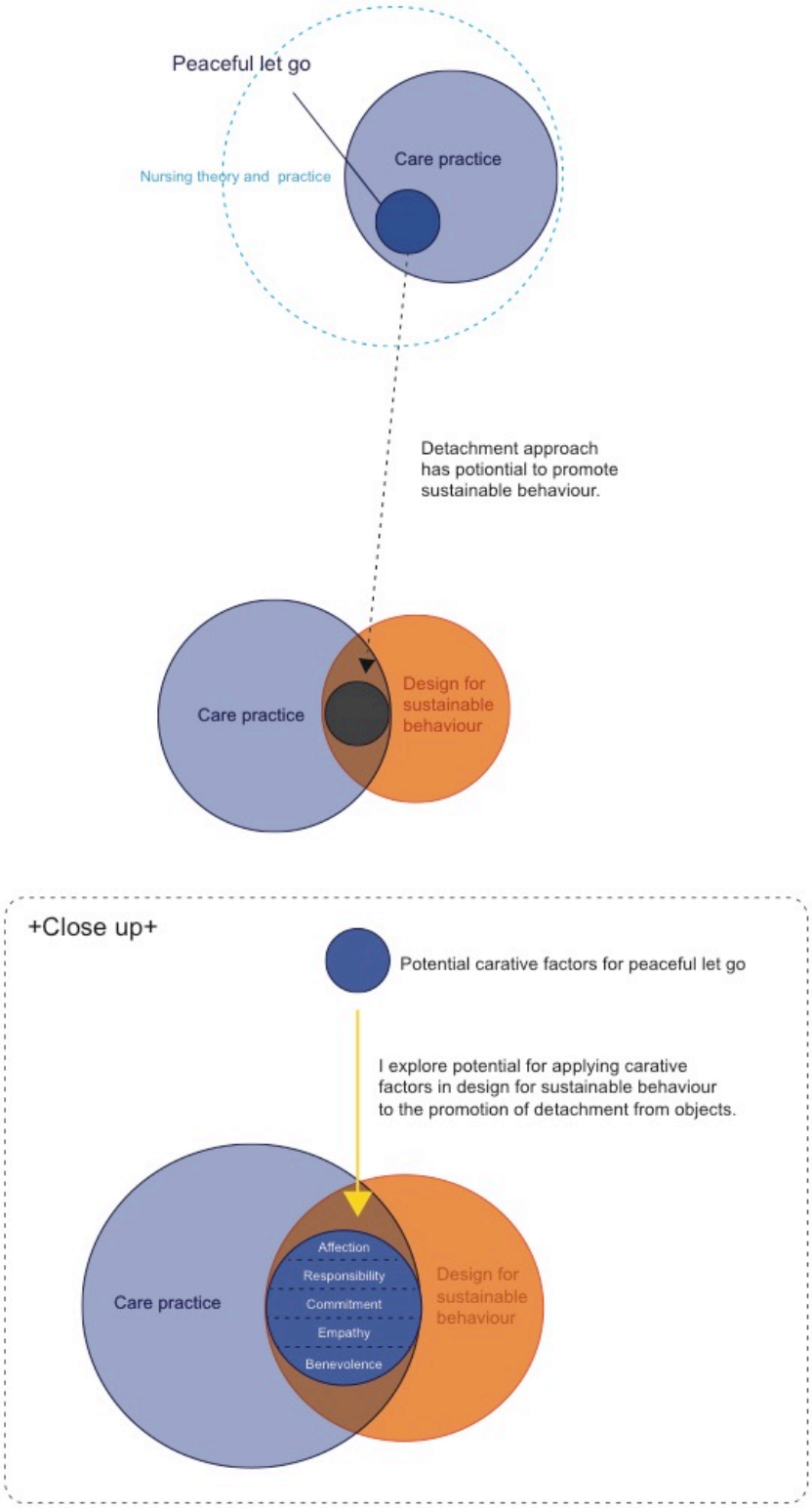


Figure 4. An illustration of the scope and topic included in this chapter highlights the connection between the literature in the field of care practice and design for sustainable behaviour. It describes the potential feasibility of adapting and applying care practices of 'peaceful letting go' and five themes of caring (*affection, responsibility, commitment, empathy* and *benevolence*) with carative factors, particularly from nursing practice, to the design process in order to promote sustainable behaviour.

Chapter 3 | LITERATRUE REVIEW

This chapter first reviews key research into psychological, economic and social factors that fuel consumption, obsolescence and possession that lead to the hibernating or accumulated objects at end of use in domestic space and wasteful consumer attitudes, and their impact on the environment. Second, it reviews extensively the approaches that aim to promote people's sustainable disposal behaviour, including the circular economy, collaborative consumption, strategies for product longevity through object detachment and design for sustainable behaviour change models. Next, it offers a literature review of care theory, its processes and aims, how care practices, particularly in nursing, resonate with sustainable behaviour and how this has been explored in design research to find opportunities. Figure 4 describes the scope and topic included in the chapter, highlighting the connection between care practice and sustainable behaviour (See 3.10). Finally, idea generation methods and existing toolkit formats for behaviour change are examined to help to shape the toolkit. This chapter ends by identifying gaps in the knowledge and clarifying the research questions.

3.1. Consumption, Possession and Its Impact

Capitalist societies have been "hugely successful in increasing the material welfare of billions of customers" (Tietze and Hansen, 2013), based on the concept of ownership and unlimited available goods in modern production systems (Botsman and Rogers, 2011). People have got used to "cognitive knowledge, scientific diversity and technology", in which society has become obsessed with growth-based culture, with the consequence of encouraging consumerism (Packard, 2011). These trends have been driven by a population growth, eventually creating a 'take-consume-throw away' culture.

Vance Packard (2011) examined "how growth became an unexamined virtue" and expressed concern at the environmental implications of product obsolescence (Slade, 2006) for resource use and waste (Strasser, 1999). He shifted our view of consumerism from a positive view of consumer practice to a negative term meaning excessive materialism. The deliberate shortening of product lifespan, consumer preference and the power of established cultural norms contributed to "a tendency to neglect social and environmental dimensions but became more

focussed on profit-led performance, creating a harmful structure in the environment and a sense of meaninglessness" (Papanek, 1971). Consumption on a global scale does not follow a sustainable path (Keoleian and Menerey, 1994); today waste has reached critical limits, causing resource depletion, climate change and increasing cases of previously unknown human disease.

Bocock (1993, p.69) claimed that consumption is "an iterative cyclical loops of desire and disappointment", thus "modern/post-modern consumers will never be satisfied". According to Chapman (2010, p.63) consumption is not just about the purchasing of new things, it is "a journey towards the ideal (or desired) self". Schultz et al (1989) described how "possessions are used as symbols of what we are, what we have been, and what we are attempting to become". Owners focus on "product performance and its delivery of the fantasy associated with it by marketing" (Fletcher, 2017). Subsequently, when the object becomes out of date then "inevitably their experience becomes disappointing as the fantasy fails to deliver, so they compare its performance with newer offering and they search for a new item" (Fletcher, 2017). The problem is that "the styling of many consumer durables changes frequently" long before the original has expired, often "incrementally but sometimes in a more substantial transformation" (Cooper, 2010). With technological development and new manufacturing processes, a newly designed model often reaches the market place with additional features, the owner's perception of their possessions changes (Bayus, 1988) frequently and the existing product may be considered inferior and a desire for a new model leads to "products being accumulated or discarded prior to failure" (Cooper, 2010).

Many examples of consumer behaviour occur without people evaluating their existing possessions, due to impulse purchases, special offers, an easy access purchasing route (e.g. Amazon), then previously purchased objects become less valuable. Hyper-consumption become popular in the 20th century with people's endless acquisition of more things in ever greater numbers (Botsman and Rogers, 2011). People have an endless list of things that want to have due to the availability of low-cost goods; consequently they purchase regardless of their need.

Media and advertising design has the power to make products symbolically redundant/obsolete by giving negative signals to consumers (Packard, 2011) and prompts people to buy unnecessary things to increase the sales of next new model.

In Packard's books *The Hidden Persuaders* (2007) and *The Waste Makers* (2011) he delineated the way that advertising, marketing and public relations are used to encourage consumption and Papanek (1985) also asserted that advertising design persuades people "to buy things they don't need, with money they don't have, to impress others who don't care". In addition, marketing strategies such as 'buy one get one free' or 'receive a free gift when you purchase this product' manipulate consumers to own more than what they pay for, stimulating their desire to consume. Online purchase has become popular, also encouraging people to purchase more products easily. As a result, many of the old products become obsolete although they still have value. In fact, Papanek (1971, p.9) criticized designers' role in "creating useless and unnecessary products" and cultivating product obsolescence.

3.1.1. Obsolescence

Planned obsolescence, the deliberate restricting of the product's life span, has become commonplace, driven by manufacturers' cost reduction, the convenience of disposability, and the appeal of fashion (Cooper, 2005). Companies increase long-term sales by stimulating consumers' desire for replacement; however, fully functioning products are either accumulated or sent to landfill (Burns, 2010).

Obsolescence is the period of time when a product falls into disuse, which has been categorized in various ways. Packard (1963, p.58-59) addressed three different forms of obsolescence: obsolescence of 'function', 'quality' and 'desirability'. 'Obsolescence of function' refers to when "an existing product becomes outmoded when a product is introduced that performs the function better"; 'obsolescence of quality' refers to when a "product breaks down or wears out at a given time, usually not too distant"; and 'obsolescence of desirability' refers to when "a product that is still sound in terms of quality or performance becomes 'worn out' in our minds because styling or other changes make it seem less desirable" (Packard, 1963). He expressed concern over the environmental impact created by obsolescence. Cooper (2004) distinguished between 'the failure of a product to function' and 'the falling into disuse of a functional product'. 'Relative' obsolescence is an important form of making functional objects fail, which is the cause of "the discarding of products prior to technical failure on the basis of dissatisfaction" (Cooper, 2010). It is characterized by psychological,

economic and technological factors that determine the lifespan (Cooper, 2004). For example, psychological obsolescence and deliberate obsolescence boost commercial profits in industry because people are willing to pay for new designs in terms of fashion and style when old clothing becomes obsolete. In contemporary consumption, not many users have much interest in extending the lifespan of products, especially when they have purchased the items for fashion and trend reasons (Cooper, 2004). Within companies' obsolescence policy, many products that still function are replaced with a new item in the latest style or with more advanced technological functions (Campbell, 1992; Cooper, 2004). Technological obsolescence is another mode, "when an innovation through new knowledge or reduced environmental impact" replaces the old one, so it becomes of no use (Cooper 2004). Today the word 'recyclable' applied to products takes advantage of the 'green' label to increase sales without threatening sales turnover, and "offers business an environment excuse for instant obsolescence" (Fairlie 1992, p.280). Economic obsolescence occurs when reuse or the upgrade cost is too expensive for consumers or manufacturers, due to human labour cost or the availability of cheaper products in a similar design.

Today millions of consumer products are purchased: most are replacement purchases (Cooper, 2010). The motive for purchasing is not always a defect of the product in possession, but is caused by the stimulation of new desires, and this applies to most products. This highlights how human psychology could be shaped to perceive a product as obsolete and to desire a replacement despite its functional condition (Packard, 1963). This is unethical, as it nurtures a wasteful attitude in people, popularizing the 'throw-away society' (London, 1932) and creating environmental impact. The OECD (1982) argued that we should not assume that all products are planned and marketed in continuation of the "philosophy of false obsolescence". Companies and producers have attempted to shift their approach; however, consumers' behaviour should also change. They claimed that it is not only the producer but also the consumers' replacement of goods that is causing the waste.

3.1.2. Possessing and Lingering Attachment

Owners' decisions about end-of-use object possession is predominantly influenced by the nature of products, replacement options, personal characteristics

and the situational context (Cooper, 2010). Once the old products become obsolete and are replaced, many old products that exist within households are waiting to be reused (Boyd and McConocha, 1996) by the owner or other users, or are disposed of. In some cases, cupboards, spare rooms, garages and even space under beds is filled with products that have become obsolete (Park, 2011), because they still see the value in them and believe that one day they will become valuable. Burns (1981, 2003) explained that some products become obsolete when they are still in the owner's possession (while others were are already in the waste stream) for a mixture of reasons. As a result, many obsolete things people have owned sit there gathering dust and are eventually trashed (Botsman and Rogers, 2011).

One reason to explain people's possession of old products is the endowment effect: people tend to pay more to possess something they own than to obtain something they do not own. In this theory, even if people have no attachment to objects, they value more the things they already own, because the impact of losing objects is greater than gaining a new object. The endowment effect demonstrated that current ownership can affect the value of an object (Kahneman et al., 1990; Strahilevitz and Loewenstein 1998). Kahneman (1998) proposed loss aversion theory to explain the reason behind this endowment effect. In this theory, among all the possessions a person owns, they tend to prefer avoiding losses to acquiring equivalent gain. In other words, once people own a product, giving up that item feels like a loss. This applies in some cases. However, this does not imply that a person experiences the value of attachment to all of their possessions. Some possessions will result in greater feelings of loss, and will thus require relatively more monetary compensation to give them up than others, whereas some possessions have little attachment and a greater willingness to receive compensation than to retain it. Furthermore, possessing objects does not always imply that the object itself has meaning, but is often established as a result of the service that they render, as well. Shu and Peck (2011) linked psychological ownership to attachment and proved how it would contribute to loss aversion. Meanwhile, Keltner, Horberg and Oveis (2006, p.17) explain that "both integral as well as incidental emotions can shape moral cognition". They claim that "many judgments such as… loss aversion, once thought to be universal regularities of the

mind, are in fact swayed profoundly by fleeting emotions and moods": relevant studies exploring emotions such as compassion can influence moral judgments.

Walker and Chapman's observation of four kinds of value is useful to explain people's possession of object attributes to differentiate between values of objects more precisely. In the book *Visual Culture* they distinguish four kinds of value that can be attributed to an artefact (Walker and Chapman, 1997):

1. Artistic value – intrinsic excellence, aesthetic quality, significant content
2. Use Value – practical function irrespective of appearance and aesthetic attributes (this can also include decorative, symbolic, memorial, ideological and political value)
3. Sentimental value – relating to the private, biographical and emotional life of individual
4. Exchange value – momentary value, which is variable because of fluctuations in the market and the economy.

This explains why objects to which a person feels deeply attached may even become priceless (Belk 1991), while objects to which a person feels less attached may become exchangeable.

In Daniel Miller's (2008) view, the status of possessing things may not be too problematic, as it functions as a vehicle for all kinds of social interaction. He claims that the view that "our relationship with possessions is superficial is not true" (Miller, 2008, p.1). In his book *The Comfort of Thing*s, through visiting thirty households in London he uncovers the patterns through which people find meaning in their lives today. He reveals how possession of products has been nurtured in their lives and how the objects become champions in the daily struggle to make their lives meaningful. He suggests that things have the power to establish people's identities. He refers to a person called 'George' as an example and he expresses sadness for him, as he owns nothing, not because he is a self-conscious minimalist but because his entire life had been characterized by "powerless, dependent, non-responsibility" (Miller, 2008 pp.8-17). Miller (2008, p.1) claims that "possessions often remain profound and usually the closer our relationship with objects, the closer our relationship with people", because people project meaning onto the object through which the relationship with others is reflected. Miller's approach can be seen to associate the possession of objects with their artistic value, use value and sentimental value. Meanwhile, the

possession of an object because of its exchange value can be seen as a fleeting relationship, as it is very much dependent on variation in economic or non-emotional influences. In Bruce Sterling's 'Reboot 11' talk, he urged us to keep three types of things – beautiful things, things with emotional meaning, and tools – and to get rid of the rest. He also sees other objects as representing frozen social relationships (as quoted in Schöpfel 2009) as print-outs of those relationships which are associated with the stage at which objects became obsolescent.

Contrary to Miller's view, Belk (2013) argued that there are many ways to express our identity without ownership, due to technological development. Marchand (2003, p.128) defined sustainable users as people who are trying to reduce consumption and are conscious of environmental impacts. She investigated the multifaceted nature of the relationship established between users and their individually created material world. Her research revealed that such people wish to "free themselves from any attachment to objects", and that "the notion of liberty, manifested in the choice to possess less and prioritize quality over quantity, [...] consistently reiterated detachment toward objects and possession". The respondents strive to have access to things, but not to own them; keeping undue accumulation of goods to a minimum, they tend to practise a certain detachment towards objects they own, to deal with the issue of obsolescence, and they favour those that are high quality and long lasting. For Marchand (2003, p.128) sustainable users "make conscious efforts to change their outlook as a means of combating the dependence on unnecessary objects" and "wish to rediscover the simple pleasure of being, attaining happiness and inner peace through respect for others and the living environment". Jeanne E. Arnold (2012) and her research team at UCLA studied the home life of thirty-two ordinary Californian middle-class families in Los Angeles for ten years. The study reflects on how other people cope with their mountains of possessions and other daily challenges. The result showed that 75 per cent of garages were filled with 300 to 650 boxes, storage bins and other storage for end-of-use items. They found "clutter to be such an overwhelming problem that it elevated stress hormone levels – especially in mothers", disturbing their opportunity to discover inner peace (Arnold, 2012). The users' lack of motivation, knowledge and the design system prevent potential opportunities for the reuse or recycling of objects which could potentially enhance the value of products prior to final disposal. In

particular, the situational context has an important influence upon consumers' disposal decisions, and includes economic and social influence, social norms, and a prompt clear-out of hibernating or accumulated object at end of use because of moving house (Cooper, 2010): consequently critical levels of reusable product waste are produced.

3.1.3. End-of-use Phase Behaviour Change

Substantial evidence proves that consumer behaviour does not consider product lifespans across the stages of purchase, use and disposal, thus sustainable consumption is consequently being delayed. Van Nes and Cramer (2006, p.1308) stated: "It is not an intrinsic characteristic of the product that needs to be changed, but it is the behaviour of the consumer that needs to be changed through the product design". Since the notion of planned obsolescence became popular (Packard, 1963), interest in the lifespans of manufactured objects has become a central component of contemporary design discourse (Cooper, 2002), yet the current systems are not designed to guide users to facilitate obsolescence and products' after-use cycle. Previously, much of the subsequent research suggested that companies and producers should have more responsibility for obsolescence. However, the positive side is that companies have paid increasing attention to the use and disposal phases to manage the life cycle of products cautiously, and identify new opportunities as they try to improve product performance (Westkämper et al. 2001; Stahel, 2010); now the interest is in the potential for product design to influence the way users dispose of products appropriately to reduce environmental impacts (Fiksel, 1996; Lewis and Gertsakis, 2001).

A design strategy to address sustainable behaviour for the end-of-use phase needs to be considered carefully. Increasing the emotional attachment to objects does not necessarily lead to a reduction in replacement behavior: the attachment merely leads to the accumulation and storage of seldom-used items (Evans and Cooper, 2010), and it is unrealistic to seek to increase attachment to all products for users to treat as favourite objects (Van Nes, 2010). At the same time, knowing the destination of the old product in possession also sometimes plays an important part in the decision to replace it. This is maybe because people feel bad about disposing of a well-functioning product, so replacing it is easier when it is kept in

use in some way, either by someone else or in another application (Van Nes, 2010).

In the last two decades the idea of decoupling economic growth from environmental pressure has received growing attention from scholars, businesses and governments (Jackson, 2009). The circular economy has become a core part of business agenda, which entails gradually decoupling economic activity from the consumption of finite resources, and designing waste out of the system (Ellen MacArthur Foundation, 2013). It is important to address ways to improve each product's life cycle by planning for inevitable obsolescence at the end of its use. "Planning *for* obsolescence" (Burns, 2010 p.59) is required to enable developing products, awaken users and ultimately increase product longevity and material circulation.

3.2. The Circular Economy

The circular economy is a fairly recent emerging concept, emphasising the objective of "closing material loops in an economically attractive way to decouple wealth from resource usage" (Van den Berg and Bakker 2015, p.365). It proposes a move away from a traditional linear model of making, using and disposing to maximize the resource's value when it is in use, then to recover and regenerate products and material at the end of each service's life (WRAP, 2015). This is an industrial system-based concept aiming to seek to decouple revenues from material input, distinguishing two cycles, the 'technical' and 'biological', to create effective material and energy flow (Figure 5). Within a biological cycle, consumable products are made of biological ingredients or 'nutrients' which are the least toxic for the environment, thus they safely return to biosphere. In the technical nutrient cycle, products are designed to be reused multiples times, to be redistributed to the service provider, to be remanufactured by the product's manufacturer or, the least favourable option, to be recycled. Both cycles aim to 'design out' waste, thus products are designed and optimized for the cycle (Ellen MacArthur Foundation, 2013). The important aspect is that the new design should be generated by using reclaimed end-of-life products rather than the extraction of resources (Ellen MacArthur Foundation, 2013). Circular design includes innovative material selection and standardised components, designed-to-last products, design for easy end-of-life sorting, separation or reuse of products and

materials, and design-for-manufacturing criteria that take into account potential useful applications of by-products and waste. The Ellen MacArthur Foundation proposed four opportunities to drive clear-cut sources. ‘The power of the inner circle’, which refers to minimizing the material usage compared to the linear system; ‘the power of circling longer’ refers to maximizing the numbers of cycles through reuse, remanufacturing or recycling; ‘the power of cascading’ refers to emphasis on the diversity reuse opportunities across the value chain; and ‘the power of pure circles’ in which lies non-toxic material innovation. A number of industries are taking these approaches through innovative design ideas such as biodegradable packaging or clothes rental services (e.g Ecover or Mud jeans). Goods, services and systems within a circular economy are designed for sustainability rather than obsolescence, promoting not only the re-use of end-of-life resources but also models that have a positive impact on the planet. Consequently, the transition to a circular economy will mean benefits from material productivity and less harm for the environment, and will eventually increase the quality of our lives.

Figure 5. Circular Economy System diagram (Ellen MacArthur Foundation, 2011)
Image has been redacted.

Ellen MacArthur Foundation, 2017.Infographic Circular economy system diagram. [Online]. Ellen MacArthur Foundation Website, [Accesses 10 June 2018]. Available from: https://www.ellenmacarthurfoundation.org/circular-economy/concept/infographic

Some might ask ‘how will companies generate profit without making revenue through selling products?’. The most important rule for optimization from a linear to a circular approach is a tighter the reverse cycle by extending a range of inner circles (Ellen MacArthur Foundation, 2013). This results in less embedded energy and labour being lost and more material being preserved, thus enhancing natural capital and considerable net material savings. In addition to a reduction in volatility, supply risk and externalities, the system’s resilience will increase. A key driver for this concept is the increasing awareness of resource scarcity, risks to business competitiveness and the potential impact this may have in the long term (Prendeville and Sherry, 2014).

Admittedly, more consistent circular design needs to be adopted. Within the circular economy better design can reduce significantly the amount of material bills and the expense of disposal. However, even though there are improvements in resource efficiency and the exploration of new forms of energy has been carried out (Thorpe, 2008), systematically designing out material leakage and the disposal phase needs to be considered to prevent loss of value and a negative effect along the material chain (Ellen MacArthur Foundation, 2013) through seeking a way forward in the restorative use of non-renewable resources. Here “design becomes a transversal tool connecting actors and players in the fields of sustainable product design, services design and co-creation” (European Commission, 2012). With some adjustment to design and the business model, the reverse cycle process and other enabling factors, the circular system can drive significant resource productivity and profit to manufacturers and deliver a more competitive economy.

This system-based model will require a transformation from consumer ownership to usership (Ellen MacArthur Foundation, 2013); thus there is a need for a shared responsibility among all stakeholders and consumers, enabling the return of products for reuse, repair and remanufacturing, as well as the collection of waste for recycling (Ghisellini et al., 2016) for a zero-waste circular system (Stahel, 2010). Users need to “care for, maintain and build positive imaginative association with objects, and their participation in using the products increases its value over time with it meaning” (Allwood et al, 2017). The strategy to promote ‘usership’ may depend on the time availability of owners. Unlike today’s ‘buy-and-consume’ economy, durable products can be also leased, rented, or shared

wherever possible. After-use systems and options need to be clearly distinguished and directed in order to circulate within the loop.

3.2.1. The Access-based Economy

Cooper (2005) states that increasing product longevity and access-based consumption are two strategies for slowing resource consumption to sustainable levels. This model allows access to goods and services, selling the services the product provides (e.g. renting) rather than selling products permanently. It redefines the relationship with users and enhances product longevity by shifting the concept from owners to users. For examples, product-service systems (PSS) could address the longer life span of products by offering an 'enabling platform' for consumers to purchase "services without having to own a product" (Cooper, 2005) (See section 3.2.5).

In this model, the transactions are also facilitated via community-based online services. The digital society has helped this shift, as users are actively involved as co-creators and providers of resources or services to others. In particular, peer-to-peer giving or sharing of goods and services, coordinated through community-based online services, by reducing resource consumption and waste suppress over-production, and may generate financial profit while decreasing negative environmental impact. Examples of services that foster access-based systems rather than private ownership include peer-to-peer ridesharing (e.g. Uber), peer-to-peer hospitality (e.g. Airbnb) and goods/skills exchange or transaction sites (e.g. Freecycle). For example, Airbnb is an online marketplace for hospitality services, where people can rent or lease short-term lodging including hostel beds, rooms and apartments. The company acts as an agent and receives a service commission from both guests and hosts in conjunction with every booking.

Baxter's (2015) framework proposes that the theory of psychology ownership might be useful in approaching the slower consumption strategies of product longevity and access-based consumption. He explains why consumers prefer ownership rather than access and suggests a way to overcome current access-based consumption. His approach might useful to address when an individual may legally own objects without ever taking possession of them (McCracken, 1986; Baxter 2015). The 'efficacy and effectance factor' is useful for this PhD. It refers

to ‘owners having control over the objects’ and it aims to provide a better guide for access schemes than ownership.

However, the access economy faces a few challenges, such as the fact that the system will threaten local job markets, issues of who is taking responsibility for the injury and protection of workers, and defining and designing government regulations (Huet, 2015).

3.2.2. Sharing Economy

The original meaning of the sharing economy grew out of the open-source community, which refers to peer-to-peer based sharing of goods or services through the use of digital platforms and offline activities (Bostsman and Rogers, 2010). Eckhardt and Bardhi (2015) suggested the correct term for the sharing economy in the broad sense of the term is ‘access economy’. The academic discourse on the sharing economy has fallen behind (Heinrichs, 2013); however in *What’s Mine is Yours,* by Botsman and Roger (2010), three main features of the sharing economy are posited: a product service system (e.g. car sharing or the renting of machinery and tools); a redistributed market (e.g. second-hand shops or online resale platforms); and a collaborative lifestyle, which refers to the expansion of the idea of collaborative consumption as ‘a new form of peer-to-peer sharing by social media platforms’ (Botsman and Rogers, 2010). They claim that through collaborative lifestyle change processes, social interaction can be improved while resource use can be minimized.

The access economy model received criticism because the term gradually changed the original meaning to describe most online-based sales, including business-to-business activities (Harvard Business Review, 2015) as they took advantage of the concept and became increasingly capital-driven platforms by providing consumers with convenient and cost-efficient access to resources (Eckhardt and Bardhi, 2015). Heinrichs (2017) recently connected sustainability discourse and development to build the grounded theory concept by expanding it to business-to-business relationships, and to government-citizen relations to contribute to a more detailed understanding of the extensive approach of the sharing economy which could ‘deliver effective resource use, strengthen social capital and foster decentralized value production’. At this point, as this model

does not consider energy flow or other challenges for sustainable behaviour, it was not considered for this PhD.

3.2.3. Biomimicry

Biomimicry refers to studying nature's most successful developments and then imitating these designs and processes to solve human problems. (Kennedy, 2004). It is the concept of adapting natural forms, materials, processes and systems as models to drive innovation in human life. The approach believes that nature can provide powerful examples of sustainable solutions and help to solve many problems facing humanity, because systems of nature have evolved and been perfected for a million years (Meadows, 2009). Biomimicry means not only transferring the observation of nature to the development of products but also the creative application of biological concepts into products (University of California, no date).

There are two views on how biomimicry could be applied appropriately (Volstad and Boks, 2008): the 'reductive view', which sees biomimicry as a transfer of 'biological technologies' into the design domain; the 'holistic view' sees biomimicry as a measure for products that do not harm the environment in their production, use or decay. The 'reductive approach' to biomimicry may offer "knowledge in a specific domain while providing valuable new technologies"; however there are limits which apply to all stages of the design process (Belletire, 2005), while the 'holistic approach' has more potential to achieve sustainable design. 'Mimicking of a natural process', involves considering the production processes found in nature, and is a step toward a holistic approach (Benyus,1997). 'Mimicking of the natural ecosystem', is in line with the holistic view that involves "considering the whole way in which nature manages to produce without damaging the environment, through considering everything as a part of whole system" (Volstad and Boks, 2008). Designers will become knowledgeable about life cycle planning, thus they will consider the life cycle of products at each stage of the product design process. This process includes the "ending with renewal or reuse of the manufactured product" (Belletire, 2005). The latter approach was important within this PhD when creating the Toolkit for designers to provide knowledge of the end-of-use cycle and to consider the whole life cycle of the products.

Biologists at the Design Table (BaDT) have developed a database to "present designers and engineers with an easy and clear way to search for and access the biological information they need" (Volstad and Boks, 2008) to support designers in converting biomimicry theory into practice. The biomimicry data was gathered and developed into a tool by translating nature's strategies, which could apply to a specific design challenge for the most promising design or system strategies (Volstad and Boks, 2008). In particular, this method provides an opportunity to explore ideas based on the analogy of two different but parallel databases (Volstad and Boks, 2008). Thus, it was a relevant approach to this PhD, as it attempts to address design solutions for product design-related problems (Kolle, 2005). Furthermore, biomimicry-inspired decks of cards were developed to inspire from nature's solving of the challenge of packaging and other domains (Volstad and Boks, 2008). These ways of providing inspiration to designers were also relevant for my PhD.

However, Kaplinsky (2004) pointed out that "the biomimicry focus on nature stands which is contrast approach to human-centred design", therefore such approach may be difficult to apply in "the complex network of human society which all designs work within". Furthermore, the biomimicry approach cannot achieve the perfect optimization of the product life cycle, therefore it is important to consider other appropriate solutions to apply.

3.2.4. Collaborative Consumption

Felson and Spaeth (1978, p.614) define acts of collaborative consumption as "those events in which one or more persons consume economic goods or services in the process of engaging in joint activities with one or more others" which includes any joint activity: even, for instance, drinking beer with friends (Belk, 2013). The concept was redefined recently in reference to "peer-to-peer based activity" (Belk, 2010; Botsman and Roger 2011; Albinsson and Perera, 2012) including "all kinds of traditional sharing, bartering, lending, trading, renting, gifting and swapping" or sharing access to goods and services', attracting interest for its potential for resource-saving, waste minimization and the suppression of over-consumption. (Botsman and Rogers, 2011, p.15).

In particular, peer-to-peer giving or sharing of goods and services, coordinated through community-based online services, contributes to a circular economic

system by reducing resource consumption and waste, and may generate financial profit while decreasing a negative environmental impact (Ellen MacArthur Foundation, 2013). Redistributing online markets such as Freecycle, which provide and obtain permanent access to resources for free or a fee, attempt to recirculate the unwanted products. The Loop is one of five new reuse hubs in London, where end-of-use goods can be redistributed and refurbished by multiple users, which also offers opportunities for accredited training, employment and volunteering for local residents. The Undercroft (Figure 6) has also opened to provide cheap household goods for residents along with work and training opportunities, while also reducing the amount of rubbish being dumped at the roadside, by 'upcycling' unwanted items. At the hub, people's unwanted goods are collected for free, expertly refurbished and then sold on at a competitive price. The upcycling method could contribute to environmental benefits, using waste as a source material and promoting localization by utilizing locally sourced material, increasing employment through public skill-sharing and education, eventually promoting sustainable consumption (Han et al, 2015).

Figure 6. The Undercroft, located below Hargraves House flats in London.
Image has been redacted
Hammersmith and Fulham Council, 2015. Reduce waste by sending unwanted household items through The Loop. [Online]. Hammersmith and Fulham Council Website. 19 November 2015, [Accesses 05 May 2016]. Available from: https://www.lbhf.gov.uk/articles/news/2015/11/reduce-waste-sending-unwanted-household-items-through-loop

The more accurate delineation of the collaborative consumption concept is that participants do not have individual ownership: however, products or services are used multiple times through the activities of temporary access based on digital transaction, which aims to reduce waste and mop up the surplus created by over-production and consumption (Botsman and Rogers, 2011, p.11). Bardhi and

Eckhardt (2012) conflated collaborative consumption and sharing and redefined the term as "access-based consumption", which refers to "paying for users' access to products or the experience of temporary access". Nevertheless, the concept received great interest because people's participation in collaborative consumption in communities and services is "generally characterized as driven by obligation to do good for other people and for environment, also engaging in sustainable behaviour" (Prothero et al., 2011; Sacks, 2011). Belk (2013) expanded these concepts, including the "other compensation (not only the fee) factors as a result of possession and distribution", and he repositioned it in the middle ground between sharing and marketplace exchange (e.g. Zipcar). Therefore, the definition covers 'non-monetary compensation', but it excludes 'gift giving' as it involves permanent transfers of ownership.

Collaborative consumption has been named as one of ten ideas that will change the world in *Time* magazine (2011). Due to the development of information and communication technologies, users are actively involved as co-creators and providers of resources or services to others. Users have the opportunity to experience collaboration in a more enjoyable way and "deliver humans' second nature of innate behaviour caring" (Botsman and Rogers 2011, p.11). Correspondingly, increasing attention on environmental concern, re-stressing the importance of community and financial cost, has made users "move away from top-heavy, centralized forms of consumerism". and shift to a tendency "to share, aggregate, open and cooperate" (Botsman and Rogers 2011, p.11). These new ways of consumption will extend and increase the usable life of products, create a more intensive use of goods and systems, and promote reuse of possessions that are no longer wanted (Leismann et al., 2013). In particular the benefits for users will be to save money and space, make new friends and become active citizens, when they access products and services rather than owning them. Eventually, the system will contribute environmental benefits by reducing waste, increasing resource efficiency, encouraging the development of better products and potentially generating financial profit.

Leadbeater (2009) asserted that "in the twenty-first century of collaborative consumption we will be defined by reputation, by community, and by what we can access and how we share and what we give away". It is a growing movement,

with millions of people participating from all corners of the world, reinventing not just what we consume but also how we consume.

The limits of this system include the specific situation where people require a strong motivation for sharing behaviour, otherwise products will be thrown away (Hamari et al., 2015). This is because people might be positive about collaborative consumption but their attitudes may not necessarily translate into action. The issue of sustainability is only an important factor for those people who think about sustainable consumption (Hamari et al., 2015). In addition to this, when users have strong affective relationships with the owned products they would not apply the concept (Botsman and Rogers, 2011). Furthermore, there may be the potential appearance of careless behaviour, when users utilize shared objects because the owners cherish the products less. Having less attachment to objects could also produce more damaged objects (Belk, 1988).

3.2.5. Product-Service System

A product-service system (PSS) is defined as "an integrated combination of products and services" (Baines et al, 2007), "so that they capable of jointly fulfilling a user's need" (Goedkoop et al., 1999, p18; Tukker and Tischner, 2006) which has been considered as a vehicle "to enhance competitiveness and foster sustainability" (Tukker, 2004). The model emphasizes that selling the use is more important than selling the product itself (Pergande, 2012), thus "users would effectively purchase the service of such a product for a defined user period… rather than the … [product] itself" (McDonough and Braungart, 2009, p.111). Therefore, product ownership is reduced and resources are shared (Tukker and Tischner, 2006). It consistently addresses creating value through new product development and new service development, which aim to shift companies' approach from "designing (and selling) physical products only, to designing (and selling) a system of product and services" (Manzini and Vezzoli, 2003). These values represent convenience, comfort, information or emotional and cultural value (Rapitsenyane, 2014). Three main categories of the product-service system have been identified (Tukker; 2004; Behrend et al., 2003; Zaring et al., 2001): 'product-oriented services', referring to services providing added value to product life cycles (UNEP, 2002). This is a business model based on product sales but including some extra services (e.g. take-back agreement or a maintenance

contract); a ‘user-oriented service’ refers to services providing enabling platforms for customers (UNEP, 2002): a business model based on a non-product focus, though still with the provider holding ownership of the products but sometimes shared by multiple users (e.g. product renting, sharing and pooling), the end-of-life disposal thus becoming the responsibility of the service provider; and a ‘result-oriented service’ a model referring to a service providing a final result to customers (UNEP, 2002) based on the agreement on a result between client and provider: therefore there is no product involvement. This is a mode allowing a provider more freedom in fulfilling the “final need, demand, or function of the client” (e.g. pest management services) (Tukker, 2006). Tukker (2004) identified in the ‘result-oriented’ services category more specific types. ‘Activity management/ outsourcing’ refers to some part of the company’s activity being outsourced; ‘Pay per service unit’ refers to users only paying for the output of the products used; and ‘functional result’ refers to when the provider promises the client delivery of the result. However, the needs of the client are shaped in more abstract terms, which may be difficult to translate in practice, and providers’ responsibility of delivering the result is too high within in this category. Nonetheless, the PSS model enables firms to create new sources of added value and competiveness, because clients’ need can be accomplished in an incorporated way and they can build unique relationships with clients.

PSS has been considered as potentially a more sustainable approach as the relationship is based on the premise of services creating value by addressing function, which may consume less resources than products (Clark et al, 2009; Manzini et al. 2001); as a result the system creates a beneficial effect for the environment (Mont, 2002; Tukker, 2004; Baines et al, 2007). Tietze and Hansen (2013) claimed the PSS approach could enhance firms’ innovative behaviour towards generating less product manufacturing, utilization, and disposal (e.g. Baines et al., 2007; McDonough and Braungart, 2009), therefore contributing to reducing environmental external factors and a sustainable economy without government intervention (Tietze and Hansen 2013). In order to successfully contribute to sustainability, it is important to understand that different types have varying potential influence on sustainability and a design of the PSS is required with a broader approach toward considering the “business-consumer interaction along a value chain” (Tukker and Tischner, 2006). Tukker (2004) confirmed that

the ‘user-oriented service’ approach is the most promising from a sustainability perspective, which requires “a design system that offer high intangible value for users”; “a development of the considerable performance indicators for functionality”; and “an approach to reduce the liability risk”. These factors were relevant to this PhD as it guided the approach to the transfer of ownership.

The system faces a few challenges, as there are contradictions between what would be desirable from a sustainable approach and what provides benefits for business (Tukker, 2004). Additionally, many companies will still focus on product-related services unless the technological system changes; therefore environmental improvement will be subtle. The evidence to date suggests that current businesses have not found profitable opportunities and the material demand has not been reduced (Allwood et al., 2017). Furthermore, careless and irresponsible behaviour by consumers might occur, which will result in environmental impacts. Finally, the market for the product service system probably has a relatively low value, compared to the product sales business model (Tukker, 2004).

3.2.6. System Thinking

Within the circular economy, understanding system-level thinking is central to decide and plan the design strategies. The systemic approach offers potential solutions for environmental problems and related human behaviour, including planned obsolescence, by presenting different business models transforming the relationship between consumers and business (Bocken et al., 2016).

Systems thinking usually refers to “a non-linear relationship, the ability to understand how things influence one another within a whole” (Senge, 1990, pp.74-75): through this thinking process we can view “how to change systems more effectively, and to act more in tune with the natural process of natural and economical world (Senge, 1990, pp.74-75)”. Senge (1990) suggested the fundamental rationale of systems thinking is “to understand how it is that problems that we all deal with, which are the most vexing, difficult and intransigent, come about, and to give use some perspective on those problems in order to give us some leverage and insight as to what we might do differently”. In the systems thinking approach, the ‘problems’ are viewed as parts of overall system: all parts are interconnected, therefore a change in one part affects the

entire system (Arnold and Wade, 2015). When all the patterns of parts are connected a structure of the system is organized which determines the cause of behaviour, and behaviour is dependent on connection between the parts (Sweeney and Sterman, 2000). Within systems thinking, it is important to understand the leverage points because this can help to explain how a small shift of one component of complex system can deliver broader changes in other parts (Meadows, 1999). The context or circumstances in which action is taken is also an important consideration in understanding the potential impact (Arnold and Wade, 2015). This approach was relevant when I observed what will influence consumers to discard end-of-use behaviour and understood the motivational factors in behaviour change.

Meadows (1997) initially developed the list of nine 'places to intervene in a system' at a meeting of the World Trade Organization, afterwards listing twelve items in increasing order of effectiveness in the context of system modelling, which is applicable for a non-linear system. Humans are part of the system, therefore human behaviour could be viewed as leverage point (Meadows, 1997). Therefore designed interventions could offer opportunities in addressing any of the leverage points to influence users' behaviour (Lockton 2013). According to Lockton (2013), places to intervene, such as 'the structure of information flow', can be addressed through design strategies like providing different kind of feedback, feed forward. He aligned this point with Lilley et al.'s, Bhamra et al.'s and Wever et al.'s 'Eco-feedback' categories. Other interventions in 'the rules of the system' can be addressed by giving rewards or punishment for users' behaviour, or 'the power to add, change, evolve or self-organize a system structure' can be addressed through design approaches like developing new physical structures or artifacts to make new rules. Within the 'design for behaviour change' literature, these leverage points often use a combination of one or more of them (Lockton 2013). However, within the circular system thinking process, having involvement from different people from diverse sectors collectively working together is essential. Industry sectors and cities need supply changes and individual consumers need value changes that are managed from the beginning until we produce social, ecological and economic well-being (Hawksworth et al., 2017).

This approach helped me to understand the problems everyone faces and extend the perspective on those problems. Some possible leverage points and places to intervene were also considered through a system thinking approach; however, many other design for behaviour change models and strategies provide more likely interventions, and this was more influential to structure the Carative Factors Inspirational Toolkit.

3.2.7. Transitioning to the Circular Economy

In the linear economy system, once raw material is extracted from the environment, transformed into products and used for its intended purpose, it is discarded and lost to the system (Ellen MacArthur Foundation, 2013) which causes damage and risk to industry and the environment. It requires a large quantity of resources and energy to facilitate, which cannot be sustained with the planet's limited resources. In this model, the highlight is in eco-efficiency, therefore industries only seek to minimise the volume, velocity and toxicity of material (Ellen MacArthur Foundation, 2013). The model will try to fit into circular product design by utilising existing technologies and services. Consequently, some materials are recycled but most of them go through a process of downcycling, which limits their usability they are only going to remain in a linear flow system (Ellen MacArthur Foundation, 2013).

Recently, many companies such as Unilever, Philips and Google have been shifting to circular system models through a circular design approach. As this is an emerging movement and is in the transitional stage, appropriate design approaches to address people's sustainable behaviour in dealing with the end-of-use phase of products are needed until the full circular system is established. Many objects are still designed to be obsolete without providing an after-use system for users: material is locked up or thrown away eventually, which requires some kind of intervention to bring it back and reverse it to circular economy cycles. Transitioning to a circular economy does not only aim to reduce the negative impact of the linear economy. However, it aims at a systematic shift to generate economic, social and environmental benefits on a long-term resilience basis (Ellen MacArthur Foundation, 2013), by building a supportive relationship between the ecological system and future economic growth. Therefore, the emphasis should shift to eco-effectiveness rather than eco-efficiency (Ellen

MacArthur Foundation, 2013). The concept of eco-effectiveness proposes the transformation of products and their associated material flow to "enable material to maintain their status as resources and accumulate intelligence over time" (Braungart et al., 2006) to create a "synergetic relationship between economy and ecology for the positive recoupling relationship" (Ellen MacArthur Foundation, 2013). Consequently, it generates business and economic opportunities, and provides environmental and societal benefits (Ellen MacArthur Foundation, 2013). Companies are already taking a circular economy approach and to effectively facilitate and achieve its principles two fundamental aspects are required: product design and active users (Shah, 2014; Ghisellini et al.,2016). Therefore, the designer should deliver products, services or systems that fit into circular economy principles, enabling users to change behaviour and foster the closed-loop cycle by sharing, reusing or returning the objects to manufacture. Designers are facing the challenge to change users' behaviour in a sustainable way, particularly at the end-of-use phase.

Active Citizen

To achieve a complete circular economy system requires radical transformation, such as the development of new infrastructure, cross-sector collaboration and a legal framework, which needs more time for a structural shift (Ellen MacArthur Foundation, 2013). However, as we are in the transition stage, the circular economy expects active users, referring to a user who cares about the environment, to be responsible in participating in the closed-loop cycle by reusing or returning the products back to the producers and recycling material appropriately (Shah, 2014; Ghiesellini et al, 2016). The transition to the circular economy requires behaviour change in users through understanding the value of the material and products and identifying the available methods for them to deliver sustainable behaviour. The development of new ways of consumption, information and technology has helped this shift as users are actively involved as co-creators and providers of resources or services to others. Additionally, ownership is moving away and shifting toward the need for shared responsibility among stakeholders, industry, and consumers. Behaviour change is one of the most promising approaches for sustainable development policy and in particular

for sustainable consumption policy (Jackson 2005), yet it challenges issues within the circular economy (See Chapter 1).

Challenge of the Circular Economy

The circular economy creates new opportunities for sustainable consumption, and provides environmental and societal benefits; however, there are some challenges it faces (Bicket et al., 2014; Ghisellini et al., 2016). According to EASAC (2015) the circular economy approach is still in an early phase. Transforming the linear structure and business models may be challenging issues as they have been in place for many decades (Rizo et al., 2017). The major issues of implementation include technical, economic and infrastructure problems and the issue of behaviour change (Prendeville et al., 2014).

- To maintain material in a closed-loop system is an issue, as a company might struggle to implement functioning distribution networks that bring products from locations scattered nationally or internationally to a central depot (Prendeville et al., 2014). During the collection process, the quality of unwanted items will get lower. Furthermore, there is poor market demand for reused and remanufactured products.
- Business needs an appropriate financial model to market the products once the end of use products are collected for remanufacturing into new products. Although PSS offers new innovative opportunities for companies to benefit from a sustainable perspective, this is a complex area to achieve because the net environmental benefits depend on the quality of shared products, the potential need for increased transport of goods and its environmental impact; and possible change in consumer patterns need to be considered (Demailly and Novel, 2014). For example, the energy use involved in products needs to be considered, as the reuse or recycling of existing long-lasting products might save more energy than the shared use of the new shorter lifespan object (Rizo et al., 2017). Similarly, objects could be designed for a longer lifespan but may be impossible to recycle and short-life products designed with biodegradable materials may produce different profits for the company (Murray, 2017). Furthermore, there is a chance that a business might experience profit risk when the

consumer who previously bought a new item from the company switches to a lower-priced product because of cost down manufacturing process from the same company, or the sharing model might increase the replacing behaviour (Demailly and Novel, 2014).

- Ghisellini et al. (2016) emphasized that the aim of the circular economy is to decouple economic growth from resource usage; however, the concept cannot support the endless economic growth model, as some material is not possible to recycle. Endlessly recycling material is costly (Andersen, 2007) and difficult to achieve. For example, recycling certain plastic risks contaminating other materials. However, entering the right product to the appropriate recycling pathway is expensive. Furthermore, sometimes producing new goods and services is cheaper than recycling or reusing end-of-use products: then the circular system is not economically beneficial.
- Changing behaviour is another challenge to current modes of production and consumption, as altering people's habits or attitudes to avoid any activities that are not sustainable is not easy to achieve (Prendeville et al., 2014). There is a chance of a rebound effect occurring, where there is a reduction in expected purchases from new technology-based products that increases energy consumption (Rizo et al., 2017). A boomerang effect may occur, where users may reduce their energy conservation effort once they are told they have met a target, or reduce levels to below that of other group members (Lockton, 2013)

Therefore, focusing only on resources and material efficiency in products is not the way to move toward to the circular economy. Investigating ways to change people's behaviour and business, taking risks but attempting to change their approach toward the circular system through a radical design approach, is also required (Prendeville et al., 2014).

3.3. Product Longevity

A product's longevity defines "its life-span (or lifetime)" (Cooper, 2010, p.8; Van Nes, 2003), the term 'product life-span' signifies the time between the first possession and the ultimate discarding of a product (Park, 2010). A product's life-

span is the total duration of use: therefore it allows a change of owner or user, and the context and uses of the product (Park, 2010). Two perspectives can be distinguished here: 'technical life', the period of 'physical capacity to function': and 'service life', the period when the 'product [is] in use from initial acquisition to final disposal as waste' (Park, 2010). A product's lifetime is determined by how it is designed and manufactured, consumers' behaviour towards a product and many other socio-cultural influences (Cooper, 2010). The most influential factors to determine the product's lifetime depend on the type of product and pattern of use (Cooper, 2010).

The problematic industrial planned obsolescence (Packard, 1963) has brought attention to a strategy to optimize the lifespan of products to reduce waste. However, addressing the optimal lifespan measurement of each product is challenging, as it is difficult to assess the database. The current analysis is mainly based on a technological perspective (Chalkley et al., 2003) and excludes the pattern of use of products and other life-cycle impacts (Park, 2010). However, there is ongoing debate concerning environmental benefit. Product life should be 'optimized' by "planning for the inevitable obsolescence at the end of products' life cycle" (Burns, 2010). This is because unlike the linear economic model, the circular model minimizes throughput of material and energy by optimizing product longevity by reusing, taking back of end-of-use goods for manufacture or recycling. Within the transition stage to the circular economy, the focus is on the measuring of resource productivity and energy flow (Cabinet Office 2001; Defra 2017).

A strategy to increase product longevity (Chapman 2005, 2010; WRAP, 2009; Evans and Cooper 2010; Van Nes, 2010, p.107) is recognised as one of the strongest strategies to slow the throughput of materials and energy, reduce waste, influence consumption and increase positive environmental impacts. The appropriate process to enhance the lifespan is "to promote the design of products with increased durability; to make aware owners' concern related to product longevity; to encourage owners to take good care of their possessions; and to provide greater market incentives for longer-lasting products" (Cooper, 2005, p.64). The strategies for such longer-lasting products (Conn, 1977; Cooper, 1994, 2000) include effective ways to increase the resource and energy efficiency to optimize the product's life cycle (Cooper, 2010). It can be achieved by adopting

strategies “such as the design of upgradable” (WBCSD 1996: 17). Designing things to last longer and extend their product lifespan (e.g Chapman 2005, 2010; Evans & Cooper 2010; Tietze & Hansen 2013; Tukker 2004; Van Nes 2010) include reuse and recycling through manufacturing processes. It primarily aims at providing potential environmental benefit, though economic and social improvements also need to be considered (Cooper, 2010).

Simultaneously, achieving sufficiency by restraining the consumption of resource needs to be considered for sustainable development (Fuchs and Lorek, 2005). Slow consumption is an approach “to slow down the transformation rate from raw material into products and products used up” (Cooper, 2010). It means reducing the throughput of products and services (Cooper, 2010). Both approaches of providing resource efficiency and sufficiency need to be delivered together (Cooper, 2010; Sirkin & ten Houten, 1994). Promoting product longevity solely by increasing durability is problematic, as redesigning products may involve thicker and more solid material which involves an increasing chance of using non-recyclable material. There is also the possibility of prompting the rebound effect (Chalkley et al., 2003) of additional consumer spending: then it would not lead to a reduction in the consumption level. Promoting solely slow consumption may also result in unemployment and other social problems (Cooper, 2010).

Many companies are taking a circular system approach by collaborating with technology and the market system to overcome obsolescence and promote product longevity. Substantial consideration is required of individual users’ behaviour change considering the numbers of functional products that are discarded as waste. In particular, people’s decisions concerning when and how to dispose of end-of-use products collectively and decisively have an impact on the environment (Evans and Cooper, 2003a, b; Consumers International, 2018). To fully utilize a product’s potential lifespan through reuse or upgrading, users’ efforts are required (Cooper, 2010). Moreover, Evans & Cooper (2010) found that the majority of their research respondents exhibited “highly optimizing behaviour at the disposal stage for one or more products (85 per cent), particularly when they are dealing with everyday footwear and large kitchen appliances”, rather than at the acquisition and use stage, when most consumers “appear uninterested in product life-span” and “fail to exhibit highly optimizing behaviour” (Evans & Cooper, 2010, p.330). Their study shows that the disposal phase has the most

potential to address the optimization of behaviour (Evans & Cooper, 2010) and to influence products' lifespan. An understanding of users' influence on decision-making about the products' disposal is vital to shape design strategies for product longevity as a means to achieve sustainable consumption.

Object Attachment and Detachment Phase

People often have particular objects which they have a special bond with, or they have less attachment to. The degree of product attachment or detachment by the consumer changes over time (Schifferstein and Zwartkruis-Pelgrim, 2008), including the disposal phase. Ball and Tasaki (1992) tested whether product attachment was dependent upon ownership stages and they distinguished five distinct stages in the development of attachment and detachment for a particular product: pre-acquisition, early ownership, mature ownership, predisposal and post-disposal. The degree and the duration of these stages may differ between the products, but it applies to most user-object relations (Schifferstein and Zwartkruis-Pelgrim, 2008). During the early stage of possession, feeling towards a new product enhances the degree of product attachment depending on the route by which users obtained it, and the physical circumstances, which are likely to affect the emotional experience during ownership. During the ownership stage, a consumer's emotions with the specific product is not static: users' attachment to objects changes over time "due to dynamics in the target products (e.g. the object's functionality), consumers (e.g. the consumer moving house), product-consumer interaction (e.g. an ownership change) and situational context (e.g. new technology development)" (Ball and Tasaki 1992; Kleine and Baker 2004; Schultz et al. 1989; Schifferstein and Zwartkruis-Pelgrim, 2008). In other words, the lifespan of objects was affected by the quality of care and amount of maintenance the user applied, according to their emotional bond with the objects. Accordingly, products are stored, used, maintained, repaired, and disposed of as a last option (Nicosia & Mayer, 1976). Findings showed that product attachment increased from the early to the mature owner and declined as the consumer began to think about disposing of objects, which in fact coincided with the owner trying to distance themself from the object; however the attachment remained even though it was low level (Ball and Tasaki, 1992). This is contrary to Davis' (2002) 'person-product relationship' life-cycle model, in which he proposed the end-of-

use of the product stage as the 'broken relationship' phase. During the disposal stage, certain objects are selected which people keep, to be given away, otherwise they are thrown away.

Figure 7. Attachment and detachment profiles (Khan, et al., 2007). Result from the second phase of 'Product Life Creative Workshop', 25 June 2007.
Image has been redacted.
Khan, A., McAdam, J. and Kaynamara, A.2007. Result from the Product Life Creative Workshop University of Brighton 25 June 2007. In: Chapman J. *Emotionally Durable Design*. Ph.D. thesis, University of Brighton.

Similarly, Khan et al (2007) suggested that the relationship is not totally broken but rather increases during the end-of-life phase. They analysed whether Domestic Electronic Product (DEP) attachment and detachment is dependent upon the ownership stage and they distinguished five stages in the ownership process, seen in Figure 7. The graph shows the appearance of feeling towards products just before the objects are discarded; this is a phase in which users are reviewing the life of the products (Khan et al., 2007) and having lingering emotions. Evans and Cooper proposed the classification of products' disposal phases into 'problem recognition', 'problem assessment' and the 'moment of disposal'. The phase in which users are reviewing the life of products (Khan et al, 2007) is associated with the 'problem assessment stage'. This reflective stage may provide an opportunity to restore the attachment – to detach from the emotion to let the product go for donation, sale or trade-in – or to terminate the attachment (Chapman, 2008). The user's lingering attachment toward end-of-use objects is attributed to various factors. The nature of the product, replacement options, users' personal characters, their situational context (Cooper, 2010) and many other

factors influence users' decisions about whether to continue to possess objects that have reached the end of their useful life.

Product Attachment and Detachment in Design

Product attachment is defined as "the strength of the emotional bond a consumer experiences with specific product (Schifferstein, Mugge, and Hekkert 2004)". The determinations of the consumer-product attachment have been widely explored in design research to increase the durability of the relationship between user and product: designing things to last longer (e.g Ackermann et al., 2018; Chapman 2005, 2010; Evans and Cooper 2010; Chapman 2005). In *Emotionally Durable Design*, Jonathan Chapman (2005) proposed six essential strategies for attachment (detachment, narrative, surface, consciousness, fiction and attachment) which are applicable for the design process to increase the emotional bond with users, and insisted that designing products should incorporate a lasting emotional as well as physical perspective. This is an emerging type of sustainable design approach to reduce consumption and waste by increasing the durability of relationships established between users and products.

However, designers should question whether the product attachment approach is appropriate to apply to every product type and relationship. Van Nes (2010) pointed out the risk of applying product attachment strategies to every occasion and advised designers to consider the feasibility and desirability of such a strategy.

> Can mass-produced products ever be personalized? One person will be more eager than another to create a bond with a product, and people generally only feel attached to a small selection of their possessions. What would happen if people had close bonds with many of their products? It would be a real burden to care for all of them. They cannot all be treated as 'favourites'. Perhaps it is unrealistic to seek to increase attachment to all products. (Van Nes, 2010, p. 129)

In response to Van Nes's (2010) statement, the other main approach is to decouple the ownership and attachment between users and products by exploring ways to possess less (e.g Botsman and Rogers), including reuse and sharing by multiple users or taking them back to the manufacturer. Van Hinte (1997) also urges: "besides reckoning with discarding and recycling, product design includes setting up or adapting relevant services: cleaning, upgrading, transport, spare parts, information desks and in some cases, even facilitating the support of shared

use". Certain types of market, such as the secondary market, can also offer a range of options for extending product longevity (Gregson and Crewe 2003). This includes auctions, car boot sales and online markets, where end-of-use products can be sold or donated to others by employing economic activities (Cooper, 2010). There are emerging movements toward access-based consumption which are commonly based on service-oriented consumption, that could offer longer-lasting products through the shared use of the products. Charitable donation is another option; however, there are negative perspectives on this as many of the unsold items are destroyed or transported to third world countries and result in the invasion of their culture and destruction of their community relationships. Council collection is the local authority's free bulk waste collection service, offered to prevent consumers fly-tipping; however there is a risk here of increasing replacement behaviour and prohibiting the reuse of products, as most of the collected items are sent to recycling processes. Moreover, the recycling method has an increasingly negative environmental impact: this should be considered as the least preferable solution for users.

Marchand (2003, p.128) claimed that sustainable consumers wish to own high-quality objects at the same time as keeping their accumulation of goods to a minimum, and they tend to practise a certain detachment towards the objects they own, to deal with the issue of obsolescence; they strive to have access to things, but not to own them. In order to meet the requirement of Marchand's (2004, p128) description of sustainable users and to promote sustainable behaviour, both design approaches through product attachment and detachment need to be explored equally. In particular, a design strategy to loosen ownership and any remaining emotions requires further research, as such approach has not been widely explored yet.

3.4. Emotion and Behaviour Change

Triandis (1977) proposed an integrated model of interpersonal behaviour which includes social factors and emotions in forming intentions. Triandis' model (Figure 8) is similar to the 'Theory of Planned Behaviour' (TPB), but it goes beyond by adding 'habits' and the presence of 'facilitating conditions' that either enable or delay the performance of a particular behaviour (Milhausen et al., 2006). It differs in its inclusion of 'habits', which intervene between 'intention'

(composed of attitude, social factors, and affect) and 'behaviour', 'Habit' acts as a key determinant of the actual enactment of 'intention', the ensuring 'behaviour'. Both 'intention' and 'habit' are in turn both ruled by the 'facilitating' or 'constraining conditions', the external factors influencing whether or not the person will perform the specific behaviour (Chatterton, 2011; Jackson, 2005), such as inborn attributes, acquired capabilities, situational context, public policy, and economic variables (Stern et al., 1999).

Figure 8. Model of interpersonal behaviour (Triandis, 1977).
Image has been redacted.
Triandis, H. C. 1977. *Interpersonal behavior*. Monterey, CA: Brooks/ Cole.

A function of 'intention' predominantly engages in the action to behave, which he considered to be the present situational constraints and conditions. Triandis (1977) explicitly argued that 'intentions' are formed as a result of the key role that is played by both 'social factors' and 'emotions'. 'Social factors' include 'norms', 'roles' and 'self-concept'. According to Triandis (1977), 'norms' are the social rules about what should and should not be done. 'Roles' are "sets of behaviours that are considered appropriate for persons holding particular positions in a group", 'Self-concept' refers to "the idea that a person has of his/herself, the goals that it is appropriate for the person to pursue or to avoid, and the behaviours that the person does or does not engage in". 'Affect' is another factor forming 'intention'. It is shaped by "emotion, which has unconscious input to decision-making, and is ruled by instinctive behavioural responses to particular situations".

Triandis (1977) stated that 'affect' refers to the pure emotion of joy, elation, pleasure, depression, distaste, discontentment, or hatred an individual feel with regards to a particular behaviour in question. These emotions can either be positive (pleasant) or negative (unpleasant) and either strong or weak (Triandis, 1977). The literature shows an important relationship between an individual's affect towards a particular behaviour and their subsequent intention to perform that particular act (Limayem et al., 2004). In this theory, behaviour is influenced by moral beliefs, but the impact of this is limited by 'emotional drives and cognitive limitation' (Triandis, 1977). Triandis' model proposes an explicit role for emotional factors in influencing behaviour intention for behaviour change, and this approach was relevant to this PhD.

For designers it is important to design products that 'fit' the emotions of the users, that is, products that elicit the emotions that the user would like to experience (Desmet et al., 2015). Emotions dominate decision-making because they trigger and motivate behaviour (Desmet and Hekkert 2007).

The existing research on emotional design and the emotions associated with a product often relate to provoking an emotional or affective response from users, satisfying emotional needs or "making users experience the source of inspiration for design process" (Savaś, 2004). Tractinsky et al. (2000) demonstrated a relationship between affect and usability. In Norman (2004, p70)'s framework, affection may arise due to three different levels of cognitive involvement: 'visceral', 'behavioual' and 'reflective'. At the 'visceral' level, it is mostly automatic and universal affective responses that are produced. Visceral design focuses on the automatic responses to the appearance of a product, 'behavioural' design essentially deals with the ease and efficiency of use of the product, and 'reflective' design primarily focuses on the personal and cultural meanings of products (Norman, 2004). Norman emphasized that the designer has a responsibility to develop objects that provide pleasure and meaning to users, which then potentially enhance the relationship with the users during the use phase. Chapman (2005) proposed 'emotionally durable design', through the exploration of consumer psychology and the deep motivation that fuels the human condition, proposing creative design strategies and practical tools that enable designers from a multi-disciplinary context to explore new ways of thinking and designing objects capable of supporting deeper and more meaningful

relationships with users. Design for durable emotional attachment increases the objects' lifespan, thus promoting sustainable behaviour in users to cherish and keep, rather than throw away. When applying the framework in the field of design for emotion, most design objects are considered to evoke positive emotion by encouraging the pleasurable experience which then potentially contributes to the object's lifespan.

Desmet (2002) shifts the view and suggests that "products do not merely evoke basic affective responses such as liking and disliking, but also highly differentiated emotions such as anger, disgust, boredom and amusement". He describes how products' appearance evokes emotion, and proposed that the emotional experience can be drawn out from other things that the product represents. Desmet and Hekkert (2007) propose a product experience framework, based on Russell's (2003, p.147) concept of 'affect', that is "a neurophysiologic state that is consciously accessible as a simple, non-reflective feeling that is an integral blend of hedonic (pleasure-displeasure) and arousal (sleepy-active) values". Desmet and Hekkert (2007) define product experience as "any change in the affect that is attributed to human-product interaction, covering instrumental, non-instrumental and even non-physical interactions". In their framework, three levels of affect generation are identified: the 'aesthetic level' which refers to affect generated by sensorial stimulation; the 'meaning level' which refers to affect induced by expressive characteristics of products; and the 'emotional level' which includes affect attributed to an object and combined with appraisals, commonly expressed as terms such as anger, fascination, joy, contempt and so on (Demír, 2008). The approaches to promote particular emotions users experience, enabling users to experience the source of inspiration, and that provide an inspiration source for brainstorming and idea generation, are relevant in influencing user behaviour.

3.5. Design for Sustainable Behaviour

The concept of sustainable development is defined as a process of improving the quality of life for humanity while living within the capacity of supporting eco-systems (SPC, 2011). In particular, environmentally significant behaviour, based on its impact and the behaviour of users interacting with products (Stern, 1992),

may be viewed from a sustainable development perspective (Daae, 2014). Changing behaviour to a more sustainable approach has recently received increasing acknowledgement and attention (Daae, 2014), in particular from government policy and the design sector. Design for sustainable behaviour is an emerging research area at the intersection of sustainable design and interaction design, applying insights from multiple disciplines to the problems of influencing more environmentally friendly (and socially beneficial) use of products and services. (Lockton et al., 2008; Liley et al., 2005, 2007; Rodriguez and Boks, 2005; Elias et al., 2007; Bhamra et al., 2008; Wever et al., 2008; Pettersen and Boks, 2008; Froehlich et al., 2010). Designers are concerned with how people use and interact with products, how they use and deal with them, and how design interventions might change this.

For better or worse, how products, services or system are designed contribute to shaping users' behaviour. Hence, designers have the opportunity, and should take responsibility, for taking these potential behaviour change opportunities into account in their design process (Niedderer, 2018). Designers may aim to change behaviour through thoughtful design that will deliver sustainable behavior in users. One of the first contributions to understanding how the design of products affects behaviour was Jelsma's dimensions of scripts (Jelsma and Knot, 2002)). He proposed that a script has a direction, a force, a scale, and a distribution. The design for sustainable behaviour research community was set up, influenced by Jelsma's (2006) script concept.

Transforming consumers' behaviour in the context of their impact on the environment through design is challenging, as human behaviour is a complex domain (Daae and Boks, 2014): users' characters and the context of the use of packaging and products also need to be considered to justify sustainable behaviour, and behaviour change also has to take account of other subsidiary behaviour such as water and energy consumption. Therefore, the purpose of design within the behaviour change field is that design must play another role, instead becoming 'part of the solution' (Chapman and Gant, 2007). Design should not just be used as a tool for marketing, nor aim at enabling business to make a profit but for a cultural shift and social cognition change (Chapman and Gant, 2007). In this respect, the emerging field of design for sustainable behaviour has the potential to play a role in delivering sustainable disposal solutions in

environmentally beneficial ways by encouraging consumer behaviour change through design.

3.5.1. Lilley and Bhamra's Model

Figure 9. The models of sustainable behaviour intervention (Lilley et al., 2007)

Image has been redacted.

Lilley, D. 2007. *Designing for bahaviour change: Reducing the social impacts of product use through design*. Ph.D. thesis, Loughborough University.

Lilley (2005) expanded Jelsma's understanding of behaviour dimensions and proposed three 'interventions to change behaviour': 'educational interventions', 'technological interventions'; and 'product-led interventions' (Figure 9). She divided the principles into three types according to how strongly they affect behaviour. In the structure, the middle part of spectrum is called 'behaviour steering'. On each one side she added the product-led interventions category which comprises 'intelligent products and systems', and the consumer-led intervention category which comprises 'eco-feedback'. 'Eco-feedback' aims to influence behaviour by providing information or feedback and giving choice to users, whereas 'intelligent products and systems' aims to take control of users' behaviour by designed products, services or systems, and force or block inappropriate behaviour. Between these two axes, the 'behaviour steering' category provides a guide for users toward desired behaviour by script.

Figure 10. Seven interventions to change behaviour (Bhamra et al., 2011).

Image has been redacted.

Bhamra, T., Lilley, D. and Tang, T. 2011. Design for sustainable behaviour: Using products to change consumer behaviour. *The Design Journal.* 14 (4), pp. 427-445.

Bhamra et al (2011) extended Lilley's framework to 'Seven interventions to change behaviour' through earlier investigations, which can be applied within design (Figure 10). The design interventions are classified by the degree of power for decision-making between users and products: 'eco-information', 'eco-choice', 'eco-feedback', 'eco-spur', 'eco-steer', 'eco-technology' and 'clever design'.

(Bhamra et al, 2011). In this model, developing a balanced and ethical approach is important. The seven design approaches fall into three levels of intervention, starting from where the power in decision-making lies with the users and moving on to where the power in decision-making lies completely with a product or system. The middle ground is where the users and products share the power of decision-making. The 'eco-information' strategy aligns to those of Lilley's 'eco-feedback', except that this approach is about giving simpler information, therefore it was renamed. Lilley's 'intelligent products and systems' are similar to 'eco-technical intervention'; her 'behaviour steering' approach aligns with Bhamra's 'eco-choice' and 'eco-steering'. Additionally, the 'eco-spur' approach rewards intended behaviour, and the 'clever design' approach removes the desired end result and changes the user's behaviour unconsciously.

3.5.2. Mindful Design

Niedderer's (2013) research focuses on the impact of design on human relationships, investigating the role of mindfulness and emotions as a means to stimulate mindful interaction and behaviour change through design. Initially, Niedderer (2013) developed the model of 'performative objects', focusing on mindful awareness in a social context based on a concept from psychology. The 'performative object' is designed to facilitate mindful awareness of the physical and symbolic social actions and their consequences during the use of the object (Niedderer, 2004)' and direct them to be aware of the issues to mediate in this disruption. (Niedderer 2013).

The concept has further developed into a model of 'mindful design' to describe how objects can be designed to enable mindful attention (Niedderer, 2007). 'Mindful design' seeks to enable behaviour change through attitude change, based on mindful awareness and reflection which are intentionally provoked (Niedderer, 2007). The 'Brainball' game is an example of the 'mindful design' approach: it requires two players to move a ball, each toward the other player's direction, to win a game where players compete in relaxing conditions. Both players wear headbands, and their brainwaves are picked up by sensors and displayed on the screen to control the game. The player who is the most relaxed during the game wins. The interference of physical or symbolic functions during the use of the object in the context induces reflection by the individual on their inner state/

emotions, their inter/action and how these reflect personal and social beliefs, and opens users to an examination of their own behaviour (Niedderer 2007).

The mindful design approach to behaviour change offers four benefits (Niedderer 2013). Firstly, it offers stimuli for internal motivation to change users' attitude as the basis for lasting behaviour change (Niedderer 2013). It has the ability to shift the focus from an external motivation of control to internal motivation control. Secondly, the mindful approach provokes responsibility in users to make decisions, which is perceived as empowerment. Thirdly, mindful design provides an opportunity to question people's individual desire to expose and let users reflect on their own behaviour. Finally, this design approach provides a starting point to create certain actions for users and drive them to desirable actions, while users' incidental emotions shape their moral belief and judgment (Niedderer 2013). Mindful design rather focuses on providing internal motivational elements, which enable conscious decision-making and commitment as an essential basis for attitude change and subsequently for lasting behaviour change (Niedderer 2013). A holistic approach in provoking internal emotions in people (including responsibility and commitment) through design that helps their decision-making processes for sustainable behaviour change have not been fully explored.

3.5.3. Lockton's Model

Lockton's (2013) approach was slightly different to previous designs for sustainable behaviour models. He proposed the 'Design with Intent' method, which is a collection of design patterns – and a design and research approach – for exploring the interactions between design and people's behaviour, across products, services and environments (Lockton, 2013). He developed a toolkit, both digital and physical, to provide guidance at the concept generation stage for design teams when they are briefed with a design for influencing user behaviour. By using product and system design patterns, designers generate ideas to influence user behaviour to offer the potential for improving performance and reducing user error. He grouped design patterns which share similar considerations, behavioural understanding or assumptions about how to influence users based on six lenses – 'architectural', 'errorproofing', 'interactive', 'ludic', 'perceptual', 'cognitive', 'Machiavellian', and 'security' (Figure 11). Each pattern consists of phrases and questions to enable the toolkit to be use as a 'provocation

tool' to invite discussion about behaviour and provide an inspirational guide for designers to explore the field of behaviour change.

Figure 11. Design with Intent (Lockton, 2013).
Image has been redacted.
Lockton, 2013. Introduction to the Design with Intent toolkit. [Online]. Dan Lockton Website, [Accesses 25 January 2016]. Available from: http://designwithintent.co.uk/introduction-to-the-design-with-intent-toolkit/

The ways of phrasing the questions for inspiration, to frame the elements, and to apply the toolkit format in the design process were relevant to my research, although this PhD was also was inspired by the SACMP thinking method. The 'Design with Intent' toolkit does not indicate which pattern is applied for each different occasion, and how to apply the toolkit is down to the designer or researcher, sharing a similar approach to this PhD.

3.5.4. Zachrisson and Boks's Model

Daae and Boks (2011) created a booklet entitled 'Design principles of behaviour change' with proposed design guidelines to be followed and applied by designers during the design process. It was structured around a step-by-step guide to be applied for the design process. The guidelines are as follows:

1. 'Study and measure the baseline practice' – this explains how to choose the right methods to gather the most relevant information for a project.
2. 'Identify which behaviour is to be changed' – in which designers determine which behaviour to change or maintain from an environmental perspective.

3. ‘Identify what affects the behaviour’ – which analyses the information gathered and the influential factors for the target group and behaviour are found.
4. ‘Select the principle to use’ – in which the guide booklet suggests the most promising design principles, according to the result of the analysis in the previous stage. ‘The Landscape of Obtrusiveness and Control’ is introduced here as a guideline for design principles, which are based on the two parameters: the degree of control that a product allows users to have over people’s behaviour, which categorizes ‘informing’ as where the users are in control to ‘determining’ where the product is in control, through ‘persuading’ in the middle. Others consist of the degree of subtlety or obtrusiveness of the designed solution where seven strategies are located (Daae, 2014).
5. ‘Generate the ideas’ – where to find a creative solution through the identified requirement for the new design.
6. ‘Evaluate and select the ideas’ – where designers access how the idea will fulfill a list of requirements, personas, and the guidelines provided.

Figure 12. Meaning and Empathy categories of the Dimension of Behaviour Change cards (Daae and Boks, 2011).

Image has been redacted.

Daae, J.Z. and Boks, C. 2011. Using a guide to select design strategies for behaviour change; Theory vs Practice. In: Matsumoto, M., Umeda, Y., Masui, K. and Fukushige, S. eds. *EcoDesign 2011 Design for Innovative Value Towards a Sustainable Society, 30 November-2 December 2011, Kyoto, Japan.* [Online]. [no place]:Springer Science, pp.362-367.[Accessed 10 November 2017]. Available from: https://link.springer.com/chapter/10.1007/978-94-007-3010-6_70

By following this process designers can decide which design principles to use and the presentation of which design solution in certain parts of the landscape may be the most appropriate for affecting behaviour change for the each different personas.

Daae (2011) also developed the Dimension of Behaviour Change toolkit (Figure 12), building upon the content and insight from the previous toolkit, to be applied in the design processes in a more practical way. Through a workshop with designers and university students, and the categorizing process, nine possible dimensions are revealed, which can be applied when designing a product aimed at changing behaviour. The cards are divided into nine categories of distribution of control ('Meaning', 'Exposure', 'Encouragement', 'Timing', 'Empathy', 'Control', 'Obtrusiveness', 'Importance', and 'Direction'). On each card, sixteen design principles are presented based on the spectrum of two extremes. The cards contain examples of photos, and the explanation of how the existing design of the product in the photo may affect nine specific possible dimensions and consequently influence user's behaviour. It also provides a number of likely advantages and disadvantages of using the specific part of the dimensions of the design strategies, and suggests what designers should consider in avoiding the failure of each application. The 'Meaning' and 'Empathy' dimensions were particularly important categories to consider for this PhD. The 'Empathy' dimension is "a purely egocentric perspective" which represents a scale of influencing users' behaviour by making the user aware of themselves or focusing on others and what others to think (Daae, 2014). 'Meaning' refers to the dimension between "motivating rationally by making the user feel it is the right thing to do and emotionally by making the desired behaviour pleasurable" (Daae, 2014).

3.5.5. Fogg's behaviour model

Fogg (2009) presented a behaviour change model that identifies the three key factors: users' 'motivation', 'ability' to perform and 'trigger'. Each element has subcomponents which define the larger elements. The harder behaviour is to do, the more it requires sufficient motivation. The processes of changing behaviour are as follows: firstly set the target behaviour, then identify the barrier, finally remove the barrier. The important aspect here is that targeting a simple behaviour

is likely to increase the chance of success. The barriers are determined as lack of motivation, ability or trigger. In this thesis, I set the target behaviour as detaching hibernating or accumulated objects at end of use rather than keeping them. People who are keeping end-of-use objects already have the trigger, thus the trigger was not identified as a barrier. When the objects cease to be useful then some people face difficulty in making a decision, because they cannot make a decision or don't know what to do, which indicates that users require motivation and ability to change their behaviour, and this was analysed in this PhD.

Figure 13. The Fogg Behaviour Grid describes 15 ways behaviour can change (Behaviour Wizard Team, 2018).

Image has been redacted.

Fogg, 2018.Fogg behaviour grid. [Online]. BJ Fogg Website, [Accesses 30 January 2019]. Available https://www.behaviorgrid.org

Fogg and Hreha (2010) proposed the 'Fogg Behaviour Grid' (Figure 13), which suggests fifteen types of behaviour targets based on psychology and techniques of persuasion. It consists of types of changes in one axis and duration of the change on the other axis to provide fifteen combinations. The green path represents a new behaviour such as growing new vegetables, the black path represents the stopping of existing behaviour such stopping smoking (Fogg and Hreha, 2010). The green path faces two significant challenges: commitment and fulfilment (Fogg and Hreha, 2010), therefore increasing the motivation and simplifying the behaviour

is to achieve the green path. This approach was important in this thesis particularly when I analysed the motivational factors for *commitment*. Alongside the behaviour grid, the team also proposed The 'Behaviour Wizard' to help people to target behaviour from three options; 'I want to'; 'stop'; or 'start': after the selection of the option the Wizard guides designers through an appropriate solution to achieve a change in behaviour.

3.5.6. MINDSPACE

MINDSPACE is a report used by Behavioural Insights Team "as a framework to aid the application of behavioural science to policy-making processes", which was compiled by the Institute of Government with a team from Imperial College and the London School of Economics (Dolan et al., 2009). According to the Behavioural Insights Team, applying these tools can "lead to low cost, low pain ways of 'nudging' citizens into new ways of acting by going with the grain of how we think and act" (Dolan et al., 2009,). It also aims to provide a better understanding of various effects on behaviour change to achieve better outcomes for individuals and society (Dolan et al., 2009). Legislation and regulation are the most obvious and effective ways to restrict people's behaviour in certain ways; however, these approaches are costly and many cases inappropriate (Dolan et al., 2009), so they proposed this framework for government to take coercive approaches, such as incentives. The distinctive aspect of this model is that the category comprises 'changing the context' – the environment within which we make decisions and respond to cues – that has the potential to change behaviour at relatively low cost (Dolan et al., 2009).

MINDSPACE was created to provide a checklist for policy-makers to help them to identify any barriers that currently inhibit behaviour change. They identify nine strong influences on human behviour change, described under the following headings: 'Messenger', 'Incentives', 'Norms', 'Defaults', 'Salience', 'Priming', 'Affect', 'Commitment' and 'Ego' (Figure 14). In this model, traditional interventions, such as providing information or education, were not considered. But it explains the robust effects that reinforce human behaviour, and that derive from people's increasing understanding of how our 'automatic system' and contextual cues affect us (Dolan et al., 2009). According to their framework, our behaviour is affected by a more conscious and considered understanding of our

needs, desires and priorities (Dolan et al., 2009). Recognising these various influences is crucial, given the complex environment in which people make decisions (Dolan et al., 2009). 'Norms', 'Defaults', 'Salience', 'Priming' and 'Affect' were developed to describe the automatic effect in human behaviour, while 'Messenger', 'Incentive', 'Commitment', and 'Ego' are influential elements drawn from more reflective processing. There is no logical order in which to apply these elements, thus they can overlap. Although MINDSPACE complements and improves conventional policy tools, there are still many questions to be answered. Uncertainty remains over how long-lasting many of these effects are; whether the effects will work in all sets of circumstances, and whether the effects will work for all segments of the population (Dolan et al., 2009).

Figure 14. MINDSPACE: Influencing Behaviour through Public Policy (Dolan et al., 2009).

Image has been redacted.

Dolan, P., Hallsworth, M., Halpern, D., King, D., Metcalfe, R. and Vlaev, I. 2009. *Mindspace - Influencing behaviour through public policy.* London, UK: Cabinet office & Institute for Government. [Accessed 20 April 2015]. Available from: https://www.instituteforgovernment.org.uk/sites/default/files/publications/MINDSPACE.pdf

In Chapter 4, this thesis introduces what might be considered and modified from the MINDSPACE framework. As this thesis attempts to change people's behaviour through their caring motivations, influential factors such as commitment and responsibility from the MINDSPACE framework were relevant for consideration, particularly when extracting caring factors from behaviour

change strategies. The influential factors that were selected and translated from the MINDSPACE tool were applied for different user types within different contexts during this PhD: this also helped to provide clarity on the remaining uncertain aspects of the MINDSPACE tool.

3.6. Behaviour Change in Design Process

Most of the influential factors considered during the design process can potentially lengthen or shorten the object's life during use (Cooper, 2010). However, when these factors are considered in the later stage of the design process, it is limited to influencing users' behaviour change. Object durability can be improved during the making and testing process, or can affect the decision to use more durable materials and better-quality manufacturing processes for construction. Therefore, some may argue that because extreme tests of durability for some performance items and other recent advanced testing technology is now available, these could fit the speed and cost imperatives of the supply chain better, consequently changing consumer care practices (Shellenbarger, 2001; Annis, 2012; Cooper et al., 2014). However, the potential behaviour-influencing elements of products and services have mostly already been determined by the later stage of design process (Lockton, 2013); furthermore, changing people's behaviour is challenging in many ways (see Chapter 1), which may not offer the results that manufacturers intended.

Most of the current design solutions to change behaviour in a sustainable way for the end-of-use cycle of products are added at the later stage of the design process (e.g. providing recycling bags, or providing clothing collection boxes at the entrance of shops), with no proper consideration or understanding about environmental problems or human behaviour change factors at the early design stage, which results in much difficulty in changing users' behaviour. The "formulation of the problem may often be a critical phase in design situation" (Kneller 1965)"; however, design problems are not initially defined entirely clearly, which requires much effort to expand an understanding of them thoroughly (Dubberly, 2005). In many cases, early design decisions in response to design problems determine the scope of later decision-making for the production of products and their life cycles. Therefore, taking a holistic view of a product's life cycle during the early stages of the design process with an appropriate

understanding of the problems may benefit behaviour change in users better than addressing the potential scope of design solution decision-making at a later stage.

3.6.1. Idea Generation and Problem Solving

One of the challenges and aims for design is to address the problems we face in human society, develop new ideas in response to issues, and solve the problems accordingly. Christiaans (1992) emphasized the importance of defining, understanding and framing problems in the design process and advocated spending more time to achieve a creative solution. Dorset and Cross (2001) also advised that creative design is about "developing and refining together both the formulation of a problem and ides for a solution", which involves an "iterative analysis, synthesis and evaluation process". The model of creative design proposed by Maher et al. (1996) stresses the 'co-evolution' phase, in which the problem and solution spaces co-evolve together by "exchanging the information between the two spaces in the design processes and until (temporarily) fixed by an emergent bridge which identifies a problem-solution pairing" (Dorset and Cross, 2001). Most design researchers agree that "a solution is inherent in a problem", which can be achieved through the iterative process of reformulating or even redefining problems and a conscious effort to develop an idea for the solving these problems (Dubberly, 2005). For "every solution that is offered exposes new aspects of the problem, requiring further adjustment to the potential solutions". (Coklin, 2009). According to American graphic designer Paul Rand, the "idea may also grow out of the problem itself, which in turn becomes part of the solution" (Heller et al, 1998). This suggests that the idea generation process is as much about "problem-framing" as "problem solving" (Maher et al, 1996), therefore the process of understanding and framing the problem will help to "bring out the ideas, which is crucial to achieve a creative design solution" (Rittlel & Webber, 1973). In other words, "*problem understanding and problem resolution are concomitant to each other*" (Rittel and Webber 1973, p.161). A design process that emerges through the co-evolution of the problem-solution approach aligns with the systems thinking approach. Because problem-solving deals with identifying what causes the problems in order to frame the problems and find ways to solve them, similarly the systems thinking approach also emphasises the importance of understanding problems to find the leverage point

in order to change behaviour. Both approaches were relevant in this PhD during the Toolkit development process, allowing designers to understand and frame the problems and find the solution through the Toolkit.

Idea generation involves numerous alternative ways of understanding and solving a problem, and selecting potential concepts (if possible) enables further development towards the achievement of creative design solutions. There has been substantial growth in new design methods which attempt to bring rational procedure into the design process to help designers to understand the problems, reducing the error in the delivered solution or assisting designers to free their minds to think creatively and broaden their perspectives (Cross, 2008). However, though designers' role is shifting to influence people's behaviour towards more sustainable lifestyles, there are few resources available to help designers to understand the problems in order to address the challenge of human behaviour and develop a creative solution. In particular, there are few focused guidelines for designers on the after-use phase of products which can be applied during the early idea generation stage of the project, where the most influential approaches and factors can be considered in relation to behaviour change. In other words, there is an opportunity here to provide guidelines to help designers to simulate and explore the ideas, and to consider the whole cycle of product use and the after-use phase at the early stage of the design process in order to change users' behaviour.

Idea generation can be done in groups or individually, formally or informally, and by designers on their own or other experts from different fields (in a multidisciplinary way). Prototyping activities, sketching, card sorting or storyboarding attempt to solve a problem and may even improve people's understanding of a problem, thus changing our pre-consciously defined problems and revealing new solutions (Dubberly, 2005; Dam & Siang, 2017). Idea generation can begin in many different ways: simple ideas from "off the top of the head", adopting an early idea as a "primary generator" (Lawson, 1991) or applying a structured idea generation method using tools. The toolkit can be developed through the direct request for, or the capture of, the requirements of particular industries or stakeholders, or it can be co-developed with other potential users by refining it together (Lockton, 2013): the latter approach was taken in this PhD. Further reviews of literature defining a potential toolkit structure will be found in section 3.6.2.

3.6.1.1. Lateral Thinking and Idea Generation

Edward de Bono is one of the pioneers of 'creative thinking': he rationalized the teaching of thinking as a skill, meaning that by training the brain one can improve the way one thinks. He coined and introduced the concept of 'lateral thinking' to help people to solve problems through a creative yet indirect approach (de Bono, 1967) that involves looking at a situation from unexpected angles. 'Lateral thinking' is "a process of using available information to bring about creativity and insight", and "restructuring, escaping and the provocation of new pattern" (de Bono, 1990). Once the patterns are formed, a code, or system, can be structured, which is a very efficient way of handling information (de Bono, 1990 p.7). Within his approach, trying to think in the same direction is not as useful as changing direction: lateral thinking deliberately distances itself from "vertical or logical thinking (the traditional method for problem solving that moving forward to the solution by sequential step from the relevant but selective data)" and uses the information provocatively "to restructure the developed pattern and insight in order to bring about new patterning": thus "one may have to deliberately seek out irrelevant information" (de Bono, 1990 p.8). It involves discarding the obvious, leaving behind traditional thought, throwing away preconceptions (de Bono, 2016) and viewing the problems in fresh ways to create new ideas. It is a generative and systematic way of thinking creatively that tends to avoid any rigid conclusion in a repetitive manner (de Bono, 1990). This technique is useful for problem solving, seeing thing in a different way to discover alternative ways to solutions using a small amount of time rather than thinking about it in a broader sense. The principles of lateral thinking are:

(1) 'Recognition of dominantly polarizing ideas' could relate to "list the relevant assumptions which they are currently making ".

(2) 'The search for different ways of looking at things' could relate to: "one should review the original assumption and take a fresh look the problems and abstracting the problems".

(3) 'A relaxation of the rigid control of vertical thinking' could relate to: "one should reassess what the need is and reconsider other possibilities for providing what is needed and abstract the solution".

(4) 'The use of chance to encourage other ideas' could relate to: "one should admit and involve low-probability ideas which are unlikely to occur in the normal

course of events (de Bono, 1990), promoting a greater range of possible solutions".

The complex pattern of behaviour can be coded by using information provocatively to restructure a new pattern by juxtaposing unlikely information for a whole new pattern of behaviour to be activated (de Bono, 1990). This approach was useful when abstracting the information gathered from the literature review and interview data, to bring about new patterning into the form of a toolkit. This approach was also relevant when structuring the Toolkit for designers to encourage them to use it provocatively and to think from a different angle about new ideas.

Brainstorming is "a formal setting for the use of lateral thinking" (de Bono, 1990, Chapter 15). This special setting could encourage the application of the principles of lateral thinking. During the brainstorming session one can provide stimulation to others and receive it from others through a repeatable process and provide new stimulatory effects for getting ideas moving, not getting stuck with a particular way of looking at the situation. Also, it provides an opportunity for people to make suggestions that go beyond logical ideas. It works better in a formal setting because it allows participants to freely express their thoughts without reference to the criticism of others (de Bono, 1990).

One of de Bono's ways to provoke ideas is 'random input'. In order to use random inputs, one has to generate them deliberately through various materials (e.g. a dictionary or book) (de Bono, 1990). In a brainstorming session, the ideas of others can act as random inputs: even opposite ideas can provide useful input. One way is to place two unconnected concepts and deliberately mix unconnected pieces of information in order to disturb the original pattern (de Bono, 1990). When the connections appear they generate new ideas "by using reversal, exaggeration and distortion of ideas to bring a new entry point to the problem, as a result changing the view of the original situation" (de Bono, 1990). The prompt, lateral thinking process has potential for the creative thinking process, thus helping designers frame the problem. This PhD follows some aspects of Bono's thinking process, which include providing 'random input' during the idea generation session to shift views.

Edward de Bono designed a creative thinking technique tool for group discussion and individuals involving six coloured hats in a role-play context to provoke

effective parallel thinking processes (de Bono, 1985). Identifying each member's role with a coloured symbolic 'thinking hat' enables them to focus or redirect their thoughts and conversations (de Bono, 2007). It lets people move outside their habitual thinking method and help members to think from different perspectives (de Bono, 1985). One of the most useful implications of this concept for an idea generation process is that of having a different perspective from each coloured hat. This approach was relevant when four of the caring themes, with their influential factors, are provided for designers to stimulate the thinking process during the idea generation session.

3.6.1.2. The SCAMPER Method

SCAMPER is a creative idea-generating method of encouraging questions, which consists of seven different procedures or activities (Substitute, Combine, Adapt, Modify, Magnify, Purpose, Eliminate, and Reverse) during the thinking process. It is a creative and provocative thinking process which will help designers to improve existing ideas, to enhance their knowledge and to generate diverse concepts during idea generation. It was first proposed in Osborn's (1953) brainstorming recommendation but further developed by Bob Eberle (1971) as a simplified version. The core techniques use the topic of seven different verbs to stimulate ideas based on the modification of old products or services to new ideas. The thinking process through this method will generate sub-questions. For examples, by using the verb 'eliminate', sub-questions will arise, such as 'can I eliminate the rules?' or 'what feature can I remove?'. These ways of thinking were embedded in the Carative Factors Inspirational Toolkit to encourage designers to answer the questions through different verbs when generating ideas for behaviour change. Lockton (2013) also took a similar approach and proved that there is an opportunity to stimulate designers' imagination and creativity through this method within the design for sustainable behaviour change field. Within the SCAMPER method, facilitators could move between the seven thinking techniques without being restricted to specific sequential flow when generating ideas. This method follows a lateral thinking approach, therefore it is important to welcome all ideas, no matter how non-logical they are, and be open to all possibilities.

3.6.2. The Toolkit

Using a toolkit in the design process is an increasingly common way for designers to tackle issues, expand their knowledge and skill and provide inspiration for the idea generation phase. It is typically used during the design process to implement a particular method or theory with suggested activities. Pettersen & Boks (2008b) stated that "ideally industrial designers should be equipped with a decision-making tool… in order to choose the strategies best suited for each project". Using a toolkit is the one of the best ways to inspire new ideas "to look at similar experiences in other contexts, instead of focusing too narrowly on the research topic" (IDEO, 2009).

Linddahl (2005, p.59) identified the three main reasons to apply a toolkit: (1) "to facilitate various kinds of communication within the product development process" (2) "to integrate knowledge and experience into the methods and tools as a know-how backup" and (3) "to contribute with structure in product development". Furthermore, the design tool demonstrates how to use inspirational material for designers during the design process to explore various possible ideas rather than concluding with one single solution. Providing examples of existing ideas and any other insight derived from relevant disciplines would expand the knowledge and help designers' idea generation (Lockton, 2013). The toolkit is intended for the early stage of the design process, as it can be used freely and openly at this stage.

All toolkits have different designs, structures and formats. Dong and Clarkson (2005) demonstrated that toolkits have been developed through direct responses and requests from particular industries or stakeholders. This means that the toolkit can develop with and through potential users, evaluating them as they are used in the practice. This was the approach taken in this PhD, although it was not possible to work with real industry project briefs, as behaviour change is still a new design goal. Therefore this PhD is more focused on the identifying whether designers are able to engage with issues of sustainable disposal behaviour change, and drawing attention to the opportunities offered by the toolkit.

Knowing the requirements for the toolkit is relevant as it helps to understand how the design process would work better, and to select the appropriate format for the proposed design problem context. According to Lofthouse (2006), the toolkit should contain examples of concepts, be as visible as possible and contain minimal text. Lindahl (2005) investigated how 'design for environment method

and tools' should be designed so it will be more commonly used in the design process. He proposed four major requirements for the toolkit to be better utilized. It should :

(1) Be easy to adopt and implement

(2) Facilitate designers to fulfill specified requirements

(3) Reduce the risk that important elements in the product development phase are forgotten

(4) Reduce the total calendar time to solve the task.

Knight and Jenkins (2009) also emphasis the clarity and visibility of the tool in design practice, and they classified the toolkit into three categories. (1) 'Guidelines', which refers to providing broad support for designers, (2) 'Checklist' refers to providing an in-depth but narrow application at selected stages in the design process, and (3) 'Analytical tool' refers to providing detailed and systematic analysis at specific stages of the design process. They concluded that category of 'Checklist' followed by 'Guidelines' was considered to be most applicable to their companies' design process. Therefore, providing sources as an inspirational guide could play an important role in design thinking because the "definition of contact triggers idea generation, and acts as an anchor for structuring designers' mental representation of design" (Eckert and Stacey, 2000. P.525). This PhD initially follows the approach of providing an inspirational guide. However, there is not much research establishing the correct ways to use the toolkit in different design contexts; therefore evaluating and refining the ideas after the design process was crucial.

3.6.2.1. Circular Design Guides

Circular design guides (Figure 15) "encourage to shift the mind-set of what we design from product to economic system", and "expand the design audience of who we design for from a solitary user to a connected people or the globe" (Brown, 2016) and help to ask the right questions. Thus it allows innovators to explore new ways to create more sustainable, resilient, and long-lasting solutions for the circular economy from "a radical, restorative and regenerative approach to the economic system to provide advantages for our world around us" (Brown, 2017). The guide consists of four methods: 'Understand', 'Define', 'Make', and 'Release' (Ellen MacArthur Foundation and IDEO, 2017). Each of the four

categories consists of numbers of activities to help designers to achieve the suggested methods, by guiding them in how to explore the particular subjects. Within each category of activity, information is provided about the specific activity, providing step-by-step guidelines for users to follow and asking relevant questions for the user to build the narrative and generate new ideas with new methods. It also provides representative examples which take a circular system, and suggests related methods to search for. Ecovative is a good example which takes circular design guidelines. The guidelines mainly consist of asking 'what if?' or 'how?' questions to develop their own understanding of applying the context and building the narrative to find solutions, rather than suggesting direct behaviour change strategies to guide the toolkit users. (Ellen MacArthur Foundation and IDEO, 2017). Instead, various types of worksheets and circular strategy cards are provided to be used during the workshop sessions. Designers can generate new solutions for everyday products by reflecting on the functional and emotional needs that they serve, following the worksheet guide and using the 'Circular Strategy Cards' (Ellen MacArthur Foundation and IDEO, 2017).

Figure 15. Screen shot of Circular Design Guide website.
Image has been redacted.
IDEO, Ellen MacArthur Foundation, 2017. Methods. [Online].Circular design guide website, [Accesses 19 July 2019]. Available from: https://www.circulardesignguide.com/methods

The 'circular brainstorming activity' and 'user-centred research' categories in the 'Make' method were important to be considered for this research as it describes a

way to frame problems and proposes useful brainstorming actives in a workshop situation. In particular, the suggestion that using a probe in an interactive way to build communication with other participating members was relevant when shaping the Carative Factors Inspirational Toolkit. 'Product as a services' and 'Product life extension' in the 'Circular Strategy Cards' were useful strategies to be adapted for this PhD.

3.6.2.2. Design with Intent Cards

Lockton (2013) has developed a toolkit consisting of 101 cards based on his 'Design with Intent' model (Figure 16). It was originally developed to help inspire brainstorming and idea generation for practitioners to address a more systematic approach to design for behaviour change (Lockton, 2013). The toolkit is a collection of design patterns drawn from a range of disciplines for exploring ideas for influencing users' sustainable behaviour change through design (Lockton, 2013).

Figure 16. Design with Intent toolkit (Lockton, 2013).
Image has been redacted.
Lockton, 2013. Dan Lockton Design with Intent [Online]. Dan Lockton Website, [Accesses 25 January 2016]. Available from: http://danlockton.com/design-with-intent/.

It can also be used as a tool for analysing existing design examples that influence behaviour or provocational tool to explore ideas and categories of design methods as a reference (Lockton, 2013). The cards are colour coded and grouped

according to different kinds of disciplines and "loosely fit into the taxonomy" (Lockton, 2013). They are in card format, which enable a more detailed view of each pattern, and are also available in worksheet format or a digital version that allows users an overview of each lens. The processes to use are varied: one way is to lay out all the cards, group them by lens and go through each lens and check for phrases or questions that are relevant to the project or address the problems (Lockton, 2013). Or participants can pick two to three patterns randomly and think about applying potential ideas to the design problems they are dealing with. Participants can also use the toolkit to analyse existing design ideas and compare them with the toolkit to find gaps. Lockton (2013) suggests working as a group in pairs or threes to explore each lens and report the findings to everyone. How the toolkit was formatted and the way it was used during the workshop was relevant to my research. The benefit of the card format, that they can be grouped, spread among a group of people in workshop, shuffled and re-ordered and provide a consistent format for the idea or patterns described (Lockton, 2013) was relevant in shaping the toolkit. The target behaviours for each pattern were not given during the use of the toolkit, as this method can restrict the designer's thinking processes, and this approach was also relevant for my PhD.

During the development process of the Design with Intent toolkit, Lockton (2013) conducted a workshop to find out the user types proposed by the participants. They were asked to write down a statement about what users are like based on their experiences and knowledge (Lockton, 2013). Then the user types were clustered based on the findings through an affinity diagram, and finally categorized into three main types of users. Lockton (2013) explored a dimension of users: "how designers model users when seeking to influence behavior, which involves distributing different balance of control between users and the products or system with which they are interacting". Lockton (2013) views a design for behaviour change model from a different angle by presenting three different ways to perceive the user, how users behave and how their behaviour can be influenced through design, instead of describing how the designed product affects behaviour (Niedderer, 2018). 'Pinball' types are the users who do not think at all, thus they are likely to be shunted and pushed and pulled around by the available design. 'Shortcut' types are the users who take shortcuts and choose what is available. 'Thoughtful' types are the users who take the opportunity to learn more about the

world around them and their impact on it (Lockton, 2013). This approach was relevant to this PhD because it provides ideas about to how to consider and adapt the user types during the idea generation processes.

3.6.3. Modelling the User

All design influences people's behaviour. However, people behave differently consciously and unconsciously even if the given environment or situation is the same. To characterize the model, it helps to link user types and their motivation factors for behaviour change and for designers to explore potential ideas for the particular type of user (Defra, 2008). This will avoid designers making assumptions about the particular users and human characteristics, and assist tailored approaches for specific groups (Defra, 2008). It helps to identify the issues, barriers, motivations and current behaviour and provide initial thoughts on the opportunities for each model. (Defra, 2008).

Seven Population Segments

Figure 17. The seven population segments (Defra, 2008).
Image has been redacted.
Defra (Department for Environment, Food & Rural Affairs). 2008. *A Framework for Pro-environmental Behaviours.* [Online]. London: Defra. [19 May 2018]. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69277/pb13574-behaviours-report-080110.pdf

Defra's environmental segmentation model divides the public into seven clusters (Figure 17). Each group shares a different set of attitudes and beliefs towards the environment, environmental issues and behaviour (Defra, 2008). The model was

created based on people's survey responses to their ecological worldviews, lifestyle, attitudes towards behaviour and current behaviour, sociogeodemographics, motivations and barriers to knowledge and engagement. Defra have grouped those seven segments into three broad types based on strategy level.

(1) Segments 1,3 and 4 consist of those who are willing to act and have the potential to do more. Segment 1 comprises active users who are prepared to do more, as they have strong pro-environmental beliefs. People in Segment 3 are less active than Segment 1, although they are also still willing to do more. Segment 4 are beginners in environmental behaviour, but have strong pro-environmental beliefs; therefore they are also willing to do more. Interventions that 'enable' (e.g. give information) and 'engage' (e.g. media campaigns) will support all these segment users in their behaviour (Defra, 2008). These types of users are associated with Lockton's (2013) 'thoughtful' types, who are willing to learn more about their world.

(2) People in Segment 2 and Segment 5 require different strategies to act. However, both groups are placed within the 'willing to act' area. People in Segment 2 are already active, but they have strong concerns about environmental issues and are trying to avoid producing waste. People in Segment 5 have a 'willing to do more' attitude; however, knowing how others are acting in the same circumstances is a critical factor for their behaviour. For them, their actions are informed by their awareness of those of others (Defra, 2008). The emphasis should be on considering interventions such as 'enabling' (e.g. provide a viable alternative), 'encouraging' (e.g. a reward scheme) or 'exemplifying' (e.g. by business and government providing an example) that will enhance their behavioural attitude. Success in changing the behaviour of people in Segments 1, 3 and 4 to more environmentally friendly activity could help to encourage those in Segment 5, as this group is influenced by other people's behaviour. In this sense, it is clear that people in each segment influence other segment types: thus understanding the segment's characteristics potentially has an implication for behaviour change strategies. The type of user in Segment 5 can be associated with Lockton's (2013) 'shortcut' types, "who make decisions based on the how choices are presented to us" and that choices are based on what most people probably stick with it.

(3) Segment 6 and Segment 7 consists of the group of people who are least willing to act and are less likely to be open to behaving voluntarily, or who are influenced by the example of other people's behaviour. The emphasis here should be on considering interventions such as 'enabling' (e.g. providing the least amount of choice) or 'encouraging' (e.g. through the tax system). These types of users are associated with Lockton's (2013) 'pinball' types who do not think at all.

This suggests that each segment has an implication for design interventions, as well as the development of behaviour change strategy. Understanding these characteristics and attitudes helps to engage behaviour change strategies successfully, especially in building motivation and eliminating barriers. People in Segments 6 and 7 have the least potential for environmental motivation to be applied, whereas people in Segments 1, 3 and 4 have more opportunity to engage with environmental concerns to enact sustainable behaviour (Defra, 2008). Segments 2 and 5 are likely to be influenced by other people's behaviour (Defra, 2008). These three main types of user model were adapted and included in the Carative Factors Inspirational Toolkit because of the way the groups are clustered, fundamentally based on the gap between attitude and behaviour. This resonates with the gap between a caring attitude and caring behaviour; therefore, this PhD attempts to explore ways to reduce the gap through caring factors to achieve sustainable behaviour.

Defra (2008) has suggested that an understanding of current lifestyles is needed to develop interventions for different population segments. It is thus relevant to assess segmentation in tandem with addressing key life-stage moments (e.g. moving house, having a baby), as people generally tend to change their behaviour at these particular points (Defra, 2008). Therefore it may be useful to address life-stage moments to find out whether there are strategies that can work across segments, or to identify which interventions are applicable and more beneficial. This PhD attempts to understand intervention that promotes responsible and decisive disposal behaviour by tackling the barriers for people who are facing moments of change in their lives, such as moving house or children growing up, as these situations tend to produce an increased amount of end-of-use waste.

3.7. The Concept of Care in Design

Care is "the sequence of action that makes up the complex substantive act of care" (Dilnot, 2017). It is delivered through acts by understanding the perception of care-receivers' needs, their situation, their requirements and the translation of that consideration into an act or object or gesture that attempts to answer or meet those needs (Dilnot, 2017). In other words, care is something that expresses our relationship to each other and the world (Rodgers et al., 2019). Care is about the relationship with a subject in need, and it always involves others, but also particular circumstances. In certain cases, care is about how it is delivered. Care is the moment of gesture of how this act of care is presented. Gesture stands for "the manner (attitude) through which an act of care is presented", and gesture relates to the particular moment of care in a particular context or situation (Dilnot, 2017). However, the concept of care in design is an "ideal and aspiration" (Dilnot, 2017), therefore it is an abstract concept which is not instantly clear in terms of definition and how the gesture of care is expected to be performed. Dilnot (2017) states that people tend to understand care through "a specific act we are engaged in", not through principles. He emphasises that in the act of caring, the care-giver does not speak about care action, but does act. The care-giver acts on the proffered solution. People may talk about a specific action after the care-giver's behaviour, but not the principles. Therefore, as soon as we separate the language from the site where the care action is delivered to its subject, we make the substance of care act difficult to access and engage with. Care can be discussed by looking at action; otherwise it loses its reality as a human action. This disassociation leads to uncertainty between thought and act, and obscures our understanding of the substance of the gesture of care itself (Dilnot, 2017). Consequently we lose the sense of care: what care actually is. Dilnot (2017) also insisted that care does not always come with the action, the gesture that emerges from the generalised concept of care remains without an understanding of what must be done, and therefore without specific content. Therefore the gesture that emerges from a generalized concept of care has not yet been clearly defined in design and it is difficult to set functioning criteria by which it can be exhibited. Dilnot states that "we are no longer sure how the gesture is supposed to be performed" (Dilnot, 2017).

Badiou (1998, p15) claimed that "only a clear vision of the situation is needed" to understand care action and set the principles. To propose a clear direction of care in design, the designer needs to consider the translation into a "materially-expressed gesture, act or object" (Dilnot, 2017) in relation to the particular context or situation. This perspective requires account to be taken of the creative translation of need through the "capabilities of a made thing, and the capacities to meet the perceived need" (Dilnot, 2017). The way in which designers capture the awareness of perceived need is thus relevant, as it can then be materialised and embodied through the design process.

The theory of care might be useful in design to understand care action, to generalise and frame care action and its principles, and re-establish an inherent ethical dimension. The analysis of acts of care based on the theory of care, and understanding these in their embodied situated sites will help to develop care in design. In this sense, the translation of care receivers' needs and their situation is relevant, so that care givers' perception delivers something that answers needs. The materialisation of their needs through the design process has an advantage. Dilnot (2017) gives an example of a chair that relieves the distress and pain caused by standing. In this context, a chair is the translation of a need which relieves and endures (Dilnot, 2017). The quality of knowledge and understanding that is built into the object, and the object's configuration, can define the care. Care, therefore, that involves providing an answer to perceived needs is key to the role of the designer. The role of designers is to provide a configuration as well as the necessary technical conditions for the care receiver more specifically, and to encode these into the configuration of the thing with a significant level of knowledge and understanding of its users (Dilnot, 2017).

However, knowledge about how to use the product and the effect of the product is not the only amount of need required that might be encoded within the design of objects through which care is delivered. Care is also about the possibility of diverse ways in which the need for care can be met, but also about their implication (Dilnot, 2017). To generalise care as embracing objects and services is the complex translation of needs into varieties of forms capable of meeting these needs. The social, political and cultural context all play into this (Rodgers et al., 2019).

3.7.1 Design-With-Care

The intention of design–with–care is "to fulfil the need for a practice of design that is oriented to care as a commitment to human and non-human co-existence" (Rodgers et al., 2019). It is not to promote the "designer as hero", but to offer a "humble but valuable expertise" (Rodgers et al., 2019). The aim of design-with-care is to connect people, things and situations as they are but "caring for the dynamism of difference and celebrates diversity and fluidity, operating inclusively and leaving the process and products of design open and transparent" (Rodgers et al., 2019). It goes beyond design practice as "making preferable", instead "acting to give form to the practice of caring ecologies" which surround multiple care-givers and receivers across both systems and context (Rodgers et al., 2019). In this approach, design needs to be attentive to context, difference and time to be relational and reflexive, and therefore caring (Rodgers et al., 2019). Yet it is important to understand that care is action, requiring effort and time to build a relationship and maintain contact, and has an effect. Good design should set out to build this relationship through helping care receivers, which requires listening deeply, look closely, and be responsive to the context and expressed needs (Rodgers et al., 2019). We live in transitional times which require a clear vision of the situation (Badiou, 1998) Yet, the key role of care is that providing opportunities for transition to a better future, thus design-with-care has the potential to suggest a possible future vision.

Design has the potential to bring care to presence (Rodgers et al., 2019). Rodgers et al. (2019) defined design–with-care as a way of genuinely acknowledging what exists already and sustaining these resources (Rodgers et al., 2019). This may be a small nudge or a reconfiguration of relations. This can be an altering of existing resources, or designing away from them. This also means rearranging the relations, facilitating a new involvement of design action with place, history and culture. It also means recognising that a variety of perspectives and other disciplines are required in order to understand and make sense of complex relations and dynamics that are inherent in real world. Then these different forms of knowledge can be integrated and exhibited in a meaningful way. They insist that as design has the power to serve as a means for developing ways of caring for a better world, our livelihoods, our relationships and for each other, designers should be individually and commercially prompted to take action, to take

responsibility for the framing of design problems and propose a future possibility. Furthermore, they state that design has the power to make a difference in relations and the world by looking at what design brings to facilitate the care that already exists. Design needs then to accommodate the engagement of caring in the actions of care and their consequences. Rodgers et al. proposed two relevant conditions for the design of possible futures in relation to design-with-care: 'care of relations' and 'care of complexity'.

Care of Relations is to design-with-care by taking into account that today the relationship between people, things, environments and ecology must be repaired, not only to maintain a good balance but also to emphasise the interdependence between these entities (Rodgers et al., 2019).

Care of Complexity is to design-with-care by being sensitive and responsive to the boundaries between humans and the non-human (i.e., artifacts, animals, nature), local, global, virtual and temporal contexts, and acknowledging the importance of valuing the commonality and diversity in post-global, post-national, and post-individual contexts (Rodgers et al., 2019).

Within these conditions, design has to develop ways of caring relationships. In other words, design needs to find a way to develop the balance of our being and the being of non-human entities between these different products and services, and to agree with an empathic and compassionate view of our world. Caring and designing will then empower all participants in caring gestures, action, and objects, including humans and non-humans, in a relationship of care.

3.8. Definition of Care in Care Theory

Care is a term rooted in the word '*Cura*': traditionally the word came from a mythological figure (Reich, 1995). The myth vaguely suggests that "humankind as a social totality is brought into the world and sustained by care, since it binds humans together, care is the glue of society" (Reich, 1995). In the *Oxford Dictionary of English*, the term 'care' is defined as:

1. (Noun) the provision of what is necessary for the health, welfare, maintenance, and protection of someone or something.
2. (Noun) serious attention or consideration applied to doing something correctly or to avoid damage or risk.
3. (Verb) feel concern or interest; attach importance to something.
4. (Verb) look after and provide for the needs of.

The word ‘care’ represents two fundamental but conflicting meanings. It represents “worries, troubles, or anxieties” (Reich, 1995); on the other hand, care signifies “providing for the welfare of another, which delivers a positive connotation of care as attentive conscientiousness or devotion” (Reich, 1995). The German translation of the English word ‘care’ encompasses an awareness of dependency, possession of needs and relatedness as basic elements of human composition, and also to concrete caring activities in a broad sense (Reich, 1995). The word itself has a nuance in that there are different ways to deliver care activities in different forms; however, the dictionary explanation does not imply specific care activities.

To understand the meaning of care behaviour within the sustainable behaviour change context, it is essential to establish the meaning through academic definition. In care ethics literature, 'care' is most often described as “a practice, value, disposition, or virtue”, and is frequently described as “an overlapping set of concepts” (Held, 2006, pp.36-40). Held (2006) noted that care is “a form of labour, but also an ideal that guides normative judgment and action”. Engster (2007, p.28) developed a “basic needs” approach to care, defining care as a practice that includes “everything we do to help individuals to meet their vital biological needs, develop or maintain their basic capabilities, and avoid or alleviate unnecessary or unwanted pain and suffering, so that they can survive, develop, and function in society”. Tronto (Fisher et al., 1990, p. 40) interprets care as “a species activity that includes everything that we do to maintain, continue, and repair our 'world' so that we can live in it as well as possible. That world includes our bodies, ourselves, and our environment”. Bubeck (1995) further argues that the caring relationship does not necessarily involve or invoke any specific emotional attachment. She described care by highlighting “personal interaction and dependency” (Bubeck, 1995, p.129). They distinguish care from “service”, by specifying that “ ‘care’ involves meeting the needs of others who cannot meet their needs themselves”, whereas “ ‘service’ involves meeting the needs of individuals who are capable of self-care”: although this view has many critics it may be useful in a human-object context (Sander-Staudt, no date).

Heidegger (2005) used the word *care* at an abstract, ontological level to describe the basic structure of the human self. His philosophy offers a deeper level than the psychological experience of care, while he stressed that *care* is what accounts for

the unity, authenticity, and totality of the self: that is, of *Dasein.* Briefly, Heidegger claims that "we are care, and care is what we call the human being" (Heidegger, 2005, p.225). Heidegger stated the role of care as follows: "… it is care (Sorge) that signifies a man's existence and makes it meaningful" (Heidegger, 2005, p.225).

To sum up, care is a crucial form of human development, and it is primarily aimed at physical needs but also spiritual requirements (Reich, 1995). Care represents one of the most fundamental values of humans to maintain this world, and one of humans' intrinsic behaviours. The term care is often found in nursing practice; it is a feeling that also requires an action. Care offers a response in the present as well as projecting concern and hope into a shared future (Jones, 2013). However, care states, activities and moral commitment need not only mean nursing and social work activities or housework in the narrow sense, but also "dedication to a cultural transformation" extensively to "care for the world" (Reich, 1995). In other words, all human beings are required to practise care for the development of our society (Tronto, 1993). As we are living in an individual but complex society, care demands "good intentions, combining activities, attitudes, and knowledge of the situation of other encounters" (Tronto, 1993).

3.8.1. Caring Process in Human Care

The word 'caring' is derived from the word 'care' (Reich, 1995). Philosopher Milton Mayeroff (1971) provides a detailed description and explanation of the experience of caring and being cared for. He took the idea of care into new personalist directions (Mayeroff, 1971). His definition of caring is "a process, a way of relating to someone that involves development, the relationship is mutual", and "through caring for someone or something that we grow as human beings" (Mayeroff, 1971). Therefore, "if you care for something, you are helping others or things grow, develop and progress in some way" (Mayeroff, 1971). The process embraces 'memory' but also expresses the 'expectation' for the one cared for. Caring (and being cared for) can give meaning to our ordinary lives, and the depth and value that come with emotion (Mayeroff, 1971). He insisted that caring could get stronger through the practice of mindfulness; this is called 'the force of care', which signifies that care gets stronger and extendable through continued practice: its process is a universal one, which applies to us all (Mayeroff, 1971).

Watson also explained that the caring process "helps the person attain (or maintain) health" but also she added to "die a peaceful death". In nursing practice, caring behaviour is as much about maintaining or mending subjects (that is, patients) as it is about ways to "let things go gracefully" (Watson 1985, p.7). In certain nursing practice, caring is a process of understanding patients' quality of life, accepting their condition (Purtilo and Doherty, 2010) and respecting their current condition. The process aims to sustain a subject's condition, or, where this is not possible, to reduce the pain and distress of the inevitable to "let go peacefully" (Watson 1985, p.7). Caring means aiming to provide comfort (when cure is no longer possible) and find ways of gracefully letting go (Purtilo and Doherty, 2010). This resonates with the requirements for the sustainable user. This thesis suggest that care practice could help to respond to their requirements and promote sustainable behaviour: discovering and understanding which factors can motivate such emotion and action may be valuable in promoting user-object detachment and care-giving behaviour.

The theorist Trontos (1990) identified 'four phases of caring'. She suggests we need to allocate care responsibility in society in order to maintain 'our world' (Tronto 1990, p.40).

1. Caring about	Recognizing the need, attitude
2. Taking care of	Seeking responsibility
3. Caregiving	Action, behaviour, reacting to a care-receiver's needs, facing conflict with other factors.
4. Care receiving	Assessing the success of the intervention with the care-receiver and preserving the relationship between care-giver and care-receiver. The most distinctive aspect of the ethic of Care.

Table 2. Tronto's 'Four phases of caring' (1990, p. 40).

In Table 2, the phases of care are broken down into four stages that provide an understanding of the cognitive, emotional, and action strategies for the care-giver. The phases of caring are not necessarily in sequential order, and often overlap

with each other (Lachman, 2012), but may fail to follow as there are more needs than caring capabilities (Shaw et al., 2016). Shaw et al. (2016) sees that a caring attitude does not necessarily lead to "care-giving", because of conflicts between the individual's self-benefits and social norms: not having much knowledge or information also creates confusion and uncertainty about how to address care action. Indeed, the different 'degrees of care' exist from the instinctive level to the social dimension. 'The degree of care' controls a person's feeling and influences care behaviour about whether to act or not and "That degree presupposes some valuation regarding 'what makes 'x' worth caring about" (Shaw et al., 2016). Depending on the variation of the subject and its experiential value, the level of caring is defined and encouraged to act (or not to act) (Shaw et al., 2016). Tronto (1993) acknowledged that care is "relational with inclination to care for those in closest proximity" (Shaw et al., 2016). This view was relevant to this research to understand the phases of caring behaviour and the behavioural challenge.

3.8.2. Caring Factors in Human Care

Trontos (1993, p.127) further identified 'four elements of care' (Table 3) that are necessary to increase efficacy for motivating caring behaviour from a psychological perspective in relation to 'four phases of caring'.

1. Attentiveness	Detecting need, not neglecting needs, care requires recognition of other's need in order to respond to them.
2. Responsibility	Receptive position with respect to the patient, obligation refer to situations where action or reaction due
3. Competence	Knowledge and skill
4. Responsiveness of the care receiver	Care is concerned with condition of vulnerability and inequality.

Table 3. Tronto's 'Four elements of caring', (1993, p.127).

For example, without attentiveness, a nurse would not even recognize that there might be something wrong and would be seen as literally not caring about what happens to them. Without responsibility, a nurse would not support what a patient needs, and without competence they would not be able to provide a patient with the best care necessary. And without the responsiveness of the care receiver, optimal health will not be achieved. Having interest in or concern for something is the one of the fundamental elements to recognize need (Lachman, 2012) which can be associated with Fogg's behaviour change factor 'trigger'. Competence requires knowledge and skill, which are associated with Fogg's factor of 'ability': the other three elements were relevant for this thesis.

Distinctively, the ethical aspect is the fundamental value of caring. Thus, the central point is that normative value applies to whether the care-giver makes a decision to act or not. Care as a normative value is related to "the ideal of not inflicting harm, but it also includes a reasonably limited commitment to actively working for the preventing of harm" (Pettersen, 2011, p.54). Furthermore, it is related to "the ideal of contributing to the promotion of good" (Pettersen, 2011, p.54). This can be associated with sustainable behaviour's fundamental aim within the circular economy to generate less harm for objects and the environment, eventually increasing the quality of our lives. Therefore, care practice has the potential to promote sustainable behaviour.

Eriksson (2006, p.178) introduced the word 'carative' in caring science and defined it as "love and charity" and the motive for all caring. Her theory influenced Watson's development of carative factors (Nelson and Watson, 2012). Watson's carative factors aim to define the caring process that may help a patient "maintain life" but also "die a peaceful death" (Watson 1985, p.7). Carative factors are seen as "nurse-patient interactions and relationships" that can be employed "to support and enhance the experience of the actual caring occasion". (Watson, 2008, p.5). Within Watson's theory, the core concept of carative factors lies in love and a heart-centred approach and compassion (Watson, 2008; Watson, 2012). She argues that nurses should not only focus on professional practice as technicians or skilled workers with scientific knowledge and expertise does, but also in a broader context of ethics and metaphysics-spirituality (Pajnkihar, 2008). In her theory of caring, she emphasizes a co-created relationship between care-giver and patient. Moreover, caring consciousness and moral commitment are

needed to make a connection with the care receiver within the allocated space and time. In other words, through the practice of care, nurses discover the value of the care-receiver, and care action becomes meaningful and stronger.

In this thesis, it was necessary for nurses to understand which factors influence the patients (or family) to decide when it is time to let go peacefully. Knowing such influential factors will help nurses to make better decisions and deliver care appropriately. Carative factor number ten 'Opening and attending to the spiritual or mysterious and existential unknowns of life and death', was relevant to this research from the 'letting go' perspective, as this is about encouraging the nurse to see the existing value of the current condition of the patient but allows them to open their mind to more hopeful opportunities.

Noddings (1984) stated that the caring relationship is basic to human existence and identified two parties in a caring relationship: the 'one-caring' and the 'cared-for' and insisted that both parties require some form of obligation to care reciprocally. "The human affective responses" and the "memory of being cared-for" motivate care action. Mayeroff (1971) also indicates the importance of a feedback cycle between care-giver and care-receiver for the continuous caring process. According to Mayeroff (1971), caring emotion extends over time, unlike immediate empathy, though it requires an understanding of the care-receiver's experience. To create a repetitive experience, it is important to consider the long-term and authentic characteristics and value of the care–receiver, not just to respond based on immediate needs (Mayeroff, 1971). Providing meaningful responses between the two parties makes caring relationships unique: this aspect was a relevant approach. Mayeroff (1971) proposes caring as acting on empathy, as being able to understand another's world as if you were that person. In their caring relationship, the caregiver focuses attention on the care receiver and becomes observed in their process. Jones (2013) suggested that good care aims to help the person or things progress in some way to be as independent as possible, yet safe. Chris Gastmans (2006) also shares similar views and states that good care combines certain activities, attitudes, and knowledge of the care-receiver and the situation (Gastmans, 2006). At the same time, care is a reciprocal practice, occurring within a framework of a relationship between the caregiver and care receiver (Gastmans, 2006). In summary, good care practice is exhibited when the care-giver is competent, aware of the receiver's need, has knowledge, and is

responsive and respectful (Lachman, 2012). The context for good care practice, such as the care-receiver's context or the care-giver's mood and situated environment, can be associated with the context of sustainable behaviour change. They were relevant factors in this research.

Form of care	**Description and properties**	**Types of relations and acts**
To care for	Affection or love for specific others	Intimates, lovers, family, friends, kin. Expectation of attention and sensitivity to caring needs
To have care of	Responsibility or duty of providing for attending to the needs of another. This may be frequently instrumental or functional acts of caring, such as washing.	Social position – legitimate acts of caring associated with that position, such as teacher, parent, guardian, physician, etc.
To care about	Some commitment of interest – a disposition to act in certain ways to enhance or maintain the state of the entity of interest. Some valuation is involved.	Providing medical attention, parenting, providing advice, listening attentively, treating with respect: even the outcome of events
To care that	Concern in the form of benevolence – no specific caring act(s) e.g. concern may be expressed over conflicts in distant parts of the world	Not focused on a particular individual: more abstract and less concrete

Table 4. Blustein's (1991) 'Forms of Care', reproduced in Shaw et al. (2016).

However, there is some recognition of how better care is provided without a loving form of care. Engster (2007, p.28) stressed the need for basic moral obligation from the people who are providing care with due consideration of the receiver's circumstances. In this view, care is socially constructed, thus their behavioural motivations are defined by social position. Care is a learned

behaviour acquired within a particular cultural environment. He also emphasises the care-giver's capabilities: "we should care for others in need when we are able to do so because we have implicitly demanded and continue to demand care from others…" (2005, p.57). Blustein (1991) proposed a detailed exploration of human 'care' in its various forms: concern for and commitment to individuals, ideals, and causes (Blustein, 1991). His analysis emphasises the multi-dimensional properties of care, and identified four overlapping form of care. He emphasizes the importance of care from the perspective of committing to something and insists that commitment of care has longevity and consistency (Blustein, 1991; Davis et al., 2007) of action, and that commitment arises from shared beliefs and moral obligation, but is not necessarily a duty.

Furthermore, Shaw et al. (2016) emphasized that there are different motivations to 'caring for' as a process of care. She made an attempt to understand the gap between a 'care about' attitude and a care-giving behaviour challenge through exploring the role and influence of care by adapting Blustein's (1991)'s 'Forms of care'. She sees the gap as resonating with the sustainable behaviour and attitude gap, particularly ethical consumption behaviour, and tried to translate the different 'Forms of Care' into caring action to develop a discourse of ethical consumption behaviour (Table 4).

In particular, they examined the commitment form of care as a means of informing the gap but also as a motivation for action, because "care about" is related to commitment to action (Shaw et al., 2016). Within the 'care about' and 'have care of' forms, for example, nurses provide better care action because of the "binding qualities of the membership of her group, such as a network of belief", which motivates them. The nurse accepts the particular role within her group as part of shared intentions (Shaw et al., 2016). The scope of this obligation does not extend to 'caring for': there will be limited empathy and attention to needs. The commitment fundamentally arises from the moral obligation that is about what is right and virtuous (Engster, 2005). In such cases, there is no involvement of personal advantage, but "loyalty, benevolence and unselfishness" can be manifested in such behaviour (Blustein, 1991; Davis and McMaster, 2013), thus 'Caring about' may benefit the care receiver without benefiting the caregiver. This is a different motivation to 'caring for'. There may be some sense of obligation and responsibility that follows with the form of commitment (Shaw et

al., 2016). Obligation entails responsibility that is related to an individual's role and position. In light of this, forms of care may not appear as single forms, but could emerge with multiple forms (Blustein, 1991). Although Shaw (2016) emphasized a commitment form of care as a motivation, all four forms of care were relevant to this thesis, and it provided a foundation for understanding user-object relations. Understanding different forms of care will help to identify what influences a person to motivate care action, and to examine the different types of relations and behaviour depending on the which form of care is dominant. In other words, the different forms of care influence a person to be motivated to act.

However, providing a too intense approach to caring about something becomes a burden to the individual and care action leads to "the loss of autonomy" and sometimes does not meet the receiver's needs. Providing a superficial approach to care could potentially lead to throw-away behaviour, or replacement behaviour (Baier,1982) .

3.9. Care in Design for sustainability

'Care perspective', or 'care thinking' are commonly connected to social policy, health and social care within the design industry (Barnes, 2012; Jones, 2013). However, there is little formal interpretation of this term in respect to the practice of design for sustainability or how we adapt the meaning of care in sustainable designing processes. Sustainability is often used to describe appropriate and desired responses to the environmental challenges of our time. However, it is important to note that because of the complexity and vagueness of the term, the path to a sustainable future is difficult to envision and not yet clear (Engelman, 2013).

Within the literature of design for sustainability, care is either mentioned directly or indirectly by using synonyms like protection, responsibility, or awareness (Carleklev, 2017). Care is "persuasive and persuades someone to do something changes their behaviour" (Carleklev, 2017). The aim of care in design for sustainability is not just about the capability of something to be maintained over a long period, it also asks questions about what make our life worthy. (Ehrenfed and Hoffman, 2013). In this regard, Gwilt et al. (2015) defined appropriate care practice as "knowing how to help extend and preserve the life and use of

particular objects and spaces". She argued that current society cares less about product care and maintenance, consequently fostering a 'careless' society.

In sustainable design, care practices have been explored by focusing on creating a relationship between users and objects by proposing ways to handle the product with care, and suggesting various repair methods or upcycling methods to postpone its replacement, and thus consume less. Chapman stated that our daily use of products "...depends upon our care and attention in order to survive" (Chapman, 2005, p.72). Cox et al. (2013)'s view of care practice, such as repairing, was more focused on building a relationship between the user and objects. Gwilt et al (2015) views care practice as maintaining objects. They explored drivers for maintaining users' behaviour behind key decision-making factors. McKaren et al. (2015)'s definition of care is activity to maintain value; therefore she attempts to discover how consumers' attitudes, expectations and behaviours (e.g. washing) in relation to clothing lifetimes affects garment care and clothing use.

Gwilt et al. (2015) investigated the consumer's unpredictable care practice embedded and expressed in their daily encounters with products, which has the potential to become motivational factors to encourage users to engage more with care and maintenance activity as a means to extend the lifespan of the products. They found some of the care value attribution that users associate with products; however, this research merely focused on examining care practice from the owner-object perspective to engage more maintenance activities for the individual user, but did not consider care practice from multiple users' perspective. A similar research approach was taken in this PhD during the foundation study to understand the care practice embedded in our daily encounter with products. There, I extended Gwilt (2015)'s view of care practice into three different perspectives (See Chapter 2).

3.9.1. Forms of Care Approach to Sustainable Behaviour

Forms of care (affection, responsibility, commitment, benevolence and empathy,) have been used individually to inspire and stimulate designers, as a means to invoke a caring attitude in users and behaviour change through design.

Forms of Care: Affection

Design research has identified a need to understand what motivates people to keep and care for products for prolonged periods (e.g. Chapman, 2005; Schifferstein and Zwartkruis-Pelgrim, 2008; Mugge et al., 2010; Niinimäki and Koskinen, 2011). 'Caring for' is the most primary level and fundamental way for humans to create value in objects and it is "a 'love' form of care" (Shaw, 2016). Within this property of relations, people are naturally inclined to help and give care to the object (Kirschen, 2001). The 'love' form of emotion is elicited from products when people are attached to them (Mugge, 2007). Mugge, Schifferstein and Schoormans (2004) explained that "when a person is attached to an object, (s)he is more likely to handle the product with care…". Chapman (2005) also stated that if a consumer feels attachment to a product s/he will handle it with good care, and even postpone its replacement. Providing an opportunity to establish an emotional bond or attachment between user and product that together with associated practices of care can help sustain and extend product lifetimes (Chapman, 2005; Walker, 2006; Schifferstein and Zwartkruis-Pelgrim, 2008). Walker (2006, p.49) also pointed out that products that provoke emotional and personal responses can become "...precious to us and worthy of our care". This suggests that an object has to be valued, be special or cherished in order to motivate the user to care for it.

Desmet (2012) identified the 'love' form of emotional interaction with objects as tending "to create the experience of an urge to be affectionate and to care for someone or something". Such emotion is accompanied by feelings of affection (and attraction), which tends to "induce an approachable attitude, intimacy and nurturance towards the object" (Desmet, 2012). Whether products are beautiful or provide sensory pleasure, or people have invested time or effort in them, influences users to love products (Desmet, 2012). The relationship with objects create meaning, value and experience through the cognitive process and gives rise to caring action. During the course of the relationship with things, the emotionality of the relationship implies the power of the objects to evoke meaningful opportunities (Demir, 2008) to care for the product and keep the product as long as possible (Savaş, 2004). Experience is also shaped by the characteristics of the user, the features of things, and many other physical factors (Desmet, 2004). In addition, the experience is always influenced by the context

(e.g., physical, social, economic) in which the interaction takes place (Desmet, 2007) and the care action is delivered. Sometimes the product itself represents someone we love, which enables the user to express their love for the object (Desmet, 2012). Norman (2004, p.70) described affective emotion as elicited by "...an object's special characteristics makes it a daily part of our lives, when it deepens our satisfaction, whether because of its beauty, its behaviour or its reflective component" (2004, p.227). However, Norman (2004) claimed that although affectionate emotion for a product is provoked through the interactions between product and user, the user does not necessarily feel they have a moral or ethical responsibility to care for the specific product.

Forms of Care: Responsibility

Through the responsibility form of care, people act because it is the right thing to do (Kirschen, 2001). People's awareness of what ought to be done motivates them to take care of something (or someone), addressing need (Tronto, 1993). Gwilt et al. (2015) point out that an alternative view on care practice is that "responsibility should be shared between users and producer", thus users also have a duty of care to engage with care and maintain the object by preserving its functionality. They argued that "design is then not merely seen as a contributor to production, but instead it is a bridge between production and consumption" (Gwilt et al., 2015). They explore the practice of care from the perspective of maintaining the product processes, concluding that there should be the potential to give responsibility by offering information to consumers about the after-care system, improving personal knowledge at the same time as providing the required external facilities. Their view associates with the PSS, and both approaches were relevant to this PhD.

When people recognize the influence of their behaviour and its result in creating a better society, then a specific norm of responsibility is generated to elicit behaviour change (Dolan et al., 2009). Furthermore, Wever (2006) conducted research to understand littering behavior, which has proved that when no one is watching people tend to display careless behaviour by littering more, whereas when people are being watched by others then they tend to take more responsibility for their actions. The recycling programme study in Norway discovered that perceived responsibility was found to be a major determinant for

people in delivering recycling behaviour. Responsibility for their own recycling behaviour tended to be taken less often when people were not certain about whether their neighbour was recycling or not. This shows that knowing about the actions of their peers has the potential to create a responsibility for respecting and promoting the value of things to prolong the circulation of material (Dolan et al., 2012). In behavioural economics, generating loss aversion in the consumer's decision-making process is likely to bring success in provoking the taking of responsibility for objects' return. A deposit system is a good example: "when customers hand over their deposit, loss aversion predicts that failure to return the bottle and collect the payment back will trigger a larger psychological cost" (Dolan et al., 2009). However, this approach requires an understanding of a person's experiences and the value of attachment to the possessions.

Forms of Care: Commitment

According to Blustein (1991), commitment has two distinctive factors: it "presuppose a belief" and "involves a dedication to action implied by that belief". Because commitment is an authentic and genuine emotion, such a disposition translates into particular action (Shaw et al., 2016). Within the state of commitment, the ethic of the care role dominates: if it is not delivered some might feel guilty (Kirschen, 2001). This is because commitment arises from the moral obligation to do what is right and virtuous (Blustein, 1991). The ethical aspect of its nature produces certain social norms and shared intentions among group members (Shaw et al., 2016), encouraging a motivation to act and habit of behaving. However, people are not forced to act but act voluntarily, as it is not necessarily a duty. When people have a commitment to something then they are willing to spend time and energy for a long time (Fogg and Hreha, 2010). In other words, the commitment form of care has longevity and consistency (Blustein, 1991; Davis and McMaster, 2007). Through the commitment form of care the caring activity becomes habitual, and people learn to resist or reinterpret the activity in other ways to maintain (or promote) the values. Generally, people's commitment is boosted when they know what will happen in the future, participating activities are on a regular basis, they have a long-term plan, or there are reciprocal benefits.

Pledgebank.com (Figure 18) and www.stickk.com are web-based platforms which enable users to set their commitment contracts: other people help them to achieve personal goals by doing things together. First, users set up pledges and other people are encouraged to sign up for them. If the pledge attracts enough people, the group encourages the ideas to move forward. Current examples include 'I will start recycling if 100 people in my town do the same'. The design system induces people's social norms and shared intentions to commit to such activity and enhances their local community's engagement.

Figure 18. Screenshot of Pledgebank.com website.
Image has been redacted.
PledgeBank, Mysociety,Uknown. PledgeBank UK. [Online].Mysociety website,
[Accesses 13 November 2014]. Available from:
https://www.pledgebank.com/assets/img/screenshot-pledgebank.png

Shaw et al. (2016) described the commitment to a particular set of values as entailing the sense of responsibility and obligation. A responsibility form of care acts as a link between the commitment form of care and the affection form for desire to act: this makes people behave in a caring way (Shaw et al., 2016). Similarly, MINDSPACE asserts that when designers try to use commitment devices to make an initial change in their behaviour, people may build on that initial change and start taking personal responsibility in the related areas, too (Dolan et al., 2009).

Forms of Care: Benevolence

The benevolence form of care is described as "the desire to do good or charitable feeling, that is not focused on a particular person", that is "more abstract and less concrete" (Shaw et al., 2016). Benevolence does not involve action or behaviour to affect a process or outcome. For example, it is possible for people to have benevolent emotions toward people who are working in poor factory conditions to produce clothing. However, there may be limitations on acting because of distance, lack of caring resources and a lack of shared intentionality (Tronto, 1993). In other words, the environmental effects *on* behaviour *are a* lot stronger than most people expect, and accordingly the situated context influences the eliciting of benevolence to determine care action.

Forms of Care: Empathy

Eliciting empathy is a central method for achieving caring, altruism, and compassion (Kim, 2008). The Chinese idiom Yeok-gi-sa-gi (역지사지) is a thinking process of "considering for others, seeing things from another's perspective and being able to put aside one's self-centred focus and impulses" (Kim, 2008) in order to open the way for empathy. These capacities are ever more demanding in our increasingly multi-faceted society, allowing people to live together in mutual respect and creating a caring society (Kim, 2004). Here, language is a very important tool to achieve empathy. Rather than saying 'Don't hit Jimmy, that hurts him', it is a more caring and attentive approach to say 'how would you feel if Jimmy poked you?'.

Creating emotional engagement between users and subjects through the design of systems influences people's decision-making for behaviour change. Within the behaviour change context, the empathic form of emotion refers to the consideration of the collective versus the individual (Tromp et al., 2011). Empathy tends to be described by defining "whether the user is focusing on themselves or others and what others think" (Tromp et al., 2011). It plays on the user's concerns about themself versus the user's concerns about others: 'I know I do something' versus 'the world knows it'; social norms versus individual norms; consequences for me versus for others; users' responsibility versus others' responsibility (Tromp et al., 2011). Observation, role- playing or playing with

prototyping techniques are used in the design context for users to gain empathy and try out behaviour in a certain context (Aldersey-Williams et al., 1999; Steen, 2008). Through these techniques, "the researcher can get input about users' experiences and emotions towards the surroundings, in different or future physical, social or cultural contexts" (Steen, 2008).

Figure 19 and 20. The bird-shaped litter bin (left), and a charity donation poster by Oxfam (right).

Within design for sustainable behaviour, knowing how other people (or objects) experience the particular situations could help designers to elicit empathy from users and improve the people's commitment, and is the first step toward caring action (Tromp et al., 2011). For example, presenting photos of how other people experience a certain context is one way to elicit empathic emotion (Figure 20). The image of a very thin woman and her child engages people's emotion, influencing people's decision about whether to donate or not. Creating anthropomorphic features is another strategy in product design practice that affects empathy (Riek et al., 2009) to accomplish emotional designs. The physical appearance of a human likeness serves as a key visual stimulus to trigger a positive effect in people, and this promotes related behavioural responses (Fink, 2012). The litter bin featuring an open beak engages people's feelings that they would like to be fed, and encourages people to behave sustainably (Figure 19) (Lockton, 2018). However, Tunstall (2014) argues that while empathy may be encouraged through design, the value of 'caring' involves action. Therefore,

while empathy can enable designers to understand the experiences of other people (Brown, 2013) or subjects, she considers that empathic emotion alone does not automatically involve the more positive act of caring. This resonates with Shaw's view on the gap between a care attitude and care-giving behaviour: therefore other forms of care and factors are required to motivate caring behaviour.

3.9.2. Approach to Nursing Practice

In the literature on care in nursing practice, Watson's 'carative factors' aim to define the caring process as one that "helps the person attain (or maintain) health" but also to "die a peaceful death" (Watson, 1985). Care behaviour is as much about maintaining or mending subjects (that is, patients) as it is about ways to let things go peacefully. Particularly in certain nursing practices, caring is a process of understanding patients' quality of life, accepting their condition (Purtilo and Doherty, 2010) and respecting their current condition. The process aims to sustain a subject's condition, or, where this is not possible, to reduce the pain and distress of the inevitable to "let go peacefully" (Watson 1985, p.7). In this sense, the caring process could be applied in user-object relationships to influence a user's decision-making process on hibernating or accumulated object at end of use, aiming to encourage users to respect the value of the current condition of the object in relation to future opportunities where its value can be recaptured. Moreover, Gastmans (2011) explains that good care aims to help the person or things progress in a way they can be as independent as possible, yet safe. By integrating these concepts, opportunities can be found to create caring motivations for the possibility of letting go peacefully, and of detachment from ownership, which may contribute to the longevity of objects and ensure that the hibernating or accumulated object at end of use and its valuable material is returned back into loop and are not sent to landfill, incinerated or lost. Such an approach could provide a new approach to design for sustainable behaviour within the context of the circular economy.

Caring (and being cared for) can thus give meaning to our ordinary lives through the depth and value that come with emotion (Mayeroff, 1971). In other words, through the practice of care, users discover the meaning of objects, and care action becomes meaningful. According to Marchand (2004, p.128), sustainable users 'make a conscious effort to change their outlooks, as a means of combating

their dependence on unnecessary objects' and 'wish to rediscover simple pleasure of being, attaining happiness and inner peace through respect for others and the living environment'. This resonates with the carative philosophy of 'peaceful letting go', and thus care practice could help to respond to their requirements and promote sustainable behaviour. This could facilitate the discovery by users of the meaning of objects and their material.

3.10. Insight from the Literature Review

The review of the literature shows that hibernation is a significant barrier to a circular economy model (Wilson et al., 2016). In many cases, hibernating or accumulated objects at end of use become obsolete and thrown away. Therefore, the loss of resources and value within the loop must be reduced and it must be ensured that end-of-use products and the valuable material that they contain are returned back into loop and are not sent to landfill, incinerated or lost (Wilson, 2017; Darby and Obara, 2005). By considering these aspects during the design process they may promote responsible and decisive disposal behaviour, such as returning the product for reuse, remanufacturing or recycling. In this sense, it is worth understanding and exploring the emotional factors at play for different users (or owners) in their decision-making attitude towards hibernating or accumulated objects at end of use.

The literature review showed that the carative philosophy of 'letting go peacefully' in nursing practice resonates with the requirements of sustainable users, as sustainable consumers wish to own high-quality objects at the same time as keeping their accumulation of goods to a minimum, and they tend to practise a certain detachment towards the objects they own, to deal with the issue of obsolescence. Hence care practice could help to respond to their requirements and promote sustainable behaviour. Carative factors relate to "the ideal of not inflicting harm, but […] also includes a reasonably limited commitment to actively working for preventing of harm" (Pettersen, 2011), so understanding, translating and exploring which factors motivate such actions for different types of users may be valuable in addressing the user-object detachment approach. Figure 4 is an illustration of scope and topic included in this chapter, highlighting the connection between the literature in the field of care and design for sustainable behaviour. It describes the potential feasibility of adapting and

applying the care practice of 'peaceful letting go', and the translation of five themes of caring and carative factors from nursing practice to the design process in order to promote sustainable disposal behaviour. This informed the question of whether the adaptation and application of carative factors have value in the design process to promote detachment from hibernating or accumulated objects at end of use, and encourage users to adopt more responsible and decisive disposal.

In sustainable design, care practices have been explored by focusing on creating a relationship between users and objects by proposing ways to increase the emotional attachment, thus encouraging that users care for the object. However, designers should question whether the product attachment approach is appropriate to apply to every product type and relationship as a way to encourage sustainable behaviour. Applying product attachment strategies on every occasion is unproven (Van Nes, 2010), and in some case objects are eventually left in the hibernation period with no certain decision made about them. Users may have a lingering attachment to objects that impedes such behaviour, and a conventional care practice approach to wasteful behaviour has been overlooked by designers in the field of emotional longevity of products. Therefore designers should consider the feasibility and desirability of such strategy in each case. In contrast to the approach of emotional attachment and caring for the object, there is a pragmatic approach within care practice with less emotional responses around responsibility or a commitment to objects' end of use. Bubeck (1995) argues that the caring relationship does not necessarily involve or invoke any specific emotional attachment, and such an approach has been less developed. This thesis explores whether the pragmatic approach has a value in the design process to influence design thinking toward detachment from hibernating or accumulated objects at end of use and encourage responsible and decisive disposal.

3.10.1. Gap in Knowledge

Following the literature review, the gaps in knowledge were identified.

> There has been little design research which understands the relationship between user and hibernating or accumulated objects at end of use.

This has not yet been thoroughly defined in the current research. It is important to understand what influences consumers to decide about end-of-use practice and which emotional factors are at play for different users (or owners) towards the hibernating or accumulated object at end of use. This will help designers to understand the problems and address solutions for product longevity and material circulation to be pursued as a means to achieve sustainable behavior, thereby reducing environmental impact.

> There is a lack of design research exploring care practice and identifying caring motivations from the perspective of 'letting go peacefully' to influence design thinking toward users' detachment from hibernating or accumulated objects at end of use.

The design strategies to promote the determination of responsible, decisive and appropriate user-product detachment to loosen the remaining emotional ties and ownership for closed loop materials and objects has not been fully explored yet, This research is about understanding care-giving behaviour from the user-object detachment perspective and establishing strategic design approaches to encourage more responsible and decisive disposal to enable the longevity and circulation of objects and materials in the design development process within a circular economy framework.

The review of the literature also shows there are many available design tools that support designers in considering use phases for product longevity. However, it also proves that there is a need to support guidelines for designers to consider users' end-of-use cycle of products and to promote responsible and decisive disposal behavior in users, to be used directly and simply during the idea generation process. The opportunity to create caring motivational engagement for the possibility of letting go peacefully may provide a new approach to informing the design process in order to encourage more responsible and decisive disposal of hibernating or accumulated objects at end of use within the context of design for sustainable behaviour.

3.10.2. Implications for Research

This research could have future implications for a design process which promotes a pragmatic, less emotional response around responsibility or commitment to hibernating or accumulated objects at end of use for users. It identifies the need to:

- Understand the relationship between the user and hibernating or accumulated objects at end of use.
- Understand the nature of human-to-human care behaviour of peaceful letting go and translate caring factors as motivation for responsible and decisive disposal in the object-user context.
- Develop practical guidelines for designers that inform the design process to encourage a more responsible and decisive disposal of hibernating or accumulated objects at end of use, along with addressing current strategic approaches to objects, services, and systems that aim towards conscious disposal behaviour.

This research does not posit that we need to choose between owning and sharing. In the future, we will possibly engage in both of these. It is more to suggest and extend care concepts and update the meaning of 'sharing', 'reusing' and 'returning'. We are going through a period of growth and a transitional stage in terms of the direction of the circular economy, and there is a need for a new design approach involving practical working methods and design tools to enable implementation. A user-object detachment approach could challenge our conventional lingering relationship with hibernating or accumulated object at end of use and suggest more meaningful lifespans for objects. A caring motive model from the user-object detachment perspective for promoting sustainable behaviour will reshape designers' temperaments and mind-sets.

3.10.3. Identifying the Research Questions

This thesis explores the idea that care-giving behaviour might promote responsible and decisive disposal for hibernating or accumulated objects at end of use. The philosophy and theory of care-giving in nursing practice may be usefully adapted and applied to the care of possessions. Exploring humans' intrinsic care-

giving behaviour, and discovering the factors that motivate care-giving behaviour involving peaceful letting go may help to identify appropriate approaches to user-object detachment and to promote objects' re-use, their return to the manufacturer (or shop), or their recycling in order to maximise the resources' values when it is in use but also to recover and regenerate them when they are no longer in use. This approach might be useful for designers when addressing issues of the object in hibernation, obsolescence and throw-away attitudes within the circular economy. This PhD attempts to identify whether this approach has value in design processes; it was examined through the process of the development and evaluation of the carative factors and its themes, in the form of a design toolkit.

RQ1 Can carative theory from nursing practice be applied to inform the design process, to encourage more responsible and decisive disposal of hibernating or accumulated objects at end of use?

The question will be answered through an iterative process involving the development and testing of a design toolkit by discovering the benefit for designers. The toolkit development aims to inspire and help designers explore a range of possibilities rather than converging on a single solution. The Toolkit's set of Carative Factors Inspirational Cards will be an output of this research. It consists of illustrations of relevant situations and examples of photos with inspirational comments and questions for designers. Different user types are investigated during the workshops and other design briefs.

RQ2. What factors inform different users' decision–making process towards hibernating or accumulated objects at end of use?

These questions will be answered by combining the care literature in nursing practice and behaviour change literature with semi-structured interview results. Qualitative and quantitative research was conducted to understand people's relationship with hibernating or accumulated objects at end of use. Furthermore, the carative factors were categorized, and the diverse set of motivations was adopted as inspirational material for the designers' toolkit to contribute to design practice.

Chapter 4 | RESEARCH METHODOLOGY

This chapter explains the research methodologies and methods applied in this research. Crotty's (1998) four elements of the research process are used to explore the approach. In his framework, the terms epistemology, theoretical perspective, methodology, and methods represent distinct hierarchical levels of decision-making within the research design process (Crotty, 1998). Constructionism and action research methodologies are the main ones that are considered. The research methods used and explained in this PhD have drawn in some part from social science. The research methods mainly include interviews and observations, workshops and case studies. This research takes neither strictly a 'top-down' nor a 'bottom-up' approach; I went back and forth until I found the right research paradigms (Figure 21).

4.1. Epistemology

A research paradigm is "the set of common beliefs and agreements shared between scientists about how problems should be understood and addressed" (Kuhn, 1962). According to Guba (1990), research paradigms can be characterised through ontology, epistemology and methodology. Ontology and epistemology create a holistic view of how knowledge is viewed and how we see ourselves in relation to this knowledge (Patel, 2015). An epistemological stance refers to our theory of knowledge and the view of reality that researchers employ in a study (Creswell, 2013). Epistemological assumptions are concerned with how knowledge can be created, acquired and communicated: in other words, "*what it means to know"* (Creswell, 2013). Epistemology seeks to ask: "what is the nature of the relationship between the would-be knower and what can be known?" (Guba and Lincoln, 1994, p.108). Feast and Melles (2010) have mapped Crotty's epistemological stance from a design research perspective. Epistemology provides the foundation for research, and on this is built the theoretical perspective of the research project. In the framework, the knowledge stance has been classified into objectivism, constructionism and subjectivism. In this PhD all three epistemological stances appear.

According to Friedman (2003), "the objectivist position emphasizes the logical construction of theories based on discrete empirical facts; that aim is to explain the phenomenon objectively". The objectivist stance is possibly apparent in the early research processes when conducting surveys to identify different types of hibernating or accumulated objects at end of use, and the needs of this research approach.

Constructivists believe that there is no single reality or truth, and reality needs to be interpreted, and therefore they are more likely to use qualitative methods to get those multiple realities (Patel, 2015). The constructionist position stresses 'reflective practice' in design research: the researcher aims to understand meanings others have about the world (Creswell, 2013) by the development process of making. This was apparent at the early stage of this research, when conducting qualitative interviews and observations to try to understand the underlying meaning of events and behaviour. I used qualitative approaches to explore the behaviour, perspectives, feelings and experiences of people and what lies at the core of their lives (Robson, 1993). In addition to this, following Cross's notion of design epistemology (the study of 'designerly ways of knowing') (Cross, 2001), this thesis considers the iterative process of the development and evaluation of the Toolkits and outcomes through workshops with reflective practice (Schön, 1983), which resembles a constructionist stance. Understanding how designers use the Toolkit in the design process emphasises a constructive stance. The design knowledge is gained through making and reflecting on the creation of the Toolkit, such as the Carative Factors Inspirational Cards, and by expanding and reflecting upon the development of these artefacts (Cross, 2001) and the outputs from the workshop. As human beings can construct different meanings, even of the same phenomenon (Gray, 2013), understanding something in its context (Holloway, 1997) was more relevant.

Subjectivism appears when the practitioner's understanding is re-constructed by the making process (Robson, 1993). A subjectivist stance is apparent in the process of extracting the applicable caring elements from the literature and translating the metaphorical meaning of the caring factors into the relevant design factors. The process of designing and making the Toolkit can also be seen as a subjective stance. However, the development process of the Toolkit and the reflection of the outcomes are as important as the output of the Toolkit itself.

4.1.1. Theoretical Perspectives

Crotty (1998, p.3) defined the theoretical perspective as "the philosophical stance informing the methodology" and claims there are potentially many theoretical research perspectives that result from particular epistemological stances. In this thesis, positivism and post-positivism are relevant perspectives, as these are associated with objectivist epistemological stances. In this perspective, reality can be measured, and hence "the focus is on reliable and valid tools to obtain that" (Patel, 2015). An interpretive approach is largely the perspective employed, which is associated with constructionist and epistemological stances. This approach is to interpret reality to know something and understand the process. The theoretical perspectives of design phenomenology are present when exploring how carative factors are embedded in the Toolkit in the design process. However, the important thing is the development process and understanding meaning through the design process rather than explaining the facts themselves.

4.1.2. Methodology

Methodology is the strategy or plan of action that lies behind the choice and use of particular methods (Crotty, 1998, p.3). Thus, methodology is concerned with why, what, from where, when and how data is collected and analysed (Scotland, 2012).

4.1.2.1. Practice-led Research

Research *into* design, research *through* design, research *for* design

In his writing on design, Frayling (1993) categorised research into three types: 'research *into* design', 'research *for* design' and 'research *through* design'. Research *through* design (Archer, 1995) is undertaken for this PhD. As Pontis (2010) has stated, "research *through* design involves both understanding the process of design itself and developing new design actions, artifacts or methods"; this thesis involves investigating the design process. Research *through* design focuses on the role of the product prototypes as "an instrument of design knowledge enquiry" (Keyson and Bruns, 2009). In this sense, the iterative development and evaluation processes to test the impact of the new design tool of the Carative Factors Inspirational Cards fit with Frayling's idea categories of research *through* design. Observing how the Toolkit was experienced by

participants through an iterative process may also be used to guide research though design, which will help to evolve the modification of design tools (Keyson and Bruns, 2009). The various level of outcomes have evolved as a means for articulating, developing and validating knowledge (Keyson and Bruns, 2009). The decisions for the next development processes were made on users' experience of using a Toolkit.

The outputs from the design process through the design tool itself will enable this PhD to focus on research *for* design approach. Although the iterative process of the Toolkit development and reflections on it are central, this research also comprises the development of new *artifacts*, of which the goal is to visually communicate new knowledge (Pontis, 2010).

Research into design is "the most straightforward, because there are countless models and archives from which to derive its rules and procedures" (Frayling, 1993). According to Allison (1995) and Frayling (1993), the most common research into design includes "research into a variety of theoretical perspectives on art and design – social, political and material… whatever". In this thesis, the theoretical models are derived from research into nursing practice and care theory, thus this approach follows that of research *into* design.

Practice-led research

Pontis (2010) stressed the association of theory-based research with research into design: practice-led research aligns with Frayling's research *through* design and practice-based research aligns with Frayling's research *for* design. In this thesis three approaches were considered, but it is mainly research *through* design that is dominant.

The term 'practice-led research' is commonly used in design research methodology, representing the idea of acquiring knowledge through acting. In that approach, researchers are allowed to incorporate their creative practice, creative methods and creative output into the research design and as a part of the research output, "leading to new knowledge that has operational significance for that practice", in order to advance knowledge about the practice or within the practice (Candy, 2006). Within this approach, a practitioner acts as a researcher and researcher acts as a practitioner. Therefore, in this thesis I act as a practitioner when developing the Toolkit design with designers during and after the workshop,

and act as a researcher when I try to understand their use of the Toolkit. Smith and Dean (2009, p.5) note that practice-led research arises out of two related ideas. Firstly, "that creative work in itself is a form of research and generates detectable research outputs". This means the development and evaluation processes of the Toolkit is a structure of research and produces demonstrable research outcomes, which makes this thesis practice-led research. Secondly, "creative practice – the training and specialised knowledge that creative practitioners have and the processes they engage in when they are making art – can lead to specialised research insights". The insights are derived from developing the practical application of the design tool of the Carative Factors Inspirational Cards and validating through the idea generation process in the workshops: this will provide evidence of practice-led design research.

Pontis (2010) stated that action research is an appropriate methodology for practice-led research, as well as practice-based research. Therefore, this thesis mainly undertakes practice-led research through a design and action research approach to allow designers to understand the Toolkit use and develop the Toolkit with designers.

4.1.2.2. Action Research

Action research methodology (Crotty, 1998) has been widely adopted in practice-led design research. Denscombe (2010, p.6) writes that an action research strategy's purpose is "to solve a particular problem and to produce guidelines for effective practices". In an action research methodology, the researchers take action by setting themselves within the practice and involving themselves by creating or promoting change (Lewin, 1946). Action research is "learning by doing", used in real situations, since its primary focus is on solving real problems (Mills, 2003). In this PhD, the designer-researcher was both the creator of the tools and the observer of their use, hence acting in and on the context being investigated, in keeping with an action research methodology (Lewin, 1946), which involves understanding both "the process of design itself and developing new design action, artifacts or methods" (Pontis, 2010). I actively undertake the action by encouraging myself to engage with the context, as an "attempt to develop a solution that is of practical value to the people with whom the research is working", simultaneously "developing theoretical knowledge" (Davison 1998,

pp.3-6). Action research is usually chosen when circumstances require flexibility, there is involvement of people in the research, or change must take place quickly or holistically (Mills, 2003). As the tool was developed with designers through iterative workshops with multiple designers, and the Toolkit was developed in a desirable direction based on the reflection of previous cycles, action research was the appropriate approach.

The *plan-act-observe-reflect* cycle (Robson, 1993) was relevant for this thesis. Lewin (1946, p.38) described action research methodology as "proceeding in a spiral of steps, each of which is composed of a circle of planning, action and fact-finding about the result of the action". It involves planning a change, acting and then observing what happens following the change, reflecting on these processes and their consequences, and then planning further action and repeating the cycle (Robson, 1993). Throughout the PhD such processes were adopted, as the spiral processes provide an opportunity to think about the goal, the plan and actions of the next step of the research. Equally, the processes create the chance of modification based on what has been learned in the previous cycle, as the iteration follows reflection on the effects of the actions.

Action research is unlikely to be entirely objective; as Archer (1995, p.11) stated, in action research "findings only reliably apply to the place, time, person and circumstances in which that action took place". Therefore it is important to explain the researcher's situation and position and set the context to make clear in which circumstances of action the encounter takes place. In this PhD, design briefs were created to focus on specific problems to describe in detail the situation involved. This helped to me to gather valuable data for the next workshops and develop further the next workshop structures. In this way, findings could be "more generalizable" (Archer, 1995, p.12).

The research plan stage includes problem reframing, in which the aim of the researcher is modified based on what was learned in the previous cycle. The plan and act stages evolved with each iteration cycle, based on the reflection on the effect of actions. Schön (1983) described the concept of 'reflection-in-action' and 'reflection-on-action' in reflective practice models of action. This PhD will adopt both modes. The mode of reflection-on-action will mainly be adopted where the researcher steps back from the situation and looks back at what has occurred during the workshops to understand. At the same time reflection-in-action will

also be considered where the design Toolkit is being modified by going through reflective iterations. As action research partly involves subjectivity, the case study method was taken, as this approach has flexibility in terms of the number of the researcher's interventions that can be made. I tried to be involved as little as possible when facilitating the workshop and during the idea generation session; however, I took action when I introduced the Toolkit to users.

4.1.2.3. Grounded Theory

Grounded theory is an inductive methodology in which researchers develop theory from the data collected as they proceed (Robson, 2011), continuously re-framing and re-orienting their research questions and methods to help build the theory (Eisenhardt, 1989). This theory is 'grounded' in data obtained during the study, particularly in the actions, interactions and processes of the people involved (Robson, 2011). It commonly goes through multiple stages of data collection and coding processes; generally the data is extracted from real-life data (Robson, 2001). Then it combines coding with analysis to help locate and build research (Glaser and Strauss, 1967) and re-plan the next stage of research to probe and investigate the theory (Friedman, 2008). It is a flexible design strategy for doing research and a particular style of analysing the data arising from that research (Robson, 2011), which provides an ability to modify the focus and goal of study as it progresses. This thesis adopts some aspects of grounded theory in that data is gathered from the perceived problem to give it relevance and direction. As the grounded theory methodology involves going out into the field and collecting data, interviews, observation and workshop methods are used in this PhD. Although grounded theory is often presented as an appropriate approach for qualitative study, Glaser (1992) made extensive use of quantitative data to prove that grounded theory is also appropriate for a quantitative approach. In this respect, the survey method was also used to help build the theory of the goal of research as a process in this thesis, and to enable the research to evolve and develop as the research proceeds (Lilley, 2007). However, a fully grounded approach was not considered, as the process of the research of the development of theory and practice will not be as linear where data was first gathered and then analysis was undertaken. The flexibility in approach enables the research to

evolve, as the result of the previous cycle provides insight and direction before the data is gathered for the next iteration.

4.1.2.4. Phenomenological Research

Grounded theory researchers investigate social processes and interaction, while researchers taking a phenomenological approach consider the meanings of experience, behaviour and narratives (Harrison, 1989). The reasons for people's attachment to hibernating or accumulated objects at end of use are diverse. I explored the dynamic character of people's emotions towards hibernating or accumulated objects at end of use through both interviewing and observing, with the help of phenomenology. Also, the Toolkit use by each practitioner during the workshops was unique, therefore the nature of their use was understood from a phenomenological perspective.

Phenomenological research should begin with the practice of 'epoché' and 'bracketing'. The researcher should block out their biases and all their assumptions and judgments about the physical world in order to explain a phenomenon. They should set aside all questions of judgement about the physical nature and their most basic beliefs about nature. While carrying out phenomenological research, the researcher should not be concerned about the existence of an object of consciousness, but rather know things through internal reflection (Moustakas, 1994): how people experience the phenomenon consciously. During the interviews, observation and workshops, I took notes on what I heard and saw, and what the participants said. The 'memo-ing' method and some voice recording were used to collect data during the studies, which permitted the re-reading and replaying of the interviews and helped to eliminate personal bias and preconceptions (Miles and Huberman, 1984). This was documented with the field notes and interview transcriptions, which helped me to subsequently organize data and structure the theory. The methods of memo-ing and taking photographs were also used during the workshops, which helped me to reflect the phenomenon in the participants' Toolkit use.

According to Lester (1999) and Groenewald (2004), explication seems a better way of explaining than phenomenological analysis. The term 'analysis' should be avoided because it usually means breaking something into parts, whereas explication implies the investigation of the constituents of the phenomenon, while

keeping the context of the whole (Hycner, 1999). The important part of this research is to keep the essence of the experience from the perspective of the participants, and the researcher should fully involve themselves with rich and descriptive data. Following Hycner's (1999) explication process, I (1) delineated the meaning of data and (2) clustered units of meaning to form themes. Then I (3) summarized each data set, including all the themes and individual variations which occurred. In particular, the analysis of interviews and observation involve open coding, in which the researcher forms initial categories of information about the phenomenon as studies from the initial data gathered. (4) Finally, I validated it through an iterative process of re-checking the data, extracted general themes from all the data and made a composite summary. Throughout the research, I tried to set aside various assumptions and only observe and reflect on participants' experiences.

4.1.3. Specific Research Methods

This PhD consists of predominantly qualitative approaches, which helped to structure the development of the research plan. This is because, first, the research aim was to understand the participants' behaviour and their relationship with the objects, to generalise the findings and to predict the next step of the research. This approach appears during the process of collecting and breaking down data into a number of factors based on themes of caring. The data is more in the form of texts, descriptions and analysis from documents, which then became the basis for developing the next stage of the research. Secondly, qualitative methodology was also useful in the exploration of change or conflict. Qualitative approaches were considered when understanding designers' idea generation process using the Toolkit during the workshop sessions. Qualitative data was gathered based on the feedback from designers about how designers had incorporated the Toolkit into their own ideas in order to validate the method of how the tool influenced the design process. This process was led by categorizing the data, validating it through iterative processes of the development of the Toolkit and building reliability into the interpretations of findings. In part, mixed forms of qualitative and quantitative approaches appeared when the survey was taken. As part of the survey, data was collected to seek an objective view (Hughes, 1997) of the approach towards design for object detachment from possession, seeking to

establish the general need for this research in the design field. Through the research technique of using questionnaires, a numerical form of data was collected. Short-answer questions were asked to gain insight into participants' attitudes towards objects to generate qualitative data (Crotty, 1998).

4.1.3.1. Observation and Interview

As a tool for collecting initial data in this study, qualitative observation and semi-structured interviews were used to initiate the phenomenon and define the problems in the relationship between users and hibernating or accumulated objects at end of use. Marshall and Rossman (1989, p.79) defined observation as "the systematic description of events, behaviours and artifacts in the social setting chosen for study". Observations enable the researcher to describe existing situations using the five senses and provide a 'written photograph' of the situation under study. This method can help to uncover the reality of what people really do, as opposed to what they say they do: thus it was a useful method to understand how people deal with hibernating or accumulated objects at end of use in real life. The aim is to observe and understand people's natural behaviour as much as possible (Erlandson et al., 1993), and this helps to define the problem in a specific context. Through observation and informal conversation, participants gradually opened up the discussion, allowing the researcher to be open to discovery. Field notes (Silverman, 2005) and photographs were taken to record it.

In the qualitative research approach, interviews are often followed by observation, which helps to analyse the data (Jamshed, 2014). Two interview sessions were carried out. The interview is "a type of framework in which the practice and standards are not only recorded, but also achieved, challenged and as well as reinforced" (Oakley, 1998). The purpose of the first interview was to understand the users' relationship with objects and classify the observed findings through a process of coding and deconstructing to build grounded theory for the next step of the research. I used semi-structured interview techniques, as the aim was to "explore many respondents comprehensively as well as keeping the interview focused on the desired line of action" (DiCicco-Bloom and Crabtree, 2006). The semi-structured interview is an open discussion method where the respondents are asked to answer pre-set open-ended questions. In order to make the process rigorous, the interview questions and guide, which needed to be explored by the

interviewers, are prepared in advance (DiCicco-Bloom and Crabtree, 2006). Generally, in the semi-structured interview method, the questions consist of one core question and many related associated ones, and this improves further through the testing questions (Creswell, 2007). To allow freedom, I, as a researcher, allowed myself to explore new ideas brought up during the interviews as a result of what the interviewees said (Robson, 2011) and modified the interview questions according to the interview context and the interviewees. This helped to gain detailed information and answer the questions which arose spontaneously. The interview was conducted with an individual or with a group (Corbin, 2008), and it happened in the natural setting of their own homes, as this helped participants to talk freely, enabling the researcher to learn about their modes of behaviour according to their personality.

Another semi-structured interview was carried out that was different in purpose and scope. The aim was to derive insights to inform the development of the next version of the Toolkit from the early version of 0.0. The objective for this interview was to investigate the respondents comprehensively and reflect upon the first iteration of the Toolkit, which potentially provides rich material for participants' experience (Robson, 1993) and re-frames the questions and Toolkit for the next cycles. Informal interviews were also used within this PhD. The aim was to derive insights to form the second development of the Toolkit (2.0), mainly by requesting comments and feedback.

Thematic coding analysis is a generic approach to qualitative data (Robson, 1993). The analysed data reports the "experience, meaning and the reality of the participants" and "examines the ways in which events, realities, meanings and experience have an effect on a range of discourses operating within society" (Robson, 1993). By following the phases of the thematic coding processes, I read and re-read the data and took notes on the initial ideas. Then I organized the data into meaningful groups and decided what themes I could see in them. By identifying interesting aspects of the data, I formed the basis of themes within the data set and coded the themes with similar individual data. Then I collated codes into potential themes based on the caring framework, by arranging relevant data into each potential theme. The re-checking process was essential before demonstrating the data. Finally, the data was presented in a table format.

Limitations of the Observation and Interview Methods

Researchers' biases or assumptions may often occur (Kawulich, 2005). This may be because human observations are biased (Kawulich, 2005) in relation to data collection, and we see what we expect to see. We have the tendency to only look where we think we will find positive results (Kawulich, 2005). Schensul and LeCompte (2013, p.88) suggested that "the most accurate observations are shaped by formative theoretical frameworks and supported by scrupulous attention to detail". Therefore, the discovered data was coded and developed into the motivational factors at each stage when new data was found. The initial categories of the 'Four Motives of Caring' themes provide a boundary when analyzing the discovered data, for me to focus on the topic but avoid bias.

The limitations of the interviewing method was that the "lack of standardization that it implies inevitably raises concerns about the reliability" (Robson, 2011). However, conducting action research by iterative rechecking of field notes and applying the recoding processes made the data reliable (Lockton, 2008). Above all, the aim of the research was to provide a process for the understanding of participants' experiential relationship with objects and their use of the Toolkit, resulting in a qualitative approach rather than a definition of the facts.

4.1.3.2. Survey

Surveys are common methods of gathering information from individuals in academic design research (Kelly et al., 2003). In this study, a survey through a questionnaire was carried out, as it is easy to run, achieves a significant amount of responses in a short period of time and it is possible to collect both quantitative and qualitative data (Robson, 2011). Surveys are well suited "to descriptive studies, and also to explore aspects of a situation" (Denscombe, 1998); therefore it was a useful approach in this thesis when exploring certain phenomena (Kelley et al., 2003) relating to object accumulation in the domestic environment over a short period of time. The results of the survey were qualitative in terms of the answers to questions highlighting the problems of making further action decisions about end-of-use objects and providing an overview of the relationship to those objects. In addition, it was a quantitative approach in terms of providing a numeric form of data relating to people who are in need of an approach to object detachment from possession.

A well-designed survey can potentially achieve high levels of representation and validity (Kelley et al., 2003). To do this, the content of the questionnaire in this research was carefully planned based on the literature review to address the appropriate topic in terms of layout. The content of the research tool, such as emotional scale, was added. Then the questionnaire was presented clearly by avoiding the use of capital letters, as this format is difficult to read; questions were clearly numbered and grouped by subject, and instructions were given to make it easier for participants to follow. It mainly consisted of closed questions and multiple-choice questions. Open questions were also included, as these can provide useful insight into the topic, if well answered (Kelley et al., 2003).

Limitations of the Survey Method

In this PhD, there were many limitations to the survey not drawing on a high volume of samples. However, data collection and analysis with a larger sample would have been more time-consuming and expensive. It is also rare that all the people who received the survey will reply. Therefore, the available potential participants (Kelley et al., 2003) were selected, but I had to respect respondents' time to overcome the limitation mentioned above. The time required for the questionnaire to be filled in was nine minutes (a similar strategy to that of pricing something at 99p rather than £1), and this was clearly presented when the questionnaire was sent out via email. It appealed to people by indicating how many pages it contained, and most of the questions were multiple choice. Indeed, the data was saturated after a certain number of questionnaires had been received, as similar responses were frequently repeated.

The survey data that is produced is often likely to lack detail or depth on the topic being investigated (Kelley et al., 2003). Therefore, the result of the questionnaire provided limited information for an understanding of the genuine meaning of respondents' replies. Moreover, the survey often consists of multiple-choice questions, which do not necessarily explain why a particular answer has been chosen. Although the questionnaire contained short response sections, there was little depth provided in the responses. For example, the point at which an object becomes 'end-of-use' is a relative term; therefore participants tend to understand it differently and provided answers based on their own knowledge and experience. Some participants interpreted it as meaning the status of the object when it is no

longer in use although it still has emotional attachment (e.g. the first item of clothing I bought for my child), while others understood it as the object essentially becoming unused but kept for an unknown purpose in the future). Nonetheless, all the data was useful for further analysis and for understanding the relationship with hibernating or accumulated objects at end of use. However, to minimize these limitations, informal conversations were conducted after surveys of participants who were available and were willing to participate. This was to understand the deeper meaning of their answers and avoid my bias when analysing their responses. Informal conversation may promote 'low pressure' interactions, allowing respondents to speak more freely and openly, thus helping researchers to build a relationship with respondents and understand the genuine meaning of their responses.

4.1.3.3. Workshop

The main practical research method engaged with in this thesis was the workshop. Workshops are efficient and enjoyable ways to gain data from participants, which provides a wealth of insight (Martin and Hanington, 2012). A participatory workshop brings a group of people together to seek their opinions, extract their knowledge and to solve problems in a collaborative and creative environment (Martin and Hanington, 2012). The workshop method can be used to create new ideas and directions in response to design briefs through the participatory design process in the form of idea generation sessions, individually or as a group. In this thesis, the idea generation process was emphasised in order to encourage designers' participation in the design process as a means to explore, develop and communicate ideas.

The purpose of the workshop was to alert designers to the design challenge in relation to environmental problems, to promote circular design through the Toolkit. Therefore, most of the workshop applicants had some interest in environmental problems but they were also potential users of the Toolkit. Participants were selected through online advertising, on a first-come, first-serve basis. I created a poster and highlighted the topic and aim of the workshop in an email, to encourage contributions from designers who showed interest in the topic. The first workshop was held in an academic setting. The workshop process differed to other workshops, as it was a pilot study. It began by discussing the

objects the designers brought in to familiarize themselves with the context. This helped participants to understand the problems accurately and increase the chance of their engagement with the workshop process, as the objects they brought in had a direct relationship with them.

Four series of workshops were generated in industrial settings. The workshops usually started with an introduction to explain the background of the research and aim of the workshop. In the next session, participants were asked to group into pairs and generate concepts together by using the Carative Factors Inspirational Cards in response to the brief, except in workshop three, where a designer worked individually to generate concepts through (and without) the Toolkit. The workshop was planned in advance, and the Toolkit was given out at the moment when designers began the idea generation. The workshop structure evolved according to the insight and direction provided by the results of the previous cycle, and data was gathered for the next iteration.

During the workshop session I tried to set myself apart and intervene as little as possible, as an observer rather than as a practitioner. I presented as a facilitator, introducing the Toolkit and explaining how it could be used, answering questions that were related to the design briefs or the Toolkit, and discussing the ideas generated by the participants after the workshops. However, the final workshop was fully generated by a third party, without the researcher's presence. Memo-ing (Robson, 2011) was used to document the process. The ideas generated by participants applying the Toolkit were archived, as these provided an opportunity to demonstrate the use of the design tool and refine the Toolkit through each process.

The purpose of the workshops is to enable the formulation of the design toolkit and to develop an original theoretical framework. The planning of the Toolkit session and the process of the workshop practices contributed to the development of the design of the Toolkit. The reflections on the studies were carried out with the people who were involved in the workshops by discussing and getting their feedback on the use of the Toolkit. This aimed to minimize the risk of misinterpreting the ideas generated and missing out the significant elements of the relevant research. In grounded theory, it may be difficult to decide when data is saturated or when the theoretical framework is sufficiently developed (Robson, 2011). Therefore, the research was carried out until I reached saturation point in

terms of the caring factors that were found, when it reached the point of diminishing returns, and I did not then add to what I had already found.

Limitations of the Workshop Method

The workshop outcomes may vary depending on the context and quality of the participants. The range of participating designers included those working in different design sectors, and they had different level of design skills and knowledge, so diverse outcomes were generated, which affected the quality of the data.

The fundamental nature of the workshop can provide a limitation. Some of the effects on people of being in a group might occur in the group workshop setting (Diehl and Stroebe, 1987). The large numbers of participants could hinder participants' individual responsibility, therefore there could be a lack of individual contribution. This could reduce the quality and the number of ideas being generated. Therefore deciding on the number of participants was essential. Even numbers of participants were recruited in order to pair themes during the workshop session to enhance participants' responsibility. The aim of the workshop was to understand and explore the intensive use of the Toolkit rather than to generate many ideas through the Toolkit. The number of recruited participants was set at between six and eight, which created less pressure for certain participants when speaking in front of large numbers of people. To meet the goal of the research, the focus was on involving controllable numbers of participants for the researcher's benefit, to increase the opportunity to listen to individual opinions.

In action research methodology, researchers are also actively involved during the workshop in encouraging participants to work on particular problems rather than the researcher setting themselves apart to describe, understand and explain the "naturally arising" responses to a problem (Robson, 1993, p.438). Thus, the ideas generated are difficult to validate or generalize about, as the data is produced mainly in a non-realistic setting, Therefore, selecting the workshop participants and creating the case study process were critical. In order to overcome the limitations, participants were selected who are currently working in specific sectors in the industry, and the workshop was generated at their premises, where they usually conduct workshops. Moreover, a few of the participants were

selected directly through their design work, and they were lacking the same motivation. This possibly helps to simulate the use of the Toolkit by designers in a real-world situation; however, limitations still remained, as the each designers' motivations may differ in a real-world setting.

4.1.3.4. Case Study

Yin (1984, p.23) defines the case study research method "as an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used". In the case study method, data is gathered from a variety of sources and continues for an extended period of time, so the processes and the development can be studied as they happen (McLeod, 2008). In this research a case study approach was adopted to explore the use of the Toolkit and derive insight from the designer's experience of the use of the Toolkit for further development. The approach provided a descriptive view of how participants use the Toolkit and insight from the Toolkit users to develop it for further use. The development process and the reflection on the process partly involved qualitative approaches. Throughout this thesis, a similar method is also used to develop and evaluate the carative factors during the workshop sessions. In all cases the design brief addressed at the workshop is self-generated Additionally, three case studies demonstrate how designers have used the Toolkit in responding to their own design brief. The objects, services or systems are produced according to each of the factors of the framework. This approach benefits from getting sufficient feedback.

Limitations of the Case Study Method

The main limitation of the case study method is its inflexibility. The results of the case study cannot be generalized as a phenomenon, as it is difficult to judge whether the cases I investigated are representative of the wider body of similar instances (McLeod, 2008). Therefore, I attempted to address as many design briefs as I could to validate the Toolkit, either self-created design briefs or those by participating designers. However, considering that the aim of this research is to give designers an understanding of the problems and to work on the problems

through the Toolkit, the main purpose is not to generalize the results but rather to demonstrate and describe the process.

Another limitation is that the researcher's own subjective feeling may influence the case study, as this is a qualitative approach. This could mean that the subjective opinion of the researcher may appear when assessing the data (Robson, 2011). In order to avoid personal bias, the feedback from the final workshop was gathered by a third party; however, the researchers' own subjective view still remained.

4.1.3.5. Metaphor

The essence of metaphor is "understanding and experiencing one kind of thing in terms of another" (Lakoff and Johnson, 1980, p.5). Metaphors structure our perception and understanding, and affect the way we organize our ideas (Gibbs, 2008; Lakoff and Johnson, 1980). In the early stages of the research, the process of thinking metaphorically about seeing 'object care' as 'human care' (particularly in nursing practice) (Schön, 1979) allowed me to understand the problem by comparing the meaning of care and its aim and process in each context. This thinking process affects the way I perceive the world, categorize experience and organize thoughts (Casakin, 2007). Schön's (1979) generative metaphor framework was used to reflect upon metaphors. He refers to 'metaphor' as "a certain kind of product – a perspective or frame, a way of looking at things" and to " a certain kind of process – a process by which new perspectives on the world come into existence" (Schön, 1979). He investigates the consequences of "seeing as" within concrete experiences, in which "metaphor acts as a generative force for the construction of meaning and becomes the framework for interpretation, creating particular ways of knowing" (Schön, 1979). Schön (1979) states that when "*A* is seen as *B*, it is then possible to explore *A* through reflecting upon the values, assumptions, and meanings of *B"*, and this exploration further improves our understanding of both *A* and *B*. 'Object care' was explored through reflection upon the values and meanings of 'human care', which allow me to frame the gap in care practice within the design research. As metaphors help designers "to understand unfamiliar design problems by juxtaposing them with known situations" (Casakin, 2007), this way of thinking provided an opportunity to observe a specific problem in the design process, the lack of consideration for

the end-of-use cycle. Together, certain solutions and insights were derived when using metaphors.

Metaphors used in the design field typically serve to generate new ideas, solve problems, and stimulate creativity (Casakin, 2007). Designers have a critical awareness of metaphors: they have power to shape the perception of design processes and knowledge (Gulari, 2015). As a designer, I used metaphors in this research and identified relevant knowledge through a review of the literature on care behaviour and the factors influencing it. Metaphors related to nurse-human caring behaviour address how these metaphors shape our understanding of the human-object context, which subsequently became a foundation for a toolkit. Schön's (1979) generative metaphor framework was used to reflect upon metaphors, which allows the mapping of one experience on the terminology of another experience and thus to acquire an understanding of complex topics or new situations (Vosniadou and Ortony, 1989). Nurses' caring experience and their motivational factors were mapped, interpreted and translated into what it means in the user-object context. Exploring both contexts further improved the understanding of behavioural motivations and the discovery of potential solutions, and these elements later shaped the foundation of the Toolkit to be used in the design process. Metaphors essentially shape the way we value things as a result of "seeing as". (Schön, 1979). Using metaphor allowed me to take inspiration from new perspectives, as it looked at similar experiences in other contexts, instead of focusing too narrowly on the research topic (IDEO, 2009). No software was used to identify the term 'letting go' and other researchers were not involved in the interpretation. However, the data was evaluated though the semi-structured interviews and the workshop process.

Applying metaphor to an ill-defined problem can help to structure design problems, increase designers' knowledge of a particular design situation and stimulate design creativity (Casakin 2007). Metaphors are a powerful tool because they influence both our perception (how we see the world) and our action (the way we act or behave); thus metaphors have the potential to change designers' perceptions and the way they design. Therefore, the concept of carative behaviour and relevant caring factors extracted from nursing practice as a metaphor were presented to designers to be explored in the design process, and their effects were examined in use among workshop participants. Metaphorically translated data

allows designers to identify and capture design concepts, as well as defining goals and requirements. Therefore, the data discovered may enhance designers' innovative thinking and encourage the application of novel ideas to design problems. The workshop participants were asked whether the metaphoric translation has influenced their design thinking toward the user-object detachment approach. The success of the use of metaphor was analysed based on their feedback. According to Casakin (2007), using metaphor in the final stage of the design process is more complex: "it is the early stages of the design process when fuzzy metaphors aid reflection about the essence of a situation". Therefore, it was appropriate to be applied in the idea generation session.

Limitation of Metaphor Method

Metaphors always have an inherent limitation in terms of appropriateness, and can be misleading. Metaphor can structure subjective perception and understanding (Gibbs, 2008); however, each metaphor conveys a different view of reality, and represents particular ways of seeing (Gulari, 2015). In this respect, comparing nurse-patient relations with the user-object relationship could provoke an argument about appropriateness. However, in design, "new metaphors contribute to the richness of design and alter the way we think about the design" (Gulari, 2015). Moreover, the caring factors were derived from the most genuine relations between humans, which proves their suitability.

The attempt to use metaphor should be not focused on replacing subject and substance, but should encourage ways to illuminate the meaning of the subject's experience (Carpenter, 2008). Otherwise, metaphors distort or obscure their essence. Misleading metaphors produce a design solution that often relies on the designer's skill (Casakin, 2007). In this PhD, an attempt was made to understand the meaningful experience behind nurses' motivation to develop it into a tool for designers. Those elements were diluted through the iterative Toolkit development processes of workshops and individual designers' design projects. Nonetheless, the aim of using metaphor in this PhD was to provide an opportunity to examine the phenomenon from a unique and creative perspective (Carpenter, 2008), and to evaluate the value of the approach in design for behaviour change. The metaphor analysis approach still retains some of the credibility issues (Schmitt, 2005).

4.1.3.6. Participant Selection

It is not possible to study every participant in a target group. In particular, carrying out real-world studies can mean that representative sampling is very difficult. However, it can produce a sample that can be logically assumed to be representative of the population (Lavrakas, 2008). In this sense, Robson's (1993) purposive sampling approach, in which members of particular groups are purposefully sought out, was suitable for this research. As this research follows the grounded theory approach, "the researchers carry out initial sampling and from analysis of the results extend the sample in ways guided by their emerging theory" (Robson, 2011). Within the purposive sampling method, it is important to identify and select individuals or groups of individuals who are especially knowledgeable about or experienced in the phenomenon of interest (Creswell and Plano Clark, 2011). The participants who fit into the particular context were recruited in this PhD. In this method, the participants are selected by the judgment of the researchers. Additionally, Spradley (1980) notes that it is also important to consider participants' availability and willingness to participate, and their ability to communicate experiences and opinions in an articulate expressive and reflective manner. Opportunity sampling method, in which selecting the participants who are available at the time and willing to take part are significant aspects, was also considered. Therefore the participants were selected on the basis of who was potentially interested in process of the development and use of the Toolkit, and wished to be part of it. Finally, convenience sampling, which identifies participants that are easy to find, was partly employed when recruiting the design department team for each case study.

Three different cases of population sampling processes appear in this research. The first was to conduct the survey, the second to carry out the interviews and the final one was to run the workshop. In the survey study, the participants were mainly sourced from the primary school parents' association, church community members who are living with young children, or family-based households, and retired people. This was done in a purposive way, because participants were selected who potentially experience problems with accumulated belongings, and only attracted people who had a level of interest in the subject to fill in the questionnaire. These populations are (consistently) facing moments of change such as having growing children or moving to a smaller house (Defra, 2011).

They potentially have accumulated belongings in their domestic environment, thus they are potentially facing this challenge. I sent out the questionnaire online, and it also was put on facebook.com and linked.com.

For the interviews, the participants were identified from the previous stage of the survey, but a number of university students also showed interest in taking part. They potentially faced the stage of needing to dispose of objects at some point in the future, as they were international students who wished to move back to their own countries. Both purposive and opportunity sampling approaches were used.

To recruit participants for the workshops, I first approached university students for a pilot study. Although it can be argued that this partially uses the convenience sampling method, "they were chosen because they were potential users of the toolkit" (Lockton, 2013). Lilley (2007) and Tang (2010) stated that using university students in some workshops are common in design research. At the later stage of the research, professional designers working in industry were recruited to test the Toolkit. The process of recruiting designers partly relied on convenience sampling, particularly when making contact with the design team within the company. The companies are selected based on the findings from the early stages of research. The chosen companies tend to work in a field where they produce the products that present disposal challenges to consumers (e.g. pharmaceutical products). Therefore, the selected sample fits with the research objectives; moreover, participating designers in each company had special knowledge in their design sectors to generate potential design solutions. The selected companies were approached via email and verbal telephone communication. The participants were interested in the topic and willing to participate in the processes of Toolkit development, but they were also asked to attend by their design team directors. Nevertheless, they are potential users of the Toolkit, as well as being creative designers who can respond to design briefs promptly, as they have special knowledge of the particular subject of design. Therefore, this research could produce a sample that can be reasonably assumed to be representative of the population (Lavrakas, 2008). Yet, this research mainly uses a self-selecting sampling method, therefore the process of selecting samples might be biased.

4.2. Validity and Reliability

In research methodology, reliability and validity are ways of demonstrating and communicating the rigour of the research process and the trustworthiness of the research findings (Roberts and Priest, 2006). Reliability refers to "a measure of stability or consistency of test result, the extent to which the same answers can be obtained using the same instruments more than one time" (Dudovskiy, 2013). Validity is about "the closeness of what we believe we are measuring to what we intended to measure" (Roberts and Priest, 2006). Unlike quantitative research, in a qualitative approach researchers should "reclaim the responsibility for the reliability and the validity by implementing verification strategies integral and self-correcting during the conduct of inquiry itself" (Morse et al., 2002).

Maxwell (1996) presented three main types of approach which constitute particular threats to the validity of the research. These are description, interpretation and theory. The main threat to providing a valid description of what one has seen or heard lies in the inaccuracy or incompleteness of the data (Maxwell, 1996, pp.89-90). To accomplish a valid description, I took field notes and audio recordings wherever feasible. The notes were written throughout the interviews and observation and the workshops, reflecting on what was happening. Secondly, the main risk to providing a valid interpretation of meaning on what is happening lies in the focus of "what is occurring or emerging from what you learn during your involvement with the setting" (Robson, 2011). By re-reading the field notes and re-checking the appropriateness of the data several times, assumptions were eliminated and corrections (Morse et al., 2002) were made, and the framework was modified. As Robson (2011, p.170) suggested, "continually and assiduously charting and justifying the steps" support the capture of logical insight rather than relying on interpretation. The multiple stages of the research process also help to increase the validity. Finally, the main threat to providing a valid theory is when the researcher is not considering alternative explanations or not understanding the phenomenon during the study (Maxwell, 1996). To avoid this threat, I devoted time to seeking out the data which was not in agreement with the theory, consistently seeking out caring motivations and barriers. Through this process the framework and the factors were modified at each cycle. This was a critical process of countering research bias. In qualitative research, there are no set rules for reaching data saturation (Giorgi, 1988). However, there are some

factors that inform researchers about arriving at data saturation, such as when further data does not add new information to the research aim, and there is enough information to replicate the study (Fusch and Ness, 2015). In this research, data saturation was accomplished when the caring factors became repetitive and did not add anything new to the aim of this PhD. This also establishes the validity of this research.

The research method of generating qualitative data makes it difficult for formal reliability testing (Robson, 2011), as it is based on the researcher's observation. Therefore, researchers worry about the reliability of their methods during the research process. However, engaging multiple research methods "leads to more valid, reliable and diverse constructing of realities" (Golafshani, 2003, p.604). Furthermore, improving the analysis and understanding process involves several researchers' interpretation of the data at different times or locations. Being able to show other researchers what I have been working on is one strategy to minimize the risk from this problem (Easton et al., 2000). Therefore, the research findings and knowledge-building process were shared during the PhD by presenting it at conferences and symposium and publishing in journals, which helps to gain peer review and further feedback.

4.3. Summary of the Chapter

How research methodology was applied within the thesis is explained in Figure 21. In Figure 22, the description of different studies in a timeline that shows when they happened and the relationship between each study were presented. Chapter 3 clarified the intersection and connection between care practice and sustainable behaviour, examining the literature on nursing practice and how this could engage with design for sustainable behaviour, particularly focusing on the relationship of the user with hibernating or accumulated objects at end of use. A gap in the knowledge was found and the research questions were identified. In Chapter 5, a survey was carried out to identify whether design for user detachment from hibernating or accumulated objects at end of use is a useful approach to reduce the amount of waste produced. Semi-structural interviews were then conducted to understand this relationship. Next, the metaphor analysis method was employed to translate the carative factors identified in the literature on nursing practice to object care practice to apply to the design process in order to influence design

thinking toward user detachment from hibernating or accumulated objects at end of use. The semi-structural interviews also helped to discover additional motivational factors. The selected caring themes and carative factors are introduced in the form of the Toolkits (from Versions 0.0 to 5.0) in Chapter 6. The method of participatory workshops and case studies was used to examine the application of the Toolkits in the design process, exploring the three different types of relationships. This research adopts a mainly constructivist stance; however, a subjectivist and objectivist stance also appears, together with an interpretive approach and a phenomenological perspective.

- The knowledge was created throughout the iterative cycles of development and evaluation processes. By following an action research '*spiral*' of *plan, act, observe and reflect* (Robson, 1993) the Toolkit was developed. Therefore, action research methodologies were adopted. A partially grounded theory approach was adopted; however, the research plan as it evolved was based on reflections on the findings from the previous cycle. A partly phenomenological approach was adopted to understand users' behaviour.
- The dominant research methods employed in this research are interviews and observations, a survey, workshops, case studies and metaphor analysis. Purposive and opportunity sampling methods were mainly adopted for the participant selection process.
- In order to accomplish validity and reliability in the research, multiple research methods were used, as well as comprehensive documentation in field notes and audio recordings.

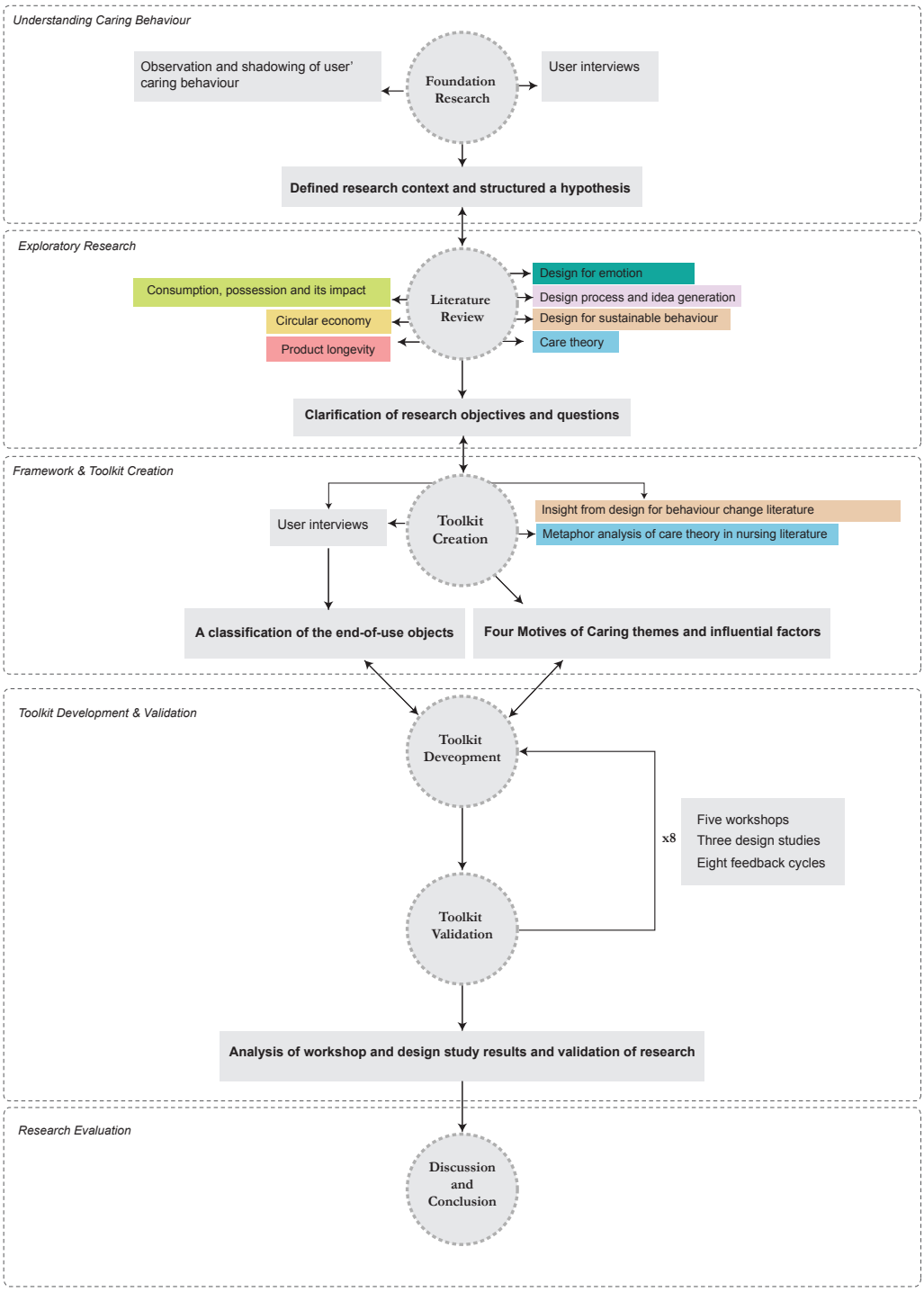


Figure 21. Research methodology applied within the document. Constructionism and action research methodologies are the main ones that are considered. The research methods mainly include interviews and observations, workshops and case studies. I went back and forth until I found the right research paradigms.

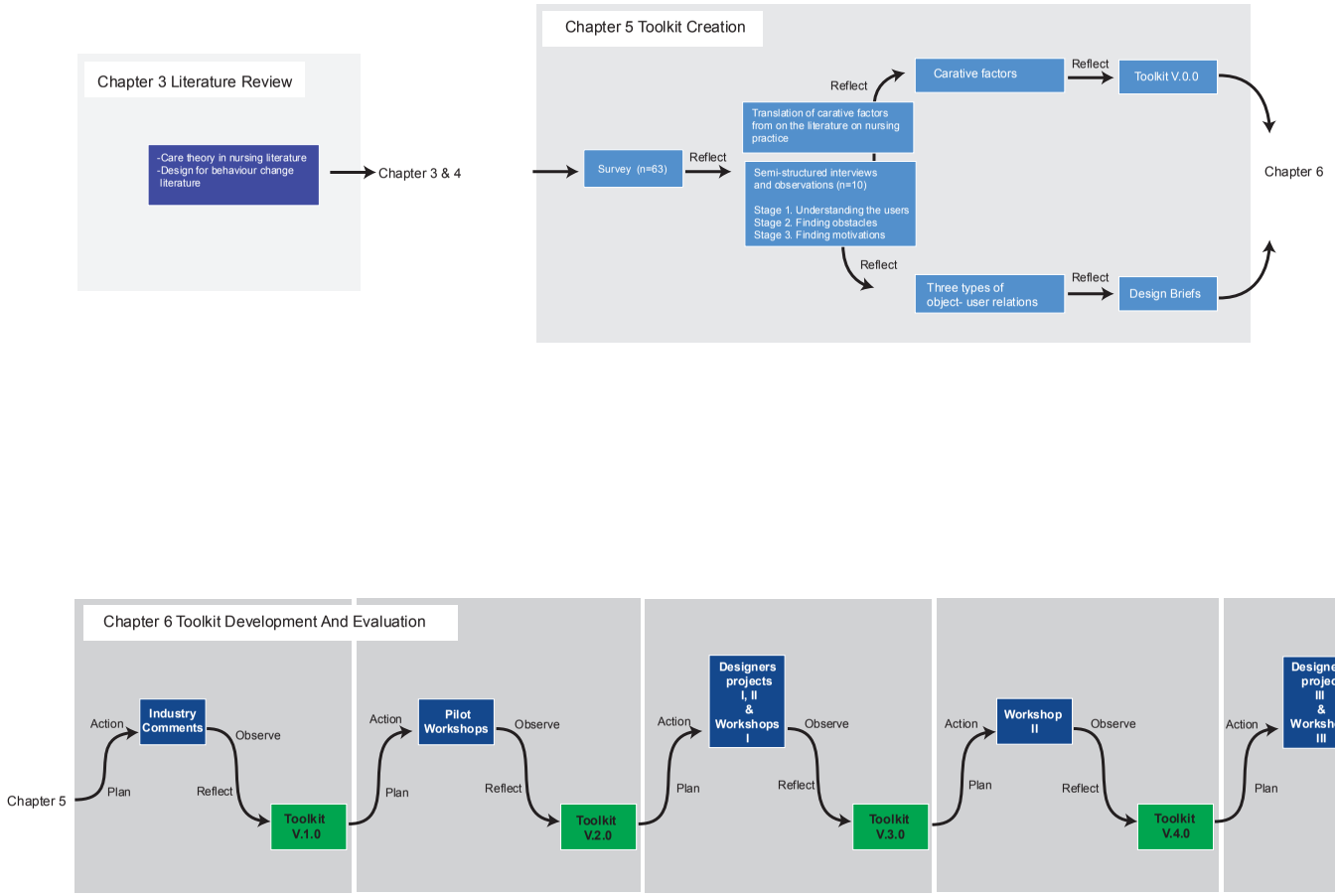


Figure 22. A diagram showing different studies and how they fed into each other.

Chapter 5 | CREATING THE TOOLKIT

In this chapter, the initial Toolkit development processes are introduced. Figure 23 is a diagram that shows the process of understanding users' relationship with hibernating or accumulated objects at end of use and the development of carative factors for an initial Toolkit. First, the survey was carried out to identify whether people who face a moment of change experience difficulty in acting decisively when the relationship comes to an end with the object. Then it was identified whether the design for object detachment is a useful approach for those relationships to reduce the amount of hibernating or accumulated objects at end of use that end up in landfill. The aim of the survey was to find out whether this approach has the potential to promote decisive and responsible disposal behaviour for the general consumer. Second, the obstacles and motivations for letting objects go peacefully were identified through semi-structured interviews and observations. Thirdly, caring themes were constructed borrowing concepts from care theory. Next, influential caring factors under each theme were extracted and developed from nursing practice and behaviour change strategies to form a set of stimuli for a Toolkit to be applied in the design process.

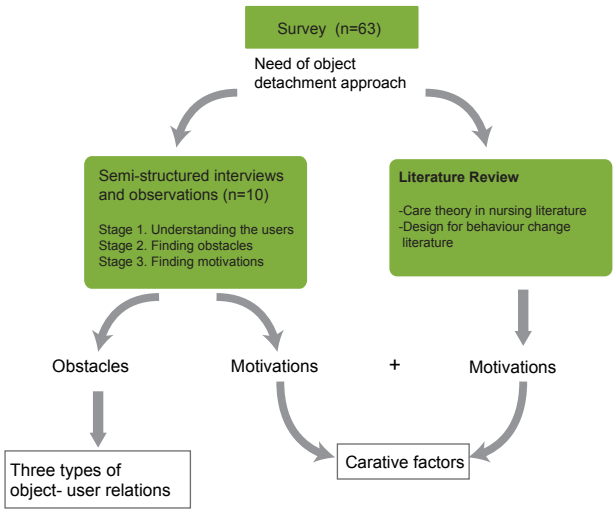


Figure 23. Process of understanding users' relationship with hibernating or accumulated objects at end of use and the development of carative factors.

5.1. Identifying the Need for This Research

The circular economy emphasises that products are designed to be reused, remanufactured, redistributed and recycled by using reclaimed end-of-life products rather than extracted resources (Ellen MacArthur Foundation, 2013). The literature reviewed in this thesis identifies that there is a need for object detachment from a process approach, as sustainable consumers wish to keep the hibernating or accumulated objects at end of use to a minimum, tend to practise a certain detachment towards the objects they own, to deal with the issue of obsolescence (Marchand, 2003). However, it makes more sense to know whether this approach has the potential to promote sustainable behaviour for the general consumer.

Plan of Online Questionnaire

The online questionnaires were created to receive prompt responses within a limited time from a wide range of people on an object detachment approach to things kept at home. It was structured in four sections. The questionnaire mostly consisted of multiple-choice questions, requiring mainly short answers, to put less pressure on participants (Kelley et al., 2003). In the first section, the research objectives and contexts are explained. The term 'end-of-use' object in this questionnaire refers to "objects that have ended their useful life, hence they are in a hibernation period" (Wilson et al., 2016). It is a relative status, which describes the state in which objects that are not used. Additionally, the term 'disposal' does not describe 'throwaway' behaviour in this research context, but represents 'the action or process of getting rid of something, that includes reuse, return and recycling behaviour'. The aim of the survey was to obtain an overview of people's relationship with hibernating or accumulated objects at end of use, and enquire about a sustainable object detachment approach. In the second section (Figure 24-1), (1) participants were asked for their names; (2) participants' occupations were requested to provide collective and aggregate profiles that ensure that the participants were not taken from one sector. Gender was not requested, as the result will not to be analysed as gender-specific: (3) Three user types were described, based on Defra's (2008) user models, and the participants were asked to select the most appropriate one to describe themselves.

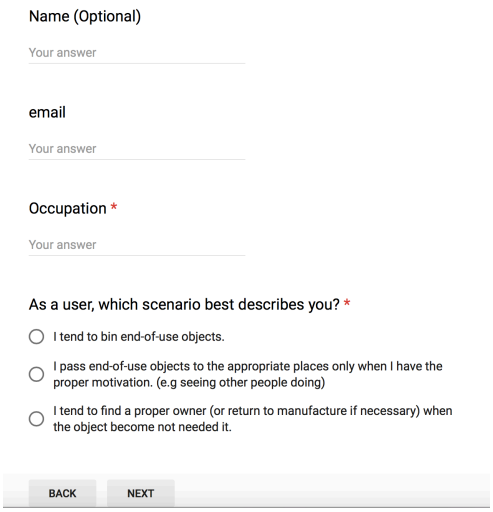


Figure 24-1. Screenshot of the online questionnaire: section two.

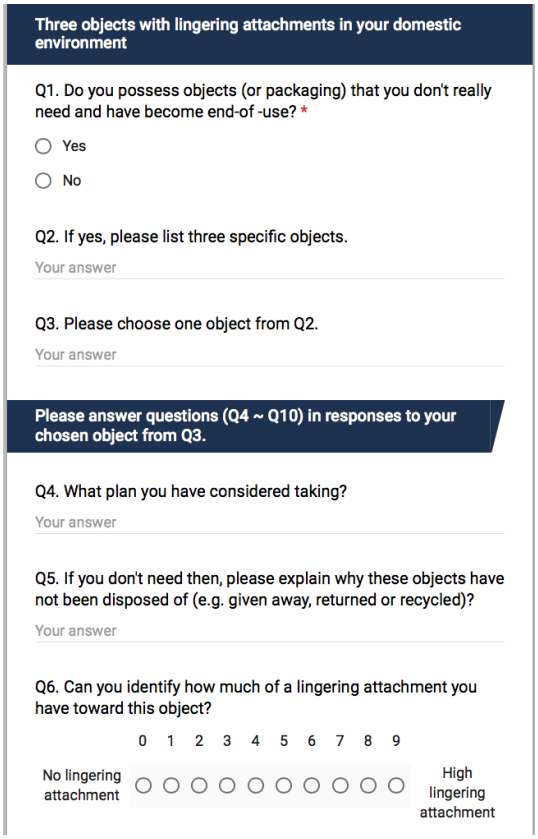


Figure 24-2. Screenshot of the online questionnaire: section three.

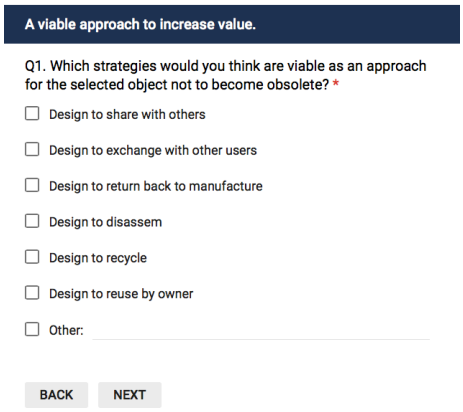


Figure 24-3. Screenshot of the online questionnaire: section four.

In the third section, participants were requested to answer whether they possessed hibernating or accumulated object at end of use in their domestic environment. Figure 24-2 represents the questions in section three. They were asked to list a maximum of three hibernating or accumulated objects at end of use, to allow the participants to become familiar with the context. Then they were asked to select one of the three, and answer the questions in relation to obstacles to acting responsibly and decisively in letting go.

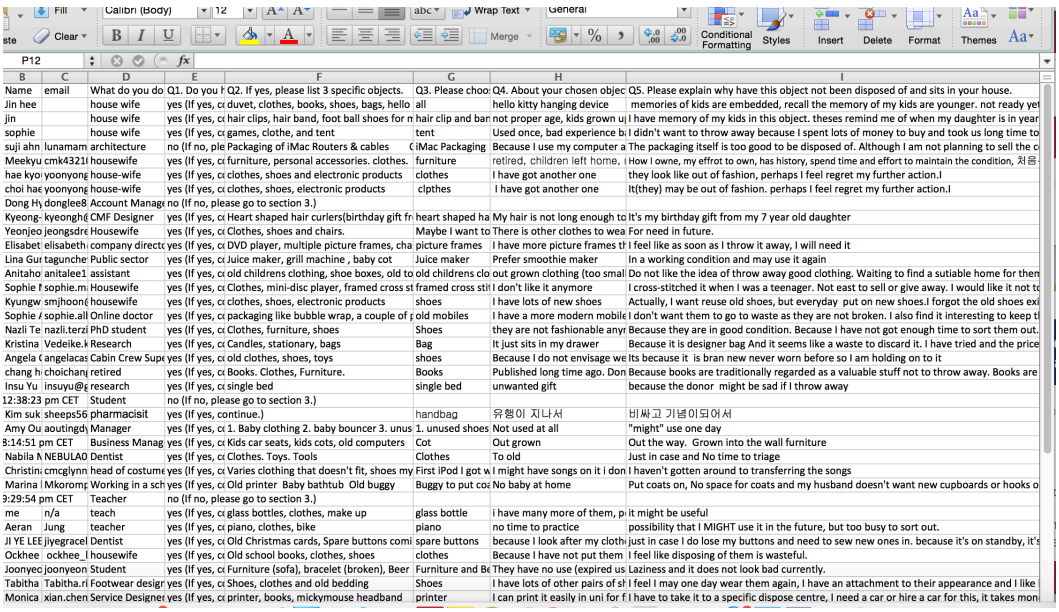
The final section (Figure 24-3) was to find out whether object detachment is a viable approach to reawaken and recapture the value and quality of hibernating or accumulated objects at end of use that has not yet been developed.

Act and Observe

Seventy-three questionnaires were sent out to Canary Wharf College parents' groups, Open Door church communities and international university students. They were mainly homemakers with growing children, retired people and students temporarily staying in one location, aged between 28 and 65. Those groups of people tend to possess hibernating or accumulated end-of-use objects in their domestic environment, and they have a high chance of facing challenging moments in making decisions, such as when the objects become unsuitable for a particular age group, moving to smaller houses or moving back to their own country. The participant selection method is explained in Section 4.1.3.6.

Reflection

Fifty-three questionnaires were completed: 257 objects were mentioned on the questionnaires. However, ten questionnaires were excluded from analysis, as the answers provided were unclear and a few questions left blank. For example, one participant listed a watch given by a friend, and stated this could be disposed of "only if the friendship breaks up". This data was difficult to analyse, as the participant expresses a subtle nuance – she had already made a decision to keep the watch, rather than facing difficulty in acting decisively. The data received was printed in paper form and insights were derived from analysing and memo-ing. The answers received were analysed through the Google Doc analysis system and arranged in Excel spreadsheets (Figure 25).



Name	email	What do you do	Q1. Do you h	Q2. If yes, please list 3 specific objects.	Q3. Please choo	Q4. About your chosen objec	Q5. Please explain why have this object not been disposed of and sits in your house.
Jin hee		house wife	yes (If yes, ci	duvet, clothes, books, shoes, bags, hello	all	hello kitty hanging device	memories of kids are embedded, recall the memory of my kids are younger. not ready yet
jin		house wife	yes (If yes, ci	hair clips, hair band, foot ball shoes for n	hair clip and ban	not proper age, kids grown u	I have memory of my kids in this object. theses remind me of when my daughter is in year
sophie		house wife	yes (If yes, ci	games, clothe, and tent	tent	Used once, bad experience b	I didn't want to throw away because I spent lots of money to buy and took us long time to
suji ahn	lunamam	architecture	no (If no, ple	Packaging of iMac Routers & cables	iMac Packaging	Because I use my computer a	The packaging itself is too good to be disposed of. Although I am not planning to sell the c
Meekyu	cmk4321	housewife	yes (If yes, ci	furniture, personal accessories. clothes.	furniture	retired, children left home,	How I owne, my effrot to own, has history, spend time and effort to maintain the condition, 처음
hae kyo	yoonyong	house-wife	yes (If yes, ci	clothes, shoes and electronic products	clothes	I have got another one	they look like out of fashion, perhaps I feel regret my further action.I
choi hae	yoonyong	house-wife	yes (If yes, ci	clothes, shoes, electronic products	clpthes	I have got another one	It(they) may be out of fashion. perhaps I feel regret my further action.I
Dong Hy	donglee8	Account Manag	no (If no, please go to section 3.)				
Kyeong-	kyeongh	CMF Designer	yes (If yes, ci	Heart shaped hair curlers(birthday gift fr	heart shaped ha	My hair is not long enough to	It's my birthday gift from my 7 year old daughter
Yeonjeo	jeongsdre	Housewife	yes (If yes, ci	Clothes, shoes and chairs.	Maybe I want to	There is other clothes to wea	For need in future.
Elisabet	elisabeth	company directc	yes (If yes, ci	DVD player, multiple picture frames, cha	picture frames	I have more picture frames th	I feel like as soon as I throw it away, I will need it
Lina Gur	tagunche	Public sector	yes (If yes, ci	Juice maker, grill machine , baby cot	Juice maker	Prefer smoothie maker	In a working condition and may use it again
Anitaho	anitalee1	assistant	yes (If yes, ci	old childrens clothing, shoe boxes, old to	old childrens clo	out grown clothing (too smal	Do not like the idea of throw away good clothing. Waiting to find a sutiable home for then
Sophie I	sophie.m	Housewife	yes (If yes, ci	Clothes, mini-disc player, framed cross st	framed cross sti	I don't like it anymore	I cross-stitched it when I was a teenager. Not east to sell or give away. I would like it not t
Kyungw	smjhoon	housewife	yes (If yes, ci	clothes, shoes, electronic products	shoes	I have lots of new shoes	Actually, I want reuse old shoes, but everyday put on new shoes.I forgot the old shoes exi
Sophie /	sophie.all	Online doctor	yes (If yes, ci	packaging like bubble wrap, a couple of p	old mobiles	I have a more modern mobile	I don't want them to go to waste as they are not broken. I also find it interesting to keep t
Nazli Te	nazli.terzi	PhD student	yes (If yes, ci	Clothes, furniture, shoes	Shoes	they are not fashionable anyr	Because they are in good condition. Because I have not got enough time to sort them out.
Kristina	Vedeike.k	Research	yes (If yes, ci	Candles, stationary, bags	Bag	It just sits in my drawer	Because it is designer bag And it seems like a waste to discard it. I have tried and the price
Angela (	angelacas	Cabin Crew Supe	yes (If yes, ci	old clothes, shoes, toys	shoes	Because I do not envisage we	Its because it is bran new never worn before so I am holding on to it
chang h	choichan	retired	yes (If yes, ci	Books. Clothes, Furniture.	Books	Published long time ago. Don	Because books are traditionally regarded as a valuable stuff not to throw away. Books are
Insu Yu	insuyu@g	research	yes (If yes, ci	single bed	single bed	unwanted gift	because the donor might be sad if I throw away
12:38:23	pm CET	Student	no (If no, please go to section 3.)				
Kim suk	sheeps56	pharmacisit	yes (If yes, continue.)		handbag	유행이 지나서	비싸고 기념이되어서
Amy Ou	aoutingd	Manager	yes (If yes, ci	1. Baby clothing 2. baby bouncer 3. unus	1. unused shoes	Not used at all	"might" use one day
8:14:51	pm CET	Business Manag	yes (If yes, ci	Kids car seats, kids cots, old computers	Cot	Out grown	Out the way. Grown into the wall furniture
Nabila N	NEBULAO	Dentist	yes (If yes, ci	Clothes. Toys. Tools	Clothes	To old	Just in case and No time to triage
Christin	cmcglynn	head of costume	yes (If yes, ci	Varies clothing that doesn't fit, shoes my	First iPod I got w	I might have songs on it i don	I haven't gotten around to transferring the songs
Marina I	Mkoromp	Working in a sch	yes (If yes, ci	Old printer Baby bathtub Old buggy	Buggy to put coa	No baby at home	Put coats on, No space for coats and my husband doesn't want new cupboards or hooks o
9:29:54	pm CET	Teacher	no (If no, please go to section 3.)				
me	n/a	teach	yes (If yes, ci	glass bottles, clothes, make up	glass bottle	i have many more of them, p	it might be useful
Aeran	Jung	teacher	yes (If yes, ci	piano, clothes, bike	piano	no time to practice	possibility that I MIGHT use it in the future, but too busy to sort out.
JI YE LEE	jiyegracel	Dentist	yes (If yes, ci	Old Christmas cards, Spare buttons comi	spare buttons	because I look after my cloth	just in case I do lose my buttons and need to sew new ones in. because it's on standby, it's
Ockhee	ockhee_l	housewife	yes (If yes, ci	Old school books, clothes, shoes	clothes	Because I have not put them	I feel like disposing of them is wasteful.
Joonyeo	joonyeon	Student	yes (If yes, ci	Furniture (sofa), bracelet (broken), Beer	Furniture and Be	They have no use (expired us	Laziness and it does not look bad currently.
Tabitha	Tabitha.ri	Footwear design	yes (If yes, ci	Shoes, clothes and old bedding	Shoes	I have lots of other pairs of sh	I feel I may one day wear them again, I have an attachment to their appearance and I like
Monica	xian.chen	Service Designer	yes (If yes, ci	printer, books, mickymouse headband	printer	I can print it easily in uni for f	I have to take it to a specific dispose centre, I need a car or hire a car for this, it takes mon

Figure 25. A screenshot of the spreadsheet.

Section two

The collected data proved that the participants were from diverse sectors. The detail of the questions in section two are presented in 24-1.

(1) This was an optional question

(2) Diverse occupations, such as teachers, dentists and retired people, were represented.

(3) Seven people stated that they are the sort of people who find an appropriate place to let go of the objects at end of use. Seventeen people confirmed that they

are the sort of people who keep hibernating or accumulated objects at end of use until something happens in their life and they throw it away. Twenty people answered that they are the sort of people who would let go of hibernating or accumulated objects at end of use when there is an appropriate motivation. This indicates that this survey participation is not focused on one user type.

Section Three

(1) This was a 'yes or no' question. Apart from two participants, more than 90 per cent of people answered that they do possess hibernating or accumulated objects at the end of use, although they do not really need them.

(2) 257 objects were listed. This question helped participants to familiarize themselves with the questionnaire context.

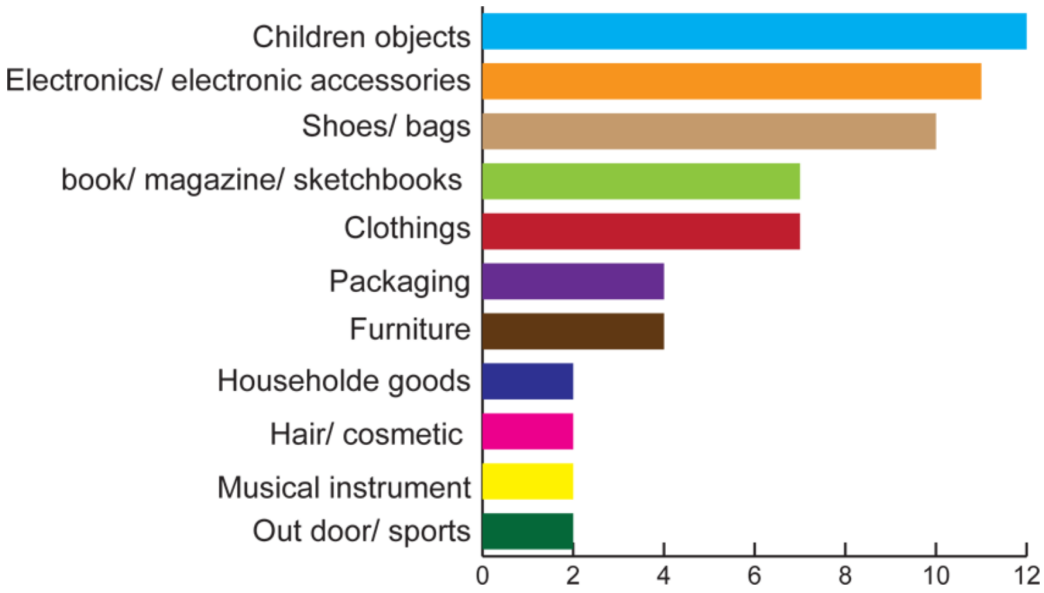


Figure 26. Children's objects and electronic devices are the most distinctive end-of-use objects that are kept at home. (n=63).

(3) In order to increase the numbers of survey participants, the questionnaire had to have a simple, short format. I asked them to choose only one object for further questions. Figure 26 is the result of the survey which represents the hibernating or accumulated objects at end of use that are in dead storage space in the domestic environment. Among the 53 objects, children's objects (e.g. shoes) were the most common hibernating or accumulated objects at end of use in the home although they are no longer used, followed by electronic products, shoes, books and

furniture. The results perhaps have been influenced by the fact that the some of the selected sample participants are people with growing children. It is difficult to conclude that those objects represent the ones that are at risk of being thrown away. However, the result identified the distinct sectors where opportunities for using the detachment approach lay.

(4) More than 50 per cent of people consider ways to dispose of objects such as recycling, or giving them away. This helps to gain insight into what people really want to do with these objects.

(5) The question required a short answer. The answers included: 'I may need it later', and 'I will regret it if I dispose of it' which can be grouped together, as both share similar meanings. Other answers included 'I like the look of the object' or 'I find the content beautiful', or 'it is an unwanted gift from a friend or family member', which can be grouped under same theme of 'having lingering affection for the object', where products are beautiful or sometimes the product itself represents someone they love, which enables the user to express their love toward the object (Desmet, 2012). Likewise, an unwanted gift represents the gift-giver, which encourages the gift-receiver to build affection toward the object, and makes it difficult to let go. Other interesting answers were 'objects are practically in too good a condition to throw them away, however difficult it is to find new recipients', 'the place to donate them or give them away is a long way away' and 'I don't know where to dispose of the objects'. Nearly 60 per cent of participants confronted the moment they wished to deliver sustainable behaviour, but there was a lack of information, guidelines, or a collecting service. The characteristics of the user, such as their personality, were adopted to explore during the idea generation sessions.

(6) This was asked to find out how much lingering emotion was left towards the hibernating or accumulated objects at end of use to let go of such objects. When the objects contain personal meaning, such as unwanted gifts from friends, the lingering emotion tends to be too strong to let it go, whereas when an object contains less personal attachment, such as a BT router, there tends to be less lingering emotion around letting it go. This confirms that increasing the emotional attachment approach is appropriate to apply for relations with certain objects (Van Nes, 2010). The designer should question whether the user-object detachment approach has the potential to be considered as a strategy.

Section Four

(1) The intention was to identify the need and opportunity for the object detachment approach. Although they are from diverse user types, the result verifies that the majority of participants claimed that design for sustainable disposal was a viable approach among the six another possible choices. 'Design to share with others' and 'Design to exchange with other users' were the most common choice.

There is a limitation to this survey, as the selected participants' views could only represent a minority of consumers. However, previous research has confirmed that people who have gone through a 'moment of change' have created an environmental impact which identifies that they require different design strategies. Nevertheless, a number of authors have suggested that targeting individuals who are undergoing a moment of change may be a promising focus to provide a significant opportunity for encouraging the take-up of pro-environmental behaviour (Defra, 2011).

Summary

- Overall, there is some demand for design for object detachment approaches for hibernating or accumulated objects at end of use.
- People who are facing a moment of change tend to have remaining emotions towards certain types of hibernating or accumulated objects at end of use.
- In some cases, when users have stronger lingering emotion towards objects, they wish to keep them. This could mean such emotional attachment could act as a motivation to increase the relationship with objects.
- In some cases, when users have less lingering emotion toward objects, they wish to let them go and dispose of them in a responsible way. This could mean there is some demand for an object detachment approach for a certain type of hibernating or accumulated objects at end of use.

5.2 Understanding the Relationship between Users and Hibernating or Accumulated Objects at End of Use

To design a complete circular system it is important to understand the users' end-of-use phase and what is restricting users' responsible and decisive disposal

behaviour. Understanding the emotional factors at play for users (or owners) towards the hibernating or accumulated objects at end of use have the potential for real environmental impact within the transition towards a circular economy. Investigating what is lacking in motivation and ability will help to understand the barriers. Having an understanding of barriers to desired behaviours is likely to improve the success of designed outcomes towards behaviour change in reaching the target behaviour (Fogg, 2009).

The survey result provided an overview of people's behavioural barriers to letting things go peacefully. However, it was difficult to understand the complex layers of the relationship with hibernating or accumulated objects at end of use. Our behaviours are influenced by many internal and external factors: therefore they cannot be answered by simple questions. Moreover, the survey participants were not actually facing the challenging moment where they were required to make prompt decisions, such as moving house; therefore they were saying what they wished to do about the hibernating or accumulated objects at end of use. The barriers identified also embrace participants' assumptions. Besides, it would not be too much of a problem if the users ended up keeping them. In order to understand the real relationship between users and hibernating or accumulated objects at end of use, and the related obstacles, semi-structured interviews were conducted with people who were facing a genuine challenging moment. These were the people who were moving to a new house within a few weeks, and who had growing children. This will help to understand the real obstacles, particularly the reason for hibernating or accumulating objects at the end of use until they are obsolete, even though they are not needed. This section presents the development process of the interview questions, how the observation was conducted, findings from the research and how data was analysed.

Planned Interview Questions

The interviews and the casual conversations were planned to understand the user's relationship with the hibernating or accumulated objects at end of use and their emotion toward objects. Purposive and opportunity sampling methods were adopted. Six interviewees were planning to move house within few weeks, and four interviewees have growing children. The first group of six interviewees included a retired banker, students and a member of a family who all planned to

move to new places: thus they were facing a real challenging moment of dealing with accumulated end-of-use objects. The second group of four people were homemakers with growing children who frequently face the moment of dealing with the end-of-use objects. Table 5 shows the interviewees in numbers with their age, occupation and the hibernating or accumulated objects at end of use they mentioned.

The interviews consisted of three stages, to gain data about potential barriers and motivations for peaceful letting go through the interviewing and observing process. The first stage was to gain demographic information about the participants' ages, gender and occupation. The second stage was to understand the object-user relationship and investigate the obstacles to letting go. They were asked to list three hibernating or accumulated objects at end of use they had at home, which had not been used but are difficult to make a decision about; in particular, for Interview Group 1 this applied when they were organising their possessions prior to moving house. Participants were allowed to observe their environment to give appropriate examples and to talk freely about the barriers for peaceful letting go. The final stage was to discover the motivational factors for decisive letting go. Interviewees were asked to list one object that they had let go and were asked to describe what motivated them to let go of the hibernating or accumulated objects at end of use in a decisive and responsible way. They were encouraged to use the sources in 'Four Motives of Caring' themes, *affection, responsibility, commitment* and *benevolence*, when they were describing the motivational factors. This was to understand their motivation through the lens of care and to extract relevant motivational factors for further analysis.

The casual conversations were planned for the group of people who had moved to new homes after conducting the interviews. The aim was to define the problematic relationship in relation to the identified barriers. They were allowed to talk freely about the hibernating or accumulated objects at end of use that were actually thrown away from the three listed objects, or other objects if necessary, when moving house, and the barriers they had faced during the possession phase. This group of people provided honest opinions about what restrained them.

Interviewee number	Age	Occupation	End-of-use object in the hibernation period
I1	38	Teacher	My daughter's socks Tent kit Used Nespresso capsules
I2	44	Engineer	Cables Projector screen Children's car seat Hoover Radiator
I3	28	Student	A pair of running shoes Cosmetics Cardboard boxes
I4	68	Retired	Mobile phones My children's desk Old TV Desk
I5	60	Retired Banker	Old books Suit
I6	25	Student	Sky box Unused ink cartridges
I7	44	Home manager	Children's plates and cutlery Never worn clothes Hair accessories Chocolate packaging
I8	57	Home manager	Children's clothing and socks
I9	64	Home manager	Clothing Old plates Pharmaceutical products A pair of boots and running shoes
I10	39	Home manager	Children's potty Sachets of food Cosmetic products Underwear

Table 5. The interviewees in numbers with the objects they mentioned.

The interviewees were aged between 25 and 68. Four participants (I1, I4, I7, and I8) were the people who had participated in the online survey. Four interviewees were re-recruited from Canary Wharf College Parents' Groups and Open Door Church, via email communication, and two interviewees were selected through facebook.com. Some audio recordings of interviews, field notes (some participants were uncomfortable when recording their voices), and photographs of their environment were taken. The interviews were semi-structured because then I could restructure the questions during the interview sessions as a result of what the interviewee said, which helped me to gain more detailed information about the relationships, and define the problem in a specific context.

Act and Observe

Stage 1

Ten series of interviews and five casual conversations were conducted over a ten-month period. The interviews were carried out prior to casual conversation with people who were moving house.

The interview questions include: (1) What is your age? (2) What is your occupation?

Stage 2

I visited the homes of six participants (I1 I2, I3, I4, I5 and I6) who were moving out within a few weeks' (or months') time, and those of four participants (I7, I8, I9 and I10) who frequently faced the need to make a decision about hibernating or accumulated objects at end of use. Then I observed those objects in the participants' domestic environments and interviewed them to understand the relationship between them and their attitude toward objects. Observation is an effective method that helps a researcher to understand how people really store and deal with objects at the end of use in a domestic environment in a real-life setting. The interviewees were asked to list a maximum of three objects which are still in their homes even though they didn't really need them, with a high chance of them now being thrown away. I1 took me to her store room to show me an unwanted gift from her neighbour, a tent kit (Figure 27, top left), which was not useful for her but which she had kept until now. I3 was moving back to her own country: she had piles of clothing which she has not worn and does not need. She kept

them because they may be worn one day, or she didn't know they were in her cupboard. As she was moving out within a few days she needed to make a prompt decision: “I might give it to a charity shop or bin it”. While I1 was observing her belongings she said that many of the objects were kept in her drawers, such as pharmaceutical products or cosmetic products, and she didn't notice them until she was packing up to move. I took the photographs of each object and wrote field notes. The photo of one object, hair accessories, was taken by I2 and sent it over by WhatsApp, as she struggled to remember where the object was.

Having understood the potentially problematic relationship with hibernating or accumulated objects at end of use, the next step was to find out what the obstacles were to the letting go of the objects. The interviews were carried out in their domestic environment. Additionally, they were allowed to list more hibernating or accumulated objects at end of use if necessary. The interviews focused on questions such as “why you haven’t let go of this object responsibly when it had value?”. II9 said: “I thought I might use it in the future […,] but I might bin it because I haven’t found a place to donate it near me”. I10 stated: “I tried to sell the kids’ potty online so I put an ad on Gumtree, but I had no offers”. Whereas I6 stated that she didn't realize the object was in her house until she was starting to pack up her stuff.

The next step was to find out what actually happened to these listed objects, and what the physical obstacles were to responsible and decisive letting go. The casual conversation was carried out via mobile phone or on site after a certain period of time had elapsed, when the interviewees in Group 1 had moved to new places. They were asked to list the objects which had been thrown away of the three they had listed, or other objects, if necessary. I4 had thrown away a desk that was used by their children, because the design was too old-fashioned, hence he couldn’t find anywhere to give it away to. I2 had thrown away stored cables in a bin store located at the basement of his flat: he wasn't sure how to dispose of them. He had also thrown away a vacuum cleaner and a small radiator, which had been stored at home. He had tried to sell these objects but there were no offers for them. I1 eventually threw away the used Nespresso capsules she had collected; she made an attempt to return them to the manufacturer, but she couldn't stand the smell while collecting them. The findings are categorised in Table 6 according to different types of lingering emotion remaining towards the objects.

Figure 27. Photographs of the hibernating or accumulated objects at end of use that are at risk of being thrown away. A tent kit (top left), accumulated clothing (top right), a car seat (middle left), an old vacuum cleaner (middle right), old cables (bottom right) and expired pharmaceutical products (bottom left).

Figure 28. Interviewees reading the descriptions of each caring themes.

Stage 3

This stage was to understand what would have helped the participants to let go of hibernating or accumulated objects at end of use decisively and responsibly. The 'Four Motives of Caring' themes were presented to interviewees with the descriptions (Figure 28). Each caring theme was a motivation to induce a care action of peaceful letting go. The interviewees were allowed to read and ask questions about each theme. Then they were asked to list one end-of-use object that had been successfully let go responsibly and decisively, with a positive sense of purpose. They were encouraged to use the sources of 'Four Motives of Caring' themes: *affection, responsibility, commitment* and *benevolence*, when they were describing the motivational factors. This was to understand their motivation through the lens of care, and to avoid making assumption about participants' own motivation but to validate the each motive of factors clearly within caring perspective. However, the participants made decision whether they explain the motivation by using the caring themes or not.

Then they were asked to describe how the selected caring factors had influenced their behaviour. I5 had listed a suit that was not needed. He selected the caring themes of *affections* and *responsibility* as the motivation for peaceful letting go. He stated that the object had his own memories so he passed it onto his cousin, and said that 'without responsibility the care action won't happen'. The good condition of the item also helped I5 to gain responsibility. I6 listed an end-of-use cartridge and she selected *responsibility* and *commitment.* Knowing that the

company would come at a definite time to collect the end-of-use use cartridge helped her to enact both *responsibility* and *commitment*. The results of the analysed motivations are listed in 5.3.2.3

Reflection

During the second stage, 34 objects were listed in total; 32 of the objects are included in the analysis. Some participants only listed one or two objects, whereas others listed more than three objects. As the interview used a semi-structured method, they were allowed to discuss more objects when they found this was relevant to the questions. The interviews and observation session reminded participants about hibernating or accumulated objects at end of use kept in their drawers or cupboards. The research had helped them to reflect on what they owned and let them reconsider the items for further action. Some participants listed the hibernating or accumulated objects at end of use which still had remaining positive emotional attachments (e.g "my first drawing book"). These types of objects tend to have a definite relationship with the users, which led to a high chance of a caring action of keeping the object; therefore this type of object does not cause too much of a problem. However, this research focuses on hibernating or accumulated objects at end of use which have an uncertain attachment, hence they are kept for an unknown future or for another opportunity to be reused, returned to the manufacturer, or recycled.

After the interviews, the photographs which were taken during the interviews (and sent by participants), audio recordings and field notes were analysed. By following a thematic coding analysis approach, each participant's insight was written on an individual note, in the order that the participants mentioned the barriers (or motivations). The frequency of the words used by the participants and the tone of voice were important measuring tools to understand the users' relationship with hibernating or accumulated objects at end of use. In this sense, listening to recorded sound and re-reading the field notes helped to reflect on the factors they emphasised. The notes are divided into two files, because two questions were asked during the interviews. Although different types of object were recorded during the research, understanding the relationship with the users was more important.

Types of Object- User Relations	**Recorded objects**	**Detailed background**	**Obstacles**
A. Users have lingering affection	Purse , Game set	It was an unwanted gift and the participant kept it because she had an emotional attachment to it.	Remaining affection
	A folding table	It was left at the corner of a house: although it was a very old design, it contained memories.	
	Chocolate metal tin packaging, Jacket, A pair of boots and running shoes	Participants kept them for years even though they were not used, because they liked the designs.	
B. Users have lingering regret	Pharmaceutical products, Sachet-packed food, Cosmetic products	They were kept at the back of their drawer (or fridge) because they had forgotten them, or just in case they might need them in the future although the use-by date had expired.	Lingering regret Sometimes they forgot they possessed the objects.
	Mobile phone	It was kept because I might need it later. “My personal information on it may not have been erased completely”.	
	Cables, Cardboard boxes, A pair of running shoes	They were kept just in case they might be needed, but never used.	

C. Users have lingering responsibility	Sky box, Picture frames, Vacuum cleaner, Tent kit, Ink cartridges, Coffee capsules, Children's clothing and socks, Children's car seat	They were kept because the participants felt uncomfortable throwing them away due to the good quality of the objects and environmental concern, but they don't know how to find / haven't found another user.	Lack of knowledge and/or availability of suitable services or systems for disposal. Having difficulty finding a new recipient. Takes time and not easy.
	Projector screen, Desk	It was kept because "it was too bulky to deal with."	Size, weight and difficulty of disassembly.
	Hair accessories, Children's potty, A pair of running shoes, Underwear	Participants think it may be difficult to give it to a new recipient for reasons of hygiene.	Fixed idea of inability to find new recipients -Not many services to take the end-of-use objects to.
	Suits, Old books, Old wooden TV, Old printer	They are in good condition, although they are an unfashionable/ design. However, they do not want to donate the objects to charity, because there is a high chance of the shoes being thrown away.	Became obsolescent

Table 6. Analysis of obstacles to letting go of objects peacefully.

Figure 29-1. A classification of the relationships between users and hibernating or accumulated objects at end of use according to the degree of attachment and detachment. Each relationship consists of examples of photos I took during the initial research stage. Users have different levels of attachment toward their objects until the moment of decision occurred.

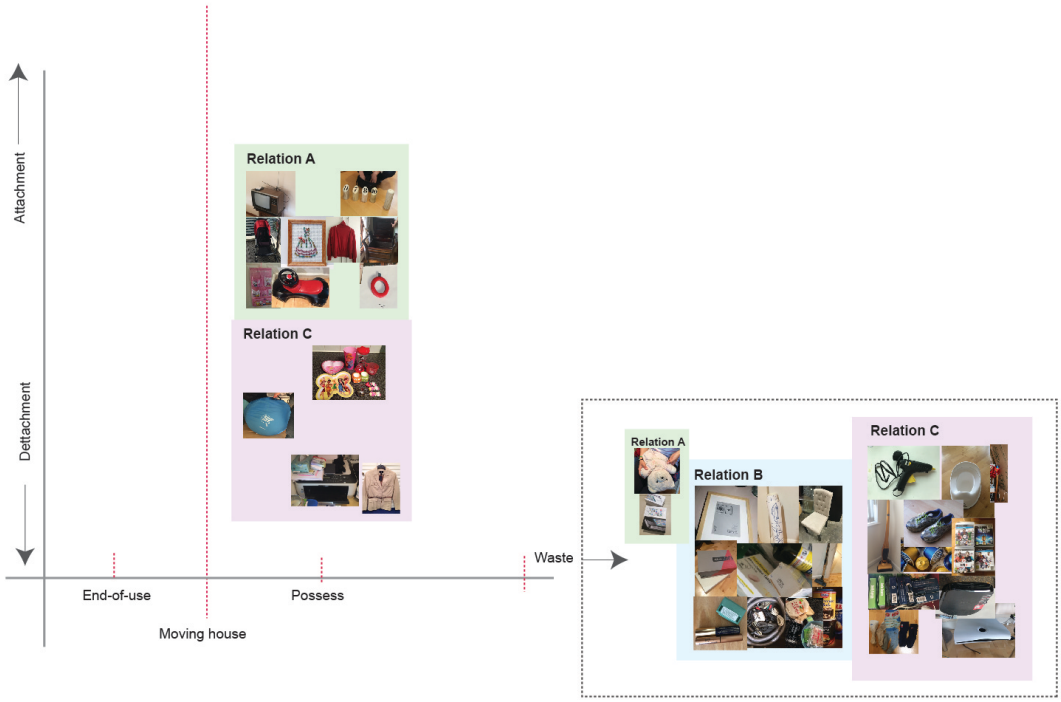


Figure 29-2. A change of level of users' attachment and detachment toward hibernating or accumulated objects at end of use after a decision-making moment, such as moving house, occurred. The hibernating or accumulated objects at end of use in B and C relationships were mostly thrown away.

Next, notes with similar extracts were given the same code and were grouped together. Then the codes were classified into potential themes, and all the data was gathered under potential themes. Through the process of re-checking data, Table 6 was created. Users' relationships with hibernating or accumulated objects at end of use were classified into three different types in response to interviews at Stage 2. These are: 'users have lingering affection', 'users have lingering regret' and 'users have lingering responsibility'.

A A relationship where 'users have lingering affection' toward the object. This involves emotional aspect of attachment.

B A relationship where 'users have lingering regret' towards the object. This does not involve so much emotional attachment but involves a practical aspect of attachment.

C A relationship where 'users have lingering responsibility' towards the object. It does not involve so much attachment; instead they are ready to let the object go,

but are waiting for an opportunity to arise. Users tend to keep them because they have a certain responsibility for the objects or the environment.

An obstacle such as “feeling guilty if I dispose of the object” (e.g. an unwanted bed frame from a mother-in-law) is a complex human emotion which will not be dealt with in this thesis. It can be seen that the emotion towards end-of-use objects can be categorised according to the amount of attachment users have. The attachment is defined depending on the degree of users’ emotional and practical need for the objects. In Figure 29-1, photos taken during research process were classified according to the degree of users’ attachment and detachment. Eight interviewees confirmed that they have a strong attachment to objects located in relation to A rather than B.

It should be noted that the emotions towards hibernating or accumulated objects at end of use could overlap with each other between the three relationships. The classification only attempts to show the distinct user and hibernated object relationship which became apparent during the interviews.

After a certain period of time had elapsed, casual conversations were conducted with the interviewees and Figure 29-2 was created. It reveals the problematic relationships in which the users have a throw-away attitude. Although users had some degree of attachment to objects within the B relationship, most of the items were thrown away when the owners moved to new homes. Considering the responses from I2, I3, I4, I5 and I6, there was lingering emotional connection to those objects, and they were keeping them for a mostly unknown future for no particular reason. This indicates that objects in the B relationship require a design approach to increase the emotional connection or other external factors to motivate their care-giving behaviour. The objects in the C relationship were reluctantly thrown away, according to I2, I3, I4 and I6, as the users primarily wanted to dispose of them responsibly. Users tried to avoid throwing them away but couldn’t find a place where they would be needed, except a charity shop. However, when users realised their financial value or had an emotional connection to objects, they tended to keep them for the next opportunity. Providing a potential place for them to be given away will help users in the C relationship to deliver care action. Most of the objects in the A relationship were kept after moving home; however, there were a few objects that were thrown away. This relationship has a potential risk of delivering throw-away behaviour,

therefore whether this relationship requires the design for object detachment approach or not was tested in workshop I.

Summary

- There are three distinct groups of relationships between users and hibernating or accumulated objects at end of use. They are (A) where users have lingering affection, (B) where users have lingering regret and (C) where users have lingering responsibility.
- The relationship can be classified depending on the degree of attachment to hibernating or accumulated objects at end of use.
- Relationships B and C are the main barrier to letting go of the hibernating or accumulated objects at end of use responsibly and decisively

5.3. Development of the 'Four Motive of Caring' Themes

Care practice could promote sustainable behaviour. In certain aspects of nursing practice, caring is a process of understanding patients' quality of life, accepting their condition (Purtilo and Doherty, 2010) and respecting their current condition. The caring process aims to sustain and maintain (or enhance) a subject's condition, or, where this is not possible, to reduce the pain and distress of the inevitable to "let go peacefully" (Watson, 1985, p.7). Discovering and understanding which factors can motivate such an attitude and actions may be valuable in promoting user-object detachment and care-giving behaviour. Applying these concepts to user-object relationships, I can identify useful ways of influencing attitudes and behaviours around possession and lingering attachment, and around object obsolescence and throwaway attitudes. In order to explore the dimensions of caring for one's possessions, this study borrows Blustein's (1991) four forms of care (Blustein, 1991, pp.121-130; Shaw et al., 2016), namely *affection, responsibility, commitment* and *benevolence,* and applies them to care-giving behaviour from a user-object relationship perspective. Translating these principles to design, forms of care and carative factors could help users to recognise an individual object's value and motivate them to preserve its value and let it go peacefully.

5.3.1. Identifying Carative Factors

The 'Four Motives of Caring' themes (*affection, responsibility, commitment* and *benevolence)* were initially drawn from human care practice. The underlying motivational factors for each theme were extracted and translated to a user-object context with more applicable phrases for designers. When comparing two different problem-solving approaches, it is essential to search for their basic abstractions or common denominators (Koberg and Bagnall, 1991). To do this, an analysis of the problems is first required, by "break[ing] the situation or problem into parts for examination" (Koberg and Bagnall, 1991). This was carried out in the previous stage of research (See Chapter 2.). Then a process of synthesis is necessary, "to reassemble the situation based on our understanding of improvements discovered in our study" (Koberg and Bagnall, 1991). Here I used a metaphorical approach. Metaphors used in the design field typically serve to generate new ideas, solve problems, and stimulate creativity (Casakin, 2007). This stage was essential for this PhD when extracting the caring factors from the human care context as a solution to the problem.

To create a concrete concept, the factors were also identified from a literature review of behaviour change strategies. Then data was also extracted from interviews to gain insight from the real world. Then all the accumulated inspirational factors are termed carative factors, as they were originally rooted in nursing practice.

5.3.1.1. Extracting Factors from Nursing Practice

By adopting Schön's (1979) generative metaphor framework of 'seeing as', 'object care' was explored through reflection upon the values and meanings of 'human care'. First, it is necessary to identify which influential factors will help nurses to decide how to let the patient die or let them go peacefully and deliver caring processes appropriately. Then the term 'nurse' was translated to 'user', and 'patient' to 'hibernating or accumulated object at end of use'. My attempt was to make sense of translated factors and they are applicable in the user-object context. Therefore some factors are not directly translated, but have had some modification in order to fit into the context. For example, 'predicting what will happen in the future' (e.g. become obsolete) helps nurses to deliver peaceful letting go behaviour. However, in a user-object context, users require intervention

if they are to predict what will happen to objects in the future. Therefore it makes more sense to define the factor as 'letting users know what will happen to the object in the future'. It is also relevant for nurses to understand which factors influence the patients (or family) to decide to die (or let go) peacefully, because in most cases the 'peaceful letting go' was decided by them. The identified factors were initially placed within the *commitment* theme following Engster (2005) and Shaw et al., (2016)'s view of nurses' caring motivations.

According to Lee (2002), to die in a "healthy" fashion "the dying person must have control of medical care, the right to hear painful truths, time to review the past, the presence of significant others, and opportunities to talk about spiritual issues". By adapting Schön's (1979) generative metaphor framework, requirements were translated into the user-object context (Table 7). In this case, translating "patients have the right to hear painful truths" to "the object has the right to hear painful truths" does not make sense. Therefore, this was translated to "the object has a right to tell the user painful truths'. The factors identified were initially placed within the *affection* theme, because Lee (2002)'s approach follows Watson's view of caring. Watson's core concept of carative factors lies in love and a heart-centred approach (Watson, 2008; Watson, 2012). However, they moved across to other themes in a later stage of the Toolkit development process, when the factors were matched more suitably to other themes.

Thirteen influential factors that might be applicable in a user-object context were discovered, which can be applied to object-user relationships to influence the users' view on end-of use objects' value and that aim to encourage users to value the current condition for a more hopeful opportunity (e.g. reuse, return to the manufacturer or recycling).

	Carative factors to let go of the patients peacefully	**Translated carative factors to let go of objects peacefully**
Affection	Patients have control of medical care (Lee, 2002)	The object has a self-controlled caring system
	Patients have the right to hear painful truths (Lee, 2002)	The object has a right to tell the user painful truths
	Patients have time to review the past (Lee, 2002)	Let users review their past relationships with the objects
	Patients have the presence of significant others (Lee, 2002)	The object is present to users
	Patients have opportunities to talk about spiritual issues (Lee, 2002)	The object or system communicates future use
Responsibility		
Commitment	Aware of positions of their roles	Make users aware of their roles
	Being authentically present (Watson, 2010)	Let users be present to the objects
	Recognise that the dying person faces the unpredictability of death (Lee, 2002)	Let users recognise that end-of-use objects can become obsolete unpredictably
	Knowing the patients' feelings concerning their current (healthcare) situations. (Watson, 2010)	Let users know the problem the object is currently facing.
	Predicting what will happen in the future (Watson, 2010)	Let users know what will happen to the objects in the future
Benevolence		

Table 7. Translating carative factors from the nurse-human context to the user-object context.

5.3.1.2. Extracting Factors from Behaviour Change Strategies

I attempt to identify caring factors from existing behaviour change strategies. To do this, behaviour change motivational factors were deconstructed in relation to caring themes. MINDSPACE and EAST frameworks were useful in this PhD because they deal with the emotional motivation to change behaviour. For example, the motivation to arouse commitment for activity is "[…] to make commitments public, since breaking the commitment will lead to significant reputational damage" (Dolan et al., 2009). This factor is recognised to promote commitment, which also has the potential to deliver care action, as the commitment is part of a form of care. Likewise, in the EAST framework the way to motivate commitment is "to raise the stakes", to make one's commitment in public. The factors with a degree of similarity in meaning are merged and abstracted as one factor and categorized. It could be argued that the emotion of commitment described in the MINDSPACE and EAST frameworks aim at changing social behaviour, while this PhD aims to influence users' environmental behaviour. However, considering that the ultimate aim of care action is to maintain and develop our society (Tronto, 1993), and by extension to "care for the world", the motivation for caring emotions can be shared. The feedback cycle between care-giver and care-reviver were relevant aspects to motivate caring behaviour; therefore only the factors that derive meaningful responses were extracted from the behaviour strategy literature. Table 8 represents the behavioural insights derived from the literature and identified the caring factors which can potentially influence peaceful letting go behaviour in the user-object context.

In Fogg's (2009) behaviour change model, targeting 'easy to do' behaviour has a strong tendency to achieve success in behaviour change. It is important to explore the factors that create easy ways to deliver action. Although caring processes happen even in a difficult situation within the human-human context (e.g. helping someone in danger), human-object relationships require different caring factors to lead caring behaviour. These factors were identified under benevolence, as such an emotion is related to "distance" – where the action takes place – and the "availability of caring resources" (Shaw et al., 2016), which means it is depends upon the person's context and the situated environmental influences.

	Behaviour Insight	**Identified carative factors**
Affection		
Responsibility	Make one feel better about him/herself – bonding with action for a desired image (Dolan et al., 2009, p.28).	Encourage users to have a desired image (e.g. celebrities) by bonding with sustainable letting go.
	One sees others contributing as well (Dolan et al., 2009, p.39).	Encourage users to see other people contributing as well.
	When people recognize the impact their personal behaviour has on creating a better society (Dolan et al., 2009, p.39).	Let users know what impact their behaviour has made on making a better society.
	Make one pay a deposit and get it back when the person delivers the behaviour (Dolan et al., 2009, p.39).	Let users pay a deposit first and get it back when they return the object.
	Being representative of the group/ public (Dolan et al., 2009, p.54).	Let the users be representative of the group.
Commitment	Define the outcome clearly (Dolan et al., 2009, pp. 34-36).	Let users know the outcome of their behaviour.
	Make one's commitment in public or to another person (Ideally, someone whose respect you value) (Dolan et al., 2009, pp.34-36).	Make users' pledges in public or to another person.
	Have clearly planned commitments and follow up whether they were successful. (Service et al., p.42)	Encourage users to have clearly planned commitments and follow up users' behaviour.
	Combine commitment with financial punishment for failure. (Service et al., p.34)	Combine responsible and decisive disposal behaviour with financial punishment for failure.

	Behaviour Insight	Identified carative factors
	Provide benefit if they commit to it – Reciprocity. (Service et al., p32)	Provide benefit to users if they continuously dispose of objects sustainably.
	Give credit for their action, which can then be used for one's desired purpose. (Dolan et al., 2009, p.40)	Give credit for users' peaceful letting go action which can then be redeemed for their desired purposes.
	Create a contract for a specified period of time to comply with the requirements set up and let the partners support. Provide positive feedback or reward when the contract has been successful. (Dolan et al., 2009, pp.26-27)	Create a contract for a specified period of time to use of objects and return, and let the partners support. Provide feedback or reward when the contract has been successful.
	Provide a message from a similar background. (Dolan et al., 2009, p.32)	Let other users communicate to pass on the objects to new users.
	Create a positive self-image - Team up with people and deliver action together; if not, apply penalty. (Service et al., p.25)	Team up with multiple users and let the objects circulate around; if not, apply penalty.
Benevolence	Make it easy (Service et al., pp.9-10)	Make passing on objects to other people easy
	Make it timely (Service et al., pp.37-42)	Make sure recipients are available and they are able to accept the objects.

Table 8. Extracted carative factors from behaviour change strategies.

5.3.1.3. Extracting Factors from Interviews and Observation

During the interviews and observation research stage discussed earlier, ten objects were discussed, along with the participants' caring motivational factors. All the objects are included in the analysis. The identified caring factors were subsequently categorized according to 'Four Motives of Caring' themes. The thematic coding processes were taken, except that frameworks and themes had already been created based on care theory. Data was re-checked and re-read and noted down. Then the identified motivations were grouped together based on the participants' responses to each of the caring themes, and placed under the potential themes. Table 9 is a summary of the identified relevant caring factors in relation to the objects. It is difficult to say which theme has the most influence on caring behaviour, as all the participants mentioned more than one caring theme. However, I organised the carative factors into the caring themes most frequently mentioned during the interviews.

Motivational factors such as 'moving house' or 'a request by my family' were not considered, as these are difficult to adopt as design strategies. So, because 'replacement by other objects', 'clearing my space' and 'freeing myself of guilt' are not considered as carative factors: in particular, the factor of 'replacing the old one for a new one' went against the aim of this research.

5.3.2. Reflection on the Carative Factors Extractions

Thirty-seven influential factors that were found during the initial research had a direct impact on creating original carative factors for influencing behaviour. Emerging factors were categorised under 'Four Motives of Caring' themes, to be subsequently developed into a set of stimuli for a Toolkit. In this study, factors under the *affection* theme aim to encourage users to let go of objects peacefully to a meaningful place rather than evoking an affective response from users through the object's design. (Desmet and Hekkert, 2007). Therefore, the carative factors under the *affection* theme tend to already imply users' emotional attachment to objects.

The factors identified also includes the motivation ways for responsible and decisive disposal, which does not involve the users in building an emotional attachment. These factors were discovered during the interview sessions, when I5 mentioned the library loans system, which is a good example of delivering care-

giving behavior. Additionally, I2 mentioned she wished she had a place where they could borrow children's toys, and I6 wanted a service to take their mattress away when they had finished using it. Those factors are associated with the access-based product ownership model, which induces users to let objects go decisively, consequently avoiding the object obsolescence period and reducing unwanted waste. However, only the influential factors which were stated during the interviews were considered; this research did not extract factors from PSS.

It was found that the 'Four Motives of Caring' themes of *affection, responsibility, commitment and benevolence* have a very fine line between them; thus the interviewees took some time to understand the definition of each theme when they were explaining about the motivation for responsible and decisive letting go. How people interpreted the definition of forms of care was relative, so even though they are the same carative factors they may sit within different caring themes, depending on which theme the interviewee stated. Indeed, the motivations found were intended to provide an overview of caring motivation from a thematic perspective rather than to provide definite dispositional guidelines. Human disposition is a composite of complex layers – it cannot be defined as one factor, providing just one particular disposition. By revisiting the analysed data and care literature reviews, the first version of the Carative Factors Inspirational Toolkit was established (Figure 30).

Summary

- The relevant carative factors were translated from nursing practice through a metaphorical thinking process and identified from the behaviour change strategies, and the interview data is abstracted to form into a set of stimuli.
- The identified factors also motivate responsible and decisive disposal behavior which does not involve the users in building an emotional attachment.
- The 'Four Motives of Caring' themes have a fine line between them, thus the identified factors may fit into other themes, depending on the context and characteristics of the user.

Caring themes	Interviewees numbers	Contributed Objects	Background	Extracted carative factors
Affection	I2, I5	Buggy My child's clothing Suit of clothing	The buggy provided good memories of their child, so it was not easy for I2 to let go. I2 wanted to find the right person who needs it.	Finding a person who would appreciate the objects
	I9	Antique table	Although the table was not in use, it contained memories, and her time and effort to maintain.	Received the appropriate financial amount
Responsibility	I4	Plant	The object was a living thing so she didn't want it to die.	Living thing
	I10	Computer	Getting a financial return was important. The participant said the product was sold for a good price.	Getting a financial return
	I6	Glass jar	The material was durable, so she couldn't throw it away, but she ended up put in a glass recycling bin.	Durable material
Commitment	I1	Children's clothing	It was difficult to find someone who would take the objects. However, I2 knew how much waste she was creating if she threw it away. Therefore, she donated it to a charity shop, but she was concerned about the after-use.	Knowing the effect of my behaviour
	I6	Cartridges	She gets a regular collection service from the cartridge company. She earns points by returning products.	Collection services Getting benefits
	I5	Library books	The library set a date by which to return the books: if they did not they were asked to pay a fine.	Provide a deadline to return, otherwise pay a fine.

Caring themes	Interviewees numbers	Contributed Objects	Background	Extracted carative factors
Benevolence	I8	Hair pin	I8 heard the sad story of someone in a refuge, there were in a place near her where she could donate the objects.	Hearing a sad story with an obvious opportunity to act.
	I7	Bread maker	She was sympathetic to a story about someone in need from her friend.	Hearing a sad story with an obvious opportunity to act.
	I3	Coins	Participant spotted a person in need of money. He had some change and the place to donate the money was nearby.	Timing

Table 9. Motivational factors identified during the interviews and observation.

5.4. Summary of the Chapter

Chapter 5 answered Research Question 2, 'what factors inform different users' decision-making process towards hibernating or accumulated objects at end of use' through an iterative development process of the carative factors? The motivations and barriers for decisive and responsible letting go for hibernating or accumulated objects at end of use were identified through the interviews and relevant literature review to answer Research Question 2. Thirty-seven influential factors were found during the initial research, and these had a direct impact on creating original carative factors for influencing behaviour. Using Blustein's four forms of care (Blustein, 1991, pp.121-130; Shaw et al., 2016) as an initial framework, influential caring factors were located within each theme and developed into a set of stimuli for a Toolkit to be applied in the design process. Users' relationships with hibernating or accumulated objects at end of use were then analysed as a foundation for forming the design briefs. Having explored the possible link between carative factors and product ownership and disposal, the next phase of

the study sought to apply the carative model to the design process by defining the context based on the barriers found in the early stages of the research.

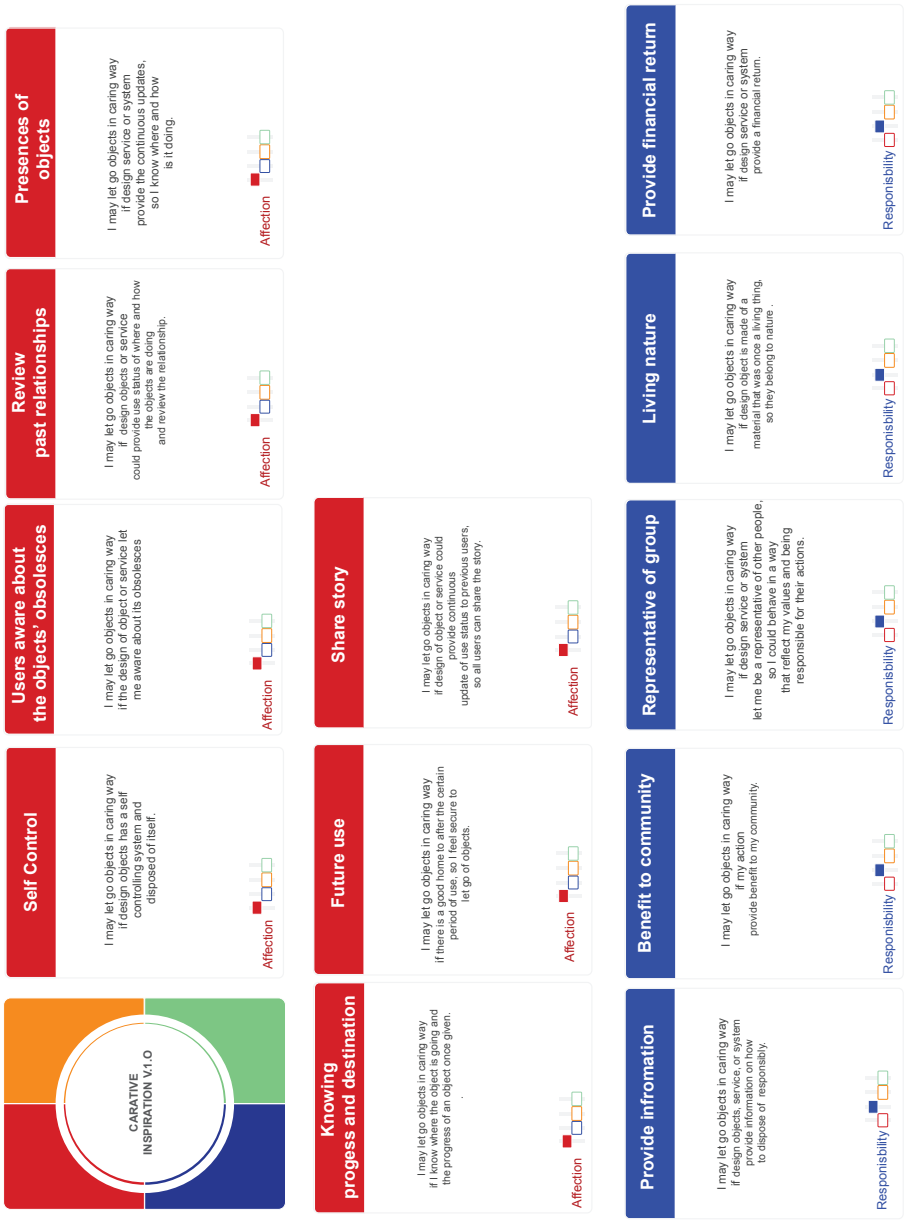


Figure 30. Carative Factors Inspirational Cards, Version 0.0.

Figure 30. Carative Factors Inspirational Cards, Version 0.0.

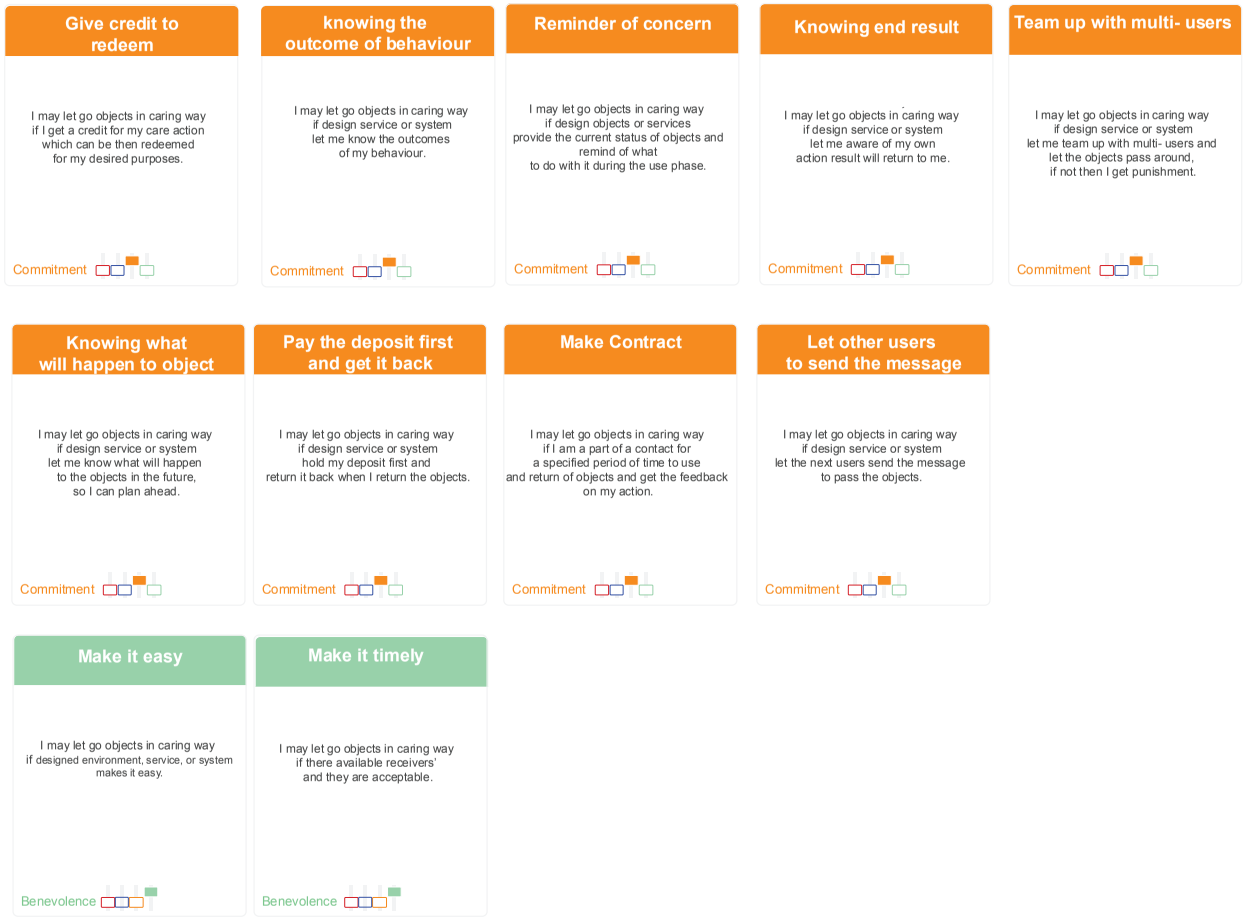


Figure 30. Carative Factors Inspirational Cards, Version 0.0.

Chapter 6 | TOOLKIT DEVELOPMENT AND EVAULATION

Chapter 6 describes how the Toolkit was developed and evaluated. The Toolkit was further developed through *plan-observe-act-reflect* processes by conducting a series of workshops and design studies. The aim was to provide designers with a better understanding of the problems and exploration of the ideas through the Toolkits, and to develop and test the Toolkit. Each stage of the study is explained with the aims, processes, key findings, reflection and a summary.

6.1. Development of the Toolkit

The current design of objects, services and system processes do not foster the responsible or decisive disposal of objects by users. Providing guidelines could help designers gain a better understanding of the problems and support the generation of ideas in more sustainable ways. One approach, which this research has taken, is to provide a source of inspiration in the form of a toolkit for brainstorming and idea generation. Through the process of identifying and gathering together inspirational carative factors, I developed a Toolkit which aims to support the generation of ideas by designers.

The initial Toolkit (Version 0.0) was developed with four professional designers, through several informal conversations in order to understand its viability and how to improve its structure and content (Figure 30). The Toolkit was further developed and validated over the following 18 months via one participatory workshop as a pilot study with six Masters level design students and four series of participatory workshops with twenty-three designers working in industry. Additionally, three design studies with university students and an industry-based designer were conducted with their own design briefs, in which the participants explored the ideas through the Toolkits individually. Table 10 shows the workshop participants and groups in numbers with their design sectors and the objects they explored.

The discussion sessions after the idea generation workshops and the designer's own projects helped to gain feedback about their use and further improvement. In response to the participants' feedback and the discussions during the workshops, the Toolkit was reflected on and planned for the next cycle to answer Research Question 1 (RQ1): Can carative theory from nursing practice be applied to inform

the design process, to encourage more responsible and decisive disposal of hibernating or accumulated objects at end of use? The understanding of the findings, the validation of the Toolkit and the requirements for the next stage will be explored through the action research *plan-act-observe-reflect* process (Robson, 1993). The aim of the Toolkit is to allow designers to understand the different kinds of relationship between users and objects, explore ideas through inspirational questions and drive creative solutions for the peaceful letting-go of objects. The outcomes from the Toolkit will contribute to design knowledge, and the development processes of the iterative cycles are a significant contribution to design research.

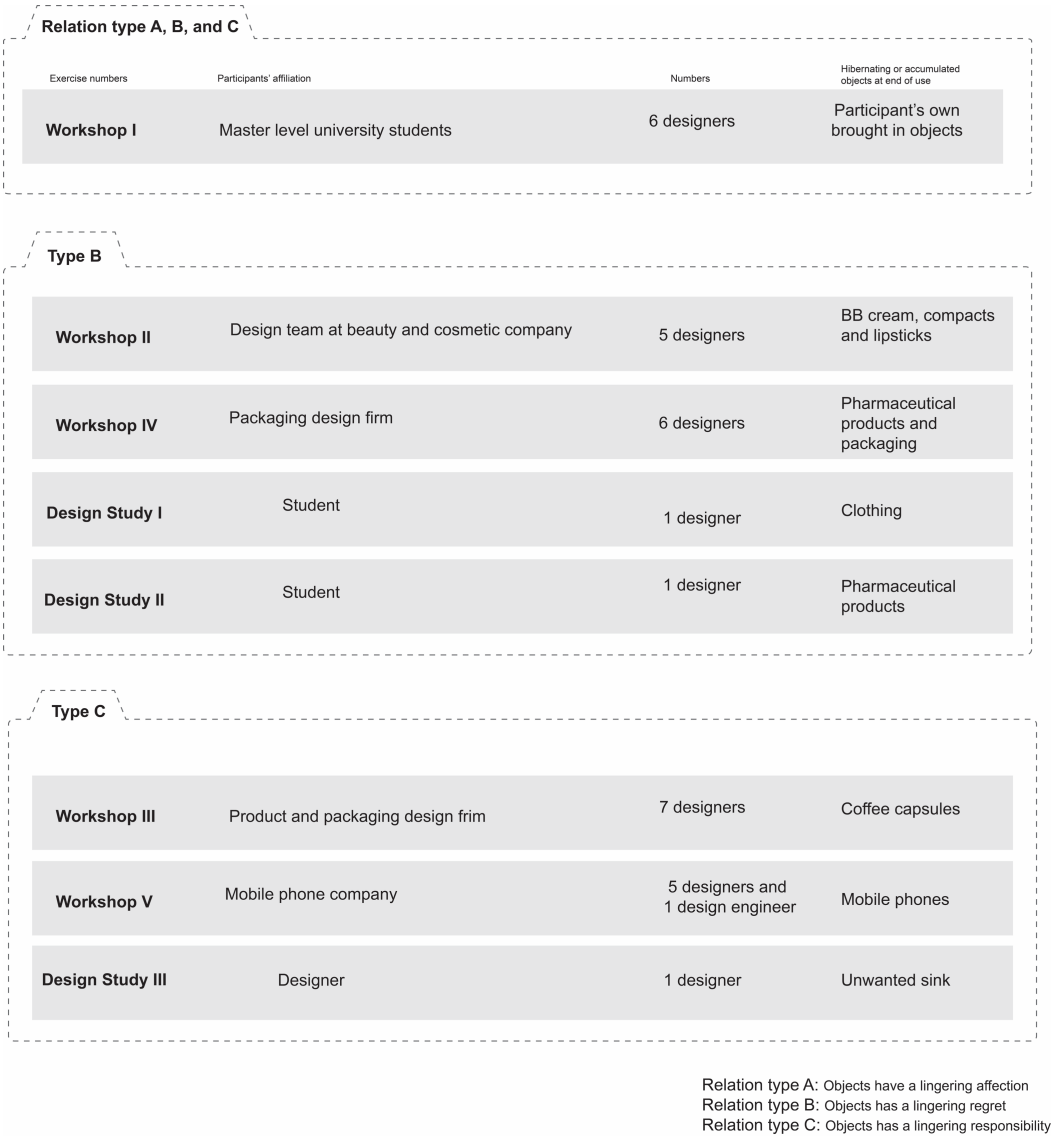


Figure 31. Workshop structure.

Workshop number	Design sector	Participant number	Group number	Explore objects
Workshop I	Student	**P1**	Group1	Ink cartridge
		P2		
		P3	Group2	Chair
		P4		
		P5	Group3	Shoes
		P6		
Workshop II	Cosmetic Company	**P7**	Group 4	Lipstick and compact
		P8		
		P9	Group 5	Moisturizer
		P10		
		P11		
Workshop III	Packaging and brand design firm	**P12**	Group 6	Coffee capsules
		P13		
		P14		
		P15	Group7	Coffee capsules
		P16		
		P17		
Workshop IV	Packaging design agency	**P18**	Group 8	Pharmaceutical products
		P19		
		P20		
		P21	Group 9	Pharmaceutical products
		P22		
		P23		
Workshop V	Mobile phone Company	**P24**		Mobile phones
		P25		
		P26		
		P27		
		P28	G10	
		P29		

Table 10. Workshop participants in numbers with the products they explored.

6.1.1.1. Development of the Carative Factors Inspirational Toolkit Version 0.0

Thirty-three factors found during the initial research had a direct impact on the creation of original carative factors for design processes. They were colour coded with different motives, and described and grouped into themes for the design processes (Figure 30). The Toolkit described here aims to allow designers to explore ideas through inspirational factors to trigger a wider perspective within an idea generation process, enabling different approaches to design challenges, and to drive creative solutions to encourage more responsible and decisive disposal of hibernating or accumulated objects at end of use.

The Toolkit is in the form of a set of cards, designed to make it easy for users to understand the context, problem and proposed solution and provide a creative and inspiring visual experience (Lockton, 2013). Therefore, an attempt was made to use as little text as possible, but to deliver sufficient content to designers with the necessary support. The key words describing the motivational factors for behaviour change were written briefly on each card, with inspirational comments derived from the interviews and the literature.

The comments describe the motivations in detail, which are in the same format across all the cards, starting with the following: 'I let go of an object in caring way if ..' for consistency. A prototype version of the Carative Factors Inspirational Cards was produced for testing to obtain relevant feedback from design experts before it was taken to the workshops and given to designers. Lindahl (2005) stated that a physical tool has collaborative and inspirational advantages. However, it can be argued that although the digital format also shares similar benefits; the printed version has advantages in usability during the workshop, as it can be shared with other members of the group and offer an overview of each factor (Lockton, 2013). The digital version was further developed to be used for the designers' own projects.

6.1.1.2. Reflection on the Carative Factors Inspirational Toolkit Version 0.0

Two industry-based designers, one architect and one design engineer, were invited to review the Toolkit's content, format and layout. The aim was to find out whether the Toolkit was legible and understandable. Informal conversation may foster 'low pressure' interactions and allow respondents to speak more freely

and openly, so it helps researchers to understand their views more genuinely (Robson, 2011). The general feedback was that although the idea to promote object detachment from possession through design was interesting, the design of the cards was not intuitive, and it was difficult to understand how they would be used during the design process. The Toolkit consisted simply of relevant text; it took time for them to understand each factor. In addition, the factors offered a different understanding for each participant. They suggested that seeing a visual description of how each of the factors have applied in real life might be beneficial. It also required a more interesting design and legible layout. Other feedback includes comments about phrasing of 'I let go of..': the sentence did not communicate how it should be applied in a design context.

Therefore, the first version of the Carative Factors Inspirational Toolkit was designed to include a simple description of how to apply the Toolkit during the design process and a visual image with the related text, in order to encourage the creative thinking process for designers. (See section 6.1.2.1). The next version of the Toolkit was planned to describe the situation and motivations more effectively, with a more structured layout.

6.1.2. Development of the Carative Factors Inspirational Cards Version 1.0 – Version 5.0

This section presents the development and evaluation phases of the Toolkit from Versions 1.0 to 5.0. The potential for the Toolkit to help the designer to understand the user's relationship with hibernating or accumulated objects at end of use and help them to explore circular products, services or systems through inspirational questions in order to trigger a wider perspective within an idea generation process was evaluated through workshops. The confirmation of this was sought through feedback and discussion with participants after the workshops. A participatory workshop was used for exploring design ideas, because it is an efficient and enjoyable way to gain data from participants and enhance the potential diversity of perspective. The aim of the workshop was twofold: first, to provide a critical research environment enabling the identification and examination of the carative factors, and the development of an original design; second, to develop a design-led process to produce case-specific design knowledge which addresses the concept of peaceful letting things go.

During the workshop, the focus was on generating a large number of 'unrealistic' ideas, so the quality of the ideas was not assessed formally. However, the potential and viability of the concepts were discussed at the end of each study. The quality of the workshop, such as how designers understood the issues through the Toolkit and how the Toolkit was used, and the process itself, was more critical for this research. The number of participants was limited to eight, which was a manageable number for the researcher. A purposive sampling approach was taken when selecting the participants in each of the design sectors, to include individual participants who were especially knowledgeable about a certain issue (Robson, 2011). An opportunity sampling method was also used to select the participants who were available at the time.

It can be difficult to assess formally the 'usefulness' of a toolkit to any idea generation method. In practice, toolkits are often used in contexts where there can be no comparable control group (Lockton, 2013). For this reason, during Workshop III, the idea generation session was conducted with the two groups – those who did not use the Toolkit and those with the Toolkit. This was to compare the designers' experience and confirm the usefulness of the Toolkit. This test method was not continued in the next workshop, as a more suitable approach was evaluation through the discussion and observation method to encourage critical debate about the problems and opportunities of the application of carative factors in design processes.

The workshops in this research were intended to investigate how participants used the Toolkits, whether they found them beneficial, and which aspects were well understood; therefore the process of the use of the Toolkit and the review of the findings generated through each phase was vital. Field notes and documentation through memos were used to collect data. Taking field notes is an effective method that helps researchers observe what is occurring or emerging from what he/she learns during their involvement (Maxwell, 1996; Robson, 2011). Re-checking the notes after the research provides an opportunity to correct the data process, which is crucial for establishing validity and reliability (Miles and Huberman, 1984). Some of the ideas created during the workshops are not included in this thesis, as the written ideas in the text were not readable and some ideas generated by the participants were not completed.

User types

In order to help participants visualis users with different behaviours and attitudes, a range of types was presented. This was based on Defra's (2008) seven population segments as an established and relevant set of behavior types, and based on the identified gaps between attitude and behaviour. This resonates with the gap between a caring attitude and care behaviour. Therefore, three distinctive broad types of users and were renamed to fit into the purpose of this research through the lens of care. These were identified as 'Attentive users', 'Cautious participants', and 'Careless consumers' (See 3.6.3).

'Attentive users' are people who were willing to act (or more) and have the potential to do more. They will do as much as they could to help environmental problems: they know what they want, thus they tend to plan for their behavior. 'Cautious participants' are people who are willing to do more but lack the motivation that leads to behavior change; however, knowing how other people act in the same circumstances is a critical factor in generating behavior change. They tend to find quick solutions that are available and tend to reduce the amount of work involved. They make decisions based on how the choices are presented to them. This group requires more than informative design interventions to act. 'Careless consumers' are those who are least willing to act and less likely to be open to behaving voluntarily or being influenced by what other people do. They are not conscious of the effects of their behavior The users' situated environment could generate careless behaviour in the user, particularly when the user is in a situation of emergency.

6.1.2.1 Development of the Carative Factors Inspirational Cards Version 1.0

Plan

Reflecting on the initial Version 0.0, of the Toolkit, Version 1.0 was designed to be more intuitive and adaptable during the design process. Figure 33 is an edited version of the Toolkit, which consists of the 'Four Motives of Caring' themes and the Toolkit instructions. Figure 32 illustrates the details of changes in the Toolkit. Descriptive illustrations of each factor were added, with related inspirational comments and questions. Some of the carative factors were extracted from nursing practice, which was intended to encourage the designers to find connections to generate new ideas. These factors were difficult to find in

examples of existing design ideas: therefore, inserting illustrations was a more suitable approach for the toolkit design.

The colour-coded method for the different motives remained the same, as it was a useful way for designers to understand the caring motive involved. Within the colour codes the inspirational comments were added, as they were beneficial for designers to understand and frame the problems that users face, and the desired design concepts that users might want. These were found during the interviews and literature review. In addition, the inspirational questions for designers were added in the grey box. In a similar approach to the SCAMP method, the texts were modified to a format of questions to encourage designers to answer the question by doing particular activities during the idea generation process. This is a way to stimulate ideas by using a different approach, using verbs and encouraging designers to answer the questions, which are also relevant in developing a Toolkit. Most of the sentences start by asking 'can you (verb)..?' or 'How can you (verb)', and different verbs were adapted to promote specific activities. This could enhance the practicality of the Toolkit and made it a more accessible way for designers not only to approach the problems, but also to ultimately accept all ideas and not to limit them.

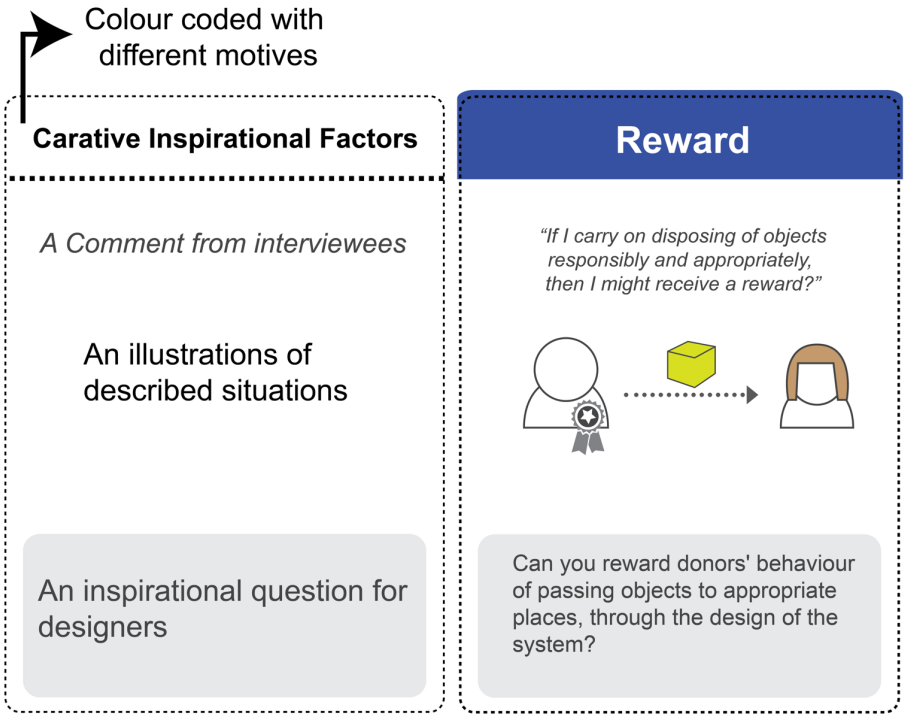


Figure 32. A description of the modified carative inspirational factors, Version.1.0.

Figure 33. Examples of the Carative Factors Inspirational Cards, Version 1.0.

Having improved the foundation version of the Toolkit, the next step in the development of the Toolkit sought to apply the Carative Factors Inspirational Cards to the design process. The first idea generation workshop through the Toolkit was run with design students. The aim of the workshop was to test whether all the 'Four Motives of Caring' themes and three different types of relationship (Figure 29-1) were useful in the design process to influence design thinking toward user detachment from hibernating or accumulated objects at end of use. To validate this, participants were encouraged to discuss their own motivations for, and barriers to, object detachment. Understanding their own motivations and barriers through discussion of participants' own experience would provide an opportunity for a better understanding of users' relationship with hibernating or accumulated objects at end of use by designers and help them think about the motivational factors. The improved version of the Carative Factors Inspirational Cards were then given out to designers for the idea generation session to understand how the group of factors had been applied to the design process according to different user types. The use of the Toolkit was then analysed by categorizing the carative factors that were applied according to different themes and user types.

Act and Observe

The Toolkit described here aims to allow designers to explore ideas through inspirational questions, to enable different approaches to the design challenge and to drive creative solutions for letting go of objects peacefully. A participatory workshop was run with design students as a pilot study. A university setting was considered a relevant place in which to seek initial feedback, primarily because of its accessibility and the potential to seek out participants, but also because they are potential users.

The workshop was held at the Royal College of Art (RCA) and involved six postgraduate students for idea generation and discussion, recruited via online advertising in collaboration with the RCA Student Union. Participants were asked to bring examples of the hibernating or accumulated objects at end of use they were keeping at home that they had not disposed of. The workshop consists of three sessions. In the first session, participants shared their own stories about the objects they brought in (Figure 34). This provided the opportunity to discuss barriers to user detachment from object possession and to consider whether and how this might be problematic. Written notes and photography were used to collect data during the studies, which permitted re-reading of the workshop and discussion, and helped eliminate personal bias and preconceptions (Miles and Huberman, 1983).

Most participants experienced difficulty in making a decision to let go in a peaceful way because the objects evoked certain types of emotion (e.g. *responsibility* or *affection*), and thus they were hoarded at home (Choi, et al., 2018). Later they were asked to redesign the objects, or to create a service or system using the Toolkit, and to join in a discussion to evaluate the Toolkit.

In the second session, the participants were asked to draw hibernated or accumulated objects at end of use which they have let go of responsibly and decisively, with a positive sense of purpose or appropriateness (Figure 36). A laptop, jacket and boots were among the things that were drawn. The participants reported that this process helped them to think about the motivational factors at play and gave them an opportunity to reflect on the carative factors developed from the previous stage. The positive factors that participants listed in relation to the responsible disposal process were ‘knowing its destination’, ‘knowing a person in need’, ‘getting rewards or payment’ and ‘receiving appreciation’.

Identifying and discussing such obstacles helped the participants become more aware of the issues around ownership, disposal and end-of-use objects.

Figure 34. Participants discussing the obstacles to responsible and decisive disposal behaviour.

Figure 35. P6 and P2 generating ideas.

Figure 36. Participants' drawing of hibernated or accumulated objects at end of use but let go of responsibly and decisively to a place where the objects were valued.

Figure 37. Ideas produced through Workshop I.

The final part of the workshop was an idea generation session (Figure 35). Six participants were divided into three pairs, and asked to choose an object (or image

of an object) from the collection of examples they had brought. P2 and P3, who brought in a spaghetti-measuring ring and a Minnie Mouse hair band, had difficulty imagining letting go of the object they had brought in, therefore they chose another object. It was concluded that the participants would not explore ideas around those objects and would keep them and use them for another purpose. Group 1 selected an unopened ink cartridge to explore ideas around how to best deal with it. The ink cartridge had been kept because it was new and unused, but the original printer had been given away, which fits into a Type C relationship. Group 2 was interested in exploring ideas around furniture, especially a chair. The owner kept it because it might be useful in the future, which fits into a Type B relationship. Group 3 chose a pair of shoes at end of use which were kept at home because the owner couldn't find an appropriate place to give them away, which fits into a Type C relationship. Considering the fact that "acquisitions of everyday footwear and upholstered chairs are often prompted by relative obsolescence rather than product failure" (Evans and Cooper, 2010, p.328), the objects selected by Group 2 and Group 3 became obsolete for psychological reasons, although they were still usable. The participants stayed in pairs and generated design concepts using the Carative Factors Inspirational Cards, focusing on the idea of relinquishing things for a closed-loop material process. Participants were allowed to choose user types they wished to explore for each theme. The pairs were allowed to explain and discuss their thoughts during the concept generation session. The idea generation session in the workshop lasted for two hours: fifteen minutes for each idea exercise on each caring theme.

Twenty-five design concepts were generated using the Toolkit (Figure 37), and the concepts were summarised according to the 'Four Motives of Caring' framework and different user types. Figure 38-1 and 38-2 represent a selection of ideas from the workshop. Group 1 mainly focused on instilling *responsibility* or *commitment* in users. None of the concepts were generated through the theme of *affection*. However, in this case the users had a weak level of lingering affection towards the ink cartridges. Therefore Group 1 had difficulty generating ideas on this theme. Group 2 developed ideas on each of the four themes. Although the burden of responsibility might be regarded as the main reason for keeping furniture, having lingering regret in preparation for unexpected potential need was another reason for failing to let go / retaining ownership of it. All three of the

other factors were also used to generate concepts, and nine concepts were generated through the cards. According to this group, obstacles to detachment for owners of furniture may vary according to their personal experiences, and *responsibility* is not the only factor to consider, but all of four themes are relevant. Group 3 chose a hibernating pair of sports shoes (trainers) at end of use: they interestingly produced one solid idea by using four themes together. Although each theme in the cards was given out at a different time, they built upon one idea by using all four themes. Most of the ideas generated focused on passing it on to another user or returning it to the manufacturer. Some of the concepts the participants generated involved redesigning the whole product, or focusing on improving the services and systems at the end of use of the objects for appropriate disposal.

Reflect

Because of the limited time available, not all of the 43 carative factors were considered during the idea generation session. One group started with one factor and worked through the session before moving on to the next themes, while others picked up a number of inspirational factors that were interesting to them. Additionally, one group used the cards to explore as many ideas as possible, whereas others built upon one solid idea by using the cards. In almost all cases, participants requested more time to continue working at the end of the session. This engagement may indicate that the Toolkit helped to inspire them to explore ideas and that it informed new perspectives in specific ways.

During the workshop three new motivations were identified by participants. In particular, P6 drew a national football strip, as he cared about the objects, and thus found an appropriate person to give it away to. P5 drew a decorative object she was keeping at home, but she gave it to a friend who would take care of it and appreciate it. The new motivations that were discovered were:

- Knowing that someone needed the object and that they would appreciate it.
- Adding a patriotic meaning, or other symbol of loyalty or affiliation.
- Reminding the user about for the next action.

These would be added to the next version of the Toolkit.

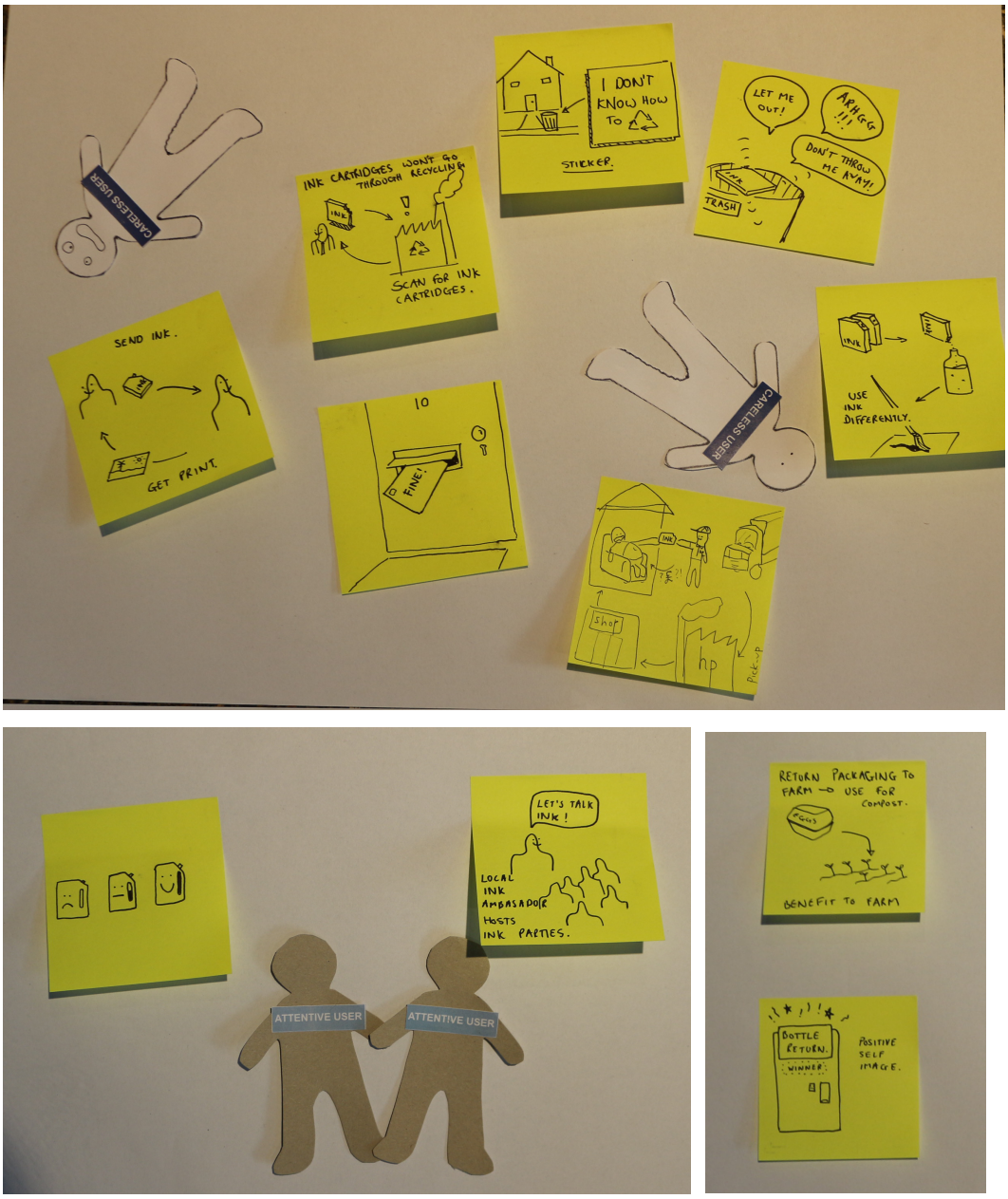


Figure 38-1. A selection of ideas from the workshop.

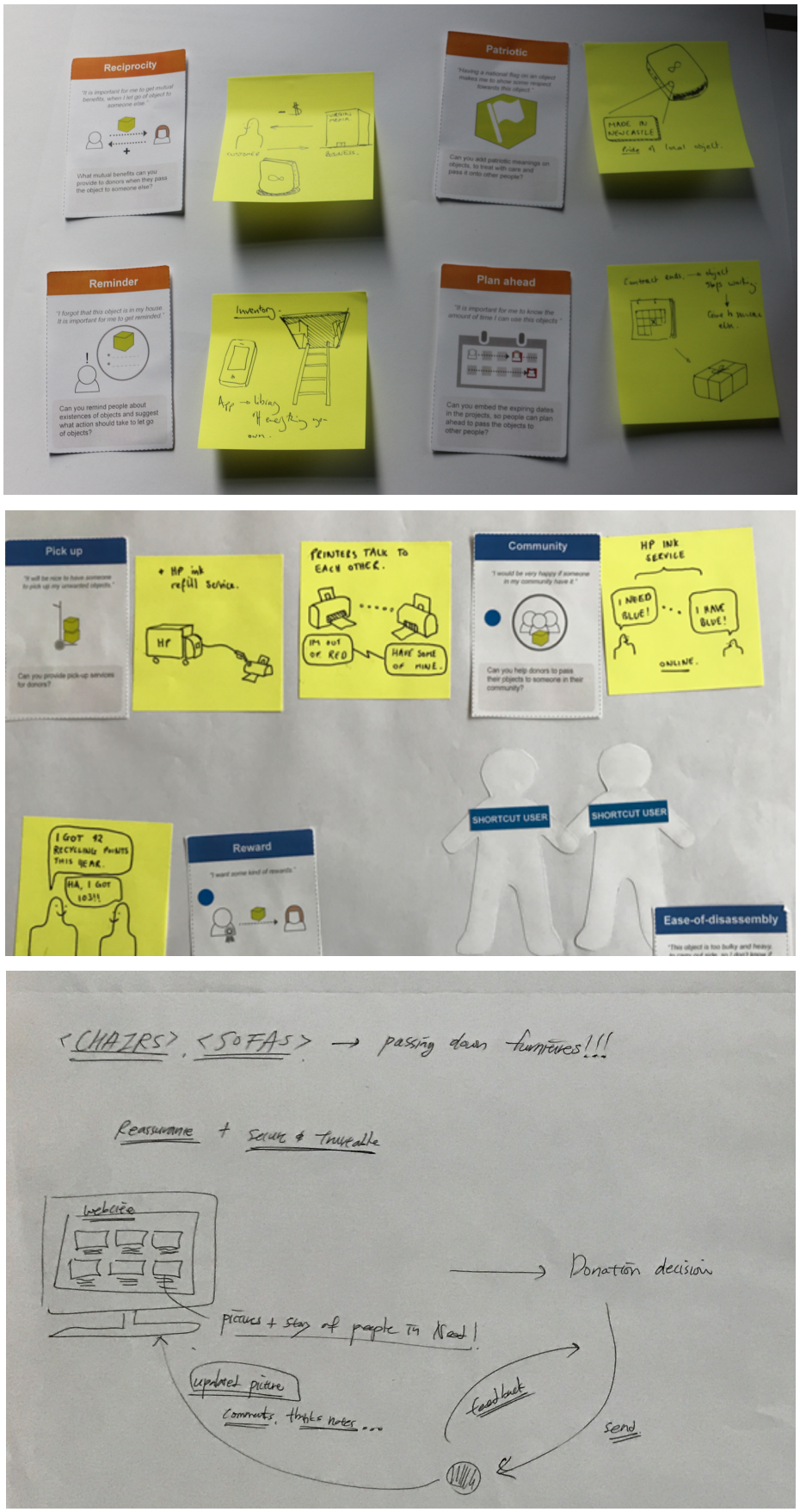


Figure 38-2. A selection of ideas from the workshop.

The workshop process also provided an opportunity to rethink the theme of *affection*. The aim of the motivational theme was to let designers explore ways to enable the letting go of end-of use objects in the hibernation period that owners have a high degree of lingering affection for: that is, a 'Type A' relationship. However, two participants stated that such a situation would not encourage them to share their personal story with another user and that they would hesitate to let the object go. Considering the participants' responses, for objects in a Type A relationship with the user it might be a more viable approach to strengthen the object attachment through design (rather than through the object detachment approach) to extend the object's lifespan. Furthermore, in many cases owners find secure places to give away their objects when they experience lingering affection, reassured that they are reducing the chances of it being thrown away (Interviewee 10). Therefore, understanding what types of relationship users have with hibernating or accumulated object at end of use was an important factor in applying carative factors. For this reason, it may be difficult to apply carative factors, particularly to a Type A relationship, and the theme of *affection* does not appear to be useful in the idea generation practice for an object detachment approach. Therefore, the Type A relationship was not considered during the idea generation session. However, the theme of *affection* itself will remain in the caring themes framework, as *affection* is the most fundamental element that motivates users' caring behaviour. Above all, some of the carative factors under *affection* seemed useful in the idea generation process, which requires different themes to be grouped together. Indeed, design for object detachment through carative factors was more useful where 'users have a lingering regret' or 'users have lingering responsibility' (Type B and Type C relationships).

Lockton (2013) states that designers are more used to being creative on demand, and do not appreciate highly structured idea generation methods; therefore, setting target behaviour can be an additional constraint. Although the target behaviour was set as 'peaceful letting go', most of the ideas generated focused on passing the object on to another user, or returning it to the manufacturer. Some of the concepts the participants generated were the redesigning the whole product, or focusing on improving the services and systems at the end of use of the objects for appropriate disposal. This means that the Toolkit has the potential to support designers in exploring ideas by considering the whole cycle of the product.

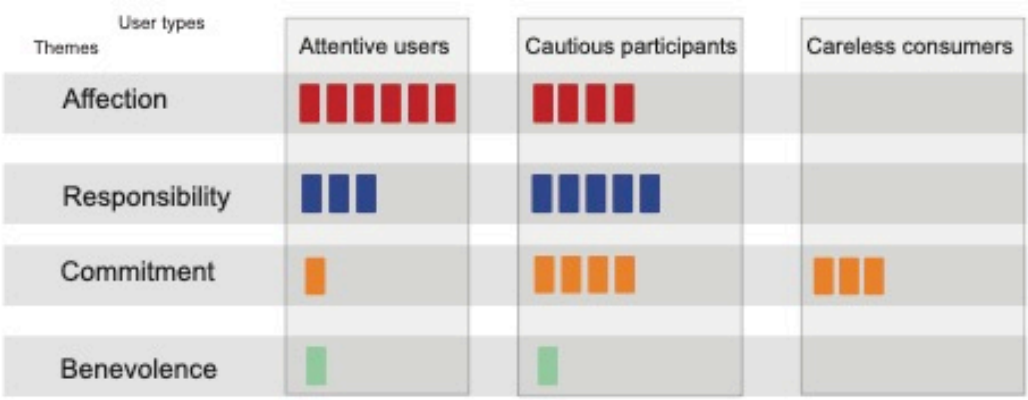


Figure 39. The carative factors applied to the Type B relationship were classified according to caring theme and user type. For example, six carative factors within the theme of *affection* were used for 'Attentive users' when designers explored ideas.

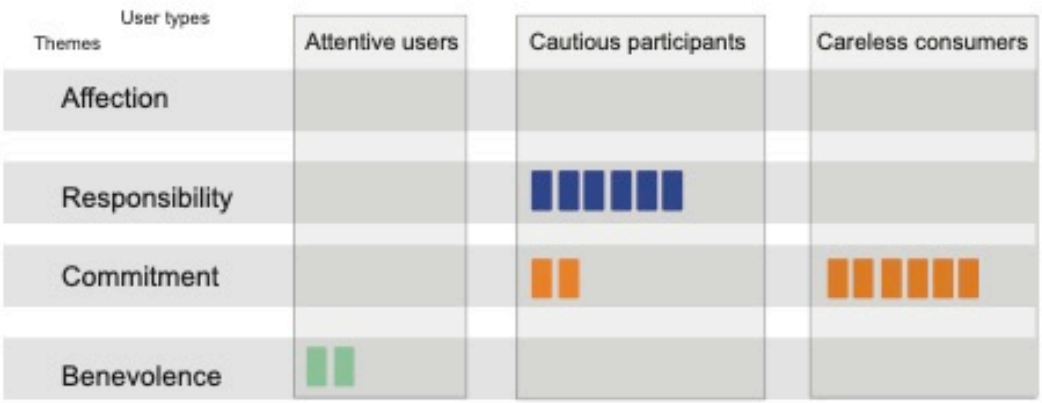


Figure 40. The carative factors applied to the Type C relationship were classified according to caring theme and user type. For example, six carative factors within the theme of *responsibility* were used for 'Cautious participants' when designers explored ideas.

Figure 39 and 40 represent the numbers of the carative factors applied by designers during idea generation. They are categorised according to the 'Four Motives of Caring' themes and three different user types to understand the distinctive motivational caring themes for each user type. When designers were dealing with the Type C relationship, more ideas were generated through the themes of *responsibility* and *commitment* (Figure 40). For these themes, designers tended to explore ideas that are more appropriate for 'Cautious participants' and 'Careless consumers'. Six carative factors within the theme of *responsibility* were

used when exploring ideas for 'Cautious participants' and six carative factors within the theme of *commitment* were applied when exploring ideas for 'Careless consumers' (Figure 40). According to workshop participants, this may be because the attentive user is already aware of their responsibility or commitment to the environment. When designers are dealing with the Type B relationship, *affection, responsibility* and *commitment* were involved (Figure 39). This may be because the designer had a different interpretation of the remaining emotions towards hibernating or accumulated objects at end of use, so they chose different motivational factors. Participants tended to use 'threatening' or 'constraining' factors by penalizing people, or constraining people's choices, when they explored the ideas with 'Careless consumers'. 'Careless consumers' may be difficult to engage with carative motives, as they have little concern about or interest in the matter, thus they are most likely to change their behaviour through government intervention (Defra, 2008). For the next workshop session, I decided to adopt only 'Cautious participants' and 'Attentive users' who have some degree of interest in or concern for environmental issues.

The workshop session provided me with an opportunity to learn that not all three types of relationship are useful for exploring carative factors. The Type A relationship did not appear to be useful in the practice of idea generation. Furthermore, not all the 'Four Motives of Caring' themes were feasible to apply to the design process to promote a user-object detachment approach. The theme of *affection,* where users have a positive liking emotion towards hibernating or accumulated object at end of use, seemed less relevant for the object detachment approach. However, such a theme would remain the framework, as it is the most fundamental element that motivates caring behaviour by users. However, the sub-factors within the theme of *affection* needed to be reviewed for the subsequent study. For the next study, carative factors were tested with a more focused setting, in particular when applied to objects in a Type B relationship.

This session provided a better understating of the relationship between users and hibernating or accumulated objects at end of use for designers. The session of exploring ideas through the Toolkit helped designers to think from the user's perspective and to engage with the issues and design concepts (Choi, et al., 2018). The findings of this study provided an insight into the potential value to designers of an awareness of how carative factors may help address the issues of product

obsolescence. The experimental ideas that came from the workshop are of value to design research as they serve to demonstrate and articulate ways of working with and interpreting the Toolkit. New motivational factors that would inform users' decision-making process toward hibernating or accumulated objects at end of use were discovered, and these needed to be tested in the next study.

Summary

- The theme of *affection* and the Type A relationship do not appear to be useful in the practice of idea generation for the object detachment approach through the Carative Factors Inspirational Toolkit.
- However, some of the carative factors within the theme of *affection*, such as 'future use', 'sharing a story' or 'knowing the progress and destination' seemed feasible to apply in the design process for an object detachment approach. The potentially applicable factors could be positioned within a different theme; therefore an alternative theme was required to address these factors.
- Design for object detachment through carative factors is more useful where 'users have lingering regret' or 'users have lingering responsibility'.

6.1.2.2. Workshop I - Development of Version 2.0

Plan

The pilot workshop provided a relevant review of the three types of relationship and the usefulness of the Toolkit. A new direction for the improvement of the Toolkit and the creative design brief for the next workshop were identified.

The main change at this stage was the re-contextualisation of the four carative themes through the process of reflection. The previous workshop confirmed that the theme of *affection* does not appear to be a useful motivation to be explored during the practice of idea generation within this research objective, although it is still a relevant theme for delivering caring action. The Toolkit was modified into 'Five Motives of Caring' themes.

Within Tronto's (1993) caring factors, attentiveness is one of the main ones to increase the efficacy of motivating care behaviour. This requires the recognition of others' needs, which signifies that caring acts on empathy, and is able to understand the care-receiver's experience and emotion towards the surroundings

and recognition of others' needs in order to respond to them (Mayeroff 1971; Tromp et al., 2011; Steen 2008). Eliciting empathy towards the subject (the object or the recipient) is a central method of achieving caring (Kim, 2008); therefore the theme of *empathy* was added as part of the carative motive themes. However, in order to fit factors within the *empathy* theme, a number of factors were moved around and added. The sub-factors within *affection* were retained, as they could be interpreted with multiple meanings, and therefore had the potential to fit into alternative themes. For example, the factors of 'reviewing past relationships', 'knowing that someone needed the object and that they would appreciate it' and 'sharing a story' from the theme of *affection* were retained, as they fitted within the *empathy* theme. The factors describing the way users focus on others, and what others think (Tromp et al., 2011) were moved to a position within the theme of *empathy*. Therefore, the factors of 'provide a sympathetic story' and 'provide benefit to the community' were moved from *responsibility* to *empathy*. Also, 'create anthropomorphic features', 'inform future use' and 'provide re-creation opportunities for other users' were added by reflecting on the interviews and literature review.

The aim of providing the themes was to capture and group together similar inspirational factors for design from nursing practice and behaviour change strategies to challenge designers to think creatively and broadly. In this sense, themes can act as a way to trigger disruptive ideas within the idea generation session. As the 'Five Motives of Caring' themes overlapped to some extent, and certain carative factors arguably fit into other themes, it should be noted that the themes were intended to assist the idea generation process in a design practice context to provide a loose classification rather than fixed categories.

The layout of the cards and style of illustrations were also modified in order to make them more approachable and intuitive (Figure 41). The colour-coded themes remained the same, as they offered a useful method by which designers could understand the themes. The inspirational questions and relevant comments were also retained: these encouraged designers to explore ideas and find a solution by answering the questions or acting out the verbs, which they were required to do. In the second workshop, two user types, 'Cautious participants' and 'Attentive users', were adapted during the idea generation session, and the 'Careless consumers' type was excluded. This is because these two groups may

have a higher potential than ‘Careless consumers’ to achieve caring behaviour through the carative factors. Shaw (2018) stated that the gap between the caring attitude and behaviour could influence consumers’ care actions. In other words, ‘Cautious participants’ and ‘Attentive users’ tended to have a narrower gap between attitude and behaviour than the ‘Careless consumer’. Moreover, ‘Careless consumers’ have a higher chance of being influenced by ‘automated’ or ‘forceful’ factors than other factors, which was proved in the pilot workshop and the discussion session. However, these strategies are not included in the Carative Factors Inspirational Toolkit, since the aim of care actions is to make users aware of their choices through their decision-making process and the behaviour they are delivering. Applying ‘automated’ design strategies could create less opportunity for users to be aware of their decision-making process. Equally, applying ‘forceful’ factors as a design approach for consumers could be viewed as an unethical approach because it limits consumers’ choices (Lilley and Wilson, 2013). As such factors were not included in the Carative Factors Inspirational Toolkit, it was not feasible to include the ‘Careless consumers’ group during the workshop.

In the second workshop, Version 2.0 was developed and evaluated through the card and worksheet format (Figure 42 and 43). The main aim of the workshop was to test whether the themes of *empathy, responsibility, commitment* and *benevolence* and their re-categorized factors are applicable to the design process to inform the design process to encourage more responsible and decisive disposal of hibernating or accumulated objects at end of use. To validate this, the session was planned with a more focused setting, with an idea of the most appropriate design sectors to approach in which designers may benefit from adapting and applying the Toolkit. Appropriate design sectors, and the objects that fit into the Type B relationship, were identified based on the initial stage of research, and the design brief was created. The use of the Toolkit was analysed by categorizing the applied carative factors according to the different themes and user types. The workshop also aimed at developing the Toolkit further and identifying what role the Toolkit plays during the idea generation session.

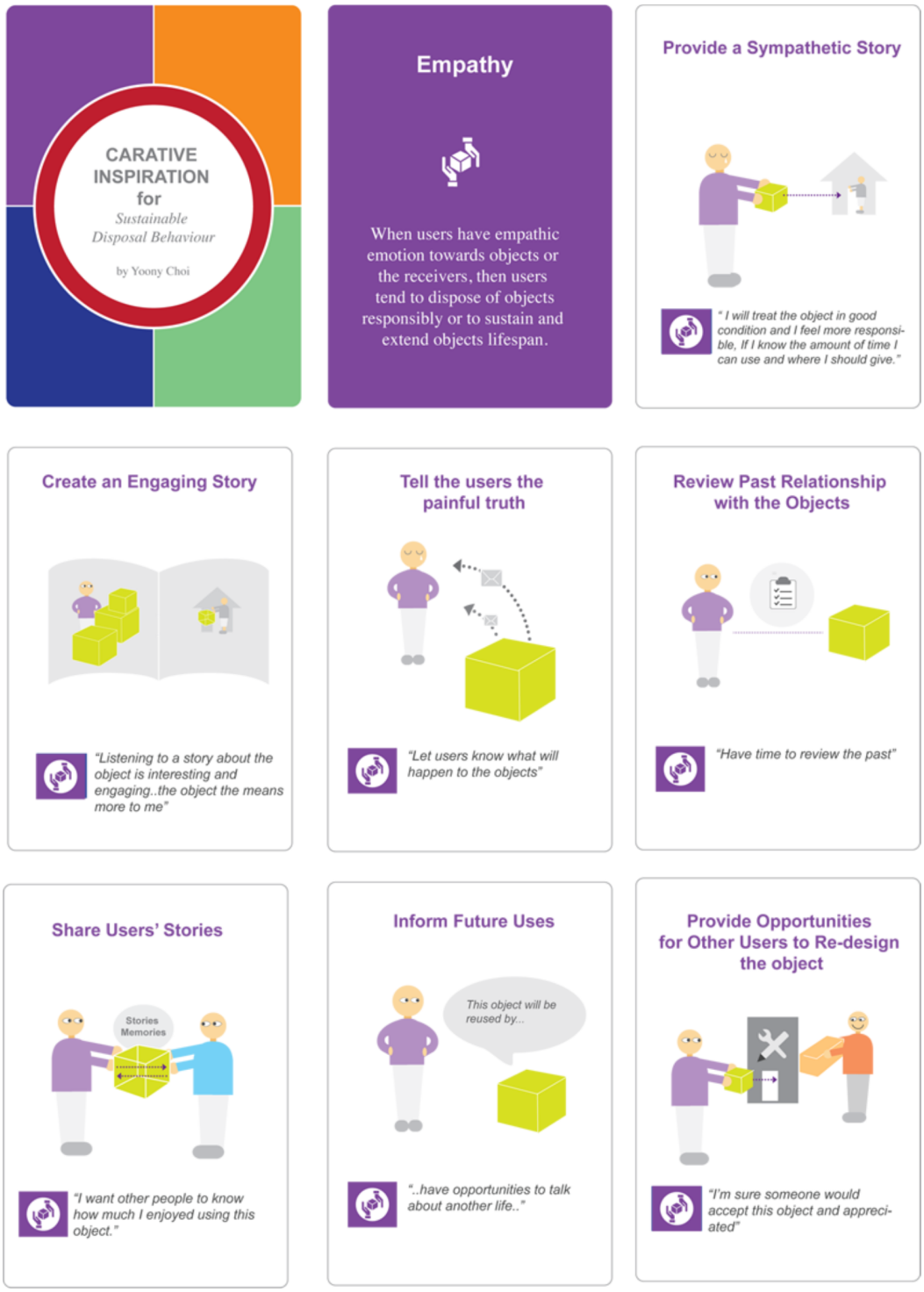


Figure 41. Carative Factors Inspirational Cards, Version 2.0: The theme of *empathy* was added.

Figure 42. Carative Factors Inspirational Cards, Version 2.0.

Figure 43. Carative Factors Inspirational Worksheets, Version 2.0.

Act and Observe

A workshop was conducted with five designers who work in a design team at a beauty and cosmetics company. It was held at the company's seminar room in order to create a 'real-life' setting. The workshop participants were recruited through a verbal agreement with the design team director from those who were available at the time; four participants had an interest in the workshop topic, whereas P10 had low motivation (See section 4.1.3.6). A workshop design brief was created to deal with the problem of hibernating or accumulated cosmetics at end of use, such as lipsticks, compacts and moisturisers, being kept for an unknown future. By addressing the question of how the design could be improved to help users let go decisively and responsibly, participants were asked to generate ideas by applying the inspirational carative factors. The photos taken during the early stages of research and interviews and interviewees' comments were shared with the designers.

Objects	Background of the participants	Obstacle
Lipstick	Forgot it had been left in a drawer. Kept it for an unknown future and became out of date.	-Not enough knowledge of how and when to dispose of it appropriately. -Forgotten. -Became out of date. -Difficult to disassemble. -Lingering regret and prompt decision. -Size is small, hence less guilt felt when throwing it away. -Made of mixed material.
Moisturiser	Kept it for unknown future, and it became out of date. I have another one, never got to use it.	
Compact	The object is made of valuable material. Maybe a chance to reuse it. Owned too many and never used. Forgot the object was in the box.	

Table 11. Participants' comments and identified obstacles to responsible and decisive disposal behaviour

The workshop consisted of three sessions. In the first session, participants shared their experience of keeping hibernating or accumulated cosmetics products at end of use with lingering regret, but eventually throwing them away. This process was to allow designers to familiarise themselves with the context and reflect on the barriers that I identified during earlier research. All the designers agreed that the user's lingering regret does cause a wasteful attitude, because the objects become obsolescent, reflecting their personal experiences. The apparent obstacles to responsive and decisive letting go of hibernating or accumulated objects at end of use are categorized in Table 11. Later they were asked to redesign the objects, or to create a service or system using the Toolkit, then to join in a discussion to evaluate the Toolkit.

In next session, the participants were asked to group into pairs or threes, and the design brief was projected on the screen. They were asked to choose one object from the collection of lipsticks, moisturisers and make-up compacts. The Toolkit was introduced to the designers and I explained how it had been created and described how it has been used by showing the previously worked examples. Finally, the whole Toolkit set, in a worksheet format and card format, was given to the whole group of designers at the same time to select from: they were allowed to read it through, and they started to generate ideas through applying the inspirational carative factors (Figure 44 and 45). They were asked to mark the factors they used by placing different-coloured stickers on the worksheet according to each idea. Group 4 selected the end-of-use lipstick and make-up compact to explore ideas. Group 5 chose an unwanted half-used moisturiser. The pairs were allowed to explain and discuss their thoughts during the concept generation session. The workshop ran for two hours, with forty minutes for the idea generation session with two user types, 'Attentive users' and 'Cautious participants'.

Group 5 generated one solid idea by using four themes together. They developed an idea built on their company's current recycling and returned product scheme. The idea is as follows:

1. Provide a visible graphic and information about the return scheme on the pack.
2. Apply a different colour to each part to make a connection with the place to send it.

Figure 44. Participants reading the Carative Factors Inspirational Toolkit.

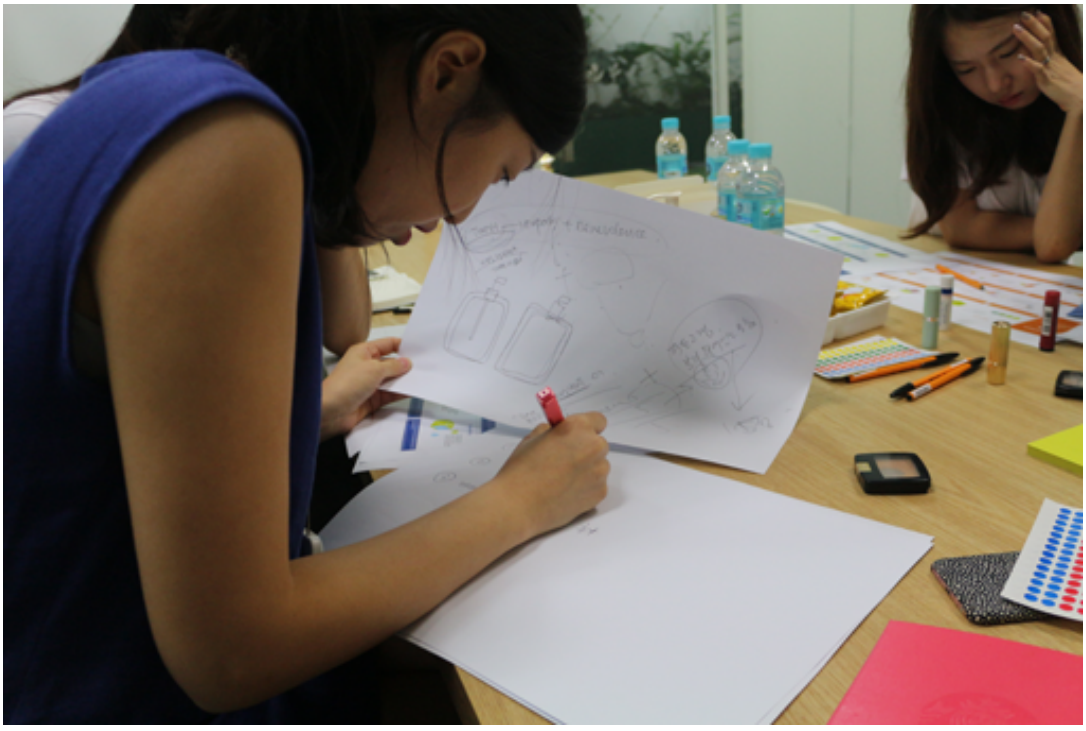


Figure 45. Participants generating ideas.

3. Part of the price of the bottle is a charity donation. The donation will be given to the fund when the bottle is returned.
4. Apply a different points scheme to each part of the packaging. When it is returned to the collection point, each part is required to be separated and put in the different boxes, and different points can be earned accordingly.

This study also made me realize that the themes of *responsibility* and *commitment* were explored more than the other themes. Designers tend to consider a range of factors when exploring their ideas for 'Attentive users'.

The final session was to review the benefit of using the Toolkit, the viability of the Toolkit and improvements for the next version.

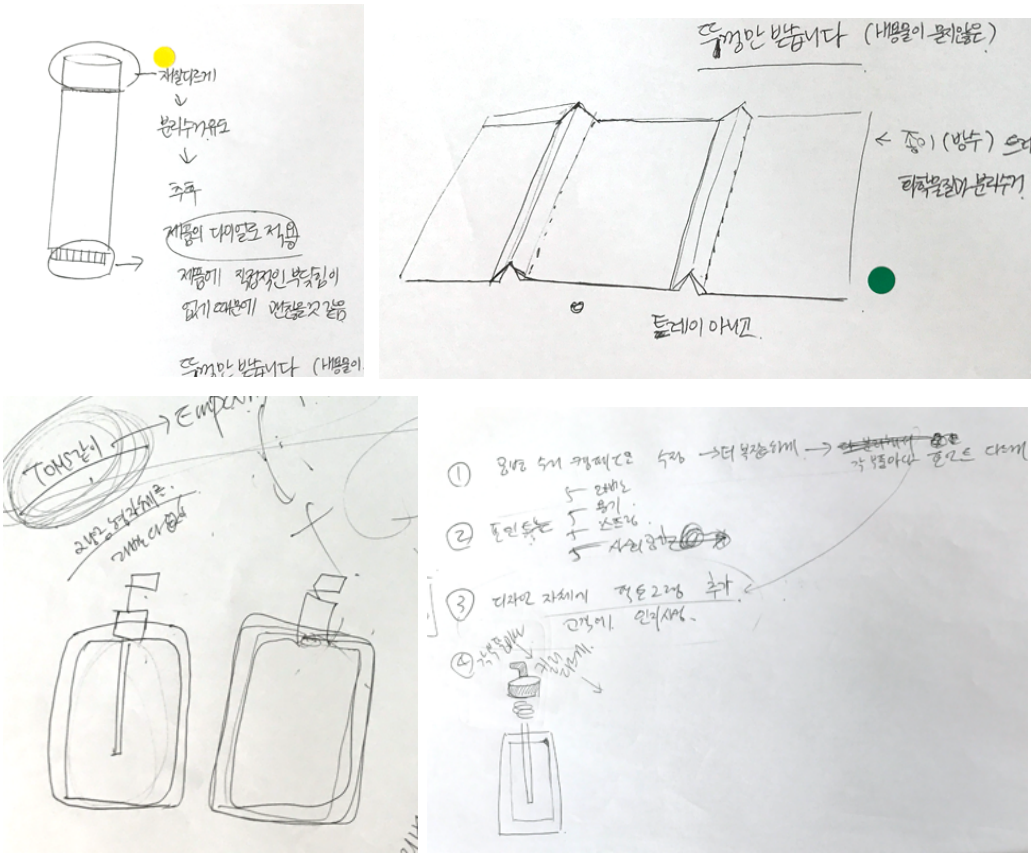


Figure 46. A selection of ideas from the workshop.

Reflect

During the second session, no new obstacles were identified. However, having lingering regret for particular objects does not always appear as one single barrier to peaceful letting-go, but rather there are multi-layered reasons for this. For example, an owner holds on to end-of-use cosmetic products in case they are needed for an unknown future use, but also they like the design, they have forgotten about its existence or they had difficulty in finding a place to responsibly dispose of it. This means that the A, B, and C relationships could overlap. However, this research will carry on exploring the specific relationships which are classified in Figure 29-1. The new motivational factor of 'making a connection between the object and its next destination' was added.

Initially, I created a design brief to be explored during the workshop; however, this was modified through the idea generation processes with designers to deliver a realistic industry brief. The initial brief was to design an object, service or system to lessen the lingering regret toward hibernating or accumulated beauty products at end of use and let them go in a responsible and decisive way. As designers tend to start designing and briefing simultaneously (Lawson, 2005), later on designers developed the brief to 'design an object, service or system that encourage users' responsible and decisive disposal behaviour' such as returning them to the manufacturer (or shop) or recycling, and not considering the issues of lingering regret so much. This indicates that it may be possible to apply the carative factors for generating ideas to promote sustainable disposal, including the context in which users carelessly and quickly throw away an object (e.g. takeaway packaging); this could mean that carative factors may be possible to apply in the case of 'Careless users'; this requires further research. (See section 6.1.2.5)

As the company only allowed a certain amount time for holding a workshop, not all of the forty-three carative factors were considered during the idea generation session. Group 4 started with one factor and generated as much as they could and moved on to the next factor. Group 5 generated one idea with one factor and used another to build upon one solid idea by using multiple factors; consequently the ideas generated address relevant aspects of packaging design requirements: that is, visual communication, structure, price and the after-use system. Two of the concepts the participants generated chose to redesign the whole product, creating

‘a new structural design for a cosmetic compact’ (Figure 46, top right), for instance, or ‘applying anthropomorphic features to a design object’. However, the most of the ideas focused on the design of objects, services and systems to be improved at the end-of-use phases for responsible and decisive disposal. The target behaviour was not set again; most of the ideas generated through the workshop focused on users’ behaviour in terms of sending products back to manufacturers (or shops) or removing hazardous material to be disposed of safely. This suggests that the Toolkit has potentially informed designers about exploring ideas to promote users’ responsible and decisive disposal behaviour. Group 5 built an idea upon the company’s current recycling and returning product scheme by using the Toolkits. This indicates that the Toolkit has the potential to be applied to directly improve the current sustainability of systems in the design process.

It was found that there is a very fine line between the forms of care involved in the ‘Five Motives of Caring’ themes; hence the participants took some time to understand the definition of each theme. However, this did not seem to affect the designers much in exploring ideas through the Toolkit, as some of participants used mixed themes. Furthermore, the themes can overlap, and the intention of classifying the caring themes was to provide loose classifications of each form rather than defining each form. As Blustein (1991) stated, the forms of care may not appear as single form, but could emerge with multiple forms; therefore the Toolkit explored the themes both through a single factor and multiple factors. The factors within the themes of *responsibility* and *commitment* were used together on many occasions (Figure 47). This may be because the forms of care are interconnected, and thus the commitment to a particular set of values entails the sense of responsibility (Shaw et al., 2016). Similarly, when designers use the factor within the theme of *empathy* to promote behaviour change, sometimes it is beneficial to combine this with other factors, such as whether they are ‘easy to do’ in the theme of *benevolence* or ‘providing information’ in the *responsibility* theme. The theme of *empathy* was most explored when addressing the group of ‘Attentive users’; this may be because ‘Attentive users’ may already have a highly caring attitude and willingness to act, and therefore such emotional factors may work well in promoting caring behaviour.

Participants seemed strongly engaged with the issues and the design Toolkit during the workshop session. According to P10, who had low motivation in this workshop, "it was new to know about users' lingering regret act as an obstacle for responsible and decisive disposal behaviour, as I had never thought about it". P7 stated that the workshop provided an opportunity to think about how current design processes are lacking in consideration of the end of the product cycle. Through generating the ideas through the Toolkit, P7 reconsidered the user's relationship with hibernating and accumulated objects at end of use, "The Toolkit enabled me to think about a way to generate responsible and decisive disposal behaviour in users".

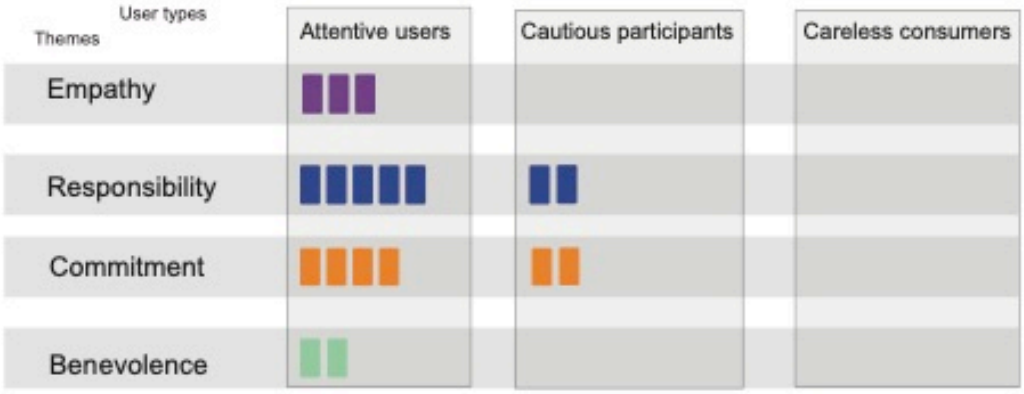


Figure 47. The carative factors applied to the Type B relationship were classified according to caring theme and user type. For example, six carative factors within the theme of *responsibility* were used for 'Attentive users' when designers explored ideas.

Through this workshop session, I learnt that a modified version of the caring themes and their sub-factors can influence the process of idea generation by designers toward user detachment from hibernating or accumulated objects at end of use. They provided them with a better understanding of users' relationships with hibernating or accumulated objects at end of use, based on their feedback. They also have the potential to inform the design process to encourage sustainable disposal behaviour, including the context in which unconscious throwaway behaviour by users occurs.

Group 4 stated that the Toolkit acted as a checklist, while Group 5 stated that the Toolkit provided inspiration for designers. This insight has enabled me to think

about the design of the Toolkit layout and the effectiveness of illustration. It was suggested that the amount of text was difficult to digest within such a short time and a factor such as 'An object embedded with holiness' was difficult to apply in design ideas, as it is dependent upon users' religious affiliation. Such a factor required further testing, rephrasing the texts but delivering the same message. For the subsequent study, the amount of text was reduced, and the illustrations were modified. Another additional comment was that in reality this approach may be difficult to pursue as they might face many barriers within the company's marketing strategies, which echoes the challenges of the circular economy.

This is a part of an action research process (Crotty, 1998) to develop the Toolkit but also to examine and validate the carative factors in the design process through a repetitive cycle. Thus, changes were made in the Toolkit and further action was planned for the next cycle based on what was learned in this workshop. The next version of the Toolkit, Version 3.0, was set up to test the Type C relationship, where 'users have lingering responsibility', keeping the hibernating or accumulated objects at end of use for a better opportunity to arise for its use, as it still has value.

Summary

- Users' emotions towards hibernating or accumulated objects at end of use are multi-layered.
- Classifying the 'Five Motives of Caring' themes maybe useful for some cases, but not always, as designers tend to mix across the themes when applying the design process.
- The Toolkit encourages design of after-use services and systems, but it also allows the designer to redesign the object.
- The Toolkit has the potential to build ideas upon existing design strategies for improvement.
- The workshop provided a better understanding about the Type B relationship between the user and the hibernating or accumulated objects at end of use.
- The Toolkit can be used as guide but also as a checklist.

6.1.2.3. Workshop II - Development of Version 3.0

Plan

The feedback and comments from the previous workshop confirmed that the Toolkit has the potential to be applied to the Type B relationship. In this workshop it was necessary to test the Toolkit for the Type C relationship, in which 'users have lingering responsibility'. The aim was not only to observe the Toolkit in use, but also to test whether carative factors are applicable to the both relationships during the design process to encourage more responsible and decisive disposal of hibernating or accumulated objects at end of use. The Toolkit use was analysed by categorizing the carative factors that had been applied according to the different themes and user types. The workshop was planned to develop the Toolkit further and test it in a real-life industrial design setting, based on the knowledge acquired from the previous cycle. The Toolkit validation process would make clear what role the toolkit plays during the design process. In order to find out whether the Toolkit has the potential to apply in Type C relationships, the conditions of the experiment had to remain the same as in the previous workshop. Therefore, the workshop structure and the Toolkit format remained mostly the same as in the previous testing cycle, except that a few of the less useful illustrations and texts were modified, and newly discovered factors such as 'making a connection between the object and the next destination' was added. In this workshop, the Carative Factors Inspirational Cards, Version 3.0, was developed and evaluated through a design brief that dealt with a Type C relationship. The card format and worksheet format were both suggested by designers during the workshop session. It was decided that this workshop should focus on one particular problematic object, to get a better understanding of how participants used the Toolkit, and how beneficial it was to use the Toolkit for the particular problem. A design brief was created for designers who work in a packaging company to explore how the design could help users to let go of accumulated coffee capsules (or pods) at end of use responsibly and decisively. During the interviews and observation research phase, I came across three participants who faced challenging decisions about returning their end-of-use coffee capsules to the manufacturer. They made attempts to collect the used capsules, because they saw the value of the object and the way they could be remanufactured into other products, and because of their environmental concern. However, they failed to return them and they ended up being thrown away, because users found the smell and the nuisance of the return process difficult.

Coffee capsule (or pod) waste is one of the emerging problems in the food industry, and it creates a huge environmental impact (Stokel-Walker, 2016). According to Jan Dube, a spokesman from the Department of the Environment and Energy, Hamburg, Germany, "these portion packs cause unnecessary resource consumption and waste generation, and often contain polluting aluminium… cannot be recycled easily because they are often made of plastic and aluminium" (Yeung, 2016). Generally, pods are not accepted by local recycling collection services, and a critical number of capsules end up in landfill (Burrow, 2017). Many of the coffee capsule production firms run recycling programmes where they pick up used capsules when users purchase new capsules, or provide a recycling bag for users to send back to the manufacturer. However, users tend to fail to deliver the action. This object is an example of the Type C relationship, which was explored in this workshop.

One can argue that users throwing away coffee capsules happens unconsciously, whereas this PhD deals with lingering emotions toward hibernating or accumulated objects at end of use, therefore the issue of coffee capsules may not fit into this research. However, this PhD focuses on the context of users retaining emotion towards hibernating or accumulated objects at end of use, and there are some users who have a lingering sense of responsibility towards their used coffee capsules, so they collect them, rather than carelessly throwing them away. I am focusing on these users, namely 'Attentive users' and 'Cautious participants', who have some interest in, or concern about, the issues. The user who throws them away without thinking is a 'Careless consumer; however, this workshop did not explore these users.

The company selected has expertise in the food and beverage market. Therefore, the designers who work in the particular firm have professional design knowledge and expertise in packaging and branding design; therefore they have the potential to provide honest insight into the Toolkit and its usefulness according to the design brief. Observing how they define the problem and find a creative solution through the use of the Toolkit during idea generation is relevant in order to develop the Toolkit further. At the end of the workshop session, the designers were invited for discussion about whether the Toolkit was inspirational, and which aspects was difficult to understand, in order to inform improvement.

Act and Observe

A participatory workshop was conducted with seven designers who work in a design agency which specialises in packaging and brand design. It was held in the company's conference room. The workshop participants were recruited through the design team director who sought his team members' interest in the workshop topic and their willingness to contribute.

A workshop design brief was created to deal with the problem of hibernating or accumulated coffee capsules at end of use because users see the value of it but fail to deliver care action. By addressing the question of how the design could be improved to help users let go of these objects responsibly and decisively, participants were asked to generate ideas by applying carative factors.

The workshop consists of three sessions. The first session was to discuss the obstacles to letting go by users, particularly focusing on the issue of coffee capsule waste (Table 12). However, not all the participants were familiar with coffee capsules, users' behaviour when dealing with accumulated used capsules and their impact on the environment. I therefore provided background research statistics on waste and influences on the environment and suggested ways to dispose of the products to help designers to understand the context. I shared the photos taken during the interviews and observation and the interviewees' comments to help designers to understand the design problems.

Objects	Background of the participants	Obstacle
Coffee capsule	Makes an unpleasant smell after a few days' collection. Takes a very long time to fill the recycling bag to the suggested level. I can only drop off the recycling bag at a certain point, but that place is not close to me. It is not easy to use the pick-up service as they come to collect at random times.	Not enough services or disposal points. Users do not have much knowledge about where to dispose of items. Recipients do not appear very often.

Table 12. The specific obstacles shared with workshop participants.

Figure 48-1. Participants generating ideas.

Figure 48-2. Participants using the Toolkit as a checklist.

Figure 48-3. Participants presenting ideas during the workshop.

Figure 49. A selection of ideas from the workshop.

In the next session, designers were asked to redesign the coffee capsules, or create a service or system to help users to let go of these in a responsible and decisive way. The participants were asked to group into pairs or threes. Then the design brief was projected on the screen to be explored, and the Toolkit was introduced. As a workshop facilitator, I provided instructions verbally on the use of the Toolkit by presenting the examples worked on earlier. All groups dealt with same design brief; there was no intention to compare the two groups – the aim of this session was to observe whether participants understood how to use the Toolkit and how they applied it in design to solve problems. The worksheets and cards were both available to increase the designers' choices. Before and during the idea generation session, they were allowed to read, discuss and choose certain factors from the Toolkit if necessary (Figure 48-1). The idea-exploring process and the duration remained the same as in the previous workshop. At the end of workshop, each group was asked to present their concepts to the other participants (Figure 48-3). This can be done verbally or by sketching – this can help ideas to develop further through other participants' contributions, in which they proposed a distinctive perspective.

Nineteen design concepts were generated using the Toolkit (Figure 49), and the generated concepts were organised according to the themes of the carative factors. *Responsibility* and *commitment* were both groups' favourite themes to explore (Figure 50). They tended to focus on the factor with which they were familiar as a concept, such as 'provide financial return' or 'provide pick-up services and provide a benefit for returning the object'. Some of the interesting concepts generated by participants using the Toolkit at the workshop included:

- Provide a spade shaped like a bin-bag to collect just the used coffee grounds and donate them to the community garden.
- Add a little strip feature on the packaging as an easy peel-off feature to separate the used coffee grounds easily.
- Create a local community or a third-party organisation to collect the capsules and turn them into a new product to re-sell.
- A time-calculating app which will forecast the collection time for the end-of-use capsules. It allows the user to book a pick-up service and to deliver new capsules at the same time.

The final session was to discuss the benefit of using the Toolkit, and for a review of improvement. To find out whether the carative factors had informed the design process, the participants were first asked how well they understood the 'Five Motives of Caring' themes in relation to accumulated objects at end of use, how beneficial it was to apply the carative factors in the design process to generate the concept of peaceful ways to let go. For further improvement, designers were asked whether they understood how to use the Toolkit. Throughout the workshop, I recorded what I perceived and reflected upon the notes.

Reflect

In the discussion session, it was difficult to reflect on the obstacles, as two participants were not aware of the issue of the disposal of coffee capsules within the domestic environment, Nevertheless, no additional obstacles for letting go were discovered in the second workshop, therefore Type B and Type C relationships are fairly acceptable as specific relationships to explore in this research.

Nine factors were used to generate ideas from Group 6 and ten from Group 7. The participants explored ideas by applying one factor, or explored their own idea first, then building on one central idea by using the carative factors. Some of the concepts the participants generated involved redesigning whole products (e.g. a new shape for coffee capsules), or focusing on improvements to the services and systems at the end of use of the objects for responsible and decisive disposal. Targeting behaviour was suggested in this workshop, because the designers were not aware of methods of disposing of coffee capsules in a sustainable way; however, it was not definitive. Most of the ideas focused on ways to return the capsules to the manufacturer or retail stores. It was interesting to see that one group suggested involving third-party organisations or the local community to collect the end-of-use items and to creatively and collectively repurpose them into another more durable product. This suggests that the Toolkit has the potential to broaden designers' perspective and inform a new direction for them; the Toolkit potentially provided inspiration and informed designers.

Figure 50 describes the carative factors that were applied by participating designers during the idea generation session, categorized according to user type and caring theme. The themes of *responsibility*, and particularly *commitment*,

used most frequently for ‘Cautious participants’ when designers were exploring ideas. This may be because this group of people requires a different motivation from that of ‘Attentive users’, who already experience the ‘caring for’ emotion. They tend to be influenced by external factors such as ‘being watched by peers’ or ‘knowing what other people are doing in the same situation’; therefore, engaging with an empathic emotion only may not lead to caring action. However, commitment arose from shared belief, and has the potential to motivate the ‘Cautious participants’ who are easily influenced by other people’s behaviour.

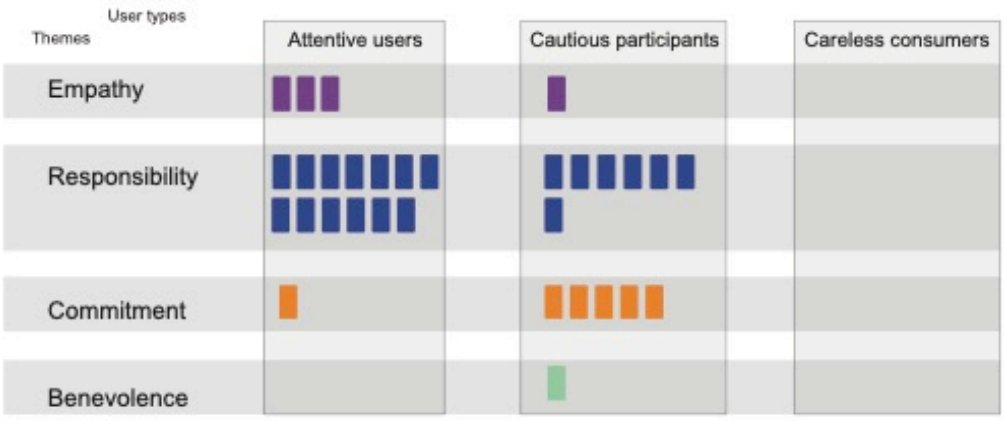


Figure 50. The carative factors applied to the Type C relationship were classified according to caring theme and user type. For examples, thirteen carative factors within the theme of *responsibility* were used for ‘Attentive users’ when designers explored ideas.

The main aim of this workshop was to test the application of Toolkit within the Type C relationship. More ideas were generated through the Toolkit compared to the previous workshop, even though the same amount of time had been given for idea generation. The workshop session provided an opportunity to understand whether the Toolkit is also beneficial when exploring Type C relationships. However, the numbers of ideas generated during the workshop also depends on the participants’ abilities and the amount of the objects they explored.

Participants prefer to work using worksheets rather than a card format when working as a pair or in threes. This is because is easier to get an overall picture of each theme from the worksheet. One participant, however, commented that the card format might be beneficial, too, because it is easier to share and flick through, which requires further testing.

The Carative Factors Inspirational Toolkit is original, but the level of critical engagement it established with designers through workshops was also important. It was occasionally observed that the Toolkit was used as reference or as a checklist for some of designers during the workshop, rather than as an inspirational tool to inform designers. Group 6 used the Toolkit as a reference when generating ideas. Similarly, P13 and P14 preferred to generate ideas without using the Toolkit initially, and then they developed the ideas further by using the Toolkit. P15 preferred to use the Toolkit as a checklist when reviewing whether the generated ideas fit into any of the themes or factors (Figure 48-2). This suggested that the Toolkit might not communicate fully through the idea generation session. One participant's comment was that this may be because the Toolkit contains illustrations and text only. However, using it as reference or checklist offered one option for adapting the Toolkit. Nevertheless, considering the fact that the Toolkit was given out to participants to read through before the ideas session started, it may have had some influence on their thinking processes during the idea generation process. Therefore, although the Toolkit was sometimes used for reference purposes, some degree of inspiration was potentially provided. Furthermore, Knight and Jenkins (2009) suggest that the most applicable role for the toolkit in a company's design process is as a checklist, which provides an in-depth but narrow application for designers, followed by guidelines. The use of the toolkit as a reference or checklist is the essential role of the toolkit.

Participants engaged intensively with the issues and the design of the Toolkit during the workshop session. According to P17, using the Toolkit helped them to understand the design problem of the lack of consideration of the after-use situation, which results in the hibernation or accumulation of many other products in the home. However, P18 commented that some of the factors, such as 'inform users about better use' and 'inform users' future use' are close in meaning, which could lead to confusion. Therefore, those factors needed to be integrated and rephrased for the following study. Others comments include: "the workshop session provided an opportunity to rethink our design processes and how designers are creating 'beautiful' waste'". He insisted that design firms must consider the end-of-use cycle when first generating an idea for a product. Accordingly, he indicated that the Toolkit might be useful to assist designers

when designing packaging, exploring the ideas around responsible and decisive disposal behaviour by users. The most interesting aspect of the Toolkit for the participants was the written comments on each factor, which were the findings from the interviews and literature. It was noted that in reality this approach was maybe only possible to carry out by working together with other company departments, such as marketing and engineering. This means the Toolkit needs to be tested with other sectors for future research; however, this is beyond the scope of this PhD. Nonetheless, this PhD provided designers with a better understanding of the relationship between the user and hibernating or accumulated objects at end of use.

The positive comments from the participants may be valid; however, they might just be saying that the Toolkit was useful because they were aware of my presence. To test the usefulness of the toolkit and whether it is beneficial or not, it was necessary to conduct the idea generation sessions with two comparable groups – a group idea generation session without the Toolkit and one with the Toolkit – for the next study. In addition, the next version of the Toolkit (4.0) was planned to understand which format of toolkit is more useful for individual design study, and to develop the Toolkit further through the individual workshop sessions.

Summary

- The carative factors are also beneficial when exploring Type C relationships in design practice.
- The written comments were a useful element.
- 'Cautious participants' tend to require the *responsibility* and *commitment* factors to motivate their care-giving behaviour, because they are the type of people who require 'shared intentions' that also evoke the *commitment* form of care.
- The workshop provided a better understanding of the Type C relationship.
- Involving other departments of the company to explore ideas together through the Toolkit may be beneficial to achieve design for responsible and decisive disposal behaviour.

6.1.2.4. Workshop III - Development of Version 4.0

Plan

The modified set of Toolkit cards was intended to allow designers to recognise each factor easily and make prompt decisions about which factor can be applied to different design problems. Some aspects of the illustrations and the text in the Toolkit were refined to provide more perceptive and accurate descriptions. The following factors were eliminated, as they overlapped with other factors.

- Better use
- Give an (unpredictable) reward

In order to find out whether the carative factors informed the design process, it was worth finding out whether the designers found the Toolkit useful and inspirational. Therefore the aim of workshop was to evaluate the usefulness of Version 4.0 of the Toolkit, and to find out what role the Toolkit played in the design process, by conducting an idea generation session with two separate groups, but in a different environment. In practice, it is difficult to formally assess the 'usefulness' of any idea generation method because they are often used in contexts where there can be no comparable control group (Lockton, 2013). Therefore, this session aimed to test the usefulness of the Toolkit by comparing the idea generation processes of two groups – with the Toolkit and without the Toolkit. Two different formats of the Toolkit, worksheets and cards, were provided for designers to choose from accordingly. The Toolkit use was analysed by categorizing the applied carative factors according to the different themes and the user types.

The workshops were planned to have two separate idea generation sessions. In each group three designers were allocated and they were all given the same design briefs. Three of the designers in Group 8 were asked to generate as many ideas as possible by using external stimuli, such as online sources; however, the Toolkit was not provided. The designers in Group 9 were given the design briefs under the same conditions, but in their case the Toolkit was provided.

Individual workshop sessions were conducted with six designers working in the packaging design industry who often deal with a pharmaceutical product design brief. Applying the Toolkit in a diverse set of design briefs is a useful method to

investigate the viability, practicability and acceptability of Toolkit use in a real-life design industry context. Exploring and comparing how they defined the problems and processed idea generation through the Toolkit (or without the Toolkit) was intended to help to identify the usefulness of the Toolkit.

During the interviews and observation research phase, I came across two participants who kept expired pharmaceutical products in a drawer. One of them eventually threw away more than half of these when she moved to a new house. In the UK, £90m worth of unused and expired prescriptions are stored at home every year (Connelly, 2018). The NHS recommend that patients should not keep unwanted medicines at home for future use, but return them to a pharmacy for safe disposal, whether they have been opened or have expired. However, a critical amount of pharmaceutical waste is still kept and thrown away. This indicates that users' lingering regret acts as an obstacle to sustainable ways to dispose of pharmaceutical products, as used products kept for a long time become obsolete, and they are easily thrown away or flushed down the toilet. Pharmacies have an obligation to accept unwanted and end-of-use medicines from patients (PSNC, 2004); however, not many users have been motivated to take them in. In some areas prescription drug take-back boxes are provided in which unused drugs that are past their expiry date can be safely disposed of. Mail-back programmes are also available whereby police departments or healthcare providers send mail-back packages for safe disposal. In this respect, a design brief in this workshop intended to explore the opportunity to lessen users' lingering emotion towards products through the use of the Toolkit in order for users to let go of objects in a responsible and decisive way to be returned to the manufacturers (or pharmacy). The target behaviour was not defined specifically; however, existing design ideas, such as 'unneeded medical collection box' or 'requesting a disposal bag from pharmacy' was mentioned in two groups.

The workshop also aimed to find out whether the Toolkit provides a better understanding of the concept of product detachment from possession for designers. The discussion session was planned to take place after the idea generation session, including the question of whether designers understood how to use the Toolkit.

Act and Observe

The workshop session was conducted with two sessions each for two separate groups in the conference room. The designers were asked to tackle the problems of hibernating or accumulated pharmaceutical products at end of use and packaging kept in the domestic environment 'just in case', for an unknown future. The design brief was given out to designers individually at different times, as the participants were available at different times. The designers arrived at different times, therefore the first three designers to arrive were allocated to Group 8, and the other three designers were allocated to Group 9. The descriptions of 'Attentive users' and 'Cautious participants' were presented to allow designers to explore ideas around specific types of user.

During the first session of Group 8, the design brief was presented and the participants were required to generate ideas individually, based on their own knowledge, for fifteen minutes each for two different user types (Figure 51). They were allowed to search online using their smartphones or laptops. After the sessions, the participants were asked to present the ideas they had generated and explain the thinking behind them, and express their experience and any difficulty they had faced. During the second section, I presented the Carative Factors Inspirational Cards to each designer, allowing them to read them through for about five minutes, and discussed whether the Toolkit would provide opportunities to enhance inspiration and potentially be of benefit during the idea generation process.

The participants in Group 9, on the other hand, were requested to explore ideas around the design problem by using the inspirational Toolkit (Figure 52). The Toolkit was given to designers with the brief description of how to use the tool and how designers had previously used it in their idea generation process. Then the designers were asked to generate the ideas by adopting the Toolkit for 15 minutes each for two different user types, and they were also allowed to use online resources. After the sessions, the participants were asked to run through the ideas generated and report on their experience of using the Toolkit. The conversation continued with questions about how well they understood how to use the Toolkit and its usefulness.

The individual workshops lasted for around an hour, with a 30-minute idea generation session. Thirteen ideas were generated from Group 8 and seventeen from Group 9. Figure 53 and 54 show a selection of these ideas. P18 and P19 tended to search online for existing design ideas first when the design brief was given. P20 searched for an appropriate way to dispose of pharmaceutical products (Figure 51). Then, based on their findings, they started to generate the design concepts. Some common concepts were generated by the participants in Group 8; for example:

- A clearly written message on the product about how to dispose of products and make the expiry date visible
- A clearly written recycling symbol on the product.
- Self-coloured material that changes to let users know the time has come to let the product go.
- Applying different materials to different parts of the pack and packaging to indicate that the user should separate the materials when disposing of them.

Similarly, Group 9 was allowed to explore online, but they mainly spent time on exploring the Toolkit when generating ideas. The participants tended to use the factor which they are familiar in terms of the concept, and ones that offered a short text or provided straightforward information, such as 'provide information' or 'knowing the result'. *Responsibility* and *commitment* were the themes that were mainly explored. All three of the designers were still writing or drawing ideas even when the set time had finished. Some of the interesting concepts generated by the participants are as follows:

- A reward points scheme when medicine is discarded into the appropriate bin. Redeeming the points within the local economic community.
- An educational tool: when people pass a medicine disposal bin, a video will play to let people know what effect and influence they will have by returning the pharmaceutical products they don't need.
- Manufacturers or pharmacies send a message to users requesting the return of unwanted products and packaging.

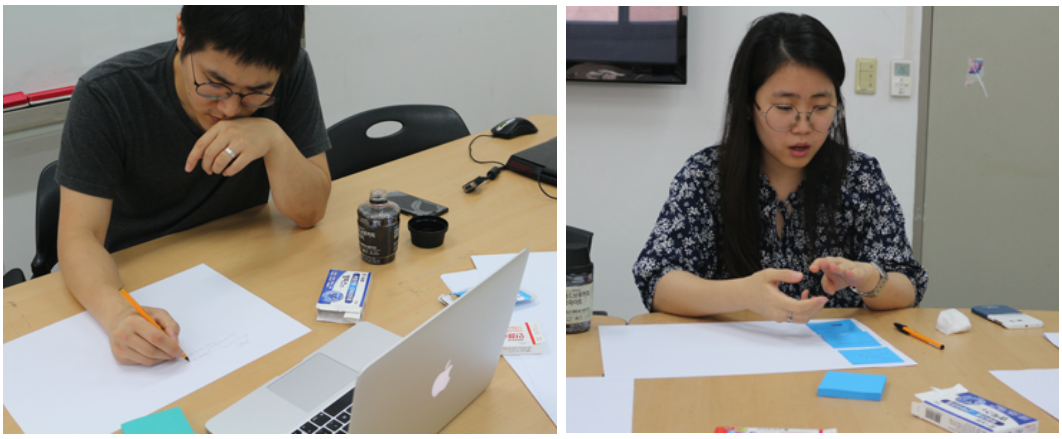


Figure 51. Designers generating ideas without the Toolkit.

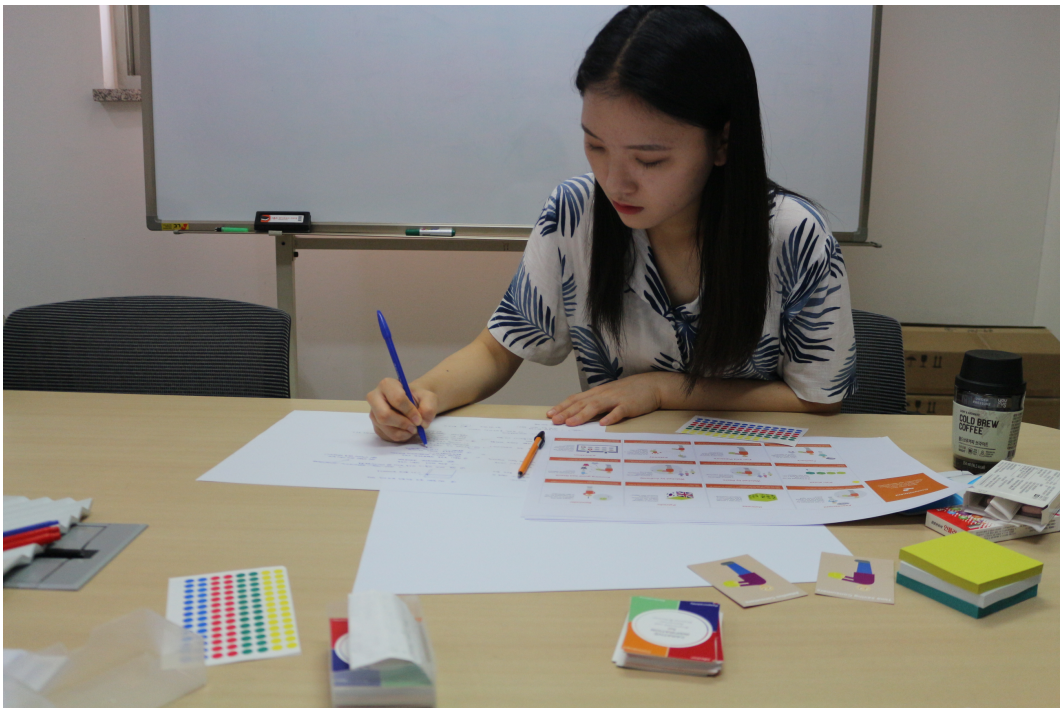


Figure 52-1. Designers generating ideas using the Toolkit.

Figure 52-2. Designers generating ideas using the Toolkit.

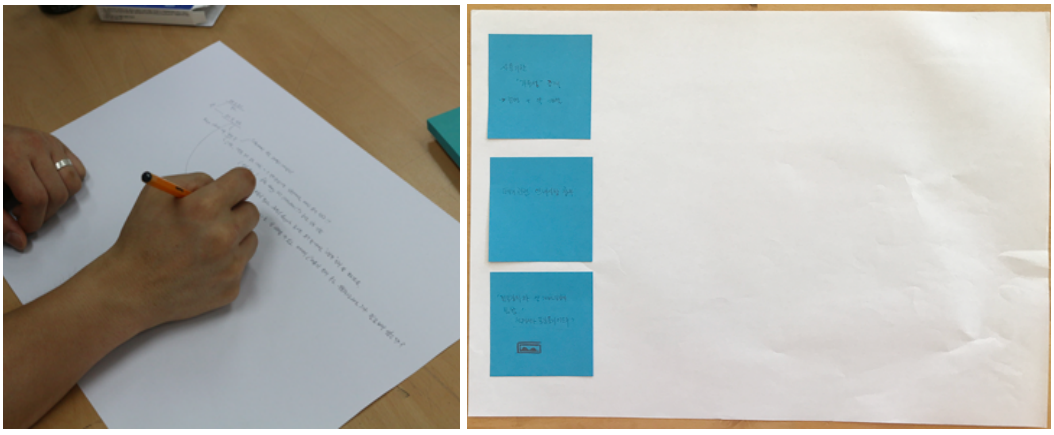
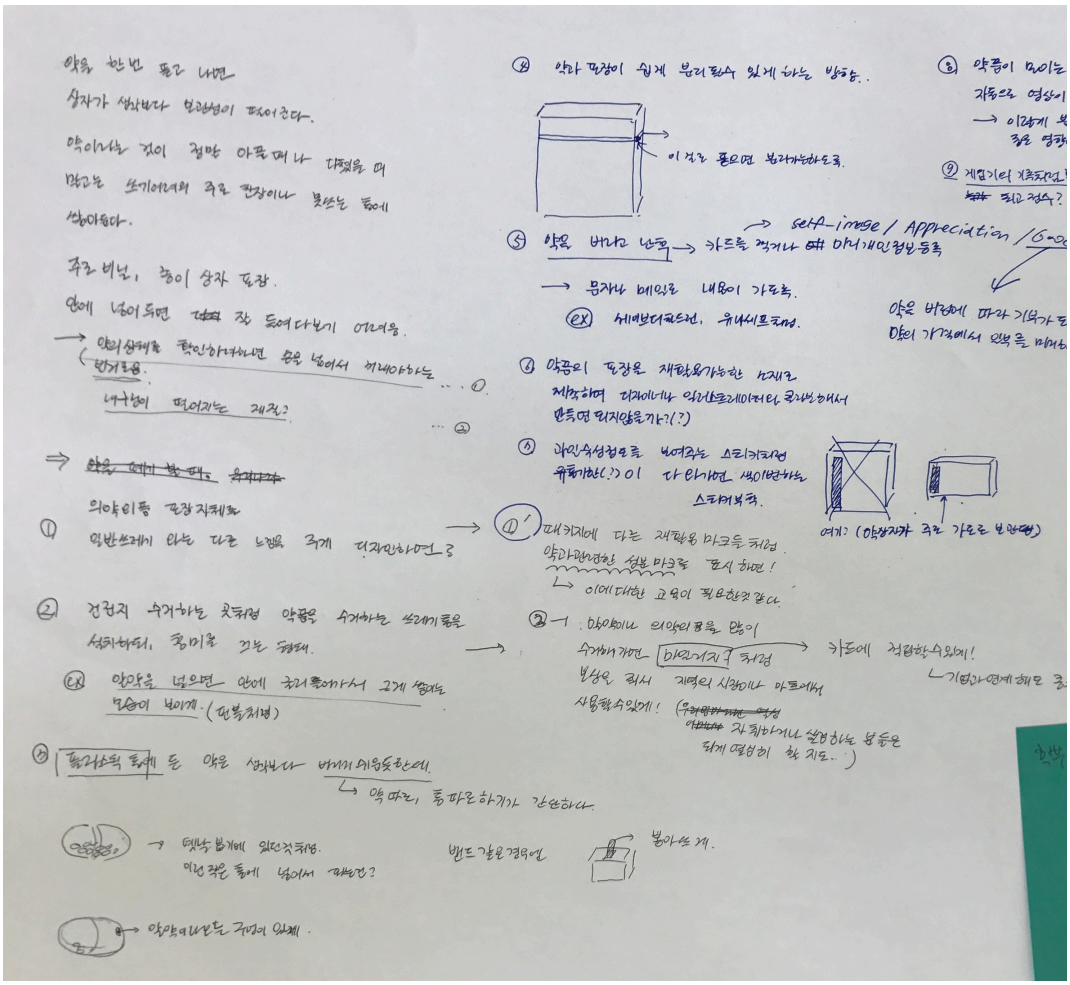


Figure 53. Ideas generated by P18 and P19.



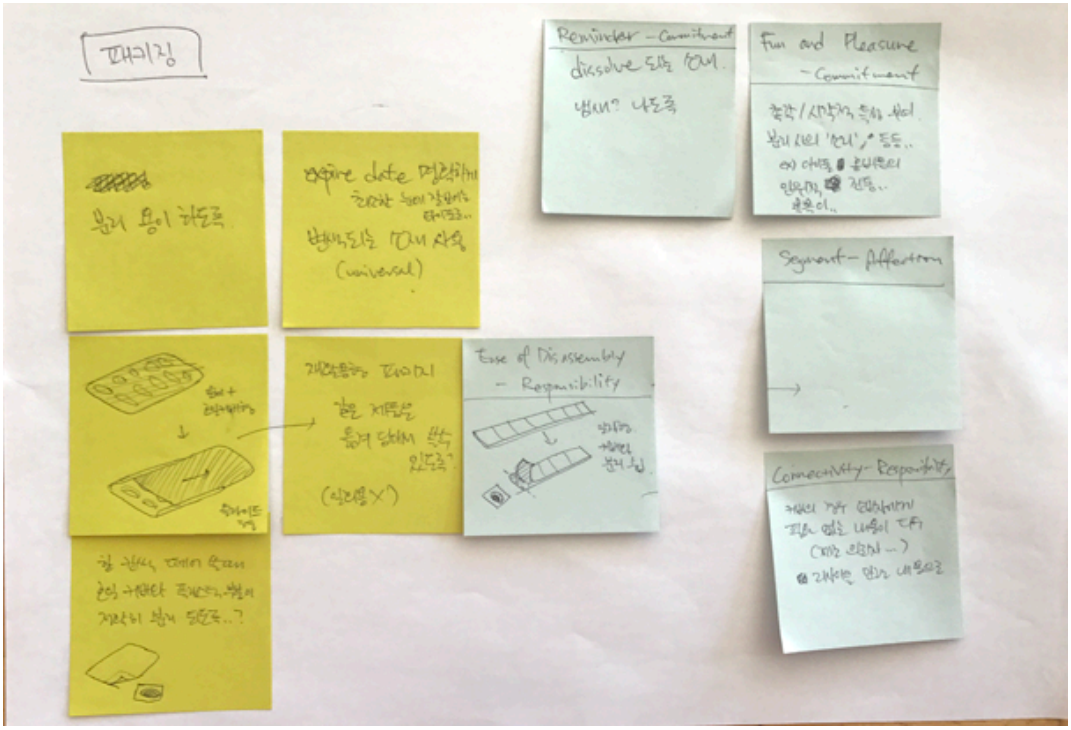


Figure 54. Ideas generated by P22 and P23.

Reflect

The central aim of this workshop was to identify whether the designers found the Toolkit useful and inspirational for idea generation.

When three designers in Group 8 were developing ideas without the Toolkit, most of the ideas generated were quite repetitive and shallow. The ideas were mainly about changing the shape or colour of the product, providing information about how to dispose of the objects or applying different materials to the product for easy separation. Moreover, the ideas generated by one designer overlapped with other designers' ideas. In fact, all three designers generated ideas that related to 'applying different materials for easy separation'. This indicates that in generating ideas without the Toolkit the designer's creativity is limited. However, it should be noted that the designers' individual abilities and knowledge created important variations.

The participating designers in Group 9 tended to choose the factors with which they were familiar and found easy to understand, based on the simplicity of the illustrations and length of the texts. For instance, the designer P23 in Group 9 tended to read the Toolkit thoroughly and apply it to his own ideas. Designers tended to generate as many ideas as they could and move on to the next factor, rather than using multiple factors to generate one single idea. Figure 55 describes the carative factors applied by each participant during the idea generation session; these are categorized according to user types and caring theme. The factors of *responsibility* and *commitment* were the most frequent themes used in relation to 'Attentive users' and 'Cautious participants'. This is perhaps because the characteristics of pharmaceutical objects are less likely to encourage empathic emotion in the user.

The ideas explored were diverse compared to Group 8, as Group 9 made an attempt to improve services and systems for disposing of medicines at the end of use sustainably. Additionally, they generated new product design ideas which could provide feedback to users to motivate care behaviour. For example, P22 generated ideas about a new structure for a blister pack, but also considered ways in which the products could be returned. Considering that more diverse ideas were generated through the use of the Toolkit, it can be confirmed that the Toolkit acted as an inspirational tool and was of benefit to the idea generation process.

Occasionally, designers (such as P21) tended to develop an idea based on their own knowledge first, using the Toolkit when looking for more inspiration. P21 stated that she realized later that a similar approach was advocated in the Toolkit. In this sense, the Toolkit has the potential to be used as a checklist.

The Toolkit was also presented to Group 8 after the idea generation session, and they were asked whether there were any factors they had not considered but thought were useful, and whether the Toolkit provided them with any further design opportunities. All the designers in Group 8 agreed that the Toolkit would offer useful material to provide inspiration. They commented that some of the factors, such as 'being watched by peers/ authority' or 'inform users of the impact of their behaviour' or 'create a contract for a specific period of time' are interesting, and they had not considered them as design solutions before during an idea generation session. All three designers indicated that the Toolkit offers the opportunity to open up their perspectives to explore more diverse approaches and inform new knowledge. P20 was excited to see the Carative Factors Inspirational Cards, as they had the potential to act as a problem-solving tool, so she asked for a copy of the Toolkit to use for future design projects.

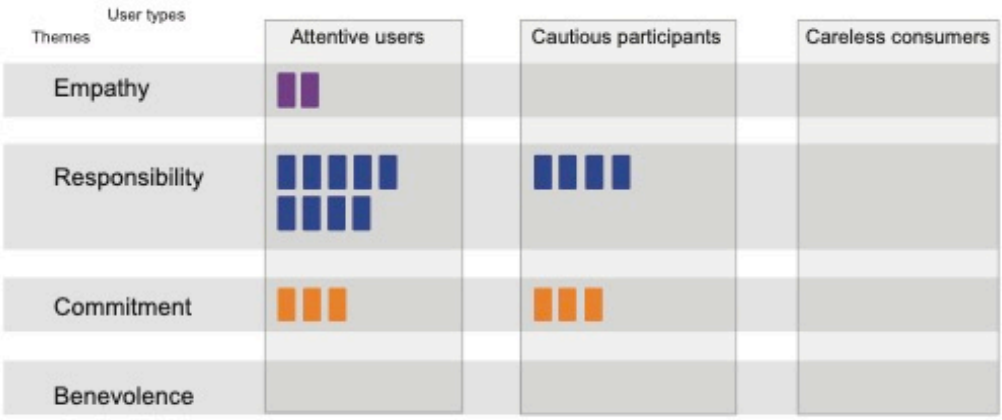


Figure 55. The carative factors applied to the Type B relationship were classified according to caring theme and user type. For example, nine carative factors within the theme of *responsibility* were used for 'Attentive users' when designers explored ideas.

My other question was: "does the Toolkit provide a better understanding of the concept of product detachment from hibernating or accumulated products at end of use to designers, and do designers understand how to use the Toolkit? P21 and

P22 commented on the positive aspects of the Toolkit, particularly the comments sections, that helped them to understand users' remaining emotions towards hibernating or accumulated products at end of use and the difficulty users face. However, most of the participants noted that photos of examples may be beneficial to create a more explicit Toolkit, as some factors, such as 'create an engaging story' provide an unclear message. This was noted when P23 stated that the illustrations provide a vague and abstract definition of the carative factors. Therefore, there is a strong possibility that the illustrations convey different meanings to each designer, so that their generated ideas are influenced by this, and they may also contain different meanings. There were a number of questions raised by the designers about usability issues, such as 'can we mix the factors when generating ideas?', or 'can I explore my idea first and then use it later?'. This was because the instructions on how to use the Toolkit were only explained verbally before they started the workshop session. This indicated that the Toolkit must include instructional guidelines on how to use the tool, which was modified for the next workshop session.

All the designers preferred to work in worksheet format rather than card format. During the workshop session, P21 made notes next to the worksheets. P21 said, "this format seems more organised" when exploring the Toolkit individually. As for the independent design studies, it was not necessary for the Toolkit to be shared with other designers or quickly flicked through during the idea generation process. Instead it provided an overview of the carative factors in each different theme. Therefore the worksheet format allowed designers to understand the care themes and factors promptly and enhanced the engagement with the designer. The worksheet format thus has more potential to be accepted as an individual study tool for designers; however, the designer's personal choice may apply.

The next version, 5.0, required a refinement of the text to deliver a clear message, and the addition of photos to represent each of the carative factors.

Summary

- The ideas generated by using the Toolkit were more diverse, which can confirm that the Toolkit acted as an inspirational tool and was of benefit to the idea generation process.
- Adding the detailed instruction guide and examples of photos which represent each of the specific carative factors may provide benefits to designers in their use of the Toolkit.
- The worksheet format has the potential to be accepted for individual designers' study.

6.1.2.5. Workshop IV- Development of Version 5.0

Plan

In Version 5.0, instructions on how to use the Toolkit were added (Figure 56) and photos which represent each of the specific carative factors were added to deliver a clear meaning to create an inspirational guide for designers (Figure 57). The previous series of workshops established that the worksheet format restricted the sharing process with other members of the group in selecting the necessary factors. The card format was therefore adopted for the next workshop. Lockton (2013) identified that a small card format is not suitable for collaborative work. Therefore, to enhance designers' engagement with the card contents and its use during the group work, and to enable the inclusion of photos, the card size was increased.

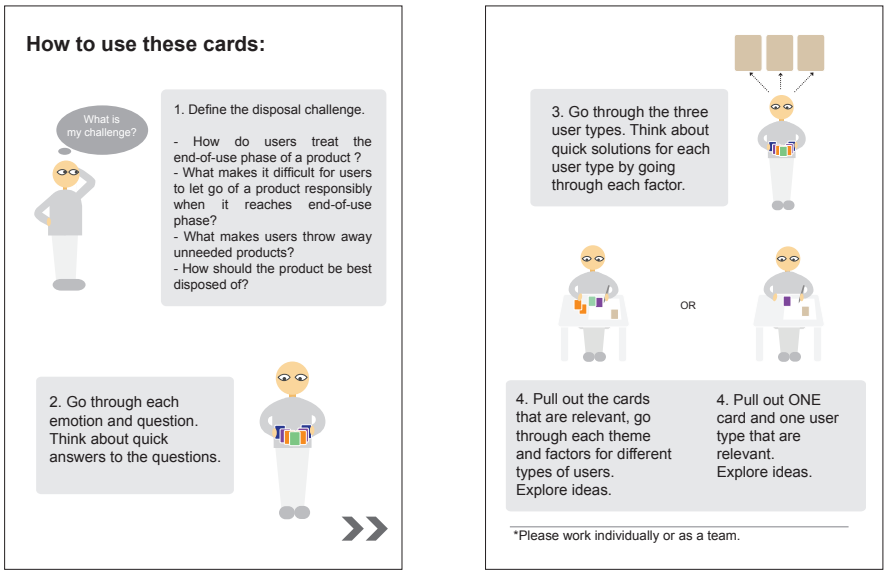


Figure 56. Added instructions for use.

With the modified Toolkit, the final workshop was designed to understand whether the Toolkit could be applied to the idea generation process solely by the participants, without the researcher's presence as a facilitator. Therefore the Toolkit was handed over to the design firm, and it was planned that the workshop would be run by the participants themselves. Furthermore, the aim was to find out what role the Toolkit played during the idea generation session. The Toolkit use was analysed by categorizing the carative factors that were applied according to the different themes and user types.

The barrier to letting go of hibernating or accumulated objects at end of use was found to be present in both Type B and Type C relationships, in which some people keep things for an unknown future but also keep them because users have responsibility for the objects or the environment. Therefore, Workshop V was planned for designers to explore their ideas when dealing with both relationships.

Figure 57. Front (Top) and back (Bottom) of the modified card with detailed explanations.

In the UK, only 33.7 per cent of previously owned mobile phones are returned back into the system, while mobile phones are usually kept by owners 'in hibernation' for about 5 years (Wilson et al., 2016). Mobile phone hibernation is a significant barrier to a circular economy model (Wilson et al., 2016). Around 125 million UK phones are thought to be languishing unused, ending up in the landfill (Nichols, 2015). Mobile phones contain toxic material which will leach out and can contaminate the soil, as well as water. Many parts of mobile phones are reusable or recyclable. The unwanted phones can be passed on to other people, returned to the shop for recycling or disposed of in a small electrical recycling centre, to promote material circulation, eventually saving resources. The hibernation period may provide a potential opportunity for design to explore potential ways to contribute to responsible and decisive disposal behaviour. The challenge is finding how to detach users from possession and dispose of the hibernating mobile phone at end of use sustainably, and in a way that reduces waste and helps the environment. A design brief was created for the workshop to explore how design could help and enable users to let go of hibernating or accumulated objects at end of use responsibly and decisively. The planned workshop decided to focus on one object in order to prompt an attentive review of the Toolkit by observing the use of the Toolkit in relation to one particular problem. The card format was presented for the participants to use during the idea generation session and test its viability. The Carative Factors Inspirational Cards Version 5.0 was further developed through a design brief. Figure 58 and 59 represent the themes of *empathy* and *responsibility,* and their carative factors in Version 5.0.

The selected participants were the designers and design engineers who work in the mobile phone industry. They had had many years of experience in designing and developing mobile phones, so were the most suitable participants to provide professional insight into the use of the Toolkit. Furthermore, participants would have less pressure to provide positive feedback as they were aware of my absence during the workshop process. They might give more honest criticism about how beneficial it is to use the Toolkit in the idea generation process, and the practicability of the Toolkit.

Another aim of this workshop is to test whether the 'Careless consumers' group has some potential to change their behaviour through carative factors. In this

workshop, three user types, ‘Attentive users', ‘Cautious participants’ and ‘Careless consumers’ were adopted as target groups for the idea generation session. During the previous Toolkit development cycles, although a ‘forceful design’ approach was one of the most effective strategies to be applied to the ‘careless consumer’, it was not included in the selected carative factors. This was because the forceful design approach was seen as an unethical approach because it limits users’ choices (Lilley and Wilson, 2018); thus it does not correspond with the concept of carative factors, which are based on the ethics of care. Therefore, the forceful design approach and ‘Careless consumer’ group was not considered during the cycle of the Toolkit development and evaluation sessions. However, Lilley and Wilson (2018) have confirmed that designers’ intention is a critical factor to determine whether the applied design strategy is ethical approach or not when validating behaviour change strategies. In this sense, the forceful design approach may have the potential to be an ethical approach depending upon the designers’ intention and the context in which it is applied. The aim of the carative factors is to awaken the consumer’s conscience and help them to make better decisions to encourage decisive and responsible disposal behaviour, based on the concept of a care ethic. Therefore the forceful design approach within the carative context can be viewed as an ethical approach. In this sense, the forceful design approach, such as ‘penalizing’ is worth exploring to identify whether it has the potential to influence the ‘Careless consumer’ group to motivate responsible and decisive disposal behaviour. Additionally, the aim of the workshop was to ask: ‘Does the Toolkit provide a better understanding of the concept of object product detachment from possession to designers and provide benefit during an idea generation session?’. The final aim was to find out whether the carative factors require further development and evaluation.

Figure 58. Carative Factors Inspirational Cards, Version 5.0: *Empathy*.

Figure 59. Carative Factors Inspirational Cards, Version 5.0: *Responsibility*.

Act and Observe

The Toolkit was passed to the workshop facilitator in advance. He was allowed to read it through to check whether he had any queries. The main question he had was how to mark the user type and the carative factor used for each generated idea. There were no questions arising in relation to the use of the Toolkit.

The participatory workshop was conducted with two product designers and four design engineers. It was held at the company's meeting room, to provide a realistic setting. The workshop participants were recruited by the director of design engineering team who asked his team members to participate. P24 and P26 had some interest in the workshop topic and were willing to contribute, whereas the rest of the four participants had lower motivation. Involving designers who have a lower level of interest was important, as not all of the designers are interested in the subject when they work on the project in the real world.

The workshop consists of three sessions. The first session was to deliver the design brief to the workshop participants. The design brief was explained to all the workshop participants at the same time, including the facilitator. The aim was to create as realistic a situation as possible. It was read out loud at the beginning of the workshop through a speakerphone remotely. Additionally, as the participants had less knowledge of the background research into mobile phone waste and obstacles to users letting go of hibernating or accumulated mobile phones at end of use and the wasteful attitude this represents, these were explained, together with the workshop aim and the brief. The target behaviour suggested by the UK government in terms of disposing of mobile phones in sustainable ways was also communicated verbally; however, participants were told not to restrict themselves to this, but to explore beyond it.

In the next session, a facilitator handed out the Toolkit to designers. The facilitator's role was to provide a brief introduction to the Toolkit, set the appropriate time for each idea generation session, collect the outputs and document participants' feedback during the discussion session. The workshop had no planned rules about whether the participants should group together or work as individuals; this was to be discussed by the participants and the facilitator. However, I explained how the previous workshops been conducted, which then provided a general idea of what might be most suitable for their workshop session. Then the designers were asked to explore ideas about a new mobile phone design,

services or systems to enable users to let go of hibernating or accumulated mobile phones at end of use responsibly and decisively. All the participants shared the same design brief and the participants were asked to generate ideas by using the Toolkit.

The workshop lasted for one hour and fifteen minutes, with thirty minutes for an idea generation session. All the cards were spread out and displayed on the table prior to the idea generation session, and designers were allowed to select the one they needed for their own idea exploration. The facilitator provided both user types at the same time, and the designers were allowed to freely explore, draw and write ideas, whichever came to mind first that fitted into the appropriate user type. The card format was available during the workshop, as the designers were expected to work in collaboration. It was found that two designers paired up but the rest of them preferred to work their own.

Based on the suggested responsible and decisive disposal behaviour, designers generated ideas around new products, services or systems to help users return the end-of-use mobile phones to manufacturers, retail stores or third-party organisations, or the reuse of the phones by multiple users. Some of the most interesting ideas are as follows: (Figure 62 and 63)

- A mobile phone design that enables easy detachment of the battery. Similarly, the glass on the front screen offers an ease-of-disassembly structure.
- When the user first purchases a phone a virtual character is installed. If it is not recycled or returned then the character becomes ugly or distorted, or is destroyed. However, if it is passed it onto a new user the character recovers and becomes healthy.
- Rewards are given to the users when the phone is returned. When they collect a certain number of these, then they can exchange them for a plant or an animal they would like. The aim is to promote the underlying aim of recycling: ‘save living things on earth through recycling activity’.
- The recycled mobile phone collecting points are positioned where there are many passers-by and a machine is installed that offers to delete personal information promptly to encourage the disposal of mobile phones at the right place.

The final session was to share the experience of using the Toolkit. The ideas generated were not presented to each other because of the limited time allowed. However, the facilitator asked questions focusing on their experience of the use of the Toolkit, how useful the Toolkit was, whether they understood the way to use the Toolkit and whether they had acquired new knowledge. The feedback and relevant comments were recorded in a notepad by the facilitator and passed on to me.

Figure 60. Participants exploring the Toolkit.

Figure 61. Participants generating the ideas by using the Toolkit.

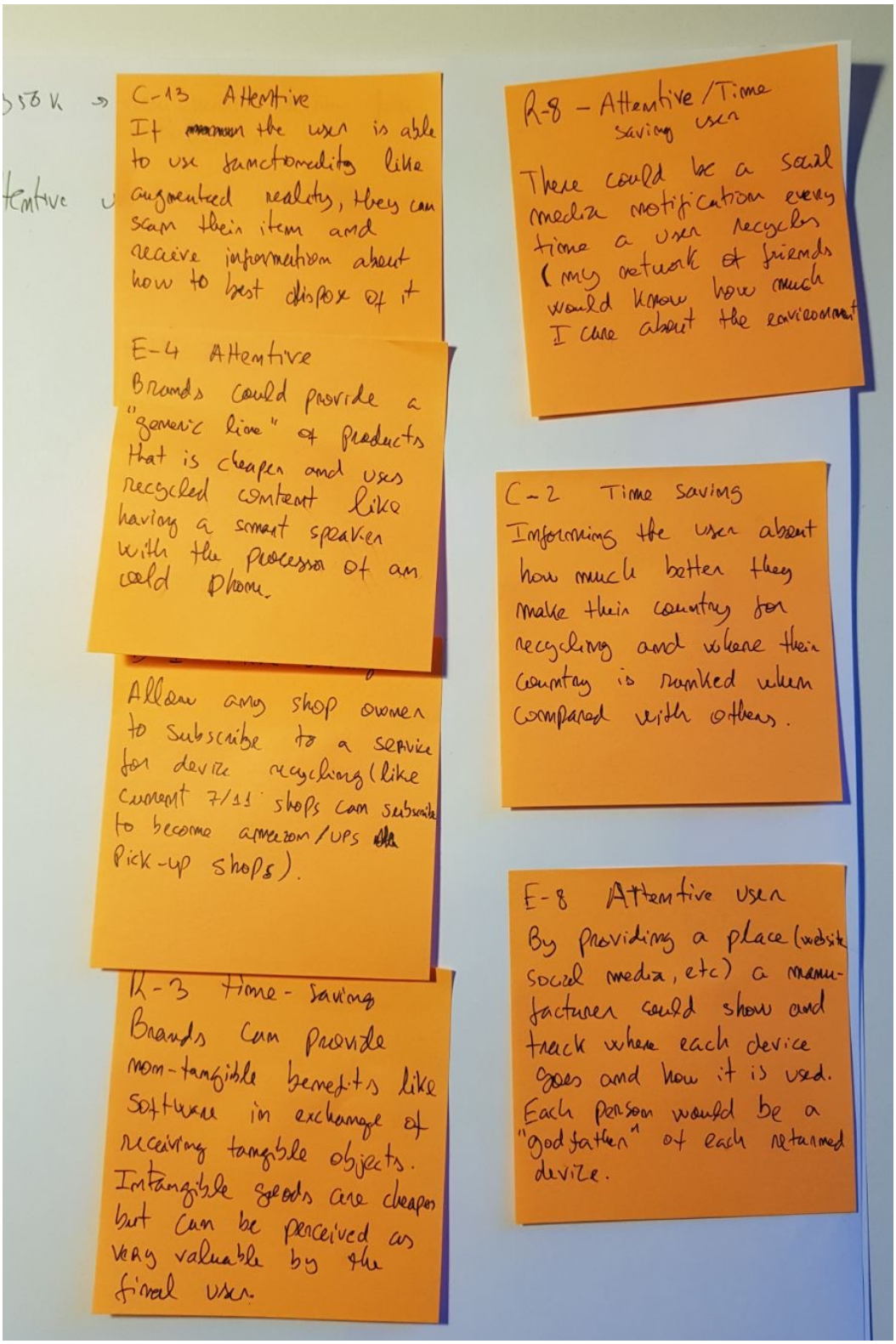


Figure 62. Ideas generated by P24.

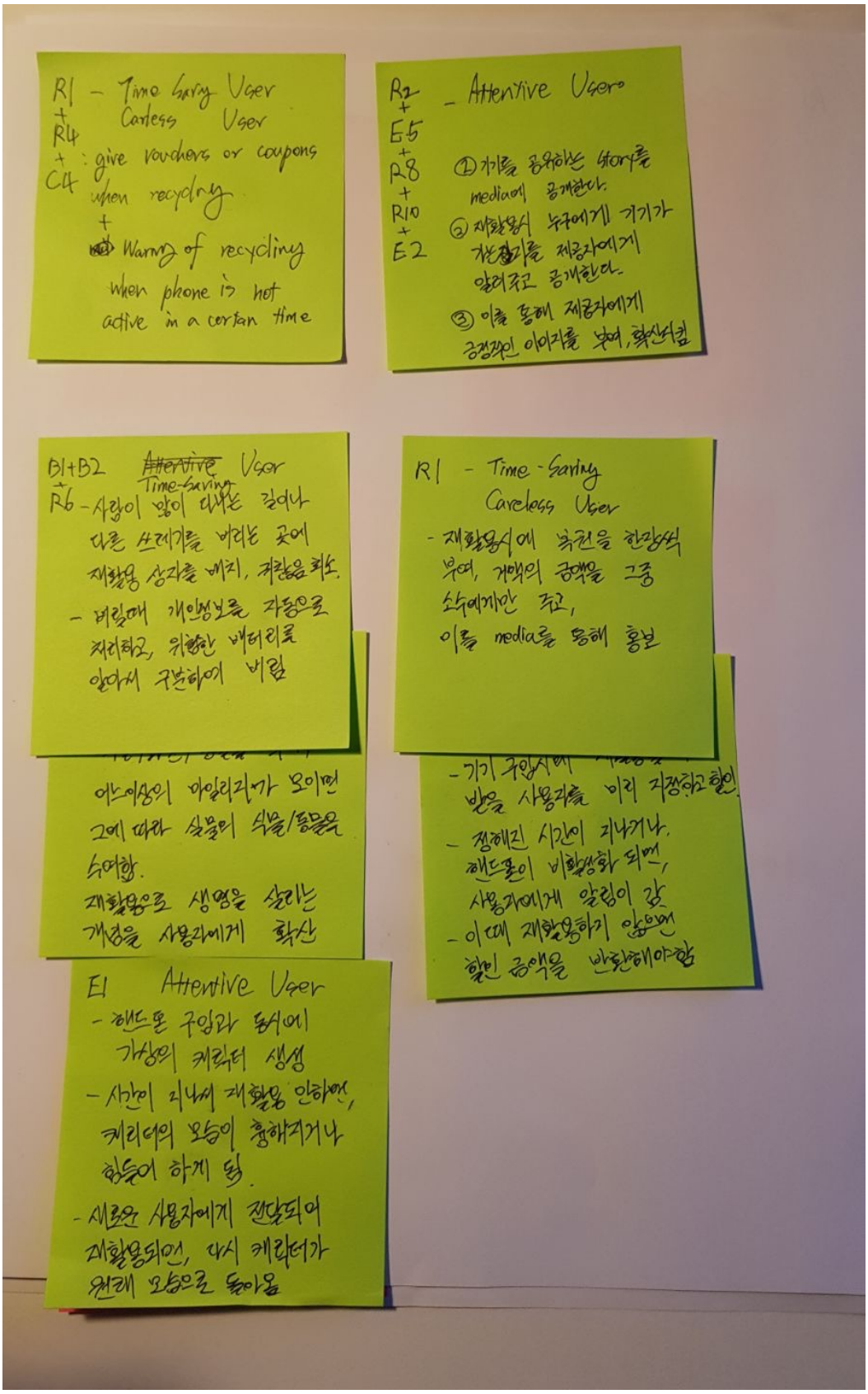


Figure 63. Ideas generated by P25.

Reflect

The central aim of this workshop was to understand the viability and usability of the Toolkit without the researcher's presence. Although the instruction card was included in the Toolkit set, the participating designers tended to rely on the facilitator's guidance in the use of the Toolkit. As the facilitator had read the instructions on how to use the Toolkit prior to the workshop session, he was able to answer questions. During the workshop session, none of the designers had any questions about how to use the Toolkit. This may be because the facilitator provided sufficient information about the Toolkit to the users. However, reflecting on the fact that the facilitator had not asked any questions relating to the use of the Toolkit prior to the workshop, the cards did offer instruction to users to some extent. Nonetheless, the designers tended to fully engage with the Toolkit without any questions arising during the idea generation session, which potentially means that the Toolkit can be applied directly to the design process and that designers understand how to use it. However, it is still relevant to provide sufficient instruction to the users.

According to the facilitator, before the idea generation session began, they tended to read, discuss and choose certain factors from the Toolkit that were interesting. Then they selected the user type and started to explore ideas (Figure 60 and 61). Figure 64 demonstrates the carative factors that were applied by each participant during the idea generation session when they were exploring both Type B and Type C relationships simultaneously, and they are categorized according to user type and caring theme. They mostly used the theme of *responsibility* to address the carative factor of 'providing financial return'. According to the facilitator, all the designers agreed that providing benefits is a very important aspect of changing users' behaviour. *Empathy* was also explored occasionally when creating services to encourage empathic emotion toward other potential users, which enables users to pass them on to other specific users. However, all the themes were explored extensively. This indicates that all 'Five Motives of Caring' themes have the potential to be applied to the brainstorming process to promote users' care-giving behaviour in relation to peaceful letting go. The 'Careless users' target group was also explored by P29 with the 'charge a penalty' factor, which indicates that this group may be considered to have the potential for the promotion of responsible and decisive disposal behaviour through carative factors.

The designers were strongly engaged with the Toolkit, as they continued to generate ideas by switching the cards. However, participants tended to use the cards which had short sentences on them, and designers tended to generate as many ideas as they could using one factor and then move on to the next factor, but they also tended to produce one solid idea by using a range of factors by mixing them together as they built upon the ideas, which used a similar approach to Workshops II, III, and IV. Other ideas included redesigning the mobile phone entirely with a new structure, and there were ideas to improve services or systems to encourage responsible and decisive disposal by users. This indicates that the Toolkit encouraged designers to generate a broad range of approaches, and has the potential to act as an inspirational tool by stimulating designers' creative thinking process without the researcher's presence.

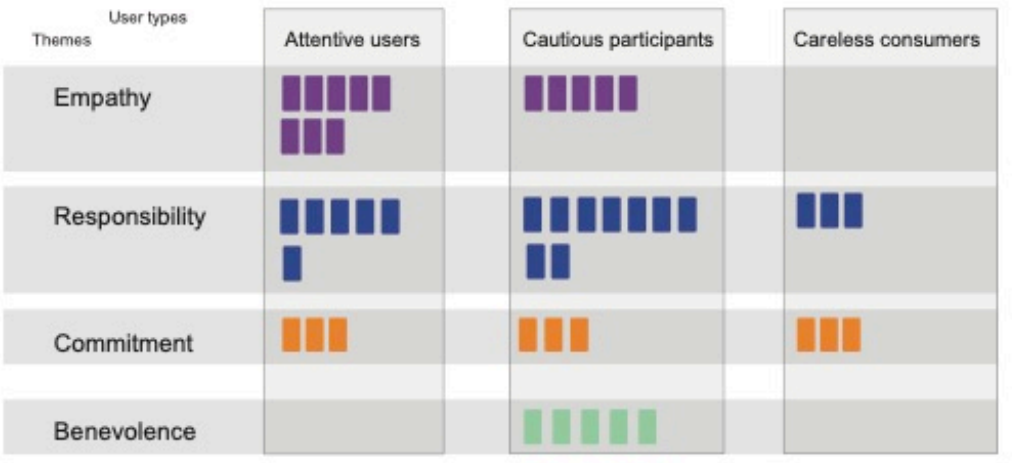


Figure 64. The carative factors applied to different user types when designers were dealing with Type B and Type C relationships simultaneously. These were then classified according to caring theme and user type. For example, nine carative factors within the theme of *responsibility* were used for 'Cautious participants' when designers explored ideas.

Initially, the Toolkit was designed to identify which carative themes and factors work best for the different types of relationships and different user types. However, observing that designers tended to use mixed themes and factors when exploring the ideas indicated that suggesting specific caring motivations for specific behaviour might not be the best way to provide an inspirational tool for

designers. Moreover, when the two themes are applied together it is difficult to tell which of the caring theme had more influence on the idea generated.

My other question was: 'does the Toolkit provide a better understanding of the concept of user detachment from hibernating or accumulated object at end of use for designers?'. According to the facilitator, the participants shared their personal stories about their accumulated and hibernating mobile phones at end of use during the idea sessions, and shared their barriers to peaceful letting go. Some designers argued that an obstacle for 'letting go' of objects lay in a multi-layered attribution. Therefore, providing guidelines to designers for exploring a specific theme for a specific relationship may not be an appropriate approach. However, providing a designer with an understanding of the overall picture of the barriers may be more useful. Nevertheless, describing the users' relationship types (Figure 29-1) did provide me with opportunities to create design briefs. On the other hand, they all agreed on the need for a service to delete personal information as a motivation. My understanding, based on the feedback from the facilitator, was that the Toolkit provided a better understanding of the user's relationship with hibernating or accumulated mobile phones at end of use and the object product detachment approach for the workshop participants.

The card format of the Toolkit was provided during the workshop session. According to the facilitator, although the worksheet was not available for individual study, the participants seemed not to have had much of a problem in sharing the cards. P25 said that sharing the cards was not too problematic, because while the desired card was being used by someone else he had time to explore the other factors. Using the card format may give designers an opportunity to explore unfamiliar factors, and stimulate creative thinking. Additionally, the card format was beneficial for the designers, as they were inspired by other designers' use of specific factors. P28 stated that he tended to choose the same card as the one that other designers were exploring. P24 liked the card format because it provided an overview of caring themes when they were spread on the table. He also liked the idea that he could select only the one he needed. This indicated that the card format is potentially useful for group workshops in helping them to understand the design problems and provide inspiration. In this workshop, the Toolkit was mainly used as inspirational tool. It should be noted that individual design study was conducted within the workshop

session, so it was necessary to test the card format during the individual design projects, which will be explained in next section.

The final aim was to find out whether the carative factors require further development and evaluation. Considering that in the workshop participating designers had not mentioned additional carative factors, it can be concluded that the data was saturated at this point. Furthermore, the participants emphasised that the Toolkit encouraged them to explore ideas from a different perspective, which signifies that the Toolkit informed the designer's idea generation process and acted as an inspirational instrument and material to enable designers to draw creative design solutions. Therefore the Carative Factor Inspiration Toolkit does not require further development at this point.

Summary

- The Toolkit has the potential to be used on its own during the idea generation session.
- The Toolkit can be applied in the design process to overcome both barriers.
- Providing a guide for designers to explore a specific theme for a specific relationship may not be a useful approach at this point, mainly because designers tend to mix the themes.
- The card format has the potential to be applied during the group workshop as well as individual design study.
- The Toolkit acts as an inspirational tool during the design process.
- 'Careless consumers' have the potential to demonstrate responsible and decisive disposal behaviour through the application of carative factors.

6.1.3. Design Study

Plan and act

Alongside the workshop, three design studies were carried out by two university design students and a design practitioner to test whether the Toolkit offers useful material to apply during idea generation. The Toolkits were delivered via email in a digital format and were expected to apply to the design briefs. All the participants had attended the previous workshops and they asked to obtain the Toolkit for their individual design projects. The design briefs were created by themselves, mostly inspired by the previous workshops they attended. Designers

were familiar with the Toolkit contents and ways to apply it; therefore the aim of this study was to recognise whether the Toolkit is useful and would provide inspiration during the idea generation session. Each of the design studies happened at a different stage of the Toolkit development (See Figure 22).

Version 1.0 was given to Designer 1 after the first pilot workshop, Workshop 1. Attending the workshop provided the designer with an opportunity to address the problem of accumulated clothing in the domestic environment. According to Designer 1, in the UK, the average British woman hoards £285 worth of clothing in their wardrobe that they will never wear (Devaney, 2017). The survey found that people throw away around 680 million garments in one spring season as they clear out their wardrobes, with 235 million pieces of clothing reaching UK landfill. Therefore, Designer 1 created a design brief to deal with the problem of unwanted clothing waste, addressing the question of how the design could be improved to help owners enable a shared use situation or sustainably dispose of hibernating or accumulated clothes and elevate the objects' efficacy.

Designer 2 used Version 2.0. This study was made after Workshop I; he also requested the Toolkit for his own design project. He explored the problem of unwanted pharmaceutical products, particularly inhalers left to accumulate at home, either forgotten or kept 'just in case', even if they had expired. According to Designer 2, inhalers are made of mixed materials and are at risk of exploding when they are compacted or get too hot: they should treate as hazardous waste and be returned to a pharmacy or manufacturer to be recycled instead of thrown away. Most people have little knowledge of how to dispose of inhalers, and they simply keep them or throw them away. Designer 2 created a design brief to deal with the problem of unwanted inhaler waste, addressing the question of how the design could be improved to help owners dispose of hibernating or accumulated devices at end of use responsibly and decisively by returning them to the manufacturer (or pharmacy) to increase the efficiency of the resources in the object.

Finally, Version 4.0 was given to Designer 3. She addressed the problem of washbasins that were no longer required that were dumped in public spaces, although they were still in a usable condition. She addressed the question of how design can encourage stakeholders to reuse valuable resources in a creative way. According to Designer 3, the construction sector represents one of the most

significant contributors to global waste production: they are responsible for over 30 per cent of the waste that ends up in landfill (Crawford, 2017). There is a growing awareness of the need to divert construction waste from landfill to reuse or recycling.

6.1.3.1 Design Study I

Reflect

The feedback was gained through informal conversation, so that the designer would feel less pressure to talk about their experience of using the Toolkit (Figure 67).

The aim of Designer 1's project at the start of her research was to design a creative service for users to pass on hibernating or accumulated clothing at end of use to other users. Her focus was on objects hoarded at home which are the focus of a high degree of lingering affection, such as a pair of jeans which are no longer worn, but which have memories for the user. Her approach is associated with the Type A relationship, which I analysed in Workshop 1. Her approach was questioned by the other designers, who said that keeping an object like this may not in fact be a significant problem; moreover, separating the user from an object of affection such as this may not be appropriate, and may even be difficult to achieve, as some users would be less likely to share their personal experience with another user, and would hesitate to let the object go. Therefore, Designer 1 decided to focus on hibernating or accumulated clothing at end of use because the owner hasn't found a recipient for them yet.

By applying carative factors during the idea generation process (Figure 65), one strong, solid concept was created. According to Designer 1, the target behaviour was concrete, therefore it was not necessary to consider other factors to explore ideas. She used the Toolkit initially as a guide for responsible and decisive disposal behaviour. She scanned the overall factors and then moved on to the detailed factors which she found were necessary to apply. Two carative factors influenced the design development process most, by crossing over between the two themes. The carative factor of 'providing benefit to the community' was the most useful during the idea generation as it provided the designer with a different perspective. Initially, she created a platform where users could exchange and sell unwanted clothing. Later she based her idea on the 're-creation' factor. The

output of the design idea (Figure 66) was a story-telling-based, peer-to-peer online and offline platform where people could donate and purchase second-hand clothes, and in doing so receive points or credits. The platform also offered design tutorials or workshops on upcycling skills and techniques to enable people to repair, adapt and customise their clothes they had purchased. Later the re-created clothing could be exhibited at a gallery, or re-sold. According to Designer 1, the Toolkit enabled openness to new design ideas during the idea generation process. In particular, the factor of 'providing benefit to the community' offered an opportunity to shift her focus from a company to a community in terms of the service provider. She commented: "I always thought a company should take responsibility for end-of-use clothing", and the Toolkit allowed her to change her focus from a commercial to a community-based perspective. 'Re-creation' was another influential factor when generating ideas. 'Picking up'; 'Receiving a benefit', 'Sharing a story', 'Providing financial return', 'Knowing about the progress and destination of an object' were also useful factors. However, she used these for reference rather than as inspirational material.

Designer 1's own background research to define the area in which carative factors could apply in her own design project was useful to review the relationship between the user and the hibernating or accumulated object at end of use which I defined in Figure 29-1. Her findings also confirm that it is not necessary to address the Type A relationship through the object detachment approach. As I also found out through Workshop I, objects in this type of relationship are less likely to be thrown away, and there is more chance of them being taken care of and passed on to other people. Reflecting on Workshop I and getting insight from Designer 1's design process confirmed the need to re-contextualise the caring themes for the next Toolkit version.

Considering the process of defining the problem and finding the appropriate relationship to apply, the Toolkit did help Designer 1 to understand users' relationship with the hibernating or accumulated objects at end of use. Moreover, it acted as a tool for inspiration during the idea generation process, which indicates that the Toolkit helped and informed the designer about understanding the object detachment approach.

It should be noted that there is a basic difficulty in receiving honest opinions from the participants, as participants might have said the Toolkit was useful because

the they felt pressure to provide the answer I was expecting to hear, and might have felt a responsibility to contribute to providing relevant feedback.

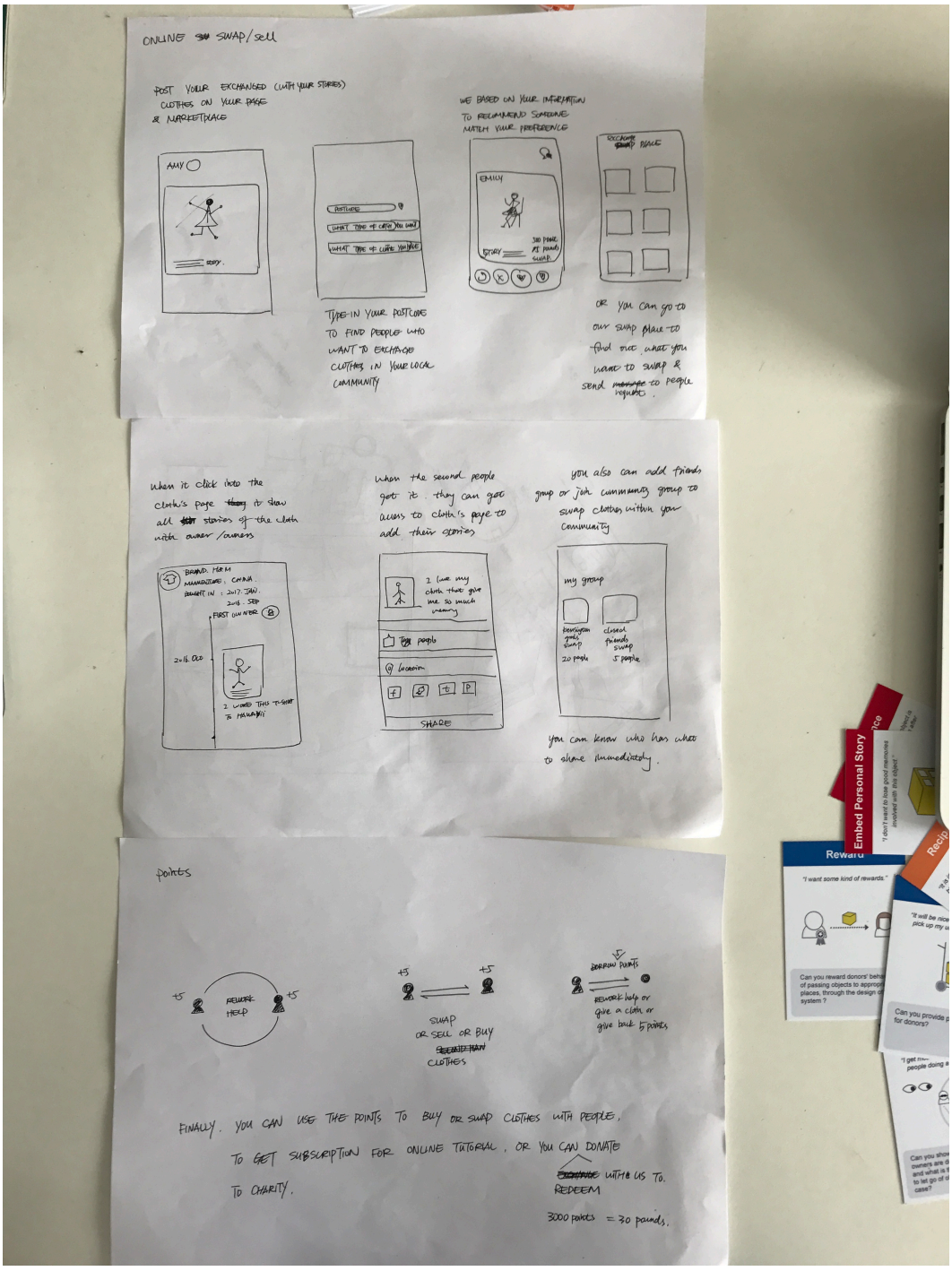


Figure 65. The Carative Factors Inspirational Toolkit being used during Designer 1's design study.

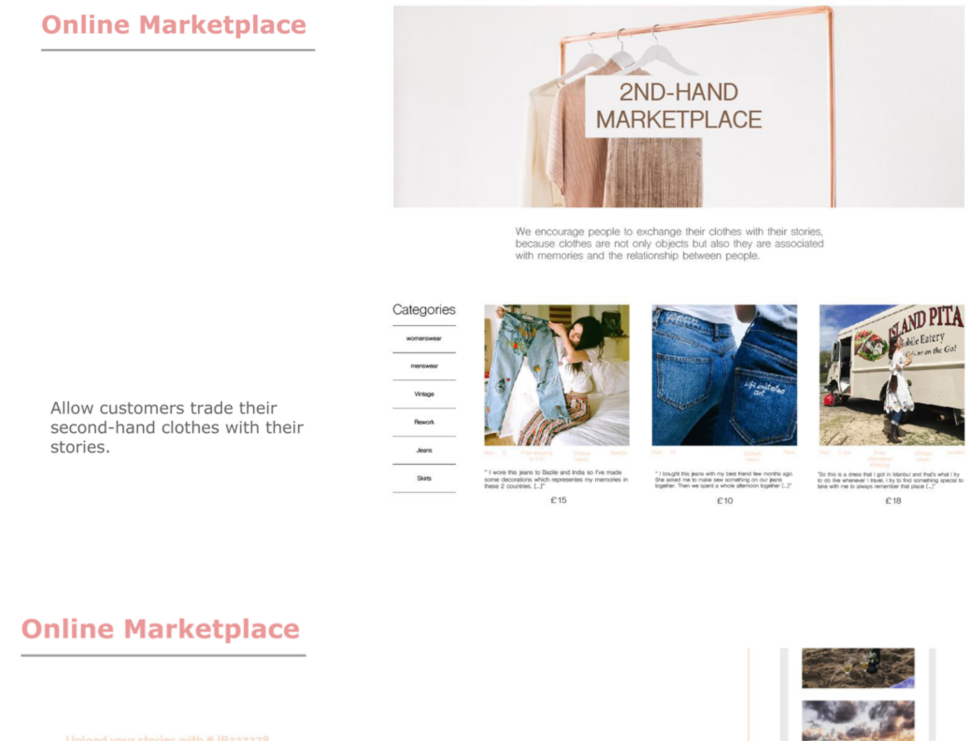


Figure 66. The concepts generated by Designer 1 through the Carative Factors Inspirational Cards. © Copyright 2017 Xian Chen. All Right Reserved.

Figure 67. Getting feedback on Toolkit use after the individual design study by Designer 1.

6.1.3.2. Design Study II

Reflect

The feedback was gained by telephone, as Designer 2 had relocated to South Korea. The original aim of his design project was to explore the problem of hibernating or accumulated pharmaceutical products at end of use, particularly inhalers left to accumulate in the home, either forgotten or kept 'just in case', even though they may be past their expiry date. Later he expanded the area to address responsible and decisive disposal behaviour for accumulated pharmaceutical products in general.

Two core ideas were generated through the use of the Toolkit. Firstly, Designer 2 explored the idea of promoting responsible and decisive disposal behaviour in relation to accumulated unwanted inhalers. Prompted by the factors of 'giving a reminder' and 'providing a financial return', he created a series of inhaler packaging ideas (Figure 68, above). The design involves pharmaceutical packaging which comes with a free return paper bag; once the bag is returned the user gets a discount coupon for their next purchase from any pharmaceutical product from the shop, which encourages users to send back the unwanted products. According to Designer 2, the Toolkit was useful because it provided a primary guide for the direction of his design: "when you start the idea generation,

the potential design solutions can be broad"; the Toolkit, however, helped him to narrow down his perspective and allowed him to focus on a potential design solution. This indicates that the Toolkit potentially helped him to frame the problem, and as the design process continued a solution was derived. The user type guide was also useful for Designer 2, as it helped him to consider different contexts. According to Designer 2, he focused on two factors rather than exploring a range of factors, as they encouraged the most inspirational ideas and were easier to apply than other factors. He selected the 'give a reminder' factor to explore as many ideas as he could and then he moved on to the factor of 'provide a financial return' to generate more ideas. He then found distinctive ideas from each idea generated and merged them together. His own background knowledge was an important resource when building the ideas. Some of the interesting ideas generated through the Toolkit are as follows:

- The pharmacy keeps a record of the expiry dates for each medication and sends a reminder message to the patient to drop off the medicines that are past their expiry date at the pharmacy.
- Pharmaceutical bins are provided near grocery shops.
- An unwanted inhaler collecting service when the user orders products.

Secondly, he expanded his own design brief to address the problems of people's disposal behaviour in relation to accumulating pharmaceutical products. Encouraged by the carative factors of 'giving a reminder' and 'providing a financial return', the resulting concept was a smartphone application to manage pharmaceutical products, linked with unique scanning codes which are printed on the packaging. The app helps users manage their medicines, gives notice of expiry dates, provides information on how and where to dispose the pharmaceutical waste and its packaging and offers services to request a pharmaceutical waste disposal bag (Figure 68, below). Having explored ideas through two carative factors, Designer 2 decided to carry on exploring the same inspirational factors for another design brief.

Figure 68. The concepts generated by Designer 2 through the Carative Factors Inspirational Card. The packaging comes with a free paper bag to return the pharmaceutical products (above). An app to help to manage domestic medicines (below).
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According to Designer 2, "the Toolkit was useful during the previous project" because it provided an initial concept approach and a design

solution, and this led him to expand the design brief and generate another idea. Nevertheless, it can be observed that the Toolkit in fact acted as an inspirational tool for both projects, because the second project was produced while Designer 2 was exploring the ideas in the first project, where the idea was generated through the carative factors.

In this case, the carative factors were initially used as a guide for the idea generation process, which supported designers in exploring a specific design solution, rather than generating a large number of ideas. This potentially means that the Toolkit helps the designer to define the design direction promptly, by addressing relevant solutions. The main aim of the Toolkit remains to provide as much inspiration as possible, however, and this aim was accomplished when Designer 2 was generating ideas.

As Designer 2 attended the workshop prior to his individual design study, he had no difficulty in understanding the use of the Toolkit. However, Designer 2 gave feedback on the size, layout and the visual appearance of the Toolkit, saying that the illustrations require more explanation, and they should be bigger and have a more engaging design layout.

6.1.3.3. Design Study III

Reflect

The feedback from the Designer 3 was gained through telephone conversation, as she is located in South Korea. Designer 3 acquired the Toolkit after Workshop 4.0. Initially, the Toolkit was designed to tackle the issues of accumulated products at end of use that are thrown away in public spaces (Figure 69). Interestingly, Designer 3 wanted to apply the Toolkit for hibernating or accumulated products at end of use that are located in a public setting, however. The Toolkit was sent to the designer via email in a digital format; Designer 3 said that such a format was directly applicable during the design study.

According to Designer 3, ‘providing re-creation opportunities for other users’ was the most influential factor, followed by the factors of ‘supporting a good cause’ and ‘ease of disassembly’. Starting by exploring as many as she could through the factor of ‘providing re-creation opportunities for other users’, a few of the ideas

were chosen for further development. Interesting ideas explored by Designer 3 include:

- A community service to collect unwanted washbasins to create other useful products.
- An easy disassembly structure so they can be given away to different places to be reused.
- An easy disassembly structure so they can be returned to the manufacturer.
-

According to Designer 3, two of the other factors had less influence, and instead they were used for reference. This was because the core inspirational factor already embraces the meaning of doing something good for other users. Also, in order to create re-creation opportunities for other users, the object needs to be disassembled easily, which means 'ease of disassembly' is also included in the 're-creation' factor.

The main design idea devised by Designer 3 was to cut the washbasin into a smaller size and modify the existing structure into a more friendly shape, to be relocated in a children's outdoor play area (Figure 70).

According to Designer 3, the Toolkit broadened her perspective, enabling her to address new design ideas during the idea generation process and focus on possible design solutions. She usually relies on online resources at the early stages of the design process when addressing the design brief and exploring ideas. Sometimes she spends lots of time on research for an appropriate design solution when working on a real-life industrial project, but ends up not gaining much useful information. In particular, when the design brief deals with sustainability issues, she requires a significant amount of time to digest the information. In this respect, Designer 3 stated that the Toolkit helped her to engage in idea generation promptly without too much worry. This indicates that the Toolkit has the potential to be applied directly during the idea generation session.

Figure 69. A photo taken by Designer 3 of the washbasin at end of use located in a recycling centre. © Copyright 2017 Yerin Bhek. All Right Reserved.

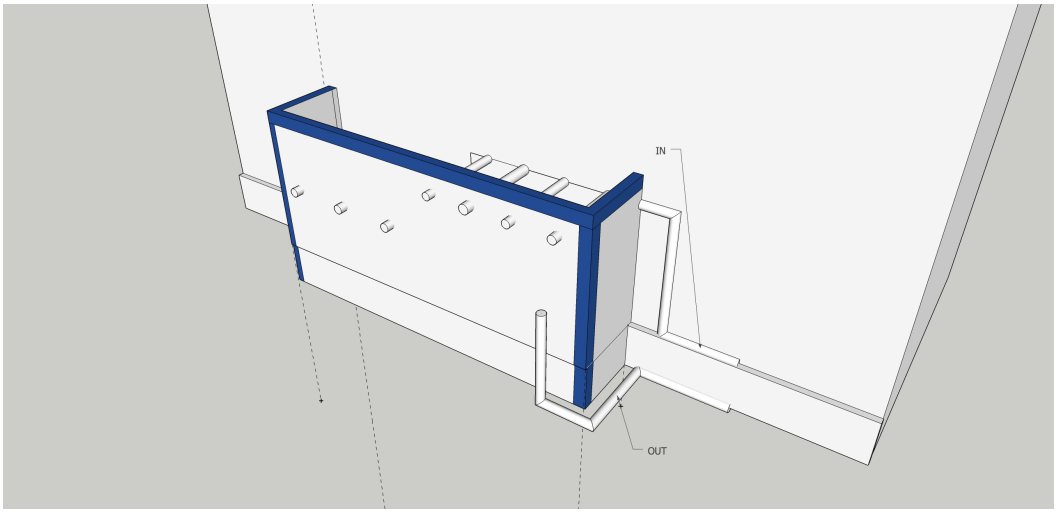

Figure 70. The concept in progress generated by Designer 3 through the Carative Factors Inspirational Cards. © Copyright 2017 Yerin Bhek. All Right Reserved.

Furthermore, she stated: “If I had time I could explore more ideas”, which potentially means that the Toolkit did provide more design opportunities and was used as inspirational material. Another interesting finding was that the Toolkit

was originally designed with the aim of changing user disposal behaviour within the domestic environment. However, this design study showed that the carative factors have the potential to be applied for behaviour change within a public setting in the context of industry or the public sector. However, applying the Toolkit in design for the disposal of unwanted public structures requires further research, because the ownership of the object does not function in the same way as in the domestic environment.

According to Designer 3, some of the illustrations on the card were unclear in meaning. The illustrations tended to describe an abstract situation, and it was not easy to link them to a real design solution. For her, the inspirational questions and the written comments were more useful. The feedback from the designers and their insight from using the Toolkit allowed reflection on the viability and acceptability of the Toolkit, which was fed back into the development of the following version of the Toolkit, Version 5.0.

Summary

- The Toolkit has the potential to be used as a primary guide, but also as a reference or inspirational source.
- The Toolkit has the potential to help designers to build upon their existing knowledge.
- The Toolkit provides designers with an opportunity to create a new design brief by going through the design process.
- Different ideas can emerge from different carative factors; however, they can merge together to create a one solid idea.
- The digital form of the Toolkit is potentially applicable for individual design studies.

6.2. Insight from the Carative Factors Inspirational Toolkit Development

The design case studies revealed insights from individuals who had chosen to use the Toolkit in their own design projects and from groups of people who were asked to use the Toolkit in workshop sessions. Through participating designers' suggestions and criticism, improvements were made in each cycle, and this suggested future revision to the Toolkit. The workshops and the design studies showed that the participating designers made use of the Toolkit in a variety of ways. Most of the individual design studies used it as a guide for direct idea generation or inspirational material. Some groups produced one solid idea,

building on the ideas by using all the 'Five Motives of Caring' themes together, while other participants generated as many ideas as possible through one factor. Some of the participants actively engaged with drawing their ideas, and other groups explored ideas in writing. In some cases the Toolkit was used as a reference or checklist to analyse generated ideas.

6.2.1. How the Research Questions were Answered

This chapter started by reflecting on the considerations in developing the Toolkit, which allows designers to explore ideas around responsible and decisive ways to dispose of hibernating or accumulated objects at end of use. The 'Five Motives of Caring' themes framework in which the caring factors were brought together, and the reflection of the sub-factors in use during the design process in respond to three different user types would answer RQ2. Each version of the Toolkit evolved through evaluation via participatory workshops and design studies, and aimed to answer RQ1. Consequently, a form of the Toolkit was developed which covered the barriers to sustainable disposal behaviour, classifying the particular factors in relation to particular caring themes.

The series of workshops and the design studies through the action research process of the *act* and *observe* stages described in this section addressed the first research question. The form in which the caring factors are gathered together answered part of this question, as the collection suggests a particular method for testing viability. The first version of the Toolkit was shaped by integrating concepts from the literature and interviews, and then external feedback was gained. Drawing on the feedback, the following version of the Toolkit was developed and evaluated through multiple cycles, from Versions 1.0 to 5.0.

The modification of the 'Four Motives of Caring' themes was made through testing in Workshop 1, then the 'Five Motives of Caring' themes became relevant to the design process to influence design thinking toward user detachment from hibernating or accumulated objects at end of use. In Workshop IV the usefulness of the carative factors was validated by conducting two different idea generation sessions. In Workshop V, the Toolkit was evaluated by giving the Toolkit to a group of designers to explore without the researcher's presence. Whether the carative factors 'inform the design processes' was addressed extensively in this chapter by the way the Toolkit was used for idea generation. Reflecting on

feedback from the workshops and the designers' own design studies also informed the answer.

Throughout the workshops and design studies in this research, it has become clear that the Carative Factors Inspirational Toolkit has the potential to be used in 'real' problems and design briefs set for industry and academia to generate caring concepts to influence users' relationship with hibernating or accumulated objects at end of use through the design process. Additionally, most of the ideas generated were aimed at returning the products to manufacturers, reuse or recycling, which require users' responsibility and decision-making, even though the specific target behaviours were not set. This process answered the first research question of whether the caring factors that were extracted can encourage more responsible, decisive disposal, which is the equivalent of 'peaceful letting go' in caring theory. This had implications for the subsequent development of the Toolkit and the designer's process of development in a specific challenging context, where designers' exploration of ideas to encourage users' more responsible, decisive disposal behaviour helped to address this question. Each stage reflected on insights from the evaluation process and implied the subsequent development of the Toolkit. Nonetheless, more than half of the workshop participants stated that they understand users' relationship with hibernating or accumulated objects at end of use and had an increased knowledge of carative factors to be applied to the design process to influence design thinking toward object detachment through the use of the Toolkit. To conclude, the carative factors can be applied to inform designers' thinking towards more responsible and decisive disposal of hibernating or accumulated objects at end of use. This indicates that RQ1 has been answered through the iterative process described in this chapter.

Three different types of relationship between users and hibernating or accumulated objects at end of use were categorized based on the emotional factors at play for users; this was intended to answer RQ2. The relationships they addressed include 'users having lingering regret', 'users having lingering responsibility' and 'users having lingering affection' with a diverse set of object types. The feedback from designers, direct insight from running the workshops and individual design studies enabled reflection on the value of the use of the Toolkit within three different relationships. The relationship in which 'users

having lingering affection' does not appear to be useful for applying carative factors to encourage a user-object detachment approach. However, two other relationships in which the distinctive emotional factors at play for users toward hibernating or accumulated objects at end of use had the potential to influence design thinking toward user detachment from those objects. Two relationships became the foundation for developing a design brief for each workshop.

The action research process of the *reflect* and *plan* stages described in this section addressed the second research question. In order to answer RQ2, three different user types were classified based on the gap between caring attitude and caring behavior. The carative factors that were applied during the idea generation process when exploring two different relationships were categorized according to each theme and user type. Then the carative factors that informed the decision-making process of different user types were validated through the iterative reflection process of getting feedback from the designers' use of these factors. Drawing on the feedback from the use of the previous version, the next version of the Toolkit was developed and evaluated through multiple cycles of use, from Versions 1.0 to 5.0. For 'Attentive users', all the themes were used when designers generated ideas. However, it was mainly the themes of *responsibility* and *commitment* that were applied when designers were exploring ideas for 'Cautious participants'. Other themes were also occasionally considered for 'Cautious participants'. For 'Careless consumers', it was mostly the theme of *commitment* that was considered during the designers' idea generation session. Through the *reflect* and *plan* stage, a decision was made to eliminate unnecessary factors and add newly discovered factors which had more potential to influence users' decision-making process. However, it was almost impossible to test every user type and all the relationships against each of the carative factors. Therefore, further experimental research is needed to identify which specific carative factors would inform different user types' decision-making processes.

6.3. Summary of the Chapter

Chapter 6 answers both Research Questions through the iterative development processes of the Toolkit. The motivations for, and barriers to, 'peaceful letting go' were discussed continuously in the workshop sessions until the data was saturated. Discovering additional relevant factors or discarding unnecessary factors in the

process aimed to address both RQ1 and RQ2. The question of whether the carative factors can inform the process of design to encourage more responsible, decisive disposal of hibernating or accumulated objects at end of use was answered through a process of evaluation of the Toolkit in use. Each version of the Toolkit covered the *plan* stage, reflecting on the previous cycle, then the *act*, *observe and reflect* stages were carried out, exploring the evaluation of the Toolkit in use. The insights from each stage of the evaluation were fed back into the development of subsequent versions of the Toolkit.

Chapter 7 | DISCUSSION

This chapter reflects on the usefulness of metaphor in understanding the translating of nursing practice to design for sustainable behaviour. It then reflects upon the ideas that the use of the Toolkit evokes, including the themes and implications of the circular economy. It includes the development of the Toolkit and reflection on the use of carative factors in design process, and further it compares this research to other work in the field of behaviour change that addresses similar problems in order to confirm the originality of this research. Finally, the limitations of the research are discussed, and further suggestions made.

7.1. Usefulness of Metaphor in Translating from Nursing Practice

The Carative Factors Inspirational Toolkit method proposes specific design approaches to encourage responsible and decisive disposal behaviour in users, and primarily involves principles translated from nursing practice.

Metaphors structure our perception and understanding and affect the way we organize our ideas (Gibbs, 2008; Lakoff and Johnson, 1980). At the early stage of the research, the process of thinking metaphorically in seeing 'object care' as 'human care' (Schön, 1979) allowed me to define the gap between these by comparing the meaning of care and its aims and processes in each context. In the literature of nursing practice, care behaviour is as much about 'maintain' and 'repair' as about 'peaceful letting go'. 'Object care', which is explored and translated through reflection on the values and meaning of 'human care' from the perspective of nursing practice, allows me to frame the opportunity that care practice allows to 'peacefully let go' within sustainable design. A metaphorical thinking process affects the way I perceive the world, categorize experience and organize thought (Casakin, 2007). Care practice in sustainable design research has been widely explored as a way to enhance the user-object relationship, rather than adopting a user-object detachment approach. In particular, care practices of 'peaceful letting go' resonate with sustainable behaviour and sustainable user need, thus the approach has potential implications for design for sustainable behaviour: however, it has been less investigated. Therefore, the use of metaphor

in understanding the translation of care behaviour from nursing practice to design is beneficial in providing an opportunity to find a gap in design which care practice can fill.

Applying metaphor to a design problem can help to structure the problem, increase designers' knowledge of a particular design situation and stimulate design creativity (Casakin, 2007). Insights from nursing care practice informed behaviour change strategies in relation to the requirement for 'peaceful letting go', which offers an approach which is in contrast to the focus of most other approaches involving care practice in design. Understanding and translating the applicable caring factors that enable peaceful letting go from nursing practice and allowing designers to explore carative factors that are shaped through a metaphorical analysis has had a positive effect on a number of the workshop participants. It has helped designers to understand the particular context of users facing difficult decisions about hibernating or accumulated objects at end of use, and provide a better understanding of users' relationship with these objects. The use of the Toolkit, which is a collection of carative factors translated from nursing practice to design through the use of metaphor, prompted designers' idea generation process. According to the Toolkit users, their knowledge of responsible and decisive disposal behaviour has increased, and the Toolkit has provided inspiration for processes to influence design thinking toward user detachment from hibernating or accumulated objects at end of use. Metaphorically translated data allowed designers to identify and explore the diverse concepts and define their goal.

This PhD does not claim that all the carative factors from nursing practice have been perfectly translated for each of the motivational factors within the user-object context, as this can be subjective, and not all the factors are adopted in the Toolkit. Using metaphor to translate an understanding from nursing practice to design could convey a different view of reality and represent particular ways of seeing (Gulari, 2015). However, there has been an attempt to maintain stability between the two contexts, human-human and human-object, by using a generative metaphor framework (Schön, 1979). In order to overcome the problem, by using a metaphor an attempt was made not to focus on replacing the relationship between the subject and the substance, but to illuminate the meaning of the subject's experience (Carpenter, 2008). However, the more valuable aspect of this research

is that it has provided potential opportunities for exploring the concept of the peaceful letting go of hibernating or accumulated objects at end of use during the early stages of the design process by applying metaphorically translated factors from nursing practice to influence design thinking towards a user detachment approach.

7.2. Implication for the Circular Economy

The majority of circular economy approaches focus on business and manufacturing contexts, and as a result they are making an effort to shift their manufacturing processes and other relevant strategies toward a circular economy. Equally, it is necessary to change user behaviour, as the circular economy requires a transformation from ownership to usership (Ellen MacArthur Foundation, 2013) to accommodate the need for shared responsibility among the stakeholders and the consumer, therefore enabling the return of products for reuse, remanufacturing and the collection of waste for recycling (Ghisellini et al., 2016). In order to successfully transition to the circular economy, designers are required to consider the result of hibernating or accumulated objects at end of use as part of the design process to promote users' ownership or their responsible and decisive disposal of products to prevent valuable resources being thrown away until the circular system is fully established. This research highlights designers' understanding of the user's relationship with hibernating or accumulated objects at end of use and their role in facilitating users' sustainable letting go through carative themes and factors within the circular economy.

The design outcomes contain the design knowledge that has been generated through the consideration of carative themes and their sub-factors, and they demonstrate carative concepts which were developed progressively, based on reflection on the Toolkit's use in workshop and design studies. Applying the theme of *affection* in the design process to influence design thinking towards the object detachment approach was not efficient. The aim of this motivational theme was to let designers explore the ways to enable the peaceful letting go of hibernating or accumulated objects at end of use that their owner has a high degree of lingering affection for. However, designers tend to find it difficult to apply and generate ideas by using this theme, so this theme is more appropriate for strengthening the attachment through design in order to maintain ownership

for a period of time. Otherwise, in many cases owners find a secure place where they can give away their objects that they still have a lingering affection for, so there is less chance they will be thrown away and the lifespan of the objects is extended. In many cases, the theme of *affection* is one of the most fundamental and strongest elements that motivate caring behaviour to reuse objects at end of use by many users, and it could enhance 'The power of circulating longer' (Ellen MacArthur Foundation, 2013) within the circular economy system.

When exploring *empathy, responsibility, commitment*, and *benevolence* in the design process, most of the ideas focused on how the service and system can be improved or a new structure found for products to promote responsible and decisive disposal, despite the fact that the target behaviour was not prescribed. The ideas evoked through the application of carative factors fell into four themes, including sharing objects between multiple users, sending them back to the manufacturer (or shop), appropriate sorting for recycling or removing hazardous material to be disposed of safely, mainly by providing the user with *responsibility* or *commitment* to objects or the environment. Materials and objects therefore participate in creating a closed-loop cycle, which overlaps with the objectives of the circular economy. Based on the feedback gained from the participants, the ideas generated contribute to the promotion of re-using end-of-life resources to prevent a loss of value and a negative effect within the materials chain (Ellen MacArthur Foundation, 2013). In other words, the design outputs that were generated, through the consideration of carative factors, focused on providing users with *empathy, responsibility, commitment*, and *benevolence* to enhance 'the power of circulating longer' and 'the power of pure cycles'; to increase the opportunities to drive clear-cut sources. Therefore, applying caring themes in the design process influences design thinking towards detachment from hibernating or accumulated objects at end of use, enabling the user's return of products for reuse or remanufacturing, as well as the collection of objects as waste for recycling (Ghisellini, Cialani, & Ulgiati 2016) in a zero-waste circular system (Stahel, 2010).

Some other attempts were made to incorporate carative factors from a product-service system (PSS). However, the Toolkit was initially designed to influence the user's relationship with hibernating or accumulated objects at end of use rather than to provide inspirational resources for an access-based system model:

therefore not all the PSS strategies were considered as carative factors. In particular, 'product-oriented services' and 'user-oriented service' system strategies were adapted as carative factors as the Toolkit evolved through the workshop sessions. Workshop II participants generated ideas around a contract-based selling scheme that lets users return cosmetic packaging to the manufacturer, utilizing users' responsibility and commitment to objects at end of use to encourage decisive and responsible disposal behaviour. Workshop IV participants explored ideas around a mobile phone rental scheme. The Toolkit prompted designers to consider a new service development, as well as a new product, which aims to shift companies' approach from designing physical products only to designing a system of products and services. It is an evident that the product-oriented service and user-oriented services system strategy has been considered when themes of *responsibility* and *commitment* have been applied to inform the design process to encourage more responsible and decisive disposal of hibernating or accumulated objects at end of use. However, exploring all levels of PSS, such as a 'result-oriented service' and factors to change users' disposal behaviour, would be a relevant approach for further work.

Nonetheless, most of the ideas evoked thorough the application of the Toolkit imply an increasing awareness of resource scarcity and a positive effect along the material chain through behavior change in users. Ideas explored, such as a mobile phone rental scheme, aim to increase in value over time by promoting 'usership'. The ideas generated demonstrate that carative factors enable consciousness in the user by prompting the qualities of *empathy, responsibility, commitment*, and *benevolence* in users to share an object with multiple users, return it to a service centre or manufacturer, or send it to be recycled as valuable material and for the object to participate in creating the closed-loop cycle to "enable materials to maintain their status as resources" (Braungart et al., 2006). Consequently, the use of the Toolkit in the design process offers the opportunity to enhance natural capital and considerable net material savings.

However, it is worth reflecting on the commercial perspective in terms of whether companies would be interested in taking back used products for remanufacturing or recycling or proceeding with PSS approaches. Generating ideas through the application of carative factors might be commercially beneficial to companies as it is a way of increasing their market share, and offers the chance to increase the

size of their loyal customer base. Additionally, considering the efficiency of resources in the circular economy, there is a benefit in terms of a reduction in material cost when a company takes back used products. The online reward scheme idea generated by Participant 27 is a good example. This idea involves the user receiving points once they have returned a used phone; the user then redeems the points when purchasing another phone. The manufacturer reuses the collected item or reproduce the material for another purpose. Furthermore, exploring ideas through the application of carative factors might provide an opportunity to increase the benefits once the company retains the ownership of products and consumers only pay for services. This will reduce competition from other companies and increase the chances of customers returning to the same company. Participant 24 generated the idea of a mobile phone subscription service is a good example. Users subscribe to a phone and recycling service, and when the phone is no longer wanted they can return it to the recycling platform, where a service to delete personal data is provided. Finally, the ideas created through the application of carative factors will contribute to creating a new local business opportunity for renting, leasing or upcycling. Participant 29 generated the idea of creating a marketplace where a third party deals with selling and buying the used phones and the material. Group 2 generated an idea for setting up a pop-up shop that takes used products and provides an upcycling service. Consequently, carative factors have the potential to contribute to generating business and economic opportunities, but also environmental benefits. However, ideas generated and developed using the Toolkit may face a number of challenges in this transition stage. For example, the quality of unwanted items will become lower during the collection process and there is less demand for reused or remanufactured products. Energy and water consumption need to be considered when measuring the net environmental benefit, which depends on the quality of the shared products and the potential increase in the transportation of goods. Besides, endlessly recycling material is costly (Andersen, 2007) and difficult to achieve. Furthermore, a business might experience profit risk when a consumer who had previously bought a new item from the company switches to a lower-cost manufactured product from the same company, or sharing might increase replacing behaviour (Demailly and Novel, 2014).

7.3. Reflection on the Toolkit Use in the Design Process

The aim of this research was to allow designers to understand the relationship between the user and hibernating or accumulated objects at end of use and produce inspirational material to explore the potential for adapting and applying nursing practice to promotion of the object detachment approach. The carative factors were collected together in the form of a Toolkit that aimed to provoke inspiration and find diverse ways to approach a solution, helping designers' idea generation processes. The iterative action research development process for the Toolkit intended to explore the viability and practicability of applying carative factors to the design process via action research *plan-act-observe-reflect* cycles. Each stage of the Toolkit development plan was driven mainly by insights gained from running a series of workshops and observing how the Toolkit was used in the individual design studies. The evaluations were based on insight from feedback by the workshop participants who used the Toolkit and designers who explored the Toolkit for their individual projects, which then provided valuable directions for the next version of the Toolkit.

Throughout the evolution of the workshop process, the final Toolkit was suggested as a collection of loosely categorised carative factors within the 'Five Motives of Caring' themes, which include ways of influencing users' relationship with hibernating or accumulated objects at end of use. The workshop results and studies of designers described in Chapter 5 suggest that the Toolkit enables designers to link the problems and the solution within the idea generation process and influence their design thinking towards user detachment from hibernation or accumulated objects at end of use. In summary, the Toolkit has the potential to be developed further, with the Toolkit users' responses enabling it to provide a wider range of inspirational resources.

As Casakin (2007) confirmed, "it is the early stage of the design process when fuzzy metaphors aid reflection about the essence of the situation". Integrating the carative factors at an early stage of the design process has more effect on influencing behaviour change, and for considering the whole cycle of product use, including the after-use phase. This allows designers to apply influential factors to current design problems to reach target behaviour. Therefore it is suggested that the Carative Factors Inspirational Toolkit should be presented and used for

generating ideas for different design strategies at an early stage of the design process.

Toolkit Use Requirements in the Design Process

The five different formats of workshop and three design studies with different groups of design industry participants and designers have helped to identify which aspect should be considered when using the Toolkit during the idea generation sessions. The Toolkit's usability was developed as part of the workshop sessions. For each workshop session I tried to provide different user types and developed the Toolkit features for idea generation by the designers. The different user-object relationships were adapted as design briefs. It was confirmed that involving different user types encouraged the participants to explore ideas from different perspectives, and providing different relationships to work on allows designers to frame the problems. Therefore, both aspects ought to be an important consideration when running an idea generation workshop at which the Toolkit is presented.

In addition, the Toolkit was designed with the aim of enabling both individual and group idea generation sessions to address the diverse set of design briefs that deal with the distinctive challenges of promoting user detachment from hibernating or accumulated objects at end of use through the application of carative factors. Taking the iteration of an action research process, the Toolkit provided opportunities for workshop participants to share the different perspectives and inspirations of other members, and build upon each other's ideas. The Toolkit has developed further, to ensure that it is appropriate for individual design studies. In this respect, the Toolkit has value in the design process for both individual and group idea generation sessions. Therefore, both group and individual formats ought to be an important consideration when using the Toolkit during the idea generation sessions.

Finally, the format of the Toolkit could be an important consideration when using it in the design process. Designers requested that the Toolkit should be an intuitive tool rather than too text-based, and be directly applicable. To incorporate this, the Carative Factors Inspirational Cards have illustrations and short quotations on one side; the other side has short texts with photos. The format of the Toolkit has been improved to adapt to different uses. Different formats have

been tried, including worksheets, cards (different sizes) and digital formats in order to identify the best formats to be used in different design environments. However, this was not addressed formally, as it was not the aim of this research. Besides, the different formats of the Toolkit were available at each stage of development, therefore the practicality and success of each format cannot be generalized.

The Role of the Toolkit in Design Process

The Toolkit's role in the design process is mostly to present appropriate knowledge in a certain form and promote designers' techniques with the help of expert insights (Lockton et al., 2010), in this sense, a group of carative factors which can be applied in a specific context have undoubtedly been seen to be beneficial to designers who wish to address design thinking towards user detachment from hibernating or accumulated objects at end of use and responsible and decisive disposal behavior. The Toolkit provides illustrated examples of each of the carative factors, with inspirational comments and questions that aim to inform designers' knowledge, allowing different ways of looking at the problems, as well as solutions, and encouraging them to explore ideas. However, it was difficult for designers to explore all the factors within the limited time allowed. In some cases they used it as a reference or a checklist, but some applied it directly to the design process as inspirational material.

In the group session, the Toolkit allowed the participants to review their experiences and provided the opportunity to take different approaches in the idea generation sessions by using the Toolkit. In the design study sessions, designers were encouraged to expand the potential of design approaches through the process of applying the Toolkit. In some cases, participants reported that the Toolkit was used in more than one way, or for a single purpose, in both the individual and group idea generation sessions. It should be noted that the personalities of the participants and their relationships with other members of the group would influence the generation of ideas, so it could be argued that the Toolkit might not have necessarily been effective or informative for some participants. Furthermore, some participants have more interest in the subject than others, so they considered the problems before joining the workshops, which then perhaps suggests that the Toolkit is more influential than it actually was.

Nonetheless, the feedback suggested that the concept of carative factors is inspirational and informative for the many designers who have applied it as part of their idea generation process to promote the decisive and responsible letting-go of objects. This role of the Toolkit in the design process can be generalised based on the development process through the series of workshop sessions.

However, not all designers may need a toolkit: the Toolkit has more potential for designers who wish to address responsible and decisive disposal behaviour within a short time, but do not have enough information. As the Carative Factors Inspirational Toolkit mainly focuses on the after-use cycle of objects, it could be suggested that it incorporates other toolkits that focus on use phases; however, this requires further research.

Scope of the Toolkit

The process of developing the workshop format and elaborating the carative factors resulted in expanding the scope of the Toolkit for the users' diverse contexts. The Carative Factors Inspirational Cards were originally a collection of inspirational material to be used at the idea generation stage to explore ways to influence design thinking towards users' detachment from hibernating or accumulated objects at end of use. As the research progressed, the Toolkit embraced carative factors to promote general sustainable disposal behaviour which does not involve the issue of users' possession. Furthermore, the 'forceful' design approach was included in the carative factors. This approach had previously been considered an unethical strategy because it limited user choice. However, supported by Lilley and Wilson's (2018) statement that the intention of the designer is a critical factor in determining whether the design strategy that is applied is an ethical approach or not when validating behaviour change strategies, the forceful design approach within the carative context has the potential to be an ethical approach. The intention of designers when applying a forceful design strategy in this context is to awaken user consciousness and help them to make better decisions about hibernating or accumulated objects at end of use for decisive and responsible disposal, to prevent object obsolescence but also to promote the flow of products and material to fits into a closed-loop cycle to recover and regenerate products and material at the end of life of each service (WRAP, 2015), based on the concept of an ethics of care. Therefore, the forceful

design approach within the carative context can be considered as an ethical approach which was then incorporated into carative factors, making it potentially applicable to designing for sustainable disposal behaviour. In this sense, ‘Careless consumers’ were adopted as target groups for idea generation session. ‘Careless consumers’ have a higher chance of being influenced by ‘forceful’ factors than other factors, which was proved in the pilot workshop and the discussion session. Therefore, 'Careless consumers’ have the potential to demonstrate responsible and decisive disposal behaviour through the application of carative factors.

Use of Carative Themes and factors

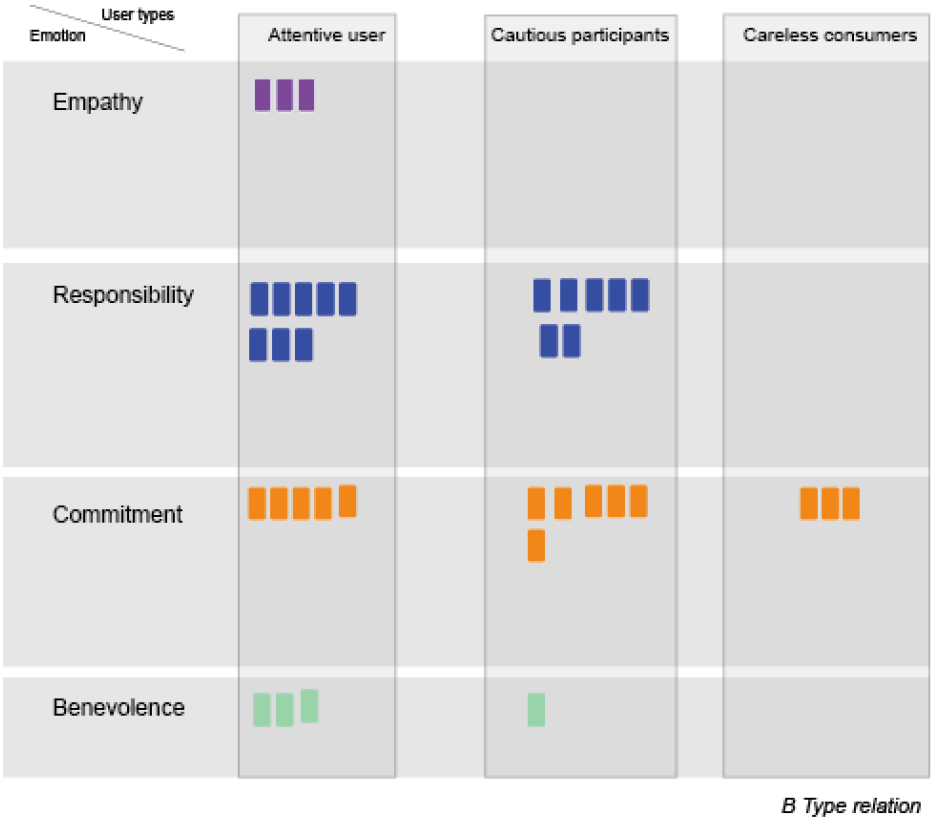

Figure 71. Carative factors in the Type B relationship that were applied during the pilot workshop, Workshop I, Workshop III and Design Study II. They are categorised according to caring theme and user type. For example, eight carative factors within the theme of *responsibility* were used for ‘Attentive users’ when designers explored ideas.

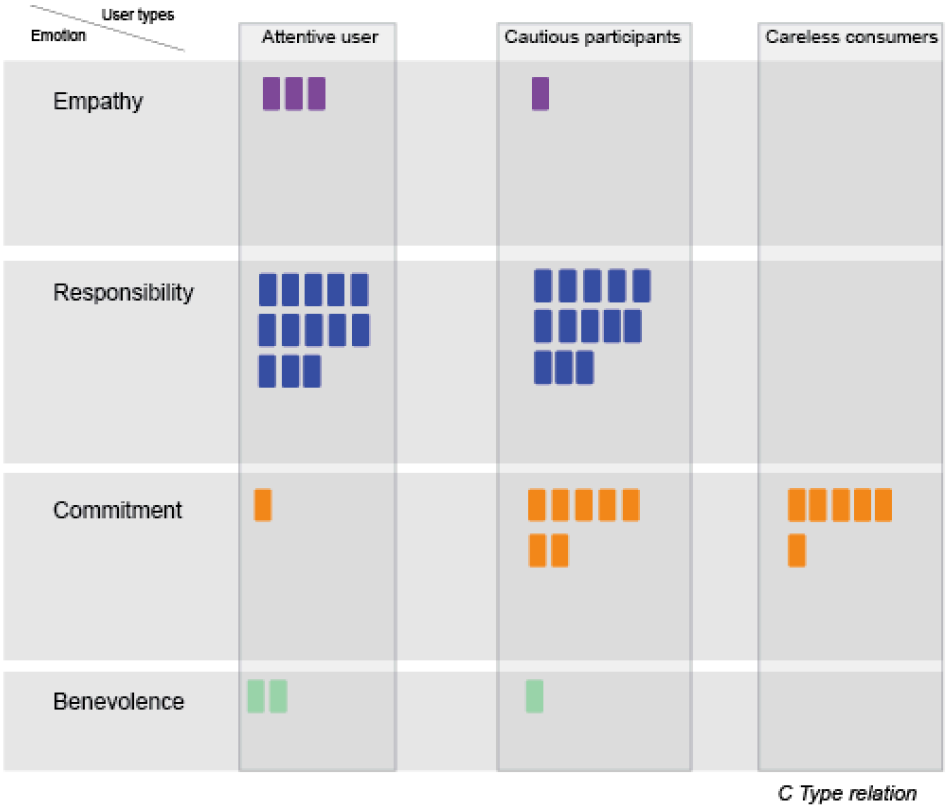

Figure 72. Carative factors in the Type C relationship that were applied during the pilot workshop, Workshop II, Design Study 1 and Design Study III. They are categorised according to caring theme and user type. Ten carative factors within the theme of *responsibility* were used for 'Cautious participants' when designers explored ideas.

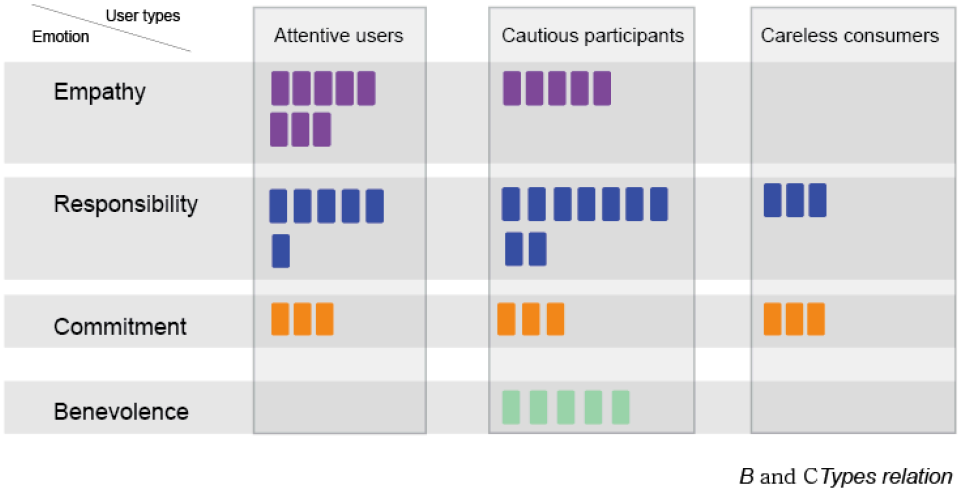

Figure 73. Carative factors in Type B and C relationships that were applied when considering both relations during Workshop IV. They are categorised according to caring theme and user type. Nine carative factors within the theme of *responsibility* were used for 'Cautious participants' when designers explored ideas

Having a range of themes in a design approach is common in design for behaviour change. Design with Intent (Lockton, 2013) proposes categorised design patterns, and shares similar considerations, and a similar behavioural understanding, of how to influence users; it is based on six lenses as a method for describing techniques for influencing behaviour. Principles of Design for Sustainable Behaviour also uses nine categories of distribution as a way to group design strategies. Likewise, the Carative Factors Inspirational approach uses five themes to categorise and frame similar factors based on the characteristics of each component. However, it is slightly different to other approaches, as it focuses entirely on addressing the user's motivation for caring. The Carative Factors Inspirational Toolkit is original because it is the only approach focusing on disposal behaviour change to make explicit use specifically of caring themes as a method for describing strategies for influencing design thinking toward user detachment from hibernating or accumulated objects at end of use. The thematic structure, with the specific motivational factors, provides a particular direction for designers.

It has become apparent that *responsibility* and *commitment* were the themes that were most applied during the research for both Type B and Type C relationships, as described in Figure 71 and 72. This was also observed when the carative factors were explored for the design brief dealing with Type B and Type C relationships simultaneously (Figure 73). For 'Attentive users', all the themes were widely explored. In particular, the theme of *empathy* and *benevolence* were explored more than with the two other groups. The ideas mainly involve encouraging empathic emotions in the user towards other potential users or providing the appropriate environment in which to elicit the emotional response of a "desire to do good" in users to deliver care action (Shaw et al., 2016), which enables users to pass on hibernating or accumulated objects at end of use to specific users. For this group of people, the gap between a caring attitude and user behaviour is narrower than in other two groups; therefore, solely applying emotional factors from the *empathy* theme or environmental factors from the *benevolence* theme have significant potential for promoting user detachment from hibernating or accumulated objects at end of use. However, two of the groups required other themes to be applied together with the *empathy* or *benevolence* theme to influence their decision-making process. Designers mostly explored the

themes of *responsibility* and *commitment* when they were dealing with 'cautious' participants. This group tends to be influenced by external factors such as 'being watched by peers'. This is because commitment arose from the shared belief that motivated the 'Cautious participants', who were easily influenced by other people's behaviour (Blustein, 1991; Davis et al., 2007). In many cases, *responsibility* and *commitment* were considered together, and this is because the forms of care are interconnected, and the commitment to a particular set of values entails a sense of responsibility (Shaw et al., 2016). The theme of *commitment* is mainly considered in relation to the 'careless' consumer. These are people who find it difficult to engage with caring behaviour, as they do not have much concern for, or interest in, environmental matters. For this group, a forceful design approach, such as penalizing them, or constraining their choice of design strategies, were used. Overall, *responsibility* and *commitment* are the themes that are considered most in influencing design thinking towards user detachment from hibernating or accumulated objects at end of use. In other words, design objects, services, or systems that provide user *responsibility* and *commitment* have the most impact on users' decision-making process, and encourage more responsible and decisive disposal of those objects.

However, it is difficult to confirm that they are the most useful themes to apply to each different user type according to different relationships, as designers may use particular themes which are more approachable and familiar to generate the ideas. Furthermore, in some cases the users had a multi-layered relationship with the hibernating or accumulated object at end of use that makes it difficult to define which of the caring themes and factors are most relevant in influencing which type of relationship, so this requires further exploration. It was also difficult to distinguish which of the themes have more influence for particular ideas when the themes were mixed. Nevertheless, the process of applying the caring themes in the design process showed how to integrate the themes during the design process and represents a way of building upon each theme as a strategy to suit design practices.

People's behaviour is also affected by a more conscious and considered understanding of our needs, desires and priorities (Dolan et al., 2009) and the situated context. Recognising these various influences is also crucial, given the complex environment in which people make decisions (Dolan et al., 2009). In this

respect, the Carative Factors Inspiration Toolkit uses a lens of care to influence people's behaviour. It takes a holistic approach in provoking caring motivation in the user (*affection, empathy, responsibility, commitment and benevolence*) when applied to the design process, which helps the process of decision-making by the user towards detachment from hibernating or accumulated objects at end of use in terms of prompting responsible and decisive disposal behaviour; they could also make a contribution to the field of design for sustainable behaviour.

7.4. Validation

Validity is about the "closeness of what we believe we are measuring to what we intended to measure (Roberts and Priest, 2006). Testing whether carative factors are specifically applicable, informative and inspirational is only possible in a real-life design context. This was the reason why the workshop was conducted with industry-based designers at the place where they usually held their idea generation workshops. Observing how they use the Toolkit via workshop processes could provide valuable insight into the evaluation of the Toolkit. Appropriate design professionals from a diverse range of design companies were recruited as workshop participants to fit the design briefs. It was confirmed by the participants that the design briefs were viable in that they attempted to address real-life problems. The workshop and design studies described in Chapter 5 demonstrate that the Toolkit is suitable for a wide range of design briefs, shown by the Toolkit being used on real design problems by participants consisting of practising industry-based designers, who generated a diverse set of concepts.

It could still be argued that this design process is an artificial setting, and does not reflect accurately how carative factors really work in an actual design practice. Indeed, in a company's real-life design process, the designers do not always follow the same procedures as were carried out in this research. In order to test whether the Toolkit is able to significantly inform the design process in real-world design contexts, the designers were provided with the Toolkit to use in their own ways to apply in their design projects, without the researcher's presence. This was partially incorporated into the 5.0 development version of the Toolkit. The Toolkit was made available for the workshop participants to use and they analysed their experiences of using the Toolkit afterwards. The designers who were working on their own design projects were also given the Toolkit to use, and

their feedback was gathered to form the foundation of the evaluations. However, this had still limitations, as the workshop facilitator was aware of the instructions for the use of the Toolkit and the majority of the designers who used it for their own projects were aware of how the Toolkit could be used, because they had attended the workshops.

One question that arises is 'how can I measure the effectiveness of each carative factor?' However, in the field of design for behaviour change, it is difficult to measure the effectiveness of each influential element. The results of the workshop method differed depending on the participants' personalities, the time they were allowed, and the nature of the setting.

It could be argued that the format of the workshops could be formalised by establishing a comparable control group and measuring the how the other groups generate ideas, subject to the change in each factor. However, there were many difficulties, and limitations appeared with this approach. This test method should be done with participants with similar levels of background knowledge of design and creativity. Whether the Toolkit informs the design process should then be evaluated either by measuring the range of ideas generated by the Toolkit users or by assessing whether the Toolkit users generate a higher quality of sustainable behaviour change concepts.

These processes were difficult to achieve, for three reasons. Firstly, classifying the workshop participants depending upon their level of creativity and allocating them to groups with similar profiles before running the workshop was not possible in the circumstances of this PhD, within the limited budget available and the number of participants contributing. Secondly, recruiting large numbers of workshop participants and comparing the number of ideas generated was not feasible for this scale of PhD. Finally, design experts' assessment of the quality of the concepts generated can be subjective. Therefore the Toolkit was used with participants from different design backgrounds in their individual approaches, and its effect was measured by the feedback they provided.

Another question that arises is 'does people's actual behaviour change through applying design ideas generated from using the Toolkit?'.It was difficult to address the actual behaviour change effect through design within the scope of this PhD. Judging from the design ideas which were developed from the use of the Toolkit, it could be argued that carative factors would not necessarily have any

actual influence on the users' behaviour change. However, the main aim of this research was to find out whether the Toolkit would provide a better understanding of the user's relationship with hibernating or accumulated objects at end of use and inform the designer about using the idea generation process to address user detachment from hibernating or accumulated objects at end of use. Moreover, testing the carative design model would have taken several months of measuring each of the design interventions' influence on behaviour, as all the concepts needed to be prototyped, and the test needed to include every type of controlled user, once the best concepts had been chosen from workshop participants. Producing carative design prototypes from the workshop ideas are beyond the scope of this PhD within the limited time available. Therefore it was a more sensible approach to develop and evaluate the carative factors in a collective form of the Toolkit, and test its viability in an idea generation process with industry collaboration.

7.5. Difference to Other Models

A range of research has been published in the field of design for sustainable behaviour change (See section 3.5). It is useful to acknowledge the distinctive characteristics of the Carative Factors Inspirational Toolkit to understand where this research fits.

7.5.1. Approach

In the field of design research for sustainable behaviour change, not all of the methods or frameworks produced are developed with designers. 'A spectrum of control' or 'power of distribution' (Lilley et al., 2005; Bhamra et al., 2011: Daae and Boks, 2011) are included in design strategies to make a contribution to the field of design for sustainable behaviour; these are mostly based on user research. However, the emphasis on the carative concept approach is different, as it involved Toolkit users during the development process. The Carative Factors Inspirational Toolkit was developed based on the result of the previous workshops and design studies and feedback from designers who applied it in the design process. It was developed and tested with potential users even when the tool was unfinished, which demonstrates a similar approach to Lockton's Design with Intent (Lockton, 2013). Therefore, the process of exploring the inspirational

carative factors that was made directly available in the idea generation process to design practitioners offered great practical value. Other approaches, such as the Behaviour Change Wizard (Fogg and Hreha, 2010), Principles of Design for Sustainable Behaviour (Daae and Boks, 2011) and Design with Intent (Lockton, 2013) were also designed to apply directly to use by designers. They are all at the stage of being continuously improved, based on the designers' use and their feedback.

Design with Intent, Principles of Design for Sustainable Behaviour and Circular Economy Design Tools were particularly developed to assist designers to explore a broader sense of behaviour change with a simple format. However, the Carative Factors Inspirational Toolkit specifically considers users' relationship with hibernating or accumulated objects at end of use and aims to influence design thinking towards user detachment from those objects for responsible and decisive disposal rather than the wider characteristics of behaviour change. Circular Economy Design Tools could facilitate the exploration of responsible disposal behaviour; however, they focus on building the participants' own narrative through the Toolkit, while the Carative Factors Inspirational Toolkit aims to provide inspiration and information and allow designers to create diverse concepts.

7.5.2. Incorporating other Existing Models

There are ways to incorporate existing approaches and propose other models. For example, Lidman and Renström (2011) proposed five classifications of design strategies to influence sustainable behaviour change, which is an integrated model of Bhamra et al.'s (2008) and Tang's (2010) seven strategies for behaviour change. Lockton (2013)'s Design with Intent approach integrates approaches from a range of literature on psychology and interaction design and behaviour change models.

In this study, the initial 'Five Motives of Caring' themes in the framework were borrowed from human care theory, which are the foundation of the Toolkit. The sub-factors within each theme are taken from nursing practice, and are integrated with behaviour change strategies and the interview data as design implications. The process of accessing the usefulness of each of the factors and eliminating unnecessary factors is valuable, as this process suggested a further model for

developing the Carative Factors Inspirational Toolkit. The results of the workshops and case studies suggested that carative factors are inspirational and informative, which confirms the advantage of this multidisciplinary approach.

7.5.3. Carative Factors

There are some aspects of the themes that resonate with the approach taken in MINDSPACE (Dolan et al.,2009) which was proposed to inspire policy-makers, and the Mindful Design approach (Niedderer, 2013). These both involve less reliance on emotional motivation as a relevant basis for behaviour change. In particular, MINDSPACE (Dolan et al., 2009) includes the commitment form of care, which is parallel to the *commitment* theme in the Carative Factors Inspirational Toolkit.

The Mindful Design model approach also seeks to provide internal motivational elements which enable conscious decision-making and commitment as an essential basis for attitude change, and subsequently for lasting behaviour change (Niedderer, 2013). However, although Mindful Design shares a similar aim to the *commitment* theme in the Carative Factors Inspirational Toolkit, the method is slightly different. Mindful Design provides an opportunity to question people's individual desire and lets users reflect on their own behaviour, while the Carative Factors Inspirational approach provides possible solutions to prompt caring motivation towards hibernating or accumulated objects at end of use and lets users deliver caring behaviour accordingly.

7.6. Ethics of Behaviour Change

How do you know that objects, services or systems designed through carative factors will result in care for the environment?

Carative factors have been created to generate responsible and decisive disposal by users toward hibernating or accumulated objects at end of use within the framework of the circular economy by receiving responses from the care-receivers or the places where they take care of the objects. The responses can be framed as financial return, emotionally rewarding experiences or other forms of reward or penalty. Providing meaningful responses between the two parties makes the caring relationship continuous and stronger, as the caring process embraces the care-giver's 'memory' but also expresses their 'expectation' of the

one cared for (Mayeroff, 1971). Mayeroff (1971) insisted that caring could extend through continuous practice, hence design through care practice will lead to continuous and strengthening care-giving behaviour by users towards objects. In other words, when designers are working on behaviour change through carative factors, they should aim to create a continuous feedback loop system between the care-giver and the care-receiver. In this sense, objects, services or systems designed through the application of carative factors enhance the continuous feedback loop system for users to continuously practice care, thus strengthening the user's care-giving behaviour. Through care practice, users discover the depth and value of the object that comes with responsibility and commitment. Consequently, carative design contributes to the prevention of the loss of precious resources but also to promote the flow of products and material to fit into the closed-loop cycle to recover and regenerate products and material at the end of life of each service (WRAP, 2015). Care action thus becomes meaningful to our ordinary lives, eventually contributing to environmental care. Indeed, design decisions have consequences for local and global contexts initially, but ultimately affect our society and our environment.

In addition, carative factors comprise a normative value, one of the most relevant elements to support users' decision-making on care-giving behaviour towards objects. A normative value relates to "the ideal of not inflicting harm, but it also includes a reasonably limited commitment to actively working for the preventing of harm" (Pettersen, 2011). Therefore the objects designed through the application of carative factors do not become obsolete, and provide a responsibility and commitment by users to actively prevent harm, ultimately maintaining the value of the object, which generates less harm for the environment: consequently the whole of society benefits.

Nevertheless, the question of whether design that emerges from the application of carative factors will result in care for the environment does not involve simple and straightforward answers. In particular, users' behaviour is affected by many other aspects of designed products, services or systems and external factors: carative factors are not the only influential ones. Therefore, the purpose of the carative concept design approach should be focused on the effect of carative factors, whether the resulting design leads to people behaving in a different way or not.

Designers should always consider ethical issues throughout the design process when seeking to influence behaviour (Lockton, 2018). This awareness has been present throughout this PhD when considering the impact of carative factors on users' behaviour. Although forceful design approach is more effective than an informative one particularly for the 'Careless consumers', it was not considered fully until Workshop IV, as this approach could limit user choice and therefore produce an unethical approach, which could potentially result in social problems (DeVries, 2006). Such approach makes users less aware of their behaviour: it has been observed as "a source of moral laziness or anti-democratic force in society which lets designers, rather than representatives of the people, steer our behaviour" (Verbeek, 2006). However, supported by Lilley and Wilson (2018)'s statement that designers' intention is a critical factor in determining whether or not applied design strategy is an ethical approach when validating behaviour change strategies, a Carative Factors Inspirational Toolkit approach implies the ethical consequence of care-giving behaviour; the target behaviour was also based on a circular economy framework, with users either reusing or returning items to manufacturers to guide normative actions. This may have reminded designers of their responsibility towards user behaviour outcomes when generating ideas. In this sense these approaches within the carative context have an ethical intention and consequence for behaviour, thus this strategy was considered to be an ethical approach and included in the carative factors. However, it is important to apply a balanced approach between controlling and encouraging sustainable behaviour change (Lilley & Willson, 2017).

It should be noted that users' behaviour is strongly influenced by their situated environment, as well as their personality. Design can support users, and help them to make decisions on behaviour change; however, design goals have a limit to their reach, as they are largely dependent on users' decision-making at any given moment.

7.7. Limitations and Recommendations for Further Research

This research aims to provide a designer with a better understanding of users' emotions toward hibernating or accumulated objects at end of use and suggests the carative factors that can be applied in the design process to influence design thinking towards user detachment from those objects, and accordingly started

with certain research questions. While the research questions were addressed, some issues that were uncovered during the research process emerged. These were not possible to address within the given time and scope, though some topics could be investigated further.

7.7.1. User Type Segmentation

Each user type is distinguished by the caring attitude and gap in their caring behaviour; they are then tested to find the appropriate design interventions. However, users' disposal behaviour is influenced by many other external factors, including their situated environment and how easy the target behaviour is for them. Therefore, measuring and analysing patterns of user behaviour should be carried out with larger-scale research.

- It was almost impossible to test every user type and all the object types against each of the factors and make a judgment about how users would act based on a carative factors through experimentation. In this PhD, I mainly involved two user types. Furthermore, rather than categorising the objects by type, this research was focused on users' relationships with hibernating or accumulated objects at end of use. It did not aim to define a set of rules governing which design themes and factors are most effective in influencing which types of user, although this raised questions as the research progressed. This suggested that further development from this PhD would be to test different types of users and different object relationships with each of the carative factors and suggest which carative factors might be most effective for specific users.
- The user types can be further segmented and grouped, particularly by the degree of engagement they have with disposal activity. Different people dispose of the same products in different ways within a specific environment. A similar group of users who would be likely to behave in similar ways can be clustered. This can be done via user research and ethnography in specific contexts, then by developing a set of 'disposal behaviour personas' for a particular context. This data will help designers gain more detail about barriers and motivations for sustainable disposal behaviour. The barriers can be categorised depending upon the different

user types in specific contexts. Then a more detailed user profile is created, which it is possible to apply during the design process when addressing different carative factors. By analysing how different types of users behave in response to design through carative factors in a specific environment, more detailed design strategies can be developed.

- Defining user types could help designers to understand user behaviour and shift assumptions of predetermined influential factors before applying the Carative Factors Inspirational Toolkit to idea generation. When designers use one particular user type for idea generation in the first part of the session, the generated ideas perhaps represent a specific user type. If the second user type is presented, the designer has a better chance of considering a different way of thinking about other user types, which could expand the designer's field of vision and the possibility of generating more creative ideas. Some kind of pattern might be observed when applying a particular user type to each carative factor; however, this requires further research for confirmation.

7.7.2. Relationship Type Segmentation

Different users act differently within different relationships with hibernating or accumulated objects at end of use. Understanding the type of relationship between different users and hibernating or accumulated objects at end of use helps to identify the specific behavioral motivation and barrier for each user type.

- The suggested further development of this PhD research is to create more detailed segmentation of the relationships between users and hibernating or accumulated objects at end of use, incorporating different user types. The relationship types could be further discovered by in-depth interviews with different types of users, identifying their emotion toward each type of object in a specific environment, then clustering them into similar groups of relationships that users would be likely to have with hibernating or accumulated objects at end of use according to their type. Once the user types and their related relationship are further segmented then different user attitudes toward each of the hibernating or accumulated objects at end of use can be analysed. This could help to further identify barriers and

design opportunities for each type of user in response to the different relationships, which it is then possible to apply to the design process.

It should be noted that there might some findings that overlap with user type segmentation, as both analyses aim to find out the motivations for, and the barriers to, sustainable disposal behaviour.

7.7.3 Further Development of Carative Factors Inspirational Toolkit

In Version 5.0, some carative factors were difficult to find applied in a real-life context, while some factors were applied in multiple contexts. For examples, there were many examples of concepts providing financial return to users in a real-life context, which aligns with the carative factor of 'Providing financial return'. Indeed, many concepts were generated from the 'Providing financial return' factor during the idea generation session.

- Providing multiple examples of the carative factors being applied in real life would potentially help designers when applying the factors to the design ideas.
- Including more case-specific design studies from academia and industry, observing their design processes and the resulting products, services or systems, and their impact on behaviour. This will help other Toolkit users to understand different background information in various contexts of the challenge of sustainable disposal behaviour, and would enhance the reliability of the Toolkit and support designers in broadening perspectives.
- Encouraging designers to consider user characteristics as a reflective and strategic approach during the idea generation process.
- The Toolkit requires a formal position in the design process in order to be used effectively. This can be identified by asking the case study participants where the Toolkit best fits into the design process and allowing them to confirm the role the Toolkit plays in their approach.

The workshop process and the descriptions on the cards resulted in an improvement in services or system-driven ideas, but not much diversity in the object-driven ideas.

- Allowing Toolkit users to add their own discovered factors could be another way to further develop the Toolkit.

There will be continuous improvement in the Carative Factors Inspirational Toolkit in order to make it more valuable for designers, in consideration of the potential that the Toolkit has to be adopted by industry-based designers.

- Not all of the carative factors are considered for the design process. Therefore, the remaining factors could be applied during the idea generation session by other design exercises, and they could be edited accordingly. This way the design practitioner will continuously suggest improvements in the Toolkit, and the Toolkit will continuously make a contribution to knowledge in design practice.

A Toolkit was developed to recommend particular themes to be applied for the particular character of users' relationship with hibernating or accumulated objects at end of use.

- Some participants from the workshop suggested a clear recommendation about when to use the particular themes for different user types. Providing some kind of pattern of which types of user disposal behaviour challenges are often approached through which caring motive themes can be useful. However, this requires much more concrete evidence about the success in practice of applying the carative factors in different user contexts, which requires a long-term project.
- Nevertheless, this may help to build strategies for different user types by suggesting the relevant themes to connect users' different motivations.

The viability and usability could be improved further. For a future version, texts could be modified and illustrations could be replaced by a range of examples of design ideas and processes.

- The Toolkit is available as an online resource to be downloaded by designers, so the feedback on how designers have used the digital format of the Toolkit will be valuable for further improvement. Offering a digital

application would allow access to an explanation of its use and a forum where designers could share the ideas generated and open up discussion.

- A final opportunity will be to make prototypes and test the concepts in a real-world setting, generated through this research. Providing evidence of the reuse of objects by multiple users or the return of the object to the manufacturer, service provider or for recycling would confirm that the carative factors influenced users' behaviour. Although many other factors influence and change users' behaviour, systematically analysing change in users' behaviour and identifying users' insights into the use of prototypes would confirm the effectiveness of the application of carative factors to the design process.

Chapter 8 | CONCLUSION

This chapter draws conclusions from each of the previous chapters. The research questions are then revisited, with the answers from the outcomes, to define the contribution to knowledge that is valuable for design researchers and designers in terms of both design practice and design research

8.1. Conclusion from each Chapter

This thesis has developed knowledge by integrating nursing practice theory, behaviour change strategies and interview data in a way which has helped designers create carative ideas for addressing the relationship between users and hibernating or accumulated objects at end of use and think about enabling user detachment from these objects.

- The introductory chapter outlined the background to users' relationship with hibernating or accumulated objects at end of use, the challenges in achieving responsible and decisive disposal behaviour and the impact on the environment. It pointed out that designers do not generally consider the end-of-use phase of objects during the design process. The opportunity to address this issue through design was identified.
- In Chapter 2, care practice was reviewed and categorised through the interviewing and observation method to identify a possible foundational design approach. The research questions were subsequently broadly framed.
- The literature review in Chapter 3 first examined the background of users' relationship with hibernating or accumulated objects at end of use and reviewed the range of approaches to influencing behaviour change in users. This involved an extensive review of the circular economy, product longevity, behaviour change strategies, emotion and behaviour change, and issues around object attachment and detachment. The literature review continued by exploring current design for sustainable behaviour toolkits and idea generation methods to confirm the need for a toolkit in the design process, particularly to address the hibernation period of objects and to understand the formats and requirements which would be useful in shaping the toolkit. An extensive review of the literature on nursing practice, care

practice in nursing and design for sustainable behaviour research was then carried out to identify the intersections and connections between these topics. Approaches in the literature on nursing practice were identified, and the way these engaged with user detachment from hibernating and accumulated objects at end of use was explained. Supported by Van Nes's (2010) view of product detachment, an opportunity was identified to provide a guide for designers which brings together insights into the motivations for users' care-giving behaviour through object detachment to apply in the design process. Subsequently, Chapters 2 and 3 led to setting the research questions. To sum up, the research in this PhD intended to focus on the development and evaluation of a design toolkit to facilitate care practice with the less emotional responses of responsibility and commitment in the design process to influence design thinking towards user detachment from hibernating or accumulated objects at end of use.

- Chapter 4 studied how design research methodologies and relevant theoretical perspectives, methodology and methods were applied in this research. This research has mainly considered constructionist, interpretivist, and action research methodology to develop and evaluate the Toolkit. The workshop is the main method adopted for this PhD to facilitate idea generation. The participants came from both academia and different design industry sectors to generate concepts in response to the design briefs. Design studies and interviews were also considered. The Toolkit was evaluated using qualitative methods through observation and by gathering feedback from the Toolkit users.
- Chapter 5 described how the carative factors and the design briefs were initially structured. The insights were derived from the literature review and the interviews. A collection of inspirational factors was initially categorised within the 'Four Motives of Caring' themes to inform designers and for use during the idea generation phase.

  Users' relationships with hibernating or accumulated objects at end of use were then analysed as a foundation for forming the design briefs. This illustrates the potential usefulness to designers of an understanding of users' relationships with hibernating or accumulated objects at end of use,

and of the obstacles involved in 'letting go'. This chapter addressed the initial requirement for the development of the Toolkit to answer RQ 2.

- Chapter 6 reported on the development and evaluation process of the Toolkit, by taking the *plan-act-observe-reflect* stages of the action research spiral, from Version 0.0 to Version 5.0 of the Toolkit. The participatory workshop method was used to examine the application of the Toolkit. This involved students from design departments, industry-based designers and design engineers, who applied the Toolkit to the different design briefs. In each stage of the idea generation session, exploring the use of the Toolkit and the carative factors with different design briefs attempted to answer Research Question 1. Reflecting on the insights from each of the exploratory stages of the toolkit, and the participants' feedback, including the implications for the future development of the workshop format, the next version of the Toolkit was developed.

  The content of the Toolkit and the workshop format evolved through the evaluation processes. The workshop described at the end of Chapter 6 represents a progression of the Toolkit to a form that has the potential to address sustainable disposal behaviour more generally. The Toolkit was validated by generating a diverse set of concepts and gaining feedback from participants. Observing the participants' generation of diverse sets of concepts for different user types through the Toolkit at the workshops in response to briefs involving disposal behavior challenges with a wide range of hibernating or accumulated objects at end of use, it is clear that the Toolkit provided a better understanding of the user's relationship with hibernating or accumulated objects at end of use. This research therefore provided an answerer to RQ 2. The use of carative factors in the design process influenced designers' thinking about encouraging user detachment from these objects for responsible and decisive disposal. The participants stated that the Toolkit provided inspiration during idea generation, while others confirmed that their perspectives broadened when finding the solutions. The iterative development and evaluation of the Toolkit processes described in Chapter 5 have continuously answered RQ1. Initially, it was not possible to incorporate all of the carative implications into the motivational factors. The carative factors that were mainly

considered included a relevant perspective that is translatable and applicable to the design process. It is perhaps never possible to achieve the complete set of carative factors, as some of the factors and themes overlap with each other, and the translations are subjective, which may create an uncertainty about navigating each factor towards the appropriate themes. The latest version of the Carative Factors Inspirational Toolkit, 5.0 offers a set of stimuli to provide inspiration for designers' creative idea generation and suggests ways of addressing the problem in the design process rather than providing a set of rules to apply specific forms of care for specific target users and behavior.

- Chapter 7 reflected on the usefulness of metaphor in translating and understanding caring factors from nursing practice to design. It then reflected upon the ideas that the Toolkit prompted, including the theme of integration into the circular economy. Next it reflected on the development and evaluation of the Toolkit, and discussed how the Toolkit can be used during the design process, concluding that the use of the Carative Factors Inspirational Toolkit is different from other behaviour change models; its originality lies in the way it metaphorically draws elements from nursing practice and human care theory, and it particularly focuses on carative motivational factors for the hibernation period of objects. Furthermore, insights were gained through the critical reflection on the use of carative factors in the design process. It was agreed that the Toolkit is potentially of benefit to designers who have little knowledge of the user's relationship with hibernating or accumulated objects at end of use, but who wish to consider design thinking towards a user detachment approach for sustainable disposal involving objects being reused, returned to the manufacturer or recycled at their end-of-use phase, as this provides a range of potential approaches. Above all, designers should consider the ethical issues when seeking to influence behavior change in users. Indeed, the ethical consequences of users' behavior were a key consideration when the Carative Factors Inspirational Toolkit was created, so the designer will be able to incorporate these ethics in the Toolkit directly in the idea generation process.

8.2. Contribution to Knowledge

This research provides progressive knowledge, through a diverse set of carative factors, for addressing the relationship between the user and hibernating or accumulated objects at end of use, and the challenge of the disposal of these objects. The response to the Research Questions has articulated the contribution to knowledge in design practice and design research.

8.2.1. A Better Understanding of Users' Relationship with Hibernating or Accumulated Objects at End of Use

This research was "carrying out empirical work that has not done before" (Phillips and Pugh, 2010, p.62) by categorizing users' relationships with hibernated or accumulated objects at end of use based on the user interview research, which helped to identify the obstacles to the responsible and decisive disposal of products and material in participating in and helping to create a closed-loop cycle, and the design opportunities therein. The definition of 'hibernation' was linked to the period of physical connection. This research investigated the relationship between the user and hibernating or accumulated objects at end of use by looking into their emotional relationship, then choosing pragmatic design approaches of evoking less emotional responses in the user in relation to *responsibility* and *commitment* to objects at end of use, to encourage more responsible and decisive disposal of those objects. The relationships were classified to answer RQ2 and adapted into design briefs to make a contribution to knowledge which aims to provide a better understanding of the different degrees of emotions in users toward hibernating or accumulated objects at end of use and address the potentially wasteful route for designers. The insight from the workshops demonstrates how designers adopted the design brief as part of the discussion, and it has advanced a better understanding by designers of relationships and design opportunities. Understanding the design opportunities helped the designers to tackle appropriate intervention through the use of the Toolkit.

The value of this research for designers is that it helps them to understand users' relationships with hibernating or accumulated objects at end of use, producing potential design opportunities using the application of carative factors to design processes. For academic researchers, the value is in the classification of different

degrees of emotion in users toward hibernating or accumulated objects at end of use, which helps them to better understand users' relationships with those objects, and to identify the factors that inform the decision-making process in users, which can facilitate future attempts to address responsible and decisive disposal. Its exploration of different types of relationship by applying and adapting carative factors to the design process through practice-led research methods is beneficial to the design researcher.

This research provides foundational research into how to integrate an awareness of the issue of hibernating or accumulated objects at end of use and the need for responsible and decisive disposal behaviour into the design process in a real-life design industry context. In the context of this research, I am proposing that the design process should consider the whole lifecycle of objects on a system level, particularly the phase when the object is at end of use, enabling the user to reuse certain objects, return them to the manufacturer or recycle them.

8.2.2. The Translation and Application of Carative Factors to the Design Process

This research involved "taking a particular technique and applying it in a new area" (Phillips and Pugh, 2010, p.62) through extracting, translating and integrating relevant factors from the literature of care, particularly nursing practice, to categorise the act of care from a 'peaceful letting go' perspective within the human-object context and apply it in the design process. Selected motivational factors have been adopted as a design toolkit format to be applied in the design process to influence design thinking towards user detachment from hibernating or accumulated objects at end of use.

In answering RQ1, an original contribution to knowledge is offered by "making a synthesis that hasn't been made before" (Phillips & Pugh, 2010, p.63) – I synthesized existing sustainable behaviour change strategies and incorporated carative factors translated from nursing practice which were then gathered and classified under a thematic arrangement of care theory. This work is original in its borrowing of carative factors from nursing practice to apply to the design process, the focus being on influencing design thinking toward user-object detachment; this approach does not appear to have been taken before.

Forms of care

Mugge, 2007	Chapman, 2005	Schifferstein et al., 2008	Desmet, 2012	Niedderer, 2013	Gwilt et al, 2015	Tromp et al, 2011	Lockton, 2013	Daae, 2014	Choi, et al., 2018
Affection	Affection	Affection	Affection						Affection
				Responsibility	Responsibility				Responsibility
				Commitment					Commitment
						Empathy	Empathy	Empathy	Empathy
									Benevolence

Figure 74. Forms of care described in Design for Sustainable Behaviour.

Previously, care practices in design for sustainable behaviour research have been described as forms of *affection, responsibility, commitment* and *empathy*, as indicated in Figure 74. However, translating acts of care from nursing practice helped me to expand the relevance of care practice to the field of design for sustainable behaviour change by including *benevolence* as a form of care. *Benevolence* as a form of care consists of emotional and environment factors which involve eliciting the emotional response of a "desire to do good, or a charitable feeling" in users and providing the appropriate environmental conditions that will facilitate this within the particular context or situation (Dilnot, 2017: Shaw et al., 2016). In this research, I synthesized the scattered existing knowledge of care practice in design for sustainable behaviour with *benevolence* as a form of care within the framework of 'Five Motives of Caring'. Figure 74 represents the forms of care which have been explored in earlier design for sustainable behavior research. It also positions this research in relation to these.

Further, there are two different frameworks to be considered when care practice is explored in the field of design for sustainable behaviour that addresses hibernating or accumulated objects at end of use and their participation in the closed-loop cycle. One is to increase emotional attachment in order to care for the objects (Mugge, 2007: Chapman, 2005), and the other is pragmatic, to provide responses that are less emotional - *responsibility* or *commitment* – to objects at end of use. However, Gwilt et al. (2015) explored *responsibility* as a form of care in their research, exploring a potential design approach that would make users responsible for taking care of objects for a longer period of time, the user therefore having a better engagement with the object and its life span increasing. In their research, *responsibility* as a form of care was explored to increase the level of emotional attachment. Meanwhile, Niedderer (2013) explored *responsibility* and *commitment* as a means to provide internal motivational elements, which enable conscious decision-making as an essential basis for attitude change and subsequently for lasting behaviour change. Neither form of care in Niedderer's (2013) research were positioned in a particular direction. On the other hand, this research takes a pragmatic approach by exploring the 'Five Motives of Caring' themes in the design process to influence design thinking towards user detachment from hibernating or accumulated objects at end of use. In this respect, the Carative Factors Inspirational Toolkit, which is based on five

thematic approaches to care, has made an original contribution towards the integration of care practices in design research.

An original contribution has been made to design research through an iterative process of development and testing of carative factors in the design process, within a new design framework of ‘Five Motives of Caring’. It has 'synthesized existing knowledge’ from behaviour strategies and nursing practice and ‘applied it in a new area’ (Phillips & Pugh, 2010, p.63). RQ1 has been answered by applying carative factors to inform the design process in order to influence design thinking towards the detachment by users from hibernating or accumulated objects at end of use. This involves categorizing directly applicable design factors to be used by designers, focusing on behavioural motivation. Most of the earlier examples of the integration of care practices to design have not offered a guide for designers to be applied directly to the design process. However, the Carative Factors Inspirational Toolkit is in the form of a set, or collection, for designers to use with (and without) the presence of an expert, helping to make the design process more inspirational and informed in order to influence design thinking towards users’ detachment from hibernating or accumulated objects at end of use. The participating designers were encouraged to apply carative factors to the design process in order to produce carative concept-based ideas. As the Toolkit was directly applied to the idea generation processes, it has had an effect on designers’ thinking. Overall, from observing the application of the Toolkit at the series of workshops and gathering feedback from the Toolkit users, it can be observed that the Toolkit has an effect on the process of idea generation by designers.

Three examples of evidence showed that this process has answered RQ1. First, a series of workshops and design studies have proved that the Toolkit is applicable to the design process, particularly in the idea generation sessions, when designers were tackling the issue of hibernating or accumulated objects at end of use. A variety of ideas were generated during the development and evaluation process in response to diverse design briefs, which aimed to promote the responsible and decisive disposal of hibernating or accumulated objects at end of use. Secondly, the Toolkit has been applied to a range of design briefs that deal with different types of user relationship with hibernating or accumulated objects at end of use, and the problematic results of this, to generate ideas which have proved that the

Toolkit is applicable as part of the design process. In addition, the design briefs have been largely focused on the circular economy to promote the reuse of objects, returning them to the manufacturer or disposing of them at an appropriate place for environmental benefit, which encourages a corresponding consequence of the behaviour outlined in RQ1. The ideas generated in each workshop were intended to encourage users to be more responsible and decisively dispose of hibernating or accumulated objects at end of use. Therefore, the ideas generated through the application of carative factors to a diverse set of briefs offer evidence that the Toolkit influenced designers' thinking towards user detachment from hibernating or accumulated objects at end of use. Finally, based on feedback from designers, the Toolkit was found to be helpful to them. Some of the participants said they were likely to use it again, and requested the Toolkit to use for their own design projects. Many of the participants said that the Toolkit provided inspiration during idea generation and it helped them to build ideas on existing knowledge. Although the Toolkit requires improvement, it has been demonstrated that it is informative for designers and valuable material to use in the design process when addressing the range of hibernating or accumulated objects at end of use. In fact, the scope of the application of the Toolkit in the user context has been expanded and become diverse. Designer 3 applied the Toolkit in the idea generation process to tackle the problem of hibernating or accumulated objects at end of use in a public space to promote manufacturers' approach to reuse, which may have benefits. Consequently, the Toolkit has become potentially applicable in addressing problematic disposal behaviour in domestic and public space more generally. Overall, the results of the workshops and design studies suggested that carative factors are inspirational and applicable to the design process for influencing design thinking towards user detachment from hibernating or accumulated objects at end of use, which confirms the advantage of this multidisciplinary approach. Therefore the cycle of understanding, applying the development and evaluation of carative factors to each design process to influence design thinking towards user detachment from hibernating and accumulated objects at end of use through action research, provides an original contribution to design research.

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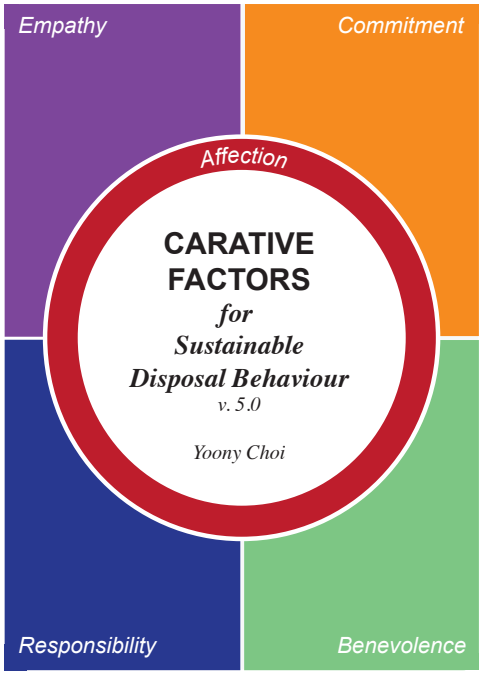
Zaring O. ed. 2001. *Creating Eco-Efficient Producer Services*, report of an EU project. Gothenburg: Gothenburg Research Institute.

Appendix 1 | CARATIVE FACTORS INSPRATIONAL TOOLKIT



There will be continuous improvement in the Carative Factors Inspirational Toolkit in order to make it more valuable for designers. I would like a lot more evidence for which carative factors work for promoting sustainable disposal behaviour.

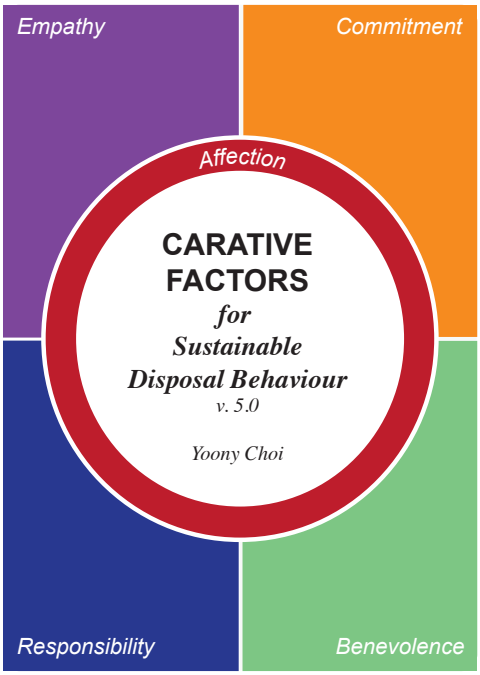
Please contribute to the development of the Toolkit in three ways:

1. Provide examples of the carative factors being applied in real life.

2. Provide examples of the carative factors being applied to your own project. Then the Toolkit will include more examples and references.

3. Provide your insight about the provided examples on yoonychoi.com. This will lead to further discussion and expand the carative factors.

Your submission will feature in the
Carative Factors Inspiration Toolkit online version.
Contact: yoonjung.choi@network.rca.ac.uk



About these cards:

These cards are designed for designers to explore ideas through inspirational questions. The toolkit is to help designers trigger wider viewpoints within the idea generation process in order to enable different ways to approach design challenges and drive creative solutions for letting go of objects with lingering emotions, disposing of objects responsibly, or extending product lifespans.

Three different users types are included to help designers' idea development processes.

About carative factors[1]:

The word 'carative' in caring science defines it as "love and charity" and the motive for all caring. The caring process aims to sustain and maintain (or enhance) a subject's condition, or, where this is not possible, to reduce the pain and distress of the inevitable to let go peacefully. Carative factors are seen as caregiver and care-receiver interactions and relationships that can be employed to enhance the experience of the actual caring occasion. They aim to define the caring process that may help a

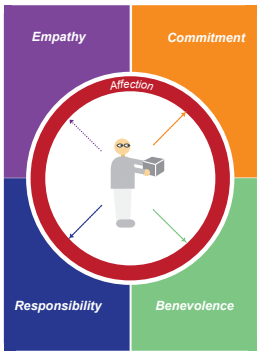
1. Watson, J. 2008. Nursing: the philosophy and science of caring. revised edition. Boulder:

care-receiver maintain life but also die a peaceful death.

The opportunity to create caring emotional engagement for the possibility of letting go peacefully is valuable in promoting caregiving behaviour. The caring process could influence a user's view on an object's value at the end-of-use stage, and aim to encourage users to preserve the value of the current product condition for other positive opportunities. Therefore, the carative philosophy of 'letting go peacefully' could promote sustainable behaviour.

About four themes :

The forms of care[2], namely affection, responsibility, commitment, benevolence, and empathy have potential to promote caring action of peaceful letting go.



2. Blustein, J. 1991. Care and commitment: Taking the personal point of view. New York: Oxford

The theme of ***affection*** is located in the centre of the framework, as all of four emotions are driven by affection. Then the cards are organised into four themes of inspirational factors, namely ***responsibility, commitment, benevolence*** and ***empathy*** and that might apply to generate concepts for objects and the environment.
Thirty-seven influential factors are categorised under four themes. Each card consists of an illustration describing the situation, photography showing examples, and provocative questions for designers to stimulate the design process. They are colour-coded with different motives and provide inspirational comments from users and care literature.

How to use these cards:

1. Define the disposal challenge.

- How do users treat the end-of-use phase of a product ?
- What makes it difficult for users to let go of a product responsibly when it reaches end-of-use phase?
- What makes users throw away unneeded products?
- How should the product be best disposed of?

2. Go through each emotion and question. Think about quick answers to the questions.

3. Go through the three user types. Think about quick solutions for each user type by going through each factor.

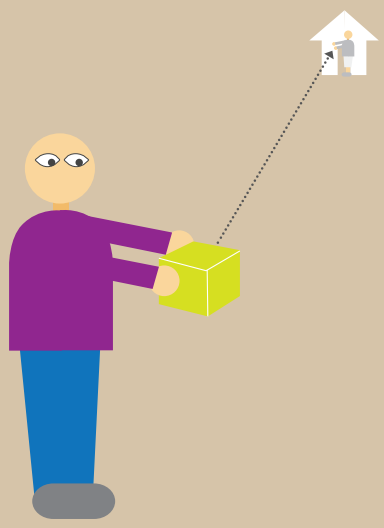
OR

4. Pull out the cards that are relevant, go through each theme and factors for different types of users. Explore ideas.

4. Pull out ONE card and one user type that are relevant. Explore ideas.

*Please work individually or as a team.

Attentive User



About the user: Attentive User

"I do as much as I can to help with environmental problems."

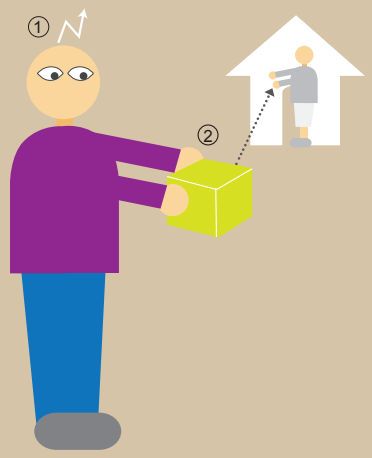
"I find new users when I have finished with my possessions."

"I actively look for opportunities to pass products to other users rather than waiting for opportunities to occur."

"I think about what I should do with products I don't really need."

"I know what I want."

Cautious Participant



About the user:
Cautious Participant

"I try to help the environment. I do a few things but would like to do more as long as I see others are too."

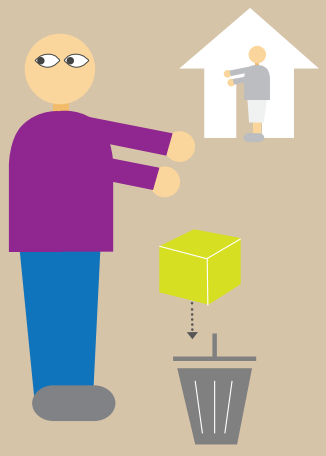
"I sometimes forget to recycle or to donate to charity shops, but I would like to do a bit more."

"I don't want to spend too much time and effort."

"Too many choices could put me off."

"I don't like change."

Careless Consumer



About the user:
Careless Consumer

"I don't care about environmental issues. I am just living life the way I want to."

"I bin products when I am finished with them."

" I don't investigate further action when I am done with objects."

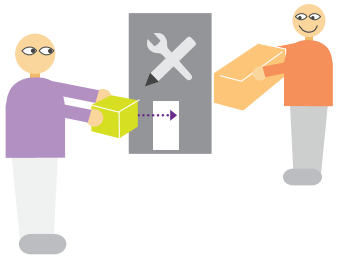
CARATIVE FACTORS for *Sustainable Disposal Behaviour*

Empathy

Empathy

When users have empathic emotion towards the receivers (or objects), then users tend to dispose of objects responsibly or to sustain and extend objects lifespan.

Provide Opportunities For Other Users To Re-design The Object



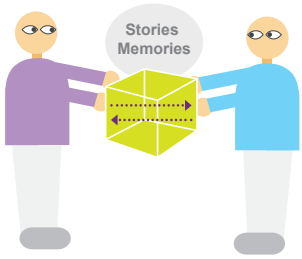
"I'm sure someone would accept this object and appreciate receiving it."

Groundwork provides collection services for unneeded objects and lets other users pick them up or create new objects to take home.

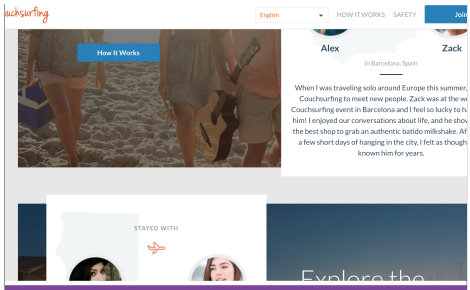
Can you provide services for new users to collect unneeded objects and help them to create something new?

Empathy

Let Users Share Stories



"I want other people to know how much I enjoyed using this object."

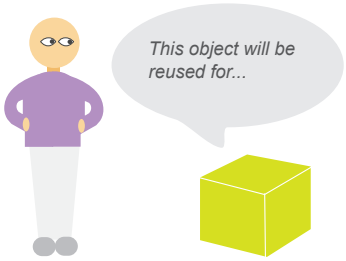


Couchsurfing is an online platform where people offer their surplus space to travellers. The travellers are then able to share their experiences on the platform.

Can you let users share stories about their experiences of end-of-use objects?

Empathy

Inform Users Future Uses



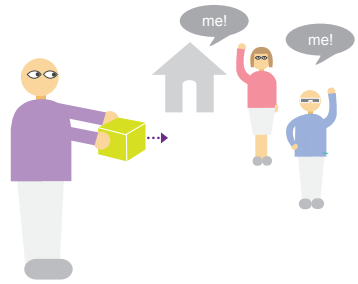
"..have opprtunities to talk about another life.."

Gumdrop informs the user about the future use of a collected end-of-use chewing gum.

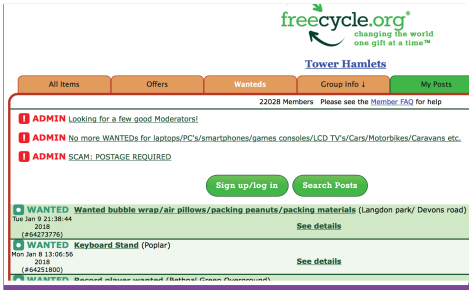
Can you inform the users about the future uses of end-of-use objects?

Empathy

Let Users Know Receivers' Needs



"If I know who needs the objects then I would be happy to give them away."

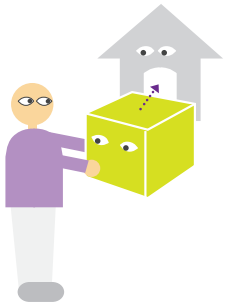


Users can search for people looking for objects on Freecycle's online platform.

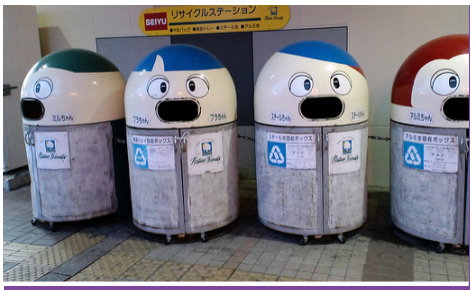
Can you provide information about who really needs the objects?

Empathy

Apply Anthropomorphic Features



"If the object had human characteristics, I would treat it differently."

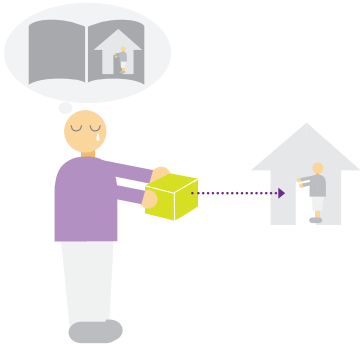


Anthropomorphic features on these bins help users to consider their disposal behaviour.

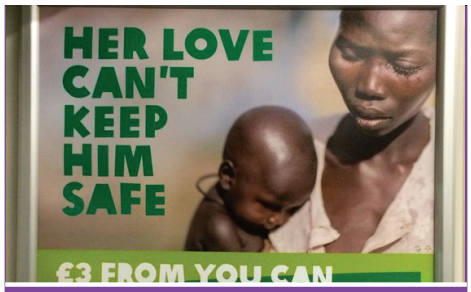
Can you apply anthropomorphic features to an object or a place where users dispose of objects, to encourage users to pass the object to the right place when it reaches end-of-use phase?

Empathy

Provide A Sympathetic Story



"I get persuaded by listening to a sympathetic story. "

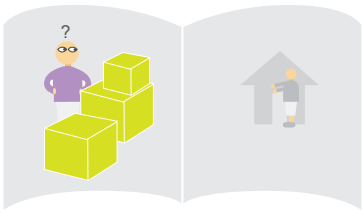


Seeing sympathetic images and reading sympathetic stories motivates users to let go of their possession.

Can you appeal to users with sympathetic stories about the people who might receive the object, to persuade users to pass the end-of-use object on?

Empathy

Create An Engaging Story



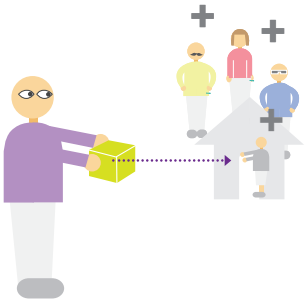
"Listening to a story about the object is interesting and engaging..the object then means more to me"

Story of stuff is an animated documentary raising people's awareness by sharing the story of a life cycle for material goods.

Can you tell stories through the design, which keep users engaged and make them realize 'letting the end-of-use object go' to the right place is the best solution?

Empathy

Let Users Know Objects Are Going To Good Causes



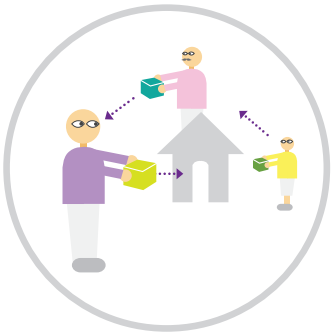
"I want someone to benefit from this object and for the object to be used more. If that's the case, then I am happy to give it away."

Public sharing fridges offer opportunities for users to recognize other users' needs and share their unneeded food.

Can you let users know that end-of-use objects are going to good causes, and about the people who will benefit from the objects?

Empathy

Create A Community Circulating System

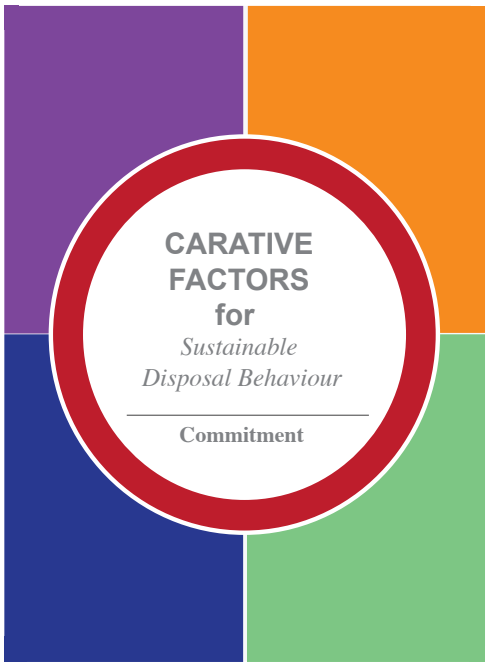


"I would be very happy if someone in my community has it."

BookMooch is a community-based platform where users can swap end-of-use books.

Can you help users pass their end-of-use objects to someone in their community?

Empathy



Commitment

When users have a sense of obligation and they are committed to certain activities for the purpose of environmental concern, they tend to dispose of objects responsibly or to sustain and extend their lifespan.

Inform Users' Role

- Your role is...
- As a user you should..

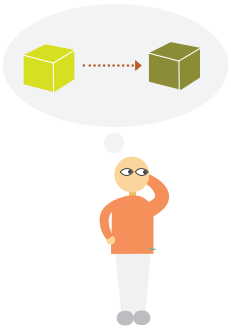
"... aware of position of their role."

This card is looking for examples.

Can you inform users about their roles as a responsible citizen, their responsibility for a product's lifespan and their obligation to dispose of product sustainably?

Commitment

Let Users Recognise That Objects Are Reaching Its End-of-use Phase



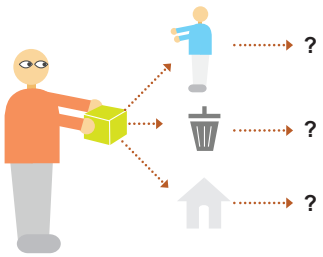
"Knowing the patients' current healthcare situations that they are getting close to end-of-life."

This app helps users recognize the objects' expiry date and remind them to take actions.

Can you make users aware that an object is reaching its end-of-use phase and suggest responsible ways of disposing of it?

Commitment

Inform Users About The Impact And Result Of Their Behaviour



"predicting what will happen in the future."

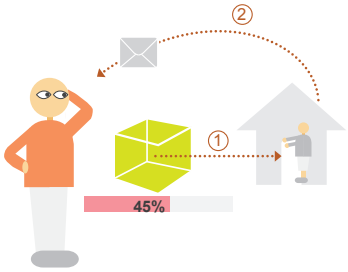
Throw this cup in the litter bin, otherwise it will still be here 6 months from now...

Providing information about the consequences of users' behaviour helps to reduce the amount of unwanted coffee cups being thrown away.

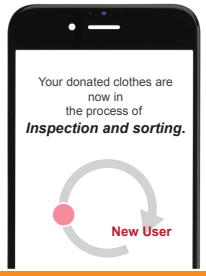
Can you provide users with information about the impacts of their different actions, to avoid throwaway behaviour?

Commitment

Provide Updates On Disposed-of Objects



"I want to know where my object is and what has happened to my object after leaving me."

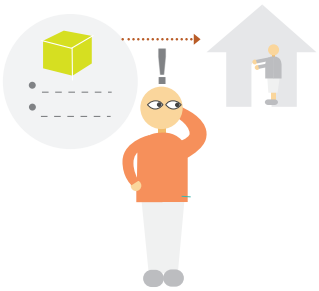


This app helps users to make sure their disposed-of objects are delivered to the specific place for the right users and are well treated.

Can you let users know what has been happened to the object passed on?

Commitment

Remind Users About The Existence Of Objects



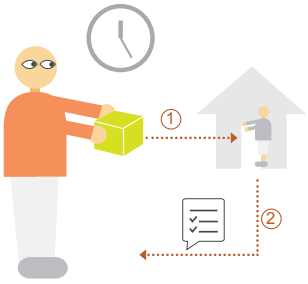
"I forgot that this object is in my house. It would help me to be reminded."

This app helps users manage food in the fridge as it is linked to the fridge system. It notifies users about the existence of objects, expiry dates and suggests further actions.

Can you remind users about the existence of objects, their usefulness, and suggest what action they should take accordingly?

Commitment

Create A Contract For A Specified Period Of Time And Give Feedback



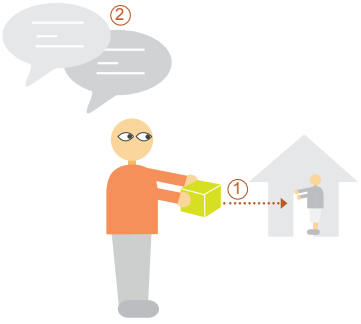
"Create a contract for a specified period of time to comply with the requirement set up and let the partners support. Provide feedback or reward when the contract has been successful."

At the 'Library of Things', users set a contract and rent objects for a specified period of time, if not returned then penalty applies.

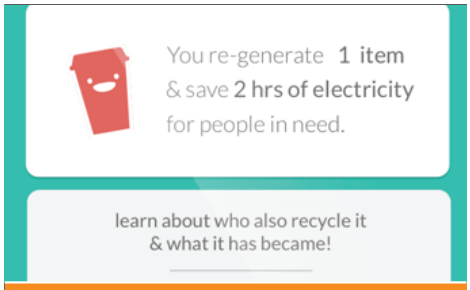
Can you set a time limit for use and provide information about where to return end-of-use objects? Can you provide a reward or give a penalty to users once the items are (or not) returned?

Commitment

Give Feedback On Users' Disposal Behaviour



"Define the outcome clearly."

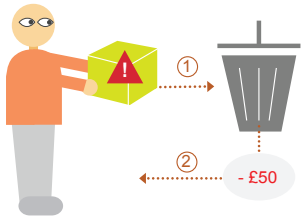


This app allows users to get feedback on their responsible disposal behaviour.

Can you let users know how much of a difference they are making through their behaviour by passing end-of-use objects to the right place?

Commitment

Set A Financial Punishment For Failure



"Apply financial punishment for failure."

Providing information about the financial penalty encourages users to recycle end-of-use objects rather than throwing away.

Can you make users aware that a financial penalty is applied when they throw away end-of-use objects?

Commitment

Change The Tone Of Voice

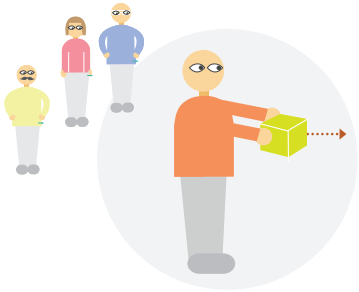
"Change the tone of voice from 'thank you for agreeing' to 'you agreed'".

This coffee capsule contains the message of 'you have agreed to return this to the manufacture' to encourage users' being aware of their commitment to sustainable disposal behaviour.

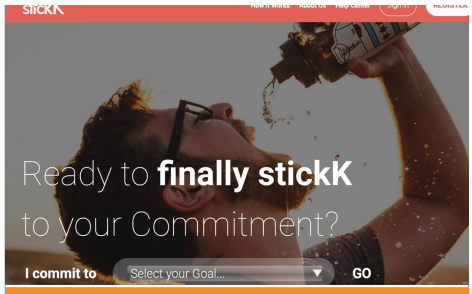
Can you give the message 'you agreed to return...' to users, to make them aware of their commitment to sustainable disposal behaviour?

Commitment

Let Users Disposal Behaviour Be Watched By Peers



"Make one's commitment in public or to another person (Ideally, someone whose values you respect.)."

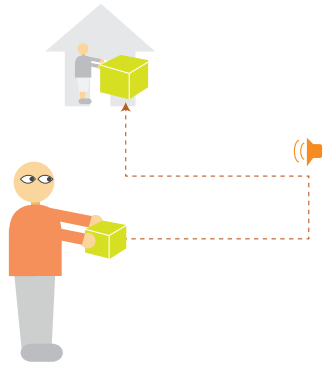


StickK allows users to set goals and notifies other people of their progress, thus the users' behaviour is watched by others.

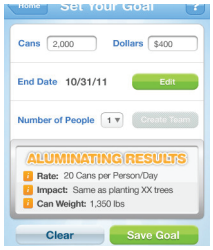
Can you let peers observe and monitor users' disposal behaviour, so they dispose of end-of-use objects responsibility and sustainably?

Commitment

Set A Goal And Inform Users Of Their Progress



"Have clearly planned commitments and follow up whether they were successful."

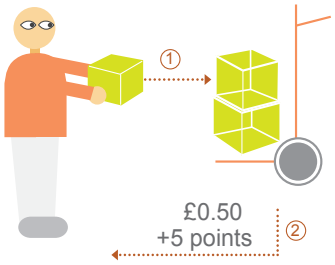


This app allows users to set goals and informs them of their the progress and the impact of their behaviour.

Can you let users set a goal of responsible disposal and create the paths for them to follow, while users get information about their progress?

Commitment

Inform Who Will Pick Up And When, And Give Benefits



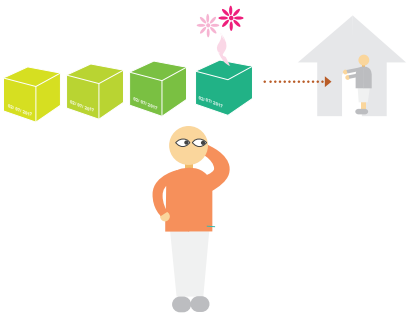
"It would be nice to have someone pick up my unwanted objects and provide the benefits."

Ocado pick up services encourage users to dispose of end-of-use plastic bags responsibly by providing the pickup services and benefits.

Can you provide pick-up services for users and other benefits?

Commitment

Notify Amount Of Use Time Left



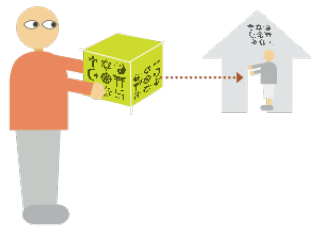
"It is important for how long I can use this object. That motivates me to plan ahead."

The pattern appears on this juice carton packaging as time goes by. This helps users to recognise the end-of-use phase, and dispose of it responsibly.

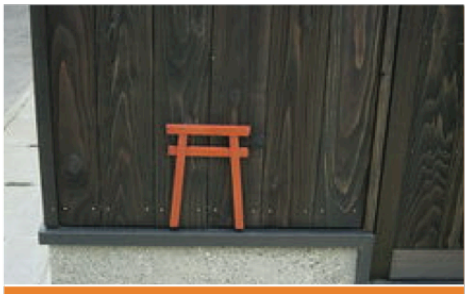
Can you embed the expiry date in an object, so users can plan ahead for responsible disposal?

Commitment

Add Sipiritual Meaning



"have opportunities to talk about spiritual issues."

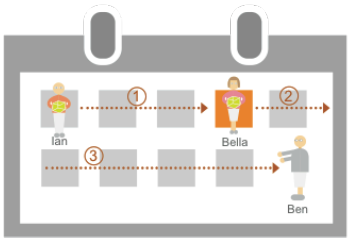


Levels of rubbish were reduced when this religious symbol was added to places where people were most likely to litter.

Can you add spiritual meaning to objects or inappropriate places for disposing of end-of-use objects, to encourage users' responsible disposal behaviour?

Commitment

Pre-allocate Users



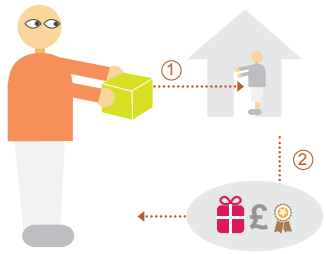
"Team up with people and deliver action together, if not then apply punishment."

This app helps to find participants who would like to take part in the shared purchase, thus multiple users can share the objects, if not then the fine applies.

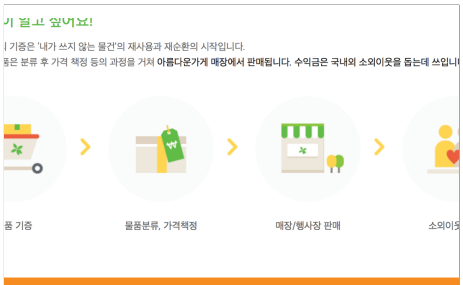
Can you find a collective of users at the beginning of an object's use, with pre-allocated usership times? Can this be enforced with a fine?

Commitment

Give Unpredictable/ Predictable Rewards



"If I carry on disposing of objects responsibly and appropriately, then I might receive a reward?"

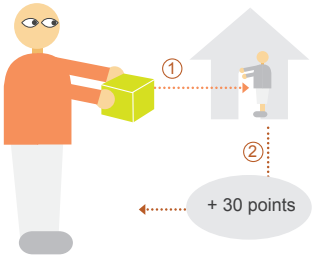


The Beautiful Store reward donors with exempting from tax of a certain amount of their income, to encourage users to pass the objects to the right place.

Can you reward users' responsible disposal behaviour?

Commitment

Give Credit To Be Used For Users' Desired Purpose



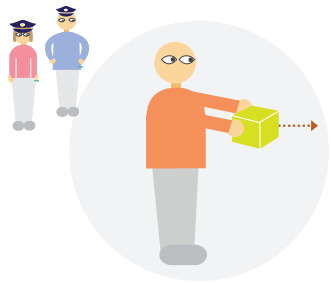
"Give credit for their action, which can then be used for ones' desired purpose."

When users return end-of-use bottles, they receive discount vouchers which can be redeemed from their purchase.

Can you give credit to users for their responsible disposal behaviour which can then be used for their desired purposes?

Commitment

Let Users Disposal Behaviour Be Watched By An Authority



"I behave differently when an authority watches me."

Displaying this photo of eyes produced by an authoritative organization at the place where people are likely to litter, encourages users to dispose of end-of-use objects in the right place.

Can you let users know their disposal behaviour is being monitored by an authority, so they do not throw away end-of-use objects?

Commitment

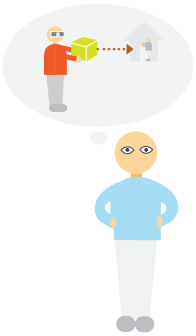
CARATIVE FACTORS for *Sustainable Disposal Behaviour*

Responsibility

Responsibility

When users have a duty to deal with objects in a specific way, they tend to dispose of them responsibly to sustain or extend that object's lifespan.

Encourage User To Become Desired Images



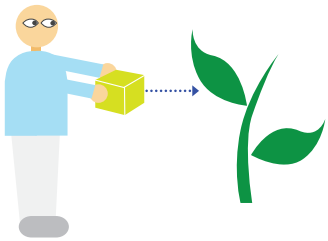
"Make one feel better about him/ herself-bond up with an action for the desired images."

The Kpop boy band BTS made a donation to people in need, following that their Fandom ARMY donated $1,000,000 to UNICEF.

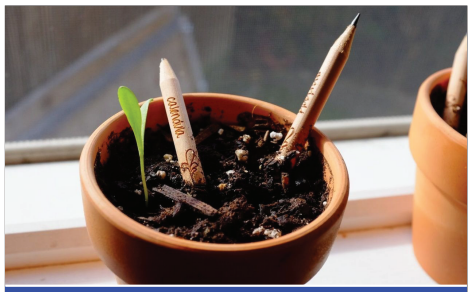
Can you use well-known personalities to be tesitmonials, delivering messages of responsible disposal behaviour to encourage people to follow their lead?

Responsibility

Make Object with Living Things



"This object has the potential to be a living thing."

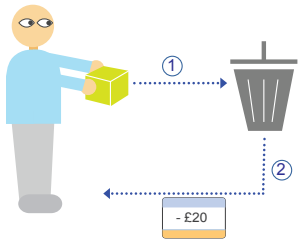


The end-of-use sprout pencil can be planted to grow into a new plant.

Can you show users that an end-of-use object has the potential to become a living thing, to encourage them to dispose of it with care?

Responsibility

Ask For Security



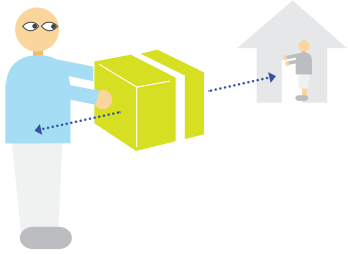
"Make one pay a deposit and get it back when the person delivers the behaviour."

The landlords hold the deposit first to make sure the tenants use the house nicely and return it at the end-of-use. They return the deposit when the tenants deliver the appropriate behaviour.

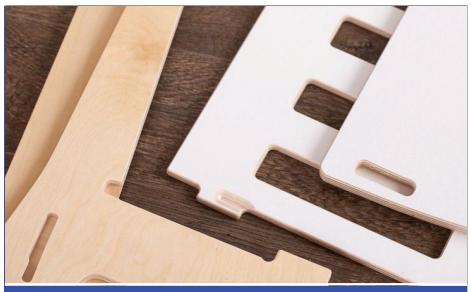
Can you design a system so that users provide security against careless disposal behaviour?

Responsibility

Make Disassembly Easier



"This object has a complicated structure, I might throw it away later."

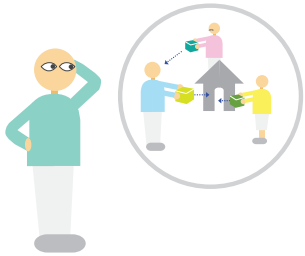


Objects designed to disassemble easily reduce users' burden and encourages users to dispose of them responsibly at the end-of-use phase.

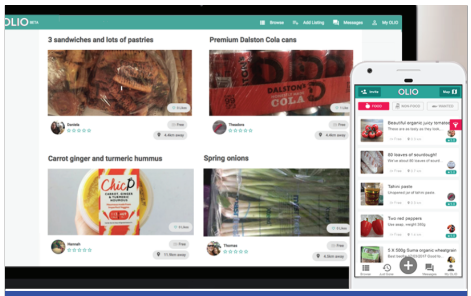
Can you design the object for simple disassembly so users can easily dispose of an end-of-use object in the right way?

Responsibility

Let Users Know About Other Users' Disposal Behaviour



"I get motivated by seeing other people doing the right thing."

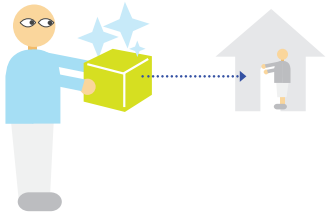


'OLIO' is an app to connect people sharing unneeded food and other items. Seeing other users' responsible disposing behaviour persuades other users to adopt similar behaviour.

Can you show users how other people are disposing of their end-of-use object, so they can see the appropriate disposal method for their similar object?

Responsibility

Design An Object To Remain A Good Condition And Inform About Correct Disposal



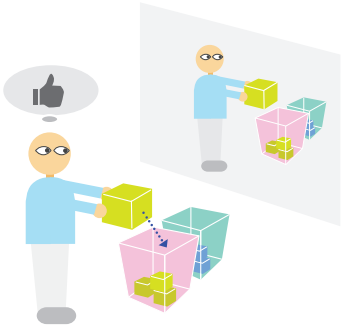
"If the object is in good condition and I know where to dispose of it, then I feel more responsible for it."

HP cartridges are made of a long lasting material, and offer users free recycling bags and pick-up services for disposing of end-of-use cartridges responsibly.

Can you design an object to remain in a good condition, and inform users to dispose of it at the right place when it is no longer needed?

Responsibility

Provide Positive Self-image



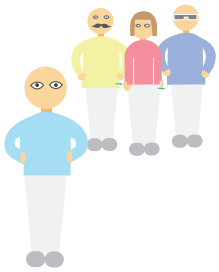
"I am proud of myself and feel like I have done the right thing when I dispose of my objects in the right place."

Transparent bins encourage users to be more conscious of their sorting decision and provide an opportunity for users to reflect on their behaviour after disposal.

Can you encourage users to be more conscious of their disposal decision, and proud of themselves as a result of their behaviour?

Responsibility

Be Representative Of The Group



"Being representative of the group/ public."

This card is looking for examples.

Can you encourage users to form a group promoting responsible and sustainable behaviour, with participants taking it in turns to be a representative of the group?

Responsibility

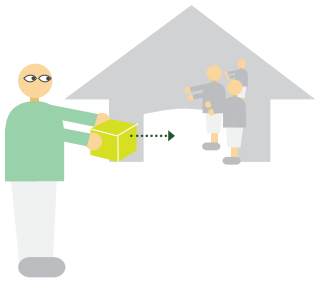
CARATIVE FACTORS for *Sustainable Disposal Behaviour*

Benevolence

Benevolence

When situated environment encourages users' concern in the form of benevolence, then users tend to dispose of objects responsibly or to sustain and extend objects lifespan.

Consider Receivers Availability And Acceptability



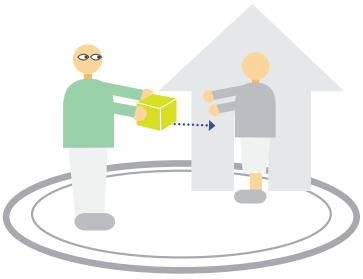
"Make it timely."

These Bins have sensors to detect whether they are full and notify the council when it is time to empty them.

Can you make sure end-of-use object receivers are always available, to avoid users littering?

Benevolence

Provide Accessible And Simple Processes



"I will dispose of the object with care if the process is simple and accessible."

Freiburg Cup' is a reusable coffee cup that can be obtained from participating outlets. It can be returned to any place signed up to the scheme after use.

Can you design accessible and simple processes for passing end-of-use objects to the right place?

Benevolence

Appendix 2 | INTERVIEWS WITH MOTHERS

Interviews with four mothers to understand what care-giving behaviours are.

Interview transcription of mother 1
Katinka Donagemma, 41yearrs, Graphic designer, Italian. She is married and has two children.

“As a mum working in an artistic world, mainly packaging, it’s matter of you realise more rubbish surrounded you, and try to store to your children about recycling, water usage, to be environmentally friendly, and that goes to teaching everyday repeating while they brushing their teeth with running water. It implies to our consciousness of nature and highlight of the beauty of nature to respect it. Because if you don't know the miracle what is the nature does, you don't learn to respect live along side.
So I think as a mother you explore these avenues more because you just care more about this, you care about your children, more about the future.

Even as a mother, when you do packaging design, I found very hard to convince client to go more environmentally friendly packaging. Because they have to change the machinery, cartons don't survive on the shelf as long as they wanted it and the society wants perfection. Everything needs to be perfect. Consumer wants prestige because of society’s illness. The same thing goes to fruits. You know banana is the most amazing packaging design in the world, but when you see bruised bananas you are not going to buy it. So we have segmented already in our mind. Because we don't know what exactly looks like in realty in nature. There is

a big problem in our society. My children as well, if there is bruise on banana, they don't want to eat it, it's terrible.
As a mother, in the moment of care, you care about your children, you want to distil more about them, you know then they will not live where we lived. For my children they will have other issues, which will be environment and fuels. I would walk to short corner, but my husband won't. This is because of my mother, it's long time tradition."

1. How did you feel after giving birth? How would you want to be treated after giving birth?

Just after: "I was very lucky because how I have been taken good care of. If you are well enough, it was bit like a chain, in out, in out. I felt scared,
What do I do. no one explained anything. How to hold, why is it crying. You feel very exposed. Lots of problems, very exposed, vulnerable and your body is like machine. Do it and gone. Just like get on with your life. If you do it at NHS, which I think is amazing but like a chain."

Now: "I think I have great husband, because he support me a lot. I think now we are very rational, before we were petrified that everything went wrong, killing my child for some odd reasons. Do this like this, they don't breeze and chock, you are being burden with too much information which won't necessary pin you down. Now I think you read a lot so you get prepared but then you never prepared what is the outcome will be. I think I try to be calm which maybe kids can see now but not always. The bathroom is like Piccadilly Circus, Can I just have 2 minutes own my own! I mean your body has to go on with it.
The delivery was fine, I could have gone for party after birth. But the problem was after, I over estimated myself. You want to ask for help, but you couldn't because maybe I am a bad mother. So there is lots of stigma. Sometime if I ask silly questions, does it mean I am a bad mom? Or you feel depressed, they will take me to hospital."

2. Did community help you to get over?
"Yes, friends help to get over things. You have to find the way. My mom gave me the best lesson, my daughter was born she came to London and left just after 2 days. You have to know your child, as a family you have to know each other, because it will change dynamically."

3. Why do you think you felt that way?
"Because your knowledge is limited to other people's experience in one extend, and you know that your experience will be all different. And you can't read the order, to know what is right thing to do for child, no book will ever tell you what's right or wrong. You grow up with certain savoy to solve the problems I think. The decision has to be made every moment, and it's a responsibility for another human being. It's a big responsibility! Its huge. Their future, nourishment, given what's wrong and right, it's huge. The brick needs to be in right position in order to build the strong house."

5. Do you want to be a pregnant again?
"I would love to. I actually want 5 boys."

6. What makes you to feel pregnant again?
“I think it's the best thing in the life, children, you have a reason why you doing things, reason why go to work, reason why behave this way. Everything is in their perspective. And they give you lots of energy, when you down they come and cuddle you, give you lots of perspective in life. We probably haven’t mentioned about the 5 stories of butler. But the children they are responsible, know how to behave, They give you lots of joy.”

7. What was the most important role as a being pregnant?
“I think emotion I can control because your hormone was very up down. As pregnant and working, I had very bad experience where I was before. There were lots of stresses. When you are at work, than you try to protect your self and child from the stress. I used to drink and smoke but as soon as I know I’m pregnant I stopped within a second. I stopped drinking, literally your body tells you that's it.”

8. What do you think ‘Care’ is?
“I think Care is not about physical thing, normally, it’s about giving food, taking bath. But mental care and psychological care. So manage to read your daughter, something happened at school, psychological part. Conversation and you know the things that you don't see at the first glance is big part of care. Where you have to teach children to express themselves even it's fear, anger. Shout at mom, let it all out. To teach them this as well.
It's also understanding them. They will one day choose their own path, but I have to be sure that I told taught them to decide what is right and wrong. To tell them access of life. That is care. And to trust them that they are own their feet. When my daughter goes for sleep over I have to trust her that she will behave. This is for me is care. As packaging, it stands its own, can survive, and can live it’s own life without controlling.”

9. How do you build the relationship with your kids?
“Talking. We talk a lot. My daughter had problem with lot of bullying. She is very insecure of herself. I tell her it’s ok to make a mistake, I love the way who you are. Lots of talking.
Accept their perspective as well. Choose what’s important and start and doing it.”

10. What makes your relationship stronger?
“Conversation, 1 to 1. We did charity cycle with my daughter, from Africa. She realised how lucky she is, through this journey. So sometimes it’s good to show them a real life, on the street we talked about homeless people and food. Let her know why not to throw away food. For me travelling, back packing, see other place is best education.
1 to 1 is very important, because, some of the feeling they have which don't want to be embarrassed by siblings.”

11. What makes your children dependant/ independent on you?
“I think my daughter is very independent. She is very comfortable in every housework. She is very responsible, now we are starting to train her to buy milk on her own. If you install, what is good and bad, than it start to build trust. My son, he is responsible. We are now trying to let him know to stop cycling before the crossing, I will go mad if he doesn’t. I trust my son now.

If you teach the rules from the beginning, then I want them to become independent.
Dependency is more about being there for them if they have problem. To have home, fixed home is so important. I travelled a lot, but I always knew I have a home, if something goes wrong, something terrible happened, I have my home. My parents say ‘come home’. I had support. My husband grew up at council, parents got divorced, but found support from martial art. He found his path, even he was dyslexia, they told him discipline. As soon as you find the hook, better believe, and someone believes you in as well.
I want to make them independent as possible.”

The represented objects brought in by mother 1.

Interview transcription of mother 2
Chizu Konta, 37yrs, Own business/ teacher, Japanese. She is married, and has two children.

Object stands for 'care': "photo of me and my parents, celebrating mom's birthday party. I invited my parents to the UK, ordered cake, went to restaurant. I think about my parents to make them happy. How and what make them happy. She can only eat brown rice, so I searched on the Internet."

1. How did you feel after giving birth?
Just after: "I thought I did something big things. I gave a one life to a world. We were going to take care our children, and I couldn't expect this hard. I was really tired."

after while: "There is many things that I've done wrong, but each time I did my best. But sometimes I look back I did something wrong, I will change now for the better life. Brining up a child is very difficult but also challenging and learning. I learnt so many things also cultural difference was a issue. We discussed a lot because the value of thinking is different. For his value is educations is very important. For me, yes of course education is important but also life experience is important. You have to find what they are really good at and what they are interested in. In Japan, it is all about memorizing things, answer is always one. So I think education here is better than Japan."

2. How would you want to be treated after giving birth?
"I wanted to be looked after, but I was more conscious about my baby than myself."

3. Why do you think you felt that way?
"humm…. I don't know. Every life is very hectic, my life changed completely changed."

4. Do you want to be a pregnant again?

“I don't think so. This is the end. Because I am handful, also economically difficult for us.”

5. what makes you to feel pregnant again?
“I thought it is better to have siblings. I always wanted to have more than one.”

6. What was the most important role as a being pregnant?
“Health. Eat good food, organically grown, vegetables and I always listened to my body. When I am tired I slept. Body has a limit so I listened and just relax. I was luck to have that opportunity because I didn't work.”

How did you build the relationship with a baby when you are a pregnant?
“Enjoy, I always thinking what kind of face, to buy clothe was enjoyable. I always thought about the baby.
I didn't want to go out much because I haven’t had a good experience as pregnant. People didn't notice I was pregnant, even I wanted seat somewhere the gardener wont let me. So I didn't want to be in public place. I wanted to be in secure place.”

7. What do you think ‘Care’ is?
“Care is a feeling of want to protect or think about someone or something. If I care too much I don't help to be independent, but sometimes I should care about something when he feels sad or lonely, I want to think about what is solution. But if he dependent too much on me, it is not good for him. It is always difficult to balance give and not to give. I want my kids to be independent but also care about their parents. For them it is natural to have parents and I didn't think about my parents much until I was pregnant but now I know how much they care about me and to teach that way is difficult. Sometime Maxim speaks bad language.
I take them to Japanese lesson, which is far place from here, but I make an effort to go there. It is tiring but I want to believe that it is good things for them. And also sometimes I don't really care what they do. There is limit to care.”

8. How do you build the relationship with your kids?
“I have a strong mind that it is good take care of child until 3yrs old. But in France, they leave at childcare quite early age, I don't know the reason. But for me it was one thing I wanted to do, to be with him. I did that, it was nice experience also I could see lots of thing, like when he did first time.
Now relationship has changed. He goes to school, he has own friends. He doesn't need me much.
Each mom has different approaches how to bring up a child. To be with them more was aim. In France is different, they want kids to play themselves. Some cultures are really different.
Japanese people set to be very caring people but I didn't know when I was in Japan. But now I see they are more care about other people than themselves. They put other person in first place. They always think about someone’s feeling. Here is more like me me me.”

9. What makes your relationship stronger?
“I think conversation and I much the love. Sometimes I don't know if I am doing well. I don't want o give them an objective things like toys or food. More about relationship with each child.

I learned in England, hug more and kiss more. In japan we don't do, I sometimes forget to express, but now I want to do more. Skin ship is really good. All they need is attention."

10. What makes your children dependant/ independent on you?
"He had his blanket. I think since a baby they were been using, probably the smell, bite the blanket a lot."
"I saw this adopted child, when they adopt they said he is a gift of god. And this couple divorced and married to another person again, the baby got neglected, how they speak to them is changed. very sad to see him."

The represented object brought in by mother 2.

Interview transcription of mother 3
Sophie Mazieres, 38yrs, Medical Doctor, French. She is married, and has one child.

Object stands for care:
"I brought a pot of Avino cream. Because Clarisse used to have eczema, she started to have probably 2 and half, since than we've been tried lots of different creams. Actually the best brand we found was Avino. So we use it for her everyday. I immediately though this one, because I use it everyday to put cream on her. She still has very sensitive skin, back, and underneath arms. We need to moisture her regularly. I was looking for something mild, not full of chemical. We always looked at the list of ingredient if it's sustainable for child skin. Not too many alcohols. I always carry little hand cream in my bag, and at home it's in the bathroom with shower oil and lotion. It really takes time to moisturize her."

The represented object brought in by a participant.

1. How did you feel after giving birth?
Just after: “I felt really tired because I had C section. So I think for couple of days I couldn't stand up because I felt the skin was stretching but it was really tight around scar. So I couldn’t take care of Clarisse, but luckily my parents arrived when the day I came back home. So If I need her I asked them to bring her to me, so I didn't have to carry.
It was an emergency C section, the placenta was little bit too low, so I couldn't. It wasn't plan. I had unusually bleeding, so they asked me to go to the hospital. When I was on the table, I lost my water, so they said it’s too late. We cant check anymore, because too much body fluid and everything. So they send me to hospital room to check the baby’s heart rate. They said it's not regular enough, you need to decide to do C section. So I said yes yes I am ok with that. I was ok because ummm.. Because I had my contraction started in the afternoon around 3. I was at A&E for 3 hours. Actually I was really relief that someone was really taking care of me. I never really complain but they shouldn’t have let me wait so much at the A&E. Because when I saw the doctor, he said I can t see you anymore. She just broke the water. Then why did I have to wait so much.
My husband was there, he didn't collapse. Everything was fine with delivery. I think when you taken care of well, than you kind forget all the problems you had. Because now everything is fine.”

Now: “the life goes on, you just … mmm I am a more person to fix it if I see a problem. So I think it was quite smooth, even though you always get ups and downs.”

2. Did community help you to get over?
“Someway yes. If you think about public services for instance, NHS. It's free so it is great. But all the time I had to wait before delivery and seeing health visitors, takes so much time. On the other hand, I also had chance to meet people who became my friends. It was also a good way to get introduce to mom.
I went to library a lot of time, like the playgroups when Clarisse was young. I regularly went there until she was 3 or 4. So you make friends, and your child

make friends, its nice. Also you get to know about the area what's happening, like activity."

3. How would you want to be treated after giving birth?
"I think probably your husband take care a lot of you. So your mom or parents. Before had Clarisse I thought I would be able to take care of my parents, but actually now when they come over, I can leave Clarisse and have little bit more time for myself. I feel that they will be always be my parents, they provide more care for me than I do for them.
When Clarisse was young, I used to expect from my mom and sister to call me regularly."

4. Why do you think you felt that way?
"I gave up my work, because we moved to London and I was already pregnant. So I felt uncomfortable to look for a job at that time. My mom was also house wife so she took care of us."

5. Do you want to be a pregnant again?
"I had miscarriage. Recently… year a ago. I had 2 miscarriages before Clarisse. (Cry) It's always difficult talk about it. I am a scientist, my degree is science so feet on the floor. Baby wasn't properly formed, it just happened. I didn't fall on the stairs or something bad happen. It was just natural. I only share this with my family. It took me a while to recover, little bit physically. I waited to see GP around 11weeks, and I went there and I was really happy. They sent me to hospital to scan, few days later, and then just 2 days before it started bleeding. So it just happened. But I am still ok. Because everything was natural, I didn't have to go to hospital or surgery. It was easy."

6. What makes you to feel pregnant again?
N/A

7. What was the most important role as a being pregnant?
"Staying in healthy. Do little bit of exercise and make sure I wouldn't go to bed too late or tired. Take little bit more about myself."

How did you build the relationship with a baby when you are a pregnant?
"I like to listening to different types of music. Because you know people always says baby also listen to music. When Clarisse was inside, every time I was itchy, she kicked me a lot."

8. What do you think 'Care' is?
"It is totally related to love, the relationship you build with someone. If you don't have relationship or objective, it's difficult to care for someone or to care for something. I would probably say the strongest bond is the child and mom. But also that the type of care you can provide, receive changes during your life. you can adjust the level of care to provide depending on their needs, and what you can give and what you can receive as well. Initially when I was younger I would say that if you care for someone, don't get anything in return, if you take care of other people. That's fine you don't expect anything from them. Now I am little bit older, I have more experience I would say you still need to benefit from something even

if is smile. Because you have the feel with the experience you wouldn't have. Something different, wouldn't happened otherwise. Even if it's not material, if the person doesn't realize that he gives you something in return."

"I care for her because I love her. Love is natural, another way to take care is make sure she is health. Health is the main aim of the care as mom. I make sure she eats enough, need vitamins, good diet. As a mom you always the first to notice your child, it can be like bad mood, couple of spots. Because that the level of the care you provide is try to be the best care."

9. How do you build the relationship with your kids?
"I spend time with her. And we do actives together. I guess as a mom, I found little bit difficult to balance between being easy mom. You know your child want to do little bit out of the box, adventures because they need to discover things themselves. But you don't want them to be hurt. On the other hand, we need to be strong with them, they need to understand there are some limits. Sometimes if you say NO you have right to say that, sometimes you cant explain everything. But sometimes it's ok then you can start Dialogue, so they can understand better.
When I am tried I tell her in advance, ask her to be easy on me. So she takes care of me as well."

10. What makes your relationship stronger?
"I think dialogue. I am always amazed the capacity they have understand things. Even when we use difficult words, they might not fully understand the meaning, in the context they always understand something from when we tell them.
If I think about something, I like to share with her.
Depends on her interest now, when she was younger she was really like to do cooking with me. Crack the eggs, whisk things like that. But she is not really into that anymore. So I tried to few times to encourage her but it's not as strong as used to be. So I tried to almost force her couple of times, but it didn't work. Now she likes to try and taste dough, so when I finish baking I call to taste it.
Always to try find the different way and to adjust with children. Because they grow up and their interest changes. They discover new things and older. As a mom, parents, and main carer always think about what can be her interest so I can provide level of care. If you don't adjust than you will lose the relationship.
The things I like to do is usually I am already sharing with her. With the actives I like to do, we are already sharing. I like cooking. For instance, when we go to the library, she choose fairy tale books and I choose the cooking books. Also I work from now but I am still a main carer, so I put her interest first than mine. Many I go to work outside, I don't know if I put myself first."

11. What makes your children dependant/ independent on you?
"I want her to be independent. Because I am an independent person. I think it is my personality. I have a twin sister, when we were young, we were at primary school. Only our close friend know who's who, because we are not look a like. Because of that I think that it contributed to the fact that I like to be independent. Because I kind of want my independence from my twin. I tried to have different set of friends to my sister's friends.
Small things, sometimes she comes to me 'mommy have a problem, I cant do it, I cant do it.' Then I say 'there is always solution to a problem. I always to do

seeing differently, if you cant do it this way, maybe you can think of different ways of doing it. Or you can't do it, than ask for help. Someone can help you. Even you don't do it by yourself, you still have it done.
At home, I do most of DIY as well like we bought couple of furniture. She loves helping me so I really enjoy the fact that she is interested in it. She can do it by herself when she gets older.
This is another way of sharing, daily basis without like having a proper class. Sharing actives at home."

Adoption.
"Did you feel neglected?
I was adopted when I was 9month old and from Korea. It was from orphanage. When they come over, they were little bit older than other couples.
The process to go through adoption takes couples of years. I think they were 28 when they had us. And my mom always says that one of the dream when she was young was to have a twin sister. So the first paper they had from the agency, had 2 sets of pictures. First thing she said way, I would never be able to choose. Until they would realized they are actually twins. For her it was like dram come true. She had a five brothers and she was the only girl.
I think she would have become little bit disappointed because we had a good relationship with me and my twin sister but we were quite independent from them. But I have a close bond with my your sister as well. She was adopted from different family. My other sister is 4 years younger, she was jealous because we are twins, knowing we used to do things together. You know in your life, you never happy."

"I think my parents gave me the best care possibly dreamed of. I mean my mom used to work but she stopped working so she could raise us. And when we arrived, I think it's easier for parents to take care of baby from the start, but she suddenly had 2 at the same time. My dad had sick leave for 3 weeks.
When you think about it, it's nice. Not all the dad would have done the same. Also at that time, they probably had a good doctor as well. At that time it was not popular to adopt kids. Especially us, non-French looking girls in the school."

Comparing care of adopting kids and natural born kids
"I think I am easier because of this whole the hassle they had to go through to finalize the all the adoption papers and the processes. First to diagnosis that you cant have a child, you need to go through a lot of world. You need to discover to notice it first and then go to the doctors and then yes you always feel a little bit enforced. You can't access everyone. And then you have a social workers come to your flat and they ask lots of private questions, about your life, relationship, the money you can afford. It's really difficult. And then you have to wait for long time. The whole process is still very expensive, you still need to pay for it. It took over 2 years.
Normally, both countries have good political, economical relationship. You need to make sure the kid don't have parents, nothing wired about it and then they need to agree. I know one friend who adopted from Gibraltar. All the process is dependent on the elections, because of political context, so they had to wait and wait for couple of years."
Do you want to find your natural mom?

“I don't think I am ready yet. I think its because that we were very lucky with my sister. Both of my parents are great parents, they didn't divorce, even though they had ups and downs. My mom had 5 brothers and my dad also has big family. Of course, they were the only one adopting the children. Despite of that, no one ever in the family felt that it was an issue with them adopting children, with us being adopted. So I think both my sister and I, when we were at school, we were a good students as well. We never had trouble with studying, getting accepted in school. We had advance studies. So I think this also contributed to the fact that it was an easy, I wouldn't say adopting, but it was easy.”

Interview with mother 4
Shinwha Cha, 46yrs, Librarian at University of London, South Korea. She is married, has two children.

s

1. How did you feel after giving birth?
"It depend on the period after giving a birth that my mood change. Ok Lets say just right after delivering my baby, I always felt amazing. It's nature, I realized that I made this wonderful creature, I couldn't possible think I can do it but there was a magic hand from somewhere encouraged me and I created another person that is beyond my imagination.
It's very complex element to say. If I am just focusing on my children and me I feel really blessed. Sometimes I don't deserve to have this kind of children and also I am very fortunate to be able to be a mom of 2 children. Because I personally had experience of miscarriage of my first child. Therefore, I really appreciated having and delivering normal children even one or two and they grow well, they thrive, and then I fell really wonderful about it. Not because I am wonderful but I feel very blessed."

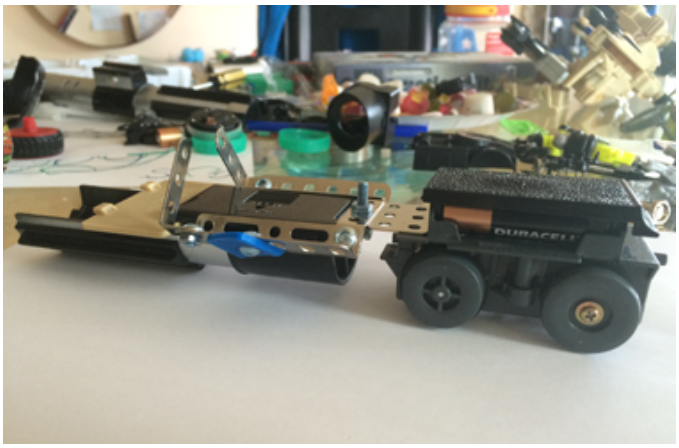
2. Did community help you to get over?
"Personally, I didn't have enough support from a lot of things because of my circumstances. I not from London, that means I am from abroad that means all my family's support was not possible here. I was alone. And then I am new to London, therefore, I didn't know a lot of people. So in many sense, I am deprived

from the all the support. But I did manage to get enough support that I need. For example, in Korean tradition, normally my mother looks after me after delivery. But I hired person to look after me so didn't have a good care but I manage to have enough support that I need. Also lacking of support is bad thing from my experience. Sometime people try to give you support, but actually it's intervening your relationship with your child and yourself. For me I had very limited support from outside that means I had more time to establish a relationship with my baby. Because I spent a lot of time with my child 24/7, so that was actually good for me to build the relationship with my child. Because I was fully committed mom."

The represented object brought in by a mother 4.

Appendix 3 | RECREATION WORKSHOP

The recreation workshop was held with five children. Children brought in their unwanted toys and disassembled their toys to transform it into a new toy by using their imaginations and other participant's parts with my help. The workshop outputs including a 'train' (bottom left) and a 'sword' (bottom right).



Appendix 4 | SHADOWING STUDY AND OBSERVATION OF DAILY CARE-GIVIGING BEHAVIOUR

A section of exapmles of participant's daily care-giving behaviours.

Participant A

Participant B

Participant C

Participant D

Participant E

42. Female. House Wife.

- clean sofa with wet wipes.
for my clean enviorment
for my own benefit but maybe it's for environment too.
- clean floor with wet wipes
for my clean environment. for my kids and family.
for my own benefit.
- put toys in the box
for my own benefit and for my kids.
- clean bookshelf with dust cleaner
(Cave with little dolls)
For my clean environment.
For my own benefit.
- put plastic waste in the recycle bag.
small (on the floor)
for my own benefit but may be for enviroment
purpose too. It stuck in the hoover.
- open fridge and close
habit. waste of energy. I heard when fridge
is open, eletricity bill goes high. For my own benefit.
- get food out from the package
and check expirey date. For my own benefit.

-open and put food on the plate.

- wash food
For my own benefit.
- bin the plastic packaging in the recycled bag. became habit.
For enviroment purpose. but I do it for my benefit too.
- chop food on the board.

- left over wrap and put in the fridge.
For my own benefit. can be used. need it for other cooking.
- peel carrots, potatos in the sink.
For my own benefit. don't like sink blocked.
- put laundry in the washing machine
For my own benefit.

A selection of Notes taken during the observation and shadowing study of participants.

Appendix 5 | ONLINE QUESTIONAIRE RESPONSES

Timestamp	Name (C	email	Occupation
2016/11/11	Jin hee	n/a	house wife
2016/11/11	jin	n/a	house wife
2016/11/11	sophie	n/a	house wife
2017/01/10	suji ahn	lunamamada@gmail.com	architecture
2017/01/12	Meekyu	cmk43210@gmail.com	housewife
2017/01/15	hae kyo	yoonyongchoi@gmail.com	house-wife
2017/01/15	choi hae	yoonyongchoi@gmail.com	house-wife
2017/01/17	Dong Hy	donglee822@gmail.com	Account Manager
2017/01/17	Kyeong-	kyeongh@hotmail.com	CMF Designer
2017/01/17	Yeonjeo	jeongsdream@hotmail.co	Housewife
2017/01/17	Elisabet	elisabeth@encorereclama	company director
2017/01/17	Lina Gur	tagguncheva@yahoo.co.uk	Public sector
2017/01/17	Anitaho	anitalee110@	assistant
2017/01/17	Sophie M	sophie.mazieres@gmail.c	Housewife
2017/01/18	Kyungw	smjhoon@gmail.com	housewife
2017/01/20	Sophie A	sophie.albely@gmail.com	Online doctor
2017/01/20	Nazli Ter	nazli.terzioglu@network.r	Student
2017/01/20	Kristina	Vedeike.k@gmail.com	Research
2017/01/20	Angela C	angelacasely_hayford@hc	Cabin Crew Supervisor
2017/01/21	chang h	choichang111@gmail.com	retired
2017/01/23	Insu Yu	insuyu@gmail.com	research
2017/01/24	N/A	n/a	Student
2017/01/25	Kim suk	sheeps56@hotmail.com	pharmacisit
2017/01/25	Amy Ou	aoutingdyke@hotmail.cor	Manager
2017/01/25	n/a	n/a	Business Manager
2017/01/25	Nabila M	NEBULA004@Gmail.com	Dentist
2017/01/25	Christin	cmcglynn@eno.org	head of costume at engl
2017/01/26	Marina I	Mkorompili@gmail.com	Working in a school
2017/01/29	n/a	n/a	Teacher
2017/01/30	me	n/a	teach
2017/02/01	Aeran	Jung	teacher
2017/02/02	JI YE LEE	jiyegracelee@gmail.com	Dentist
2017/02/09	Ockhee	ockhee_lee@hanmail.net	housewife
2017/02/10	Joonyeon	Cho	Student
2017/02/10	Tabitha	Ringwood	Footwear design
2017/02/11	Monica	Chen	Service Designer
2017/02/27	In Hong	inhongcha@naver.com	office worker
2017/03/03	Park	shera.park@gmail.com	phd candidate
2017/03/03	Anika	n/a	house wife
2017/03/03	Rekha	n/a	house wife
2017/03/03	n/a	n/a	architecture
2017/03/03	Jon	n/a	Builder
2017/03/03	Jinho	n/a	post doc research

As a user, which scenario best describes you?
I tend to bin end-of-use objects.
I pass end-of-use objects to the appropriate places only when I have the proper motivations. (e.g seeing other people doing)
I pass end-of-use objects to the appropriate places only when I have the proper motivations. (e.g seeing other people doing)
I tend to bin end-of-use objects.
I tend to give care to unwanted objects periodically and find a proper owner so it circulates material at their highest utility.
I tend to give care to unwanted objects periodically and find a proper owner so it circulates material at their highest utility.
I tend to give care to unwanted objects periodically and find a proper owner so it circulates material at their highest utility.
I tend to bin end-of-use objects.
I tend to bin end-of-use objects.
I tend to bin end-of-use objects.
I tend to give care to unneeded objects periodically and find a proper owner so it circulates material at their highest utility.
I tend to keep unneeded objects which I haven't used for 3 years and bin it when I move.
I tend to give care to unneeded objects periodically and find a proper owner so it circulates material at their highest utility.
I tend to give care to unneeded objects periodically and find a proper owner so it circulates material at their highest utility.
I tend to bin end-of-use objects.
I pass end-of-use objects to the appropriate places only when I have the proper motivations. (e.g seeing other people doing)
I pass end-of-use objects to the appropriate places only when I have the proper motivations. (e.g seeing other people doing)
I tend to find a proper owner (or return to manufacture if necessary) when the object become not needed it.
I pass end-of-use objects to the appropriate places only when I have the proper motivations. (e.g seeing other people doing)
I tend to bin end-of-use objects.
I tend to bin end-of-use objects.
I pass end-of-use objects to the appropriate places only when I have the proper motivations. (e.g seeing other people doing)
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I pass end-of-use objects to the appropriate places only when I have the proper motivations. (e.g seeing other people doing)
I pass end-of-use objects to the appropriate places only when I have the proper motivations. (e.g seeing other people doing)
I pass end-of-use objects to the appropriate places only when I have the proper motivations. (e.g seeing other people doing)
I tend to give unneeded objects to charity which I haven't used it for a year.
I tend to bin end-of-use objects.
I tend to bin end-of-use objects.
I pass end-of-use objects to the appropriate places only when I have the proper motivations. (e.g seeing other people doing)
I pass end-of-use objects to the appropriate places only when I have the proper motivations. (e.g seeing other people doing)
I pass end-of-use objects to the appropriate places only when I have the proper motivations. (e.g seeing other people doing)
I pass end-of-use objects to the appropriate places only when I have the proper motivations. (e.g seeing other people doing)
I pass end-of-use objects to the appropriate places only when I have the proper motivations. (e.g seeing other people doing)

Q1. Do you p	Q2. If yes, please list three specific objec	Q3. Please choose one ob	Q4. What plan you have c
yes (If yes, cc	duvet, clothes, books, shoes, bags, hello	all	give away;donation
yes (If yes, cc	hair clips, hair band, foot ball shoes for m	hair clip and band	give away
yes (If yes, cc	games, clothe, and tent	tent	give away;sell
no (If no, ple	Packaging of iMac Routers & cables	(iMac Packaging	
yes (If yes, cc	furniture, personal accessories. clothes.	furniture	
yes (If yes, cc	clothes, shoes and electronic products	clothes	recycle bin
yes (If yes, cc	clothes, shoes, electronic products	clpthes	recycle bin
no (If no, please go to section 3.)			
yes (If yes, cc	Heart shaped hair curlers(birthday gift fr	heart shaped hair curlers	
yes (If yes, cc	Clothes, shoes and chairs.	Maybe I want to wear that clothes one day.	
yes (If yes, cc	DVD player, multiple picture frames, cha	picture frames	Use;give away
yes (If yes, cc	Juice maker, grill machine , baby cot	Juice maker	
yes (If yes, cc	old childrens clothing, shoe boxes, old to	old childrens clothing	give away;sell
yes (If yes, cc	Clothes, mini-disc player, framed cross st	framed cross stitch	give away;sell
yes (If yes, cc	clothes, shoes, electronic products	shoes	recycle bin
yes (If yes, cc	packaging like bubble wrap, a couple of p	old mobiles	
yes (If yes, cc	Clothes, furniture, shoes	Shoes	Use;give away;sell;recycle
yes (If yes, cc	Candles, stationary, bags	Bag	sell
yes (If yes, cc	old clothes, shoes, toys	shoes	
yes (If yes, cc	Books. Clothes, Furniture.	Books	give away
yes (If yes, cc	single bed	single bed	give away
no (If no, please go to section 3.)			
yes (If yes, continue.)		handbag	
yes (If yes, cc	1. Baby clothing 2. baby bouncer 3. unus	1. unused shoes	
yes (If yes, cc	Kids car seats, kids cots, old computers	Cot	
yes (If yes, cc	Clothes. Toys. Tools	Clothes	give away
yes (If yes, cc	Varies clothing that doesn't fit, shoes my	First iPod I got which is green	
yes (If yes, cc	Old printer Baby bathtub Old buggy	Buggy to put coats on.	give away
no (If no, please go to section 3.)			
yes (If yes, cc	glass bottles, clothes, make up	glass bottle	recycle bin
yes (If yes, cc	piano, clothes, bike	piano	Use
yes (If yes, cc	Old Christmas cards, Spare buttons comi	spare buttons	
yes (If yes, cc	Old school books, clothes, shoes	clothes	
yes (If yes, cc	Furniture (sofa), bracelet (broken), Beer	Furniture and Beer bottle	recycle bin
yes (If yes, cc	Shoes, clothes and old bedding	Shoes	Use;give away;sell;recycle
yes (If yes, cc	printer, books, mickymouse headband	printer	Use;give away;sell
yes (If yes, cc	small table, ormament, clothes	clothes	Use;give away
yes (If yes, cc	clothes, mobile phone, laptop	clothes	give away
yes (If yes, cc	printer, mobile phone, cosmetics	mobile phone	sell
yes (If yes, cc	clothes, kids toys, shoes	shoes	give away
yes (If yes, cc	suit case, Toys, clothes	suit case	sell
yes (If yes, cc	tools, cables, heater	cables	bin
yes (If yes, cc	books, mobile phone, old gadets	books	give away

Q5. If you don't need then, please explain why these objects have not been disposed of (e.g. g	Q6. C
memories of kids are embedded, recall the memory of my kids are younger. not ready yet.	6
I have memory of my kids in this object. theses remind me of when my daughter is in year3.	7
I didn't want to throw away because I spent lots of money to buy and took us long time to find	5
The packaging itself is too good to be disposed of. Although I am not planning to sell the comp	6
How I owne, my effrot to own, has history, spend time and effort to maintain the condition, 처음선택	8
they look like out of fashion, perhaps I feel regret my further action.I	6
It(they) may be out of fashion. perhaps I feel regret my further action.I	6
It's my birthday gift from my 7 year old daughter	8
For need in future.	4
I feel like as soon as I throw it away, I will need it	4
In a working condition and may use it again	3
Do not like the idea of throw away good clothing. Waiting to find a sutiable home for them	7
I cross-stitched it when I was a teenager. Not east to sell or give away. I would like it not to be	7
Actually, I want reuse old shoes, but everyday put on new shoes.I forgot the old shoes existed	5
I don't want them to go to waste as they are not broken. I also find it interesting to keep them	5
Because they are in good condition. Because I have not got enough time to sort them out. I wi	2
Because it is designer bag And it seems like a waste to discard it. I have tried and the price was	7
Its because it is bran new never worn before so I am holding on to it	4
Because books are traditionally regarded as a valuable stuff not to throw away. Books are carr	7
because the donor might be sad if I throw away	4
expensive and memorable	7
"might" use one day	0
Out the way. Grown into the wall furniture	0
Just in case and No time to triage	5
I haven't gotten around to transferring the songs	3
Put coats on, No space for coats and my husband doesn't want new cupboards or hooks on th	9
it might be useful	6
possibility that I MIGHT use it in the future, but too busy to sort out.	7
just in case I do lose my buttons and need to sew new ones in. because it's on standby, it's not	6
I feel like disposing of them is wasteful.	3
Laziness and it does not look bad currently.	2
I feel I may one day wear them again, I have an attachment to their appearance and I like know	7
I have to take it to a specific dispose centre, I need a car or hire a car for this, it takes money a	5
may be put on those clothes some day and still too good to throw away. Can not find proper p	7
I never know whether I actually wear one day. cause I haven't decided whether I might need o	6
the price was not right.	4
couldn't find the persom to take it.	4
I might need it later.	6
environmental concerns	2
I might need it, and it is old version.	6

Q1. Which strategies would you think are viable as an approach for the selected object not to become obsolete?
Design to share with others

Design to share with others;Design to exchange with other users;Design to return back to manufacture;Design to recycle
Design to recycle
Design to share with others
Design to share with others
Design to share with others
Design to share with others
Design to exchange with other users;Design to return back to manufacture
Design to share with others;Design to recycle
Design to share with others;Design to exchange with other users;Design to return back to manufacture
Design to share with others;Design to disassemble;Design to reuse by owner
Design to share with others;Design to disassemble;Design to recycle
Design to share with others
Design to share with others;Design to exchange with other users;Design to return back to manufacture
Design to share with others;Design to return back to manufacture
Design to recycle
Design to share with others;Design to recycle
Design to share with others;Design to exchange with other users;Design to recycle
Design to share with others;Design to disassemble;Design to recycle
Design to share with others
Design to reuse by owner
Design to share with others
Would not upcycle
Design to share with others
Design to share with others;Design to disassemble;Design to recycle
Design to share with others
Design to recycle
Design to exchange with other users
Design to share with others
Design to share with others;Design to exchange with other users;Design to return back to manufacture;Design to recycle
Design to share with others;Design to exchange with other users;Design to recycle
Design to exchange with other users;Design to return back to manufacture;Design to recycle
Design to share with others;Design to exchange with other users;Design to disassemble;Design to recycle
Design to share with others;Design to recycle
Design to share with others;Design to exchange with other users;Design to recycle
Design to exchange with other users
Design to share with others;Design to recycle
Design to share with others;Design to exchange with other users;Design to return back to manufacture;Design to recycle
Design to exchange with other users;Design to return back to manufacture; Design to reuse by owner
Design to share with others;Design to exchange with other users;Design to return back to manufacture;Design to recycle
Design to share with others;Design to exchange with other users

Appendix 6 | PHOTOS OF HIBERNATED OR ACCUMULATED OBJECTS AT END OF USE

A selection of photos of end-of-use objects that participants mentioned during the interviews and observations.

SONY
PS3

Clarks

11
7
8
10

FIFA 13
RUGBY WORLD CUP 2011
FIFA 12
FIFA 14

PHOLCODINE LINCTUS BP
Feroglobin
Tablets

Appendix 7 | NOTES TAKEN DURING THE INTERVIEWS

Transcriptions of two of audio-recorded interviews

Stage 1

What is your age?
I3: "I am 28."
I10: "39"

What is your occupation?
I3: "I am a student at Goldsmith University."

I10: "I look after our home and my children."

Stage 2

List a maximum of three objects which are still in their homes even though they didn't really need them with a high chance of them now being thrown away. Why you haven't let go of this object sustainably when it had value?
I3: "I had too many stuffs and types of objects that I don't need. Umm, cardboard boxes that I kept it for the future use. I though I might use them, but was not the right size. The pair of trainer, I kept it to because it might be useful in the future. I am still looking for someone who values this product. I could give it to charity, but I am not sure whether they will resell it or bin it. And the make up products. I never got to use them. Some plates and ceramics jar too. I guess I got used to owning this. Especially, the make up products are difficult to give away when it is half used and people have different preferences."

I10: "I have my children's used potty that I was looking for someone who wants it but couldn't find. I also tried to sell it on Gumtree but there weren't any offers, though there were more than 50 views of the advertisement. Maybe people are not keen on sharing the hygiene related products. I still kept unneeded underwear because I forgot that I have them, am not sure where to dispose of them. I feel guilt to put it in the general waste bin, do you know where to dispose of? I have 4 different brands mascara, I found this yesterday in my drawer after talking with you. These were free giveaway from the cosmetic company, I don't have time to use them, and now it became old and solid. I am going to throwing away."

How much lingering emotion remained towards the objects.
I3: "The cardboard, not much. I think I didn't keep it because I like them, but just for the future use. For the shoes, I would say high attachment because I like them it provided me comfort with good memories. It is very good quality as well. I still like them, but I always ended up wearing other shoes. Maybe they are bit out of fashion. And the make-up stuffs, not really. I bought it because this colour lipstick was trendy at that time. Now the colour is out of date, it is bit embarrassing to wear them."

I10: "My kid's potty, I think I do have some attachment because I liked the design, it was a good quality one and I spent a lot of time searching for the good one. I don't have any attachment to the unneeded underwear. They are just here because I don't know where to dispose of. I went to the cloth bank near my place other day, and it was full, this happened twice already, but I don't want to fly tip. I wish

there is some services they take the unneeded clothes. Same to mascara, I don't think I have much attachment."

What will help you to pass the end-of-use object to second users or send to manufacture?
I3: "Maybe some kind of reminder that I can look back my stuff what I own. But if the reminder message doesn't touch my heart and not persuasive than I would not do it. If the message comes too often than I will ignore it. Right time and right moment is important. If I get a reward, that's possible too. Easy way to find the appropriate second owner is also important."

I10: "An indication of what to do next. Even knowing the future use of these products will help me to dispose appropriately at the right time. Or some reward, for example, if I send it to the next place then I get a discount code or something. And also, as I said earlier, if there is some kind of pick up services or the places they take all of unwanted stuffs then I will definitely dispose of this sustainably."

Stage 3
List one end-of-use object that had been successfully let go sustainably, with a positive sense of purpose. Describe the motivational factors by using the sources of 'Four Motives of Caring' themes. (How the selected caring emotions had influenced their behaviour?).

I3: "I had few Euro left in my drawer, which I don't think I would need it anymore, as I am going back to Korea next month. Friend of mine visited my flat other day and I've remembered it might be useful for her. She is from France, so I gave it to her. I think I gave it to her because she is very good friend and I know she will appreciate it. Also because she was at my place at the right time. If she visited me before or next day, I probably won't notice Euro was in my drawer, I only discovered few day before when I was sorting and packing my stuff."

I10: "I-mac, I think the financial reward has a big influence. If the price were not right then I wouldn't have sold it. I ended up getting more then I expected. I think I had affection toward the product, I liked it very much. It functioned well and I enjoyed using it, above all it was costly. I can also say that I had a commitment to find a good owner, I wanted to find someone who really takes care of my product."

Notes taken during the interviews of eight participants. (Non-audio recorded).
Stage 1
What is your age?
I1: 38
I2: 44
I4: 68
I5: 60
I6: 25
I7: 44
I8: 57
I9: 64

What is your occupation?
I1: Teacher
I2: Engineer
I4: Retired
I5: Retired
I6: Student
I7: Home manager
I8: Home manager
I9: Home manager

Stage 2
List a maximum of three objects which are still in their homes even though they didn't really need them with a high chance of them now being thrown away.

I1: My daughter's socks
Tent kit
Used Nespresso capsules

I2: Cables
Projector screen
Children's car seat
Hoover
Radiator

I4: Mobile phones
My children's desk
Old TV
Desk

I5: Old books
Suit

I6:Sky box
Unused ink cartridges

I7: Children's plates and cutlery
Never worn clothes
Hair accessories
Chocolate packaging

I8: Children's clothing and socks

I9: Clothing
Old plates
Pharmaceutical products
A pair of boots and running

Why you haven't let go of this object sustainably when it had value?

I1: just in case she uses it again. She wanted to sell it but it was a complex process. She didn't like the idea of getting on line, register and make an advertisement to sell the product. For the 'freecycle', she had a doubt about the people who would take the product. But if anyone wants to borrow it she is happy to let it.

I2: He didn't have time. Takes too much time and effort. He didn't know how and where to send.

I4: Too bulky and heavy to take it out. Not seeing future value. They are very old, not sure anyone will appreciated it. He kept it because he was going to use in the future, but never did. Still haven't found the right person to give or sell.
He didn't realize he kept it until recently, he only realized when he started to pack for moving.
The object had less value because he had a substitute object, he but kept it if someone would take it.

I5: The book was too old. Colour has been changed, it's in an old format. Books were not in a good condition. Receivers may not be happy to get these books.

I6: He advertised on gumtree to sell or give away the cartridges, but had no luck. It's maybe because the cartridges are for the old version printer.

I7: She didn't like the idea of binning or trashing. She felt guiltily. However, it is not easy to find people who need these. She didn't want to bin it as it has her daughter's memories, would like to find some one who appreciates this.
PS CDs, people won't need it as the new version of PS lunched and these CDs do not fit in. She should have sold or given away long time ago, "guess I missed the chances".
For the clothes … She often thought about charity, but it was not convenient for her as she always has to travel there. Indeed, charity bin near her is always full. "in a rainy day, all of my donation get socked" and she felt like her effort goes for nothing.
She is not good at using Internet, so not many places she can give away.
"My daughter's stuff, I am asking around people who visit my house, so far no luck".

I8: "Because I might need it again, then I have to buy again".

I9: "I cannot find the appropriate person. Shirts and trousers are out of fashion". She will be glade if someone would take it.
For the pharmaceutical products, she didn't know she had them.. until today, and she is not sure what is the environmental friendly ways of disposing them.

How much lingering emotion remained towards the objects?
I1: Tent, she has a high attachment as she paid a lot of money. The used capsules, she had very low attachments, she collected because of environmental concerns.

I2: Children's car seat and projector screen have high attachments because they were expensive and good quality product. He has low attachments to cables,

hoovers and radiator, as some were given out for free, or they were second handed.

I4: The children's desk and an old tv contained memories, so he has high attachments. Whereas the mobile phone contained lower attachment.

I5: The suit, he has high lingering attachments. "they contains the memories". He doesn't have much attachment to old books, he liked them but would like give away if there is a receiver.

I6: very low attachments to the both objects. He kept it because he felt responsibility for the objects and for the environmental concern.

I7. She has low attachments for children's plates and cutlery. Happy to give away to someone in need. She has a high attachment to chocolate packaging and never worn jacket, because they are in good condition and beautiful.

I8: It depends on the clothing. When children's cloth contains memories, are expensive or given out as a gift she tend to have high attachments. She didn't have much attachment to low quality clothes, or if she didn't spend much time on purchasing.

I9: She has a high attachment to old plates, as it contains memories. She has very low attachment to pharmaceutical products.

What will help you to pass the end-of-use object to second users or send to manufacture?
I1: "I wish the process were easier".
I2: "If I can get benefit".
I4: He wants to find the right person or organization to give away. Made out of not too heavy material. Or prefer to keep the object in other format I can keep.
I5: if there is somewhere to take old books. If there is a deadline to return the object on time. If I can find someone to rent and promise them to give it back. Or maybe there is a joint decision between the users to take turn.
I6: "if I can find the appropriate donors".
I7: if the hospital, library or other organization takes her donation she will definitely deliver it. When she knows where it is going. Some easy ways to dispose or to sell. Some times she didn't know where and how she could dispose of.
I8: Bigger bin to contain unneeded clothe.
I9: When someone comes and picks it up. Reliable place to donate.

Stage3
List one end-of-use object that had been successfully let go sustainably, with a positive sense of purpose.
I1: Buggy
My child's clothing
I2: My child's clothing
I4: Plant
I5: Library of books

I6: cartridges
I7: Bread maker
I8: Hair pin
I9: Antique table

Describe the motivational factors by using the sources of 'Four Motives of Caring' themes. (How the selected caring emotions had influenced their behaviour?).

I1: She spent a lot of time searching for a proper buggy for her daughter and paid a lot. Her daughter loved being on the buggy, so she liked the object. She had liking and loving emotion toward the object, so she wanted to give it to someone who understands the value and appreciate the object. It was good condition too, it was used well so thought some one out there will value the object. Also, the object was expensive she wanted to get financial return rather than just give away. She also mentioned her daughter's dress, she passed it down to her sister. Because the dress was a gift from her mom, so she didn't want to give it to other people. She knew her nephew was the right age to fit in this dress. Because it stayed in the family circle, she feels good and happy that she can see how her nephew enjoying it. She also donated children's soft toys. Her children used to love these. It's too cute to be trashed.

I2: It was difficult for him to find someone who would take the objects. However, I2 knew how much waste he was creating if he threw it away. Therefore, he donated it to a charity shop, but he was concerned about the post donation. The donated clothes will possibly ended up in the development country, but he couldn't think of any other options. He had some responsibility for the environment and also for the objects. Benevolence might have influenced him as well because he delivered the unwanted clothes to the charity shop even though the process was bit tricky. He did it for the good cause.

I4: He planted his plant in the park next to his house before the house moving. "It is a living thing, alive and there is history between two". He had a responsibility for taking care of plants.
Also he mentioned an old TV, he kept it because of the look, it contains antic feeling. It had a wooden texture and very unusual design. It shared past memory of his life and story. Luckily, he found the right person at the right time. He almost had given up finding a new user, but then a person who works for moving company took the offer when he came to help packing stuff. The guy really liked it so the I4 asked if he wants it although it's too old and only has B/W screen. I4 had loving and liking emotion toward the object, he wanted the object to last longer.

I5: "The library books belong to library. It is a shared property". He had responsibility of the books as it had a deadline to return and there is fine if he didn't return it. It was helpful to know the amount of time he can let. He made commitment to return the books, otherwise he will pay the fine.

I6: It was in such a good condition. Felt guilty to throw away. He kept it until the friend visited his house and made an offer. He had responsibility for the object

but also our environment. Finding right person who really wants the product at the right time is important. Also, it helps if the object is clean and in good condition.

I7: That bread-making machine was pricy, she spent lots of time to search good reviewed one. She had a chance to talk to one of a missionary. They are living in a development country where they have no chance of eating bread, or buy bread near their home. She felt sorry for them, considering their environment, he is the one who really needs a bread-making machine. So she donated the bread-making machine to the missionary. She was so satisfied that the machine was taken by who really need. Benevolence was main factor that encourage her care-giving behaviour but also liking emotion influenced her. Because a missionary was at her place at the right time, the environment allowed her to take an action. She gave him one of her favorite item, rather than a bad quality one because she had an empathic emotion toward him.
She also mentioned the fur coat. It was her wedding anniversary gift from her husband. It was too long and didn't fit on her but it was a gift so she kept it. She kept if for 3 years and when She was sorting out the stuff before she moved to London, she decided to give it to her sister. The coat was not appropriate to wear in the UK weather as rains too much anyway. It was hard but she felt better to give it to someone near her. Then she can check how it's been treated and also can get an update of the condition. It will always be near her. Looking back, she did well, she made the right decision. Each time she looked at her sister wearing she feels good. She hopes it passes down to someone in her family.

I8: She had a guest who lives in the development country, she was young and pretty lady, but she had this hair clip which was rusty and old rubber band and not even working properly. At that moment, she decided to give one of her hair clips, once she decided that she wanted to offer something good. Because "when you decide to offer something, its better to give something good than a random one. I remembered that I had a very beautiful hairpin that will look beautiful on her. Of course, I hesitated. But knowing that the hair pin will go better on her than me I decided to give it to her. I think I had compassion and empathic feeling for her". She had a cross feeling, happy to see her happy face, but she will miss the object from time to time. But she felt good that she did something good, now she can use something else.
"I gave it to her because I know she will appreciate it and value the objects as well as my kindness. I am sure she will treat with care and keep for long time".

I9: She bought the product when she used to live in Saudi Arabia, it was quite expensive compare to her husband's wage at that time but she bought it at the end. She used it well without any problems. She had affection toward the object so she passed it onto her sister. She also felt the responsibility for the object therefore she wanted to give it to someone who appreciated this, could share the memories, and take good care of. She asked around her family first, her sister really liked it and appreciated her kindness.

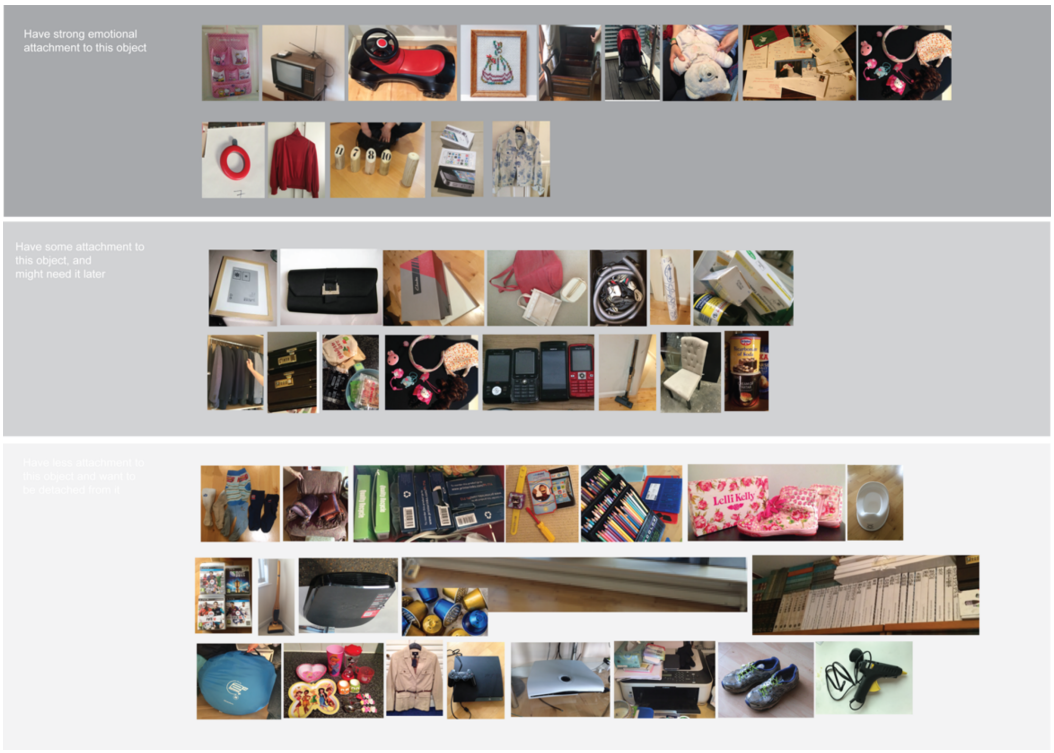
The questions for the group of people who moved to new homes (n=5).
What actually happened to these listed objects?

Thrown away objects:
Old Books, Very old hoover.
Cables, kids wallpaper, kids shoes.
Some of IKEA ceramic cups and plates
Play Station CDs and its cases, children's plates and children's portable water bottle.
Pharmaceutical products and Unused ink cartridges.

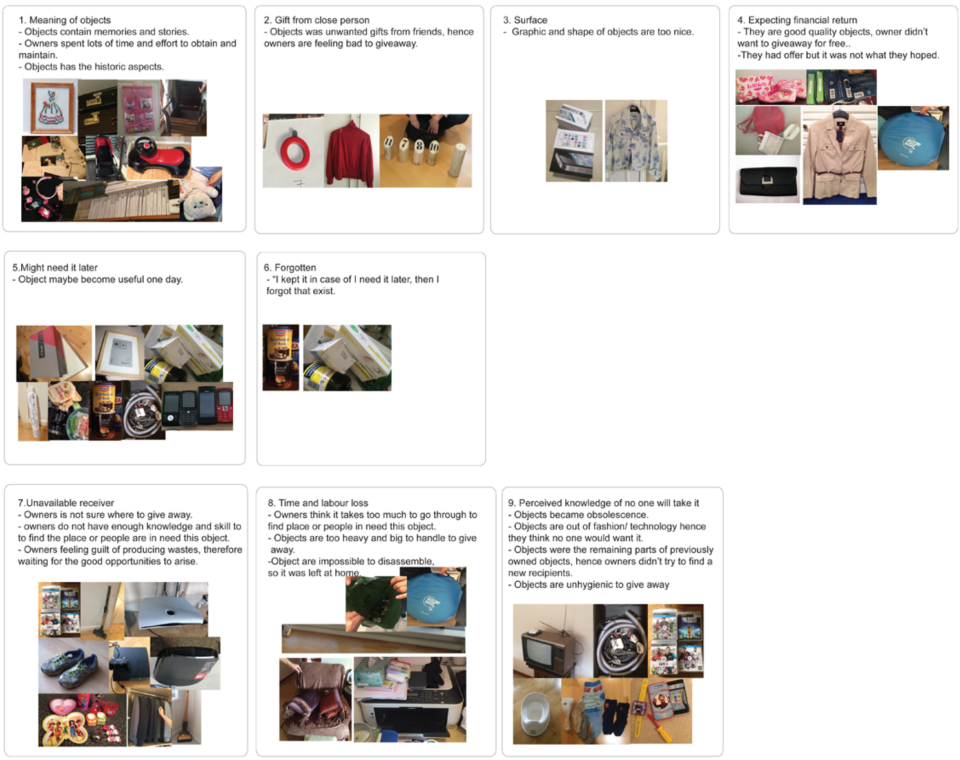
Possessed objects:
Kids car (Because it was expensive, good quality, very rare item.)
Spaghetti measuring ring (Because it was a gift from friend, and felt quality to give away.)
Hand made cross stich (Because she made it herself and it still looked good. Would like to find someone appreciate the value of the object.)
Kids clothes and accessories (Because they are in a good condition and there may be a chance to give away to someone else.)
New clothes (Because it was a gift from my friend and I might wear it someday.)
Kids plates and cutleries (Because they are still in good condition, didn't use much and I am sure someone might want it.)
Tent (Because they are still in good condition and it was not cheap. There is a chance to get a financial reward.)
Printer (Because they are still in good condition, hoping to get a financial return.)
New jacket (Because the item is new and there is a chance to be given away to someone appreciate it.)

For the thrown away object, why you haven't let go of this object sustainably when it had value?

- Because she didn't know it existed in her house.
- I1 was going to use the left over kids room wallpaper, but ended up not using it. Her son has grown out of affection to car and train.
- I6 wanted to give it to someone in need and waited but couldn't find anyone.
- I3 wanted to donate the shoes but had no time to go to the charity shop.
- I4 thought he might need it. He wanted to donate to the bookshop later but they didn't take it as it was old publication.
- I6 advertised the hoover but no offer was made.
- I2 waited until he found the right people to give away PS CDs but couldn't find anyone.



Categorizing the interviews data by levels of attachments.

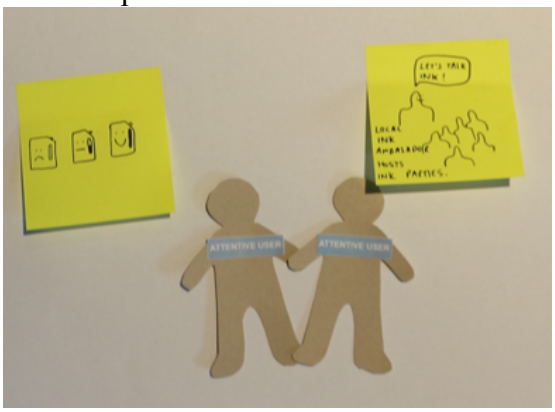


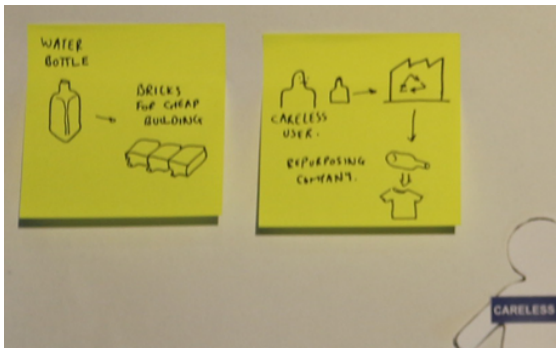
Categorizing the interviews data by motivational factors.

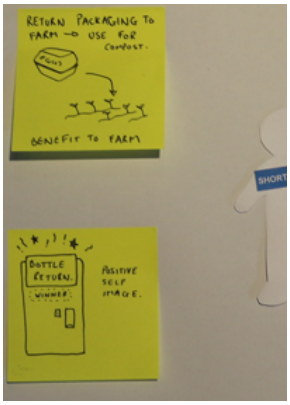
Appendix 8 | IDEAS GENERATED FROM WORKSHOPS

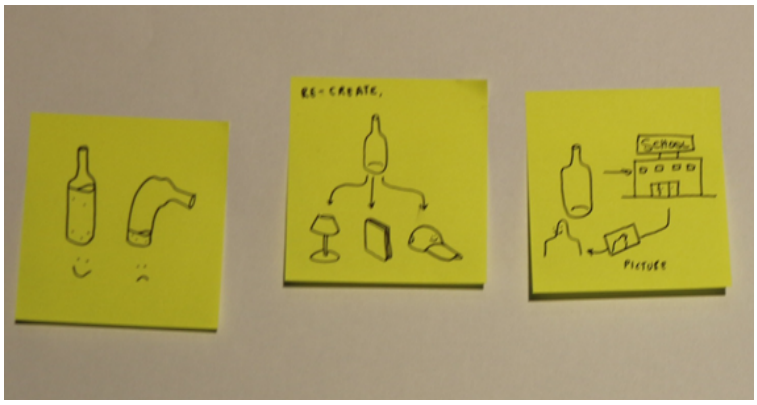
A selection of ideas produced through the workshop I, III, IV, and V.

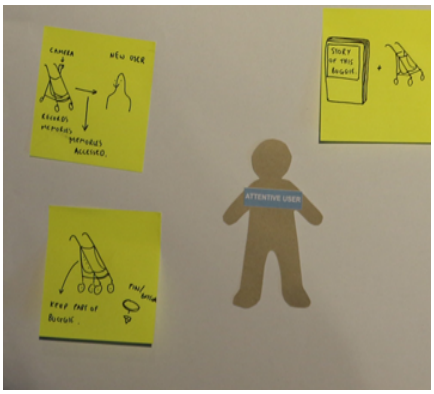
Workshop I

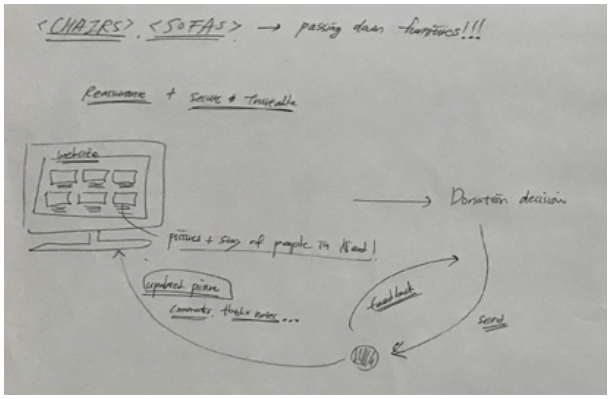




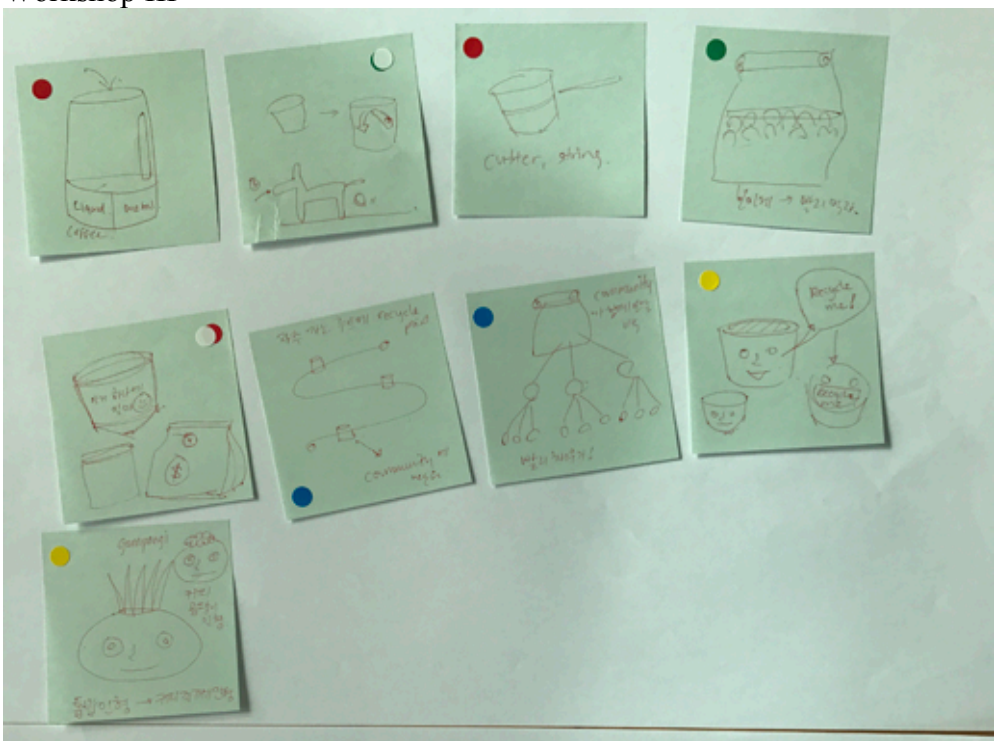


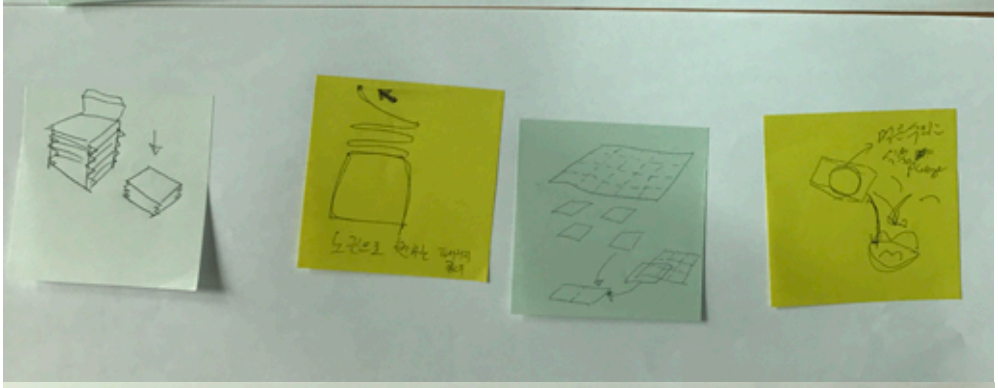


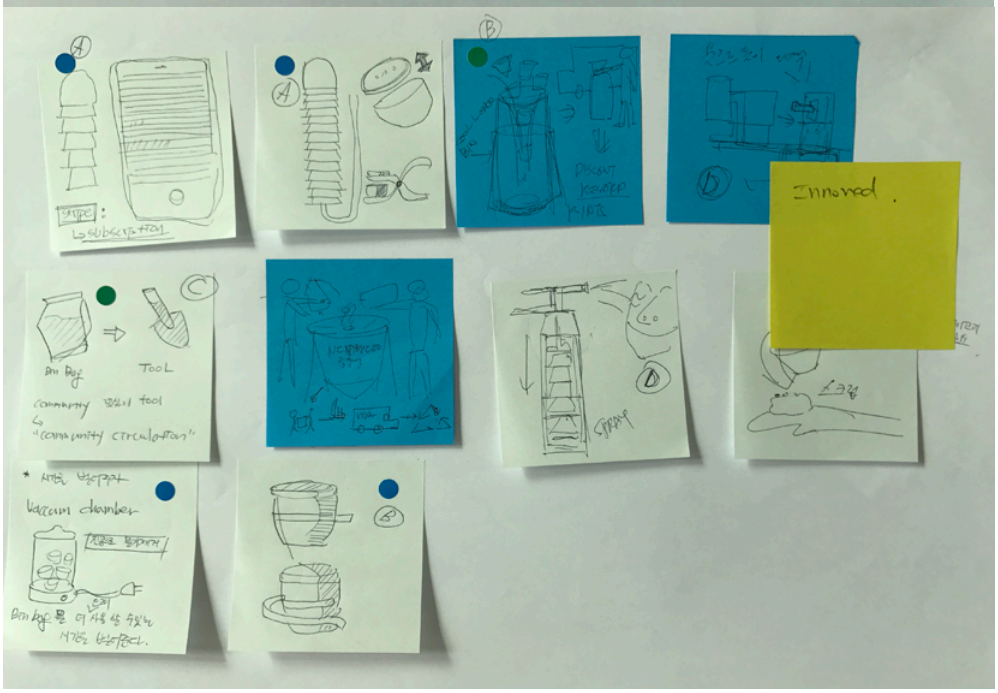




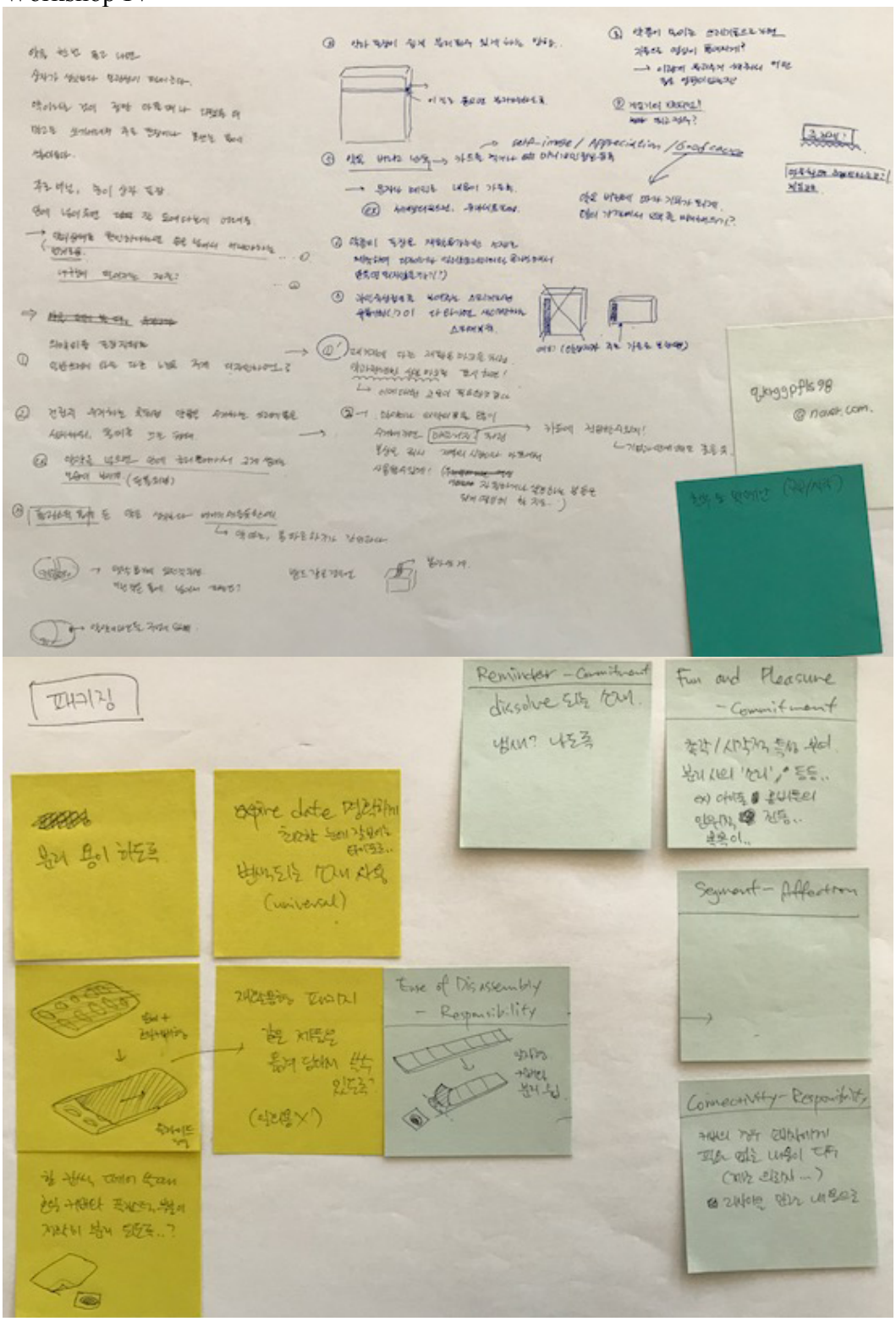
Workshop III



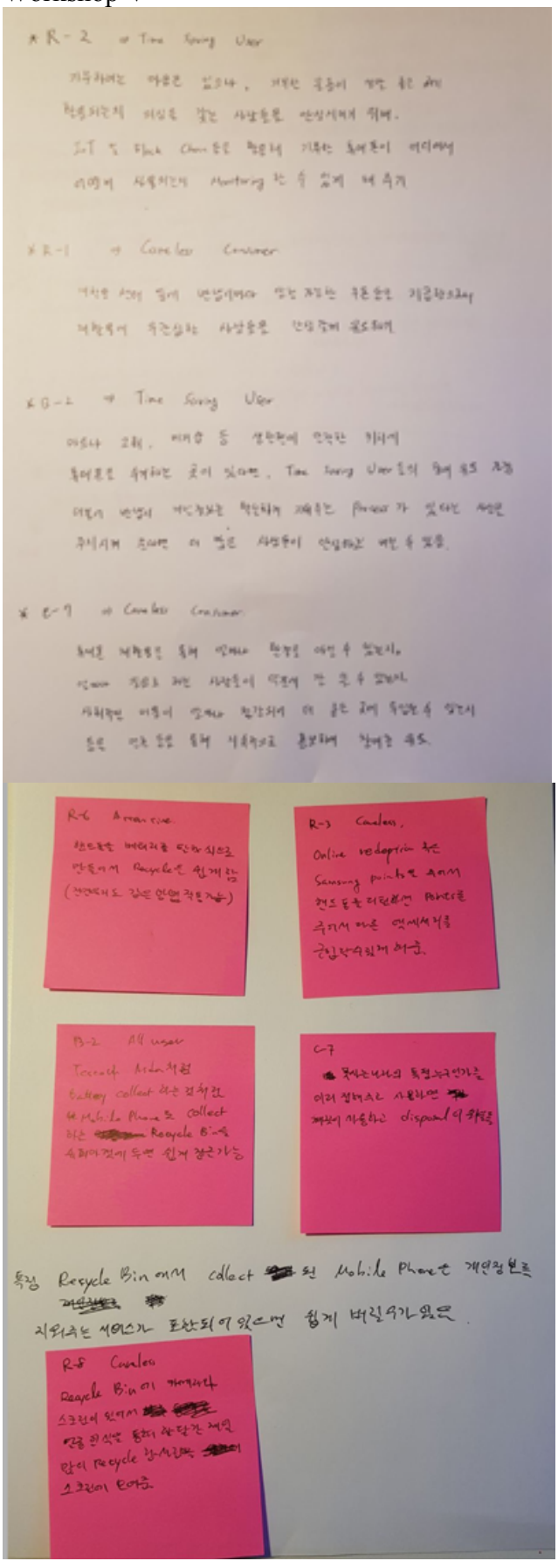


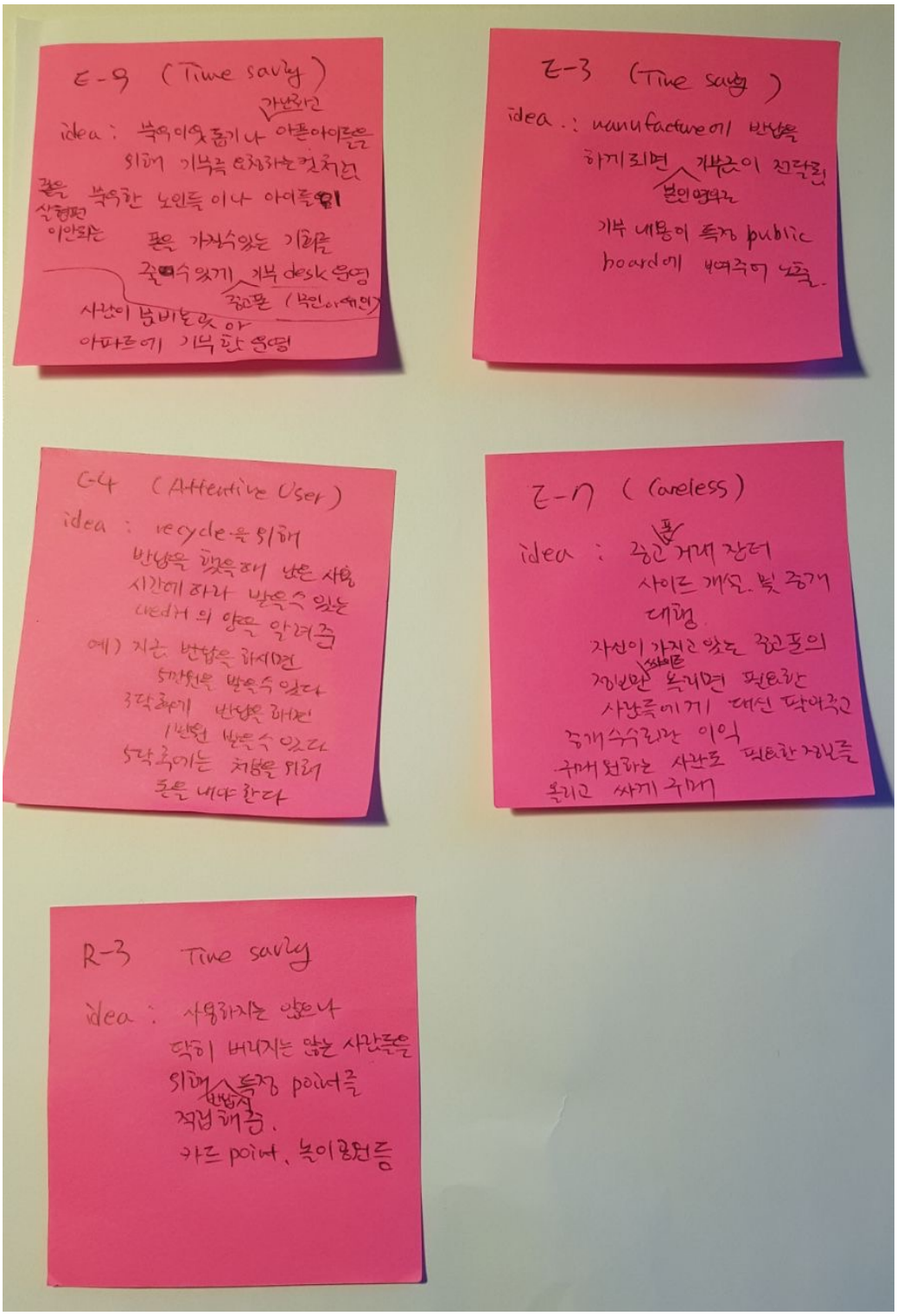


Workshop IV


패키징
Reminder - Commitment
dissolve 되는 재료
Fun and Pleasure
- Commitment
Segment - Afforfrom
Ease of Disassembly
- Responsibility
Connectivity - Responsibility

Workshop V




E-9 (Time saving)
idea : 부엌이나 좁은 아파트를 위해 기부를 용이하도록 컨셔리한 부엌한 노인들이나 아이들을 위한 이안화는 폰은 가져갈 수 있는 기부를 사람이 붐비는 곳 아파트에 기부한 용품
E-3 (Time saving)
idea : manufacture에 반영을 하게되면 기부금이 전달될 기부 내용이 특정 public board에 4면으로 노출.
C-4 (Attentive User)
idea : recycle을 위해 반영을 했을때 보는 사람 시간에 하나 반영을 할 수 있는 user의 양을 알려줌 예) 지금 반영을 하시면 5개월을 반영을 할 수 있다 3달하게 반영을 하면 1년을 반영을 할 수 있다 5달 후에는 처음을 위해 돈을 내야 한다
E-7 (careless)
idea : 주변 거래 장터 사이트 개설. 붙 중개 대행. 자신이 가질 수 있는 정보의 정보만 올리면 원하는 사람들에게 대신 팔아주고 중개수수료만 이익 구매원하는 사람들 필요한 정보를 돌리고 싸게 구매
R-3 Time saving
idea : 사용하지는 않으나 막이 버리지는 않는 사람들을 위해 특정 point를 적립 해줌. 카드 point, 놀이공원등

Appendix 9 | SUMMERIES OF THE WORKSHOP DATA

Ideas generated through the workshop I.

	Objects	**4 motives of caring themes**	**Users**	**Selected factors**	**Design concepts generated**
Group 1	Ink cartridg-e	Affection			None
		Responsibility	Cautious participant	- Community circulation - Pick up - Give reward - Inform role	- Online ink swap platform. - Pick up and deliver services. - Printers talk to each other's to find other owners who are in need for certain colours of cartridge. - Ink party host by local ink ambassadors to meet and swap.
			Cautious participant	- Give reward	- Reward point scheme to build the reputation and get reward. - Send the end-of-use cartridge to shops and reward donors with printed photos.
			Careless consumer	- Set a financial punishment	- Getting a fine. - System where ink cartridge is scanned when it is manufactured and can't be disposed of through recycling bin to restrict owners' behaviours. - Make consumer humiliated by the action of disposal, neighbor puts the stickers on his/ her door 'I don't know how to reuse'. - Talking cartridge when it is binned 'Don't throw me' or 'Let me out'.
		Commitment	Cautious participant	-Add patriotic meaning	- Add 'Made in Newcastle' on the objects to make prude of local objects.
				- Reminder	- Phone Application; Library of everything you own and remind to let go.
			Careless consumer	- Take a security	- Return to manufacture and get deposit back.
				- Plan ahead	- When the contract ends, cartridge stops working and give it to someone else to avoid getting a fine.
		Benevolence	Attentive user	- Acceptability - Easy	- Donate to school and school sends photos to donor of how pupils are using it.

Group 2	Chair	Affection	Cautious participant	- Reassurance - Secure and trustable - Knowing progress Suggestion	- Platform for passing down furniture: Services based platform for people in need. People who are looking for a chair upload pictures and their stories and the donor makes decision to give away. Send the chair to a new owner and get feedback.
			Attentive user	- Reassurance - Share story - What a surprise	- Swap website: Upload the chair with stories and pictures and receive a story of use or alternative things as rewards.
		Responsibility	Cautious participant	- Pick up services - Ease- of – disassembly	- End-of-use chair pick up services. - Donate dissembled chair and make something new with other people's donations.
			Careless consumer	- Set a Financial Punishment	- Penalty policy if keep long.
		Commitment	Careless consumer	- Reminder - Plan ahead	- Sharing purchase with other consumers and use chair for certain amount of time and pass it to other people.
			Cautious participant	-Add patriotic meaning - Knowing result - Provide Feedback	- Let people know that sharing the furniture with others will induce sense of collective pride. - System to give feedback to receivers, such as sending photos or sharing happy memories.
		Benevolence	Cautious participant Attentive	- Acceptability	- Pop up shops to donate and make something new.
Group 3	Shoes	Affection Responsibility Commitment Benevolence	Cautious participant Attentive user	- Reassurance - Embedded personal story - Feedback - Assessment - Ease-of-disassembly - Reward - Anti-function	-Shoes community-based application. An interactive tool to match donor and receivers through their requirements. Both parties up load their stories and the system finds the matching donors and receivers. Share the story of how to take care. Set the time of use and if not pass it to others then punishment.

Ideas generated through the workshop II.

	Objects	Users	4 motives of caring themes	Selected factors	Design concepts generated
Group 4	Lipstick	Attentive user	Empathy	- Apply anthropomorphic feature	- Apply cute design and provide the end destination.
			Commitment	- Create a contract	- Services to personalize the cap then return to the shop. They are washed and reproduced it to be used by a same user.
			Responsibility	- Make disassembly easier	- Provide information on packaging how to dispose of the product.
			Commitment	- Give reward - Provide updates on disposed-of objects	- Reward point scheme, when the used products are returned to the shop. - Let users aware of the remanufacturing process of the retuned object.
			Benevolence Responsibility	- Acceptability - Provide pick up services - Watch by peer	- Many available places to collect the end-of-use objects. Provide a photo taking services to the person who return the unneeded object at the site, and display it on the relevant place to make them proud of themselves.
		Cautious participant	Responsibility	- easy disassembly	- Peel-able warp.
				- Good condition and provide reminder - easy disassembly	- A lipstick cap made of distinctive recyclable material.
	Compact	Attentive user	Responsibility	- Make disassembly easier	- Create the inner divider easy to disassemble, that is made of paper based material, to dispose of chemical cosmetic separately,
			Commitment	- Inform users what will happen to objects	- Let users know what object will become once they are returned to the manufacture.
		Cautious participant	Commitment	- Inform users what result will get	- Let users know how much of environmental impact they are creating.

Group 5	Moisturiser	Attentive user	Empathy Responsibility Commitment Benevolence	- Good condition and provide reminder - Provide sympathetic story - Knowing progress and destination - Good condition and provide reminder - Provide reward	- Create visible graphic on how to dispose of the pack. - Provide the information about the return and reward scheme on the pack. - Apply different colour to each parts to make connection with the place to send it. - The part of bottle price contain charity fund. You will receive how your fund has been used once they are returned. -Apply different points to each part of returned items and earn points accordingly.

Ideas generated through the workshop III.

	Objects	Users	4 motives of caring themes	Selected factors	Design concepts generated
Group 6	Coffee capsule/ pod	Attentive user	Responsibility	- Good condition and provide reminder - Make disassembly easier	- Tool to dissemble the capsules. - A device that can hang the used capsules to dry.
			Responsibility	- Community circulation - Living thing	- Provide a spade shape like a bin bag to collect the only end-of-use coffee grind and let user donate it at the community garden. Also user can participate the planting activity.
			Responsibility	- Community circulation - Let users know about other users' disposal behaviour	- Community bin to only collect the end-of-use capsules.
			Responsibility	- Make disassembly easier - Good condition and provide reminder	- Provide information on how to disassemble the capsules and extract the used coffee grinder to be used for the cleaning purpose. Provide a bag to collect the separated metal parts.
			Responsibility	- Make Disassembly Easier - Good condition and provide reminder	- Add a little strip feature for an easy peel-off.
		Cautious participant	Empathy Responsibility	- Apply anthropomorphic feature - Pick up service - Provide financial return	- Design a cute looking disposing bin and provide pick up services. When they are returned then they get the points to redeem at the next purchase.
			Commitment	- Inform users what result will get	- Waste calculator app. The app tells users expected amount of waste they will create when they purchase the capsule and their expected impact on environment. Recommend the booking day for the collection.

			Responsibility	- Make disassembly easier	- A machine to crash the capsule that is attached to coffee making machine. Disposing process becomes a part of the serving ritual.
			Responsibility Commitment	- Reminder - Inform who will pick up and when, and give benefits	- Time calculating app, which will forecast the collection time of the end-of-use capsules and deliver of new capsules.
			Responsibility	- Design an object to remain a good condition and inform disposal place	- Vacuum chamber that let it dry the used coffee cupules.
Group 7	Coffee capsule/ pod	Attentive user	Responsibility	- Make disassembly easier	- Tool to separate the end-of-use coffee and the capsules
			Empathy	- Apply anthropomorphic feature	- Dog shape like tool to separate the end-of-use capsules.
			Responsibility	- Make disassembly easier	- Add perforated line or little strip for an easy peel off.
			Commitment Benevolence	- Availability and acceptability - Remind users about the existence of objects	- See-through recycle bag to let people plan ahead.
			Empathy Commitment	- Apply anthropomorphic feature - Committed message	- Draw human like face on the capsule with the written word ‘you have agreed to return this to the manufacture’ to remind users.
			Empathy	- Apply anthropomorphic feature - Share story	- Cute animal shape like capsule and the collecting bag shape is designed like an animal house. Engage users to be part of the story.
		Cautious participant	Commitment	- Inform users what result will get	- Let users know how much of money they are saving and contributing on the environment care through returning the end-of-use capsules.
			Benevolence Responsibility Commitment	- Make it timely - Community circulation - Make the pledge public	- Place the collecting site where the most of people walk pass by.

			Responsibility Commitment	- Community circulation - Making pledge public - Watched by peers	- Crate a local community or a third party organization where it collects the end-of-use capsules and turn into a new product and resell.

Ideas generated through the workshop IV.

	Objects	Users	4 motives of caring themes	Selected factors	Design concepts generated
Group 9 Participant 21	Pharmaceutical	Attentive user	Commitment	- Reminder	- Create aromatic smell when the products are near the expiry date.
			Responsibility Commitment	- Design an object to remain a good condition and inform disposal place - Provide reward	- Write an instruction on how to dispose of the pack on the packaging and they get reward for returning it to the manufacture.
			Responsibility	- Desired image	- Let users know how the desired image of people disposes of the products.
			Responsibility	- Provide reward - Design an object to remain a good condition and inform disposal place - Make disassembly easier	- Apply intuitive texture or sound when separating the material and give information on where to send it.
		Cautious participant	Responsibility	- Make disassembly easier - Take a Security	- Create a long strip type blister pack to make easy to separate two materials. Give deadline to return to the manufacture, if not penalty applies.
			Responsibility	- Living things	- Blister pack made out of the natural material.
Group 9 Participant 22	Pharmaceutical	Attentive user	Responsibility	- Design an object to remain a good condition and inform disposal place	- Clearly written recyclable symbol.
			Empathy	- Knowing the receiver's need	- Manufacture or pharmacy keeps the record of each product's expiry dates. Then they send a message to users at the appropriate time to return the end-of-use product.
			Responsibility	- Living things	- The whole pack is made out of the natural material
		Cautious participant	Commitment	- Inform users what result will get	- Provide the information about their disposal behaviour out come.
			Responsibility	- Watched by peers	- App or camera installed near by bin and watched by neighbors.

Group 9 Participant 23	Pharmaceutical	Attentive user	Responsibility	- Community circulation -Provide financial return	- A reward point scheme when users discard the medicine at the appropriate bin. Redeem the point within the local community market to promote the local community.
			Responsibility	- Make disassembly easier	- Ease of separation structure, with information on where to dispose of the end-of-use product.
			Commitment	- Notify amount of use time left	- Colour changing sticker on the pack to notify expiry date.
			Commitment	- Inform users what result will get	- Educational tool, when people pass by the medicine disposable bin. A short video will play to let people know about their positive impact on the society through their disposal behaviour.
		Cautious participant	Commitment	- Make pledge in public	- Register yourself on line. When a user dispose of the medicine at the right place then they receive feedback about their behaviour from other users. Other people can view how user has been done if necessary.
			Commitment	- Make contract	- Set a contract with pharmaceutical company. Users pay certain amount of deposit when they purchase the product, and the deposited is returned when end-of-use products are returned.

Ideas generated through the workshop V.

	Objects	4 motives of caring themes	Users	Selected factors	Design concepts generated
P24	Mobile phone	Empathy	Attentive user		- Brand could provide a 'generic image of products that is cheaper and user recycled xxx like having a smart speaker. (don't understand)
		Responsibility Commitment	Cautious participant	- Provide rewards - Provide benefit	- Brands can provide non-tangible benefits like software, in exchange of receiving tangible objects. Intangible goods are cheaper but can be perceived as very valuable and has fanatical values.
		Responsibility	Cautious participant Careless consumer	- Take a security	- Sign the contract and take the deposit. Deduct the fee from the deposit depend upon the level of damage.
		Commitment	Attentive user	- Inform disposal place	- Like augmented reality, they can scan the item and receive information about how to best dispose of.
			Cautious participant	- Provide updates on disposed-of objects	- By providing a place (website social media, etc), a manufacturer should show and track where each device goes and how it's been used. Each person would be a 'godfather' of each returned device.
			Cautious participant	- Give feedback on users' disposal behaviour	- These could be a social media notification. Each time users recycled, they get the message. (My return of product would tell how much I care about the environment.)
			Cautious participant	- Give feedback on users' disposal behaviour - Inform users what result will get	- Informing the users about how much better impact they make to their country for recycling and where their country is ranked where compared with others countries.
		Benevolence	Attentive user	- Accessible and simple process	- Allow local shop owners to subscribe recycling services. (Like the current convenient stores subscribe amazon pick up services to provide a pick up platform.).

P25	Mobile phone	Empathy	Cautious participant	- Recreation - Community circulation - Users know receiver's need	- Donation store, donate and share the products. Use local transportation system Informing who requires the specific products through social media. Local store serve the services to check the quality of the used mobile phone. This can be done through advertisement.
		Responsibilit y	Cautious participant	- Provide reward	- Reward is very important. Users earn reward point and can redeem at other market. Provided certain amount of reward point or other reward to encourage people's interest in environment issues.
		Commitment	Cautious participant	- Remind users about the existence of objects	- Tracking system that reminds user where the product is located.
		Benevolence	Cautious participant	-Accessible and simple process	- Reward if the users has used the phone in good condition. (like car resell system, users get reward for using the care in good condition for 2 years). Increase the second users' satisfactions.

	Objects	**4 motives of caring themes**	**Users**	**Selected factors**	**Design concepts generated**
P26	Mobile phone	Empathy Commitment	Attentive user	- Pick-up and give benefit - Share story - Make pledge in public - Know other user's disposal behaviour - Provide sympathetic story	- Make public aware of that user is sharing the mobile phone. Let donors and receivers know where that the used the phone is going to be. Provide positive image of user and the used phone.
			Attentive user	- Apply anthropomorphic feature - Share story	- When first purchase the phone user get a virtual character installed. If not recycle then the character get ugly and destroyed or tortured. If that is passed it onto new user the character recovers.
		Responsibility	Cautious participant Careless consumer	-Provide reward	- When people recycle the phone they get lottery card. Only few people win the large amount of rewards. Advertise on the media.

		Responsibility Commitment	Cautious participant Careless consumer	- Provide reward - Let users recognize the unpredictable obsolescence - Notify amount of use time left	- Give voucher or coupon to users when products are recycled. Give warring sigh to return to manufacture when the phones are not active for the certain amount of time.
		Commitment	Cautious participant	- Pre-allocate users	- When first purchase the phone, user can allocate the second receiver and get discount. After certain amount of time or when the phone became inactive, the phone alarms users, and if the user does not pass it onto another user then the discounted amount are requested to pay.
		Responsibility	Attentive user	- Provide reward - Living thing	- Provide mileage to users when the phone is returned. They collect the certain amount of mileages, and then give a plant or animal they wished to have. Aim is to spread the word of meaning 'save the life through recycling activates'.
		Benevolence	Cautious participant	- Availability and acceptability - Accessible and simple - Make disassembly easier	- Store the recycle or mobile phone collecting point where many people pass by. There is a machine that offer to delete the personal information promptly, and separate place to dispose of batteries.
P27	Mobile phone	Empathy			N/A
		Responsibility	Attentive user	- Make disassembly easier	- Make mobile phone battery easy to attachment and detached. The glass part and the battery part are easy of disassemble.
			Careless consumer	- Provide reward - Financial retune	- Online reward schema. Samsung point scheme. When the phone is return, then users get point and it can be used to purchase for another item.
			Careless consumer	- Provide positive self-image	- Camera and screen is attached to collection point and they record people who have done the right thing and play later if they agree to do so.

		Commitment	Attentive user	- Pre-allocate	- When users purchase the phone, allocate the specific person who will be the next person to use.
		Benevolence	Cautious participant	- Provide accessible and simple process	- Provide mobile phone collecting point near supermarkets. - The bin should have a device that deletes users' personal information.

	Objects	**4 motives of caring themes**	**Users**	**Selected factors**	**Design concepts generated**
P28	Mobile phone	Empathy	Cautious participant	- Inform users what result will get	- Let people know how much you can save the environment, how much of financial fee can be saved through our behaviour and it can be used for better place through media.
			Attentive user	- Inform users future uses	- Let users know how the each part of the mobile will be reused.
		Responsibility	Cautious participant	- Pick-up and give benefit - Provide updates on disposed-of objects	- Let the user monitor where and how the phone is been used after returning, by using the IoT, block chrome system.
			Careless consumer	- Provide reward	- Provide the reward coupon to motivate users.
		Commitment	Cautious participant	- Notify amount of use time left	- Colour of phone gradually changes to notify the remaining amount of use time. When returned to manufacture, they get credit.
		Benevolence	Cautious participant	- Provide accessible and simple process	- Locate the collection point near the supermarket or coffee shops where many people pass by. Assure users that there is place to delete the personal information of the phones.
P29	Mobile phone	Empathy	Cautious participant	- Engaging story	- Charity desk accept the phone to pass it onto someone in need. Place where many people pass by.

			Cautious participant	- Let users know objects are going to good causes	- When the phone is return to manufacture, some amount of fee is donated to people who are in need under their name. Make their good behaviour public.
			Careless consumer	- Know receiver's need	- Create a marketplace where the third person deal with selling and buying the used phone. Users upload the information about selling phone and the find the matching buyer. The third person gets the commission.
		Responsibility	Cautious participant	- Provide reward	- When phones are retuned, then they get point to redeem at the theme park or other shops.
		Commitment		- Notify amount of use time left	- Depends on how much of time users kept the phones, they get different credit return. E.g.) if users return now then they get £5 back. If users return after 3months then they get £1. If users return after 5 months then they get nothing.

Appendix 10 | PHOTOS OF PARTICIPANTS GIVING FEEDBACKS

A selection of photos participants giving feedback on Carative Factors Inspirational Cards version 0.0 to version 5.0.

Appendix 11 | FEEDBACK FROM PARTICIPANTS

Participants' feedback notes taken during the workshop I to V.

The casual conversations

Do you understand how the toolkit would be used during the design process? Which aspects of cards were well understood which were not?

Design engineer

- The idea to promote object detachment from possession through design was interesting.
- The design of the cards was not intuitive. Difficult to understand how they would be used.

Architecture

- No, not sure how to use them.
- Cards are about how to let things go.
- More information is needed.
- Liked the colour coded theme, but need more explanations.

Industry-based designer 1

- No, confusing texts.
- Would need more information on how to use and some picture or photos might be helpful.

Industry-based designer 2

- Not really
- Everything, I didn't understand. Why do I need this card? Why do I have to design the object to let go?
- Need more information.

Workshop I

Do you understand how the toolkit would be used during the design process? Which aspects of cards were well understood which were not?

P5

-Yes, the comments on the cards were helpful.

-Unsure whether participant can mix (or not) the card when generating the ideas.

- Some illustration didn't deliver the clear meaning.

P3

-Yes, the comment on the card was useful, because some comments they've never considered.

- Questions were helpful but rarely used it.

- Didn't understand some factors like embedding the holiness.

P1

-Yes. Knew how to apply in design process, but would like more information as a part of the card set.

-Didn't know multiple cards can be applied in one idea.

P6

-Yes, the written comments were helpful.

- Some illustrations delivered unclear meaning, would like more detail explanations.

Were the cards inspirational and provided a new perspective during the idea generation process, and which aspect requires improvement?
P5
-Yes, it did give me a new perspective. Never though about community based exchange system. It provided an opportunity to rethink about the relationship between the end-of-use object and user. I have many unwanted products which are kept in my storage.
-I would need more explanation on how to use.

P3
-Yes, it was inspirational, because each factor provided me with new ideas.
- Some of the illustrations on the cards are very abstract. Not sure if it matches to texts.
- I would prefer bigger size.

P1
-Yes, particularly the written comments were good.
- More information on how and when to apply this toolkit.

P2
- Some point it did but not always. I used my basic knowledge. But the comments on the cards were interesting.

Workshop II
Were the cards inspirational and provided a new perspective during the idea generation process, and which aspect requires improvement?

P10
-"It was new to know about users' lingering regret act as an obstacle for sustainable disposal behaviour, as I had never thought about it".
-Workshop provided me to shift the thinking about end-of-use unneeded cosmetic products.

P11
-Toolkit provided inspiration for designers. It helped to generate new ideas.
-Meaning of responsibility and commitment need detail explanation.

P7
- The workshop provided an opportunity to think about how current design processes are lacking in consideration of the end of the product cycle.
-"The Toolkit enabled me to think about the way to generate sustainable disposal behaviour in users".
-Would like to do apply this card later, very useful.

P8
-The ideas generated through their basic knowledge first. Toolkit acted as a checklist as it was used after the ideas were generated.

-The amount of text was difficult to digest within such a short time and a factor such as ‘An object embedded with holiness’ was difficult to apply in design ideas, as it is depends upon users’ religious affiliation.
-In reality this approach may be difficult to pursue as they might face many barriers within the company’s marketing strategies.
- Design object with considering the end-of-use approach need to be established as a design cultural.
-There were too many texts, would like to see in different language.

Workshop III
Were the cards inspirational and provided a new perspective during the idea generation process, which aspect was difficult to understand and which aspect requires improvement?

P12
- Yes, engaged through out the idea generation session.
- Using toolkit is inspirational most of the time.
- Tended to use the factor she was familiar with. Would need to improve on reducing the amount of texts.
- Could be helpful to generate the ideas that designers have missed out, or haven’t thought about.
- Prefer to use the worksheets rather than a card format when working as a pair or in threes.

P13
- Sometimes.
- Providing the examples of how these factors have been applied in a real world might be helpful.
- It can be useful with more detailed explanation about how to apply during the design process.

P14
- There were many interesting inspirational factors, such as ‘providing information’ or ‘applying anthropomorphic features’.
- The card format might be beneficial too because it is easier to share and flick through.
- Adding photographic images might be helpful, if there is an example.
- The comments were helpful to understand users’ perspectives and what they need.

P15
- Only used it as checklist
- Participant believed in her knowledge than the toolkit.
- The toolkit and the workshop helped to understand the design problem.
- The illustration was interesting but didn't communicate much.
- Would like to know more on how to apply this toolkit in design process.

P16
- Used to generate two ideas, mostly used it as a reference.
- When stuck, looked in and find the new inspiration.

- Toolkit might be useful material to assist designers when designing packaging, or other product exploring the ideas around users' sustainable disposal behaviour.
- Can be useful in the future design process.
- Text was bit long.
- More explanation about how to use the card may be helpful.

P17

- Used it as checklist, but can be useful material if this is developed further.
- Toolkit might be useful material to assist designers when designing packaging, exploring the ideas around users' sustainable disposal behaviour.
- Using the Toolkit and the workshop process helped to understand the design problem of the lack of consideration of the after-use situation.
- "The workshop session provided an opportunity to rethink our design processes and how designers are creating 'beautiful' waste". Suggested that design firms must consider the end-of-use cycle when first generating the idea of the product.
- However, in reality this approach was maybe only possible by working together with other departments within the company, such as marketing, and engineering department.
- Written comments on each factor were inspirational.

Workshop IV

Are there any factors you had not considered but thought were useful? Would the toolkit provide you with any further design opportunities?

P18

- Yes 'observed by other people' and 'making a contract' are interesting factors. The Toolkit could offer more inspirations and can be a useful material.
- P18 was able to explore more ideas, such as to create the contract between the users or manufactures. Suggested a few ideas to achieve. (e.g. online platform where users can make a contract between the user and the manufacturer and reward the user if they return the object.)

P19

- Yes, toolkit seems useful. Some of the factors, such as 'knowing the result' or 'making a contract' are interesting, as never considered them as design solutions during the idea generation session.
- Toolkit may have opportunities to open up their perspectives to explore more diverse approaches and inform new knowledge.

P20

- -Yes, 'applying anthropomorphic feature', 'making a contract' or, 'review relationship'. There are more. It could provide me with the further design opportunities, which have not been considered.
- Toolkit contains interesting factors.

- ‘Give remainder’ factor is interesting and this can be explored in many ways.
- Would like to find out more, asked for a copy of the Toolkit to use for future design projects.

Does the Toolkit provide a better understanding of the concept of product detachment from possession to designers, and do you understand how to use the Toolkit?

P21

- Yes, particularly the comments sections that helped to understand users’ remaining emotions toward the end-of-use products and the difficulty users face.
- Yes, I had no problem using it, it was helpful. However, photos of examples may be beneficial to create an explicit Toolkit, - as ‘create an engaging story’ provide an unclear message.
- Some factors are related to the human-product relation, whereas some factors talks about the design of the object. Bit confusing.
- Not sure if this factors will actually promote people’s care-giving behaviour.
- Prefer to use the worksheet format as it seems more organised, and provides an overview of the carative factors in each different theme.
-

P22

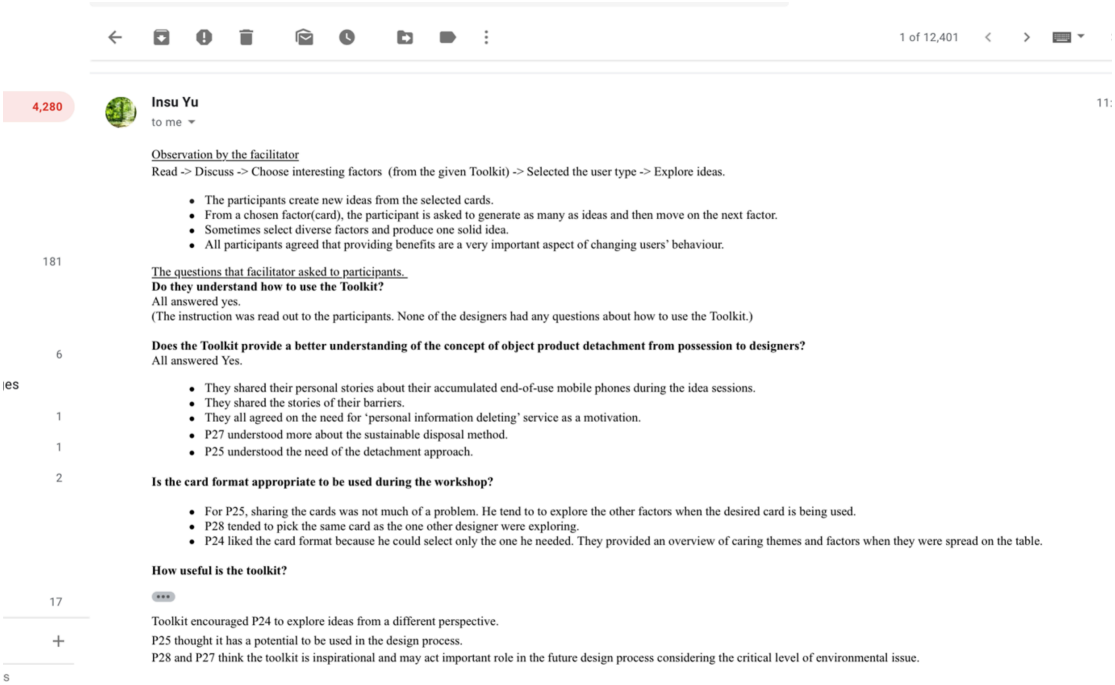
- Yes, it was easy to understand as the participant read the title first. If she was interested then she read the detail.
- Particularly the comments sections helped her to understand of the need of detachment approach. Question part helped her to explore the concept of product detachment from possession.
- Yes, the toolkit was used when exploring the ideas. Could apply to other product types.
- Liked that the toolkit was organized by a keyword.
- Prefer to work in a worksheet format, because such format provides an overview of the carative factors in each different theme.

P23

- Yes, it provided an opportunity to understand the relationship between end-of-use object and the user, and to reconsider the life cycle of the object.
- No, toolkit was not difficult to apply in idea generation process.
- Toolkit was used as a guideline.
- “Reading this card made me to understand other people’s experience”
- It was convenient to use.
- The card layout design was good enough to navigate P23 from the headline, sub titles to detail.
- The illustrations provide a vague and abstract definition of the carative factors. The illustrations may convey different meanings to each designer, so that their generated ideas are influenced by this and may contain different meanings too.
- Worksheet format was easier to use during the session.

- Card size can be slightly bigger.

Workshop V



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Insu Yu
to me

11:

Observation by the facilitator
Read -> Discuss -> Choose interesting factors (from the given Toolkit) -> Selected the user type -> Explore ideas.

- The participants create new ideas from the selected cards.
- From a chosen factor(card), the participant is asked to generate as many as ideas and then move on the next factor.
- Sometimes select diverse factors and produce one solid idea.
- All participants agreed that providing benefits are a very important aspect of changing users' behaviour.

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The questions that facilitator asked to participants.
Do they understand how to use the Toolkit?
All answered yes.
(The instruction was read out to the participants. None of the designers had any questions about how to use the Toolkit.)

6

Does the Toolkit provide a better understanding of the concept of object product detachment from possession to designers?
All answered Yes.

- They shared their personal stories about their accumulated end-of-use mobile phones during the idea sessions.
- They shared the stories of their barriers.
- They all agreed on the need for 'personal information deleting' service as a motivation.
- P27 understood more about the sustainable disposal method.
- P25 understood the need of the detachment approach.

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Is the card format appropriate to be used during the workshop?

- For P25, sharing the cards was not much of a problem. He tend to to explore the other factors when the desired card is being used.
- P28 tended to pick the same card as the one other designer were exploring.
- P24 liked the card format because he could select only the one he needed. They provided an overview of caring themes and factors when they were spread on the table.

How useful is the toolkit?

17

Toolkit encouraged P24 to explore ideas from a different perspective.
P25 thought it has a potential to be used in the design process.
P28 and P27 think the toolkit is inspirational and may act important role in the future design process considering the critical level of environmental issue.

Screen capture of email sent from the facilitator, about the feedback gained from the participants.

Design Study 1

- Designer 1 didn't consider other factors except 'providing benefit to the community'.
- Toolkit initially used a guideline, so she scanned the overall factors and then moved onto the detailed factors until she found were interesting to apply.
- Built the idea on the 'providing benefit to the community'. This factor offered an opportunity to shift her view of the service provider from company to community. "I always thought company should take responsibility for the end-of-use clothing". It allowed her to think from community to a community-based perspective. Toolkit provided an opportunity to explore new design ideas during the idea generation process.
- 'Recreation', 'Pick up'; 'Receiving a benefit', 'Sharing a story', 'Providing financial return', 'Knowing about the progress and destination' were also useful factors. she only used these as a reference.

Design Study 2

- 'Reminder' and 'providing a financial return' factors were useful.
- Firstly, used 'reminder' factor to explore many ideas.
- 'Providing a financial return' factor was also useful to generate more ideas later.
- Tried to merge two factors together.

- Toolkit was useful as it provided an initial guide for the design directions. “When you start the idea generation, the potential design solutions can be broad”, but the toolkit helped to narrow down his perspective and allowed him to focus on a potential design solution.
- The user type guide was also useful, as it helped him to consider different contexts.
- Didn't use other factors, in fact didn't read all. Two chosen was most interesting and easy to apply.
- Expanded the design brief and applied the same factor to design ideas.
- Illustrations require more explanation, each card section should be bigger, some more interesting design layout.

Design Study 3

- She had not much problem using the digital format during the design study.
- Looked at the toolkit when she needed.
- ‘Providing re-creation opportunity for other users’ was the most influential factor. Started exploring as many as she could by using this factor. Didn't use other factors, as this was the most interesting.
- ‘Good cause’ and ‘Ease-of-disassembly’ factors were also useful, but didn't think influenced much. They were rather used for reference.
- Toolkit was useful as it encouraged her to think from different perspective. It did provide her design inspiration during the idea generation process.
- Usually tended to rely on online resources and spend lots of time on researching for a design solution at the early stage of design process Sometimes ended up not gaining much useful information.
- Particularly, the design brief deals with sustainability issues, she requires a large amount of time to digest the information.
- Toolkit helped her to engage in idea generation promptly. “It was easy to apply”.
- “If I had time I could explore more ideas”,
- Some of the illustrations on the card contained unclear in meaning. Such as ‘create an engaging story’ or ‘tell users painful truth’. Didn't understand.
- The illustration tended to describe an abstract situation, and it was not easy to link it to a real design solution.
- The written comments were more useful than the question on the back.